Quality of Surface Waters of the United States 1961

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

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GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1883

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

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

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PREFACE

This report was prepared by the Geological Survey in cooperation with the states of Iowa, Kansas, Minnesota, Montana, Nebraska, South Dakota, Wisconsin, and Wyoming, and with other agencies by personnel of the Water Resources Division under the direction of L. B. Leopold, chief hydrologist, and S. K. Love, chief, Quality of Water Branch.

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[*Symbols after station name designate type of data: c, chemical; t, water temperature; s, sediment.*]

ILLUSTRATION

QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1961

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 State and 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 all uses. 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 content in streams may vary over wide ranges.

In 1941, the Geological Survey began publishing annual records of chemical quality, suspended sediment, and water temperature. The records prior to 1948 were published each year in a single volume for the entire country, and in two volumes in 1948 and 1949. Beginning in 1950, the records were published in four volumes and beginning in 1959 in five volumes. The drainage basins covered in the five volumes are shown in Figure 1. The data given in this volume were collected during the water year October 1, 1960, to September 30, 1961. The records are arranged by drainage basins in downstream order according to the Geological Survey method of reporting streamflow. Stations on tributary streams are listed between stations on the main stem in the order in which those tributaries enter the main stem.

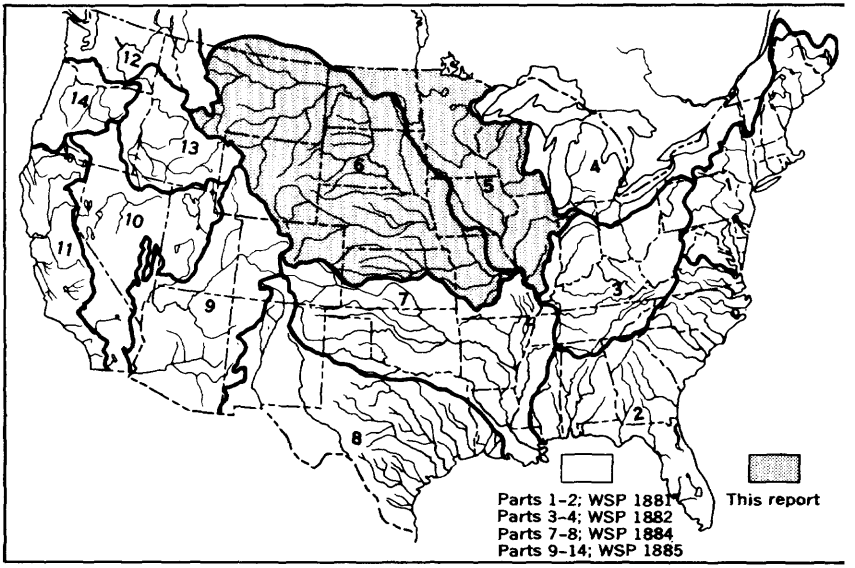

Figure 1.--Map of the conterminous United States showing basins covered by the five water-supply papers on quality of surface waters in 1961. The shaded portion represents the section of the country covered by this volume; the unshaded portion represents the section of the country covered by other water-supply papers.

A station number has been assigned as an added means of identification for each stream location where regular measurements of water quantity or quality have been made. The numbers have been assigned to conform with the standard downstream order of listing gaging stations. The numbering system consists of two digits followed by a hyphen and a six digit number. The notation to the left of the hyphen identifies the Part or hydrologic region used by the Geological Survey for reporting hydrologic data. The number to the right of the hyphen represents the position of the location in the standard downstream order listing measuring stations within each of the 14 parts. The assigned numbers are in numerical order but are not consecutive. They are so selected from the complete 6 digit number scale that intervening numbers will be available for future assignments to new locations. The identification number for each station in this report is printed to the left of the station name and contains only the essential digits. For example, the number is printed as 4-100 for a station whose complete identification number is 04-0100.00.

Descriptive statements are given for each sampling station where chemical analyses, temperature measurements, or sediment determinations have been made. These statements include the location of the station, drainage area, periods of records available, extremes of dissolved solids, hardness, specific conductance, temperature, sediment loads, and other pertinent data. Records of discharge of the streams at or near the sampling station are included in most tables of analyses.

During the water year ending September 30, 1961, the Geological Survey maintained 81 stations on 62 streams for the study of chemical and physical characteristics of surface water. Samples were collected daily and monthly at 44 of these locations for chemical-quality studies. Samples were also collected less frequently at many other points. Water temperatures were measured daily at 56 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 headings this information is available for reference at the district offices listed under Division of Work, on page 30.

Quantities of suspended sediment are reported for 41 stations during the year ending September 30, 1962. 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. Particle-size distributions of sediments were determined at 32 of the stations.

COLLECTION AND EXAMINATION OF SAMPLES

Samples for analyses are usually collected at or near points on streams where gaging stations are maintained by Surface Water Branch of U. S. Geological Survey for measurement of water discharge. The concentration of solutes and sediments at different locations in the stream-cross section may vary widely with different rates of water discharge depending on the source of the material and the turbulence and mixing of the stream. In general, the distribution of sediment in a stream section is much more variable than the distribution of solutes. It is necessary to sample some streams at several verticals across the channel and especially for sediment, to uniformly traverse the depth of flow. These measurements require special sampling equipment to adequately integrate the vertical and lateral variability of the concentration in the section. These procedures yield a velocity-weighted mean con-

centration for the section in contrast to the average concentration that existed without regard to the variable velocities of the individual fluid elements.

The near uniformly dispersed ions of the solute load move with the velocity of the transporting water. Accordingly, the mean section concentration of solutes determined from samples is a precise measure of the total solute load. The mean section concentration obtained from suspended sediment samples is a less precise measure of the total sediment load, because the sediment samplers do not traverse the bottom 0.3 foot of the sampling vertical where the concentration of suspended sediment is greatest and because a significant part of the coarser particles in many streams move in essentially continuous contact with the bed and are not represented in the suspended sediment sample. Hence, the computed sediment loads presented in this report are usually less than the total sediment loads. For most streams the difference between the computed and total sediment loads will be small, in the order of a few percent.

CHEMICAL QUALITY

The methods of collecting and compositing water samples for chemical analysis are described in a manual by Rainwater and Thatcher (1960, 301 p.). No single method of compositing samples is applicable to all problems related to the study of water quality. Although generally holding to the principle of 10 day periods or equivalent to three composite samples per month modifications are usually made on the basis of dissolved-solids content as indicated by measurements of conductivity of daily samples, supplemented by other information such as chloride content, river stage, weather conditions and other background information of the stream.

TEMPERATURE

Daily water temperatures were measured at most of the stations at the time samples were collected for chemical quality or sediment content. 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, 1963, p. 56-77 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 at two or more verticals to define more accurately the average concentration of the cross section. During periods of high or rapidly changing flow, samples were taken two or more times throughout the day at most sampling stations.

Sediment concentrations were determined by filtration-evaporation method. At many stations the daily mean concentration for some days was obtained by plotting the velocity-weighted instantaneous concentrations on the gage-height chart. The plotted concentrations, adjusted, if necessary for cross-sectional distribution were connected or averaged by continuous curves to obtain a concentration graph. This graph represented the estimated velocity-weighted concentration at any time, and for most periods daily mean concentrations were determined from the graph. The days were divided into shorter intervals when the concentration and water discharge were changing rapidly. During some periods of minor variation in concentration, the average concentration of the samples was used as the daily mean concentration. During extended periods of relatively uniform concentration and flow, samples for a number of days were composited to obtain average concentrations and average daily loads for each period.

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 in order to provide a complete record. For some streams, samples were collected 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 sediment for many of the stations, and the particle sizes of the bed material for some of the stations were determined periodically.

The size of particles in stream sediments commonly range from colloidal clay (finer than 0.001 mm) to coarse sand or gravel (coarser than 1.0 mm). The common methods of particle-size analyses cannot accommodate such a wide range in particle size. Hence, it was necessary to separate most samples into two parts, one coarser than 0.062 mm and one finer than 0.062 mm. The separations were made by sieve or by a tube containing a settling medium of water. The coarse fractions were classified by sieve separation or by the visual accumulation tube (U.S. Interagency, 1957). The fine fractions were classified by the pipet method (Kilmer and Alexander, 1949) or the bottom withdrawal tube method (U.S. Interagency, 1943, p. 82-90).

EXPRESSION OF RESULTS

Quantities of water for analysis are most conveniently measured in the laboratory by use of volumetric glassware. The analytical results thus obtained in this report are expressed in weights of solute in a given volume of water. To express the results in parts of solute per million (ppm) of water the data must be converted. For most waters this conversion is made by assuming that the liter of water sample weighs 1 kilogram; and thus milligrams per liter are equal to parts per million.

Equivalents per million are not reported, although the expression of analyses in equivalents per million is sometimes preferred. An equivalent per million (epm) is a unit chemical combining weight of a constituent in a million unit weights of water. Chemical equivalence in equivalents per million can be obtained by (a) dividing the concentration in parts per million by the combining weight of that ion, or (b) multiplying the concentration (in ppm) by the reciprocal of the combining weights. The following table lists the reciprocals of the combining weights of cations and anions generally reported in water analyses.

The conversion factors are computed from atomic weights based on carbon-12 (International Union of Pure and Applied Chemistry, 1961).

Conversion factors: Parts per million to equivalents per million

Ion	Multiply by	Ion	Multiply by
Aluminum (Al^{+3}).....	0.11119	Hydroxide (OH^{-1})...	0.05880
Arsenic (As^{+3})	.04004	Iodide (I^{-1}).....	.00788
Barium (Ba^{+2}).....	.01456	Iron (Fe^{+3}).....	.05372
Beryllium (Be^{+2})	.22192	Lead (Pb^{+2}).....	.00965
Bicarbonate (HCO_3^{-1})..	.01639	Lithium (Li^{+1}).....	.14411
Bromide (Br^{-1}).....	.01251	Magnesium (Mg^{+2})..	.08226
Cadmium (Cd^{+2}).....	.01779	Manganese (Mn^{+2}) ..	.03640
Calcium (Ca^{+2}).....	.04990	Nickel (Ni^{+2}).....	.03406
Carbonate (CO_3^{-2})	.03333	Nitrate (NO_3^{-1}).....	.01613
Chloride (Cl^{-1}).....	.02821	Phosphate (PO_4^{-3})..	.03159
Chromium (Cr^{+6}).....	.11539	Potassium (K^{+1})....	.02557
Cobalt (Co^{+2}).....	.03394	Sodium (Na^{+1}).....	.04350
Copper (Cu^{+2}).....	.03148	Strontium (Sr^{+2})....	.02282
Fluoride (F^{-1}).....	.05264	Sulfate (SO_4^{-2})	.02082
Hydrogen (H^{+1}).....	.99209	Zinc (Zn^{+2})	.03060

Results given in parts per million can be converted to grains per United States gallon by dividing by 17.12.

The hardness of water is conventionally expressed in all water analyses in terms of an equivalent quantity of calcium carbonate. Such a procedure is required because hardness is caused by several different cations, present in variable proportions. It should be remembered that hardness is an expression in conventional terms of a property of water. The actual presence of calcium carbonate in the concentration given is not to be assumed. The hardness caused by calcium and magnesium (and other cations if significant) equivalent to the carbonate and bicarbonate is called carbonate hardness; the hardness in excess of this quantity is called noncarbonate hardness. Hardness or alkalinity values expressed in parts per million as calcium carbonate may be converted to equivalents per million by dividing by 50.

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.

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. 24) and the temperature in degrees Fahrenheit. Color is expressed in units of the platinum-cobalt scale proposed by Hazen (1892, p. 427-428). A unit of color is produced by one milligram per liter of platinum in the form of the chloroplatinate ion. 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, time-weighted, or discharge-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 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.

A program for computing these averages on an electronic digital computer was instituted in the 1962 water year. This program extended computations to include averages for pH values expressed in terms of hydrogen ion and averages for the concentration of individual constituents expressed in tons per day. Concentrations in tons per day are computed the same as daily sediment loads.

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, sediment concentration when sample was collected, 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 mineral matter. 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 spring 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 dissolved-solids content in a river 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 calculated as sodium), alkalinity as carbonate and bicarbonate, sulfate, chloride, fluoride, nitrate, boron, pH, dissolved solids and specific conductance. 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. The constituents are arranged in the order that they appear on standard analytical statement cards which are used to process the chemical quality data in this report.

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 few contain more than 50 parts, but the more common range is from 10 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 steam turbines.

Aluminum (Al)

Aluminum is usually 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.

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.

Manganese (Mn)

Manganese is dissolved in appreciable quantities from rocks in some sections of the country. It resembles iron in its chemical

behavior and in its occurrence in natural waters. However, manganese in rocks is less abundant than iron. As a result the concentration of manganese is much less than that of iron and is not regularly determined in many areas. 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. 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.

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.

Strontium (Sr)

Strontium is a typical alkaline-earth element and is similar chemically to calcium. Strontium may be present in natural water in amounts up to a few parts per million much more frequently than the available data indicate. In most surface water the amount of strontium is small in proportion to calcium. However, in sea water the ratio of strontium to calcium is 1:30.

Sodium and potassium (Na and K)

Sodium and potassium are dissolved from practically 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.

Lithium (Li)

Data concerning the quantity of lithium in water are scarce. It is usually found in small amounts in thermal springs and saline waters. Lithium also occurs in streams where some industries dump their waste water. The scarcity of lithium in rocks is responsible more than other factors for relatively small amounts present in water.

Bicarbonate, carbonate and hydroxide (HCO_3, CO_3, OH)

Bicarbonate, carbonate, or hydroxide is sometimes reported as alkalinity. The alkalinity of a water is defined as its capacity to consume a strong acid to pH 4.5. Since the major causes of alkalinity in most natural waters are carbonate and bicarbonate ions dissolved from carbonate rocks, the results are usually reported in terms of these constituents. Although alkalinity may suggest the presence of definite amounts of carbonate, bicarbonate or hydroxide, it may not be true due to other ions that contribute to alkalinity such as silicates, phosphates, borates, possibly fluoride, and certain organic anions which may occur in colored waters. The significance of alkalinity to the domestic, agricultural, and industrial user is usually dependent upon the nature of the cations (Ca, Mg, Na, K) associated with it. However, moderate amounts of alkalinity does not adversely affect most users.

Hydroxide may occur in water that has been softened by the lime process. Its presence in streams usually can be taken as an indication of contamination and does not represent the natural chemical character of the water.

Sulfate (SO_4)

Sulfate is dissolved from many rocks and soils--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, 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 to about the same extent as chloride. However, the quantity of fluoride in natural surface waters is ordinarily very small compared to that of chloride. Investigations have proved that fluoride concentrations of about 0.6 to 1.7 ppm reduced the incidence of dental caries and that concentrations greater than 1.7 ppm also protect the teeth from cavities but cause an undesirable black stain (Durfor and Becker, 1964, p. 20). Public Health Service, 1962 (p. 8), states, "When fluoride is naturally present in drinking water, the concentration should not average more than the appropriate upper control limit (0.6 to 1.7 ppm). Presence of fluoride in average concentration greater than two times the optimum values shall constitute grounds for rejection of the supply." Concentration higher than the stated limits may cause mottled enamel in teeth, endemic cumulative fluorosis, and skeletal effects.

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 methemoglobinemai ("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 ppm (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. U. S. Public Health Service (1962) sets 45 ppm as the upper limit.

Phosphate (PO_4)

Phosphorus is an essential element in the growth of plants and animals, and some sources that contribute nitrate, such as organic wastes and leaching of soils, may be important as sources for phosphate in water and its occurrence may add to the apparent alkalinity. The addition of phosphates in water treatment constitutes a possible source, although the dosage is usually small. In some areas, phosphate fertilizers may yield some phosphate to water. A more important source is the increasing use of phosphates in detergents. Domestic and industrial sewage effluents may therefore contain considerable amounts of phosphate.

Boron (B)

Boron in small quantities has been found essential for plant growth, but irrigation water containing more than 1 part per million boron is detrimental to citrus and other boron-sensitive crops. Boron is reported in Survey analyses of surface waters in arid and semiarid regions of the Southwest and West 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.

Chromium (Cr)

Few if any waters contain chromium from natural sources. Natural waters can probably contain only traces of chromium as a cation unless the pH is very low. When chromium is present in water, it is usually the result of pollution by industrial wastes. Fairly high concentrations of chromate anions are possible in waters having normal pH levels. Concentrations of more than 0.05 ppm of chromium in the hexavalent form constitute grounds for rejection of a water for domestic use on the basis of the standards of the U. S. Public Health Service (1962).

Nickel and cobalt (Ni, Co)

Nickel and cobalt are very similar in chemical behavior and also closely related to iron. Both are present in igneous rocks in small amounts and are more prevalent in silicic rocks. Any nickel in water is likely to be in small amounts and could be in a colloidal state. Cobalt may be taken into solution more readily than nickel. It may be taken into solution in small amounts through bacteriological activity similar to that causing solution of manganese. However, few data on the occurrence of either nickel or cobalt in natural water are available.

Copper (Cu)

Copper is a fairly common trace constituent of natural water. Small amounts may be introduced into water by solution of copper and brass water pipes and other copper-bearing equipment in contact with the water, or from copper salts added to control algae in open reservoirs. Copper salts such as the sulfate and chloride are highly soluble in waters with a low pH but in water of normal alkalinity these salts hydrolyze and the copper may be precipitated. In the normal pH range of natural water containing carbon dioxide, the copper might be precipitated as carbonate. The oxidized portions of sulfide-copper ore bodies contain other copper compounds. The presence of copper in mine water is common.

Copper imparts a disagreeable metallic taste to water. As little as 1.5 ppm can usually be detected, and 5 ppm can render the water unpalatable. Copper is not considered to be a cumulative systemic poison like lead and mercury; most copper ingested is excreted by the body and very little is retained. The pathological effects of copper are controversial, but it is generally believed very unlikely that humans could unknowingly ingest toxic quantities from palatable drinking water. The U.S. Public Health Service (1962) recommends that copper should not exceed 1.0 ppm in drinking and culinary water.

Lead (Pb)

Lead is only a minor element in most natural waters, but industrial or mine and smelter effluents may contain relatively large amounts of lead. Many of the commonly used lead salts are water soluble.

Traces of lead in water usually are the result of solution of lead pipe through which the water has passed. Amounts of lead of the order of 0.05 ppm are significant, as this concentration is the upper limit for drinking water in the standards adopted by the U.S. Public Health Service (1962). Higher concentrations may be added to water through industrial and mine-waste disposal. Lead in the form of sulfate is reported to be soluble in water to the extent of 31 ppm (Seidell, 1940, p. 1409) at 25°C. In natural water this concentration would not be approached, however, since a pH of less than 4.5 would probably be required to prevent formation of lead hydroxide and carbonate. It is reported (Pleissner, 1907) that at 18°C water free of carbon dioxide will dissolve the equivalent of 1.4 ppm of lead and the solubility is increased nearly four fold by the presence of 2.8 ppm of carbon dioxide in the solution. Presence of other ions may increase the solubility of lead.

Zinc (Zn)

Zinc is abundant in rocks and ores but is only a minor constituent in natural water because the free metal and its oxides are only sparingly soluble. In most alkaline surface waters it is present only in trace quantities, but more may be present in acid water. Chlorides and sulfates of zinc are highly soluble. Zinc is used in many commercial products, and industrial wastes may contain large amounts.

Zinc in water does not cause serious effects on health, but produces undesirable esthetic effects. The U.S. Public Health Service (1962, p. 55) recommends that the zinc content not exceed 5 ppm in drinking and culinary water.

Barium (Ba)

Barium may replace potassium in some of the igneous rock minerals, especially feldspar and barium sulfate (barite) is a common barium mineral of secondary origin. Only traces of barium are present in surface water and sea water. Because natural water contains sulfate, barium will dissolve only in trace amounts. Barium sometimes occurs in brines from oil-well wastes.

The U. S. Public Health Service (1962) states that water containing concentrations of barium in excess of 1 ppm is not suitable for drinking and culinary use because of the serious toxic effects of barium on heart, blood vessels, and nerves.

Bromide (Br)

Bromine is a very minor element in the earth's crust and is normally present in surface waters in only minute quantities. Measurable amounts may be found in some streams that receive industrial wastes, and some natural brines may contain rather high concentrations. It resembles chloride in that it tends to be concentrated in sea water.

Iodide (I)

Iodide is considerably less abundant both in rocks and water than bromine. Measurable amounts may be found in some streams that receive industrial wastes, and some natural brines may contain rather high concentrations. It occurs in sea water to the extent of less than 1 ppm. Rankama and Sahama (1950, p. 767) report iodide present in rainwater to the extent of 0.001 to 0.003 ppm and in river water in about the same amount. Few waters will contain over 2.0 ppm.

PROPERTIES AND CHARACTERISTICS OF WATER

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.

Generally, bicarbonate and carbonate determine the proportions of "carbonate" hardness of water. Carbonate hardness is the amount of hardness chemically equivalent to the amount of bicarbonate and carbonate in solution. Carbonate hardness is approximately equal to the amount of hardness that is removed from water by boiling.

Noncarbonate hardness is the difference between the hardness calculated from the total amount of calcium and magnesium in solution and the carbonate hardness. If the carbonate hardness (expressed as calcium carbonate) equal the amount of calcium and magnesium hardness (also expressed as calcium carbonate) there is no noncarbonate hardness. Noncarbonate hardness is about equal to the amount of hardness remaining after water is boiled. The scale formed at high temperatures by the evaporation of water containing noncarbonate hardness commonly is tough, heat resistant, and difficult to remove.

Although many people talk about soft water and hard water, there has been no firm line of demarcation. Water that seems hard to an easterner may seem soft to a westerner. In this report hardness of water is classified as follows:

Hardness range (calcium carbonate in ppm)	Hardness description
0-60	Soft
61-120	Moderately hard
121-180	Hard
more than 180	Very hard

For public use, water with hardness above 200 parts per million generally requires softening treatment (Durfor and Becker, 1964, p. 23-27).

Acidity (H^{+1})

The use of the terms acidity and alkalinity is widespread in the literature of water analysis and is a cause of confusion to those who are more accustomed to seeing a pH of 7.0 used as a neutral point. Acidity of a natural water represents the content of free carbon dioxide and other uncombined gases, organic 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. The presence of acidity is reported in those waters which have a pH below 4.5.

Sodium-adsorption-ratio (SAR)

The term "sodium-adsorption-ratio (SAR)" was introduced by the U.S. Salinity Laboratory Staff (1954). It is a ratio expressing the relative activity of sodium ions in exchange reaction with soil and is an index of the sodium or alkali hazard to the soil. Sodium-adsorption-ratio 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.

Specific conductance (micromhos per centimeter at 25°C)

Specific conductance is a convenient, rapid determination used to estimate the amount of dissolved solids in water. It is a measure of the ability of water to transmit a small electrical current (see p. 8). The more dissolved solids in water that can transmit electricity the greater the specific conductance of the water. Commonly, the amount of dissolved solids (in parts per million) is about 65 percent of the specific conductance (in micromhos). This relation is not constant from stream to stream or from well to well and it may even vary in the same source with changes in the composition of the water (Durfor and Becker, 1964, p. 27-29).

Specific conductance of most waters in the eastern United States is less than 1,000 micromhos, but in the arid western parts of the country, a specific conductance of more than 1,000 micromhos is common.

Hydrogen-ion concentration (pH)

Hydrogen-ion concentration is expressed in terms of pH units (see p. 8). The values of pH often are used as a measure of the solvent power of water or as an indicator of the chemical behavior certain solutions may have toward rock minerals.

The degree of acidity or alkalinity of water, as indicated by the hydrogen-ion concentration, expressed as pH, 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 or organic matter usually have pH values less than 4.5.

The investigator who utilizes pH data in his interpretations of water analyses should be careful to place pH values in their proper perspective.

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 15 units generally passes unnoticed (U. S. Public Health Service, 1962). Some swamp waters have natural color in excess of 300 units.

The extent to which a water is colored by material in solution is commonly reported as a part of a water analysis because a significant color in water may indicate the presence of organic material that may have some bearing on the dissolved solids content. Color in water is expressed in terms of units between 0 and 500 or more based on the above standard (see p. 8).

Oxygen consumed

Oxygen consumed is a measure of the amount of oxygen required to oxidize unstable materials in water and may be correlated with natural-water color or with some carbonaceous organic pollution from sewage or industrial wastes.

Tolerances for oxygen consumed in feed water for low-and high-pressure boilers are 15 and 3 ppm, respectively (Northeast Water Works Association, 1940). Wash water containing more than 8 ppm has been reported to import a bad odor to textiles; concentrations for water used in beverages and brewing range from 0.5 to 5.0 ppm (California State Water Pollution Control Board, 1952, 1954).

Organics

Phenols.--Phenolic material in water resources is invariably the result of pollution. Phenols are widely used as disinfectants and in the synthesis of many organic compounds. Waste products from oil refineries, coke areas, and chemical plants may contain high concentrations. Fortunately, phenols decompose in the presence of oxygen and organic material, and their persistence downstream from point of entry is relatively short lived. The rate of decomposition is dependent on the environment.

Very low concentrations impart such a disagreeable taste to water that is highly improbable that harmful amounts could be consumed unknowingly. Reported thresholds of detection of taste and odor range from 0.001 to 0.01 ppm.

Detergents (ABS).--The chief surfactant in commercial detergents is anionic alkylbenzenesulfonate (ABS). ABS and other anionic surfactants resist chemical oxidation and biological breakdown. Their persistence in water over long periods of time contributes to pollution of both ground water and surface water. Some of the effects produced from detergent pollution are unpleasant taste, odor, and foaming (Wyman, Robertson, and Page, 1962). Although the physiological implications of ABS to human beings is unknown, prolonged ingestion of this material by rats is believed to be nontoxic (Paynter, 1960). The U.S. Public Health Service (1962) recommends that ABS should not exceed 0.5 ppm in drinking and culinary waters.

Temperature

Temperature is an important factor in property determining the quality of water. This is very evident for such a direct use

as an industrial coolant. Temperature is also important, but perhaps not so evident, for its indirect influence upon aquatic biota, concentrations of dissolved gases, and distribution of chemical solutes in lakes and reservoirs as a consequence of thermal stratification and variation.

Surface water temperatures tend to change seasonally and daily with air temperatures, except for the outflow of large springs. Superimposed upon the annual temperature cycle is a daily fluctuation of temperature which is greater in warm seasons than in cold and greater in sunny periods than with a cloud cover. Natural warming is due mainly to absorption of a solar radiation by the water and secondarily to transfer of heat from the air or from the bottom. Condensation of water vapor at the water surface is reported to furnish measurable quantities of heat. Heat loss takes place largely through radiation, with further losses through evaporation and conduction to the air and bottom. Thus the temperature of a small stream generally reaches a maximum in mid-to late afternoon due to solar heating and reaches a minimum from early to mid-morning after nocturnal radiation.

Temperature variations which commonly occur during summer in lakes and reservoirs of temperate regions results in a separation of the water volume into a circulating upper portion and a non-circulating lower portion. Separating the two is a stratum of water of variable vertical thickness in which the temperature decreases rapidly with increasing depth. This physical division of the water mass into a circulating and a stagnant portion is the result of density differences in the water column associated with the temperature distribution. Knowledge of the stratification in a body of water may result in increased utility by locating strata of more suitable characteristics. For example, the elevation of an intake pipe may be changed to obtain water of lower temperature, higher pH, less dissolved iron, or other desirable properties.

Temperature is a major factor in determining the effect of pollution on aquatic organisms. The resistance of fish to certain toxin substances has been shown to vary widely with temperature. The quantity of dissolved oxygen which the water can contain is also temperature dependent. Oxygen is more soluble in cold water than in warm water, hence the reduction of oxygen concentrations by pollution is especially serious during periods of high temperature when oxygen levels are already low. Increased temperatures also accelerate biological activity including that of the oxygen-utilizing bacteria which decompose organic wastes. These pollutional effects may be especially serious when low flow conditions coincide with high temperatures. Summary temperature data of water are essential for planning multiple uses of water resources.

Turbidity

Turbidity is the optical property of a suspension with reference to the extent to which the penetration of light is inhibited by the presence of insoluble material. Turbidity is a function on both the concentration and particle size of the suspended material. Although it is reported in terms of parts per million of silica, it is only partly synonymous with the weight of sediment per unit volume of water.

Turbid water is abrasive in pipes, pumps, and turbine blades. In process water, turbidities much more than 1 ppm are not tolerated by several industries, but others permit up to 50 ppm higher (Rainwater, Thatcher, 1960, p. 289). Although turbidity does not directly measure the safety of drinking water, it is related to the consumers acceptance of the water. A level of 5 units of turbidity becomes objectionable to a considerable number of people (U. S. Public Health, 1962).

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. Much fluvial sediment results from the natural process of erosion, which in turn is part of the geologic cycle of rock transformation. This natural process may be accelerated by agricultural practices. Sediment is also contributed by a number of industrial and construction 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, character of the solid mantle, plant cover, topography, and land use. The mode and rate of sediment erosion, transport, and deposition is determined largely by the size distribution of the particles or more precisely by the fall velocities of the particles in water. Sediment particles in the sandsize (larger than 0.062 mm) range do not appear to be affected by flocculation or dispersion resulting from the mineral constituents in solution. In contrast, 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 State 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.

State reports containing more complete records of stream discharge may be obtained by writing to the responsible District Engineer, Surface Water Branch, U. S. Geological Survey. For the area covered in this volume, the States, drainage basins, and locations of the district engineers are listed below.

State	Drainage basin	Surface Water Branch district office
Colorado	Missouri River	Denver Federal Center Denver, Colo. 80225
Iowa	Hudson Bay and upper Mississippi River Missouri River	508 Hydraulic Laboratory University of Iowa Iowa City, Iowa 52241
Kansas	Missouri River	P.O. Box 856 Room 403 Federal Bldg. Topeka, Kans. 66601
Minnesota	Hudson Bay and upper Mississippi River	1610 Post Office Bldg. St. Paul, Minn. 55101

State	Drainage basin	Surface Water Branch district office
Missouri	Missouri River	P.O. Box 138 103 W. 10th Street Rolla, Mo. 65401
Montana	Hudson Bay and upper Mississippi River Missouri River	P.O. Box 1696 409 Federal Building Helena, Mont. 59601
Nebraska	Missouri River	P.O. Box 591 Cotner Terrace Bldg. 225 North Cotner Blvd. Lincoln, Nebr. 68505
North Dakota	Hudson Bay and upper Mississippi River Missouri River	P.O. Box 750 202½ North Third Street Bismark, N. Dak. 58502
South Dakota		P.O. Box 216 Room 207 Federal Building Pierre, S. Dak. 57501
Wisconsin	Hudson Bay and upper Mississippi River	5001 University Avenue Madison, Wis. 53705
Wyoming	Missouri River	P.O. Box 2087 Blue Cross Building Cheyenne, Wyo. 82002

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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 1941-61, are listed below:

Numbers of water-supply papers containing records for Parts 5 and 6, 1941-61

Year	WSP	Year	WSP	Year	WSP	Year	WSP
1941	942	1947	1102	1953	1291	1959	1643
1942	950	1948	1132	1954	1351	1960	1743
1943	970	1949	1162	1955	1401	1961	1883
1944	1022	1950	1187	1956	1451		
1945	1030	1951	1198	1957	1521		
1946	1050	1952	1251	1958	1572		

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.

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*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 water 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, D.C. 20402, 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 of the Interior Department for some of the investigations in South Dakota, and by the Soil Conservation Service of the United States Department

State	Cooperating agency	Drainage basin	District office
Iowa	Iowa Geological Survey, H. G. Hershey, director and State Geologist.	Hudson Bay and upper Mississippi River Missouri River	Cotner Terrace Bldg. 225 North Cotner Blvd. Lincoln, Nebr. 68505 (Chemical-quality data) 508 Hydraulic Laboratory University of Iowa Iowa City, Iowa 52241 (Sediment data)
Kansas	Kansas Water Resources Board, Robert L. Smith, executive secretary.	Missouri River	Cotner Terrace Bldg. 225 North Cotner Blvd. Lincoln, Nebr. 68505
Minnesota	Minnesota Iron Range Resources and Rehabilitation Commission, A. M. DeYoannes, commissioner. Minnesota Department of Conservation, Division of Waters, S. A. Frellsen, director.	Hudson Bay and upper Mississippi River Missouri River	
Montana	Montana Fish and Game Commission, W. J. Everin, director.	Missouri River	
Nebraska	Nebraska Mid-State Reclamation District, J. R. McKinney, secretary.		

State	Cooperating agency	Drainage basin	District office
South Dakota	South Dakota Water Resources Commission, J.W. Grimes, chief engineer.	Missouri River	Cotner Terrace Bldg. 225 North Cotner Blvd. Lincoln, Nebr. 68505
Wisconsin	Wisconsin Conservation Department, L. P. Voigt, director, through the Committee on Water Pollution, George P. Steinmetz, chairman, Thedore F. Wisniewski, director.	Hudson Bay and upper Mississippi River	2822 E. Main Street Columbus, Ohio 43209 (Sediment data)
Wyoming	Wyoming Natural Resources Board, E.J. Van Camp, chief of water development. Office of State Engineer, Earl Lloyd, State Engineer.	Missouri River	1214 Big Horn Avenue Worland, Wyo. 82401

of Agriculture for some of the investigations in Colorado, Iowa and Nebraska. The department of Agriculture, University of Missouri, furnished financial assistance for a sedimentation study in the Missouri River basin in Missouri.

State and local agencies that cooperated in quality-of-water investigations in the drainage basins in this volume and the locations of the quality-of-water district offices responsible for collecting the data are listed in the table on page 28.

DIVISION OF WORK

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

Most of the investigations were made under the direction of 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.

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CHEMICAL ANALYSES, WATER TEMPERATURES, AND SEDIMENT

PART 5. HUDSON BAY AND UPPER MISSISSIPPI RIVER BASINS

RED RIVER OF THE NORTH BASIN

5-540. RED RIVER OF THE NORTH AT FARGO, N. DAK.

LOCATION.--At gaging station at city waterplant in Fargo, Cass County, 25 miles upstream from mouth of Sheyenne River.
DRAINAGE AREA.--6,800 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1955 to September 1961.
Water temperatures: October 1955 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 388 ppm Apr. 25 to May 2; minimum, 223 ppm June 10-11.
Hardness: Maximum, 290 ppm May 23-31; minimum, 182 ppm June 10-11.
Specific conductance: Maximum daily, 685 micromhos Apr. 30; minimum daily, 356 micromhos Sept. 10.
Water temperatures: Maximum, 77°F July 11, Aug. 3-5, 7; minimum, 34°F on several days during January and February.
EXTREMES, 1955-61.--Dissolved solids (1955-58, 1959-61): Maximum, 650 ppm May 6-9, 1958; minimum, 174 ppm Dec. 1-2, 1955.
Hardness: Maximum, 420 ppm May 6-9, 1958; minimum, 131 ppm Apr. 1-6, 1960.
Specific conductance: Maximum daily, 960 micromhos May 6, 1958; minimum daily, 275 micromhos Dec. 1, 1955.
Water temperatures: Maximum, 82°F on several days during July 1957 and 1960; minimum, 33°F on many days in 1956 and 1959.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr.

Chemical analyses, in parts per million, water year October 1960 to September 1961

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 $CaCO_3$		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. 1-25, 1960.	67.6	--	0.08	--	--	12	--	271	0	44	--	--	--	--	292	0.40	53.3	245	23	0.3	495	7.7	--
Oct. 26-Nov. 11.	130	--	.04	--	--	12	--	280	0	40	--	--	--	--	296	.40	104	247	17	.3	502	7.9	--
Nov. 12.....	77	5.8	--	43	32	11	3.9	272	0	36	2.5	0.2	0.0	0.09	284	.39	59.0	239	16	.3	477	7.8	12
Nov. 13-28.....	139	--	.05	--	--	11	--	280	0	37	--	--	--	--	289	.39	108	249	19	.3	495	7.9	--
Nov. 29-Dec. 4..	66.0	--	.07	--	--	11	--	280	0	37	--	--	--	--	289	.39	51.5	248	18	.3	498	7.9	--
Dec. 5-31.....	137	9.3	.07	49	36	13	4.7	308	0	35	5.1	.3	.7	.07	317	.43	117	271	18	.3	532	7.9	12
Jan. 1-31, 1961.	141	--	.04	--	--	12	--	319	0	36	--	--	--	--	326	.44	124	278	16	.3	545	7.6	--
Feb. 1-28.....	169	--	.07	--	--	12	--	324	0	31	--	--	--	--	336	.46	153	283	17	.3	557	7.6	--
Mar. 1.....	232	18	--	52	37	12	5.0	332	0	30	4.5	.3	.1	.06	340	.46	213	283	11	.3	558	8.1	6
Mar. 2-31.....	429	13	.11	41	27	13	5.4	222	0	47	5.5	.2	3.1	.06	274	.37	317	213	31	.4	456	7.3	5
Apr. 1-24.....	298	--	.05	--	--	12	--	247	0	52	--	--	--	--	295	.40	237	236	33	.3	488	7.8	--
Apr. 25-May 2...	419	--	.11	--	--	17	--	250	0	106	--	--	--	--	388	.53	439	285	80	.4	600	7.7	--
May 3-22.....	440	--	.12	--	--	14	--	250	0	74	--	--	--	--	334	.45	397	257	52	.4	535	7.6	--
May 23-31.....	405	--	.18	--	--	16	--	266	0	97	--	--	--	--	386	.52	422	290	72	.4	599	7.7	--
June 1-9.....	456	--	.04	--	--	11	--	253	0	45	--	--	--	--	282	.38	347	238	31	.3	481	7.5	--

RED RIVER OF THE NORTH BASIN--Continued

5-540. RED RIVER OF THE NORTH AT FARGO, N. DAK.--Continued

Chemical analyses, in parts per million, water year October 1960 to September 1961--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 $CaCO_3$		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 10-11, 1961	582	--	--	--	--	7.5	--	201	0	28	--	--	--	--	223	0.30	350	182	17	0.3	374	7.4	--
June 12-30.....	394	8.3	0.25	40	28	8.8	4.1	244	0	27	1.1	0.2	0.4	0.07	254	.35	270	215	15	.3	434	7.6	9
July 1-31.....	177	--	.12	--	--	9.1	--	249	0	27	--	--	--	--	255	.35	122	214	10	.3	437	7.5	--
Aug. 1-21.....	103	--	.09	--	--	10	--	222	0	31	--	--	--	--	244	.33	67.9	195	13	.3	415	7.5	--
Aug. 22-31.....	37.2	--	.12	--	--	12	--	209	0	33	--	--	--	--	246	.33	24.7	186	15	.4	403	7.5	--
Sept. 1-18.....	34.3	--	.05	--	--	12	--	213	0	36	--	--	--	--	235	.32	21.8	190	15	.4	407	7.6	--
Sept. 19-30.....	80.1	11	.05	37	31	12	4.0	240	0	45	4.7	.2	2.2	.06	275	.37	59.5	220	23	.4	511	7.2	3
Weighted average.....	--	--	0.10	--	--	12	--	257	0	48	--	--	--	--	298	0.41	172	241	30	0.3	495	7.6	--
Time-weighted average.....	213	--	0.09	--	--	12	--	263	0	42	--	--	--	--	293	--	--	240	24	0.3	491	7.6	--
Tons per day..	--	--	0.06	--	--	7.0	--	148	0	28.0	--	--	--	--	--	--	--	--	--	--	--	--	--

Temperature (°F) of water, water year October 1960 to September 1961

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

5-560. SHEYENNE RIVER NEAR WARWICK, N. DAK.

LOCATION.--At gaging station at highway bridge, 3.3 miles south of Warwick, Benson County.
DRAINAGE AREA (revised).--2,070 square miles, approximately, of which about 1,310 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: January 1951 to September 1961.
Water temperatures: January 1951 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 560 ppm Nov. 26; minimum, 252 ppm Aug. 1-6.
Hardness: Maximum, 352 ppm Mar. 1-21; minimum, 166 ppm Aug. 1-6.
Specific conductance: Maximum daily, 978 micromhos Mar. 16; minimum daily, 404 micromhos Aug. 5.
Water temperatures: Maximum, 82°F Aug. 1, 3; minimum, freezing point Dec. 7, 8, 10.
EXTREMES, 1951-61.--Dissolved solids: Maximum, 1,230 ppm Mar. 21-23, 1955; minimum, 150 ppm Apr. 5-9, 1960.
Hardness: Maximum, 572 ppm Mar. 20, 1959; minimum, 71 ppm Apr. 5-9, 1960.
Specific conductance: Maximum daily, 1,940 micromhos Feb. 1, 1955; minimum daily, 208 micromhos Apr. 7, 1960.
Water temperatures: Maximum (1951-55, 1956-61), 86°F July 21, 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 Lincoln, Nebr.

Chemical analyses, in parts per million, water year October 1960 to September 1961

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 $CaCO_3$		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, 1960.	1.5	--	0.06	--	--	22	--	247	0	--	--	--	--	--	299	0.41	1.21	206	3	0.7	474	7.6	--
Nov. 1-15.....	1.4	--	.05	--	--	39	--	265	0	--	--	--	--	--	340	.46	1.28	206	0	1.2	543	7.4	--
Nov. 16-25.....	1.2	--	.04	--	--	62	--	317	0	--	--	--	--	--	420	.57	1.36	220	0	1.8	655	7.4	--
Nov. 26.....	1.3	2.9	--	41	30	108	8.2	396	0	119	14	0.3	0.2	0.19	560	.76	1.97	225	0	3.1	839	7.6	33
Nov. 27-Dec. 31.	.8	20	.03	61	24	57	5.9	351	0	79	11	.2	.9	.15	436	.59	.94	252	0	1.6	706	7.9	16
Jan. 1-17, 1961.	.7	--	.01	--	--	51	--	375	0	--	--	--	--	--	461	.63	.87	289	0	1.3	723	7.8	--
Jan. 18-26.....	.7	--	.02	--	--	38	--	365	0	--	--	--	--	--	428	.58	.81	291	0	1.0	678	7.6	--
Jan. 27-Feb. 17.	.7	--	.05	--	--	23	--	293	0	--	--	--	--	--	341	.46	.64	245	5	.6	544	7.6	--
Feb. 18-28.....	1.4	--	.02	--	--	39	--	369	0	--	--	--	--	--	437	.59	1.65	291	0	1.0	688	7.7	--
Mar. 1-21.....	6.0	--	.11	--	--	50	--	452	0	--	--	--	--	--	533	.72	8.63	352	0	1.2	825	8.0	--
Mar. 22-26.....	61.2	23	--	65	24	38	7.0	314	0	73	13	.2	.5	.14	413	.56	68.2	262	5	1.0	637	7.7	18
Mar. 27-Apr. 4..	48.6	--	.23	--	--	75	--	342	0	--	--	--	--	--	507	.69	66.5	248	0	2.1	778	8.0	--
Apr. 5-22.....	31.8	--	.09	--	--	48	--	226	0	--	--	--	--	--	350	.48	30.1	177	0	1.6	555	7.8	--
Apr. 23-May 9...	19.9	--	.06	--	--	59	--	291	0	--	--	--	--	--	426	.58	22.9	224	0	1.7	677	8.0	--
May 10-31.....	13.9	--	.07	--	--	63	--	352	0	--	--	--	--	--	450	.61	16.9	243	0	1.8	713	7.9	--
June 1-18.....	2.5	--	.08	--	--	67	--	301	0	--	--	--	--	--	429	.58	2.90	222	0	2.0	682	7.6	--
June 19-30.....	.6	12	.06	43	21	39	5.0	244	0	67	8.0	.2	5.1	.09	333	.45	.54	195	0	1.2	547	7.6	8
July 1-31.....	1.4	--	.08	--	--	29	--	228	0	--	--	--	--	--	281	.38	1.06	183	0	.9	469	7.2	--

RED RIVER OF THE NORTH BASIN--Continued

5-560. SHEYENNE RIVER NEAR WARWICK, N. DAK.--Continued

Chemical analyses, in parts per million, water year October 1960 to September 1961--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 $CaCO_3$		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. 1-6, 1961..	0.5	--	0.09	--	--	23	--	198	0	--	--	--	--	--	252	0.34	0.34	166	4	0.8	414	7.5	--
Sept. 2.....	.1	--	--	--	--	13	--	236	0	--	--	--	--	--	281	.38	.08	207	13	.4	443	7.5	--
Sept. 10-30.....	1.0	27	.06	53	18	13	3.0	233	0	33	3.1	0.2	1.9	0.02	267	.36	.72	206	15	.4	426	7.6	2
Weighted average.....	--	--	1.5	--	--	54	--	303	0	--	--	--	--	--	422	0.57	8	231	1	1.6	661	7.8	--
Time-weighted average.....	a 6.5	--	5.8	--	--	43	--	302	0	--	--	--	--	--	384	--	--	234	2	1.2	611	7.6	--
Tons per day..	--	--	0.03	--	--	1.0	--	6	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--

a Mean discharge based on 365 days; mean discharge for 332 days of actual flow, 7.1 cfs.

5-560. SHEYENNE RIVER NEAR WARWICK, N. DAK.--Continued

Temperature (°F) of water, water year October 1960 to September 1961

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

5-564. BIG COULEE NEAR CHURCHS FERRY, N. DAK.
(Formerly published as 5-564. Mauvais Coulee near Churchs Ferry)

LOCATION.--At gaging station at bridge on U.S. Highway 281, 1 mile downstream from Little Coulee and 6 miles south of Churchs Ferry, Ramsey County.
DRAINAGE AREA.--2,500 square miles, approximately, of which about 690 square miles (revised) is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: June 1954 to September 1961.
REMARKS.--No flow during most of 1961 water year.

Chemical analyses, in parts per million, water year October 1960 to September 1961

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)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$		Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
																		Calcium, magnesium	Noncarbonate				
Mar. 21, 1961	0.2	15		0.07	0.26	72	18	39	20	140	0	213	22	0.2	1.5	0.11	501	254	139	1.1	712	6.8	58

RED RIVER OF THE NORTH BASIN--Continued

5-587. 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, Ransom County, and 3 miles upstream from Timber Coulee.
DRAINAGE AREA (revised).--8,190 square miles, approximately, of which about 5,700 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: August 1956 to September 1961.
Water temperatures: August 1956 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 785 ppm June 1-30; minimum, 310 ppm Mar. 7-10.
Hardness: Maximum, 359 ppm June 1-30; minimum, 163 ppm Mar. 7-10.
Specific conductance: Maximum daily, 1,170 micromhos June 17, 18; minimum daily, 475 micromhos Mar. 9.
Water temperatures: Maximum, 83°F Aug. 4; minimum, freezing point on many days during November to April.
EXTREMES, 1956-61.--Dissolved solids (1956-58, 1959-61): Maximum, 860 ppm Dec. 14-18, 1959; minimum, 185 ppm Apr. 3-5, 1960.
Hardness: Maximum, 409 ppm Dec. 14-18, 1959; minimum, 102 ppm Apr. 3-5, 1960.
Specific conductance: Maximum daily, 1,350 micromhos Dec. 15, 16, 1959; minimum daily, 243 micromhos Apr. 2, 1960.
Water temperatures: Maximum, 90°F Aug. 23, 1959; 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.

Chemical analyses, in parts per million, water year October 1960 to September 1961

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 $CaCO_3$		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, 1960.	15.3	--	0.04	--	--	66	--	252	0	141	--	--	--	--	489	0.67	20.2	242	35	1.9	768	7.9	--
Nov. 1-30.....	26.1	--	.06	--	--	75	--	300	0	141	--	--	--	--	542	.74	38.2	279	33	1.9	855	7.8	--
Dec. 1-7.....	44.6	--	.10	--	--	78	--	321	0	132	--	--	--	--	545	.74	65.6	278	15	2.0	874	7.6	--
Dec. 8.....	46	4.5	--	66	24	64	12	314	0	111	30	0.6	1.8	0.23	490	.67	60.9	262	5	1.7	769	7.5	--
Dec. 9-31.....	46.6	3.9	.10	61	25	64	11	305	0	112	26	.3	2.1	.17	469	.64	59.0	253	3	1.7	748	7.4	14
Jan. 1-31, 1961.	43.0	--	.10	--	--	61	--	301	0	110	--	--	--	--	465	.63	54.0	252	5	1.7	744	7.5	--
Feb. 1-Mar. 2...	40.8	--	.11	--	--	68	--	324	0	122	--	--	--	--	502	.68	55.3	269	3	1.8	798	7.8	--
Mar. 3-5.....	180	--	.12	--	--	53	--	244	0	113	--	--	--	--	428	.58	208	222	22	1.6	667	7.9	--
Mar. 6.....	464	8.6	--	48	19	48	11	228	0	90	18	.2	2.9	.13	372	.51	466	197	10	1.5	598	7.9	8
Mar. 7-10.....	207	9.2	--	40	15	35	9.4	176	0	80	15	.2	3.0	.13	310	.42	173	163	19	1.2	495	7.5	6
Mar. 11-31.....	67.0	--	.17	--	--	39	--	180	0	105	--	--	--	--	355	.48	64.2	191	43	1.2	564	7.1	--
Apr. 1-10.....	35.5	--	.15	--	--	49	--	192	0	132	--	--	--	--	423	.58	40.5	219	62	1.4	583	7.4	--
Apr. 11-20.....	22.5	--	.01	--	--	61	--	220	0	160	--	--	--	--	494	.67	30.0	259	79	1.6	755	7.6	--
Apr. 21-28.....	28.8	--	.06	--	--	68	--	244	0	182	--	--	--	--	545	.74	42.4	287	87	1.8	840	7.7	--
Apr. 29-May 19..	23.2	--	.30	--	--	82	--	266	0	214	--	--	--	--	631	.86	39.5	324	106	2.0	949	7.6	--
May 20-31.....	21.6	--	.13	--	--	95	--	281	0	249	--	--	--	--	707	.96	41.2	355	125	2.2	1,060	7.7	--
June 1-30.....	14.8	11	.12	78	40	113	11	282	0	274	62	.3	.2	.26	785	1.07	31.4	359	128	2.6	1,130	7.6	8
July 1-5.....	8.0	--	.06	--	--	103	--	289	0	265	--	--	--	--	736	1.00	15.9	342	105	2.4	1,100	7.8	--
July 6-24.....	5.6	--	.06	--	--	105	--	303	0	282	--	--	--	--	727	.99	11.0	332	84	2.5	1,100	7.8	--
July 25-Aug. 5..	14.8	--	.10	--	--	106	--	324	0	228	--	--	--	--	715	.97	28.6	323	57	2.6	1,080	7.8	--

Aug. 6-15, 1961.	3.5	--	.07	--	--	102	--	333	0	197	--	--	--	--	672	.91	6.35	308	35	2.5	1,040	7.8	--
Aug. 17-31.....	7.4	--	.11	--	--	93	--	324	0	185	--	--	--	--	633	.86	12.6	291	25	2.4	976	7.8	--
Sept. 1-9.....	5.8	--	.06	--	--	91	--	313	0	176	--	--	--	--	612	.83	9.58	283	26	2.3	957	7.7	--
Sept. 10-30.....	24.3	13	--	51	27	81	11	295	0	138	40	.3	.9	.27	519	.71	34.1	237	0	2.3	835	6.9	15
Weighted average.....	--	--	0.12	--	--	64	--	265	0	135	--	--	--	--	486	0.66	42	250	33	1.7	759	7.5	--
Time-weighted average.....	a 31.5	--	0.11	--	--	77	--	282	0	167	--	--	--	--	560	--	--	278	47	2.0	863	7.5	--
Tons per day..	--	--	0.01	--	--	5.5	--	23	0	12.0	--	--	--	--	--	--	--	--	--	--	--	--	--

a Mean discharge based on 365 days; mean discharge for 364 days of actual flow, 31.6 cfs.

Temperature (°F) of water, water year October 1960 to September 1961

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

RED RIVER OF THE NORTH BASIN--Continued

5-825. 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.
RECORDS AVAILABLE.--Chemical analyses: September 1956 to September 1961.
Water temperatures: October 1956 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 467 ppm Dec. 12-31; minimum, 272 ppm Mar. 23-31.
Hardness: Maximum, 349 ppm Dec. 12-31; minimum, 196 ppm Mar. 23-31.
Specific conductance: Maximum daily, 802 micromhos Dec. 20; minimum daily, 420 micromhos Mar. 31.
Water temperatures: Maximum, 76°F on several days during August; minimum, 35°F on many days during December to April.
EXTREMES, 1956-61.--Dissolved solids (1956-58, 1959-61): Maximum, 490 ppm Dec. 1-31, 1956; minimum, 225 ppm Apr. 6-16, 1960.
Hardness: Maximum, 468 ppm Dec. 29-31, 1958; minimum, 160 ppm Apr. 6-16, 1960.
Specific conductance: Maximum daily, 976 micromhos Dec. 29-31, 1958; minimum daily, 307 micromhos Apr. 5, 1960.
Water temperatures: Maximum, 81°F Aug. 3, 4, 1959; minimum, 33°F on several days during February 1958, January and February 1959.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples and determinations of aluminum, phosphate, manganese, alpha activity, beta activity, radium, and uranium available in district office at Lincoln, Nebr.

Chemical analyses, in parts per million, water year October 1960 to September 1961

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 $CaCO_3$		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. 1-23, 25-31, 1960	341	--	0.08	--	--	20	--	284	0	56	--	--	--	--	344	0.47	317	260	27	0.5	563	7.8	--
Oct. 24	401	6.5	.08	55	30	19	5.6	294	0	50	9.5	0.5	2.3	--	332	.47	360	260	19	.5	549	7.6	10
Nov. 1-15	523	--	.04	--	--	21	--	300	0	51	--	--	--	--	346	.47	489	265	19	.6	575	7.9	--
Nov. 16-30	421	--	.05	--	--	23	--	328	0	59	--	--	--	--	386	.52	439	298	29	.6	628	7.9	--
Dec. 1-10	299	--	.06	--	--	25	--	342	0	64	--	--	--	--	411	.56	332	312	32	.6	666	7.9	--
Dec. 11	350	14	.10	74	36	31	7.0	368	0	79	17	.5	1.5	0.14	456	.62	431	333	31	.7	733	7.7	--
Dec. 12-31	324	14	.08	80	36	32	6.2	371	0	81	20	.2	4.1	.13	467	.64	409	349	45	.7	753	7.4	18
Jan. 1-31, 1961	297	--	.13	--	--	31	--	379	0	69	--	--	--	--	461	.63	370	344	33	.7	745	7.6	--
Feb. 1-28	326	--	.04	--	--	29	--	371	0	59	--	--	--	--	443	.60	390	328	24	.7	714	7.5	--
Mar. 1-8	604	--	.04	--	--	28	--	329	0	58	--	--	--	--	404	.55	659	293	23	.7	637	7.8	--
Mar. 9	1,180	16	.01	54	31	24	6.8	293	0	52	13	.2	4.3	.09	368	.50	1,170	264	24	.6	590	8.2	5
Mar. 10-22	1,648	--	.10	--	--	22	--	232	0	64	--	--	--	--	319	.43	1,420	222	32	.6	520	7.5	--
Mar. 23-31	2,729	12	.09	43	22	14	6.0	200	0	52	8.4	.1	3.1	.05	272	.37	2,000	196	32	.4	444	7.4	5
Apr. 1-6	2,063	--	.14	--	--	14	--	210	0	58	--	--	--	--	289	.39	1,610	208	36	.4	474	7.6	--
Apr. 7-16, 18-22	1,225	--	.03	--	--	18	--	257	0	71	--	--	--	--	348	.47	1,150	255	44	.5	554	7.7	--
Apr. 17	1,070	13	.02	59	28	20	.8	265	0	71	11	.0	2.8	.48	357	.49	1,030	262	45	.5	581	7.8	15
Apr. 23-30	2,395	--	.06	--	--	15	--	257	0	73	--	--	--	--	347	.47	2,240	264	53	.4	550	7.9	--
May 1-17	2,005	--	.05	--	--	17	--	282	0	94	--	--	--	--	397	.54	2,150	301	70	.4	619	8.0	--
May 18-26	2,603	--	.04	--	--	19	--	297	0	120	--	--	--	--	451	.61	3,170	334	90	.5	677	7.9	--
May 27-June 3	1,624	--	.03	--	--	17	--	301	0	109	--	--	--	--	442	.60	1,940	331	84	.4	669	7.6	--

June 4-15, 1961.	1,060	8.6	.04	68	33	18	5.1	298	0	84	8.6	.3	1.3	.13	400	.54	1,140	305	61	.4	626	7.5	16
June 16-30.....	665	--	.03	--	--	16	--	268	0	55	--	--	--	--	339	.46	609	255	35	.4	543	7.7	--
July 1-7, 9-31..	404	--	.02	--	--	21	--	259	0	62	--	--	--	--	338	.46	369	250	38	.6	559	7.5	--
July 8.....	305	9.8	.00	52	32	21	5.0	271	0	61	14	.2	4.9	.76	346	.47	285	261	39	.6	581	7.5	15
Aug. 1-31.....	218	--	.04	--	--	23	--	239	0	61	--	--	--	--	326	.44	192	230	34	.7	533	7.5	--
Sept. 1-30.....	335	7.3	.05	40	26	26	4.7	216	0	57	19	.1	2.2	.07	309	.42	279	207	30	.8	505	7.1	4
Weighted average.....	--	--	0.06	--	--	20	--	274	0	74	--	--	--	--	367	0.50	756	272	47	0.5	584	7.6	--
Time-weighted average.....	763	--	0.06	--	--	23	--	291	0	67	--	--	--	--	374	--	--	276	38	0.6	603	7.5	--
Tons per day..	--	--	0.12	--	--	41	--	564	0	152	--	--	--	--	--	--	--	--	--	--	--	--	--

Temperature (°F) of water, water year October 1960 to September 1961

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

5-920. RED RIVER OF THE NORTH AT DRAYTON, N. DAK.

LOCATION.--Temperature recorder at gaging station at interstate highway bridge, 1.5 miles northeast of Drayton, Pembina County.
DRAINAGE AREA.--34,800 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: June 1954 to September 1955.
Water temperatures: December 1956 to September 1961 (discontinued).
EXTREMES, 1960-61.--Water temperatures: Maximum, 73°F June 12-14; minimum, freezing point on many days during November to March.
EXTREMES, 1956-61.--Water temperatures: Maximum (1956-58, 1959-61), 82°F July 20-23, 1960; minimum, freezing point on many days during winter months in 1958, 1960-61.

Temperature (°F) of water, water year October 1960 to September 1961
/Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph/

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

RED RIVER OF THE NORTH BASIN--Continued

5-1200. SOURIS (MOUSE) RIVER NEAR VERENDRYE, N. DAK.

LOCATION.--At gaging station, 2.7 miles north of Verendrye, McHenry County, and 7.5 miles southwest of (19 miles upstream from) mouth of Wintering River.
DRAINAGE AREA (revised).--12,000 square miles, approximately, of which about 7,400 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: October 1949 to August 1951, August 1952 to September 1961.

Chemical analyses, in parts per million, water year October 1960 to September 1961

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)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Nov. 17, 1960	19.0	--		--	--	62	32	100	--	398	0	144	32	--	--	--	616	287	0	2.6	963	7.4	--
Dec. 14.....	11.4	--		--	--	83	34	142	--	466	0	189	52	--	--	--	790	347	0	3.3	1,210	7.3	--
Jan. 5, 1961.	21.4	--		--	--	69	37	121	--	426	0	--	--	--	--	--	723	326	0	2.9	1,130	7.4	--
Mar. 9.....	77.6	11		0.45	--	43	19	76	18	225	0	134	27	0.3	13	0.05	481	185	0	2.4	717	6.9	75
Apr. 12.....	241	1.2		.09	--	33	16	51	8.8	205	0	73	16	.3	3.7	.08	329	150	0	1.8	530	7.3	--
Apr. 20.....	56	--		--	0.00	46	23	68	--	281	0	104	18	--	--	--	451	210	0	2.0	697	7.5	--
June 1.....	25.1	10		.02	--	75	25	118	11	458	0	119	45	.5	.4	.23	652	291	0	3.0	1,020	7.4	27
June 29.....	6.4	17		.16	--	71	26	134	15	421	0	132	61	.6	13	.20	694	282	0	3.5	1,080	7.8	--
July 13.....	13	21		.05	.12	69	28	112	12	457	0	124	35	.5	.3	.21	652	289	0	2.9	997	7.6	15
July 27.....	11.2	--		--	--	79	23	134	--	444	0	137	61	--	--	--	697	292	0	3.4	1,090	7.8	--
Aug. 21.....	4.5	--		--	--	--	--	129	--	414	0	--	--	--	--	--	708	283	0	3.3	1,080	7.6	--
Sept. 11.....	84.3	--		--	--	41	27	69	--	318	0	87	20	--	--	--	458	213	0	2.0	711	7.0	--

5-1240. 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, of which about 10,700 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: June 1954 to September 1961.
Water temperatures: October 1954 to September 1955, October 1956 to September 1959, October 1960 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 3,650 ppm Feb. 8-28; minimum, 501 ppm Mar. 29 to Apr. 30.
Hardness: Maximum, 1,570 ppm Feb. 8-28; minimum, 187 ppm July 1-14.
Specific conductance: Maximum daily, 4,750 micromhos Feb. 21; minimum daily, 598 micromhos Apr. 18.
Water temperatures: Maximum, 78°F July 25; minimum, freezing point on many days during November to April.
EXTREMES, 1954-55, 1956-61.--Dissolved solids (1954-55, 1956-58, 1959-61): Maximum, 3,650 ppm Feb. 8-28, 1961; minimum, 162 ppm Apr. 13-18, 1957.
Hardness: Maximum, 1,570 ppm Feb. 8-28, 1961; minimum, 85 ppm Apr. 13-18, 1957.
Specific conductance: Maximum daily (1956-61), 4,750 micromhos Feb. 21, 1961; minimum daily, 232 micromhos Apr. 18, 1957.
Water temperatures: Maximum (1959-61), 82°F July 14, 19, 1960; 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.

Chemical analyses, in parts per million, water year October 1960 to September 1961

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 $CaCO_3$		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. 1-23, 1960.	25.3	--	0.13	--	--	131	--	450	0	152	--	--	--	--	701	0.95	47.9	265	0	3.5	1,010	7.3	--
Oct. 24-Nov. 8..	13.1	--	.43	--	--	142	--	500	0	163	--	--	--	--	764	1.04	27.0	307	0	3.5	1,130	7.5	--
Nov. 9.....	5.5	20	--	53	49	152	14	552	0	179	31	0.1	12	0.22	826	1.12	12.3	335	0	3.6	1,200	7.7	--
Nov. 10-27.....	4.2	--	.59	--	--	167	--	606	0	196	--	--	--	--	918	1.25	10.4	371	0	3.8	1,310	7.6	--
Nov. 28-Dec. 6..	3.2	--	.06	--	--	216	--	779	0	250	--	--	--	--	1,180	1.60	10.2	482	0	4.3	1,650	7.6	--
Dec. 7-16.....	3.0	--	.07	--	--	254	--	924	0	298	--	--	--	--	1,400	1.90	11.3	581	0	4.6	1,950	7.7	--
Dec. 17-24.....	2.1	25	.37	127	84	288	22	1,060	0	342	62	.8	14	.43	1,600	2.18	9.07	662	0	4.9	2,170	7.7	95
Dec. 25.....	.1	--	.07	--	--	321	--	1,200	0	375	--	--	--	--	1,770	2.41	.48	751	0	5.1	2,390	8.0	--
Jan. 13-18, 1961	.2	--	.18	--	--	376	--	1,420	0	434	--	--	--	--	2,100	2.86	1.13	888	0	5.5	2,770	8.1	--
Jan. 19-26.....	.1	--	.40	--	--	556	--	1,900	87	623	--	--	--	--	3,020	4.11	.82	1,290	0	6.7	3,830	8.3	--
Feb. 8-28.....	.7	--	.43	--	--	672	--	2,380	60	739	--	--	--	--	3,650	4.96	6.90	1,570	0	7.4	4,540	8.3	--
Mar. 1-8.....	3.1	--	.42	--	--	548	--	2,130	0	561	--	--	--	--	3,060	4.16	25.6	1,360	0	6.5	3,900	8.2	--
Mar. 9-19.....	3.3	--	.10	--	--	410	--	1,670	0	420	--	--	--	--	2,350	3.20	20.9	1,080	0	5.4	3,170	8.1	--
Mar. 20-28.....	8.8	17	--	63	52	134	15	550	0	146	41	.5	15	.21	804	1.09	19.1	372	0	3.0	1,220	8.1	28
Mar. 29-Apr. 30.	5.7	--	.08	--	--	88	--	336	0	143	--	--	--	--	501	.68	7.71	218	0	2.6	782	7.9	--
May 1-29.....	10.0	--	.06	29	30	100	--	329	0	110	24	.3	--	--	515	.70	13.9	195	0	3.1	768	7.7	--
May 30-June 30..	20.3	8.6	.13	27	37	135	11	432	0	123	34	.4	3.3	.25	646	.88	35.4	220	0	4.0	956	7.5	44
July 1-14.....	21.0	--	.15	19	34	171	--	428	0	144	45	.6	--	--	708	.96	40.1	187	0	5.4	1,040	7.6	--
July 15-31.....	17.7	--	.21	25	38	191	--	481	0	120	56	.7	--	--	829	1.13	39.6	218	0	5.6	1,210	7.5	--
Aug. 1-18.....	11.2	--	.18	--	--	244	--	578	0	221	--	--	--	--	1,010	1.37	30.5	265	0	6.5	1,470	7.5	--

Aug. 19-31, 1961	10.1	--	.28	--	--	316	--	584	0	309	--	--	--	--	1,270	1.73	34.6	272	0	8.4	1,820	7.1	--
Sept. 1-11.....	9.4	17	.08	31	44	273	26	432	0	330	92	.8	30	.27	1,170	1.59	29.7	260	0	7.4	1,670	6.9	--
Sept. 12-30.....	9.9	10	.13	31	49	188	20	344	0	296	58	.5	21	.31	905	1.23	24.2	278	0	5.3	1,330	6.8	40
Weighted average.....	--	--	0.17	--	--	169	--	490	0	175	--	--	--	--	814	1.11	23	275	--	4.5	1,180	7.4	--
Time-weighted average.....	a 9.5	--	0.21	--	--	231	--	739	6	253	--	--	--	--	1,180	--	--	453	--	4.8	1,630	7.4	--
Tons per day..	--	--	0.00	--	--	4.7	--	14	0	4.9	--	--	--	--	--	--	--	--	--	--	--	--	--

a Mean discharge based on 365 days; mean discharge for 335 days of actual flow, 10.3 cfs.

Temperature (°F) of water, water year October 1960 to September 1961

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

LAKE OF THE WOODS BASIN

5-1284. SAND RIVER NEAR BRITT, MINN.

LOCATION.--At bridge on U.S. Highway 53, 1.5 miles southwest of Britt, St. Louis County.
RECORDS AVAILABLE.--Chemical analyses: July 1960 to September 1961.

Chemical analyses, in parts per million, water year October 1960 to September 1961

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)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 29, 1960	4.4	11		1.5		6.3	2.5	2.0	1.0	25	0	9.3	0.0	0.1	1.5	0.03	67	26	5	0.2	67	6.6	90
Nov. 16.....	8.9	11		1.7		7.3	1.4	2.0	1.4	24	0	7.3	.0	.1	1.3	.05	74	24	4	.2	59	6.6	100
Dec. 22.....	.8	24		1.9		18	2.2	3.2	1.2	60	0	10	.2	.1	.9	.12	113	54	5	.2	119	7.1	65
Jan. 23, 1961	.4	22		1.5		16	3.4	2.8	1.8	67	0	5.5	.0	.1	1.2	.02	101	54	0	.2	118	6.8	45
Feb. 21.....	.5	21		1.3		15	3.1	3.1	2.3	64	0	2.0	.0	.1	.9	.01	95	50	0	.2	114	6.9	45
May 11.....	a 43	3.6		.37	0.05	3.2	1.2	1.3	1.5	8	0	6.0	.1	.1	1.1	.07	56	13	6	.2	37	6.2	90
June 21.....	5.0	5.6		2.2		7.9	2.0	2.6	.8	30	0	7.3	.0	.2	1.1	.07	91	28	3	.2	62	6.7	65
July 17.....	1.3	11		1.7		11	3.3	2.7	1.1	52	0	1.8	.0	.3	.6	.02	68	41	0	.2	93	7.1	38
Aug. 14.....	.4	8.5		.59		13	3.1	3.4	1.2	58	0	2.8	.0	.2	.6	.02	79	45	0	.2	103	7.3	90
Sept. 13.....	23.4	11		1.3		9.2	2.9	2.7	1.0	13	0	26	.0	.4	1.8	.02	111	35	24	.2	76	6.7	160

a Estimated.

5-1305. STURGEON RIVER NEAR CHISHOLM, MINN.

LOCATION.--At highway bridge, 1,000 feet downstream from gaging station, about 0.8 mile downstream from East Branch Sturgeon River, and about 11.8 miles north of Chisholm, St. Louis County.
DRAINAGE AREA.--187 square miles.
RECORDS AVAILABLE.--Chemical analyses: July 1958 to September 1959, July 1960 to September 1961.

Chemical analyses, in parts per million, water year October 1960 to September 1961

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)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 19, 1960	20	10		0.69	--	16	3.9	3.1	1.6	70	0	5.3	0.0	0.1	0.3	0.03	95	56	0	0.2	126	7.4	29
Nov. 16.....	39	12		.80	--	14	3.4	2.6	1.2	59	0	7.3	.0	.1	.6	.06	92	49	1	.2	106	7.5	47
Feb. 28, 1961	14	15		.89	--	18	5.1	3.3	1.1	82	0	4.0	.2	.1	.8	.03	113	66	0	.2	142	7.4	46
Apr. 12.....	47	7.3		.67	0.07	10	3.4	2.2	2.0	47	0	3.5	.5	.1	.8	.02	75	39	0	.2	91	7.1	25
May 11.....	243	5.4		.36	.05	7.7	2.1	1.8	1.2	28	0	5.8	.5	.2	1.5	.06	80	28	5	.1	63	6.6	75
May 17.....	940	--		--	--	--	--	.8	--	20	0	7.0	.0	--	--	--	73	22	6	.1	54	6.7	45
June 12.....	86	4.8		.36	--	12	2.9	1.9	.9	45	0	4.8	.0	.2	1.4	.05	75	42	5	.1	86	6.6	40
July 12.....	14	5.3		.34	--	20	3.4	2.5	1.2	76	0	5.0	.0	.2	.8	.03	110	64	2	.1	134	7.8	45
Aug. 10.....	14	6.1		.22	--	14	3.9	3.1	1.2	63	0	6.0	.0	.2	.3	.04	87	51	0	.2	114	7.3	38
Sept. 16.....	104	8.8		.51	--	14	2.4	2.5	1.4	46	0	14	.3	.2	.8	.02	98	45	7	.2	97	6.9	80

MISSISSIPPI RIVER MAIN STEM

5-2885. MISSISSIPPI RIVER NEAR ANOKA, MINN.

LOCATION.--At hydroelectric plant of northern States Power Co. at Coon Rapids, 1.5 miles upstream from gaging station and 5 miles downstream from Anoka, Anoka County.
DRAINAGE AREA.--19,100 square miles, approximately, upstream from gaging station.
RECORDS AVAILABLE.--Chemical analyses: August 1960 to September 1961.
Water temperatures: August 1960 to September 1961.
EXTREMES, August 1960 to September 1961.--Dissolved solids: Maximum, 238 ppm Jan. 1-31, 1961; minimum, 181 ppm May 27-31, 1961.
Hardness: Maximum, 205 ppm Jan. 1-31, 1961; minimum, 134 ppm May 27-31, 1961.
Specific conductance: Maximum daily, 427 micromhos Dec. 25, 1960; minimum daily, 264 micromhos May 29, 1961.
Water temperatures: Maximum, 82°F July 26, Aug. 8, 9, 1961; minimum, freezing point on several days during December 1960 and March 1961.
REMARKS.--Records of specific conductance of daily samples and determinations of alpha activity, beta activity, radium, and uranium available in district office at Lincoln, Nebr.

Chemical analyses, in parts per million, August 1960 to September 1961

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 $CaCO_3$		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. 3-27, 1960 a.....	1981	11	0.08	43	13	6.1	1.6	192	0	16	2.1	0.2	0.7	0.06	198	0.27	1060	161	4	0.2	322	7.3	22
Aug. 28-Sept. 7 a....	4289	12	.02	38	13	6.0	1.7	171	0	16	1.3	.1	.6	.06	188	.26	2180	147	7	.2	301	7.2	32
Sept. 8-30 a....	3163	12	.05	41	15	6.0	1.7	192	0	14	1.9	.1	.6	.07	203	.28	1730	163	6	.2	328	7.5	21
Oct. 1.....	2840	14	.02	43	15	6.6	3.1	205	0	15	.0	.0	.3	.04	212	.29	1630	170	2	.2	341	7.7	12
Oct. 2-31.....	2470	8.5	.05	44	15	6.9	2.2	208	0	9.0	2.2	.2	.3	.05	203	.28	1350	172	1	.2	347	7.8	12
Nov. 1-30.....	2572	5.4	.06	44	17	6.3	2.0	213	0	7.8	2.6	.2	.4	.04	202	.27	1400	178	3	.2	350	8.0	11
Dec. 1-31.....	2113	8.9	.06	52	17	7.3	2.0	237	0	15	3.8	.2	.9	.04	231	.31	1320	199	5	.2	403	7.9	9
Jan. 1-31, 1961.	1951	11	.06	54	17	7.3	2.8	242	0	13	3.8	.2	1.5	.04	238	.32	1250	205	7	.2	402	7.5	14
Feb. 1-28.....	1998	12	.13	52	16	7.2	2.0	232	0	12	4.0	.2	2.0	.03	231	.31	1250	197	7	.2	389	7.5	11
Mar. 1-24.....	2687	11	.07	44	15	6.4	1.8	206	0	7.8	3.7	.1	.9	.04	200	.27	1450	172	3	.2	349	7.7	3
Mar. 25-Apr. 30.	4804	7.8	.15	40	13	5.7	1.8	184	0	9.5	2.7	.1	1.1	.04	183	.25	2370	155	4	.2	317	7.9	4
May 1-17.....	6664	7.2	.08	40	10	4.9	2.2	162	0	17	1.9	.2	1.4	.04	187	.25	3360	143	10	.2	293	7.3	19
May 18-26.....	13830	9.7	.23	39	9.4	5.1	2.2	146	0	20	.7	.2	2.6	.04	185	.25	6910	136	16	.2	278	7.1	45
May 27-31.....	8842	8.5	.14	37	10	4.6	1.5	148	0	16	.5	.2	1.8	.05	181	.25	4320	134	13	.2	271	7.3	47
June 1-30.....	3937	9.4	.11	44	10	6.5	2.0	181	0	12	.0	.2	1.4	.05	203	.28	2160	152	4	.2	317	7.2	28

a Not included in weighted average.

MISSISSIPPI RIVER MAIN STEM--Continued

5-2885. MISSISSIPPI RIVER NEAR ANOKA, MINN.--Continued

Chemical analyses, in parts per million, August 1960 to September 1961--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 $CaCO_3$		Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
															Parts per million	Tons per acre-foot	Tons per day	Calcium, Magnesium	Noncarbonate				
July 1-31, 1961.	2224	12	0.07	53	8.5	6.4	2.5	193	0	17	2.0	0.2	1.1	0.10	209	0.28	1260	167	9	0.2	337	7.5	18
Aug. 1-31.....	1540	14	.07	44	15	7.9	1.8	203	0	18	3.6	.2	1.4	.01	206	.28	857	172	6	.3	356	7.5	12
Sept. 1-30.....	1851	8.1	.07	44	14	6.9	1.9	199	0	16	4.1	.2	1.4	.00	198	.27	990	169	6	.2	346	7.5	10
Weighted average.....	--	9.2	0.11	44	13	6.2	2.1	191	0	13	2.3	0.2	1.3	0.04	200	0.27	1710	164	7	0.2	332	7.5	18
Time-weighted average.....	3152	9.6	0.09	46	14	6.6	2.1	204	0	13	2.8	0.2	1.2	0.04	207	--	--	173	6	0.2	349	7.5	14
Tons per day..	--	78	0.91	375	109	53	17.0	1630	0	114	20.0	2.0	11.0	0.36		--	--	--	--	--	--	--	--

MISSISSIPPI RIVER MAIN STEM--Continued

5-2885. MISSISSIPPI RIVER NEAR ANOKA, MINN.--Continued

Temperature (°F) of water, August to September 1960

Month	Day																													Aver-age
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
July				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
August				78	78	77	76	77	76	75	74	76	75	75	73	70	70	73	73	73	73	74	77	77	77	71	71	70	68	70	78	74
September	75	78	79	80	81	81	81	76	72	70	68	66	64	64	65	67	65	65	62	60	62	64	64	60	57	59	62	62	58	56		67

Temperature (°F) of water, water year October 1960 to September 1961

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

MISSISSIPPI RIVER MAIN STEM--Continued

5-3310. 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 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 79°F on several days during July; minimum, 35°F Jan. 30 to Feb. 3.
EXTREMES, 1956-61.--Water temperatures: Maximum, 85°F on several days during August 1958; minimum, freezing point on many days in 1956-60.

Temperature (°F) of water, water year October 1960 to September 1961
/Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph/

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

WISCONSIN RIVER BASIN

5-4037. DELL CREEK NEAR LAKE DELTON, WIS.

LOCATION.--At gaging station at Butterfield Bridge on Town Road, 6 miles southwest of Lake Delton, Sauk County, 7 miles east of Reedsburg, and 7 miles upstream from mouth.
DRAINAGE AREA.--44.9 square miles.
RECORDS AVAILABLE.--Water temperatures: October 1957 to September 1961.
Sediment records: October 1957 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 66°F July 30, Sept. 2, 3; minimum, freezing point on many days during November to March.
Sediment concentrations: Maximum daily, 230 ppm Feb. 23; minimum daily, 2 ppm Feb. 15.
Sediment loads: Maximum daily, 110 tons Feb. 23; minimum daily, 0.1 ton on several days in January and February.
EXTREMES, 1957-61.--Water temperatures: Maximum, 69°F Aug. 22, 1959; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 438 ppm May 11, 1959; minimum daily, 1 ppm on several days during May 1958, May 1959, February, March, and September 1960.
Sediment loads: Maximum daily, 512 tons May 11, 1959; minimum daily, less than 0.05 ton May 1, 1958, Mar. 14, 1959, Feb. 21, 28, Mar. 1, 1960.
REMARKS.--Flow affected by ice Dec. 1, 9, 13, 20-26, 28, Jan. 3-5, 9, Jan. 20 to Feb. 6, 18-21.

Temperature (°F) of water, water year October 1960 to September 1961
(Once-daily measurement, usually between 8 a.m. and 10 a.m.)

Month	Day																													Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
October	47	50	47	48	52	50	47	47	47	48	53	54	56	56	54	48	48	45	44	41	38	43	46	40	40	44	46	44	47	48	49	47
November	45	43	41	42	41	40	37	40	36	36	37	38	39	43	47	46	40	41	39	41	39	41	35	38	37	41	43	45	36	32	--	40
December	32	32	36	40	45	37	33	32	32	32	32	32	32	32	33	32	32	32	32	32	32	32	32	32	32	32	32	32	33	32	33	33
January	32	33	32	32	32	32	32	32	32	32	32	32	32	36	35	34	35	34	32	32	32	32	32	32	32	32	32	32	32	32	32	32
February	32	32	32	32	32	32	32	32	34	34	37	35	37	36	38	34	38	36	32	32	32	33	33	32	32	34	35	34	-	-	--	34
March	35	37	37	35	35	37	33	33	33	32	37	34	33	37	36	33	32	33	35	33	32	35	33	35	34	38	41	35	35	34	37	35
April	35	34	36	39	42	39	39	37	38	37	39	39	39	42	40	--	35	39	42	45	47	50	47	44	44	45	48	44	43	47	--	41
May	43	43	45	47	49	49	51	55	49	48	52	57	61	60	57	48	51	47	49	52	56	50	49	52	53	47	49	52	53	52	55	51
June	60	58	56	57	57	58	58	62	60	63	62	63	63	58	54	53	54	57	59	56	55	59	54	54	52	54	58	61	64	64	--	58
July	65	64	58	59	57	58	60	57	57	59	60	61	62	60	60	59	60	61	63	61	61	60	61	62	61	62	63	63	63	66	65	61
August	62	64	60	63	63	60	58	61	61	64	64	59	57	60	62	61	61	63	63	56	57	57	56	56	57	61	61	61	60	63	65	60
September	65	66	66	59	60	59	60	62	64	65	65	58	60	57	58	52	53	56	53	53	58	57	52	51	50	48	52	46	45	55	--	57

WISCONSIN RIVER BASIN--Continued

5-4037. DELL CREEK NEAR LAKE DELTON, WIS.--Continued

Suspended sediment, water year October 1960 to September 1961

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	27	13	0.9	74	21	4.2	20	9	0.5
2	27	12	.9	36	16	1.6	21	8	.4
3	26	14	1.0	30	12	1.0	22	7	.4
4	26	13	.9	27	8	.6	24	10	.6
5	26	10	.7	27	8	.6	44	54	6.4
6	25	9	.6	29	8	.6	30	16	1.3
7	25	10	.7	29	10	.8	23	11	.7
8	25	13	.9	33	11	1.0	22	10	.6
9	25	11	.7	32	10	.9	22	7	.4
10	24	13	.8	26	9	.6	20	9	.5
11	25	18	1.2	26	11	.8	21	10	.6
12	25	8	.5	26	15	1.0	20	8	.4
13	25	10	.7	26	22	1.5	20	13	.7
14	26	12	.8	26	25	1.8	20	17	.9
15	25	9	.6	27	45	3.3	21	15	.8
16	25	8	.5	29	29	2.3	20	14	.8
17	25	8	.5	27	40	2.9	20	10	.5
18	24	7	.4	25	28	1.9	19	7	.4
19	24	8	.5	24	22	1.4	19	4	.2
20	24	11	.7	24	19	1.2	19	6	.3
21	25	9	.6	24	17	1.1	20	9	.5
22	25	10	.7	24	16	1.0	20	4	.2
23	25	7	.5	23	13	.8	20	4	.2
24	25	9	.6	23	17	1.0	20	7	.4
25	25	12	.8	23	13	.8	20	9	.5
26	32	10	.9	23	15	.9	20	10	.5
27	28	6	.4	23	12	.7	20	7	.4
28	26	7	.5	34	40	3.7	20	7	.4
29	25	6	.4	30	21	1.7	20	11	.6
30	26	10	.7	23	13	.8	20	8	.4
31	92	70 S	18	--	--	--	20	8	.4
Total	858	--	38.6	853	--	42.5	667	--	21.9

Day	JANUARY			FEBRUARY			MARCH		
	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	20	6	0.3	17	3	0.1	25	3	0.2
2	20	6	.3	17	3	.1	25	5	.3
3	20	5	.3	17	3	.1	26	6	.4
4	20	7	.4	17	5	.2	31	11	.9
5	20	7	.4	17	3	.1	44	32	3.8
6	20	8	.4	18	4	.2	40	25	2.7
7	20	7	.4	18	5	.2	30	7	.6
8	20	6	.3	18	5	.2	27	5	.4
9	20	5	.3	18	3	.1	25	4	.3
10	19	5	.2	18	4	.2	25	3	.2
11	19	7	.4	19	6	.3	25	4	.3
12	19	7	.4	19	5	.2	24	4	.2
13	20	6	.3	19	6	.3	26	4	.3
14	21	5	.3	19	3	.2	26	4	.3
15	21	6	.3	19	2	.1	36	21	2.0
16	21	7	.4	19	4	.2	45	33	4.0
17	21	5	.3	18	6	.3	38	14	1.4
18	22	6	.4	21	6	.3	31	10	.8
19	20	10	.5	20	4	.2	31	14	1.2
20	19	6	.3	19	7	.4	60	65 J	12
21	19	5	.2	25	57	3.8	98	94 S	27
22	19	4	.2	34	60 J	7	64	69 S	14
23	19	5	.2	184	230 J	110	102	90	25
24	18	5	.2	128	62 S	25	142	75	29
25	18	3	.1	34	22	2.0	185	68	34
26	18	3	.1	28	8	.6	173	59	28
27	17	5	.2	27	4	.3	128	62	21
28	17	4	.2	25	4	.3	122	54	18
29	17	3	.1	--	--	--	47	34	4.3
30	17	4	.2	--	--	--	38	20	2.0
31	17	3	.1	--	--	--	36	16	1.6
Total	598	--	8.7	852	--	153.0	1775	--	236.2

S Computed by subdividing day.
J Computed from partly estimated-concentration graph and subdividing day.

WISCONSIN RIVER BASIN--Continued

5-4037. DELL CREEK NEAR LAKE DELTON, WIS.--Continued

Suspended sediment, water year October 1960 to September 1961--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	34	13	1.2	27	5	0.4	23	7	0.4
2	32	12	1.0	26	5	.4	22	8	.5
3	31	12	1.0	26	6	.4	21	4	.2
4	31	12	1.0	25	5	.3	20	5	.3
5	34	15	1.4	25	6	.4	20	6	.3
6	36	17	1.6	25	10	.7	19	7	.4
7	37	15	1.5	26	13	.9	20	6	.3
8	32	11	1.0	26	11	.8	26	14	1.0
9	30	11	.9	25	9	.6	24	14	.9
10	30	8	.6	24	8	.5	21	13	.7
11	29	9	.7	23	3	.2	22	16	1.0
12	35	8	.8	23	5	.3	21	16	1.0
13	34	7	.6	22	6	.4	22	31	1.8
14	34	8	.7	25	9	.6	20	27	1.4
15	41	14	1.5	36	21	2.0	19	23	1.2
16	34	7	.6	26	8	.6	19	21	1.1
17	38	7	.7	26	9	.6	18	21	1.0
18	47	13	1.6	41	25	2.8	18	23	1.1
19	41	11	1.2	30	13	1.0	33	90	A 8
20	36	10	1.0	33	16	1.4	29	42	3.3
21	45	26	3.2	27	11	.8	21	22	1.2
22	37	16	1.6	25	8	.5	23	29	1.8
23	35	8	.8	23	8	.5	26	24	1.7
24	47	19	2.4	27	10	.7	21	21	1.2
25	39	20	2.1	24	8	.5	22	22	1.3
26	35	7	.7	26	8	.6	20	22	1.2
27	32	5	.4	23	7	.4	19	17	.9
28	30	8	.6	22	7	.4	19	17	.9
29	29	12	.9	21	4	.2	18	16	.8
30	28	6	.4	21	4	.2	18	15	.7
31	--	--	--	22	5	.3	--	--	--
Total	1053	--	33.7	801	--	20.4	644	--	37.6

	JULY			AUGUST			SEPTEMBER		
1	18	15	0.7	21	11	0.6	17	11	0.5
2	18	16	.8	20	14	.8	48	48	6.2
3	17	15	.7	18	12	.6	22	18	1.1
4	18	16	.8	18	9	.4	19	13	.7
5	18	23	1.1	20	10	.5	19	13	.7
6	17	18	.8	19	9	.5	20	14	.8
7	17	14	.6	17	8	.4	18	14	.7
8	17	11	.5	17	8	.4	20	15	.8
9	17	13	.6	17	8	.4	22	22	1.3
10	16	13	.6	22	11	.6	18	16	.8
11	16	15	.6	18	8	.4	18	16	.8
12	16	13	.6	16	8	.3	34	40	J 6
13	17	17	.8	16	9	.4	110	41	12
14	17	14	.6	16	8	.3	78	35	7.4
15	17	12	.6	15	6	.2	33	26	2.3
16	18	14	.7	15	5	.2	24	13	.8
17	17	15	.7	15	8	.3	22	13	.8
18	16	9	.4	15	6	.2	21	17	1.0
19	16	9	.4	15	7	.3	20	11	.6
20	16	11	.5	15	4	.2	20	12	.6
21	17	11	.5	15	7	.3	20	10	.5
22	20	16	.9	15	13	.5	21	12	.7
23	26	24	1.7	15	6	.2	23	14	.9
24	24	21	1.4	15	4	.2	24	15	1.0
25	19	38	1.9	15	10	.4	22	13	.8
26	18	8	.4	30	73	5.9	21	12	.7
27	17	8	.4	21	16	.9	20	10	.5
28	17	9	.4	18	13	.6	20	8	.4
29	17	14	.6	17	9	.4	20	8	.4
30	19	13	.7	16	11	.5	107	63	S 19
31	24	16	1.0	16	12	.5	--	--	--
Total	557	--	23.0	538	--	18.4	901	--	70.8

Total discharge for year (cfs-days)..... 10097
Total load for year (tons)..... 704.8

S Computed by subdividing day.
A Computed from partly estimated-concentration graph.
J Computed from partly estimated-concentration graph and subdividing day.

WISCONSIN RIVER BASIN--Continued

5-4065. 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 1961.
Sediment records: February 1954 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 74°F Sept. 10; minimum, freezing point on several days during November to March.
Sediment concentrations: Maximum daily, 1,100 ppm Mar. 25; minimum daily, 2 ppm Feb. 13-15, Aug. 13, 15.
Sediment loads: Maximum daily, 1,000 tons Mar. 25; minimum daily, 0.1 ton Aug. 13, 15.
EXTREMES, 1954-61.--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, Oct. 19-21, 1958.
Sediment loads: Maximum daily, 3,960 tons July 3, 1954; minimum daily, less than 0.05 ton Oct. 19-21, 1958.
REMARKS.--Flow affected by ice Dec. 31, Jan. 1-5, 21-23, Jan. 25 to Feb. 4, 11-14, 28.

Temperature (°F) of water, water year October 1960 to September 1961

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

WISCONSIN RIVER BASIN--Continued

5-4065. BLACK EARTH CREEK AT BLACK EARTH, WIS.--Continued

Suspended sediment, water year October 1960 to September 1961

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..	39	18	1.9	99	99	26	36	20	1.9
2..	40	26	2.8	59	46	7.3	34	21	1.9
3..	40	19	2.0	50	51	6.9	36	24	2.3
4..	37	27	2.7	46	38	4.7	35	23	2.2
5..	37	20	2.0	44	43	5.1	40	66	7.1
6..	37	17	1.7	44	32	3.8	38	73	7.5
7..	36	23	2.2	44	20	2.4	38	85	8.7
8..	36	19	1.8	44	20	2.4	37	85	8.5
9..	36	15 B	1	44	17	2.0	36	77	7.5
10..	36	18	1.7	42	22	2.5	35	71	6.7
11..	35	24	2.3	38	30	3.2	35	69	6.5
12..	36	17	1.6	38	27	2.8	34	66	6.0
13..	36	16 B	2	39	31	3.3	34	71	6.5
14..	38	18	1.8	38	30	3.1	34	86	7.9
15..	35	26	2.4	44	36	4.3	34	95	8.7
16..	35	30 B	3	47	32	4.1	34	100 B	9
17..	34	17	1.6	43	24	2.8	33	112	10
18..	34	18	1.6	42	28	3.2	33	40	3.6
19..	33	19	1.7	41	21	2.3	32	90	7.8
20..	33	35	3.1	39	18	1.9	30	11	.9
21..	33	14	1.2	39	17	1.8	30	16	1.3
22..	33	6	.5	38	18	1.8	30	17	1.4
23..	34	9	.8	38	20	2.0	30	13 B	1
24..	33	10	.9	37	31	3.1	30	12	1.0
25..	33	12 B	1	37	28	2.8	30	13	1.0
26..	37	18	1.8	38	29	3.0	30	13	1.0
27..	34	13	1.2	38	22	2.2	30	7	.6
28..	34	13	1.2	39	12	1.3	30	9	.7
29..	34	17	1.6	40	8	.9	30	8	.6
30..	34	17	1.6	37	8	.8 A	30	7 B	.6
31..	208	352 S	237	--	--	--	30	6	.5
Total	1270	--	289.7	1306	--	113.8	1028	--	130.9

Day	JANUARY			FEBRUARY			MARCH		
	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..	30	7	0.6	26	13	0.9	30	18	1.4
2..	30	5	.4	26	11	.8	30	13	1.0
3..	30	6	.5	26	11	.8	31	7	.6
4..	30	5	.4	26	10	.7	137	768 S	>11
5..	30	5	.4	26	11	.8	82	252 S	75
6..	31	8	.7	26	10	.7	274	314 S	299
7..	33	11	1.0	26	11	.8	70	66	12
8..	33	7	.6	26	11	.8	43	40 B	5
9..	32	7	.6	26	12	.8	38	31	3.2
10..	31	77	6.4	27	4	.3	38	18	1.8
11..	31	106	8.9	28	9	.7	37	15	1.5
12..	31	111	9.3	29	5	.4	36	13	1.3
13..	31	119	10	29	2	.2	36	9	.9
14..	31	112	9.4	30	2 B	.2	36	14	1.4
15..	31	100	8.4	30	2	.2	39	25	2.6
16..	30	121	9.8	30	4 B	.3	39	23	2.4
17..	30	116	9.4	31	8	.7	39	17	1.8
18..	30	104	8.4	51	133 S	26	35	12	1.1
19..	29	96	7.5	41	69 S	8.8	35	13	1.2
20..	29	21	1.6	32	8	.7	55	44	6.5
21..	28	18	1.4	30	12	1.0	81	62	14
22..	28	14	1.0	41	-- E	18	104	87	24
23..	27	7	.5	184	-- E	550	159	122	52
24..	26	7 B	.5	47	70	8.9	328	682 S	980
25..	26	9	.6	34	28	2.6	301	1100 J	1000
26..	26	10	.7	33	21	1.9	167	320 J	230
27..	26	7	.5	32	20	1.7	115	142 S	48
28..	26	8	.6	31	22	1.8	75	94	19
29..	26	9	.6	--	--	--	58	48	7.5
30..	26	10	.7	--	--	--	50	38	5.1
31..	26	11	.8	--	--	--	46	28	3.5
Total	904	--	102.2	1024	--	631.5	2644	--	3313.8

E Estimated.
S Computed by subdividing day.
A Computed from partly estimated-concentration graph.
B Computed from estimated-concentration graph.
J Computed from partly estimated-concentration graph and subdividing day.

WISCONSIN RIVER BASIN--Continued

5-4065. BLACK EARTH CREEK AT BLACK EARTH, WIS.--Continued

Suspended sediment, water year October 1960 to September 1961--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..	44	23	2.7	34	29	2.7	29	24	1.9
2..	42	23	2.6	33	32	2.8	30	18	1.4
3..	40	22	2.4	32	29	2.5	28	23	1.7
4..	40	22	2.4	31	24	2.0	28	31	2.3
5..	43	30	3.5	31	22	1.8	27	28	2.0
6..	43	23	2.7	32	60	5.2	28	37	2.8
7..	42	15 B	2	32	27	2.3	29	35 B	3
8..	38	15	1.5	32	17	1.5	29	28	2.2
9..	37	14	1.4	32	13	1.1	29	32	2.5
10..	36	13	1.3	31	17	1.4	30	37	3.0
11..	38	12	1.2	31	15	1.2	31	39	3.3
12..	41	15	1.7	30	15	1.2	30	38	3.1
13..	40	27	2.9	30	19	1.5	34	34	3.1
14..	37	22	2.2	32	53	4.6	36	77	7.5
15..	37	22	2.2	34	24	2.2	32	57	4.9
16..	37	20 B	2	32	10 B	1	29	32	2.5
17..	38	19	1.9	30	11	.9	29	33	2.6
18..	44	29	3.4	32	13	1.1	30	34	2.8
19..	41	28	3.1	31	26	2.2	29	33	2.6
20..	38	32	3.3	29	22	1.7	31	38	3.2
21..	40	38	4.1	31	19	1.6	29	45 B	4
22..	38	38	3.9	30	14	1.1	33	52	4.6
23..	38	25	2.6	29	18	1.4	30	46	3.7
24..	40	31	3.3	28	17	1.3	31	38	3.2
25..	38	18	1.8	31	6	.5	31	37	3.1
26..	37	25	2.4	32	6	.5	30	30	2.4
27..	36	27	2.6	31	17	1.4	31	27	2.2
28..	34	23	2.1	30	39	3.2	31	38	3.2
29..	34	10	.9	29	47	3.7	30	38	3.1
30..	34	18	1.6	28	32	2.4	29	30 B	2
31..	--	--	--	29	23	1.8	--	--	--
Total	1165	--	71.7	959	--	59.8	903	--	89.9

Day	JULY			AUGUST			SEPTEMBER		
1..	30	28	2.3	34	22	2.0	23	10	0.6
2..	31	26	2.2	31	18	1.5	26	9	.6
3..	31	18	1.5	30	18	1.4	26	10	.7
4..	31	18	1.5	29	22	1.7	25	12	.8
5..	34	12	1.1	28	25	1.9	26	11	.8
6..	33	10	.9	27	14	1.0	25	10	.7
7..	31	12	1.0	29	16	1.2	24	10 B	.6
8..	31	12	1.0	29	7 B	.5	24	10	.6
9..	30	24	1.9 A	29	5	.4	25	11	.7
10..	30	22	1.8	29	6	.5	25	12	.8
11..	30	27	2.2	25	10	.7	25	18	1.2
12..	30	32	2.6	25	3	.2	34	32	2.9
13..	30	30	2.4	24	2	.1	84	65 B	15
14..	30	30	2.4	24	3	.2	78	50 A	10
15..	31	28	2.3	23	2	.1	40	12	1.3
16..	31	25	2.1	23	3	.2	33	17	1.5
17..	29	36	2.8	23	5	.3	31	15	1.2
18..	28	26	2.0	23	24	1.5	29	11	.9
19..	28	28	2.1	22	18	1.1	28	14	1.0
20..	28	28	2.1	21	14	.8	27	16	1.2
21..	27	29	2.1	21	14	.8	27	13	.9
22..	26	31	2.2	21	12	.7	28	12	.9
23..	30	30	2.4	21	10	.6	29	12 B	.9
24..	28	33	2.5	21	10	.6	29	17	1.3
25..	25	23	1.6	23	8	.5	29	17	1.3
26..	25	22	1.5	23	7	.4	28	17	1.3
27..	25	17	1.1	23	7	.4	27	17	1.2
28..	25	21	1.4	24	16	1.0	26	17	1.2
29..	24	20	1.3	23	12	.7	26	12	.8
30..	33	17	1.5	23	13	.8	64	52	9.0
31..	28	16	1.2	23	13	.8	--	--	--
Total	903	--	57.0	774	--	24.6	971	--	61.9

Total discharge for year (cfs-days)..... 13851
Total load for year (tons)..... 4946.8

A Computed from partly estimated-concentration graph.
B Computed from estimated-concentration graph.

WISCONSIN RIVER BASIN--Continued

5-4065. BLACK EARTH CREEK AT BLACK EARTH, WIS.--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment											Method of analysis
							Percent finer than size indicated, in millimeters											
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Mar. 25, 1961.....	1645			284	1030		46	54	63	77	95	99	100					SBWC
Mar. 25.....	1645			284	1030		9	19	34	60	85	94	98	100				SBN

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TURKEY RIVER BASIN

5-4125. TURKEY RIVER AT GARBER, IOWA

LOCATION.--At gaging station at county highway bridge at Garber, Clayton County, 800 feet upstream from Wayman Creek, 2,000 feet downstream from Elk Creek, and 1 mile downstream from Volga River.
DRAINAGE AREA.--1,545 square miles.
RECORDS AVAILABLE.--Water temperatures: October 1957 to September 1961.
Sediment records: October 1957 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 80°F July 26, Aug. 17; minimum, freezing point on many days during December to March.
Sediment concentrations: Maximum daily, 7,730 ppm July 5; minimum daily, 6 ppm Feb. 7, 8.
Sediment loads: Maximum daily, 174,000 tons Mar. 25; minimum daily, 3 tons Feb. 7.
EXTREMES, 1957-61.--Water temperatures: Maximum, 82°F Aug. 19, 1958; minimum, freezing point on many days during winter months each year.
Sediment concentrations: Maximum daily, 19,300 ppm May 20, 1959; minimum daily (1959-61), 6 ppm Feb. 7, 8, 1961.
Sediment loads: Maximum daily, 294,000 tons June 26, 1959; minimum daily (1959-61), 3 tons Feb. 7, 1961.
REMARKS.--Maximum observed sediment concentration during water year, 13,200 ppm July 19. Flow affected by ice Nov. 28 to Feb. 18.

Temperature (°F) of water, water year October 1960 to September 1961

Month	Day																													Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
October	52	54	58	50	54	52	50	50	50	50	52	--	60	--	58	--	50	--	46	--	--	46	--	40	--	42	--	44	48	50	48	--
November	44	40	44	42	--	40	--	40	--	--	34	--	42	--	48	46	38	--	38	--	37	--	38	--	40	--	44	--	34	--	--	--
December	32	--	32	--	32	--	32	--	32	--	32	--	32	--	32	--	32	--	32	--	32	--	32	--	32	--	32	--	32	--	32	--
January	--	32	--	32	--	32	--	32	--	32	--	32	--	32	--	32	--	32	--	32	--	32	--	32	--	32	--	32	--	32	--	--
February	32	--	32	--	32	--	32	--	32	--	32	--	32	--	32	32	--	--	--	--	37	34	35	35	32	33	34	36	--	--	--	--
March	39	36	38	36	33	32	32	32	32	32	36	36	36	34	34	38	36	35	38	42	38	38	38	38	38	40	42	38	38	36	40	36
April	38	38	40	44	38	40	38	38	44	44	46	42	46	44	40	38	38	42	52	52	48	54	54	52	52	50	52	48	48	48	--	45
May	54	56	50	50	52	52	58	--	48	64	--	68	--	60	60	60	60	54	52	60	56	58	58	--	--	60	--	60	--	62	--	--
June	60	66	74	--	66	--	68	68	70	--	71	--	74	78	74	--	64	--	70	--	64	--	68	--	64	--	68	--	78	--	--	--
July	75	74	70	68	64	64	70	76	76	--	70	--	70	72	68	70	74	68	68	68	70	72	68	74	70	80	--	70	--	78	74	71
August	70	70	72	74	72	70	70	70	72	78	78	--	66	--	70	--	80	--	72	--	70	--	64	--	66	--	70	--	68	--	70	--
September	--	76	70	66	--	66	--	74	--	78	--	64	62	56	54	60	58	58	64	66	--	62	54	52	51	--	58	--	50	56	--	--

TURKEY RIVER BASIN--Continued

5-4125. TURKEY RIVER AT GARBER, IOWA--Continued

Suspended sediment, water year October 1960 to September 1961
/Where no concentrations are reported, loads are estimated/

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..	513	72	100	2000	1830	9880	220	33	20
2..	487	62	82	1860	995	5000	280	32	24
3..	462	44	55	1340	340	1230	350	31	29
4..	434	43	50	1020	170	468	430	34	39
5..	414	52	58	885	--	240	460	36	45
6..	403	51	55	810	84	184	455	31	38
7..	384	41	43	735	68	135	370	26	26
8..	366	33	33	710	53	102	310	26	22
9..	348	35	33	685	50	92	170	27	12
10..	351	35	33	612	40	66	240	26	17
11..	334	32	29	579	33	52	300	26	21
12..	327	34	30	566	32	49	320	22	19
13..	324	37	32	556	32	48	290	19	15
14..	327	32	28	534	32	46	320	30	26
15..	355	28	27	612	295	S 588	300	41	33
16..	344	27	25	635	--	500	280	43	33
17..	334	26	23	539	150	218	270	45	33
18..	317	24	21	517	--	140	260	40	28
19..	313	23	19	492	53	70	255	36	25
20..	297	22	18	483	36	47	250	32	22
21..	300	20	16	466	18	23	240	28	18
22..	304	19	16	458	25	31	220	32	19
23..	304	18	15	438	32	38	190	36	18
24..	307	16	13	430	36	42	180	30	15
25..	366	--	460	426	39	45	180	25	12
26..	395	260	277	422	40	46	180	26	13
27..	344	--	75	414	40	45	200	27	15
28..	327	26	23	400	44	48	210	27	15
29..	330	29	26	397	49	53	230	27	17
30..	513	150	208	270	41	30	240	30	19
31..	962	810	S 2660	--	--	--	240	32	21
Total	11886	--	4583	20291	--	19556	8440	--	709
	JANUARY			FEBRUARY			MARCH		
1..	240	18	12	190	16	8	1100	185	549
2..	230	15	9	200	14	8	1100	205	609
3..	220	14	8	200	11	6	1130	205	625
4..	230	12	7	200	12	6	2060	2090	S 17600
5..	240	12	8	210	12	7	5100	4430	61000
6..	250	12	8	210	9	5	6520	3150	S 61800
7..	250	19	13	210	6	3	4880	2080	S 30800
8..	245	26	17	220	6	4	2220	600	3600
9..	245	34	22	230	7	4	1110	340	1020
10..	250	43	29	250	8	5	935	215	543
11..	260	33	23	260	10	7	990	155	414
12..	270	23	17	280	15	11	935	120	303
13..	280	35	26	300	20	16	860	140	325
14..	290	47	37	315	20	17	785	100	212
15..	290	40	31	340	21	19	885	195	466
16..	280	32	24	350	34	32	910	120	295
17..	270	24	17	370	35	35	885	86	205
18..	250	16	11	2550	--	9000	835	71	160
19..	230	26	16	1790	--	1000	760	51	105
20..	200	37	20	910	--	500	860	95	221
21..	180	30	15	962	800	A 2080	1070	185	534
22..	170	24	11	2920	4540	S 58900	1370	300	1110
23..	160	32	14	9580	5100	132000	2280	1220	7510
24..	160	39	17	4500	1750	21300	4820	4160	S 66100
25..	160	34	15	2300	1370	8510	11200	5740	174000
26..	160	29	13	1430	600	2320	19000	2900	149000
27..	160	28	12	1130	250	763	18100	2550	125000
28..	170	27	12	1100	210	624	17800	1980	95200
29..	170	30	14	--	--	--	16800	1600	72600
30..	180	34	17	--	--	--	5200	1650	23200
31..	190	25	13	--	--	--	3300	800	7130
Total	6880	--	508	33507	--	237190	135800	--	902236

S Computed by subdividing day.
A Computed from partly estimated concentration graph.

TURKEY RIVER BASIN--Continued

5-4125. TURKEY RIVER AT GARBER, IOWA--Continued

Suspended sediment, water year October 1960 to September 1961--Continued
[Where no concentrations are reported, loads are estimated]

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	2700	565	4120	1220	100	329	785	3340	S 8160
2	2300	345	2140	1130	78	238	710	840	1610
3	2000	285	1540	1070	68	196	635	250	429
4	1790	240	1160	1020	70	193	570	--	150
5	1680	220	998	1020	64	176	543	--	150
6	1620	160	700	935	53	134	539	--	200
7	1520	135	554	910	53	130	738	1300	A 2590
8	1430	130	502	885	59	141	810	430	940
9	1340	105	380	835	65	147	849	900	A 2060
10	1250	89	300	785	55	117	785	480	1020
11	1190	110	353	760	56	115	635	290	497
12	1250	125	422	735	58	115	570	220	339
13	1370	170	629	710	60	115	522	165	233
14	1490	225	905	760	210	431	479	120	155
15	1490	175	704	1130	2130	6500	430	120	139
16	1650	190	846	1040	600	1680	438	120	142
17	1620	240	1050	885	165	394	450	120	146
18	1460	170	670	962	140	364	430	115	134
19	1620	260	1140	935	105	265	422	115	131
20	1650	210	936	935	86	217	418	120	135
21	1680	240	1090	910	98	241	403	130	141
22	1720	205	952	835	64	144	399	125	135
23	1930	1870	12800	785	75	159	391	120	127
24	3030	6100	49900	735	60	119	373	115	116
25	2700	1600	11700	760	50	103	376	115	117
26	2140	490	2830	760	46	94	369	105	105
27	1760	295	1400	710	48	92	358	105	101
28	1520	210	862	685	51	94	344	88	82
29	1400	140	529	660	52	93	330	71	63
30	1310	115	407	635	53	91	327	82	72
31	--	--	--	612	53	88	--	--	--
Total	51610	--	102519	26749	--	13315	15428	--	20419

Day	JULY			AUGUST			SEPTEMBER		
1	351	130	A 123	9160	3370	83300	317	50	43
2	438	240	A 284	8950	1200	29000	2190	4100	S 32000
3	407	110	121	4400	800	9500	660	500	891
4	421	585	S 1010	2780	500	3750	526	270	383
5	947	7730	19800	2940	1720	13700	458	170	210
6	492	1200	1590	3570	950	9160	418	105	119
7	391	390	412	2220	385	2310	399	105	113
8	358	210	203	1520	275	1130	380	105	108
9	324	145	127	1250	230	776	348	115	108
10	265	135	97	1100	150	446	410	125	138
11	288	135	105	962	140	364	426	130	150
12	278	100	75	860	115	267	1790	4200	S 32600
13	278	85	64	760	92	189	3780	2950	30100
14	297	200	160	710	90	173	2000	1000	5400
15	310	265	222	635	88	151	1250	360	1220
16	307	120	99	588	74	117	935	220	555
17	278	115	86	556	60	90	760	135	277
18	275	115	85	522	68	96	660	105	187
19	362	4140	S 5060	570	76	117	612	95	157
20	259	335	234	509	64	88	556	105	158
21	265	160	114	471	51	65	487	100	131
22	275	135	100	434	50	59	731	2460	S 6200
23	275	145	108	407	48	53	566	600	917
24	588	1350	S 2290	422	47	54	548	155	229
25	566	500	764	399	46	50	534	110	159
26	388	200	210	384	46	48	500	110	148
27	320	180	156	373	47	47	479	105	136
28	291	165	130	369	48	48	454	95	116
29	232	120	75	351	48	45	442	85	101
30	275	90	67	341	49	45	6270	4770	S 90000
31	1710	4770	S 28900	320	50	43	--	--	--
Total	12511	--	62871	48833	--	155281	29886	--	203054

Total discharge for year (cfs-days)..... 401821
Total load for year (tons)..... 1722241

S Computed by subdividing day.
A Computed from partly estimated concentration graph.

TURKEY RIVER BASIN--Continued

5-4125. TURKEY RIVER AT GARBER, IOWA--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Mar. 4, 1961.....	1630	36		2480	2900		--	31	--	52	--	96	98	100	--			SPWC
Mar. 24.....	1615	42		5100	5140		--	23	--	36	--	90	95	98	100			SPWC
Mar. 25.....	2230	41		17800	5180		--	34	--	52	--	95	98	100	--			SPWC
Mar. 26.....	0650	40		19700	3330		--	39	--	69	--	99	99	100	--			SPWC
Mar. 26.....	1325	42		19500	2560		--	36	--	58	--	94	96	98	100			SPWC
Mar. 29.....	0845	36		18200	1880		--	28	--	46	--	85	89	94	99	100		SPWC
July 5.....	0700	64		1020	7220		44	48	60	75	90	97	99	100	--			SPWC
July 5.....	0700	64		1020	7220		24	34	52	72	90	97	99	100	--			SPN
July 31.....	1700	74		2860	5870		--	40	--	62	--	96	98	100	--			SPWC
Aug. 1.....	0500	70		7960	4820		34	39	51	67	84	97	98	99	100			SPWC
Aug. 1.....	0500	70		7960	4820		24	37	46	63	80	97	98	99	100			SPN
Aug. 1.....	1050	70		9450	2900		--	40	--	55	--	90	93	97	100			SPWC
Aug. 6.....	0645	70		4020	1240		--	34	--	56	--	92	94	98	100			SPWC
Sept. 2.....	0730	70		5600	5860		--	38	--	60	--	96	98	100	--			SPWC
Sept. 22.....	1800	62		910	5970		43	48	58	72	90	100	--	--	--			SPWC
Sept. 22.....	1800	62		910	5970		21	30	48	71	89	100	--	--	--			SPN

ROCK RIVER BASIN--Continued

5-4305. ROCK RIVER AT AFTON, WIS.

LOCATION.--Temperature recorder at gaging station in Afton, 0.2 mile downstream from highway bridge, 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 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 86°F July 30; minimum, freezing point on many days during December to March.
EXTREMES, 1954-61.--Water temperatures: Maximum, 89°F July 27-30, Aug. 4, 1955; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1960 to September 1961
(Continuous ethyl alcohol-actuated thermograph)

Month	Day																													Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
October																																
Maximum	62	61	61	61	62	62	61	61	61	62	63	63	63	63	63	61	60	59	58	55	52	50	52	51	49	48	48	49	49	49	50	57
Minimum	61	60	60	60	60	60	60	60	60	60	61	62	62	63	61	60	59	58	55	52	50	49	50	49	48	47	47	47	48	49	49	56
November																																
Maximum	50	50	47	47	46	44	43	42	42	41	40	41	40	41	44	45	45	42	41	40	40	40	40	38	38	39	39	41	41	38	--	42
Minimum	49	47	46	46	44	43	42	42	41	40	39	40	39	40	41	44	42	41	40	40	40	40	38	38	37	38	38	39	38	35	--	41
December																																
Maximum	35	34	34	35	39	39	38	36	35	35	35	35	35	34	33	34	34	34	34	33	34	34	35	34	33	33	33	33	33	33	33	34
Minimum	34	34	34	34	35	38	36	35	35	35	35	35	33	33	33	33	33	33	33	33	33	34	34	33	32	32	33	33	33	33	33	34
January																																
Maximum	33	43	33	33	33	33	34	34	33	33	34	35	35	35	34	34	35	34	34	33	33	33	33	33	33	33	33	33	33	33	32	33
Minimum	33	33	33	33	32	33	33	33	33	33	33	33	33	33	34	34	33	33	33	33	33	32	32	32	33	32	32	32	32	32	32	33
February																																
Maximum	32	33	32	32	32	32	32	32	34	35	35	36	35	34	34	36	38	37	37	38	38	37	38	38	38	37	37	39	--	--	--	15
Minimum	32	32	32	32	32	32	32	32	32	34	34	34	33	34	34	36	36	34	35	35	35	37	38	36	36	36	36	--	--	--	34	34
March																																
Maximum	39	40	39	39	39	37	35	35	34	34	34	35	35	35	36	37	37	36	36	38	38	38	38	38	40	42	45	45	44	44	44	38
Minimum	37	38	39	39	37	35	35	33	32	33	33	34	34	34	35	36	36	35	35	36	37	38	38	37	38	40	42	43	43	43	43	37
April																																
Maximum	44	43	43	45	45	45	44	45	45	44	44	45	47	47	47	47	44	46	51	52	56	59	59	59	58	57	58	58	57	57	--	50
Minimum	43	42	42	43	45	44	44	44	44	43	44	44	45	47	47	44	44	44	46	50	52	56	58	58	56	55	56	56	55	55	--	48
May																																
Maximum	57	58	58	60	60	60	61	63	63	63	64	66	69	68	68	66	64	61	63	62	64	66	66	67	66	62	64	62	66	68	68	64
Minimum	56	56	56	57	59	58	58	61	61	60	61	63	65	64	65	63	61	59	58	60	61	62	61	63	62	61	59	60	61	62	65	61
June																																
Maximum	69	73	72	74	76	75	75	75	76	80	80	82	81	77	76	76	75	76	73	75	75	73	72	72	73	73	75	79	81	82	--	76
Minimum	67	68	66	68	69	69	69	71	70	72	72	74	75	73	70	69	69	68	70	68	68	68	67	66	65	66	67	69	72	74	--	70
July																																
Maximum	78	81	78	71	74	78	77	76	78	80	76	76	75	78	75	78	79	80	78	82	78	79	79	78	79	82	79	81	85	86	83	79
Minimum	74	73	71	68	68	69	72	69	68	66	68	67	70	71	71	70	72	74	75	75	75	74	75	73	74	74	76	76	78	78	79	72
August																																
Maximum	79	80	81	84	80	79	79	77	79	79	79	76	77	78	78	80	80	80	74	74	76	76	72	72	75	74	74	80	79	80	79	78
Minimum	77	75	74	76	74	73	71	73	71	74	74	70	68	71	70	70	73	73	68	67	68	70	66	66	67	69	70	70	71	72	70	71
September																																
Maximum	79	76	79	74	76	77	79	78	79	77	77	71	70	67	64	64	65	66	66	67	67	69	67	65	62	62	62	61	59	59	--	70
Minimum	72	72	73	72	72	73	71	72	73	71	71	69	67	64	62	62	62	63	64	64	65	66	65	62	60	59	59	58	58	58	--	67

IOWA RIVER BASIN

5-4495. IOWA RIVER NEAR ROWAN, IOWA

LOCATION.--At gaging station at county highway bridge, 3.8 miles northwest of Rowan, Wright County, and 9.4 miles downstream from confluence of East and West Branches.
DRAINAGE AREA.--429 square miles.
RECORDS AVAILABLE.--Water temperatures: October 1957 to September 1961.
Sediment records: October 1957 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 84°F June 30; minimum, freezing point Dec. 13, 19, Feb. 6,19.
Sediment concentrations: Maximum daily, 230 ppm Mar. 26; minimum daily, 4 ppm Jan. 5, 14.
Sediment loads: Maximum daily, 2,020 tons Mar. 26; minimum daily, 0.1 ton Feb. 6,10.
EXTREMES, 1957-61.--Water temperatures: Maximum, 86°F Aug. 4, 1958, Aug. 21, 1959; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 750 ppm May 27, 1958; minimum daily (1959-61), 3 ppm Mar. 19, 1960.
Sediment loads: Maximum daily, 2,020 tons Mar. 26, 1961; minimum daily (1959-61), 0.1 ton Feb. 6, 10, 1961.
REMARKS.--Flow affected by ice Nov. 10, 11, Nov. 29 to Dec. 3, Dec. 7 to Mar. 22.

Temperature (°F) of water, water year October 1960 to September 1961

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

IOWA RIVER BASIN--Continued

5-4495. IOWA RIVER NEAR ROWAN, IOWA--Continued

Suspended sediment, water year October 1960 to September 1961

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	42	1.7	20	12	0.6	11	20	0.6
2	14	42	1.6	20	7	.4	12	23	.7
3	14	36	1.4	17	8	.4	13	26	.9
4	13	34	1.2	14	10	.4	18	20	1.0
5	13	36	1.3	14	9	.3	22	14	.8
6	13	34	1.2	15	8	.3	25	17	1.1
7	13	32	1.1	15	8	.3	27	20	1.5
8	12	39	1.3	15	9	.4	21	27	1.5
9	12	36	1.2	14	9	.3	15	34	1.4
10	12	32	1.0	12	8	.3	17	27	1.2
11	13	45	1.6	12	8	.3	19	20	1.0
12	13	58	2.0	13	7	.2	20	28	1.5
13	13	50	1.8	14	8	.3	20	35	1.9
14	14	41	1.5	15	10	.4	20	30	1.6
15	14	41	1.5	15	10	.4	19	26	1.3
16	17	40	1.8	15	9	.4	19	31	1.6
17	14	32	1.2	14	11	.4	19	36	1.8
18	14	25	.9	14	13	.5	18	33	1.6
19	19	20	1.0	13	12	.4	18	30	1.5
20	20	14	.8	13	13	.5	18	27	1.3
21	17	17	.8	13	14	.5	18	24	1.2
22	16	20	.9	13	16	.6	18	28	1.4
23	15	24	1.0	13	19	.7	18	32	1.6
24	16	18	.8	13	23	.8	18	36	1.7
25	16	13	.6	13	27	.9	18	40	1.9
26	15	14	.6	14	30	1.1	18	43	2.1
27	14	16	.6	15	32	1.3	18	44	2.1
28	14	17	.6	15	25	1.0	18	45	2.2
29	14	18	.7	12	17	.6	18	35	1.7
30	18	17	.8	10	18	.5	19	25	1.3
31	18	16	.8	--	--	--	19	21	1.1
Total	455	--	35.3	425	--	15.5	571	--	44.1
	JANUARY			FEBRUARY			MARCH		
1	19	17	0.9	5.4	36	0.5	60	22	3.6
2	19	26	1.3	5.2	40	.6	100	30	8.1
3	19	35	1.8	5.2	37	.5	250	40	27
4	19	20	1.0	5.2	34	.5	200	40	22
5	19	4	.2	5.2	22	.3	170	25	11
6	19	6	.3	5.2	10	.1	150	13	5.3
7	19	8	.4	5.2	11	.2	130	11	3.9
8	19	8	.4	5.4	12	.2	110	9	2.7
9	20	8	.4	5.6	10	.2	90	8	1.9
10	20	17	.9	6.0	7	.1	80	7	1.5
11	20	12	.6	6.4	9	.2	70	8	1.5
12	20	7	.4	7.0	11	.2	66	8	1.4
13	20	6	.3	9.0	13	.3	64	10	1.7
14	20	4	.2	11	15	.4	60	10	1.6
15	21	10	.6	13	18	.6	60	10	1.6
16	21	15	.8	16	20	.9	58	10	1.6
17	21	24	1.4	18	22	1.1	58	11	1.7
18	20	33	1.8	15	23	.9	60	12	1.9
19	19	30	1.5	12	24	.8	62	12	2.0
20	17	28	1.3	11	26	.8	70	13	2.5
21	15	24	1.0	10	27	.7	100	12	3.2
22	13	19	.7	11	23	.7	130	27	9.5
23	11	26	.8	13	19	.7	216	40	23
24	10	33	.9	15	15	.6	518	71	99
25	9.0	34	.8	17	11	.5	1340	120	434
26	8.0	36	.8	18	20	1.0	3260	230	2020
27	7.6	37	.8	19	30	1.5	5260	120	1700
28	7.4	36	.7	30	26	2.1	5050	74	1010
29	6.8	34	.6	--	--	--	3460	51	476
30	6.2	32	.5	--	--	--	2480	60	402
31	5.8	31	.5	--	--	--	1960	61	323
Total	490.8	--	24.6	305.0	--	17.2	25742	--	6604.2

IOWA RIVER BASIN--Continued

5-4495. IOWA RIVER NEAR ROWAN, IOWA--Continued

Suspended sediment, water year October 1960 to September 1961--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	1600	55	238	130	11	3.9	56	51	7.7
2	1240	69	231	122	10	3.3	53	49	7.0
3	928	53	133	112	11	3.3	50	49	6.6
4	750	40	81	107	13	3.8	46	44	5.5
5	615	38	63	104	10	2.8	41	28	3.1
6	496	42	56	106	17	4.9	48	39	5.1
7	393	30	32	114	14	4.3	57	50	7.7
8	328	30	27	107	13	3.8	77	75	16
9	301	25	20	104	17	4.8	138	61	23
10	267	23	17	96	17	4.4	114	47	14
11	243	22	14	89	12	2.9	89	45	11
12	267	21	15	86	25	5.8	81	54	12
13	319	31	27	83	17	3.8	95	54	14
14	337	30	27	78	27	5.7	126	63	21
15	364	42	41	75	17	3.4	130	59	21
16	355	43	41	76	13	2.7	94	47	12
17	284	33	25	75	21	4.3	76	38	7.8
18	259	21	15	98	8	2.1	66	36	6.4
19	267	27	19	138	22	8.2	59	39	6.2
20	267	30	22	138	26	9.7	54	36	5.2
21	259	34	24	128	29	10	49	36	4.8
22	220	31	18	115	26	8.1	44	35	4.2
23	199	26	14	99	24	6.4	43	34	3.9
24	199	25	13	88	23	5.5	40	34	3.7
25	220	26	15	85	21	4.8	37	26	2.6
26	206	23	13	79	25	5.3	36	29	2.8
27	179	21	10	72	29	5.6	35	27	2.6
28	160	15	6.5	68	35	6.4	34	23	2.1
29	148	12	4.8	64	36	6.2	33	19	1.7
30	138	11	4.1	58	37	5.8	32	20	1.7
31	--	--	--	55	38	5.6	--	--	--
Total	11808	--	1266.4	2949	--	157.6	1933	--	242.4

Day	JULY			AUGUST			SEPTEMBER		
1	31	23	1.9	25	44	3.0	22	34	2.0
2	30	25	2.0	29	49	3.8	23	35	2.2
3	30	16	1.3	34	52	4.8	25	34	2.3
4	29	19	1.5	75	54	11	26	30	2.1
5	28	28	2.1	281	76	58	27	32	2.3
6	30	23	1.9	292	86	68	26	34	2.4
7	38	23	2.4	199	95	51	25	30	2.0
8	37	25	2.5	143	75	29	25	35	2.4
9	32	47	4.1	105	84	24	24	36	2.3
10	29	51	4.0	83	77	17	24	36	2.3
11	27	32	2.3	70	70	13	24	60	3.9
12	27	36	2.6	58	60	9.4	25	53	3.6
13	27	36	2.6	48	50	6.5	28	46	3.5
14	25	47	3.2	42	42	4.8	29	37	2.9
15	30	49	4.0	37	39	3.9	29	31	2.4
16	24	41	2.7	34	40	3.7	27	53	3.9
17	25	51	3.4	32	42	3.6	27	75	5.5
18	24	37	2.4	30	45	3.6	25	70	4.7
19	23	36	2.2	32	50	4.3	25	74	5.0
20	27	39	2.8	32	39	3.4	25	73	4.9
21	34	42	3.9	30	44	3.6	25	76	5.1
22	36	45	4.4	28	35	2.6	25	70	4.7
23	45	46	5.6	27	32	2.3	25	51	3.4
24	37	47	4.7	26	30	2.1	25	47	3.2
25	34	48	4.4	25	29	2.0	24	65	4.2
26	32	45	3.9	25	37	2.5	23	56	3.5
27	37	65	6.5	24	38	2.5	23	62	3.9
28	30	44	3.6	24	40	2.6	23	51	3.2
29	27	43	3.1	24	36	2.3	23	51	3.2
30	25	39	2.6	23	43	2.7	34	56	5.1
31	24	43	2.8	23	33	2.0	--	--	--
Total	934	--	97.4	1960	--	353.0	761	--	102.1

Total discharge for year (cfs-days)..... 48333.8
Total load for year (tons)..... 8959.8

IOWA RIVER BASIN--Continued

5-4545. 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 downstream from Clear Creek.
DRAINAGE AREA.--3,271 square miles upstream from gaging station.
RECORDS AVAILABLE.--Chemical analyses: September 1906 to September 1907, January 1944 to September 1954.
Water temperatures: January 1944 to September 1961.
Sediment records: October 1943 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 84°F on many days during July to September; minimum, freezing point on several days during December to February.
Sediment concentrations: Maximum daily, 1,580 ppm Mar. 4; minimum daily, 10 ppm Jan. 12.
Sediment loads: Maximum daily, 25,600 tons Mar. 4; minimum daily, 6 tons Jan. 12.
EXTREMES, 1943-61.--Water temperatures (1944-61): Maximum, 90°F July 19, 1957, Aug. 24, 25, 1959; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 7,800 ppm June 13, 1953; minimum daily, 3 ppm Jan. 29, 31, Feb. 6, 8, 1958.
Sediment loads: Maximum daily, 177,000 tons May 23, 1944; minimum daily, 2 tons on several days during 1951 and 1958.
REMARKS.--Flow affected by ice Nov. 30, Dec. 10, 11, 20-22, 26, 28-30, Jan. 4, 5, 19-29. Diurnal fluctuation at low stages caused by powerplants upstream from station. Flow regulated by Coralville Reservoir upstream from Iowa City beginning Sept. 17, 1958 (total capacity, 492,000 acre-ft).

Temperature (°F) of water, water year October 1960 to September 1961

Month	Day																													Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
October	70	70	70	70	70	66	66	66	68	68	68	68	68	68	66	66	64	64	62	58	58	58	58	56	54	54	56	56	56	54	52	63
November	52	52	50	48	46	42	42	42	46	48	50	50	50	52	52	52	44	44	44	44	46	48	46	46	46	48	50	42	38	38	--	47
December	40	40	40	40	--	--	--	--	38	36	34	34	34	36	36	36	34	34	34	34	--	34	34	32	34	34	34	34	32	34	34	35
January	34	34	34	34	32	34	36	36	36	36	36	36	34	36	36	36	36	34	34	34	34	32	32	32	36	32	32	32	32	32	36	34
February	36	36	36	36	36	36	36	38	38	39	38	40	40	40	40	40	38	38	38	39	38	38	39	34	32	34	34	34	--	--	--	37
March	34	34	34	34	36	34	36	36	36	38	38	36	36	36	36	36	37	37	36	38	38	38	38	40	44	46	46	46	46	46	46	38
April	44	44	44	44	44	44	44	46	46	48	48	48	46	46	44	42	42	42	44	44	48	56	54	58	58	56	56	56	56	56	--	48
May	56	56	56	56	56	56	60	60	60	60	44	64	64	64	64	64	64	64	64	64	66	66	68	68	66	66	66	68	68	--	72	63
June	72	72	--	72	72	72	74	76	78	80	80	80	80	80	80	80	80	80	80	80	78	78	78	74	74	76	78	80	80	80	--	77
July	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	82	82	80	82	82	82	82	82	82	82	84	84	84	84	81
August	84	82	84	84	84	84	84	84	84	84	84	84	84	84	84	82	82	82	82	82	82	84	84	84	84	84	84	84	84	84	84	84
September	84	84	84	84	84	84	84	84	84	84	84	78	78	78	76	74	72	72	70	70	70	68	78	62	62	62	60	60	62	--	--	75

IOWA RIVER BASIN--Continued

5-4545. IOWA RIVER AT IOWA CITY, IOWA--Continued

Suspended sediment, water year October 1960 to September 1961

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..	1840	76	378	1680	330	1500	537	20	29
2..	1800	56	272	1160	80	251	457	24	30
3..	1430	56	216	1080	40	117	334	24	22
4..	880	52	124	1080	57	166	356	21	20
5..	872	54	127	1040	68	191	394	21	22
6..	727	58	114	1040	64	180	386	20	21
7..	590	54	86	1160	43	135	455	19	23
8..	590	57	91	1560	52	219	455	19	23
9..	586	72	114	1520	60	246	459	18	22
10..	586	70	111	1560	81	341	455	17	21
11..	586	67	106	1640	41	182	455	13	16
12..	541	47	69	1640	39	173	463	24	30
13..	511	39	54	1640	37	164	475	22	28
14..	554	34	51	1380	34	127	495	17	23
15..	511	37	51	1800	470	S 2760	487	23	30
16..	516	35	49	1340	70	253	487	41	54
17..	563	39	59	1160	65	204	455	36	44
18..	541	38	56	1120	74	224	475	30	38
19..	495	34	45	1080	26	76	495	32	43
20..	454	35	43	1080	24	70	450	45	55
21..	463	32	40	858	31	72	420	45	51
22..	370	35	35	617	17	28	380	44	45
23..	447	38	46	594	20	32	356	44	42
24..	379	28	29	590	18	29	312	38	32
25..	439	37	44	590	17	27	288	32	25
26..	423	38	43	590	16	25	300	34	28
27..	390	38	40	581	16	25	247	38	25
28..	459	37	46	594	17	27	280	49	37
29..	402	250	271	572	16	25	310	35	29
30..	435	330	388	540	17	25	310	34	28
31..	1340	400	S 1930	--	--	--	302	27	22
Total	20720	--	5128	32886	--	7894	12530	--	958
	JANUARY			FEBRUARY			MARCH		
1..	300	18	15	1120	46	139	6190	305	5100
2..	296	18	14	1300	51	179	6090	320	5260
3..	260	30	21	1250	61	206	5500	305	4530
4..	285	33	25	1250	71	240	5990	1580	25600
5..	315	29	25	1250	59	199	6290	940	16000
6..	298	37	30	1200	53	172	5320	650	9340
7..	283	38	29	1200	50	162	5410	480	7010
8..	292	42	33	1160	48	150	7230	950	18500
9..	307	24	20	885	45	108	7230	840	16400
10..	286	36	28	503	55	75	7120	640	12300
11..	260	17	12	507	170	233	7560	610	12500
12..	220	10	6	516	255	355	8660	610	14300
13..	268	36	26	644	160	278	9700	770	20200
14..	259	37	26	780	140	295	9580	300	7760
15..	250	35	24	774	215	449	8990	210	5100
16..	259	33	23	910	360	885	8770	230	5450
17..	224	40	24	1120	175	529	8660	150	3510
18..	244	22	14	1560	280	1180	8660	120	2810
19..	270	45	33	1430	325	1250	8550	125	2890
20..	210	40	23	1380	325	1210	8440	100	2280
21..	160	36	16	2240	325	1970	8440	115	2620
22..	255	26	18	3320	315	2820	8330	135	3040
23..	210	24	14	4690	320	4050	8110	110	2410
24..	320	30	26	5590	460	6940	8220	115	2550
25..	310	34	28	6190	320	5350	7780	105	2210
26..	260	32	22	6290	310	5260	6190	115	1920
27..	350	39	37	6290	300	5090	5690	105	1610
28..	300	27	22	6290	305	5180	5500	115	1710
29..	270	14	10	--	--	--	5140	105	1460
30..	472	14	18	--	--	--	4780	105	1360
31..	908	50	123	--	--	--	2400	105	680
Total	9201	--	785	61639	--	44954	220520	--	218410

S Computed by subdividing day.

IOWA RIVER BASIN--Continued

5-4545. IOWA RIVER AT IOWA CITY, IOWA--Continued

Suspended sediment, water year October 1960 to September 1961--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..	1200	110	356	2480	91	609	865	41	96
2..	1120	63	191	1880	87	442	858	34	79
3..	1080	68	198	1640	69	306	850	36	83
4..	1080	67	195	1430	31	120	850	39	90
5..	2480	65	435	1340	33	119	720	34	66
6..	5140	97	1350	1380	31	116	622	34	57
7..	5890	105	1670	1380	31	116	1410	140	533
8..	5890	99	1570	1430	29	112	3160	1080	9210
9..	5790	96	1500	1520	39	160	3800	375	3850
10..	5690	100	1540	1560	33	139	4060	245	2690
11..	5690	98	1510	1640	42	186	3970	165	1770
12..	5590	94	1420	1600	42	181	2640	67	478
13..	5410	88	1290	1480	46	184	2560	64	442
14..	5320	87	1250	1620	35	153	2240	66	399
15..	5140	85	1180	2380	36	231	1760	64	304
16..	5050	77	1050	2210	45	269	1430	67	259
17..	5230	88	1240	1940	26	136	1430	66	255
18..	5320	81	1160	1720	26	121	1430	66	255
19..	4240	91	1040	632	40	68	1340	65	235
20..	2920	93	733	335	28	25	1160	64	200
21..	2560	91	629	336	27	24	1040	63	177
22..	2560	87	601	330	28	25	932	66	166
23..	2640	100	713	634	30	51	925	65	162
24..	3000	99	802	948	39	100	850	67	154
25..	3480	93	874	925	31	77	794	71	152
26..	3240	96	840	932	27	68	716	68	131
27..	3000	92	745	925	22	55	653	65	115
28..	3000	95	770	925	21	52	644	56	97
29..	2920	95	749	895	37	89	635	73	125
30..	2920	93	733	858	30	69	398	71	76
31..	--	--	--	872	23	54	--	--	--
Total	114590	--	28334	40177	--	4457	44742	--	22706

Day	JULY			AUGUST			SEPTEMBER		
1..	210	61	35	2560	200	1380	256	105	73
2..	236	115	73	2780	115	863	307	135	112
3..	202	43	23	2780	90	676	337	160	146
4..	197	41	22	2780	69	518	300	115	93
5..	202	40	22	3000	71	575	239	150	97
6..	200	44	24	2780	73	548	268	160	116
7..	181	37	18	2400	69	447	328	175	155
8..	176	57	27	2080	72	404	237	190	122
9..	184	71	35	1720	41	190	244	120	79
10..	179	61	29	1340	48	174	220	135	80
11..	179	51	25	1120	53	160	354	110	105
12..	171	62	29	1120	56	169	334	105	95
13..	154	58	24	1120	59	178	1880	300	1520
14..	159	65	28	908	160	392	3480	115	1080
15..	176	62	29	626	155	262	3480	94	883
16..	169	84	38	556	275	413	3400	90	826
17..	169	61	28	496	425	569	3320	31	278
18..	129	77	27	510	445	613	2400	41	266
19..	152	46	19	582	605	951	769	28	58
20..	143	44	17	500	545	736	758	28	57
21..	192	59	31	511	210	290	758	29	59
22..	205	63	35	480	475	616	758	30	61
23..	253	60	41	479	130	168	787	35	74
24..	169	59	27	415	310	347	794	25	54
25..	197	57	30	410	675	747	769	39	81
26..	358	51	49	412	350	389	780	28	59
27..	608	64	105	404	395	431	843	28	64
28..	758	60	123	358	60	58	880	125	297
29..	978	58	153	416	37	42	822	170	377
30..	978	47	124	316	31	26	780	170	358
31..	1480	55	220	351	61	58	--	--	--
Total	9744	--	1510	36310	--	13390	30882	--	7725

Total discharge for year (cfs-days)..... 633941
Total load for year (tons)..... 356251

IOWA RIVER BASIN--Continued

5-4545. IOWA RIVER AT IOWA CITY, IOWA--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment											Method of analysis
							Percent finer than size indicated, 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 8, 1961.....	0845	74		2850	1540		30	47	64	89	99	100						SPWC
June 8.....	0845	74		2850	1540		14	35	46	89	99	100						SPN

IOWA RIVER BASIN--Continued

5-4550. RALSTON CREEK AT IOWA CITY, IOWA

LOCATION.--At gaging station at bridge on State Bighway 1, at east edge of Iowa City, Johnson County, and 2.2 miles upstream from mouth.
DRAINAGE AREA.--3.01 square miles.
RECORDS AVAILABLE.--Water temperatures: October 1960 to September 1961.
Sediment records: April 1952 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 76°F June 30, July 1; minimum, freezing point on many days during November to February.
Sediment concentrations: Maximum daily, 6,020 ppm Mar. 4; minimum daily, 14 ppm Apr. 11.
Sediment loads: Maximum daily, 1,420 tons Mar. 4; minimum daily, less than 0.05 ton on many days.
EXTREMES, 1952-61.--Sediment concentrations: Maximum daily, 8,240 ppm Jan. 12, 1960; minimum daily, no flow on many days in 1953-59.
Sediment loads: Maximum daily, 3,080 tons June 4, 1960; minimum daily, 0 tons on many days in 1953-59.
REMARKS.--Maximum observed sediment concentration during water year, 38,600 ppm Mar. 4. Flow affected by ice Dec. 2, 3, Dec. 7 to Feb. 21, Mar. 10.

Temperature (°F) of water, water year October 1960 to September 1961

Month	Day																													Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
October	50	52	52	52	56	54	50	50	50	50	--	54	60	58	58	50	50	48	48	40	40	42	44	42	43	43	42	40	48	52	50	49
November	44	40	38	44	40	42	36	40	36	34	34	34	36	50	54	42	38	40	38	40	38	40	36	38	--	40	--	54	--	32	--	40
December	32	32	--	44	46	38	32	--	32	32	32	32	--	32	--	32	--	--	32	--	--	--	32	--	--	32	--	32	--	32	--	--
January	--	32	--	32	--	32	--	--	32	--	32	--	32	--	--	34	--	34	--	32	--	--	32	--	32	--	--	--	--	--	--	--
February	--	32	32	--	--	32	--	32	--	32	--	36	36	36	36	36	38	38	36	36	36	36	38	36	36	36	36	34	--	--	--	35
March	36	36	38	38	38	38	36	36	36	36	36	36	38	38	38	36	36	38	38	38	38	38	38	40	40	46	46	40	36	36	38	38
April	36	36	36	38	42	36	54	38	38	37	40	40	36	44	42	34	36	40	40	46	46	50	50	50	50	42	50	42	40	40	--	42
May	44	40	42	46	50	50	50	56	46	44	52	56	64	66	58	48	54	54	50	56	52	50	50	50	54	46	50	52	54	52	50	51
June	54	62	60	56	58	64	64	64	--	66	--	70	--	68	--	54	--	58	60	--	58	--	60	--	56	--	58	68	--	76	--	--
July	76	70	64	64	70	64	64	--	60	62	--	64	--	68	66	64	66	74	74	66	68	68	66	68	66	68	70	70	70	74	74	68
August	72	70	68	70	66	66	64	68	70	70	70	64	64	64	64	66	68	68	68	64	62	66	60	60	62	62	62	68	--	70	70	66
September	--	72	74	64	--	64	--	70	--	--	72	68	68	60	52	54	54	56	56	56	60	62	56	54	54	50	54	46	48	60	--	59

5-4550. RALSTON CREEK AT IOWA CITY, IOWA--Continued

Suspended sediment, water year October 1960 to September 1961

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	0.1	63	T	5.8	240	S 4.2	0.6	54	0.1
2	.1	44	T	2.0	150	.8	.5	54	.1
3	.1	50	T	1.3	120	.4	.6	44	.1
4	.1	100	T	1.1	84	.2	1.1	34	.1
5	.1	67	T	.9	83	.2	1.4	125	.5
6	.1	99	T	.8	69	.1	.8	70	.2
7	.1	30	T	.8	61	.1	.6	37	.1
8	.1	64	T	1.0	100	.3	.5	46	.1
9	.1	50	T	.7	80	.2	.4	55	.1
10	.1	48	T	.6	47	.1	.5	46	.1
11	.1	53	T	.7	47	.1	.5	26	T
12	.1	58	T	.7	30	.1	.4	52	.1
13	1.6	570	S 4.5	.6	32	.1	.4	48	.1
14	.4	295	.3	.6	27	T	.5	44	.1
15	.2	110	.1	43	2870	S 1240	.5	52	.1
16	.1	58	T	6.4	245	4.2	.4	60	.1
17	.1	74	T	3.8	140	1.4	.4	58	.1
18	.1	64	T	2.6	125	.9	.4	56	.1
19	.2	71	T	2.4	135	.9	.3	54	T
20	.2	47	T	2.0	98	.5	.3	56	T
21	.2	40	T	1.8	105	.5	.4	57	.1
22	.2	49	T	1.6	110	.5	.3	58	T
23	.2	38	T	1.3	58	.2	.3	59	T
24	.2	33	T	1.4	120	.5	.3	55	T
25	.4	105	.1	1.3	92	.3	.3	50	T
26	.2	58	T	1.3	64	.2	.4	45	T
27	.2	74	T	1.2	70	.2	.4	40	T
28	.2	52	T	1.2	75	.2	.4	35	T
29	.2	100	.1	.9	64	.2	.5	30	T
30	1.7	480	S 2.8	.7	54	.1	.5	24	T
31	42	2980	S 553	--	--	--	.4	26	T
Total	49.8	--	561.4	90.5	--	1257.7	15.3	--	2.8

Day	JANUARY			FEBRUARY			MARCH		
1	0.4	28	T	0.2	95	0.1	0.7	48	0.1
2	.4	30	T	.2	93	.1	.8	48	.1
3	.4	64	0.1	.2	38	T	.7	80	.2
4	.4	98	.1	.3	34	T	27	6020	S 1420
5	.3	78	.1	.4	30	T	2.4	300	1.9
6	.3	57	T	.2	26	T	29	3940	S 414
7	.3	45	T	.3	27	T	5.6	585	S 11
8	.2	33	T	.3	28	T	32	3800	S 1030
9	.2	20	T	.4	24	T	6.8	400	7.3
10	.2	22	T	.5	20	T	4.7	105	1.3
11	.2	25	T	.9	46	.1	14	1100	S 70
12	.2	24	T	1.8	71	.3	11	500	S 19
13	.3	23	T	1.3	67	.2	46	2910	S 590
14	.3	23	T	.9	42	.1	9.8	250	6.6
15	.3	22	T	.6	42	.1	6.4	150	2.6
16	.3	22	T	.5	33	T	5.0	93	1.3
17	.3	26	T	1.0	43	.1	3.8	80	.8
18	.3	29	T	13	1800	A 63	3.4	64	.6
19	.3	26	T	2.0	110	.6	3.4	49	.4
20	.2	23	T	.9	46	.1	3.2	69	.6
21	.2	38	T	.8	54	.1	5.0	105	1.4
22	.2	53	T	21	1880	S 349	4.5	96	1.2
23	.2	68	T	7.1	700	13	4.0	65	.7
24	.2	89	T	1.1	165	.5	3.6	63	.6
25	.2	110	.1	.9	65	.2	3.4	75	.7
26	.2	110	.1	1.0	62	.2	3.4	75	.7
27	.2	105	.1	.7	74	.1	8.6	600	S 17
28	.2	105	.1	.7	52	.1	4.7	130	1.6
29	.2	100	.1	--	--	--	3.8	80	.8
30	.2	100	.1	--	--	--	3.2	63	.5
31	.2	100	.1	--	--	--	3.0	60	.5
Total	8.0	--	1.5	59.2	--	428.2	262.9	--	3603.5

S Computed by subdividing day.
T Less than 0.05 ton.
A Computed from partly estimated concentration graph.

IOWA RIVER BASIN--Continued

5-4550. RALSTON CREEK AT IOWA CITY, IOWA--Continued

Suspended sediment, water year October 1960 to September 1961--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	120	0.7	1.1	77	0.2	0.5	46	0.1
2	2.2	61	.4	1.1	68	.2	.4	27	T
3	2.0	54	.3	1.0	55	.1	.4	86	.1
4	1.9	115	.6	.9	60	.1	.4	24	T
5	1.8	47	.2	1.1	51	.2	.3	19	T
6	1.5	32	.1	1.1	60	.2	1.0	320	.9
7	1.4	50	.2	1.0	56	.2	.6	325	.5
8	1.4	53	.2	.9	67	.2	14	2110	S 148
9	1.4	27	.1	.8	58	.1	1.8	550	2.7
10	1.2	34	.1	.8	57	.1	1.0	410	1.1
11	1.7	14	.1	.7	78	.1	.7	150	.3
12	1.9	47	.2	.7	40	.1	.6	125	.2
13	1.5	26	.1	.7	36	.1	.5	100	.1
14	1.6	42	.2	3.1	1320	S 24	.4	78	.1
15	1.2	18	.1	1.6	520	2.2	.4	72	.1
16	1.2	21	.1	.7	72	.1	.3	67	.1
17	2.3	28	.2	.9	110	.3	.3	62	.1
18	2.0	39	.2	.9	85	.2	.3	58	T
19	1.8	24	.1	.7	62	.1	.3	41	T
20	1.8	31	.2	.7	88	.2	.3	48	T
21	1.7	49	.2	.6	66	.1	.2	55	T
22	1.9	78	.4	.5	78	.1	.2	58	T
23	2.0	44	.2	.5	61	.1	.1	62	T
24	2.0	46	.2	.5	53	.1	.1	56	T
25	1.9	47	.2	.8	80	.2	.1	51	T
26	1.6	38	.2	.6	38	.1	.1	54	T
27	1.7	50	.2	.5	28	T	.1	56	T
28	1.5	31	.1	.5	36	T	.1	89	T
29	1.5	38	.2	.5	32	T	.1	80	T
30	1.5	45	.2	.5	28	T	.2	70	T
31	--	--	--	.5	36	T	--	--	--
Total	51.4	--	6.5	26.5	--	29.9	25.8	--	154.8

Day	JULY			AUGUST			SEPTEMBER		
1	3.2	1850	S 88	18	2180	S 153	0.1	37	T
2	1.7	1400	6.4	3.0	155	1.3	.1	37	T
3	.2	120	.1	1.9	125	.6	.1	52	T
4	.2	82	T	7.1	1990	S 265	.1	58	T
5	.4	100	.1	4.5	690	S 23	.1	39	T
6	.2	85	T	1.4	115	.4	.1	20	T
7	.1	125	T	1.0	95	.3	.1	24	T
8	.1	110	T	.8	80	.2	.1	28	T
9	.1	94	T	.7	80	.2	.1	35	T
10	.1	78	T	.7	110	.2	.1	42	T
11	.1	82	T	.6	115	.2	.1	48	T
12	.1	86	T	.5	130	.2	16	2350	S 192
13	.1	86	T	.5	205	.3	62	2150	S 440
14	.1	86	T	.4	290	.3	8.0	255	5.5
15	.4	280	.3	.4	240	.3	4.0	270	2.9
16	.1	220	.1	.4	185	.2	2.3	65	.4
17	.1	175	T	.3	185	.1	1.7	43	.2
18	.1	210	.1	.2	200	.1	1.5	56	.2
19	.2	260	.1	7.7	1630	S 68	1.2	50	.2
20	.1	125	T	.8	50	.1	1.0	44	.1
21	3.7	2210	S 33	.6	60	.1	1.0	35	.1
22	1.6	835	S 13	.4	125	.1	1.0	26	.1
23	5.4	1110	S 64	.3	300	.2	3.5	180	S 2.0
24	.6	100	.2	.3	320	.3	2.4	76	.5
25	.3	80	.1	.3	350	.3	1.9	100	.5
26	.2	175	.1	.3	740	.6	1.6	44	.2
27	.2	110	.1	.3	580	.5	1.3	42	.1
28	.4	260	.3	.2	220	.1	1.2	28	.1
29	.2	175	.1	.2	40	T	1.2	45	.1
30	.1	150	T	.2	33	T	8.2	750	S 33
31	20	3260	S 1080	.2	38	T	--	--	--
Total	40.4	--	1286.4	54.2	--	516.3	122.1	--	678.3

Total discharge for year (cfs-days)..... 806.1
Total load for year (tons)..... 8527.3

S Computed by subdividing day.
T Less than 0.05 ton.

210-974 O - 65 - 6

IOWA RIVER BASIN--Continued

5-4550. RALSTON CREEK AT IOWA CITY, IOWA--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Oct. 31, 1960	1015	50		95	7320		--	24	--	43	--	95	96	98	99	100		SPWC
Nov. 15	0815	54		246	17600		--	28	--	51	--	95	96	97	99	100		SPWC
Feb. 22, 1961	1630	36		83	1100		--	26	--	45	--	99	99	100	--	--		SPWC
Mar. 4	0645	38		28	27600		28	32	39	54	85	95	99	100	--	--		SPWC
Mar. 4	0645	38		28	27600		16	18	19	46	84	95	99	100	--	--		SPN
Mar. 13	0700	38		123	10100		--	22	--	42	--	92	97	99	100	--		SPWC
May 14	1945	66		5.8	8930		44	49	65	83	96	99	100	--	--	--		SPWC
May 14	1945	66		5.8	8930		28	35	54	77	88	99	100	--	--	--		SPN
July 1	2130	76		18	16700		31	52	55	73	94	100	--	--	--	--		SPWC
July 1	2200	76		16	7080		42	46	59	75	97	100	--	--	--	--		SPWC
July 1	2200	76		16	7080		28	37	53	73	94	100	--	--	--	--		SPN
July 21	0615	68		.1	7370		54	61	74	86	100	--	--	--	--	--		PWC
July 21	0615	68		.1	7370		33	47	67	86	100	--	--	--	--	--		PN
July 31	2215	74		21	14800		--	65	--	73	--	100	--	--	--	--		SPWC
Aug. 1	0900	72		42	2360		--	31	--	54	--	98	99	100	--	--		SPWC
Aug. 4	2330	70		32	7480		--	31	--	53	--	99	100	--	--	--		SPWC
Aug. 19	0715	68		9.8	6220		--	52	--	84	--	100	--	--	--	--		SPWC
Sept. 12	0845	64		9.4	11000		--	50	--	78	--	100	--	--	--	--		SPWC
Sept. 13	0645	68		66	2360		--	38	--	61	--	96	98	99	100	--		SPWC

IOWA RIVER BASIN--Continued

5-4620. SHELL ROCK RIVER AT SHELL ROCK, IOWA

LOCATION.--Temperature recorder at gaging station, 400 feet upstream from bridge on State Highway 3 in Shell Rock, Butler County, and 11 miles upstream from mouth.
DRAINAGE AREA.--1,746 square miles.
RECORDS AVAILABLE.--Water temperatures: June 1953 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 74°F July 29; minimum, 33°F on several days during February and March.
EXTREMES, 1953-61.--Water temperatures: Maximum, 88°F June 19, 1953; minimum, freezing point on several days during December 1953, January 1954, and March and April 1956.

Temperature (°F) of water, water year October 1960 to September 1961
(Water-stage recorder with temperature attachment)

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

DES MOINES RIVER BASIN

5-4820. DES MOINES RIVER 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 upstream from gaging station.
RECORDS AVAILABLE.--Chemical analyses: November 1954 to June 1955.
Water temperatures: November 1954 to September 1961 (discontinued).
Sediment records: November 1954 to September 1961 (discontinued).
EXTREMES, 1960-61.--Water temperatures: Maximum, 86°F July 29; minimum, freezing point on many days during November to March.
Sediment concentrations: Maximum daily, 1,690 ppm Aug. 3; minimum daily, 15 ppm Feb. 10, 13.
Sediment loads: Maximum daily, 50,000 tons (estimated) Mar. 30; minimum daily, 6 tons Feb. 2, 10, 13.
EXTREMES, 1954-61.--Water temperatures: Maximum (1954-57, 1958-61), 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 (1959-61), 10 ppm Feb. 25, 26, 1960.
Sediment loads: Maximum daily, 99,000 tons June 16, 1957; minimum daily (1959-61), 6 tons Feb. 2, 10, 13, 1961.
REMARKS.--No appreciable inflow between sampling point and gaging station except during periods of heavy local runoff. Flow affected by ice Nov. 29 to Dec. 1, Dec. 7 to Feb. 14.

Temperature (°F) of water, water year October 1960 to September 1961

Month	Day																													Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
October	68	68	68	62	60	60	58	68	68	69	70	64	62	62	59	56	52	56	40	39	50	52	58	50	56	54	50	54	50	48	46	57
November	40	40	38	39	41	37	40	38	34	32	38	35	40	41	48	46	38	32	39	41	45	34	32	36	32	40	48	32	32	32	--	38
December	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
January	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
February	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	--	--	--	32
March	32	32	32	32	33	34	32	32	32	32	32	32	32	32	34	36	36	35	34	38	36	34	34	35	38	45	45	41	45	44	40	36
April	44	40	45	42	45	40	39	38	35	34	44	39	49	50	48	44	42	49	55	58	58	60	48	58	55	59	59	57	57	58	--	49
May	58	58	59	59	58	58	59	59	59	60	61	69	70	68	68	68	70	67	67	61	62	62	70	68	70	70	68	70	70	70	71	65
June	72	72	72	72	74	70	67	69	69	72	72	74	72	72	70	69	69	72	74	74	76	76	76	77	77	77	78	78	80	80	--	73
July	82	82	81	82	81	80	80	80	80	80	80	80	79	79	79	79	80	80	80	80	80	80	80	82	82	84	84	84	86	84	84	81
August	84	84	84	84	85	84	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	76	76	76	76	76	79	80	80	80	80	80
September	80	80	76	79	74	74	80	80	80	80	80	76	76	69	60	60	60	60	60	60	60	60	58	50	50	50	50	48	48	49	--	65

DES MOINES RIVER BASIN--Continued

5-4820. DES MOINES RIVER AT DES MOINES, IOWA--Continued

Suspended sediment, water year October 1960 to September 1961
/Where no concentrations are reported, loads are estimated/

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	1000	185	500	614	64	106	270	28	20
2	984	190	505	587	70	111	391	28	30
3	954	170	438	574	64	99	472	31	40
4	892	120	289	560	66	100	560	28	42
5	892	115	277	548	76	112	641	31	54
6	876	120	284	522	61	86	682	36	66
7	830	115	258	522	79	111	400	35	38
8	800	110	238	522	64	90	240	29	19
9	785	83	176	498	59	79	210	34	19
10	725	89	174	498	64	86	230	35	22
11	725	80	157	485	58	76	240	25	16
12	695	87	163	498	51	69	250	45	30
13	682	56	103	498	51	69	250	32	22
14	740	85	170	460	52	65	240	30	19
15	710	50	96	510	56	77	230	32	20
16	641	48	83	510	53	73	210	37	21
17	587	47	74	498	54	73	200	31	17
18	560	47	71	485	60	79	190	33	17
19	535	36	52	560	48	73	180	24	12
20	522	44	62	548	60	89	170	23	11
21	522	48	68	560	55	83	160	28	12
22	522	42	59	522	26	37	160	31	13
23	510	40	55	522	26	37	160	35	15
24	498	18	24	522	35	49	160	30	13
25	510	19	26	522	31	44	160	34	15
26	498	19	26	535	44	64	170	30	14
27	472	27	34	535	47	68	170	39	18
28	485	26	34	574	32	50	180	37	18
29	548	26	38	400	25	27	180	28	14
30	522	32	45	300	36	29	180	43	21
31	641	25	43	--	--	--	180	40	19
Total	20863	--	4622	15489	--	2211	8116	--	707

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	180	40	19	130	31	11	2130	--	1300
2	170	40	18	130	17	6	3050	--	3000
3	160	32	14	130	26	9	3650	--	4500
4	160	27	12	130	27	9	4750	--	8000
5	160	42	18	130	22	8	5850	--	9000
6	150	39	16	130	31	11	6890	--	10000
7	150	25	10	130	19	7	6470	505	8820
8	160	37	16	130	30	11	5850	505	7980
9	160	34	15	130	19	7	4750	425	5450
10	170	29	13	140	15	6	3650	--	3000
11	170	38	17	140	26	10	3850	--	5000
12	170	28	13	140	43	16	4250	620	7110
13	170	28	13	150	15	6	4950	590	7890
14	170	38	17	150	20	8	5250	900	12800
15	170	26	12	152	18	7	5450	--	14000
16	170	32	15	158	24	10	6050	935	15300
17	160	36	16	229	--	20	6680	340	6130
18	160	31	13	810	--	240	6470	350	6110
19	150	27	11	974	--	400	6260	365	6170
20	140	29	11	554	--	150	5650	200	3050
21	140	39	15	569	--	150	5250	200	2840
22	130	39	14	1160	--	500	5450	185	2720
23	120	29	9	2460	--	2000	5250	205	2910
24	120	24	8	3450	--	4500	5450	210	3090
25	120	21	7	3450	--	4000	6260	190	3210
26	120	28	9	3150	--	3000	8010	--	15000
27	120	30	10	2270	190	1160	9920	600	16100
28	120	24	8	1980	115	615	12600	--	30000
29	130	34	12	--	--	--	17800	--	40000
30	130	20	7	--	--	--	24200	--	50000
31	130	31	11	--	--	--	26700	--	45000
Total	4630	--	399	23256	--	16877	228790	--	355480

DES MOINES RIVER BASIN--Continued

5-4820. DES MOINES RIVER AT DES MOINES, IOWA--Continued

Suspended sediment, water year October 1960 to September 1961--Continued
/Where no concentrations are reported, loads are estimated/

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	24600	595	39500	2770	125	935	2330	83	522
2	21100	230	13100	2580	140	975	2200	88	523
3	17400	--	10000	2430	135	886	2050	78	432
4	17100	--	8000	2300	130	807	1990	68	365
5	11100	155	4650	2200	150	891	1830	140	692
6	8720	155	3650	2100	130	737	2480	480	A 3210
7	7350	145	2880	2100	155	879	4500	1400	A 17000
8	6550	130	2300	2100	155	879	6150	1500	24900
9	5950	140	2250	2100	160	907	5750	990	15400
10	5360	--	2100	2100	205	1160	4600	1000	12400
11	5170	150	2090	2100	140	794	3960	890	9520
12	5950	205	3290	2100	165	936	3690	420	4180
13	6150	330	5480	2100	125	709	3420	450	4160
14	5750	--	5000	2100	165	936	3330	470	4230
15	5950	--	4000	2000	165	891	3600	420	4080
16	5750	205	3180	2000	120	648	3690	725	7220
17	5360	200	2890	2000	170	918	4140	565	6320
18	4980	--	2600	2000	61	329	4050	530	5800
19	4700	190	2410	2000	54	292	3600	445	4330
20	4320	175	2040	2120	125	716	3330	355	3190
21	4320	180	2100	3060	150	1240	2960	300	2400
22	4230	180	2060	3510	170	1610	2580	260	1810
23	4050	175	1910	3510	170	1610	2260	275	1680
24	4050	180	1970	3510	150	1420	1930	225	1170
25	3870	175	1830	3240	150	1310	1770	205	980
26	3690	195	1940	3240	100	875	1570	220	933
27	3510	190	1800	3060	49	405	1400	210	794
28	3330	190	1710	2860	42	324	1300	190	667
29	3150	180	1530	2680	66	478	1200	190	616
30	2960	170	1360	2580	82	571	1100	215	639
31	--	--	--	2480	75	502	--	--	--
Total	216470	--	139620	77030	--	26570	88760	--	140163

Day	JULY			AUGUST			SEPTEMBER		
1	1000	99	267	2250	630	S 4980	540	185	270
2	985	68	181	4250	1630	18700	505	205	280
3	996	65	175	4350	1690	19800	618	285	476
4	1010	60	164	4450	1520	18300	582	180	283
5	1010	145	395	3950	740	7890	564	150	228
6	985	385	1020	3550	635	6090	548	240	355
7	1040	480	1350	2750	500	3710	514	220	305
8	1140	370	1140	2460	320	2130	514	155	215
9	920	260	646	2360	265	1690	539	110	160
10	830	205	459	2140	--	1400	514	100	139
11	770	200	416	1980	--	1200	548	98	145
12	740	110	220	1740	--	1000	900	150	364
13	860	84	195	1430	210	811	1380	335	1250
14	850	105	241	1170	185	584	1580	270	1150
15	840	105	238	1040	165	463	1330	230	826
16	790	105	224	930	125	314	1210	145	474
17	800	110	238	860	215	499	1040	140	393
18	910	135	332	760	205	421	998	125	337
19	860	110	255	730	60	118	928	120	301
20	890	99	238	790	125	267	888	110	264
21	1240	295	A 988	1180	220	701	942	75	191
22	1280	105	363	1200	415	1340	1060	100	286
23	1310	105	371	1320	420	1500	888	110	264
24	1270	105	360	1420	150	575	820	120	266
25	1230	160	531	1280	165	570	808	115	251
26	1110	160	480	1080	250	729	765	120	248
27	1720	355	S 1770	941	215	546	676	115	210
28	1720	290	1350	860	190	441	685	110	203
29	1490	250	1010	800	200	432	666	110	198
30	1270	160	549	700	170	321	2530	260	S 2710
31	1180	140	446	600	160	259	--	--	--
Total	33046	--	16612	55321	--	97781	26080	--	13042

Total discharge for year (cfs-days)..... 797851
Total load for year (tons)..... 814084

S Computed by subdividing day.
A Computed from partly estimated concentration graph.

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN HUDSON BAY AND UPPER MISSISSIPPI RIVER BASIN

Chemical analyses, in parts per million, water year October 1960 to September 1961

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)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
RED RIVER OF THE NORTH BASIN																							
5-460. OTTER TAIL RIVER BELOW ORWELL DAM, NEAR FERGUS FALLS, MINN.																							
Oct. 12, 1960	85	9.8		0.01	0.00	39	29	8.2	4.2	258	0	20	3.7	0.2	1.9	0.08	248	217	5	0.2	426	7.5	7
Mar. 19, 1961	a 233	16		.01	.00	43	31	8.6	4.6	278	0	19	4.4	.2	3.0	.05	275	237	9	.2	466	7.5	10
May 14.....	307	10		.02	.10	43	30	7.9	4.1	252	0	32	2.7	.3	1.3	.06	267	229	22	.2	455	7.7	6
5-490. MUSTINKA RIVER ABOVE WHEATON, MINN.																							
Oct. 12, 1960	b 0.2	3.5		0.03	0.00	150	105	79	13	175	0	822	7.1	0.2	1.0	0.37	1360	808	664	1.2	1610	7.1	9
Mar. 19, 1961	15.3	10		.04	.37	81	42	30	8.2	160	0	300	3.4	.1	1.8	.11	586	376	245	.7	812	7.2	24
May 14.....	b 5	4.2		.03	.05	134	81	58	8.8	265	0	532	5.4	.4	.2	.25	1050	668	451	1.0	1330	7.7	13
5-512. RABBITT RIVER NEAR CAMPBELL, MINN.																							
Mar. 19, 1961	b 10	12		0.09	0.00	69	34	34	7.6	163	0	247	5.5	0.2	1.5	0.11	519	313	179	0.8	725	7.3	42
May 14.....	b 10	9.0		.05	.00	161	80	121	9.8	250	0	717	12	.2	.4	.15	1350	730	525	1.9	1640	7.5	22
5-565. DEVILS LAKE NEAR DEVILS LAKE, N. DAK.																							
Jan. 5, 1961.	c1414.65	15		0.03	--	94	410	2150	233	881	27	4620	1030	0.0	4.6	1.8	9210	1920	1150	21	11000	8.4	20
Apr. 19.....	c1414.71	9.8		.05	0.00	58	254	1320	143	564	0	2790	658	.2	9.7	1.1	5780	1190	728	17	7300	7.9	18
July 11.....	c1413.91	15		.03	.04	84	416	2160	225	873	0	4620	1010	.2	4.1	1.7	9260	1920	1200	21	11200	7.5	--
Sept. 14.....	c1413.45	19		.08	.01	101	420	2190	245	933	0	4820	1050	.2	1.7	1.8	9550	1980	1220	21	11500	8.0	--
5-565.7. EAST DEVILS LAKE NEAR HAMAR, N. DAK.																							
Apr. 18, 1961	c1400.08	4.8		0.10	0.00	134	3250	13700	1390	2010	319	33600	6290	0.1	47	8.4	64100	13700	11500	51	52800	8.5	35
July 11.....	c1399.95	3.3		.07	.05	64	4900	24600	1970	3110	0	60000	9140	.2	9.7	16	106000	20300	17800	75	77600	8.2	
Sept. 14.....	c1398.82	8.7		.12	.21	271	5530	27200	2400	3130	0	69500	10400	.2	11	15	121000	23400	20800	77	84500	7.9	

5-566.3. EASTERN STUMP LAKE NEAR LAKOTA, N. DAK.

Apr. 18, 1961	c1383.00	9.7		0.09	0.00	397	10600	17500	2070	1650	0	53400	18700	0.2	42	21	117000	44700	43400	36	76900	8.1	95
July 11.....	c1382.30	8.7		.76	.05	327	13000	53700	2260	1530	0	133000	22000	.7	7.5	24	241000	54200	53000	100	109000	7.9	150
Sept. 13.....	c1382.14	9.5		.25	--	360	16200	29900	3140	1760	0	99100	26300	.6	10	30	196000	67500	66100	50	101000	8.0	--

5-566.8. TOLNA COULEE RESERVOIR NEAR TOLNA, N. DAK.

Apr. 18, 1961	(d)	16		0.01	--	39	28	39	8.3	288	0	50	11	0.3	1.0	0.09	362	212	0	1.2	566	7.6	
July 12.....	(d)	8.9		.02	0.00	30	30	40	8.5	279	0	51	11	.4	.3	.10	346	200	0	1.2	564	7.5	15
Sept. 15.....	(d)	14		.03	.05	27	31	43	9.4	283	0	52	12	.1	.2	.15	341	194	0	1.3	557	7.9	

5-570. SHEYENNE RIVER NEAR COOPERSTOWN, N. DAK.

Oct. 1, 1960.	0.8	21		0.02	0.78	60	25	68	8.4	318	0	133	13	0.2	0.2	0.18	499	252	0	1.9	754	7.6	--
Feb. 1, 1961.	.9	27		.12	--	82	50	83	7.4	506	0	152	20	.3	1.9	.19	691	401	0	1.8	1060	7.5	8
Apr. 14.....	76	14		.03	.00	55	22	60	6.5	287	0	106	14	.3	.2	.11	449	227	0	1.7	670	7.6	16
July 12.....	.6	22		.02	2.8	64	29	75	7.7	370	0	115	18	.3	.8	.18	526	277	0	2.0	814	7.5	--
Sept. 16.....	2.3	--		.03	--	54	26	64	--	330	0	103	--	--	--	--	463	242	0	1.8	718	7.9	--

5-580. SHEYENNE RIVER BELOW BALDHILL DAM, N. DAK.

Oct. 3, 1960.	15	0.5		0.05	0.85	41	19	44	9.2	245	0	72	10	0.2	0.2	0.11	332	181	0	1.4	543	7.4	19
Jan. 4, 1961.	45	1.5		.04	--	52	19	48	8.9	270	0	83	12	.2	.8	.13	373	209	0	1.4	600	7.9	--
Mar. 3.....	33	.7		.01	--	31	17	40	9.4	187	0	70	12	.1	9.8	.09	300	148	0	1.4	484	7.2	10
Apr. 14.....	10	2.6		.00	1.0	48	23	54	9.7	285	0	88	12	.3	.2	.15	405	216	0	1.6	643	7.7	--
July 12.....	15	2.1		.02	.21	37	22	52	9.2	248	0	84	13	.3	.4	.16	356	184	0	1.7	582	7.5	--
Sept. 8.....	13	3.5		.08	--	37	23	54	9.8	258	0	87	13	.3	.3	.14	368	188	0	1.7	599	7.1	--
Sept. 16.....	14	5.0		.04	.53	39	23	54	9.6	262	0	89	13	.0	.2	.20	373	192	0	1.7	617	7.9	--

a Daily mean discharge.
c Lake elevation, in feet.
d Lake content not known. Information on lake stage available in district office at Lincoln, Nebr.

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN HUDSON BAY AND UPPER MISSISSIPPI RIVER BASIN--Continued

Chemical analyses, in parts per million, water year October 1960 to September 1961--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)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
RED RIVER OF THE NORTH BASIN--Continued																							
5-645. RED RIVER OF THE NORTH AT HALSTAD, MINN.																							
July 8, 1961.	261	8.0		0.02	0.01	55	30	25	5.5	279	0	64	14	0.3	0.4	0.12	347	261	32	0.7	610	7.4	
Sept. 16.....	197	13		.05	.08	44	26	25	5.3	223	0	69	14	.2	1.9	.14	340	216	33	.7	513	7.3	
5-1236.5. BUFFALO LODGE LAKE NEAR GRANVILLE, N. DAK.																							
Apr. 20, 1961	(d)	0.1		0.04	--	38	75	176	24	423	28	347	51	0.4	0.4	0.19	1050	402	8	3.8	1450	8.6	
July 13.....	(d)	28		.07	0.04	30	96	242	29	604	0	446	66	.4	.3	.26	1340	468	0	4.9	1850	7.7	28
Sept. 13.....	(d)	34		.21	.02	28	97	288	37	661	0	510	80	.5	.7	.32	1420	469	0	5.8	2020	7.9	
LAKE OF THE WOODS BASIN																							
5-1250. SOUTH KAWISHIWI RIVER NEAR ELY, MINN.																							
Aug. 8, 1960.	159	5.1		0.23	0.00	3.8	1.8	1.4	0.4	18	0	5.5	0.0	0.2	1.0		50	17	2	0.1	40	6.5	65
May 9, 1961..	1000	6.6		.18	.00	6.3	1.0	1.2	.6	21	0	6.0	.0	.1	.6	0.03	51	20	3	.1	48	7.0	45
5-1255. STONY RIVER NEAR ISABELLA, MINN.																							
Aug. 8, 1960.	60	6.8		0.50	0.00	6.9	4.3	1.6	0.2	34	0	7.5	0.0	0.2	1.2		83	35	7	0.1	68	6.8	140
May 9, 1961..	232	4.8		.26	.03	5.5	2.0	1.2	.8	19	0	9.0	.1	.2	1.2	0.07	67	22	6	.1	49	6.5	95
5-1260. DUNKA RIVER NEAR BABBITT, MINN.																							
Aug. 9, 1960.	25	11		0.76	0.00	15	7.4	5.1	1.3	22	0	11	7.7	0.3	50		219	68	50	0.3	172	6.3	230
May 10, 1961.	75	7.8		.41	.00	11	1.3	2.6	1.2	15	0	13	3.2	.2	1.4	0.08	112	33	21	.2	94	6.4	130

5-1265. BEAR ISLAND RIVER NEAR ELY, MINN.

Aug. 9, 1960.	15	2.7		0.18	0.00	5.2	2.2	1.5	0.4	22	0	6.8	0.0	0.1	0.9		52	22	4	0.1	48	6.5	65
May 9, 1961..	160	3.0		.18	.02	6.3	.8	1.2	.6	17	0	7.5	.0	.1	.7	0.03	52	19	5	.1	48	6.6	70

5-1270. KAWISHIWI RIVER NEAR WINTON, MINN.

Aug. 9, 1960.	a 417	5.4		0.43	0.01	4.7	1.8	1.3	0.5	18	0	7.0	0.0	0.1	0.7		53	19	4	0.1	43	6.5	80
May 9, 1961..	a 2060	5.8		.22	.02	6.9	1.2	1.4	.6	23	0	7.8	.0	.1	.5	0.03	56	22	3	.1	53	6.7	45

5-1272. BURNTSIDE LAKE NEAR ELY, MINN.

Aug. 9, 1960.	c1371.24	1.7		0.06	0.00	3.3	0.9	1.1	0.7	12	0	4.3	0.0	0.1	0.2	0.00	28	12	2	0.1	33	6.7	10
May 9, 1961..	c1372.13	1.2		.01	.02	4.1	.4	1.0	.6	14	0	4.5	.1	.0	.0	.00	28	12	1	.1	33	6.8	8

5-1285. PIKE RIVER NEAR EMBARRASS, MINN.

Aug. 9, 1960.	46	11		0.84	0.00	7.8	2.6	1.8	0.5	26	0	11	0.0	0.2	1.3		97	30	9	0.1	60	6.6	280
May 11, 1961.	229	4.6		.37	.02	7.2	.7	1.6	.8	15	0	13	.0	.1	1.2	0.08	68	21	9	.2	53	6.4	90

5-1296.5. LITTLE FORK RIVER AT COOK, MINN.

Oct. 20, 1960	b 1.0	12		0.51		38	15	19	3.9	179	0	27	13	0.2	4.2	0.07	250	156	9	0.7	373	7.1	43
Nov. 17.....	b 4.5	11		.21		19	4.3	4.3	1.0	69	0	14	.9	.2	1.0	.06	121	65	8	.2	139	7.2	95
May 11, 1961.	b 60	2.3		.34	0.02	6.8	2.0	1.6	1.0	16	0	9.5	.0	.3	2.3	.15	102	25	12	.1	53	6.5	180
May 20.....	201	2.8		.42		6.1	2.4	2.0	1.0	0	0	25	.2	.3	2.5	.13	116	25	25	.2	94	4.1	180

a Daily mean discharge.
b Estimated.
c Lake elevation, in feet.
d Lake content not known. Information on lake state available in district office at Lincoln, Nebr.

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN BUDSON BAY AND UPPER MISSISSIPPI RIVER BASIN--Continued

Chemical analyses, in parts per million, water year October 1960 to September 1961--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)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
LAKE OF THE WOODS BASIN--Continued																							
5-1296.5. LITTLE FORK RIVER AT COOK, MINN.--Continued																							
June 14, 1961	38.2	4.7		0.32		11	3.8	2.6	0.9	40	0	17	0.0	0.3	1.0	0.06	107	43	10	0.2	86	6.8	130
July 13.....	.9	7.0		.73		37	10	15	2.1	143	0	24	13	.3	2.6	.09	221	134	17	.6	323	7.2	90
Sept. 15.....	--	8.9		.36		12	2.0	1.7	3.1	32	0	17	.4	.5	1.4	.07	158	38	12	.1	69	6.3	400
5-1298. RICE RIVER NEAR ANGORA, MINN.																							
Oct. 20, 1960	9.6	10		0.15		9.5	1.5	2.0	1.2	31	0	8.3	0.0	0.1	1.2	0.03	83	30	5	0.2	67	7.0	90
Nov. 16.....	21.7	9.5		.17		7.4	1.8	1.8	.8	25	0	9.0	.0	.1	1.4	.03	81	26	5	.2	57	7.0	105
May 11, 1961.	b 100	2.8		.31	0.13	4.0	1.5	1.2	1.0	13	0	6.0	.2	.1	1.3	.09	63	16	5	.1	39	6.4	90
May 19.....	154	2.2		.34		3.4	1.8	1.5	.4	13	0	5.5	.0	.2	1.3	.07	63	16	5	.2	39	6.5	90
June 14.....	46.5	4.5		.35		9.7	2.1	1.3	.6	31	0	6.3	.0	.3	.8	.13	79	33	8	.1	66	6.7	90
July 13.....	7.6	6.5		.38		9.8	1.1	1.8	.6	32	0	6.0	.0	.1	.7	.03	92	29	3	.1	71	6.7	55
Aug. 12.....	5.1	9.2		.36		7.6	3.4	2.1	1.0	36	0	7.0	.0	.1	.4	.03	71	33	3	.2	80	7.1	45
Sept. 15.....	--	8.9		.38		10	1.2	1.3	.5	19	0	19	.1	.4	.5	.05	124	30	14	.1	58	6.7	230
5-1299. SOUTH BRANCH LITTLE FORK RIVER NEAR COOK, MINN.																							
Oct. 20, 1960	17.4	10		0.46		13	2.6	2.6	1.9	48	0	9.5	0.0	0.1	0.7	0.04	84	43	4	0.2	96	7.3	55
Nov. 17.....	--	12		.36		12	1.7	2.2	1.2	36	0	14	.0	.2	1.3	.06	93	37	7	.2	77	7.4	105
May 11, 1961.	b 300	4.3		.29	0.07	5.6	2.0	1.[illegible]	.9	18	0	7.8	.0	.2	1.5	.10	76	22	7	.1	50	6.7	90
May 19.....	478	4.1		.35		5.3	1.9	1.4	.8	5	0	17	.0	.2	1.8	.01	87	21	17	.1	57	5.4	130
June 14.....	78.7	5.3		.28		9.9	2.3	1.8	.8	35	0	6.0	.0	.2	.9	.02	80	34	5	.1	73	6.7	80
July 13.....	9.6	5.2		.48		14	3.4	2.5	1.0	55	0	6.8	.0	.2	.6	.03	101	49	4	.2	113	6.8	55
Sept. 15.....	--	10		.52		7.8	3.1	2.6	1.5	20	0	19	.0	.4	1.1	.05	128	32	16	.2	70	6.5	200
5-1310. DARK RIVER NEAR CHISHOLM, MINN.																							
Aug. 10, 1960	39	6.0		0.67	0.00	7.6	2.4	1.9	0.6	30	0	6.5	0.0	0.2	0.4		76	29	4	0.2	61	6.6	120
May 11, 1961.	76	5.6		.37	.00	4.6	2.6	1.5	1.3	23	0	6.5	.0	.1	.9	0.05	60	22	3	0.1	68	6.7	85

5-1317. ROUND LAKE AT SQUAW LAKE, MINN.

Aug. 11, 1960		16		0.05	0.04	36	11	2.3	1.5	154	0	11	0.2	0.2	0.4		184	133	7	0.1	248	7.2	28
May 12, 1961.		18		.01	.00	35	9.6	2.4	1.6	149	0	9.3	.1	.1	.4	0.03	180	127	5	.1	253	7.4	33

MISSISSIPPI RIVER MAIN STEM

5-2107. MISSISSIPPI RIVER AT POKEGAMA DAM OUTLET, NEAR GRAND RAPIDS, MINN.

Aug. 11, 1960	232	8.7		0.11	0.00	33	11	4.3	1.0	156	0	6.5	0.0	0.2	0.4		172	129	1	0.2	251	7.2	32
May 12, 1961.	515	5.1		.07	.00	36	11	3.5	2.4	164	0	8.0	.0	.2	.3	0.03	166	135	1	0.1	271	7.2	11

SWAN RIVER BASIN

5-2170. SWAN RIVER NEAR WARBA, MINN.

Aug. 11, 1960		9.1		0.23	0.00	29	7.7	4.6	1.2	118	0	14	0.0	0.2	0.4		151	104	7	0.2	213	7.2	50
May 11, 1961.	214	5.8		.17	.01	30	5.6	4.1	1.6	105	0	17	.7	.2	.5	0.04	136	98	12	.2	219	7.3	44

CROW RIVER BASIN

5-2800. CROW RIVER AT ROCKFORD, MINN.

May 15, 1952.	2350	7.9		0.06		56	24	5.9	5.2	248	0	45	3.0	0.2	2.5	0.06	298	238	35	0.2	469	7.5	31
July 29, 1961	136	17		.04	0.00	62	25	15	6.8	285	0	35	12	.3	3.0	.10	343	256	22	.4	541	7.3	

b Estimated.

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN HUDSON BAY AND UPPER MISSISSIPPI RIVER BASIN--Continued

Chemical analyses, in parts per million, water year October 1960 to September 1961--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)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
RUM RIVER BASIN																							
5-2840. MILLE LACS LAKE AT GARRISON, MINN.																							
Sept. 28, 1957.....	--	--		--	--	--	--	--	--	118	0	--	--	--	--	--	--	96	0	--	205	7.4	--
Aug. 11, 1960	c1250.39	5.4		0.01	0.00	25	8.7	3.6	1.9	122	0	5.3	0.0	0.2	1.2	0.04	128	98	0	0.2	204	7.5	7
May 14, 1961.	c1250.27	4.8		.02	.09	27	7.7	3.7	1.9	122	0	4.5	.0	.2	.0	.03	127	99	0	.2	211	7.3	2
MINNESOTA RIVER BASIN																							
5-2905. WHETSTONE RIVER NEAR CORONA, S. DAK.																							
June 1, 1960.	93.2	12				78	28	27	8.0	152	0	232	3.0	0.2	2.5	0.23	528	311	182	0.7	700	7.2	
Mar. 19, 1961	b 20	17		0.02	0.18	118	40	33	6.7	227	0	327	5.9	.2	1.2	.17	704	460	274	.7	946	7.4	10
SOUTH FORK WHETSTONE RIVER AT MILBANK, S. DAK.																							
June 1, 1960.		5.4		0.02	0.00	84	46	21	5.6	178	0	276	2.4	0.2	0.2	0.13	570	400	254	0.5	781	8.2	12
Oct. 11.....						55	57	26		147	0	303					573	372	251	.6	789	7.5	
5-2915. BIG STONE LAKE AT ORTONVILLE, MINN.																							
June 1, 1960.	(d)	2.3		0.05	0.00	79	60	47	9.8	201	0	355	14	0.2	2.0	0.24	726	444	279	1.0	991	7.2	8
Oct. 12.....	e 90500	5.3		.25	.03	74	58	46	12	208	0	344	16	.2	.4	.27	683	425	254	1.0	963	7.2	8
Mar. 19, 1961	e 94000	16		.03	.69	99	33	29	6.6	251	0	215	17	.2	2.3	.14	563	381	175	.6	815	7.4	8
May 15.....	e 103600	5.5		.00	.35	132	56	56	9.0	296	0	397	19	.3	1.0	.21	886	561	318	1.0	1170	7.6	15

5-2930. YELLOW BANK RIVER NEAR ODESSA, MINN.

Oct. 2, 1960.	1.0	21		0.01	--	39	116	28	6.7	370	0	311	11	0.2	0.8	0.24	789	574	271	0.5	1080	7.9	4
Mar. 19, 1961	38	14		.03	0.00	74	27	10	6.0	198	0	150	2.3	.1	.9	.07	403	297	135	.3	593	7.4	13
May 15.....	31.4	14		.01	.10	132	52	19	7.9	317	0	313	5.1	.2	.1	.11	759	545	285	.4	1000	7.7	17

5-2940. POMME DE TERRE RIVER AT APPLETON, MINN.

Oct. 3, 1960.	42	14		0.02	--	35	86	26	7.1	337	0	210	8.7	0.2	1.7	0.20	600	442	166	0.5	874	7.6	7
Mar. 19, 1961	68	10		.02	0.00	66	41	20	7.1	270	0	144	7.1	.2	3.3	.13	450	335	114	.5	683	7.4	18
May 15.....	128	9.4		.00	.05	89	51	23	7.0	327	0	198	6.6	.2	1.4	.13	579	430	162	.5	848	8.0	15

5-3000. LAC QUI PARLE RIVER NEAR LAC QUI PARLE, MINN.

Oct. 3, 1960.	2.9	21		0.02	--	30	103	34	8.1	278	0	325	10	0.3	1.9	0.25	743	500	272	0.7	1010	7.4	8
Mar. 20, 1961	75	12		.07	0.00	84	27	16	9.1	170	0	209	5.7	.2	3.7	.12	485	322	183	.4	678	6.7	45
May 15.....	66	11		.00	.31	173	69	52	8.0	333	0	552	12	.3	.1	.24	1120	715	442	.8	1390	7.7	19

5-3045. CHIPPEWA RIVER NEAR MILAN, MINN.

Sept. 28, 1957.....	--	--		--	--	--	--	--	--	252	0	--	--	--	--	--	--	269	62	--	532	7.6	--
Oct. 3, 1960.	61.6	20		0.02	--	22	82	15	5.1	352	0	122	7.7	0.2	2.0	0.10	486	391	102	0.3	746	7.7	9
Mar. 20, 1961	70.8	11		.01	0.00	61	27	11	3.7	242	0	78	4.9	.2	1.3	.06	325	264	66	.3	527	7.5	12
May 15.....	240	17		.01	.06	84	42	14	5.5	335	0	130	3.7	.2	1.2	.08	500	381	106	.3	740	7.6	32

5-3135. YELLOW MEDICINE RIVER NEAR GRANITE FALLS, MINN.

Oct. 3, 1960.	7.1	22		0.01	--	89	85	56	7.9	346	0	381	12	0.3	1.4	0.30	882	572	288	1.0	1170	7.8	5
Mar. 20, 1961	80	11		.10	0.00	51	16	7.4	10	128	0	99	.7	.1	6.7	.09	284	191	86	.2	426	6.9	55
May 15.....	52	12		.01	.54	176	80	50	7.8	328	0	563	8.4	.3	.0	.20	1160	767	498	.8	1420	7.5	16

b Estimated.
c Lake elevation, in feet.
d Lake content not known. Information on lake stage available in district office at Lincoln, Nebr.
e Lake content, in acre-feet.

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN HUDSON BAY AND UPPER MISSISSIPPI RIVER BASIN--Continued

Chemical analyses, in parts per million, water year October 1960 to September 1961--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)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
MINNESOTA RIVER BASIN--Continued																							
5-3165. REDWOOD RIVER NEAR REDWOOD FALLS, MINN.																							
Oct. 3, 1960.	32	16		0.01	--	56	118	47	6.8	297	0	441	20	0.3	2.7	0.21	936	626	382	0.8	1230	7.7	7
Mar. 20, 1961	165	14		.06	0.00	70	22	9.9	8.0	177	0	137	3.3	.2	6.8	.08	382	266	121	.3	556	7.0	46
May 16.....	98	13		.02	.10	165	73	38	7.0	312	0	479	12	.5	2.6	.16	1050	712	456	.6	1320	7.7	12
5-3170. COTTONWOOD RIVER NEAR NEW ULM, MINN.																							
Oct. 3, 1960.	142	27		0.01	--	45	117	21	5.8	368	0	310	7.9	0.5	12	0.13	804	594	292	0.4	1070	7.8	10
Mar. 20, 1961	660	18		.10	0.00	62	17	7.5	8.6	160	0	104	3.8	.2	4.9	.08	328	225	94	.2	473	6.9	55
May 16.....	330	12		.05	.00	124	45	20	4.9	232	0	312	6.8	.4	6.4	.08	699	495	305	.4	936	7.4	4
5-3195. WATONWAN RIVER AT GARDEN CITY, MINN.																							
Oct. 4, 1960.	b 250	27		0.02	--	131	43	13	3.9	353	0	209	8.5	0.5	16	0.10	659	505	216	0.3	907	7.8	18
Mar. 20, 1961	b 400	16		.02	0.00	90	29	15	5.6	254	0	143	10	.3	8.0	.06	459	342	134	.4	683	7.4	19
May 16.....	b 550	13		.04	.00	112	43	15	3.4	306	0	201	10	.3	11	.07	606	456	205	.3	858	7.5	8
5-3200. BLUE EARTH RIVER NEAR RAPIDAN, MINN.																							
Oct. 4, 1960.	796	26		0.01	--	70	74	14	4.3	348	0	191	9.6	0.3	16	0.11	627	480	195	0.3	884	7.7	12
Mar. 20, 1961	675	15		.02	0.00	76	23	13	6.1	237	0	95	11	.3	12	.06	383	285	91	.3	590	7.3	22
May 16.....	796	7.5		.03	.04	77	33	14	3.0	234	0	138	10	.6	8.4	.07	449	329	137	.3	658	7.4	12
5-3250. MINNESOTA RIVER AT MANKATO, MINN.																							
Oct. 4, 1960.	1460	24		0.02	--	30	99	20	5.3	341	0	217	9.7	0.4	11	0.12	647	483	203	0.4	907	7.7	13
Mar. 20, 1961	2470	14		.05	0.00	74	29	16	8.2	207	0	151	7.5	.2	9.3	.12	430	304	134	.4	639	7.1	30
May 16.....	2730	9.7		.02	.01	98	44	20	5.0	270	0	216	11	.5	9.8	.11	600	426	205	.4	822	7.6	22

b Estimated.

PART 6. MISSOURI RIVER BASIN

BIG HOLE RIVER BASIN

6-255. BIG HOLE RIVER NEAR MELROSE, MONT.

LOCATION (revised).--At gaging station at bridge on Interstate Highway 15 and U.S. Highway 91, 0.1 mile downstream from Rock Creek and 7 miles south of Melrose, Madison County.
DRAINAGE AREA (revised).--2,476 square miles.
RECORDS AVAILABLE.--Chemical analyses: August 1956 to September 1957, August 1960 to September 1961.
Water temperatures: August 1956 to September 1957, August 1960 to September 1961.
Sediment records: August 1956 to September 1957, August 1960 to September 1961.
EXTREMES, August 1960 to September 1961.--Dissolved solids: Maximum, 192 ppm Aug. 17-31, 1961; minimum, 75 ppm May 22 to June 4, 1961.
Hardness: Maximum, 140 ppm Aug. 17-31, 1961; minimum, 31 ppm May 28 to June 4, 1961.
Specific conductance: Maximum daily, 340 micromhos Sept. 6, 1961; minimum daily, 77 micromhos May 31, 1961.
Water temperatures: Maximum, 74°F Aug. 1, 1961; minimum, freezing point on many days during November 1960 to February 1961.
Sediment concentrations: Maximum daily, 200 ppm June 29, 1961; minimum daily, 1 ppm on many days.
Sediment loads: Maximum daily, 708 tons May 27, 1961; minimum daily, less than 0.50 ton on several days during August 1961.
EXTREMES, 1956-57, 1960-61.--Dissolved solids: Maximum, 192 ppm Aug. 17-31, 1961; minimum, 64 ppm May 11-21, 1957.
Hardness: Maximum, 140 ppm Aug. 17-31, 1961; minimum, 29 ppm May 11-21, 1957.
Specific conductance: Maximum daily, 340 micromhos Sept. 6, 1961; minimum daily, 74 micromhos May 19, 1957.
Water temperatures: Maximum, 74°F Aug. 1, 1961; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 200 ppm June 29, 1961; minimum daily, 1 ppm on many days in 1960-61.
Sediment loads: Maximum daily, 1,700 tons May 21, 1957; minimum daily, less than 0.50 ton on several days during August 1961.
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. 5 to Feb. 2.

Chemical analyses, in parts per million, August 1960 to September 1961

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 $CaCO_3$		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. 3-13, 1960a	443	15	0.01	26	7.3	7.9	2.5	119	0	15	0.0	0.2	0.3	0.03	144	0.20	172	95	0	0.4	219	7.6	7
Aug. 14-31 a....	355	17	.01	29	7.7	8.9	2.6	129	0	16	.7	.2	.0	.07	155	.21	149	104	0	.4	240	7.7	6
Sept. 1-13 a....	329	15	.01	29	8.1	9.1	2.6	131	0	17	.9	.2	.0	.03	157	.21	139	106	0	.4	244	7.6	11
Sept. 14-30 a...	294	15	.01	31	7.7	9.4	2.6	137	0	17	1.1	.2	.0	.03	160	.22	127	109	0	.4	251	7.6	8
Oct. 1-19.....	341	17	.01	28	7.3	8.5	2.9	128	0	17	1.5	.3	.0	.03	149	.20	137	100	0	.4	233	7.7	8
Oct. 20-31.....	438	17	.00	26	6.1	8.3	2.3	116	0	16	1.6	.2	.0	.06	136	.18	161	90	0	.4	217	7.6	8
Nov. 1-15.....	488	18	.01	23	6.2	7.7	2.4	105	0	15	.9	.2	.0	.04	129	.18	170	83	0	.4	200	7.6	9
Nov. 16-30.....	482	18	.01	22	6.3	7.7	2.4	102	0	13	1.1	.2	.0	.03	127	.17	165	81	0	.4	195	7.6	8
Dec. 1-15.....	325	19	.01	28	6.4	8.5	2.3	120	0	15	1.4	.2	.0	.01	147	.20	129	96	0	.4	228	7.8	6
Dec. 16-31.....	273	18	.01	27	7.0	8.1	2.3	116	0	14	1.0	.2	.8	.01	142	.19	105	96	1	.4	221	7.6	7
Jan. 1-21, 1961.	283	18	.00	25	6.5	8.0	2.4	110	0	17	.9	.2	.1	.02	130	.18	99.3	89	0	.4	210	7.7	3
Jan. 22-31.....	241	18	.00	29	7.2	8.6	2.6	123	0	17	1.5	.2	.1	.03	145	.20	94.4	102	1	.4	236	7.7	7

a Not included in weighted average.

BIG HOLE RIVER BASIN--Continued

6-255. BIG HOLE RIVER NEAR MELROSE, MONT.--Continued

Chemical analyses, in parts per million, August 1960 to September 1961--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 $CaCO_3$		Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
															Parts per million	Tons per acre-foot	Tons per day	Calcium, Magnesium	Noncarbonate				
Feb. 1-28, 1961.	399	17	0.02	22	5.9	7.8	3.3	99	0	14	1.1	0.2	0.1	0.02	127	0.17	137	79	0	0.4	196	7.5	1
Mar. 1-14.....	370	18	.01	28	3.2	8.1	2.6	104	0	14	1.3	.2	.0	.01	129	.18	129	83	0	.4	203	7.5	5
Mar. 15-31.....	618	15	.05	20	2.0	6.9	3.4	77	0	9.3	1.3	.1	.1	.02	105	.14	175	58	0	.4	154	7.3	18
Apr. 1-30.....	675	15	.04	16	3.4	7.0	3.1	73	0	9.5	.3	.2	.2	.05	106	.14	193	54	0	.4	146	8.1	--
May 1-15.....	885	16	.01	15	3.3	6.3	1.7	65	0	9.5	.4	.2	.4	.03	92	.13	220	51	0	.4	137	7.3	2
May 16-21.....	1,523	17	.02	13	3.1	5.6	1.7	57	0	10	.2	.2	.7	.02	88	.12	362	45	0	.4	121	7.5	4
May 22-27.....	3,132	14	.03	12	2.0	4.3	1.3	47	0	7.8	.1	.2	.6	.02	75	.10	634	38	0	.3	101	7.4	12
May 28-June 4...	4,912	14	.03	10	1.5	3.5	1.0	39	0	9.0	.0	.1	.7	.04	75	.10	995	31	0	.3	93	7.2	28
June 5-15.....	4,329	15	.05	13	2.6	4.7	1.2	56	0	7.8	.0	.2	.4	.00	91	.12	1,060	43	0	.3	108	7.4	35
June 16-26.....	1,538	17	.03	18	3.9	5.9	1.6	80	0	8.5	.1	.2	8.5	.02	105	.14	436	61	0	.3	148	7.5	18
June 27-July 15.	719	18	.00	24	6.4	8.0	2.8	110	0	16	.0	.2	.2	.04	133	.18	258	86	0	.4	204	7.4	8
July 16-31.....	372	14	.00	27	7.0	10	2.5	120	0	15	.7	.2	.3	.02	137	.19	138	96	0	.4	227	7.6	10
Aug. 1-16.....	229	14	.00	34	7.5	9.5	2.7	145	0	20	1.4	.3	.2	.02	164	.22	101	116	0	.4	270	7.5	5
Aug. 17-31.....	165	15	.00	40	9.7	9.9	3.1	166	0	24	1.9	.3	.3	.01	192	.26	85.5	140	4	.4	308	7.6	5
Sept. 1-17.....	242	17	.00	36	9.0	10	3.6	150	0	23	1.9	.3	.1	.01	179	.24	117	127	4	.4	294	7.2	5
Sept. 18-30.....	367	16	.00	31	7.2	9.9	2.6	133	0	18	1.5	.2	.0	.00	158	.21	157	107	0	.4	254	7.2	5
Weighted average.....	--	16	0.03	18	4.0	6.3	2.0	78	0	11	0.5	0.2	0.9	0.02	107	0.15	215	61	0	0.4	154	7.4	17
Time-weighted average.....	742	17	0.01	24	5.7	7.9	2.6	105	0	14	1.0	0.2	0.4	0.02	131	--	--	84	0	0.4	202	7.5	8
Tons per day..	--	32.0	0.05	36.0	7.9	13.0	4.0	156	0	23.0	1.0	0.4	1.7	0.05	--	--	--	--	--	--	--	--	--

6-255. BIG HOLE RIVER NEAR MELROSE, MONT.--Continued

Temperature (°F) of water, August to September 1960

Month	Day																													Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
July			--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--
August			68	63	60	55	57	53	55	55	58	56	55	62	55	52	61	57	67	58	61	58	55	54	55	55	53	60	55	58	55	57
September	60	62	57	60	53	53	53	56	60	58	49	61	55	54	54	58	59	49	59	51	44	54	51	45	50	57	48	51	50	54		54

Temperature (°F) of water, water year October 1960 to September 1961

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

BIG HOLE RIVER BASIN--Continued

6-255. BIG HOLE RIVER NEAR MELROSE, MONT.--Continued

Suspended sediment, August to September 1960

Day	JULY			AUGUST			SEPTEMBER		
		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..				425	--	E 8	326	7	6
2..				524	--	E 12	326	5	4
3..				566	9	14	338	4	4
4..				566	11	17	346	122	114
5..				512	8	11	366	9	9
6..				470	6	8	358	5	5
7..				445	6	7	342	1	1
8..				430	4	5	338	5	5
9..				415	6	7	322	3	3
10..				395	4	4	310	4	3
11..				385	6	6	306	3	2
12..				358	5	5	302	6	5
13..				334	4	4	294	2	2
14..				318	4	3	302	3	2
15..				338	4	4	294	4	3
16..				370	4	4	298	2	2
17..				354	6	6	302	3	2
18..				354	5	5	302	4	3
19..				346	4	4	298	2	2
20..				334	2	2	294	3	2
21..				318	3	3	290	2	2
22..				310	10	8	294	2	2
23..				334	3	3	294	1	1
24..				362	4	4	290	1	1
25..				395	5	5	286	2	2
26..				415	2	2	290	2	2
27..				400	4	4	290	2	2
28..				385	3	3	290	3	2
29..				366	2	2	294	3	2
30..				350	3	3	298	3	2
31..				338	3	3	--	--	--
Total				12212	--	176	9280	--	197

Total discharge for period August to September (cfs-days)..... 21492
Total load for period August to September (tons)..... 373

E Estimated.

BIG HOLE RIVER BASIN--Continued

6-255. BIG HOLE RIVER NEAR MELROSE, MONT.--Continued

Suspended sediment, water year October 1960 to September 1961
/Where no concentrations are reported, loads are estimated/

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..	298	2	2	488	2	3	425	5	6
2..	298	2	2	500	2	3	430	6	7
3..	298	1	1	500	3	4	455	5	6
4..	290	1	1	506	2	3	460	5	6
5..	294	2	2	465	2	3	390	--	5
6..	286	2	2	450	3	4	340	--	5
7..	294	7	6	465	1	1	300	--	4
8..	306	5	4	476	2	3	250	--	4
9..	322	--	3	410	1	1	240	6	4
10..	334	--	3	400	5	5	240	4	3
11..	346	2	2	460	3	4	250	4	3
12..	366	2	2	560	1	2	260	6	4
13..	385	2	2	542	3	4	270	11	8
14..	385	2	2	560	3	5	280	6	5
15..	385	1	1	542	5	7	285	5	4
16..	385	2	2	476	3	4	290	6	5
17..	395	1	1	506	2	3	295	5	4
18..	395	1	1	542	3	4	300	4	3
19..	420	2	2	524	2	3	300	4	3
20..	420	1	1	455	2	2	300	4	3
21..	415	2	2	465	1	1	300	6	5
22..	420	2	2	465	6	8	295	6	5
23..	430	2	2	425	4	5	290	4	3
24..	435	2	2	455	2	2	285	5	4
25..	435	2	2	566	6	9	275	7	5
26..	430	2	2	590	5	8	260	8	6
27..	435	2	2	578	6	9	250	7	5
28..	445	2	2	420	--	8	240	2	1
29..	470	2	3	375	--	7	230	2	1
30..	455	2	2	395	6	6	230	4	2
31..	465	2	3	--	--	--	230	3	2
Total	11737	--	66	14561	--	131	9245	--	131
	JANUARY			FEBRUARY			MARCH		
1..	230	6	4	300	2	2	405	1	1
2..	230	8	5	320	8	7	370	--	1
3..	230	6	4	326	8	7	375	2	2
4..	235	7	4	334	7	6	366	2	2
5..	240	4	3	330	4	4	395	3	3
6..	250	4	3	334	4	4	390	3	3
7..	260	2	1	342	4	4	358	3	3
8..	270	3	2	334	4	4	354	10	10
9..	280	3	2	346	4	4	362	11	11
10..	290	6	5	354	7	7	362	4	4
11..	300	4	3	400	6	6	346	2	2
12..	305	2	2	440	4	5	362	3	3
13..	310	4	3	460	9	11	362	3	3
14..	315	6	5	460	6	7	370	3	3
15..	320	8	7	450	6	7	380	7	7
16..	325	4	4	455	5	6	445	6	7
17..	330	4	4	440	4	5	572	8	12
18..	320	7	6	420	3	3	646	13	23
19..	310	10	8	405	5	5	692	10	19
20..	300	5	4	405	3	3	740	10	20
21..	285	2	2	405	5	5	692	9	17
22..	270	2	1	445	2	2	611	6	10
23..	260	2	1	488	2	3	611	7	12
24..	235	2	1	470	4	5	653	7	12
25..	220	--	1	460	2	2	676	8	15
26..	220	--	1	425	2	2	684	6	11
27..	220	--	1	405	4	4	708	5	10
28..	225	--	1	425	4	5	611	5	8
29..	235	--	1	--	--	--	560	3	5
30..	250	--	1	--	--	--	604	4	7
31..	275	4	3	--	--	--	625	5	8
Total	8345	--	93	11178	--	135	15687	--	254

BIG HOLE RIVER BASIN--Continued

6-255. BIG HOLE RIVER NEAR MELROSE, MONT.--Continued

Suspended sediment, water year October 1960 to September 1961--Continued
(Where no concentrations are reported, loads are estimated)

Day	APRIL			MAY			JUNE		
		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	684	5	9	740	17	34	4730	25	319
2	684	6	11	821	19	42	4680	19	240
3	980	30	79	893	19	46	4730	16	204
4	1280	61	211	920	18	45	4760	18	231
5	1060	31	89	940	22	56	4850	21	275
6	848	14	32	930	22	55	4850	18	236
7	732	10	20	839	18	41	5040	23	313
8	668	7	13	776	18	38	4730	16	204
9	604	6	10	749	18	36	4250	15	172
10	572	8	12	830	22	49	3890	14	147
11	572	6	9	950	20	51	3560	18	173
12	560	6	9	960	18	47	3940	20	213
13	578	5	8	930	16	40	5140	30	416
14	572	5	8	950	14	36	4030	14	152
15	542	8	12	1050	15	43	3340	13	117
16	518	8	11	1260	29	99	2700	9	66
17	536	7	10	1360	28	103	2320	7	44
18	639	10	17	1450	30	117	1980	7	37
19	716	12	23	1510	25	102	1820	6	29
20	716	8	15	1770	33	158	1680	6	27
21	646	7	12	1790	32	155	1490	4	16
22	590	6	10	2060	40	222	1270	3	10
23	618	8	13	2300	54	335	1080	3	9
24	597	9	14	2630	48	341	950	3	8
25	604	8	13	3200	59	510	857	4	9
26	611	6	10	3920	57	603	776	4	8
27	618	8	13	4680	56	708	708	3	6
28	604	10	16	4950	48	642	653	4	7
29	632	14	24	5090	36	495	653	200	353
30	676	15	27	5220	39	550	668	9	16
31	--	--	--	5140	26	361	--	--	--
Total	20257	--	760	61608	--	6160	86125	--	4057

Day	JULY			AUGUST			SEPTEMBER		
1	597	6	10	290	5	4	182	8	4
2	566	5	8	269	1	1	213	8	5
3	530	5	7	262	2	1	228	4	2
4	524	5	7	252	2	1	219	4	2
5	684	7	13	243	1	1	216	3	2
6	930	11	28	240	--	1	213	6	3
7	1210	11	36	237	1	1	210	6	3
8	1110	9	27	234	1	1	213	3	2
9	920	7	17	231	2	1	225	5	3
10	821	7	16	228	1	1	237	6	4
11	732	5	10	222	2	1	280	3	2
12	653	3	5	201	2	1	280	2	2
13	604	3	5	190	1	1	276	2	1
14	572	4	6	190	1	1	286	2	2
15	524	3	4	192	1	1	280	2	2
16	494	4	5	188	1	1	272	3	2
17	455	3	4	172	--	1	290	3	2
18	430	4	5	168	2	1	362	6	6
19	405	4	4	168	1	T	342	2	2
20	390	5	5	170	1	T	342	2	2
21	380	5	5	165	1	T	342	1	1
22	370	7	7	155	1	T	358	2	2
23	358	3	3	152	2	1	358	1	1
24	354	2	2	158	2	1	362	4	4
25	342	3	3	158	1	T	375	1	1
26	338	5	5	165	1	T	390	1	1
27	338	4	4	170	2	1	380	1	1
28	338	7	6	172	4	2	380	1	1
29	330	4	4	165	2	1	390	1	1
30	318	4	3	168	2	1	395	1	1
31	306	3	2	170	3	1	--	--	--
Total	16923	--	266	6145	--	32	8896	--	67

Total discharge for year (cfs-days)..... 270707
Total load for year (tons)..... 12152

T Less than 0.50 ton.

6-260. BIRCH CREEK NEAR GLEN, MONT.

LOCATION.--At gaging station, 2.2 miles downstream from Sheep Creek and 8 miles southwest of Glen, Beaverhead County.
DRAINAGE AREA.--36.0 square miles.
RECORDS AVAILABLE.--Chemical analyses: September 1958 to September 1959, August 1960 to September 1961.

Chemical analyses, in parts per million, August 1960 to September 1961

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 $CaCO_3$		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. 4, 1960....	57	7.0	0.00	8.8	1.0	1.6	0.6	31	0	4.5	0.0	0.0	0.1	0.00	45	0.06	6.93	26	1	0.1	66	6.6	2
Aug. 30.....	12	12	.00	15	2.8	2.5	.9	61	0	5.3	.0	.1	.1	.01	72	.09	2.33	49	0	.2	111	7.0	6
Oct. 11.....	9.5	12	.01	16	2.5	2.6	.8	61	0	4.0	.0	.1	.1	.02	82	.11	2.10	50	0	.2	115	7.4	3
Nov. 1.....	16	11	.00	12	1.7	2.3	.9	47	0	6.8	.2	.1	.0	.01	69	.09	2.98	37	0	.2	92	7.1	3
Nov. 30.....	9.2	12	.00	15	2.3	2.7	.9	58	0	5.0	.0	.0	.2	.01	71	.10	1.76	47	0	.2	109	7.2	6
Jan. 4, 1961....	7.2	13	.00	17	2.1	2.8	.9	63	0	5.3	.0	.0	.2	.01	75	.10	1.46	51	0	.2	140	7.5	4
Feb. 2.....	6.1	13	.02	15	2.6	2.6	1.3	60	0	3.8	.4	.1	.0	.01	75	.10	1.24	48	0	.2	110	7.7	4
Mar. 1.....	6.1	13	.01	16	1.7	2.7	1.0	59	0	4.8	.1	.1	.2	.00	78	.11	1.28	47	0	.2	111	7.6	6
Apr. 4.....	4.4	13	.03	14	2.2	2.7	1.2	55	0	3.8	.3	.1	.0	.00	71	.10	.84	44	0	.2	109	7.3	2
May 3.....	7.5	12	.03	15	.6	2.9	1.3	50	0	4.8	.1	.1	.1	.00	65	.09	1.32	40	0	.2	107	7.3	6
June 7.....	156	6.7	.04	5.6	.5	1.6	.4	19	0	3.5	.2	.1	.3	.02	27	.04	11.4	16	0	.2	42	7.1	--
July 7.....	34	9.0	.01	12	.5	3.1	.6	39	0	7.5	.0	.0	.0	.01	50	.07	4.59	32	0	.2	76	7.2	3
Aug. 1.....	30	7.7	.01	8.9	1.2	1.7	.7	33	0	4.0	.0	.1	.0	.00	62	.08	5.02	27	0	.1	64	7.2	4
Sept. 5.....	8.5	13	.01	18	2.9	4.6	1.2	72	0	5.8	.4	.1	.2	.02	83	.11	1.90	57	0	.3	160	7.5	4

BIG HOLE RIVER BASIN--Continued

6-260. BIRCH CREEK NEAR GLEN, MONT.--Continued

Periodic determinations of suspended-sediment discharge, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Aug. 4, 1960	0840	52		57	9	1.4												
Aug. 30	1545	55		12	3	.1												
Oct. 11	1030	38		9.5	1	t												
Nov. 1	0820	36		16	8	.3												
Nov. 30	1600	33		9.2	2	t												
Feb. 2, 1961	0805	32		6.1	11	.2												
Mar. 1	0755	34		6.1	3	t												
Apr. 4	0725	32		4.4	70	.8												
May 3	1600	53		7.5	7	.1												
May 18	0900	38		14	5	.2												
June 20	0915	49		68	1	.2												
July 7	1210	58		34	5	.5												
July 17	1820	63		30	5	.4												
Aug. 1	1745	64		30	5	.4												
Sept. 5	1800	54		8.5	6	.1												

t Less than 0.05 ton.

MISSOURI RIVER MAIN STEM

6-265. JEFFERSON RIVER NEAR TWIN BRIDGES, MONT.

LOCATION.--At gaging station at private bridge, 0.1 mile upstream from Hell Canyon Creek, 4 miles downstream from confluence of Beaverhead and Big Hole Rivers, and 5 miles north of Twin Bridges, Madison County.
DRAINAGE AREA.--7,632 square miles.
RECORDS AVAILABLE.--Chemical analyses: September 1957 to September 1959, August 1960 to September 1961.
Water temperatures: March 1958 to September 1959, August 1960 to September 1961.
Sediment records: October 1957 to September 1959, August 1960 to September 1961.
EXTREMES, August 1960 to September 1961.--Dissolved solids: Maximum, 423 ppm Aug. 13-31, 1961; minimum, 95 ppm May 27 to June 10, 1961.
Hardness: Maximum, 282 ppm Aug. 13-31, 1961; minimum, 51 ppm May 27 to June 10, 1961.
Specific conductance: Maximum daily, 687 micromhos Aug. 25, 1961; minimum daily, 115 micromhos May 31, 1961.
Water temperatures: Maximum, 75°F Aug. 11, 1960, July 18, 1961; minimum, freezing point on many days during November 1960 to March 1961.
Sediment concentrations: Maximum daily, 160 ppm Dec. 13, 1960; minimum daily, 4 ppm May 8, 1961.
Sediment loads: Maximum daily, 1,250 tons May 28, 1961; minimum daily, 5 tons July 30, Aug. 1, 1961.
EXTREMES, 1957-59, 1960-61.--Dissolved solids: Maximum, 423 ppm Aug. 13-31, 1961; minimum, 93 ppm June 1-14, 1959.
Hardness: Maximum, 282 ppm Aug. 13-31, 1961; minimum, 49 ppm May 11-31, 1958.
Specific conductance: Maximum daily, 687 micromhos Aug. 25, 1961; minimum daily, 102 micromhos May 23, 1958.
Water temperatures (1958-59, 1960-61): Maximum, 78°F July 16, 1959; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 208 ppm Apr. 17, 1958; minimum daily, not determined.
Sediment loads: Maximum daily, 2,830 tons June 8, 1959; minimum daily, 5 tons July 30, Aug. 1, 1961.
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. 27 to Dec. 2, Dec. 5-17, Dec. 28 to Jan. 6, Jan. 20-30.

Chemical analyses, in parts per million, August 1960 to September 1961

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 $CaCO_3$		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. 5-19, 1960a	547	21	0.01	55	19	23	4.7	205	0	80	9.7	0.3	0.0	0.06	316	0.43	467	215	47	0.7	492	7.8	8
Aug. 20-30 a....	761	23	.01	63	23	27	5.9	234	0	98	12	.4	.2	.08	372	.51	764	252	60	.7	570	7.5	7
Sept. 1-15 a....	820	22	.01	60	22	25	5.3	224	0	95	12	.4	.1	.10	359	.49	795	242	58	.7	555	7.5	8
Sept. 16-30 a...	735	21	.01	60	22	26	5.1	236	0	96	12	.4	.0	.09	357	.49	708	241	47	.7	549	8.1	8
Oct. 1-15.....	697	22	.00	62	22	25	5.4	230	0	97	13	.3	.5	.08	364	.50	685	244	55	.7	571	7.9	4
Oct. 16-31.....	1,032	22	.00	65	21	23	5.0	232	0	91	11	.0	.9	.08	361	.49	1,010	248	58	.6	561	7.9	5
Nov. 1-15.....	1,277	21	.00	62	21	22	4.4	226	0	88	11	.0	.9	.06	347	.47	1,200	239	54	.6	542	7.8	4
Nov. 16-30.....	1,267	21	.00	62	20	22	4.2	226	0	86	11	.4	.9	.05	343	.47	1,170	235	50	.6	536	7.9	4
Dec. 1-15.....	1,030	22	.01	65	21	22	4.3	236	0	87	11	.4	.8	.05	363	.49	1,010	248	54	.6	558	7.7	6
Dec. 16-31.....	990	21	.01	65	20	22	4.1	232	0	86	11	.3	.9	.04	356	.48	952	246	56	.6	551	7.9	9
Jan. 1-15, 1961.	1,000	21	.00	65	18	21	4.0	223	0	85	10	.4	.9	.04	337	.46	910	238	55	.6	530	7.9	5
Jan. 16-31.....	866	21	.00	67	19	21	4.0	229	0	87	11	.4	.9	.07	346	.47	809	244	56	.6	544	7.9	4
Feb. 1-13.....	917	20	.00	62	19	20	4.2	219	0	82	11	.4	.6	.05	334	.45	827	234	54	.6	535	7.7	2
Feb. 14-28.....	1,062	20	.00	56	18	19	4.2	202	0	74	9.6	.4	.2	.04	308	.42	883	212	46	.6	487	7.7	2
Mar. 1-17.....	962	20	.11	59	19	20	4.0	212	0	79	10	.4	.4	.04	325	.44	844	225	51	.6	513	7.7	3

a Not included in weighted average.

MISSOURI RIVER MAIN STEM--Continued

6-265. JEFFERSON RIVER NEAR TWIN BRIDGES, MONT.--Continued

Chemical analyses, in parts per million, August 1960 to September 1961--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 $CaCO_3$		Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
															Parts per million	Tons per acre-foot	Tons per day	Calcium, Magnesium	Noncarbonate				
Mar. 18-31, 1961	1,208	19	0.01	51	12	16	4.1	172	0	60	8.0	0.3	0.1	0.05	261	0.35	851	176	35	0.5	413	8.0	7
Apr. 1-7.....	1,284	19	.03	39	9.8	14	3.1	138	0	45	6.6	.3	.4	.04	220	.30	763	138	25	.5	335	7.4	--
Apr. 8-30.....	819	17	.02	38	10	14	3.0	138	0	45	6.5	.2	.2	.05	215	.29	475	137	24	.5	333	7.5	--
May 1-14.....	903	18	.00	28	7.3	11	2.5	105	0	32	4.0	.3	.5	.03	160	.22	390	100	14	.5	250	7.8	1
May 15-23.....	1,661	18	.00	24	5.6	9.4	2.5	90	0	26	3.0	.2	.2	.04	142	.19	637	83	9	.4	207	7.5	6
May 24-26.....	3,143	17	.01	19	4.0	7.1	2.1	71	0	23	1.2	.2	.5	.04	112	.15	950	64	6	.4	162	7.5	5
May 27-June 10..	4,795	15	.03	15	3.3	5.5	1.4	59	0	14	.0	.2	.5	.00	95	.13	1,230	51	3	.3	134	7.3	28
June 11-22.....	3,087	18	.27	22	5.1	8.2	1.9	88	0	17	.4	.2	5.0	.00	130	.18	1,080	76	4	.4	190	7.6	26
June 23-30.....	925	19	.03	33	9.2	12	2.5	134	0	33	3.2	.3	6.3	.01	188	.26	470	120	10	.5	285	7.6	9
July 1-19.....	860	18	.01	50	8.0	15	3.0	169	0	43	5.1	.4	.1	.05	257	.35	597	158	19	.5	374	7.5	2
July 20-31.....	317	19	.00	43	14	17	4.0	172	0	53	6.6	.3	.2	.16	242	.33	207	164	23	.6	379	7.7	3
Aug. 1-12.....	194	19	.00	56	18	19	4.7	200	0	82	11	.4	.5	.05	321	.44	168	212	48	.6	492	7.6	5
Aug. 13-31.....	217	22	.00	70	26	26	6.1	253	0	118	14	.4	.2	.07	423	.58	248	282	75	.7	637	7.7	5
Sept. 1-12.....	450	23	.00	69	23	27	5.9	250	0	105	12	.2	.3	.07	394	.54	479	268	63	.7	610	7.6	5
Sept. 13-30.....	721	22	.00	63	21	24	3.3	223	0	95	11	.4	.1	.05	356	.48	693	242	59	.7	554	7.5	6
Weighted average.....	--	19	0.04	44	13	15	3.2	159	0	56	6.5	0.3	1.0	0.04	245	0.33	749	162	32	0.5	378	7.6	11
Time-weighted average.....	1,130	20	0.02	53	16	19	3.9	190	0	70	8.7	0.3	0.8	0.05	293	--	--	197	41	0.6	454	7.7	6
Tons per day..	--	58.0	0.12	134	39.0	47.0	9.9	486	0	170	20.0	0.8	3.1	0.12	--	--	--	--	--	--	--	--	--

MISSOURI RIVER MAIN STEM--Continued

6-265. JEFFERSON RIVER NEAR TWIN BRIDGES, MONT.--Continued

Temperature (°F) of water, August to September 1960

Month	Day																													Aver-age
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
July					--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--				--
August					68	70	64	65	68	70	75	68	72	72	65	60	68	72	72	69	68	61	60	59	62	66	65	62	61	69	62	66
September	64	68	68	68	64	65	60	60	62	63	63	63	60	61	61	56	57	56	55	59	40	42	42	43	45	45	45	42				56

Temperature (°F) of water, water year October 1960 to September 1961

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

MISSOURI RIVER MAIN STEM--Continued

6-265. JEFFERSON RIVER NEAR TWIN BRIDGES, MONT.--Continued

Suspended sediment, August to September 1960
/Where no concentrations are reported, loads are estimated/

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..				515	--	22	793	39	83
2..				538	--	26	775	--	85
3..				601	--	30	802	41	89
4..				674	--	40	880	--	110
5..				666	18	32	870	50	117
6..				643	18	31	870	43	101
7..				622	15	25	870	--	100
8..				608	12	20	840	--	110
9..				587	10	16	820	--	130
10..				574	12	19	820	73	162
11..				550	26	39	811	42	92
12..				495	62	83	802	34	74
13..				455	27	33	793	70	150
14..				435	6	7	784	38	80
15..				430	15	17	766	38	79
16..				490	14	19	757	56	114
17..				556	70	105	775	63	132
18..				556	120	180	775	54	113
19..				532	76	109	757	--	110
20..				520	80	112	748	80	162
21..				505	56	76	757	--	120
22..				500	56	76	757	31	63
23..				722	--	130	748	51	103
24..				840	--	160	757	71	145
25..				900	--	180	739	51	102
26..				942	75	191	739	--	60
27..				910	68	167	714	27	52
28..				900	--	140	698	24	45
29..				820	--	100	650	19	33
30..				811	32	70	650	--	50
31..				775	16	33	--	--	--
Total				19672	--	2288	23317	--	2966

Total discharge for period August to September (cfs-days)..... 42989
Total load for period August to September (tons)..... 5254

MISSOURI RIVER MAIN STEM--Continued

6-265. JEFFERSON RIVER NEAR TWIN BRIDGES, MONT.--Continued

Suspended sediment, water year October 1960 to September 1961
/Where no concentrations are reported, loads are estimated/

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	661	35	62	1140	13	40	1100	44	130
2	670	70	127	1170	--	100	1150	90	280
3	670	48	87	1220	49	161	1190	112	360
4	625	34	57	1280	--	170	1230	112	372
5	625	--	65	1260	50	170	1150	100	310
6	607	57	93	1200	--	180	1100	120	360
7	572	59	91	1250	55	186	1000	140	380
8	589	32	51	1310	52	184	980	110	290
9	607	30	49	1260	54	184	950	--	260
10	706	--	55	1220	47	155	950	--	260
11	770	28	58	1230	47	156	950	110	280
12	800	21	45	1350	56	204	950	140	360
13	840	30	68	1420	70	268	950	160	410
14	850	72	165	1420	63	242	900	100	240
15	860	103	239	1420	42	161	900	--	180
16	890	48	115	1350	54	197	900	55	130
17	940	--	130	1290	--	170	900	36	87
18	971	--	170	1350	41	149	982	52	138
19	1020	79	218	1360	48	176	1030	50	139
20	1040	45	126	1290	43	150	1000	39	105
21	1040	22	62	1240	46	154	993	40	107
22	1020	--	55	1250	37	125	1030	51	142
23	1030	--	70	1180	44	140	1020	51	140
24	1050	26	74	1180	51	162	1000	46	124
25	1040	48	135	1300	51	179	1030	41	114
26	1040	--	200	1430	70	270	1030	39	108
27	1060	67	192	1350	46	170	1030	44	122
28	1060	19	54	1250	24	81	1000	50	140
29	1100	44	131	1150	46	140	980	40	110
30	1110	18	54	1040	70	200	960	40	100
31	1110	13	39	--	--	--	950	34	87
Total	26973	--	3137	38160	--	5024	31285	--	6365
	JANUARY			FEBRUARY			MARCH		
1	950	34	87	860	34	79	1030	19	53
2	980	30	79	840	31	70	993	22	59
3	1000	26	70	860	44	102	940	22	56
4	1020	24	66	840	36	82	940	20	51
5	1040	24	67	860	30	70	930	20	50
6	1060	--	80	890	30	72	971	16	42
7	1080	46	134	910	--	75	950	23	59
8	1000	23	62	910	26	64	930	20	50
9	982	--	50	900	26	63	940	--	50
10	1020	13	36	940	30	76	940	20	51
11	982	--	50	1000	31	84	920	22	55
12	971	--	70	1070	32	92	920	20	50
13	1000	34	92	1040	16	45	940	21	53
14	960	--	85	1080	20	58	950	23	59
15	960	32	83	1090	38	112	960	12	31
16	950	36	92	1110	25	75	993	18	48
17	960	42	109	1100	36	107	1100	31	92
18	971	39	102	1070	22	64	1230	35	116
19	940	22	56	1020	38	105	1280	40	138
20	920	19	47	1020	29	80	1310	65	230
21	900	10	24	1030	29	81	1300	31	109
22	900	12	29	1070	31	90	1220	27	89
23	900	14	34	1100	22	65	1120	30	91
24	880	9	21	1090	22	65	1180	45	143
25	850	10	23	1100	32	95	1230	26	86
26	750	16	32	1050	20	57	1250	32	108
27	700	44	83	1000	15	40	1260	20	68
28	700	38	72	1000	17	46	1240	22	74
29	800	18	39	--	--	--	1120	20	60
30	850	20	46	--	--	--	1090	32	94
31	880	35	83	--	--	--	1090	35	103
Total	28856	--	2003	27850	--	2114	33267	--	2418

MISSOURI RIVER MAIN STEM--Continued

6-265. JEFFERSON RIVER NEAR TWIN BRIDGES, MONT.--Continued

Suspended sediment, water year October 1960 to September 1961--Continued
(Where no concentrations are reported, loads are estimated)

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..	1100	38	113	830	14	31	4910	30	398
2..	1110	45	135	840	13	29	4610	31	386
3..	1220	37	122	920	18	45	4730	31	396
4..	1600	64	276	950	18	46	4710	22	280
5..	1550	40	167	950	12	31	4810	36	468
6..	1290	22	77	993	14	38	4850	33	432
7..	1120	22	67	960	7	18	4940	37	494
8..	1020	22	61	900	4	10	4960	38	509
9..	950	14	36	820	9	20	4590	28	347
10..	880	14	33	770	8	17	4250	27	310
11..	840	22	50	860	8	19	3910	21	222
12..	800	16	35	950	13	33	3840	20	207
13..	800	16	35	950	9	23	5000	51	688
14..	790	12	26	950	16	41	4650	30	377
15..	751	17	34	1030	14	39	3890	22	231
16..	706	12	23	1150	19	59	3300	17	151
17..	670	17	31	1310	25	88	2720	14	103
18..	770	19	40	1530	32	132	2390	9	58
19..	880	18	43	1590	32	137	2150	9	52
20..	940	19	48	1780	38	183	1950	9	47
21..	880	27	64	1940	37	194	1740	10	47
22..	800	15	32	2200	52	309	1500	7	28
23..	790	7	15	2420	54	353	1300	8	28
24..	820	6	13	2640	69	492	1150	5	16
25..	810	40	87	3070	74	613	1030	6	17
26..	810	14	31	3720	101	1010	910	15	37
27..	800	9	19	4350	104	1220	790	22	47
28..	770	20	42	4910	94	1250	751	19	39
29..	751	25	51	4980	62	834	742	14	28
30..	800	27	58	5150	54	751	724	6	12
31..	--	--	--	5170	50	698	--	--	--
Total	27818	--	1864	61583	--	8763	91797	--	6455

Day	JULY			AUGUST			SEPTEMBER		
1..	679	14	26	225	9	5	318	63	54
2..	661	5	9	205	12	7	388	74	78
3..	634	7	12	190	14	7	437	85	100
4..	616	11	18	170	27	12	472	84	107
5..	800	40	86	180	27	13	465	35	44
6..	1060	66	189	180	14	7	451	46	56
7..	1390	39	146	190	17	9	430	41	48
8..	1480	40	160	190	22	11	430	35	41
9..	1340	38	137	185	38	19	423	--	36
10..	1160	31	97	200	32	17	458	--	50
11..	1080	27	79	210	57	32	524	51	72
12..	910	27	66	205	59	33	607	51	84
13..	840	27	61	185	55	27	598	37	60
14..	760	22	45	180	58	28	580	50	78
15..	715	12	23	185	53	26	589	79	126
16..	652	20	35	190	50	26	580	--	150
17..	589	22	35	185	57	28	580	--	130
18..	508	13	18	175	52	25	625	58	98
19..	465	14	18	165	54	24	780	36	76
20..	402	11	12	165	59	26	770	31	64
21..	367	7	7	180	52	25	780	32	67
22..	348	8	8	175	56	26	770	27	56
23..	342	9	8	190	63	32	810	34	74
24..	324	9	8	240	76	49	810	29	63
25..	306	14	12	246	65	43	810	27	59
26..	288	13	10	270	48	35	790	32	68
27..	300	9	7	282	51	39	790	31	66
28..	300	14	11	264	--	36	780	27	57
29..	276	13	10	264	45	32	770	28	58
30..	282	6	5	282	32	24	770	27	56
31..	270	10	7	300	35	28	--	--	--
Total	20144	--	1365	6453	--	751	18385	--	2176

Total discharge for year (cfs-days)..... 412571
Total load for year (tons)..... 42435

MADISON RIVER BASIN

6-388. MADISON RIVER AT KIRBY RANCH, NEAR CAMERON, MONT.

LOCATION.--At gaging station at bridge on county road, 0.2 mile upstream from West Fork and 22 miles southeast of Cameron, Madison County.
DRAINAGE AREA.--1,065 square miles.
RECORDS AVAILABLE.--Water temperatures: October 1959 to September 1960.
Sediment records: October 1959 to September 1961.
EXTREMES, 1959-61.--Sediment concentrations: Maximum daily, 2,830 ppm Oct. 23, 1959; minimum daily, not determined.
Sediment loads: Maximum daily, 32,300 tons Oct. 23, 1959; minimum daily, not determined.

Monthly and annual summary of water and suspended-sediment discharge, water year October 1960 to September 1961
/Suspended-sediment load computed from samples obtained about two times a week/

Month	Discharge (cfs-days)	Runoff (acre-feet)	Suspended sediment					
			Load (tons)	Daily load (tons)			Concentration (ppm)	
				Mean	Maximum	Minimum	Weighted mean	Maximum observed
October 1960.....	29089	57700	558	18			7	12
November.....	22075	43790	300	10			5	8
December.....	22916	45450	310	10			5	9
January 1961.....	22860	45340	372	12			6	9
February.....	18597	36890	168	6			3	4
March.....	16435	32600	31	1			1	2
April.....	11096	22010	120	4			4	8
May.....	13783	27340	248	8			7	13
June.....	19118	37920	420	14			8	14
July.....	27409	54360	372	12			5	10
August.....	26916	53390	155	5			2	4
September.....	37249	73880	510	17			5	12
Water year.....	267543	530700	3564	9.8			5	14

MILK RIVER BASIN

6-1541. MILK RIVER NEAR HARLEM, MONT.

LOCATION.--At bridge on U.S. Highway 2, 0.5 mile upstream from gaging station, 3 miles southeast of Harlem, Blaine County, and 6 miles upstream from Thirty Mile Creek.
DRAINAGE AREA (revised).--9,822 square miles upstream from gaging station.
RECORDS AVAILABLE.--Chemical analyses; June to September 1960, May to September 1961.
Water temperatures; August to September 1960, May to September 1961.
EXTREMES, May to September 1961.--Dissolved solids: Maximum, 350 ppm Sept. 24-30; minimum, 173 ppm Sept. 1-17.
Hardness: Maximum, 171 ppm Sept. 24-30; minimum, 110 ppm Sept. 1-17.
Specific conductance; Maximum daily, 665 micromhos Sept. 30; minimum daily, 294 micromhos Sept. 12.
Water temperatures; Maximum, 78°F June 28, Aug. 4, 5.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Worland, Wyo.

Chemical analyses, in parts per million, May to September 1961

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 $CaCO_3$		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 3-18, 1961..	314	3.5	0.00	36	15	37	2.4	189	0	68	5.0	0.2	0.5	0.04	268	0.36	227	152	0	1.3	447	7.7	0
May 19-31.....	330	4.4	.00	38	15	38	2.4	192	0	70	5.6	.2	.9	.05	277	.38	247	155	0	1.3	458	7.5	1
June 1-18.....	398	5.4	.01	35	16	40	2.7	194	0	73	5.6	.2	.2	.01	281	.38	302	152	0	1.4	464	7.9	9
June 19-30.....	364	5.1	.01	33	13	30	2.2	176	0	54	4.2	.1	1.4	.00	239	.33	235	138	0	1.1	400	7.8	7
July 1-31.....	430	7.4	.00	29	12	25	3.0	150	0	46	3.5	.1	.2	.05	198	.27	230	122	0	1.0	352	7.4	8
Aug. 1-19.....	347	3.7	.00	28	10	19	2.1	122	0	43	4.3	.3	.6	.06	186	.25	174	112	12	.8	303	7.4	5
Aug. 20-31.....	286	3.3	.00	29	10	19	1.9	134	0	45	4.0	.2	.6	.05	185	.25	143	114	4	.8	311	7.4	5
Sept. 1-17.....	322	4.0	.00	27	10	21	1.9	129	0	41	5.3	.0	.7	.02	173	.24	150	110	4	.9	306	7.3	5
Sept. 18-23.....	150	3.6	.00	31	13	33	1.6	148	0	70	7.9	.0	.7	.05	239	.33	96.8	131	10	1.3	410	7.3	5
Sept. 24-30.....	81	3.7	.00	39	18	57	2.0	184	0	118	14	.1	.2	.07	350	.48	76.5	171	20	1.9	565	7.5	5

Temperature (°F) of water, May to September 1961

Month	Day																													Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
April.....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
May.....	--	--	54	52	52	51	52	52	53	55	57	58	59	57	60	58	59	62	63	65	70	69	69	70	70	72	68	69	70	69	68	61
June.....	69	69	69	74	74	75	75	74	72	72	74	73	68	70	74	75	76	75	73	75	73	73	72	73	73	76	77	78	74	73	--	73
July.....	70	69	73	74	72	73	75	76	77	73	70	69	70	72	74	76	74	73	73	72	72	75	75	77	74	74	73	70	72	71	72	73
August.....	74	75	77	78	78	75	75	75	72	73	71	73	73	74	74	73	72	71	72	72	72	73	74	75	75	74	71	71	71	72	70	73
September.....	71	60	60	61	62	62	62	62	62	58	58	56	54	55	56	57	59	55	57	55	51	50	50	51	52	48	50	48	49	52	--	56

6-1740. WILLOW CREEK NEAR GLASGOW, MONT.

LOCATION.--At gaging station, 6 miles south of Glasgow, Valley County, and 8 miles upstream from mouth.
DRAINAGE AREA (revised).--538 square miles.
RECORDS AVAILABLE.--Sediment records: October 1953 to September 1961.
EXTREMES, 1960-61.--Sediment concentrations: Maximum daily, 36,600 ppm June 14; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 35,300 tons June 14; minimum daily, 0 tons on many days.
EXTREMES, 1953-61.--Sediment concentrations: Maximum daily, 58,000 ppm Apr. 5, 1954; minimum daily, no flow on many days eacb year.
Sediment loads: Maximum daily, 390,000 tons Apr. 6, 1954; minimum daily, 0 tons on many days each year.
REMARKS.--Bureau of Land Management has extensive spreader systems on some of the tributaries upstream from station.

Monthly and annual summary of water and suspended-sediment discharge, water year October 1960 to September 1961

Month	Discharge (cfs-days)	Runoff (acre-feet)	Suspended sediment					
			Load (tons)	Daily load (tons)			Concentration (ppm)	
				Mean	Maximum	Minimum	Weighted mean	Maximum observed
October 1960.....	0	0	0	0	0	0		--
November.....	0	0	0	0	0	0		--
December.....	0	0	0	0	0	0		--
January 1961.....	0	0	0	0	0	0		--
February.....	0	0	0	0	0	0		--
March.....	0	0	0	0	0	0		--
April.....	0	0	0	0	0	0		--
May.....	55	109	1430	46	1430	0		42400
June.....	1146	2270	82685	2760	35300	0		68700
July.....	15	30	e 330	11	e 260	0		--
August.....	58.0	115	2191	71	e 1500	0		11100
September.....	352.1	698	9854	328	4580	0		30500
Water year.....	1626.1	3220	96490	264	35300	0		68700

e Estimated.

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Aug. 1, 1961.....	1640	80		13	5650			99		99		100						PWC
Aug. 3.....	1515	81		11	10000			98		100								PWC
Sept. 7.....	1030	55		.7	5740			100		--								PWC

YELLOWSTONE RIVER BASIN

6-2043. BUTCHER CREEK NEAR ABSAROKEE, MONT.

LOCATION.--At gaging station, 0.3 mile upstream from mouth and 2.2 miles south of Absarokee, Stillwater County.
DRAINAGE AREA.--39.6 square miles.
RECORDS AVAILABLE.--Water temperatures: May 1960 to September 1961.
Sediment records: May 1960 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 77°F Aug. 15; minimum, freezing point on many days during November.
EXTREMES, May 1960 to September 1961.--Water temperatures: Maximum, 79°F July 7, 18, 1960; minimum, freezing point on many days in November 1960.
REMARKS.--Recorder stopped Dec. 1 to Mar. 28, June 6-8; range in temperature not determined. Flow affected by ice Nov. 23, 24, Nov. 28 to Dec. 22, Dec. 26 to Jan. 16, Jan. 18-22, 25-31, Feb. 17, 18, 26-28, Mar. 3-5.

Temperature (°F) of water, water year October 1960 to September 1961

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

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YELLOWSTONE RIVER BASIN--Continued

6-2043. BUTCHER CREEK NEAR ABSAROKEE, MONT.--Continued

Monthly and annual summary of water and suspended-sediment discharge, water year October 1960 to September 1961
/Suspended-sediment load computed from samples obtained about two times a week/

Month	Discharge (cfs-days)	Runoff (acre-feet)	Suspended sediment					
			Load (tons)	Daily load (tons)			Concentration (ppm)	
				Mean	Maximum	Minimum	Weighted mean	Maximum observed
October 1960.....	782	1550	48	1.5			23	68
November.....	327.8	650	17	.6			19	34
December.....	127.4	253	8	.3			23	44
January 1961.....	81.6	162	8	.3			36	70
February.....	90.6	180	6	.2			25	53
March.....	131.9	262	16	.5			45	116
April.....	257.5	511	47	1.6			68	160
May.....	669.2	1330	210	6.8			116	273
June.....	1155	2290	550	18			183	271
July.....	1525	3020	1009	33			245	500
August.....	1619	3210	631	20			144	187
September.....	1596	3170	667	22			155	194
Water year.....	8363	16590	3217	8.8			142	500

YELLOWSTONE RIVER BASIN--Continued

6-2078. BLUEWATER CREEK NEAR BRIDGER, MONT.

LOCATION.--At gaging station, 200 feet downstream from outflow of State fish hatchery, 6 miles northeast of Bridger, Carbon County, and 8 miles upstream from mouth.
DRAINAGE AREA.--27.5 square miles.
RECORDS AVAILABLE.--Water temperatures: May 1960 to September 1961.
Sediment records: April 1960 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 75°F July 15, 16; minimum, 35°F on several days during October to December, April and May.
EXTREMES, May 1960 to September 1961.--Water temperatures: Maximum, 80°F July 17, 1960; minimum, 34°F June 21, 1960.

Temperature (°F) of water, water year October 1960 to September 1961

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

6-2078. BLUEWATER CREEK NEAR BRIDGER, MONT.--Continued

Montbly and annual summary of water and suspended-sediment discharge, water year October 1960 to September 1961
/Suspended-sediment load computed from samples obtained about two times a week/

Month	Discharge (cfs-days)	Runoff (acre-feet)	Suspended sediment					
			Load (tons)	Daily load (tons)			Concentration (ppm)	
				Mean	Maximum	Minimum	Weighted mean	Maximum observed
October 1960.....	855	1700	83	2.7			36	123
November.....	847	1680	66	2.2			29	80
December.....	878	1740	79	2.5			33	110
January 1961.....	827	1640	150	4.8			67	100
February.....	754	1500	116	4.1			57	106
March.....	884	1750	220	7.1			92	184
April.....	858	1700	260	8.7			112	180
May.....	875	1740	224	7.2			95	185
June.....	785	1560	120	4.0			57	81
July.....	773	1530	93	3.0			45	62
August.....	813	1610	62	2.0			28	46
September.....	892	1770	228	7.6			95	222
Water year.....	10041	19920	1701	4.7			63	222

YELLOWSTONE RIVER BASIN--Continued

6-2303. RAY LAKE OUTLET NEAR FORT WASHAKIE, WYO.

LOCATION.--At gaging station at bridge on U.S. Highway 287, 1,000 feet downstream from Ray Lake Dam and 5 miles southeast of Fort Washakie, Fremont County.
RECORDS AVAILABLE.--Chemical analyses: August 1960 to September 1961.
Water temperatures: August 1960 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 472 ppm Sept. 1-8; minimum, 454 ppm Aug. 1-15.
Hardness: Maximum, 214 ppm July 4-15; minimum, 188 ppm Aug. 1-15.
Specific conductance: Maximum daily, 782 micromhos July 10; minimum daily, 673 micromhos Aug. 1, 2, 7.
Water temperatures: Maximum, 78°F July 19, Aug. 1, 2.
EXTREMES, August 1960 to September 1961.--Dissolved solids: Maximum, 523 ppm Sept. 15-26, 1960; minimum, 454 ppm Aug. 1-15, 1961.
Hardness: Maximum, 214 ppm July 4-15, 1961; minimum, 188 ppm Aug. 1-15, 1961.
Specific conductance: Maximum daily, 782 micromhos Sept. 26, 1960, July 10, 1961; minimum daily, 673 micromhos Aug. 1, 2, 7, 1961.
Water temperatures: Maximum, 78°F July 19, Aug. 1, 2, 1961.
REMARKS.--Records of specific conductance of daily samples available in district office at Worland, Wyo. Records of discharge for water year October 1960 to September 1961 furnished by U.S. Indian Service, Fort Washakie, Wyo. No flow Oct. 1 to July 3, Sept. 19-30.

Chemical analyses, in parts per million, July to September 1961

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 $CaCO_3$		Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
															Parts per million	Tons per acre-foot	Tons per day	Calcium, Magnesium	Noncarbonate				
July 4-15, 1961.	55.3	2.4	0.00	44	25	69	2.1	126	0	235	6.9	0.2	0.0	0.06	462	0.63	69.0	214	111	2.0	688	7.2	3
July 16-31.....	43.9	2.1	.00	37	25	67	1.1	105	0	241	7.2	.2	.0	.09	460	.63	54.5	196	110	2.1	683	6.9	3
Aug. 1-15.....	33.2	1.8	.00	33	26	68	1.0	93	0	249	7.5	.2	.2	.07	454	.62	40.7	188	112	2.2	678	7.2	5
Aug. 16-31.....	23.1	1.7	.00	34	26	71	1.0	100	0	256	7.9	.2	.3	.06	469	.64	29.3	191	109	2.2	696	7.4	5
Sept. 1-8.....	17.2	2.3	.00	36	25	72	.8	100	0	250	8.1	.2	.7	.08	472	.64	21.9	194	112	2.2	714	7.3	5
Weighted average.....	a 6.5	2.1	--	38	25	69	1.3	107	0	244	7.3	0.2	0.1	0.07	461	0.63	44	198	111	2.1	687	7.1	4
Tons per day..	--	0.2	--	3.6	2.4	6.6	0.1	10	0	23.0	0.7	0.0	0.0	0.01	--	--	--	--	--	--	--	--	--

a Mean discharge based on 365 days; mean discharge for 67 days of chemical analyses, 35.4 cfs.

YELLOWSTONE RIVER BASIN--Continued

6-2303. RAY LAKE OUTLET NEAR FORT WASHAKIE, WYO.--Continued

Temperature (°F) of water, water year October 1960 to September 1961

Month	Day																													Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
October	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
November	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
December	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
January	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
February	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
March	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
April	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
May	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
June	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
July	--	--	--	--	75	74	74	76	72	72	70	72	70	71	74	70	74	74	78	68	74	72	74	71	75	74	73	72	71	72	72	73
August	78	78	74	74	75	68	73	71	74	74	74	73	70	71	74	72	72	--	--	69	74	74	74	72	74	72	70	69	64	60	70	72
September	67	57	60	63	59	58	58	57	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

YELLOWSTONE RIVER BASIN--Continued

6-2390. MUSKRAT CREEK NEAR SHOSHONI, WYO.

LOCATION.--At gaging station, 2 miles upstream from mouth and 7 miles southwest of Shoshoni, Fremont County.
DRAINAGE AREA.--733 square miles.
RECORDS AVAILABLE.--Sediment records: June 1950 to September 1958, October 1959 to September 1961.
EXTREMES, 1960-61.--Sediment concentrations: Maximum daily, 20,100 ppm July 7; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 33,500 tons June 2; minimum daily, 0 tons on many days.
EXTREMES, 1950-58, 1959-61.--Sediment concentrations: Maximum daily, not determined; minimum 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.

Monthly and annual summary of water and suspended-sediment discharge, water year October 1960 to September 1961

Month	Discharge (cfs-days)	Runoff (acre-feet)	Suspended sediment					
			Load (tons)	Daily load (tons)			Concentration (ppm)	
				Mean	Maximum	Minimum	Weigbted mean	Maximum observed
October 1960.....	3	6	340	11	e 240	0		--
November.....	0	0	0	0	0	0		--
December.....	0	0	0	0	0	0		--
January 1961.....	0	0	0	0	0	0		--
February.....	0	0	0	0	0	0		--
March.....	0	0	0	0	0	0		--
April.....	0	0	0	0	0	0		--
May.....	0	0	0	0	0	0		--
June.....	166	329	35742	1190	33500	0		114000
July.....	12.2	24	1363	44	742	0		41400
August.....	0	0	0	0	0	0		--
September.....	0	0	0	0	0	0		--
Water year.....	181.2	359	37445	103	33500	0		114000

e Estimated.

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment										Method of analysis
							Percent finer than size indicated, 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 4, 1961.....	0145	48		1.8	10600			96		99		100						PWC
June 4.....	2045	60		6.6	52600			89		99		100						VPWC
July 7.....	0200	57		13	37100			77		98		99	100					VPWC

6-2445. 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 (revised).--118 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to November 1951.
Water temperatures: October 1950 to September 1951, April to September 1961 (discontinued).
Sediment records: October 1949 to September 1958, April to September 1961.
EXTREMES, April to September 1961.--Water temperatures: Maximum, 83°F May 26.
Sediment concentrations: Maximum daily, not determined; minimum daily, no flow on many days during May to September.
Sediment loads: Maximum daily, 2,100 tons (estimated) Sept. 19; minimum daily, 0 tons on many days during May to September.
EXTREMES, 1949-58, 1961.--Water temperatures: Maximum (1961), 83°F May 26, 1961; minimum (1950-51), freezing point on many days during winter months.
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.--Maximum observed sediment concentration during water year, 20,400 ppm June 2. Flow affected by ice Apr. 5-8.

Temperature (°F) of water, April to September 1961

Month	Day																													Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
April	47	58	59	48	41	40	46	36	55	57	57	55	55	34	58	65	47	54	63	61	55	67	42	45	52	55	54	62	57	61	--	53
May	70	59	70	46	57	55	56	66	69	71	77	49	59	61	47	56	61	49	65	72	71	77	78	68	82	83	82	82	71	--	--	66
June	63	50	65	71	68	78	72	73	81	74	70	82	--	72	--	78	72	68	79	72	79	--	--	--	--	--	--	--	--	--	--	72
July	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
August	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
September	--	--	--	--	--	--	--	--	--	--	--	--	47	47	--	--	--	65	51	48	44	61	50	54	59	48	59	49	46	41	--	51

YELLOWSTONE RIVER BASIN--Continued

6-2445. FIVEMILE CREEK ABOVE WYOMING CANAL, NEAR PAVILLION, WYO.--Continued

Suspended sediment, April to September 1961
/Where no concentrations are reported, loads are estimated/

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	7.0	2200	42	1.6	1350	6	0.3	--	1
2	8.2	3330 S	83	1.0	1020	3	18	11800	573
3	4.7	1360 S	19	1.3	720	3	26	13300	934
4	2.3	1300	8	1.8	1020	5	21	11200	635
5	3.0	2200	18	2.0	660	4	14	9100	344
6	3.5	2300	22	2.0	900	5	10	6600	178
7	4.0	2500	27	2.4	1360	9	7.8	6030	127
8	5.0	2300	31	2.5	2220	15	6.6	5400	96
9	6.2	--	28	2.2	2420 S	17	5.0	4200	57
10	7.0	1100	21	1.9	--	10	4.4	3300	39
11	6.6	2500	45	1.5	420	2	3.2	2400	21
12	5.8	1520	24	4.4	4050 S	52	2.0	1600	9
13	4.7	1860	24	3.8	4540 S	44	1.4	700	3
14	5.4	2600	38	2.7	3800	28	.8	500	1
15	4.8	2470 S	42	6.2	3340 S	75	.5	--	1
16	4.0	--	22	5.4	2950	43	.4	500	1
17	4.7	1650	21	2.9	1860	15	.3	400	T
18	3.5	1280	12	2.6	2100	15	.1	490	T
19	2.6	1300	9	1.4	1680	6	.1	340	T
20	2.2	1140 S	7	1.1	2180	6	.4	430	T
21	2.7	2040 S	14	1.0	800	2	.6	1110 S	3
22	2.6	1500	11	.8	550	1	0	--	0
23	1.8	--	10	.8	500	1	0	--	0
24	2.4	1800	12	.5	320	T	0	--	0
25	2.4	--	10	.3	265	T	0	--	0
26	2.3	1600	10	.4	375	T	0	--	0
27	2.3	1850	11	.4	260	T	0	--	0
28	2.0	1300	7	.2	196	T	0	--	0
29	1.7	1240	6	.2	319	T	0	--	0
30	1.4	1050	4	0	--	0	0	--	0
31	--	--	--	0	--	0	--	--	--
Total	116.8	--	638	55.3	--	369	122.9	--	3024

Day	JULY			AUGUST			SEPTEMBER		
1	0		0				0	--	0
2	0		0				0	--	0
3	0		0				0	--	0
4	.1		T				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				.2	380	T
14	0		0				.2	180	T
15	0		0				0	--	0
16	0		0				0	--	0
17	0		0				0	--	0
18	0		0				7.1	--	100
19	0		0				28	--	2100
20	0		0				3.5	4500	43
21	0		0				2.3	3200	20
22	0		0				1.8	2400	12
23	0		0				1.6	2600	11
24	0		0				1.4	3600	14
25	0		0				.6	1900	3
26	0		0				.5	1100	1
27	0		0				.5	1300	2
28	0		0				.5	1000	1
29	0		0				1.0	1990 S	7
30	0		0				1.0	1300	4
31	0		0				--	--	--
Total	0.1		T	0		0	50.2	--	2318

Total discharge for period April to September (cfs-days)..... 345.3
Total load for period April to September (tons)..... 6349

S Computed by subdividing day.
T Less than 0.50 ton.

YELLOWSTONE RIVER BASIN--Continued

6-2445. FIVEMILE CREEK ABOVE WYOMING CANAL, NEAR PAVILLION, WYO.--Continued

Particle-size analyses of suspended sediment, April to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters											Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Mar. 22, 1960.....	1250	36		18	9840			24		39		68	88	99	100	--		VPWC
Oct. 9.....	0900	42		1.7	1770			78		98		99	99	100	--	--		VPWC
Apr. 4, 1961.....	1110	48		1.1	1310			34		52		74	89	100	--	--		VPWC
May 12.....	1100	49		5.8	5450			14		24		39	52	74	89	100		VPWC
June 2.....	1015	50		31	19800			26		38		53	65	80	90	100		VPWC

YELLOWSTONE RIVER BASIN--Continued

6-2500. FIVEMILE CREEK NEAR RIVERTON, WYO.

LOCATION.--At gaging station, 3 miles downstream from Ocean drain, 12.5 miles north of Riverton, Fremont County, and 13 miles upstream from mouth.
DRAINAGE AREA.--336 square miles, of which 132 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: September 1950 to November 1951.
Water temperatures: October 1950 to September 1951, October 1952 to September 1958, October 1959 to September 1961.
Sediment records: October 1949 to September 1958, October 1959 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 68°F June 7; minimum, freezing point on many days during November to April.
Sediment concentrations: Maximum daily, 17,700 ppm June 3; minimum daily, 160 ppm Feb. 5.
Sediment loads: Maximum daily, 11,100 tons June 2; minimum daily, 2 tons on several days during December and January.
EXTREMES, 1949-58, 1959-61.--Water temperatures: Maximum (1959-61), 70°F July 3, 1960; minimum, freezing point on many days during winter months.
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. 26 to Mar. 5, Mar. 28, 29.

Temperature (°F) of water, water year October 1960 to September 1961

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

6-2500. FIVEMILE CREEK NEAR RIVERTON, WYO.--Continued

Suspended sediment, water year October 1960 to September 1961

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	79	1290	275	51	860	118	5	300	4
2	75	1150	233	50	670	90	5	220	3
3	64	960	166	51	720	99	5	200	3
4	52	940	132	51	800	110	5	260	4
5	47	810	103	49	820	108	5	300	4
6	46	750	93	49	950	126	5	380	5
7	46	720	89	52	800	112	5	300	4
8	49	820	108	52	860	121	5	280	4
9	53	1020	146	51	960	132	5	280	4
10	56	1100	166	49	920	122	5	240	3
11	60	1440	233	52	1120	157	5	240	3
12	56	1170	177	55	1210	180	5	220	3
13	52	920	129	55	1180	175	5	220	3
14	52	750	105	52	1040	146	5	220	3
15	50	780	105	50	1000	135	5	220	3
16	49	750	99	48	1080	140	5	240	3
17	49	720	95	49	830	110	5	260	4
18	49	740	98	50	1080	146	5	280	4
19	48	790	102	49	1190	157	5	200	3
20	49	810	107	49	1090	144	5	180	2
21	48	810	105	49	980	130	5	190	3
22	48	790	102	49	820	108	5	200	3
23	47	800	102	48	1280	166	5	220	3
24	48	680	88	49	720	95	5	240	3
25	46	680	84	48	920	119	5	200	3
26	47	790	100	22	700	42	5	200	3
27	47	700	89	14	1000	38	5	200	3
28	47	720	91	10	400	11	4	220	2
29	48	720	93	7	320	6	3	220	2
30	46	760	94	5	400	5	3	220	2
31	50	820	111	--	--	--	3	220	2
Total	1603	--	3820	1315	--	3348	148	--	98

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	3	220	2	10	180	5	20	2200		119
2	3	220	2	10	240	6	18	3800		185
3	3	500	4	10	220	6	17	3000		138
4	3	280	2	10	200	5	16	2500		108
5	3	320	3	10	160	4	15	1900		77
6	3	400	3	10	200	5	15	1160		47
7	3	380	3	10	200	5	14	1020	S	43
8	3	400	3	10	260	7	15	1360	S	61
9	3	440	4	10	300	8	16	1640	S	87
10	3	320	3	10	300	8	18	2210	S	119
11	3	300	2	10	300	8	18	1640	S	96
12	3	300	2	10	300	8	18	1820	S	110
13	3	300	2	10	380	10	21	2530	S	165
14	3	420	3	15	360	15	27	3560		260
15	3	300	2	15	380	15	29	4180	S	347
16	4	380	4	15	440	18	35	6300		595
17	4	400	4	15	400	16	50	7500		1010
18	4	340	4	15	460	19	57	5670		873
19	4	300	3	15	500	20	57	4020		619
20	4	380	4	15	460	19	58	3920		614
21	4	360	4	15	550	22	55	3260		484
22	4	340	4	16	700	30	40	2630		284
23	4	340	4	17	600	28	39	3080		324
24	4	340	4	18	700	34	32	3200		276
25	4	320	3	20	800	43	33	3040		271
26	4	320	3	25	800	54	32	2510		217
27	4	320	3	23	750	47	30	2180		177
28	4	280	3	22	1200	71	20	1500		81
29	4	300	3	--	--	--	25	1900		128
30	4	300	3	--	--	--	26	2370		166
31	10	280	8	--	--	--	27	2450		179
Total	115	--	101	391	--	536	893	--		8260

S Computed by subdividing day.

YELLOWSTONE RIVER BASIN--Continued

6-2500. FIVEMILE CREEK NEAR RIVERTON, WYO.--Continued

Suspended sediment, water year October 1960 to September 1961--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	26	2440	171	32	2240	194	42	2420	S 323
2	28	2830	214	34	2160	198	200	16400	S 11100
3	24	1760	114	38	2340	240	228	17700	10900
4	22	1760	105	41	2480	275	175	13200	6240
5	22	1550	92	42	2620	297	148	9600	3840
6	22	1490	88	35	1880	178	105	5420	1540
7	22	1440	86	34	1880	173	95	5600	1440
8	20	1420	77	34	1800	165	97	6000	1570
9	20	1660	90	27	1500	109	97	4600	1200
10	18	1610	78	34	2060	189	80	4340	937
11	24	2620	170	34	2000	184	77	3550	738
12	22	1580	94	44	3100	368	78	3310	697
13	21	1500	85	64	5100	881	76	3470	712
14	18	1120	54	62	4300	720	77	3300	686
15	18	1080	52	84	6960	1580	81	3390	741
16	18	1340	65	94	6100	1550	77	3080	640
17	18	1260	61	83	4050	908	69	2720	507
18	19	2760	142	64	3300	570	76	3210	659
19	29	3720	S 335	56	2600	393	81	2890	632
20	50	6520	S 926	58	2550	399	98	3140	831
21	64	6200	1070	59	2500	398	107	3500	1010
22	59	4320	688	66	2900	517	98	3330	881
23	48	3500	454	59	2430	387	102	3330	917
24	46	3630	451	55	2100	312	138	5000	1860
25	42	2960	336	55	2160	321	118	3920	1250
26	46	3520	437	53	1800	258	106	3300	944
27	36	3120	303	54	2140	312	102	3120	859
28	31	2400	201	42	1830	208	110	3020	897
29	32	2280	197	45	1820	221	112	3160	956
30	29	1800	141	42	1580	179	105	2780	788
31	--	--	--	39	1550	163	--	--	--
Total	894	--	7377	1563	--	12847	3155	--	56295

Day	JULY			AUGUST			SEPTEMBER		
1	101	2760	753	115	2000	621	95	1380	354
2	101	2980	813	104	1880	528	85	1220	280
3	112	3000	907	101	2080	567	88	1400	333
4	124	3970	1330	125	2500	844	96	1620	420
5	131	5070	1790	127	2290	785	97	1480	388
6	119	3420	1100	144	2480	964	98	1280	339
7	145	4390	1720	144	2080	809	96	1200	311
8	140	3880	1470	141	2020	769	88	1220	290
9	136	3880	1420	148	2500	999	96	1230	319
10	133	3630	1300	144	2250	875	100	1210	327
11	130	3660	1280	136	2420	889	104	1140	320
12	127	3350	1150	137	2470	914	110	1300	386
13	119	3350	1080	138	2380	887	106	1500	429
14	122	3910	1290	140	2430	919	108	1560	455
15	119	3640	1170	131	1820	644	106	1350	386
16	110	4900	1460	122	2100	692	105	1250	354
17	110	4070	1210	115	1880	584	104	1190	334
18	108	3100	904	114	1800	554	108	1320	385
19	104	2870	806	107	1800	520	180	7960	S 4220
20	104	2210	621	112	1680	508	122	2880	949
21	118	2780	886	110	1730	514	114	2020	622
22	126	2610	888	106	1500	429	109	2020	594
23	135	2620	955	105	1500	425	121	2080	680
24	140	2620	990	100	1560	421	121	1900	621
25	122	2460	810	102	1180	325	127	1860	638
26	120	2350	761	102	1320	364	127	1740	597
27	137	2660	984	99	1300	347	122	2260	744
28	142	2120	813	102	1690	465	122	1980	652
29	148	2300	919	101	1520	414	121	2230	729
30	137	2210	817	94	1300	330	120	2170	703
31	136	2080	764	93	1380	347	--	--	--
Total	3856	--	33161	3659	--	19253	3296	--	18159

Total discharge for year (cfs-days)..... 20888
Total load for year (tons)..... 163255

S Computed by subdividing day.

YELLOWSTONE RIVER BASIN--Continued

6-2500. FIVEMILE CREEK NEAR RIVERTON, WYO.--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters											Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Oct. 3, 1960.....	1545	60		59	835		--	18		31		43	50	73	95	100	--	VPWC
Oct. 18.....	0845	44		49	543		--	17		29		39	46	71	93	100	--	VPWC
Nov. 1.....	1450	47		48	660		--	20		34		47	54	71	93	100	--	VPWC
Nov. 15.....	0840	32		48	700		21	26		36		46	55	74	97	100	--	VBWC
Nov. 15.....	0955	32		51	870		15	20		29		43	56	74	93	100	--	VBWC
Apr. 28, 1961.....	1515	60		32	2230		--	32		48		67	81	91	96	99	100	VPWC
May 15.....	1240	55		99	9810		--	31		52		79	91	96	99	100	--	VPWC
May 19.....	1615	70		53	2610		--	24		37		59	76	88	96	100	--	VPWC
June 3.....	1940	58		222	16700		--	30		47		74	92	98	99	100	--	VPWC
June 21.....	1620	75		113	3300		--	26		38		64	83	95	99	100	--	VPWC
July 14.....	1450	77		126	3450		--	20		31		52	69	87	97	100	--	VPWC
Aug. 31.....	1350	69		97	957		--	30		43		69	82	95	100	--	--	VPWC
Sept. 12.....	1600	55		110	1180		--	16		24		41	56	77	93	98	100	VPWC

YELLOWSTONE RIVER BASIN--Continued

6-2530. FIVEMILE CREEK NEAR SHOSHONI, WYO.

LOCATION.--At gaging station, 1.2 miles upstream from normal bigh waterline of Boysen Reservoir at elevation 4,725 feet and 5 miles west of Shoshoni, Fremont County.
DRAINAGE AREA.--418 square miles, of wbich 133 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: September 1949 to November 1951.
Water temperatures: December 1948 to September 1961.
Sediment records: August 1948 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 71°F July 23; minimum, freezing point on many days during November to April.
Sediment concentrations: Maximum daily, 12,400 ppm June 3; minimum daily, 228 ppm on many days during December.
Sediment loads: Maximum daily, 10,800 tons June 3; minimum daily, 15 tons on many days during December.
EXTREMES, 1948-61.--Water temperatures: Maximum (1948-58, 1959-61), 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. 29 to Mar. 5.

Temperature (°F) of water, water year October 1960 to September 1961

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

YELLOWSTONE RIVER BASIN--Continued

6-2530. FIVEMILE CREEK NEAR SHOSHONI, WYO.--Continued

Suspended sediment, water year October 1960 to September 1961
(Where no concentrations are reported, loads are estimated)

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..	159	780	335	80	410	89	25	C 228	15
2..	143	680	263	77	400	83	25	C 228	15
3..	124	680	228	80	370	80	25	C 228	15
4..	118	600	191	84	420	95	25	C 228	15
5..	92	420	104	80	480	104	25	C 228	15
6..	87	360	85	79	400	85	25	C 228	15
7..	86	360	84	82	390	86	25	C 228	15
8..	90	620	151	82	370	82	25	C 228	15
9..	91	810	199	79	340	73	25	C 228	15
10..	91	730	179	77	520	108	25	C 228	15
11..	91	780	192	80	690	149	25	C 228	15
12..	89	640	154	82	740	164	25	C 228	15
13..	80	470	102	86	780	181	25	C 228	15
14..	77	400	83	82	700	155	25	C 228	15
15..	74	350	70	80	620	134	25	C 228	15
16..	74	340	68	75	650	132	25	C 228	15
17..	74	380	76	75	500	101	25	C 228	15
18..	74	390	78	77	600	125	25	C 228	15
19..	75	320	65	77	1390	289	25	C 228	15
20..	74	320	64	74	730	146	25	C 228	15
21..	74	350	70	74	520	104	25	C 228	15
22..	74	330	66	74	700	140	25	C 228	15
23..	74	310	62	72	440	86	25	C 228	15
24..	74	310	62	75	610	124	25	C 228	15
25..	75	380	77	75	600	122	25	C 228	15
26..	74	380	76	55	520	77	25	C 228	15
27..	74	360	72	48	--	55	25	C 228	15
28..	74	330	66	39	400	42	25	C 228	15
29..	77	--	70	30	390	32	25	C 228	15
30..	74	--	70	25	280	19	25	C 228	15
31..	77	370	77	--	--	--	25	C 228	15
Total	2684	--	3539	2155	--	3262	775	--	465

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..	25	C 246	17	35	C 237	22	60	1800	290
2..	25	C 246	17	35	C 237	22	50	1600	220
3..	25	C 246	17	35	C 237	22	50	1400	190
4..	25	C 246	17	35	C 237	22	45	1500	180
5..	25	C 246	17	35	C 237	22	40	1300	140
6..	25	C 246	17	35	C 237	22	34	820	75
7..	25	C 246	17	35	C 237	22	31	780	65
8..	25	C 246	17	35	C 237	22	29	640	50
9..	25	C 246	17	35	C 237	22	31	700	59
10..	25	C 246	17	35	C 237	22	39	940	99
11..	25	C 246	17	35	C 237	22	37	--	95
12..	25	C 246	17	35	C 634	60	39	990	104
13..	25	C 246	17	35	C 634	60	40	950	103
14..	25	C 246	17	35	C 634	60	45	1440	175
15..	25	C 246	17	35	C 634	60	47	1980	251
16..	30	C 385	31	35	C 634	60	48	1900	246
17..	30	C 385	31	35	C 634	60	73	4070	802
18..	30	C 385	31	35	C 634	60	78	3420	720
19..	30	C 385	31	35	C 634	60	72	2770	538
20..	30	C 385	31	35	700	66	73	2930	578
21..	30	C 385	31	35	1200	110	76	2880	591
22..	30	C 385	31	35	1200	110	56	2000	302
23..	30	C 385	31	40	1100	120	57	2200	339
24..	30	C 385	31	50	1400	190	50	1980	267
25..	30	C 385	31	60	1100	180	51	1590	219
26..	30	C 385	31	90	1400	340	50	1420	192
27..	30	C 385	31	80	1300	280	46	1140	142
28..	30	C 385	31	70	1300	250	31	890	74
29..	30	C 385	31	--	--	--	39	1480 S	167
30..	35	C 385	36	--	--	--	43	1040	121
31..	35	C 385	36	--	--	--	44	1030	122
Total	865	--	761	1160	--	2368	1504	--	7516

S Computed by subdividing day.
C Composite period.

YELLOWSTONE RIVER BASIN--Continued

6-2530. FIVEMILE CREEK NEAR SHOSHONI, WYO.--Continued

Suspended sediment, water year October 1960 to September 1961--Continued
/Where no concentrations are reported, loads are estimated/

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	38	830	85	70	1830	346	92	580	144
2	43	980	114	76	1640	337	276	8680 S	8550
3	40	870	94	88	1900	451	324	12400	10800
4	37	710	71	112	2520	762	259	9100	6360
5	35	480	45	121	2280	745	228	6900	4250
6	37	600	60	92	1190	296	197	4100	2180
7	37	590	59	85	1030	236	180	3170	1540
8	34	500	46	86	1090	253	178	3010	1450
9	34	680	62	76	1790	367	168	2900	1320
10	33	510	45	79	1900	405	155	2160	904
11	41	940	104	88	1310	311	162	2130	932
12	38	610	63	92	1510	375	168	2180	989
13	36	420	41	114	3040	936	150	1910	774
14	33	370	33	106	2540	727	155	2000	837
15	34	400	37	127	4020	1380	170	2430	1120
16	35	480	45	150	3850	1560	162	2010	879
17	35	400	38	150	2880	1170	150	1600	648
18	51	2020 S	336	143	2300	888	180	2180	1060
19	95	4410	1130	121	1500	490	186	2090	1050
20	119	4630	1490	116	1310	410	202	2360	1290
21	121	4150	1360	123	1420	472	205	2560	1420
22	110	--	950	132	1600	570	188	2350	1190
23	101	2600	709	143	1910	737	202	2120	1160
24	101	2070	564	141	1440	548	250	3200	2160
25	85	1780	409	136	1130	415	231	2680	1670
26	80	2330	503	127	1010	346	211	2140	1220
27	65	1680	295	125	1060	358	194	2040	1070
28	57	1300	200	112	900	272	199	2080	1120
29	61	1220	201	112	870	263	202	2400	1310
30	63	--	260	102	770	212	197	2200	1170
31	--	--	--	99	650	174	--	--	--
Total	1729	--	9449	3444	--	16812	5821	--	60567

Day	JULY			AUGUST			SEPTEMBER		
1	186	1920	964	237	1470	941	197	890	473
2	186	--	1000	222	1430	857	188	880	447
3	199	2360	1270	219	1300	769	194	720	377
4	216	2620	1530	243	1550	1020	199	950	510
5	228	3010	1850	246	1410	937	197	920	489
6	219	2870	1700	256	1400	968	205	880	487
7	253	3550	2420	259	1420	993	211	990	564
8	246	2780	1850	259	1350	944	194	840	440
9	253	2640	1800	259	1500	1050	202	720	393
10	256	2410	1670	262	1440	1020	211	800	456
11	272	2250	1650	272	1320	969	216	800	467
12	262	2300	1630	272	1350	991	237	940	602
13	250	2100	1420	265	1200	859	234	740	468
14	253	2290	1560	253	1310	895	240	800	518
15	246	2150	1430	231	1300	811	231	720	449
16	237	2560	1670	219	1220	721	216	800	467
17	231	2450	1530	205	1120	620	214	820	474
18	225	2010	1220	202	1120	611	219	870	514
19	214	1680	971	197	1100	585	301	4050 S	3480
20	216	1710	997	208	940	528	231	2000	1250
21	234	2020	1280	208	960	539	214	1220	705
22	243	1780	1170	208	990	556	208	920	517
23	259	1680	1170	205	900	498	202	1230	671
24	259	1760	1230	194	900	471	202	1210	660
25	234	1670	1060	197	990	527	202	1280	698
26	231	1580	985	205	930	515	202	1260	687
27	246	1770	1180	208	900	505	205	1220	675
28	253	1800	1230	219	920	544	208	1320	741
29	262	1790	1270	222	1040	623	208	1310	736
30	256	1500	1040	211	1080	615	199	1280	688
31	253	1680	1150	199	990	532	--	--	--
Total	7378	--	42897	7062	--	23014	6387	--	20103

Total discharge for year (cfs-days)..... 40964
Total load for year (tons)..... 190753

S Computed by subdividing day.

6-2530. FIVEMILE CREEK NEAR SHOSHONI, WYO.--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Nov. 1, 1960	1025	39		80	402		--	31		50		59	62	75	95	100	--	VPWC
Nov. 15	1135	36		79	545		--	32		52		66	71	85	99	100	--	VPWC
Nov. 29	1150	32		d 30	453		15	20		31		54	64	85	100	--	--	VBWC
Apr. 19, 1961	0900	50		104	6020		--	17		32		71	94	99	100	--	--	VPWC
Apr. 19	0950	52		101	5750		--	21		37		72	93	98	100	--	--	VPWC
Apr. 25	1525	58		80	1330		--	24		39		62	78	92	99	100	--	VPWC
May 11	1235	65		90	1590		--	22		35		76	86	93	100	--	--	VPWC
May 15	0850	53		134	3460		--	22		34		65	86	95	99	100	--	VPWC
May 19	1200	62		121	1450		--	26		44		68	86	98	100	--	--	VPWC
June 2	1310	54		268	10700		--	32		52		80	92	97	99	100	--	VPWC
June 3	0720	53		341	12800		2	2		50		84	95	98	99	100	--	VPN
June 3	0720	53		341	12800		32	37		56		84	95	98	99	100	--	PWC
June 8	1450	76		175	2970		--	29		41		63	82	94	99	100	--	VPWC
June 22	1130	68		194	2250		--	17		26		43	64	91	99	100	--	VPWC
July 6	1015	71		222	2580		--	19		30		54	72	89	98	100	--	VPWC
July 10	1230	71		268	2430		--	19		29		48	67	88	96	97	100	VPWC
July 27	1150	70		253	1730		--	16		25		44	62	87	97	100	--	VPWC
Aug. 10	1530	70		265	1430		--	22		34		51	63	86	97	100	--	VPWC
Aug. 31	1050	62		205	1040		--	18		26		41	51	75	92	100	--	VPWC
Sept. 14	1520	58		243	1090		--	12		20		35	49	71	92	100	--	VPWC
Sept. 19	1055	55		347	5400		--	37		61		77	83	92	98	100	--	VPWC
Sept. 19	1250	51		351	6320		--	42		66		84	89	94	99	100	--	VPWC
Sept. 26	1150	56		205	1320		--	15		24		42	57	78	95	99	100	VPWC

d Daily mean discharge.

6-2570. BADWATER CREEK AT BONNEVILLE, WYO.

LOCATION.--At gaging station, 0.4 mile west of Bonneville, Fremont County, and 3 miles upstream from normal high waterline of Boysen Reservoir at elevation 4,725 feet.
DRAINAGE AREA.--808 square miles.
RECORDS AVAILABLE.--Sediment records: October 1947 to February 1954, August 1954 to September 1961.
EXTREMES, 1960-61.--Sediment concentrations: Maximum daily, 77,300 ppm July 7; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 43,200 tons June 3; minimum daily, 0 tons on many days.
EXTREMES, 1947-61.--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.

Monthly and annual summary of water and suspended-sediment discharge, water year October 1960 to September 1961

Month	Discharge (cfs-days)	Runoff (acre-feet)	Suspended sediment					
			Load (tons)	Daily load (tons)			Concentration (ppm)	
				Mean	Maximum	Minimum	Weighted mean	Maximum observed
October 1960	0.4	0.8	36	1.2	e 20	0		--
November	0	0	0	0	0	0		--
December	0	0	0	0	0	0		--
January 1961	0	0	0	0	0	0		--
February	0	0	0	0	0	0		--
March	263.0	522	13851	447	6120	0		79700
April	0	0	0	--	--	0		--
May	34.2	68	2590	84	2520	0		30300
June	221.9	440	47420	1580	43200	0		102000
July	120.1	238	43010	1390	23800	0		164000
August	0	0	0	0	0	0		--
September	0	0	0	0	0	0		--
Water year	639.6	1270	106907	293	43200	0		164000

e Estimated.

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Mar. 21, 1961	0820	33		11	8440			50		67		83	95	100				VPWC
Mar. 22	1505	60		12	13500			56		82		96	99	100				VPWC
June 4	0410	42		62	42000			73		--		97	99	100				VPWC
June 4	1735	70		2.8	51600			82		100		--	--	--				PWC
July 7	0440	54		96	8700			55		80		92	95	97	97	100		VPWC

6-2575. MUDDY CREEK NEAR PAVILLION, WYO.

LOCATION.--At gaging station, 600 feet upstream from Wyoming Canal sipbon, 4.1 miles downstream from Sheep Creek, and 9.2 miles northeast of Pavillion, Fremont County.
DRAINAGE AREA.--267 square miles.
RECORDS AVAILABLE.--Water temperatures: March to July 1949, October 1954 to September 1958, April to September 1961.
Sediment records: March 1949 to November 1953, October 1954 to September 1958, April to September 1961.
EXTREMES, April to September 1961.--Water temperatures: Maximum, 86°F June 12.
Sediment concentrations: Maximum daily, 54,000 ppm Sept. 19; minimum daily, no flow on many days during May to September.
Sediment loads: Maximum daily, 37,000 tons Sept. 19; minimum daily, 0 tons on many days during May to September.
EXTREMES, 1949-53, 1954-58, 1961.--Water temperatures (1954-58, 1961): Maximum, 89°F June 5, 1957; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily (1961), 54,000 ppm Sept. 19, 1961; 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.

Temperature (°F) of water, April to September 1961

Month	Day																													Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
April	52	54	48	49	42	47	46	--	--	41	57	54	44	42	52	48	49	50	63	59	47	52	51	42	49	42	55	35	68	56	--	50
May	60	53	59	56	60	--	57	68	70	61	70	52	51	47	69	54	67	50	60	63	57	68	83	62	60	76	76	68	74	70	--	63
June	--	50	52	78	68	78	72	82	79	--	65	86	73	76	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	72
July	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
August	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
September	--	--	--	--	--	--	--	--	--	--	47	--	47	--	--	--	--	--	47	38	38	59	42	45	47	--	--	46	38	--	--	45

YELLOWSTONE RIVER BASIN--Continued

6-2575. MUDDY CREEK NEAR PAVILLION, WYO.--Continued

Suspended sediment, April to September 1961
/Where no concentrations are reported, loads are estimated/

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	4.8	3000	39	2.2	3500	21	0	--		0
2	4.5	2500	30	2.0	2200	12	48	38600	S	6280
3	4.2	1600	18	1.8	3100	15	48	29000	J	4500
4	4.0	3000	32	1.5	3000	12	17	5100		234
5	4.5	4200	51	1.5	1500	6	14	2020		76
6	3.7	4200	42	1.5	--	8	8.3	1450		32
7	3.5	4000	38	1.4	2300	9	5.2	1800		25
8	3.8	--	36	1.3	2000	7	4.8	2200	J	44
9	3.5	--	50	1.3	1950	7	3.5	3800	J	38
10	3.5	7200	68	1.2	1600	5	2.0	--		11
11	2.7	4600	34	1.2	2000	6	2.1	1700		10
12	2.7	3200	23	1.2	2300	7	1.3	1500		5
13	2.4	2600	17	1.2	3300	11	.3	600	J	1
14	2.4	4800	31	1.0	1600	4	.2	340		T
15	2.2	5400	32	1.8	4800	23	.1	--		T
16	2.0	6400	35	1.3	3800	13	0	--		0
17	1.8	5000	24	.9	2800	7	0	--		0
18	1.8	2400	12	.9	4200	10	0	--		0
19	1.5	3600	15	.8	1600	3	0	--		0
20	1.8	3200	16	.7	1150	2	0	--		0
21	1.8	2200	11	.6	1350	2	0	--		0
22	2.0	2000	11	.5	600	1	0	--		0
23	1.8	4000	19	.5	1800	2	0	--		0
24	2.1	3300	19	.5	2000	3	0	--		0
25	1.6	4000	17	.5	1200	2	0	--		0
26	2.0	5000	27	.4	1650	2	0	--		0
27	1.8	4600	22	.4	1550	2	0	--		0
28	2.0	3000	16	.2	1400	1	0	--		0
29	2.0	2400	13	.1	800	T	0	--		0
30	2.0	3200	17	.1	100	T	0	--		0
31	--	--	--	0	--	0	--	--		--
Total	80.4	--	815	30.5	--	203	155.4	--		11256

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
2							0	--		0
3							0	--		0
4							0	--		0
5							0	--		0
6							0	--		0
7							0	--		0
8							0	--		0
9							.1	--		4
10							.4	--		14
11							.1	13000	J	5
12							1.9	--		120
13							.8	13000	J	30
14							.2	--		2
15							0	--		0
16							0	--		0
17							0	--		0
18							.1	--		1
19							225	54000	J	37000
20							20	8190	S	736
21							4.2	1350		15
22							2.0	430		2
23							.9	220		1
24							.4	160		T
25							.3	260		T
26							.1	--		T
27							.1	--		T
28							.1	140		T
29							.8	788	S	4
30							.2	--		T
31							--	--		--
Total	0		0	0		0	257.7	--		37934

Total discharge for period April to September (cfs-days)..... 524.0
Total load for period April to September (tons)..... 50208

S Computed by subdividing day.
T Less than 0.50 ton.
J Computed from partly estimated concentration graph and subdividing day.

YELLOWSTONE RIVER BASIN--Continued

6-2575. MUDDY CREEK NEAR PAVILLION, WYO.--Continued

Particle-size analyses of suspended sediment, April to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment											Method of analysis
							Percent finer than size indicated, in millimeters											
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Apr. 4, 1961.....	1325	49		3.0	4680			58		83		96	99	100	--			VPWC
June 2.....	1815	50		47	40600			47		66		87	95	100	--			VPWC
Sept. 13.....	1420	47		.5	11200			91		98		98	98	99	99	100		VPWC
Sept. 19.....	1635	47		175	51100			38		59		89	97	99	100			VPWC

YELLOWSTONE RIVER BASIN--Continued

6-2580. MUDDY CREEK NEAR SHOSHONI, WYO.

LOCATION.--At gaging station, 2.2 miles upstream from normal high waterline of Boysen Reservoir at elevation 4,725 feet and 9 miles northwest of Shoshoni, Fremont County.
DRAINAGE AREA.--332 square miles.
RECORDS AVAILABLE.--Water temperatures: March to July 1949, October 1956 to September 1961.
Sediment records: March 1949 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 88°F July 29; minimum, freezing point on many days during November to March.
Sediment concentrations: Maximum daily, 33,400 ppm Sept. 20; minimum daily, not determined.
Sediment loads: Maximum daily, 11,100 tons Sept. 20; minimum daily, less than 0.50 ton on many days during December to February.
EXTREMES, 1949-61.--Water temperatures: Maximum (1956-58, 1959-61), 91°F July 19, 1960; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily (1951-58, 1959-61), 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. 11-13, 21, Nov. 28 to Mar. 24.

Temperature (°F) of water, water year October 1960 to September 1961

Month	Day																													Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
October	--	--	66	--	68	--	69	57	45	42	44	55	--	52	--	--	56	44	56	54	40	--	--	44	43	55	54	53	--	--	48	--
November	44	--	--	36	--	--	35	--	38	--	--	--	--	39	--	39	--	32	--	--	35	--	36	--	--	--	--	32	--	33	--	--
December	--	33	--	--	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
January	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
February	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	--	--	--	32
March	--	--	32	--	--	32	--	33	33	--	--	--	34	--	33	--	--	--	--	33	33	34	34	33	34	--	--	38	--	--	41	--
April	--	--	45	50	52	54	--	--	--	44	51	--	--	47	--	34	37	42	58	37	36	40	36	35	34	38	33	51	47	46	--	--
May	51	50	45	50	39	37	39	40	65	--	--	63	45	--	65	--	72	56	73	--	--	70	64	71	72	82	73	58	62	56	72	59
June	62	53	60	52	68	64	62	60	75	70	69	65	66	69	69	75	82	75	69	72	78	55	63	69	69	75	75	79	72	70	--	68
July	70	78	64	81	79	77	68	55	73	72	58	62	65	54	65	68	64	68	75	62	71	--	70	72	68	71	68	74	88	65	76	69
August	66	67	68	67	69	68	68	64	70	70	63	64	64	68	70	64	71	71	66	68	74	64	68	66	66	69	65	61	64	64	68	67
September	71	--	--	--	70	61	54	67	--	--	65	49	46	52	56	62	58	60	52	46	44	44	44	--	46	47	38	61	43	37	--	53

6-2580. MUDDY CREEK NEAR SHOSHONI, WYO.--Continued

Suspended sediment, water year October 1960 to September 1961
/Where no concentrations are reported, loads are estimated/

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	11	C 344	10	10	C 713	19	5	--	3
2	11	C 344	10	11	C 713	21	5	190	3
3	11	C 344	10	12	C 713	23	5	--	2
4	10	C 344	9	15	C 713	29	5	--	2
5	11	C 344	10	14	C 713	27	3	256	2
6	11	C 344	10	12	C 713	23	2	--	1
7	10	C 344	9	13	C 713	25	1	198	1
8	11	C 344	10	12	C 713	23	1	--	1
9	15	1760	71	11	C 713	21	1	210	1
10	14	600	23	6.0	--	12	1	--	1
11	15	930	38	5	--	10	1	--	1
12	18	700	34	7	--	14	1	290	1
13	15	C 377	15	10	C 764	21	1	--	1
14	15	C 377	15	14	C 764	29	1	--	1
15	13	C 377	13	11	C 764	23	1	--	1
16	12	C 377	12	10	C 764	21	1	454	1
17	12	C 377	12	15	C 764	31	1	--	1
18	12	C 377	12	9.5	C 555	14	1	--	1
19	12	C 377	12	9.6	C 555	14	1	196	1
20	12	C 377	12	5.5	C 555	8	1	--	1
21	11	C 339	10	5.5	C 555	8	1	--	1
22	10	C 339	9	5.4	C 555	8	1	--	1
23	12	C 339	11	5.9	C 555	9	1	--	1
24	14	C 339	13	18	--	16	1	--	1
25	12	C 339	11	14	--	12	1	--	1
26	10	C 339	9	9.6	--	6	1	--	1
27	11	C 339	10	6.8	C 174	3	1	--	1
28	10	C 339	9	5	C 174	2	1	111	T
29	11	C 339	10	5	C 174	2	1	136	T
30	11	C 339	10	5	C 174	2	1	--	T
31	10	C 339	9	--	--	--	1	--	T
Total	373	--	458	292.8	--	476	50	--	36

Day	JANUARY			FEBRUARY			MARCH		
1	1	--	T	2	--	T	4	--	1
2	1	--	T	2	--	T	5	--	1
3	1	120	T	2	--	T	5	90	1
4	1	--	T	2	--	T	5	--	1
5	1	--	T	1.5	--	T	5	--	1
6	1	74	T	1.5	--	T	5	84	1
7	1	--	T	1.5	--	T	5	--	1
8	1	--	T	1.5	55	T	6	110	2
9	1	82	T	1.5	--	T	7	118	2
10	1	--	T	1.5	37	T	7	--	2
11	1	--	T	2	--	T	7	--	2
12	1	--	T	2.5	--	T	8	--	3
13	1	80	T	3	32	T	9	126	3
14	1	--	T	3	--	T	10	--	5
15	1.5	--	T	3	--	T	12	156	5
16	2	68	T	3	--	T	15	--	10
17	2	--	T	3	--	T	15	--	20
18	2	145	1	3	--	T	15	--	30
19	2	--	1	3	--	T	15	--	40
20	2	--	1	3	--	T	15	1200	49
21	2	--	1	3	57	T	15	2100	85
22	2	--	1	3.5	--	T	15	2400	97
23	2	--	1	3.5	--	T	20	2700	150
24	2	--	1	3.5	42	T	25	2800	190
25	2	--	1	3.5	--	T	30	2350	190
26	1.5	--	T	3.5	--	1	26	--	150
27	1	--	T	3.5	56	1	22	--	120
28	1	--	T	3.5	50	T	15	C 2160	87
29	1	--	T	--	--	--	12	C 2160	70
30	1.5	81	T	--	--	--	14	C 2160	82
31	2	--	T	--	--	--	12	C 2160	70
Total	43.5	--	14	73.0	--	10	381	--	1471

T Less than 0.50 ton.
C Composite period.

YELLOWSTONE RIVER BASIN--Continued

6-2580. MUDDY CREEK NEAR SHOSHONI, WYO.--Continued

Suspended sediment, water year October 1960 to September 1961--Continued
/Where no concentrations are reported, loads are estimated/

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	12	--	70	8.2	1100	24	19	1260	65
2	13	--	70	7.8	920	19	79	18400 S	5670
3	12	1710	55	8.2	660	15	118	27000	8600
4	12	1900	62	12	1350	44	67	14000	2530
5	12	1900	62	8.2	880	19	57	8460 S	1490
6	10	1890	51	7.8	580	12	42	8300	941
7	11	--	55	11	1280 S	42	20	2320	125
8	10	--	55	11	940	28	14	1800	68
9	11	--	55	9.1	750	18	14	1520	57
10	12	1820	59	7.8	--	15	14	1380	52
11	12	1440	47	7.8	--	13	16	1510	65
12	11	--	36	9.1	570	14	14	810	31
13	11	--	32	16	1100	48	14	740	28
14	11	1040	31	18	--	65	14	980	37
15	11	1010	30	29	2580	202	14	870	33
16	11	1200	36	25	--	110	13	960	34
17	11	800	24	17	1280	59	14	800	30
18	10	760	21	17	1300	60	13	620	22
19	9.6	860	22	15	990	40	12	600	19
20	9.1	850	21	16	--	65	14	910	34
21	8.6	660	15	17	--	95	20	1660	90
22	8.6	860	20	14	1160	44	18	1060	52
23	8.2	1200	27	12	840	27	14	760	29
24	10	1230 S	46	12	1000	32	18	1300	63
25	15	3070 S	137	13	900	32	26	1800	126
26	9.6	1000	26	14	940	36	18	1180	57
27	9.1	850	21	15	900	36	15	660	27
28	8.2	980	22	15	1000	40	16	560	24
29	8.2	860	19	14	780	29	20	900	49
30	8.2	730	16	17	1140	52	26	1270	89
31	--	--	--	17	1010	46	--	--	--
Total	315.4	--	1243	421	--	1381	773	--	20537

Day	JULY			AUGUST			SEPTEMBER		
	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	20	1090	59	40	1750	189	31	660	55
2	16	880	38	46	1980	246	38	--	120
3	14	540	20	39	1740	183	34	--	150
4	25	1550 S	127	34	1360	125	26	--	100
5	38	1460	150	31	1040	87	21	1340	76
6	37	1870	187	25	1040	70	15	500	20
7	38	1670	171	25	740	50	16	410	18
8	68	4780	878	27	700	51	23	700	43
9	104	6470	1820	26	640	45	18	--	30
10	91	5780	1420	27	840	61	16	--	24
11	77	4490	933	28	900	68	16	530	23
12	61	3180	524	22	500	30	20	2190 S	132
13	67	3080	557	18	360	17	28	4760	360
14	72	3250	632	22	460	27	20	1390	75
15	58	3400	532	24	500	32	16	680	29
16	34	1880	173	21	500	28	15	520	21
17	27	1380	101	21	480	27	15	430	17
18	26	700	49	21	580	33	16	420	18
19	26	610	43	19	1300	67	99	23400 S	9360
20	25	820	55	36	2220	216	104	33400 S	11100
21	29	710	56	38	1280	131	32	6300	544
22	33	980	87	31	860	72	21	1700	96
23	36	1160	113	28	840	64	18	980	48
24	31	1140	95	40	1260	136	16	--	36
25	29	1170	92	29	620	49	16	760	33
26	35	1940	183	24	620	40	16	800	35
27	38	2510	258	23	460	29	15	780	32
28	29	1540	121	23	520	32	14	540	20
29	34	1850	170	27	590	43	14	560	21
30	34	1700	156	32	790	68	16	700	30
31	32	1310	113	33	700	62	--	--	--
Total	1284	--	9913	880	--	2378	765	--	22666

Total discharge for year (cfs-days)..... 5651.7
Total load for year (tons)..... 60583

S Computed by subdividing day.

YELLOWSTONE RIVER BASIN--Continued

6-2580. MUDDY CREEK NEAR SHOSHONI, WYO.--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters											Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Oct. 9, 1960	1100	45		15	2410			63		80		81	85	96	100	--		VPWC
Nov. 14	1500	34		20	1090			28		44		64	79	99	100	--		VPWC
Apr. 4, 1961	1520	50		12	1980			44		60		76	86	99	100	--		VPWC
June 2	1440	54		25	17700			47		60		93	96	100	--	--		VPWC
June 2	1630	54		65	16200			39		55		75	84	94	99	100		VPWC
June 2	1945	54		156	34300			45		62		80	90	97	100	--		VPWC
June 2	2045	53		174	25400			42		62		79	89	96	99	100		VPWC
June 3	2020	57		93	27200			54		75		87	93	98	100	--		VPWC
June 7	1340	79		20	1820			49		66		81	90	98	100	--		VPWC
July 10	1430	77		93	5670			19		31		55	73	92	99	100		VPWC
Aug. 31	1115	68		33	960		12	16		22		35	53	92	99	100		VBWC
Sept. 12	0945	49		16	2630			79		90		90	93	99	100	--		VPWC
Sept. 13	1550	49		23	5080			78		90		93	95	99	100	--		VPWC
Sept. 19	1320	51		144	14200			22		35		59	72	90	99	100		VPWC

Particle-size analyses of bed material, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Bed material: Percent finer than size indicated, in millimeters											Method of analysis
							0.062	0.125	0.250	0.500	1.000	2.000	4.000	8.000	16.00	32.00	64.00	
June 7, 1961	1330		15	20			1	4	48	86	92	97	98	100				SV
July 10	1400		28	93			1	4	40	66	78	83	88	96	98	100		SV

6-2590. WIND RIVER BELOW BOYSEN RESERVOIR, WYO.

LOCATION.--At tailrace of powerplant at Boysen Dam, 0.6 mile upstream from gaging station and 12.4 miles north of Shoshoni, Fremont County.
DRAINAGE AREA.--7,741 square miles upstream from gaging station.
RECORDS AVAILABLE.--Chemical analyses: November 1953 to September 1954, December 1960 to September 1961.
Water temperatures: December 1953 to September 1954, December 1960 to September 1961.
EXTREMES, December 1960 to September 1961.--Dissolved solids: Maximum, 801 ppm Apr. 1-15; minimum, 500 ppm July 12-31.
Hardness: Maximum, 325 ppm Apr. 1-15; minimum, 222 ppm July 12-31.
Specific conductance: Maximum daily, 1,300 micromhos Apr. 4; minimum daily, 732 micromhos July 23.
Water temperatures: Maximum, 71°F on several days during August; minimum, 36°F Dec. 14.
EXTREMES, 1953-54, 1960-61.--Dissolved solids: Maximum, 830 ppm June 18-19, 1954; minimum, 444 ppm July 20 to Aug. 25, 1954.
Hardness: Maximum, 325 ppm Apr. 1-15, 1961; minimum, 200 ppm Aug. 26 to Sept. 27, 1954.
Specific conductance: Maximum daily, 1,380 micromhos June 18, 1954; minimum daily, 647 micromhos Aug. 18, 1954.
Water temperatures: Maximum (1960-61), 71°F on several days during August 1961; minimum, 36°F Dec. 14, 1960.
REMARKS.--Daily samples for chemical analysis composted by discharge. Records of specific conductance of daily samples available in district office at Worland, Wyo.

Chemical analyses, in parts per million, December 1960 to September 1961

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 $CaCO_3$		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 31, 1956 a..	b 1,040	9.1	0.00	61	18	75	2.9	164	0	243	12	0.3	1.4	0.10	517	0.70	1,450	228	94	2.1	775	7.8	--
July 23 a.....	b 1,260	7.9	.00	38	9.5	38	2.5	109	0	120	6.0	.2	.6	.06	287	.39	976	134	45	1.4	452	7.6	--
Dec. 1-20, 1960.	340	12	.01	72	26	114	3.5	190	0	356	15	.4	.6	.14	722	.98	663	285	129	2.9	1,030	7.8	8
Dec. 21-31.....	355	8.7	.01	76	26	115	3.7	196	0	362	16	.4	.6	.11	734	1.00	704	296	135	2.9	1,050	7.9	6
Jan. 1-31, 1961.	347	4.2	.00	70	31	114	3.4	202	0	367	15	.5	.3	.12	741	1.01	694	302	136	2.9	1,040	7.9	7
Feb. 1-28.....	338	7.1	.00	80	27	108	3.4	223	0	334	14	.5	.1	.14	721	.98	658	312	129	2.7	1,030	7.8	2
Mar. 1-13.....	339	7.7	.01	80	26	100	3.3	214	0	330	14	.5	.1	.10	706	.96	646	306	131	2.5	1,010	7.8	4
Mar. 14-31.....	337	7.4	.02	80	27	108	3.7	216	0	347	15	.5	.2	.14	725	.99	660	311	134	2.7	1,040	7.7	3
Apr. 1-15.....	535	7.9	.02	84	28	123	3.3	215	0	382	16	.4	.5	.13	801	1.09	1,160	325	149	3.0	1,120	7.9	--
Apr. 16-30.....	568	7.2	.02	81	27	118	3.4	199	5	370	15	.5	.7	.13	764	1.04	1,170	314	142	2.9	1,080	8.3	--
May 1-31.....	860	6.3	.01	82	27	116	3.7	209	0	356	15	.5	.1	.12	760	1.03	1,760	315	144	2.8	1,070	7.9	3
June 1-21.....	996	7.4	.01	73	25	103	3.2	178	6	336	11	.4	.7	.07	679	.92	1,830	285	129	2.7	965	8.4	4
June 22-30.....	1,082	7.6	.01	64	21	84	2.7	172	0	272	11	.3	.1	.10	575	.78	1,680	246	105	2.3	842	7.6	3
July 1-11.....	1,068	8.1	.00	62	20	80	3.1	167	0	259	10	.4	.4	.09	541	.74	1,560	236	99	2.3	800	7.5	4
July 12-31.....	998	8.4	.00	58	19	74	2.9	137	0	245	11	.3	.3	.08	500	.68	1,350	222	110	2.2	751	7.6	4

Aug. 1-31, 1961.	1,003	6.7	.00	57	20	75	4.1	160	0	238	9.7	.4	.4	0.08	513	.70	1,390	223	92	2.2	747	7.4	5
Sept. 1-17.....	969	8.8	.02	59	21	82	3.1	166	0	248	10	.2	.6	.10	543	.74	1,420	232	96	2.4	804	7.2	2
Sept. 18-30.....	711	9.1	.01	60	20	85	3.3	172	0	257	11	.2	.5	.10	574	.78	1,100	233	92	2.4	934	7.4	2
Weighted aver-average.....	--	7.5	0.01	69	24	96	3.4	181	1	303	12	0.4	0.4	0.10	636	0.86	1,150	268	118	2.5	920	7.6	4
Time-weighted average.....	670	7.5	0.01	71	25	101	3.4	190	1	319	13	0.4	0.4	0.11	667	--	--	280	123	2.6	960	7.7	4
Tons per day..	--	14.0	0.01	125	43.0	173	6.2	328	2	548	22.0	0.7	0.7	0.18	--	--	--	--	--	--	--	--	--

a Not included in weighted average.
b Discharge at time of sampling.

Temperature (°F) of water, December 1960 to September 1961

Month	Day																													Aver-age
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
October.....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
November.....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
December.....	38	37	37	37	37	37	37	37	37	37	37	37	37	36	37	37	37	37	38	39	38	39	39	39	38	38	39	39	39	39	39	38
January.....	39	39	38	38	38	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	38	38	39	39	37	37	38	38	39	39	39	39
February.....	40	40	40	40	40	40	39	38	38	38	38	39	39	39	40	39	39	39	39	40	40	39	39	40	40	40	40	40	--	--	--	39
March.....	40	40	41	40	40	41	41	41	41	41	41	42	42	42	42	43	43	43	43	43	42	42	42	42	42	42	42	42	42	42	42	42
April.....	42	43	43	43	43	43	43	43	44	44	44	45	46	45	45	44	45	46	47	47	47	47	47	46	47	45	46	47	47	47	--	45
May.....	48	48	48	48	48	48	48	48	54	56	53	52	52	51	53	52	52	52	52	52	53	55	55	55	55	57	58	58	60	62	62	53
June.....	60	60	60	60	61	61	62	62	63	63	63	63	61	60	64	65	65	65	64	67	67	67	67	67	68	68	68	68	67	70	--	64
July.....	66	67	67	67	69	67	68	69	68	66	65	65	66	67	67	68	69	69	68	64	67	68	69	69	69	69	69	69	69	69	69	68
August.....	70	70	70	70	70	71	70	70	70	68	68	70	71	71	71	70	71	71	71	71	71	71	71	69	70	70	71	70	71	71	71	70
September.....	68	67	68	68	68	67	68	67	67	66	65	62	61	62	62	62	62	63	61	61	60	59	59	59	59	57	57	58	55	56	--	62

YELLOWSTONE RIVER BASIN--Continued

6-2685. FIFTEEN MILE CREEK NEAR WORLAND, WYO.

LOCATION.--At gaging station, 1.8 miles upstream from mouth and 2.8 miles west of Worland, Washakie County.
DRAINAGE AREA.--518 square miles.
RECORDS AVAILABLE.--Water temperatures: October 1960 to September 1961.
Sediment records: March 1951 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 84°F June 15; minimum, freezing point on several days during February and March.
Sediment concentrations: Maximum daily, 115,000 ppm May 25; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 115,000 tons Sept. 19; minimum daily, 0 tons on many days.
EXTREMES, 1951-61.--Sediment concentrations: Maximum daily, 125,000 ppm Apr. 16, 1952; minimum daily, no flow on many days each year.
Sediment loads: Maximum daily, 418,000 tons May 22, 1952; minimum daily, 0 tons on many days each year.
REMARKS.--Flow affected by ice Feb. 15 to Mar. 16. Bureau of Land Management has extensive spreader systems on some of the tributaries upstream from station.

Temperature (°F) of water, water year October 1960 to September 1961

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

YELLOWSTONE RIVER BASIN--Continued

6-2685. FIFTEEN MILE CREEK NEAR WORLAND, WYO.--Continued

Suspended sediment, water year October 1960 to September 1961

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		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	0.1	1200	J 2			
8..	0	--	0	0		0			
9..	7.4	23200	S 665	0		0			
10..	8.6	25400	S 641	0		0			
11..	5.7	20000	308	0		0			
12..	2.2	15600	93	0		0			
13..	1.0	15200	41	0		0			
14..	.7	30500	58	0		0			
15..	.4	--	E 11	0		0			
16..	.2	--	E 2	0		0			
17..	.1	700	T	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	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..	0	--	0	0		0			
29..	0	--	0	0		0			
30..	0	--	0	0		0			
31..	0	--	0	--		--			
Total	26.3	--	1819	0.1	--	2	0		0

	JANUARY			FEBRUARY			MARCH		
1..				0	--	0	0.5	3100	4
2..				0	--	0	.7	3400	6
3..				0	--	0	3	5300	43
4..				0	--	0	.4	--	E 5
5..				0	--	0	.1	--	E 1
6..				0	--	0	0	--	0
7..				0	--	0	0	--	0
8..				0	--	0	0	--	0
9..				0	--	0	0	--	0
10..				0	--	0	3	7300	59
11..				0	--	0	6	20000	320
12..				0	--	0	3	19000	150
13..				0	--	0	.5	14000	19
14..				0	--	0	.2	20000	11
15..				6	4500	73	4	24000	260
16..				20	8300	450	5	26000	350
17..				14	8800	330	2.2	23100	137
18..				9	9000	220	.9	23300	57
19..				6	6000	97	.1	--	E 3
20..				7	5600	110	0	--	0
21..				8	8300	180	0	--	0
22..				6	9000	150	0	--	0
23..				5	6800	92	0	--	0
24..				5	7800	110	0	--	0
25..				1.7	9400	43	0	--	0
26..				1	6700	18	0	--	0
27..				.7	5500	10	0	--	0
28..				.6	5000	8	6.8	30800	S 1230
29..				--	--	--	15	40400	1700
30..				--	--	--	35	49200	4820
31..				--	--	--	29	36200	2940
Total	0		0	90.0	--	1891	115.4	--	12115

E Estimated.
S Computed by subdividing day.
T Less than 0.50 ton.
J Computed from partly estimated concentration graph and subdividing day.

YELLOWSTONE RIVER BASIN--Continued

6-2685. FIFTEEN MILE CREEK NEAR WORLAND, WYO.--Continued

Suspended sediment, water year October 1960 to September 1961--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	47400	2790	0	--	0	3.5	50200	492
2..	14	33400	1310	0	--	0	1.3	20700 S	91
3..	4.8	25200	327	0	--	0	1.3	28000 S	109
4..	1.4	23700	90	0	--	0	.3	7400 J	8
5..	.5	22200	30	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	1.5	2620 S	226	0	--	0
13..	0	--	0	41	81600 S	10700	13	61500 S	4330
14..	0	--	0	9.2	61000	1570	4.2	85800	1010
15..	0	--	0	5.4	41700	630	.6	33500 S	79
16..	0	--	0	12	37800 S	1480	.1	1000	T
17..	0	--	0	20	54600 S	3310	0	--	0
18..	0	--	0	27	44700	3380	0	--	0
19..	0	--	0	7.7	33700	727	0	--	0
20..	0	--	0	2.0	27300	147	0	--	0
21..	0	--	0	1.2	25800	84	0	--	0
22..	0	--	0	2.5	54100 S	435	0	--	0
23..	0	--	0	1.0	25100 S	83	0	--	0
24..	0	--	0	17	12100 S	5240	0	--	0
25..	0	--	0	192	115000 S	68900	0	--	0
26..	0	--	0	19	68500 S	4160	0	--	0
27..	0	--	0	4.3	78000	939	0	--	0
28..	0	--	0	.8	42000 S	90	0	--	0
29..	0	--	0	.2	8600 J	7	0	--	0
30..	0	--	0	0	--	0	0	--	0
31..	--	--	--	17	59900 S	4790	--	--	--
Total	41.7	--	4547	380.8	--	106898	24.3	--	6119

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..	297	45400 S	57700				0	--	0
8..	11	32600	1000				0	--	0
9..	7.0	33400	655				0	--	0
10..	5.0	21500	290				553	52100 S	86300
11..	5.6	20700	313				333	40100 S	43700
12..	6.7	18700	338				550	46500 S	77100
13..	7.1	15800	303				68	22600 S	4410
14..	6.7	17000	308				33	14400	1280
15..	5.8	8600	135				22	11300	671
16..	4.5	7500	91				20	10400	562
17..	2.2	7870	47				17	10100	464
18..	1.6	3600	16				13	9800	344
19..	.3	1200 S	2				867	47200	115000
20..	0	--	0				621	28600 S	60500
21..	0	--	0				150	22700	9190
22..	0	--	0				106	19700	5640
23..	0	--	0				66	20600	3670
24..	0	--	0				42	14300	1620
25..	0	--	0				30	9200	745
26..	0	--	0				22	9600	570
27..	0	--	0				17	10800	496
28..	0	--	0				15	13200	535
29..	0	--	0				14	13400	507
30..	0	--	0				13	14400	505
31..	0	--	0				--	--	--
Total	360.5	--	61198	0		0	3572	--	413809

Total discharge for year (cfs-days)..... 4611.1
Total load for year (tons)..... 608398

S Computed by subdividing day.
T Less than 0.50 ton.
J Computed from partly estimated concentration graph and subdividing day.

6-2685. FIFTEEN MILE CREEK NEAR WORLAND, WYO.--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Mar. 28, 1961.....	1330	39		16	84300			84		98		100	--	--	--			PWC
May 18.....	0915	49		56	49300			63		82		98	100	--	--			VPWC
May 21.....	0845	61		1.3	26000			99		99		100	--	--	--			PWC
May 24.....	2340	57		264	110000			49		69		95	99	100	--			VPWC
May 25.....	0220	56		610	83900			49		70		92	97	99	100			VPWC
May 26.....	0830	60		18	86500			76		97		100	--	--	--			PWC
June 13.....	1115	--		55	111000			61		88		100	--	--	--			VPWC
Sept. 11.....	0015	53		1020	48600			79		93		95	97	98	100			VPWC
Sept. 11.....	0850	54		124	40100			80		95		99	100	--	--			VPWC
Sept. 11.....	1525	59		66	33300			87		100		--	--	--	--			PWC
Sept. 19.....	0840	--		665	65300			48		65		92	97	99	100			VPWC
Sept. 19.....	1145	47		870	59000			58		78		92	95	98	100			VPWC
Sept. 19.....	1355	--		1040	51600			65		85		94	95	98	100			VPWC
Sept. 19.....	1625	47		1300	47400			66		86		95	97	99	100			VPWC
Sept. 19.....	1930	--		1470	40900			74		89		95	96	98	100			VPWC
Sept. 19.....	2300	--		1820	40400			74		90		95	97	98	100			VPWC
Sept. 20.....	0130	--		2100	38700			76		90		96	97	99	99	100		VPWC
Sept. 20.....	0330	--		2160	36000			79		93		96	98	99	100			VPWC
Sept. 20.....	0500	44		1560	35400			76		91		95	98	100	--			VPWC
Sept. 20.....	0630	43		507	36800			72		86		95	98	100	--			VPWC
Sept. 20.....	1320	47		163	26000			78		95		99	100	--	--			VPWC

YELLOWSTONE RIVER BASIN--Continued

6-2795. BIGHORN RIVER AT KANE, WYO.

LOCATION.--At bridge on State Highway 14, 0.5 mile upstream from Shoshone River, 1.5 miles northeast of Kane, Big Horn County, and 12.5 miles downstream from gaging station.
DRAINAGE AREA.--15,846 square miles.
RECORDS AVAILABLE.--Chemical analyses: December 1949 to September 1953, June 1955 to September 1957, December 1960 to September 1961.
Water temperatures: July to September 1949, October 1950 to September 1961.
Sediment records: March 1946 to September 1961.
EXTREMES, 1960-61.--Dissolved solids (December 1960 to September 1961): Maximum, 2,860 ppm July 7; minimum, 385 ppm May 29 to June 3.
Hardness (December 1960 to September 1961): Maximum, 1,450 ppm July 7; minimum, 214 ppm May 29 to June 3.
Specific conductance (December 1960 to September 1961): Maximum daily, 3,030 micromhos July 7; minimum daily, 526 micromhos May 31.
Water temperatures: Maximum, 79°F July 3; minimum, freezing point on many days during November to March.
Sediment concentrations: Maximum daily, 33,300 ppm July 7; minimum daily, not determined.
Sediment loads: Maximum daily, 238,000 tons Sept. 20; minimum daily, 53 tons Dec. 8.
EXTREMES, 1946-61.--Dissolved solids (1955-57, 1960-61): Maximum, 2,860 ppm July 7, 1961; minimum, 292 ppm June 6, 1956.
Hardness (1955-57, 1960-61): Maximum, 1,450 ppm July 7, 1961; minimum, 152 ppm June 6, 1956.
Specific conductance (1955-57, 1960-61): Maximum daily, 3,030 micromhos July 7, 1961; minimum daily, 460 micromhos June 6, 1956.
Water temperatures (1950-61): Maximum, 85°F July 14, 30, 1953, July 12, 1954; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 33,300 ppm July 7, 1961; 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. No appreciable inflow between gaging station and sampling point except during periods of intense local precipitation. Flow affected by ice Nov. 18-27, Dec. 2 to Jan. 31.

Chemical analyses, in parts per million, December 1960 to September 1961

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 $CaCO_3$		Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
															Parts per million	Tons per acre-foot	Tons per day	Calcium, Magnesium	Noncarbonate				
Dec. 1-17, 1960.	609	10	0.01	141	41	132	5.5	303	0	525	26	0.5	1.0	0.19	1,100	1.50	1,810	521	273	2.5	1,440	7.9	7
Dec. 18-31.....	649	9.2	.01	125	35	118	6.0	276	0	457	24	.5	2.1	.18	972	1.32	1,700	457	231	2.4	1,300	7.6	8
Jan. 1-15, 1961.	687	9.4	.00	122	39	127	5.0	279	0	464	24	.5	1.0	.17	956	1.30	1,770	465	236	2.6	1,340	7.9	6
Jan. 16-31.....	659	9.3	.00	126	34	123	8.3	283	0	455	24	.6	1.2	.16	948	1.29	1,690	456	224	2.5	1,350	7.6	8
Feb. 1-13.....	806	9.8	.01	110	37	115	4.8	258	0	410	22	.6	1.5	.19	883	1.20	1,920	426	214	2.4	1,210	7.7	2
Feb. 14-20.....	1,260	8.5	.01	92	24	92	5.2	197	0	333	15	.5	2.2	.11	706	.96	2,400	327	165	2.2	997	7.6	2
Feb. 21-28.....	986	9.5	.00	105	33	115	4.8	240	0	399	20	.5	1.1	.13	852	1.16	2,270	396	199	2.5	1,170	7.7	2
Mar. 1-18.....	916	10	.02	118	31	114	4.6	253	0	442	23	.5	.8	.11	883	1.20	2,180	424	217	2.4	1,240	7.8	5
Mar. 19-31.....	816	8.9	.01	128	32	123	4.7	259	0	444	25	.5	.3	.14	950	1.29	2,090	451	239	2.5	1,290	7.8	5
Apr. 1-17.....	820	11	.00	113	39	144	5.0	250	0	489	26	.5	1.9	.17	999	1.36	2,210	444	239	3.0	1,340	7.8	0
Apr. 18-30.....	534	7.6	.00	111	43	142	4.5	234	0	510	25	.6	.3	.28	1,030	1.40	1,480	452	260	2.9	1,360	7.9	--
May 1-21.....	724	9.1	.00	112	35	146	4.6	216	0	495	23	.5	1.8	.15	975	1.33	1,910	422	245	3.1	1,320	7.6	0
May 22-24.....	2,307	17	.00	105	21	87	5.2	238	0	315	12	.4	2.0	.11	702	.95	4,370	349	154	2.0	997	7.7	0
May 25-28.....	3,402	12	.00	78	16	56	3.5	180	0	209	8.2	.3	2.9	.09	504	.69	4,630	262	114	1.5	729	7.9	3
May 29-June 3...	3,485	9.0	.03	63	14	40	2.0	163	0	154	5.4	.2	.2	.02	385	.52	3,620	214	80	1.2	577	7.7	8

June 4-14, 1961.	2,654	12	.01	67	18	62	2.9	164	0	229	8.0	.3	0.7	.01	505	.69	3,620	242	108	1.7	728	7.7	7
June 15-24.....	1,197	9.5	.01	84	27	90	3.7	185	0	350	14	.4	5.1	.09	704	.96	2,280	320	168	2.2	985	7.8	8
June 25-July 6..	554	9.6	.00	99	35	139	5.5	190	0	499	22	.5	.7	.17	938	1.28	1,400	392	236	3.1	1,270	7.5	6
July 7.....	1,900	24	.00	482	60	281	13	205	0	1,770	25	.5	.2	.32	2,860	3.89	14,670	1,450	1,280	3.2	3,030	7.6	6
July 8-9.....	796	17	.00	177	34	193	9.2	276	0	740	22	.5	.4	.21	1,350	1.84	2,900	583	357	3.5	1,740	7.5	6
July 10-31.....	417	14	.00	116	39	168	6.4	232	0	580	27	.6	1.6	.20	1,110	1.51	1,250	448	258	3.4	1,490	7.1	6
Aug. 1-31.....	370	11	.00	111	40	171	6.7	222	0	595	30	.6	1.9	.15	1,110	1.51	1,110	440	258	3.5	1,470	7.5	12
Sept. 1-10.....	699	13	.00	111	37	156	5.7	248	0	495	26	.4	3.9	.17	1,020	1.39	1,930	428	225	3.2	1,390	7.6	4
Sept. 11-21.....	2,129	16	.00	100	27	150	7.2	236	0	457	17	.5	5.8	.22	929	1.26	5,340	359	165	3.4	1,280	7.5	5
Sept. 22-30.....	1,671	13	.00	100	30	124	4.9	224	0	415	17	.3	2.8	.15	843	1.15	3,800	371	187	2.8	1,170	7.6	4
Weighted average.....	--	11	0.01	104	30	115	4.9	225	0	411	19	0.4	1.9	0.13	843	1.15	2,170	383	199	2.5	1,160	7.6	5
Time-weighted average.....	952	11	0.00	112	34	131	5.4	238	0	468	23	0.5	1.7	0.16	943	--	--	421	226	2.8	1,280	7.6	6
Tons per day..	--	29.0	0.02	268	77.0	295	13.0	578	0	1,060	48.0	1.0	4.9	0.35	--	--	--	--	--	--	--	--	--

Temperature (°F) of water, water year October 1960 to September 1961

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

YELLOWSTONE RIVER BASIN--Continued

6-2795. BIGHORN RIVER AT KANE, WYO.--Continued

Suspended sediment, water year October 1960 to September 1961

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	804	260	564	708	170	325	550	150	220
2	796	270	580	692	160	299	590	200	320
3	788	220	468	684	150	277	640	200	350
4	780	180	379	732	190	376	700	280	530
5	780	210	442	756	150	306	640	C 90	160
6	796	195	419	740	100	200	550	C 90	130
7	820	205	454	732	140	277	500	C 90	120
8	708	180	344	756	160	327	470	C 42	53
9	780	290	611	740	140	280	480	C 42	54
10	1920	5870	30400	732	200	395	540	C 42	61
11	1210	15600	51000	748	120	242	600	C 42	68
12	865	8110	18900	804	230	499	660	C 42	75
13	804	2900	6300	812	220	482	700	C 42	79
14	756	1140	2330	812	210	460	720	C 42	82
15	748	650	1310	788	270	574	710	C 42	81
16	740	420	839	764	690	1420	680	C 42	77
17	740	370	739	772	610	1270	630	C 42	71
18	740	290	579	760	260	530	600	C 42	68
19	748	270	545	760	C 120	250	580	C 42	66
20	748	220	444	760	C 120	250	660	C 80	140
21	748	220	444	760	C 120	250	680	C 80	150
22	740	250	500	750	C 120	240	680	C 80	150
23	740	240	480	760	C 120	250	600	C 80	130
24	740	180	360	760	C 120	250	600	C 80	130
25	740	170	340	780	C 120	250	670	C 80	140
26	740	210	420	780	C 120	250	700	C 80	150
27	740	200	400	750	C 120	240	680	C 80	150
28	732	160	316	650	C 120	210	650	C 80	140
29	724	230	450	530	C 120	170	650	C 80	140
30	724	240	469	530	C 120	170	660	C 80	140
31	716	170	329	--	--	--	680	C 80	150
Total	25155	--	122155	22102	--	11319	19450	--	4375
	JANUARY			FEBRUARY			MARCH		
1	630	C 90	150	684	150	277	892	635	1530
2	590	C 90	140	724	450	880	883	655	1560
3	560	C 90	140	788	250	532	883	710	1690
4	560	C 90	140	820	320	708	930	685	1720
5	560	C 90	140	772	300	625	901	600	1460
6	590	C 90	140	740	150	300	892	620	1490
7	610	C 90	150	708	390	746	930	710	1780
8	650	C 90	160	716	300	580	960	855	2220
9	710	C 220	420	700	120	227	910	920	2260
10	760	C 220	450	748	210	424	950	875	2240
11	800	C 220	480	756	240	490	1050	1270	3600
12	810	C 220	480	865	300	700	960	730	1890
13	820	C 220	490	1460	1840	S 8850	892	1410	3400
14	840	C 220	500	1870	2430	12300	856	1140	2630
15	810	C 220	480	1120	1440	4350	856	665	1540
16	800	C 220	480	1120	1090	3300	910	505	1240
17	790	C 220	470	1250	940	3170	940	445	1130
18	780	C 220	460	1340	1250	4520	901	620	1510
19	760	C 220	450	1080	1110	3240	865	685	1600
20	710	C 220	420	1040	1310	3680	820	580	1280
21	680	C 160	290	1000	950	2560	820	455	1010
22	670	C 160	290	1000	705	1900	812	410	899
23	670	C 160	290	1080	875	2550	812	350	767
24	670	C 160	290	1010	1080	2950	796	675	1450
25	670	C 160	290	970	1040	2720	772	885	1840
26	630	C 160	270	950	560	1440	772	485	1010
27	580	C 65	100	980	550	1460	780	350	737
28	550	C 65	97	901	650	1580	812	265	581
29	500	C 65	88	--	--	--	812	620	1360
30	520	C 65	91	--	--	--	856	780	1800
31	570	C 65	100	--	--	--	874	4290	10100
Total	20850	--	8936	27192	--	67059	27099	--	59324

S Computed by subdividing day.
C Composite period.

YELLOWSTONE RIVER BASIN--Continued

6-2795. BIGHORN RIVER AT KANE, WYO.--Continued

Suspended sediment, water year October 1960 to September 1961--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..	838	5670	12800	467	160	202	3150	2050	17400
2..	740	4460	8910	434	120	141	3010	1140	9260
3..	780	3520	7410	403	100	109	2650	950	6800
4..	740	2940	5870	409	90	99	3030	12700	104000
5..	648	1280	2240	467	110	139	3110	5250	44100
6..	1050	3020	S 9850	467	120	151	2760	3860	28800
7..	820	1690	S 3960	515	130	181	2610	1120	7890
8..	724	600	1170	550	140	208	2730	2350	17300
9..	668	460	830	522	140	197	2950	3670	S 31200
10..	676	390	712	467	150	189	2690	1890	13700
11..	628	290	492	448	120	145	2740	2310	17100
12..	613	280	463	529	120	171	2400	1580	10200
13..	1050	1240	S 4320	716	220	425	2270	2980	18300
14..	1120	1650	4990	844	1330	3030	1900	1690	8670
15..	1110	1260	3780	869	1610	3780	1580	1020	4350
16..	1000	930	2510	1030	3030	8430	1500	1100	4460
17..	732	465	919	1240	3450	11600	1490	1090	4380
18..	585	300	474	1200	4840	15700	1310	855	3020
19..	571	180	278	1090	2910	8560	1220	520	1710
20..	480	150	194	1090	2310	6800	1170	405	1280
21..	448	110	133	1450	5050	S 39000	1090	610	1800
22..	415	100	112	2490	21800	147000	968	855	2230
23..	415	100	112	2090	10600	59800	844	425	968
24..	454	120	147	2340	4200	26500	796	335	720
25..	660	320	570	3050	3750	30900	740	270	539
26..	700	720	1360	3050	10400	85600	708	250	478
27..	592	900	1440	3370	6750	61400	700	225	425
28..	557	1020	1530	4140	5230	58500	599	180	291
29..	557	960	1440	3940	3180	33800	557	245	368
30..	515	290	403	4070	3540	38900	474	250	320
31..	--	--	--	4090	3490	38500	--	--	--
Total	20886	--	79419	47837	--	680157	53746	--	362059
	JULY			AUGUST			SEPTEMBER		
1..	620	340	569	415	200	224	522	350	493
2..	454	110	135	415	215	241	515	380	528
3..	448	120	145	361	290	283	543	505	740
4..	448	90	109	333	3240	2910	599	2070	3350
5..	448	90	109	322	685	596	660	1980	3530
6..	448	90	109	300	405	328	652	800	1410
7..	1900	33300	S 205000	295	340	271	644	685	1190
8..	796	14600	31400	322	205	178	636	590	1010
9..	796	10200	21900	328	180	159	636	630	1080
10..	578	11400	17800	350	180	170	1580	14200	S 102000
11..	474	2300	2940	350	190	180	3010	26600	216000
12..	480	890	1150	355	190	182	2290	26100	161000
13..	529	770	1100	350	155	146	2040	12400	68300
14..	467	620	782	350	215	203	1400	10100	38200
15..	428	550	636	379	260	266	1270	3200	11000
16..	397	890	954	397	225	241	1240	1600	5360
17..	397	510	547	391	200	211	1250	1200	4050
18..	467	440	555	379	170	174	1260	1100	3740
19..	373	400	403	361	125	122	2850	17500	S 154000
20..	338	325	297	350	145	137	4010	22000	238000
21..	355	235	225	344	180	167	2800	21100	160000
22..	385	200	208	333	180	162	2220	9400	56300
23..	385	170	177	328	200	177	1950	4360	23000
24..	385	135	140	322	190	165	1870	2580	13000
25..	391	135	143	322	215	187	1700	1620	7440
26..	367	125	124	322	270	235	1600	1080	4670
27..	367	120	119	391	390	412	1500	950	3850
28..	373	120	121	474	360	461	1450	820	3210
29..	391	125	132	494	340	453	1400	900	3400
30..	422	190	216	515	380	528	1350	860	3130
31..	422	160	182	529	350	500	--	--	--
Total	15529	--	288427	11477	--	10669	45447	--	1292981

Total discharge for year (cfs-days)..... 336770
Total load for year (tons)..... 2986880

S Computed by subdividing day.

YELLOWSTONE RIVER BASIN--Continued

6-2795. BIGHORN RIVER AT KANE, WYO.--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Oct. 7, 1960	1240	60		829	205		16	23		50		72	78	97	100			VBWC
Nov. 16	1515	37		796	786			65		71		75	78	93	100			VPWC
Apr. 6, 1961	1535	45		1240	2030			47		72		85	88	95	100			VPWC
May 19	1710	64		1090	3070			78		96		97	98	100	--			VPWC
May 22	1210	65		2430	18400			72		94		97	98	99	100			VPWC
May 22	1830	65		2330	28900			73		92		95	97	99	100			VPWC
June 9	1710	71		2510	2870			42		71		91	95	98	100			VPWC
June 19	1100	72		1210	597			36		57		87	94	99	100			VPWC
Sept. 5	1125	61		660	2630			78		97		98	98	99	100			VPWC
Sept. 12	1130	54		2330	27600			76		96		98	98	99	100			VPWC
Sept. 13	0835	50		2090	16200			74		93		98	98	99	100			VPWC
Sept. 19	1425	52		1760	12400			46		67		93	96	99	100			VPWC

6-2862. SHOSHONE RIVER AT KANE, WYO.

LOCATION.--At gaging station at bridge on county road, 1 mile north of Kane, Big Horn County, and 1.5 miles upstream from mouth.
DRAINAGE AREA.--2,989 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to June 1953, August 1958 to September 1961.
Water temperatures: October 1959 to September 1961.
Sediment records: October 1959 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 78°F July 8; minimum, freezing point on many days during November to February.
Sediment concentrations: Maximum daily, 20,100 ppm Sept. 19; minimum daily, 65 ppm Mar. 31, Apr. 1.
Sediment loads: Maximum daily, 524,000 tons Sept. 29; minimum daily, 41 tons Apr. 1.
EXTREMES, 1959-61.--Water temperatures: Maximum, 80°F June 26, 1960; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 20,100 ppm Sept. 19, 1961; minimum daily, 65 ppm Mar. 31, Apr. 1, 1961.
Sediment loads: Maximum daily, 524,000 tons Sept. 19, 1961; minimum daily, 41 tons Apr. 1, 1961.
REMARKS.--Flow affected by ice Dec. 2-5, 15-26, Jan. 5-15.

Chemical analyses, in parts per million, water year October 1960 to September 1961

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 $CaCO_3$		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. 7, 1960....	784	15	0.01	109	41	161	4.2	270	0	530	14	0.7	5.2	0.26	1,090	1.48	2,310	440	219	3.3	1,490	7.6	6
Nov. 2.....	556	16	.00	141	61	204	6.0	337	0	727	20	.8	6.7	.38	1,420	1.93	2,130	602	326	3.6	1,810	7.4	6
Dec. 2.....	a 460	19	.00	184	40	200	7.1	362	0	698	22	.8	4.5	.35	1,380	1.88	1,710	623	326	3.5	1,870	7.5	6
Jan. 6, 1961....	a 430	17	.00	178	44	173	7.3	383	0	633	20	.9	6.1	.41	1,320	1.80	1,530	623	309	3.0	1,770	7.9	8
Feb. 3.....	a 390	15	.01	150	47	165	7.1	338	0	595	22	.8	5.2	.35	1,230	1.67	1,300	567	290	3.0	1,690	7.8	5
Mar. 3.....	354	15	.01	138	49	178	7.1	299	0	637	23	.7	3.3	.32	1,270	1.73	1,210	546	301	3.3	1,720	7.9	4
Apr. 6.....	268	10	.00	134	62	215	7.3	298	0	745	28	.7	3.1	.38	1,420	1.93	1,030	588	344	3.8	1,810	7.7	2
May 5.....	241	14	.02	140	44	200	4.9	272	0	682	20	.6	4.9	.28	1,330	1.81	865	531	308	3.8	1,710	8.0	8
June 9.....	345	17	.02	137	44	200	4.9	264	0	720	17	.7	4.4	.30	1,310	1.78	1,220	524	308	3.8	1,700	7.6	--
July 9.....	634	17	.01	113	43	169	4.6	238	0	602	14	.6	6.4	.35	1,150	1.56	1,970	457	262	3.4	1,530	7.7	9
Aug. 3.....	a 760	15	.01	100	36	147	3.7	241	0	471	12	.6	5.2	.33	956	1.30	1,960	397	199	3.2	1,310	8.1	7
Sept. 5.....	1,170	15	.01	96	33	129	3.0	240	0	450	11	.6	4.0	.22	882	1.20	2,790	375	178	2.9	1,170	7.7	4

a Daily mean discharge.

YELLOWSTONE RIVER BASIN--Continued

6-2862. SHOSHONE RIVER AT KANE, WYO.--Continued

Temperature (°F) of water, water year October 1960 to September 1961

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

6-2862. SHOSHONE RIVER AT KANE, WYO.--Continued

Suspended sediment, water year October 1960 to September 1961

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..	900	565	1400	514	C 168	233	480	C 150	190
2..	850	450	1000	562	C 168	255	460	C 150	190
3..	800	315	680	592	C 168	269	420	C 150	170
4..	760	285	580	659	C 168	299	390	C 150	160
5..	700	250	470	586	C 168	266	380	C 150	150
6..	760	210	430	562	C 168	255	380	C 150	150
7..	824	230	512	598	C 168	271	380	C 150	150
8..	876	305	721	610	C 168	277	400	C 150	160
9..	1380	1420	5290	496	C 106	142	410	C 150	170
10..	1960	4440	23500	470	C 106	135	420	C 150	170
11..	2730	2770	20400	490	C 106	140	430	C 150	170
12..	1640	1030	4560	502	C 106	144	430	C 150	170
13..	858	440	1020	480	C 106	137	430	C 150	170
14..	760	265	544	475	C 106	136	430	C 150	170
15..	712	190	365	470	C 106	135	410	C 150	170
16..	666	170	306	460	C 106	132	410	C 150	170
17..	638	C 134	231	502	C 106	144	450	C 150	180
18..	598	C 134	216	475	C 106	136	470	C 150	190
19..	652	C 134	236	450	C 106	129	470	C 150	190
20..	652	C 134	236	440	C 106	126	460	C 150	190
21..	631	C 134	228	440	C 106	126	450	C 150	180
22..	624	C 134	226	420	C 106	120	440	C 150	180
23..	586	C 134	212	425	C 106	122	450	C 150	180
24..	568	C 134	206	455	C 106	130	450	C 150	180
25..	538	C 115	167	450	C 106	129	460	C 150	190
26..	502	C 115	156	440	C 106	126	460	C 150	190
27..	496	C 115	154	445	C 106	127	450	C 150	180
28..	480	C 115	149	435	C 110	130	430	C 150	170
29..	485	C 115	151	430	C 110	130	430	C 150	170
30..	490	C 115	152	450	C 110	130	430	C 150	170
31..	508	C 115	158	--	--	--	430	C 150	170
Total	25624	--	64656	14783	--	5031	13390	--	5390
	JANUARY			FEBRUARY			MARCH		
1..	430	C 160	190	400	C 250	270	363	C 75	74
2..	420	C 160	180	390	C 250	260	342	C 75	69
3..	410	C 160	180	390	C 250	260	345	C 75	70
4..	410	C 160	180	390	C 250	260	345	C 75	70
5..	420	C 160	180	390	C 250	260	345	C 75	70
6..	430	C 160	190	390	C 250	260	345	C 75	70
7..	440	C 160	190	390	C 250	260	354	C 75	72
8..	440	C 160	190	380	480	490	328	C 75	66
9..	440	C 160	190	380	650	670	317	C 75	64
10..	420	C 160	180	380	950	970	310	C 75	63
11..	400	C 160	170	410	1700	1900	328	C 75	66
12..	410	C 160	180	400	750	810	324	C 75	66
13..	390	C 160	170	380	280	290	320	C 75	65
14..	400	C 160	170	380	200	210	324	C 75	66
15..	400	C 160	170	380	180	180	331	C 75	67
16..	400	C 160	170	390	C 113	119	338	C 75	68
17..	390	C 160	170	358	C 113	109	342	C 75	69
18..	380	C 160	160	345	C 113	105	320	C 75	65
19..	380	C 160	160	350	C 113	107	317	C 75	64
20..	390	C 160	170	345	C 113	105	320	C 75	65
21..	400	C 160	170	363	C 113	111	324	C 75	66
22..	400	C 160	170	368	C 113	112	314	C 75	64
23..	390	C 160	170	342	C 113	104	300	C 75	61
24..	390	C 160	170	345	C 113	105	300	C 75	61
25..	390	C 160	170	358	C 113	109	303	220	180
26..	370	C 160	160	334	C 113	102	289	350	273
27..	370	C 160	160	342	C 113	104	368	500	497
28..	360	C 160	160	342	C 113	104	331	170	152
29..	370	C 160	160	--	--	--	314	100	85
30..	370	C 160	160	--	--	--	303	100	82
31..	380	C 160	160	--	--	--	278	65	49
Total	12390	--	5350	10412	--	8746	10082	--	2919

C Composite period.

YELLOWSTONE RIVER BASIN--Continued

6-2862. SHOSHONE RIVER AT KANE, WYO.--Continued

Suspended sediment, water year October 1960 to September 1961--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..	234	65	41	232	360	226	260	400	281
2..	275	255	189	193	245	128	270	320	233
3..	268	230	166	201	245	133	265	320	229
4..	272	190	140	210	220	125	295	640	510
5..	303	220	180	228	265	163	325	3540 S	3290
6..	262	135	95	223	305	184	305	840	692
7..	278	210	158	241	315	205	295	520	414
8..	272	210	154	241	315	205	300	420	340
9..	270	240	175	214	220	127	300	350	284
10..	255	240	165	205	305	169	427	540	623
11..	282	350	266	228	240	148	616	890	1480
12..	328	380	337	275	380	282	798	1070	2310
13..	272	265	195	356	700	673	707	730	1390
14..	296	350	280	405	860	940	592	620	991
15..	248	305	204	580	1260 S	2140	610	580	955
16..	296	470	376	1530	5330 S	33000	707	750	1430
17..	314	360	305	1980	7870 S	48500	682	740	1360
18..	330	400	360	1060	2500	7160	670	840	1520
19..	350	845	800	912	1460	3600	826	1070	2390
20..	450	775	940	646	940	1640	721	740	1440
21..	400	1440	1600	580	650	1020	562	550	835
22..	350	1260	1200	586	670	1060	514	430	597
23..	300	1060	860	514	470	652	484	470	614
24..	400	865	930	427	420	484	538	520	755
25..	454	720	883	556	8500	12800	550	610	906
26..	350	520	491	466	3700	4660	721	1140	2220
27..	422	675	769	427	920	1060	770	1100 A	2300
28..	422	540	615	372	480	482	864	1300 A	3000
29..	310	350	293	320	380	328	805	-- E	2500
30..	255	390	269	246	320	213	1040	1300 J	4100
31..	--	--	--	260	340	239	--	--	--
Total	9518	--	13436	14914	--	122746	16819	--	39989

Day	JULY			AUGUST			SEPTEMBER		
1..	658	680	S 1310	1000	690	1900	968	320	836
2..	508	280	384	860	540	1300	1010	400	1090
3..	454	320	392	760	420	860	1170	420	1330
4..	361	250	244	700	390	740	1220	450	1480
5..	410	250	277	700	450	850	1160	420	1320
6..	432	340	397	760	400	820	1050	340	964
7..	914	3000	J 9900	900	570	1400	976	330	870
8..	652	1140	2010	1100	500	1500	1020	280	771
9..	640	1650	2850	1300	560	2000	1120	280	847
10..	812	2370	S 5600	1500	860	3500	2330	6610 S	50400
11..	640	640	1110	1300	870	3100	1370	3210	11900
12..	763	750	J 1700	1200	730	2400	2210	6420 S	41700
13..	819	850	J 2000	1000	460	1200	1190	2820 S	9750
14..	784	700	J 1600	940	580	1500	770	1000	2080
15..	756	700	J 1500	780	460	970	791	720	1540
16..	676	600	A 1100	688	410	762	864	720	1680
17..	777	550	A 1200	721	420	818	756	610	1250
18..	592	400	639	721	370	720	826	935 S	2320
19..	514	340	472	742	-- E	750	7930	20100 S	524000
20..	502	420	569	880	400	950	3290	6120 S	60700
21..	763	1450	2990	1080	540	1570	2310	6160 S	42300
22..	658	560	995	872	390	918	1560	980	4130
23..	728	580	1140	770	400	832	1180	540	1720
24..	700	550	1000	688	370	687	1270	300	1030
25..	620	450	750	763	420	865	1030	240	667
26..	560	410	620	763	370	762	968	230	601
27..	640	450	780	714	320	617	968	280	732
28..	760	460	940	856	360	832	1090	400	1180
29..	900	490	1200	805	320	696	1050	310	879
30..	1100	780	2300	826	300	669	1080	270	787
31..	1200	800	2600	856	300	693	--	--	--
Total	21293	--	50569	27545	--	37181	44527	--	770854

Total discharge for year (cfs-days)..... 221297
Total load for year (tons)..... 1126867

E Estimated.
S Computed by subdividing day.
A Computed from partly estimated concentration graph.
J Computed from partly estimated concentration graph and subdividing day.

YELLOWSTONE RIVER BASIN--Continued

6-2862. SHOSHONE RIVER AT KANE, WYO.--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Oct. 7, 1960.....	1410	58		784	240		21	28		43		66	74	89	100			VBWC
Apr. 18, 1961.....	1630	56		d 330	396			44		76		95	98	99	100			VPWC
May 19.....	1540	60		864	1220			46		66		86	93	98	100			VPWC
June 19.....	0930	68		840	1520			47		66		85	95	100	--			VPWC
Sept. 12.....	1600	51		2780	9970			71		91		97	98	100	--			VPWC

d Daily mean discharge.

YELLOWSTONE RIVER BASIN--Continued

6-2947. BIGHORN RIVER AT BIGHORN, MONT.

LOCATION.--At gaging station at bridge on U.S. Highway 10, 0.8 mile upstream from mouth, 1 mile southwest of Bighorn, Treasure County, and 4 miles east of Custer.
DRAINAGE AREA.--22,885 square miles.
RECORDS AVAILABLE.--Chemical analyses: February 1950 to September 1961.
Water temperatures: April 1949 to September 1951, August 1952 to November 1958, June 1959 to September 1961.
Sediment records: July 1947 to September 1954, October 1955 to September 1958, October 1959 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 1,460 ppm July 10-11; minimum, 501 ppm May 28 to June 6.
Hardness: Maximum, 617 ppm July 10-11; minimum, 257 ppm May 28 to June 6.
Specific conductance: Maximum daily, 1,940 micromhos July 10; minimum daily, 624 micromhos June 1, 2.
Water temperatures: Maximum, 76°F July 9, 23, Aug. 3, 6, 7; minimum, freezing point on many days during December to March.
Sediment concentrations: Maximum daily, 18,400 ppm Sept. 21; minimum daily, 83 ppm Oct. 31.
Sediment loads: Maximum daily, 502,000 tons Sept. 21; minimum daily, 137 tons May 12.
EXTREMES, 1947-61.--Dissolved solids (1951-61): Maximum, 1,460 ppm July 10-11, 1961; minimum, 304 ppm June 23, 1951.
Hardness (1951-61): Maximum, 617 ppm July 10-11, 1961; minimum, 151 ppm June 23, 1951.
Specific conductance (1951-61): Maximum daily, 1,940 micromhos July 10, 1961; minimum daily, 384 micromhos June 20, 1951.
Water temperatures (1949-51, 1952-61): Maximum, 89°F Aug. 7, 1953; minimum, freezing point on many days during winter months.
Sediment concentrations (1947-54, 1955-58, 1959-61): Maximum daily, 23,200 ppm May 24, 1952; minimum daily, not determined.
Sediment loads (1947-54, 1955-58, 1959-61): Maximum daily, 727,000 tons May 24, 1952; minimum daily, 117 tons July 22, 1960.
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. 28 to Feb. 27.

Chemical analyses, in parts per million, water year October 1960 to September 1961

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 $CaCO_3$		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. 1-14, 1960.	2,108	--	--	--	--	150	--	251	0	517	--	--	--	--	1,000	1.36	5,690	441	235	3.1	1,370	7.9	--
Oct. 15-31.....	1,473	--	--	--	--	162	--	271	0	571	--	--	--	--	1,130	1.54	4,490	498	276	3.2	1,480	8.0	--
Nov. 1-15.....	1,413	--	--	--	--	166	--	284	0	626	--	--	--	--	1,180	1.60	4,500	531	298	3.1	1,530	7.9	--
Nov. 16-30.....	1,300	--	--	--	--	163	--	295	0	587	--	--	--	--	1,180	1.60	4,140	538	296	3.1	1,530	7.9	--
Dec. 1-10.....	1,303	12	0.01	141	56	166	5.9	324	0	615	24	0.7	2.3	0.24	1,270	1.73	4,470	584	318	3.0	1,620	7.7	7
Dec. 11-31.....	1,269	--	--	--	--	150	--	318	0	545	--	--	--	--	1,130	1.54	3,870	543	282	2.8	1,480	8.0	--
Jan. 1-12, 1961.	1,208	--	--	--	--	150	--	305	0	508	--	--	--	--	1,050	1.43	3,420	525	274	2.8	1,420	8.0	--
Jan. 13-31.....	1,492	--	--	--	--	138	--	280	0	483	--	--	--	--	971	1.32	3,910	488	258	2.7	1,340	8.0	--
Feb. 1-28.....	1,946	--	--	--	--	118	--	248	0	488	--	--	--	--	898	1.22	4,720	435	232	2.4	1,240	7.8	--
Mar. 1-15.....	1,604	9.9	.01	113	44	126	5.3	263	0	475	20	.5	1.5	.18	972	1.32	4,210	464	248	2.5	1,300	8.0	4
Mar. 16-31.....	1,479	--	--	--	--	150	--	246	0	542	--	--	--	--	1,020	1.39	4,070	471	269	3.0	1,400	7.9	--
Apr. 1-19.....	1,317	--	--	--	--	160	--	244	0	568	--	--	--	--	1,020	1.39	3,630	486	286	3.2	1,460	7.8	--
Apr. 20-30.....	1,065	--	--	--	--	152	--	232	0	548	--	--	--	--	1,020	1.39	2,930	464	274	3.1	1,430	7.8	--
May 1-15.....	646	--	--	--	--	175	--	228	0	597	--	--	--	--	1,130	1.54	1,970	478	291	3.5	1,520	7.9	--
May 16-27.....	2,361	--	--	--	--	142	--	220	0	476	--	--	--	--	938	1.28	5,980	410	230	3.0	1,310	8.1	--

May 28-June 6, 1961.....	3,401	12	.02	71	19	58	2.8	162	0	222	6.8	.4	2.3	.04	501	.68	4,600	257	124	1.6	733	7.7	8
June 7-17.....	3,005	--	--	--	--	92	--	182	0	323	--	--	--	--	658	.89	5,340	312	163	2.3	928	8.2	--
June 18-30.....	1,413	--	--	--	--	118	--	194	0	410	--	--	--	--	812	1.10	3,100	360	201	2.7	1,120	8.2	--
July 1-9.....	845	--	--	--	--	154	--	212	0	550	--	--	--	--	986	1.34	2,250	406	232	3.3	1,350	8.1	--
July 10-11.....	1,335	21	.00	183	39	209	8.0	205	0	873	19	.6	10	.23	1,460	1.99	5,260	617	449	3.7	1,820	7.7	14
July 12-31.....	836	--	--	--	--	171	--	224	0	607	--	--	--	--	1,110	1.51	2,510	441	257	3.5	1,480	7.9	--
Aug. 1-19.....	852	--	--	--	--	167	--	221	0	558	--	--	--	--	1,020	1.39	2,350	396	215	3.7	1,410	7.7	--
Aug. 20-31.....	894	--	--	--	--	171	--	208	0	585	--	--	--	--	1,060	1.44	2,560	416	245	3.7	1,440	7.5	--
Sept. 1-6.....	1,337	13	.00	103	43	166	5.1	236	0	545	20	.5	2.6	.27	1,070	1.46	3,860	435	241	3.5	1,430	7.6	3
Sept. 7-19.....	2,988	--	--	--	--	150	--	241	0	493	--	--	--	--	978	1.33	7,890	391	193	3.3	1,300	7.8	--
Sept. 20-30.....	4,681	--	--	--	--	148	--	238	0	460	--	--	--	--	926	1.26	11,700	364	169	3.4	1,260	7.7	--
Weighted average.....	--	--	--	--	--	140	--	244	0	495	--	--	--	--	966	1.31	4,230	433	234	2.9	1,310	7.9	--
Time-weighted average.....	1,623	--	--	--	--	147	--	248	0	524	--	--	--	--	1,010	--	--	453	249	3.0	1,370	7.9	--
Tons per day..	--	--	--	--	--	614	--	1,070	0	2,170	--	--	--	--	--	--	--	--	--	--	--	--	--

Temperature (°F) of water, water year October 1960 to September 1961

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

YELLOWSTONE RIVER BASIN--Continued

6-2947. BIGHORN RIVER AT BIGHORN, MONT.--Continued

Suspended sediment, water year October 1960 to September 1961
/Where no concentrations are reported, loads are estimated/

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..	1930	330	1720	1340	C 131	474	1130	C 170	520
2..	1920	320	1660	1350	C 131	477	1200	C 170	550
3..	1860	225	1130	1360	C 131	481	1400	C 170	640
4..	1810	190	929	1400	C 131	495	1600	C 170	730
5..	1810	180	880	1440	C 131	509	1850	C 170	850
6..	1780	165	793	1480	C 131	523	1550	C 170	710
7..	1680	176	798	1470	C 131	520	1150	C 170	530
8..	1740	155	728	1420	C 131	502	1100	C 170	500
9..	1810	145	709	1470	C 131	520	1050	C 170	480
10..	1860	210	1050	1440	C 131	509	1000	C 170	460
11..	2520	495	3370	1360	C 131	481	1100	C 170	500
12..	3590	2000	19400	1360	C 131	481	1150	C 170	530
13..	3060	5800	47900	1400	C 131	495	1200	C 170	550
14..	2140	5530	32000	1470	C 131	520	1300	C 170	600
15..	1730	3990	18600	1440	C 131	509	1400	C 170	640
16..	1610	2390	10400	1410	C 131	499	1450	C 170	670
17..	1600	1180	5100	1400	C 131	495	1400	C 170	640
18..	1600	580	2510	1350	C 131	477	1300	C 170	600
19..	1530	340	1400	1380	C 131	488	1350	C 170	620
20..	1480	240	959	1360	C 131	481	1050	C 170	480
21..	1520	220	903	1340	C 131	474	950	C 170	440
22..	1520	190	780	1310	C 131	463	1150	C 170	530
23..	1500	160	648	1340	C 131	474	1300	C 170	600
24..	1470	140	556	1280	C 131	453	1350	C 170	620
25..	1410	140	533	1320	C 131	467	1300	C 170	600
26..	1400	122	461	1320	C 131	467	1300	C 170	600
27..	1360	116	426	1310	C 131	463	1300	C 170	600
28..	1340	112	405	1250	C 110	370	1300	C 170	600
29..	1340	89	322	1050	C 110	310	1350	C 170	620
30..	1320	113	403	1080	C 110	320	1350	C 170	620
31..	1310	83	294	--	--	--	1300	C 170	600
Total	54550	--	157767	40700	--	14197	39680	--	18230
	JANUARY			FEBRUARY			MARCH		
1..	1200	C 150	490	1600	C 180	780	1680	1040	4720
2..	1150	C 150	470	1650	C 180	800	1660	760	3410
3..	1050	C 150	430	1700	C 180	830	1590	660	2830
4..	1000	C 150	400	1700	C 180	830	1610	740	3220
5..	950	C 150	380	1750	C 180	850	1600	720	3110
6..	1050	C 150	430	1700	C 180	830	1600	760	3280
7..	1150	C 150	470	1650	C 180	800	1600	740	3200
8..	1350	C 150	550	1650	C 180	800	1570	520	2200
9..	1400	C 150	570	1700	C 180	830	1570	540	2290
10..	1400	C 150	570	1750	C 180	850	1570	600	2540
11..	1400	C 150	570	1800	C 180	870	1560	520	2190
12..	1400	C 150	570	1950	280	1500	1590	510	2190
13..	1450	C 150	590	1950	600	3200	1700	560	2570
14..	1500	C 150	610	2200	440	2600	1600	550	2380
15..	1550	C 150	630	2700	460	3400	1560	510	2150
16..	1600	C 150	650	3000	300	2400	1500	680	2750
17..	1600	C 150	650	2300	750	4700	1560	800	3370
18..	1600	C 150	650	2000	480	2600	1570	700	2970
19..	1600	C 150	650	2400	400	2600	1590	510	2190
20..	1600	C 150	650	2700	750	5500	1560	380	1600
21..	1550	C 150	630	1950	850	4500	1520	340	1400
22..	1500	C 150	610	1900	1200	6200	1470	460	1830
23..	1500	C 150	610	1950	1140	5800	1490	550	2210
24..	1500	C 150	610	1800	1400	6800	1430	500	1930
25..	1500	C 150	610	1850	2000	10000	1430	410	1580
26..	1400	C 150	570	1800	1700	8300	1430	380	1470
27..	1300	C 150	530	1700	1200	5500	1360	260	955
28..	1300	C 150	530	1700	1250	5740	1400	310	1170
29..	1350	C 150	550	--	--	--	1470	640	2540
30..	1450	C 150	590	--	--	--	1450	440	1720
31..	1500	C 150	610	--	--	--	1430	400	1540
Total	42850	--	17430	54500	--	90410	47720	--	73505

C Composite period.

6-2947. BIGHORN RIVER AT BIGHORN, MONT.--Continued

Suspended sediment, water year October 1960 to September 1961--Continued
(Where no concentrations are reported, loads are estimated)

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..	1490	--	1500	966	540	1410	4710	2020	25700
2..	1460	--	2000	803	420	911	3530	1660	15800
3..	1350	--	3000	704	410	779	3050	1800	14800
4..	1310	--	6000	610	290	478	2700	1100	8020
5..	1320	3200	11400	570	210	323	2840	955	7320
6..	1240	3580	12000	483	170	222	3170	1180	10100
7..	1240	2390	8000	522	140	197	2970	5270	42300
8..	1540	1670	6940	562	130	197	2840	2540	19500
9..	1350	940	3430	570	120	185	2900	1870	14600
10..	1240	860	2880	570	110	169	3330	1250	11200
11..	1190	780	2510	530	140	200	3490	1910	18000
12..	1100	320	950	462	110	137	3630	2050	20100
13..	1050	275	780	586	--	190	3530	1390	13200
14..	1040	235	660	704	130	247	3170	1410	12100
15..	1450	530	2070	1050	255	723	2700	1260	9190
16..	1600	450	1940	1490	410	1650	2320	1370	8580
17..	1490	515	2070	1770	445	2130	2180	1190	7000
18..	1420	430	1650	2700	2990	21800	2300	650	4040
19..	1150	380	1180	2280	3680	22700	2300	900	5590
20..	900	290	705	2040	3480	19200	2090	650	3670
21..	930	230	578	1980	2940	15700	1960	595	3150
22..	840	170	386	1980	2120	11300	1750	515	2430
23..	803	190	412	2640	2430	17300	1520	395	1620
24..	990	190	508	2860	3390	26200	1220	295	972
25..	1090	230	677	2600	11200	78600	1040	505	1420
26..	1120	310	937	2720	5420	39800	954	450	1160
27..	1400	440	1660	3270	3420	30200	840	260	590
28..	1330	870	3120	3130	4120	34800	840	200	454
29..	1190	1070	3440	3230	5580	48700	803	200	434
30..	1120	820	2480	3330	3870	34800	758	190	389
31..	--	--	--	4320	2410	28100	--	--	--
Total	36743	--	85863	52032	--	439348	71435	--	283429

	JULY			AUGUST			SEPTEMBER		
1..	713	180	347	966	240	626	1090	290	853
2..	758	200	409	990	250	668	1180	310	988
3..	812	235	515	900	200	486	1280	320	1110
4..	634	245	419	812	170	373	1380	400	1490
5..	586	170	269	650	130	228	1520	450	1850
6..	506	125	171	610	120	198	1570	570	2420
7..	522	160	226	602	100	163	1610	640	2780
8..	896	220	532	538	120	174	1570	770	3260
9..	2180	1440	8480	642	280	485	1540	665	2760
10..	1520	10000	41000	758	230	471	2160	--	6400
11..	1150	8400	26100	910	210	516	2780	1840	13800
12..	1060	4800	13700	1130	240	732	5020	6820	92400
13..	990	2300	6150	1150	260	807	4690	15400	195000
14..	1010	2820	7690	1130	230	702	4050	14700	161000
15..	1100	1700	5050	1030	200	556	3510	12200	116000
16..	1000	820	2210	942	190	483	3130	8550	72300
17..	930	590	1480	840	150	340	2910	5130	40300
18..	794	490	1050	785	120	254	2800	2090	15800
19..	767	410	849	794	100	214	3070	1710	14200
20..	740	740	1480	860	120	279	7580	6750	S 165000
21..	731	3160	6240	900	130	316	10100	18400	502000
22..	642	350	607	860	120	279	7080	13100	250000
23..	803	310	672	900	120	292	5050	13000	177000
24..	803	210	455	840	120	272	3930	8100	85900
25..	776	240	503	803	120	260	3450	4250	39600
26..	785	340	721	812	110	241	3150	2210	18800
27..	713	190	366	890	150	360	2930	2270	18000
28..	695	130	244	910	160	393	2700	1040	7580
29..	713	140	270	900	190	462	2750	1000	7420
30..	785	180	382	1000	300	810	2770	780	5830
31..	880	210	499	1050	250	709	--	--	--
Total	26994	--	129086	26904	--	13149	98350	--	2021841

Total discharge for year (cfs-days)..... 592458
Total load for year (tons)..... 3344255

S Computed by subdividing day.

YELLOWSTONE RIVER BASIN--Continued

6-2947. BIGHORN RIVER AT BIGHORN, MONT.--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Oct. 6, 1960	1500	62		1780	173		30	41		69		86	88	100	--			VBWC
Nov. 3	1340	41		1310	95		22	44		56		77	80	98	100			VBWC
Apr. 5, 1961	1510	44		1260	3280		--	86		95		100	--	--	--			VPWC
May 18	1700	54		2880	3220		--	51		75		87	91	99	100			VPWC
May 23	1520	69		3010	2890		--	56		78		89	92	99	100			VPWC
May 24	1015	69		2930	2610		3	3		65		91	94	99	100			VPN
May 24	1015	69		2930	2610		41	51		78		91	94	99	100			VPWC
June 8	1905	75		2900	2450		--	68		92		97	99	100	--			VPWC
June 20	0755	72		2160	633		--	56		77		89	94	100	--			VPWC
Sept. 8	1505	64		1560	1060		--	78		94		97	97	98	100			VPWC
Sept. 13	1530	55		4690	14200		--	77		95		97	98	100	--			VPWC
Sept. 17	0940	62		2910	5540		--	80		95		98	99	100	--			VPWC
Sept. 20	1115	56		6940	4050		--	54		75		88	92	99	100			VPWC
Sept. 21	0615	51		10600	21100		--	76		95		98	99	100	--			VPWC
Sept. 21	1145	50		9910	20100		--	78		95		98	99	100	--			VPWC

6-3085. TONGUE RIVER AT MILES CITY, MONT.

LOCATION.--At gaging station, 4 miles south of Miles City, Custer County, and 8 miles upstream from mouth.
DRAINAGE AREA (revised).--5,379 square miles.
RECORDS AVAILABLE.--Chemical analyses: January 1951 to September 1961.
Water temperatures: April 1949 to September 1961.
Sediment records: June 1946 to September 1951.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 1,090 ppm Oct. 1-16, Aug. 1-18; minimum, 477 ppm June 12-30.
Hardness: Maximum, 561 ppm Dec. 1-15; minimum, 178 ppm Sept. 10-22.
Specific conductance: Maximum daily, 1,720 micromhos Aug. 17, 18; minimum daily, 593 micromhos July 31.
Water temperatures: Maximum, 71°F June 29; minimum, freezing point on many days during November to April.
EXTREMES, 1949-61.--Dissolved solids (1951-61): Maximum, 1,790 ppm Sept. 11, 1958; minimum, 200 ppm June 23-27, 1953.
Hardness (1951-61): Maximum, 688 ppm Sept. 11, 1958; minimum, 94 ppm May 4, 1955.
Specific conductance (1951-61): Maximum daily, 2,390 micromhos Sept. 11, 1958; 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.

Chemical analyses, in parts per million, water year October 1960 to September 1961

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 $CaCO_3$		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, 1960.	5.2	--	--	--	--	214	--	470	0	488	--	--	--	--	1,090	1.48	15.3	405	20	4.6	1,550	8.1	--
Oct. 17-28.....	7.9	--	--	--	--	206	--	477	0	461	--	--	--	--	1,080	1.47	23.0	418	27	4.4	1,520	8.1	--
Oct. 29-Nov. 7..	58.3	--	--	--	--	100	--	347	0	350	--	--	--	--	785	1.07	124	428	143	2.1	1,130	8.0	--
Nov. 8-21.....	121	7.8	0.01	77	61	87	5.2	339	0	344	4.8	0.3	0.1	0.16	773	1.05	253	443	165	1.8	1,110	7.9	9
Nov. 22-30.....	71.6	--	--	--	--	107	--	383	0	380	--	--	--	--	862	1.17	167	484	170	2.1	1,220	7.9	--
Dec. 1-15.....	70.3	--	--	--	--	114	--	426	0	429	--	--	--	--	978	1.33	186	561	212	2.1	1,360	8.2	--
Dec. 16-31.....	70.2	--	--	--	--	88	--	399	0	350	--	--	--	--	830	1.13	157	506	179	1.7	1,180	8.2	--
Jan. 1-15, 1961.	80.0	--	--	--	--	80	--	380	0	318	--	--	--	--	764	1.04	165	479	167	1.6	1,110	7.9	--
Jan. 16-31.....	77.2	--	--	--	--	93	--	404	0	332	--	--	--	--	812	1.10	169	504	172	1.8	1,170	7.9	--
Feb. 1-9.....	90.2	--	--	--	--	82	--	380	0	296	--	--	--	--	762	1.04	186	469	158	1.6	1,130	7.9	--
Feb. 10-28.....	107	--	--	--	--	67	--	282	0	236	--	--	--	--	580	.79	168	352	121	1.6	872	7.9	--
Mar. 1-11.....	127	6.5	.02	76	35	64	4.4	278	0	231	4.2	.2	.0	.11	570	.78	195	332	104	1.5	851	7.8	4
Mar. 12-31.....	53.8	--	--	--	--	100	--	313	0	310	--	--	--	--	708	.96	103	390	133	2.2	1,060	8.1	--
Apr. 1-15.....	19.8	--	--	--	--	144	--	336	0	409	--	--	--	--	884	1.20	47.3	410	134	3.1	1,290	8.1	--
Apr. 16-30.....	5.2	--	--	--	--	204	--	414	0	488	--	--	--	--	1,040	1.41	14.6	414	75	4.4	1,510	8.1	--
May 1-16.....	5.2	10	.00	66	51	197	6.9	427	0	428	6.9	.4	1.8	.34	998	1.36	14.0	375	25	4.4	1,450	8.2	8
May 17-24.....	13.4	--	--	--	--	158	--	352	0	350	--	--	--	--	830	1.13	30.0	334	46	3.8	1,190	8.1	--
May 25-26.....	193	--	--	--	--	82	--	264	4	272	--	--	--	--	658	.89	343	338	115	1.9	928	8.3	--
May 27-June 1...	58.5	--	--	--	--	101	--	268	0	332	--	--	--	--	716	.97	113	355	136	2.3	1,050	7.8	--
June 2-11.....	9.1	--	--	--	--	162	--	376	0	406	--	--	--	--	920	1.25	22.6	414	106	3.5	1,340	7.9	--

YELLOWSTONE RIVER BASIN--Continued

6-3085. TONGUE RIVER AT MILES CITY, MONT.--Continued

Chemical analyses, in parts per million, water year October 1960 to September 1961--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 $CaCO_3$		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 12-30, 1961	151	--	--	--	--	50	--	236	0	188	--	--	--	--	477	0.65	194	288	94	1.3	730	8.2	--
July 1-12.....	39.2	--	--	--	--	69	--	277	0	213	--	--	--	--	528	.72	55.9	292	65	1.8	806	8.1	--
July 13-28.....	11.8	--	--	--	--	154	--	391	0	401	--	--	--	--	888	1.21	28.3	373	52	3.5	1,280	8.1	--
July 29-31.....	131	--	--	--	--	110	--	355	0	186	--	--	--	--	582	.79	206	236	0	3.1	874	8.1	--
Aug. 1-18.....	6.0	--	--	--	--	212	--	440	0	509	--	--	--	--	1,090	1.48	17.7	394	33	4.6	1,550	8.1	--
Aug. 19-31.....	8.9	--	--	--	--	148	--	360	0	355	--	--	--	--	800	1.09	19.2	307	12	3.7	1,180	8.1	--
Sept. 1-9.....	6.4	--	--	--	--	211	--	432	9	498	--	--	--	--	1,080	1.47	18.7	396	27	4.6	1,540	8.3	--
Sept. 10-22.....	120	11	0.02	41	18	95	5.7	236	0	182	0.5	0.2	2.8	0.16	494	.67	160	178	0	3.1	751	7.6	45
Sept. 23-30.....	86.5	--	--	--	--	75	--	263	0	237	--	--	--	--	570	.78	133	293	77	1.9	845	7.9	--
Weighted average.....	--	--	--	--	--	87	--	320	0	287	--	--	--	--	685	0.93	106	381	120	2.0	1,000	7.9	--
Time-weighted average.....	57.2	--	--	--	--	125	--	360	0	352	--	--	--	--	811	--	--	393	98	2.8	1,180	8.0	--
Tons per day..	--	--	--	--	--	13.0	--	49	0	44.0	--	--	--	--	--	--	--	--	--	--	--	--	--

YELLOWSTONE RIVER BASIN--Continued

6-3085. TONGUE RIVER AT MILES CITY, MONT.--Continued

Temperature (°F) of water, water year October 1960 to September 1961

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

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YELLOWSTONE RIVER BASIN--Continued

6-3265. 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.
DRAINAGE AREA (revised).--13,189 square miles.
RECORDS AVAILABLE.--Chemical analyses: December 1949 to September 1961.
Water temperatures: February 1951 to May 1954, October 1954 to September 1961.
Sediment records: March 1950 to September 1953.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 3,780 ppm July 13-15; minimum, 322 ppm July 5-8.
Hardness: Maximum, 1,600 ppm July 13-15; minimum, 47 ppm July 9-12.
Specific conductance: Maximum daily, 4,410 micromhos July 13; minimum daily, 317 micromhos July 5.
Water temperatures: Maximum, 78°F Aug. 2, 28; minimum, freezing point on many days during October to March.
EXTREMES, 1951-61.--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, 47 ppm July 9-12, 1961.
Specific conductance: Maximum daily, 9,270 micromhos Dec. 16, 1955; minimum daily, 317 micromhos July 5, 1961.
Water temperatures: Maximum (1951-53, 1954-61), 86°F July 26, 1959, July 28, Aug. 15, 1960; 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.

Chemical analyses, in parts per million, water year October 1960 to September 1961

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 $CaCO_3$		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. 2-9, 1960..	0.4	--	--	--	--	380	--	261	0	1,320	--	--	--	--	2,280	3.10	2.46	755	541	6.0	2,820	8.0	--
Oct. 10-19.....	1.4	8.7	0.01	193	87	461	10	283	0	1,540	63	0.3	0.1	0.25	2,650	3.60	10.0	838	606	6.9	3,210	7.6	16
Oct. 20-30.....	3.2	--	--	--	--	414	--	299	0	1,340	--	--	--	--	2,370	3.22	20.5	755	510	6.6	2,940	8.0	--
Nov. 1-17.....	7.7	--	--	--	--	410	--	316	0	1,350	--	--	--	--	2,330	3.17	48.4	763	504	6.5	2,920	8.0	--
Nov. 18-28.....	19.3	--	--	--	--	292	--	301	0	1,170	--	--	--	--	2,140	2.91	112	886	639	4.3	2,600	8.0	--
Nov. 29-Dec. 19.	14.6	--	--	--	--	402	--	452	0	1,490	--	--	--	--	2,770	3.77	109	1,080	709	5.3	3,290	7.9	--
Dec. 20-31.....	9.3	--	--	--	--	327	--	461	0	1,240	--	--	--	--	2,370	3.22	59.5	999	621	4.5	2,860	7.9	--
Jan. 1-15, 1961.	18.7	--	--	--	--	281	--	405	0	960	--	--	--	--	1,730	2.35	87.3	843	510	4.2	2,380	8.0	--
Jan. 16-31.....	17.3	--	--	--	--	302	--	465	0	1,080	--	--	--	--	1,990	2.70	93.0	990	608	4.2	2,640	8.0	--
Feb. 1-10.....	38.4	--	--	--	--	278	--	370	0	970	--	--	--	--	1,940	2.64	201	880	577	4.1	2,430	7.9	--
Feb. 11-21.....	43.2	--	--	--	--	244	--	300	0	888	--	--	--	--	1,690	2.30	197	774	527	3.8	2,180	7.9	--
Feb. 22-Mar. 3..	84.7	--	--	--	--	185	--	239	0	726	--	--	--	--	1,340	1.82	306	634	438	3.2	1,770	7.9	--
Mar. 4-13.....	312	8.1	.02	172	27	156	6.7	205	0	585	63	.4	2.3	.16	1,210	1.65	1,020	538	370	2.9	1,630	8.0	11
Mar. 14-24.....	333	--	--	--	--	202	--	233	0	686	--	--	--	--	1,340	1.82	1,200	584	392	3.6	1,840	7.6	--
Mar. 25-Apr. 12.	210	--	--	--	--	248	--	263	0	846	--	--	--	--	1,620	2.20	919	720	504	4.0	2,120	7.7	--
Apr. 13-30.....	56.8	--	--	--	--	307	--	257	0	990	--	--	--	--	1,800	2.45	276	726	516	5.0	2,370	7.9	--
May 1-18.....	42.2	11	.00	180	67	317	8.2	251	0	1,010	92	.4	.5	.19	1,970	2.68	224	723	517	5.1	2,480	8.0	7
May 19-31.....	281	--	--	--	--	238	--	265	0	898	--	--	--	--	1,770	2.41	1,340	806	589	3.6	2,250	7.7	--
June 1-19.....	274	--	--	--	--	192	--	205	0	680	--	--	--	--	1,280	1.74	947	562	394	3.5	1,730	7.9	--
June 20-28.....	34.1	--	--	--	--	348	--	205	5	1,080	--	--	--	--	1,910	2.60	176	667	491	5.9	2,490	8.4	--

June 29-July 4, 1961.....	4.6	--	--	--	--	367	--	236	0	1,280	--	--	--	--	2,170	2.95	27.0	740	546	5.9	2,730	7.9	--
July 5-8.....	3.8	9.3	.08	31	6.2	14	25	128	0	33	4.0	.5	3.4	.28	322	.44	3.30	103	0	.6	338	6.9	200
July 9-12.....	10.0	--	--	--	--	390	--	915	18	122	--	--	--	--	1,080	1.47	29.2	47	0	25	1,650	8.4	--
July 13-15.....	139	18	.00	411	140	525	12	328	0	2,110	220	.5	.8	.41	3,780	5.14	1,420	1,600	1,330	5.7	4,200	7.5	15
July 16-28.....	22.1	--	--	--	--	433	--	299	0	1,820	--	--	--	--	3,050	4.15	182	1,190	945	5.5	3,540	7.6	--
July 29-31.....	209	--	--	--	--	100	--	246	0	211	--	--	--	--	540	.73	305	194	0	3.1	806	8.1	--
Aug. 1-5.....	57.6	--	--	--	--	115	--	197	0	401	--	--	--	--	774	1.05	120	324	162	2.8	1,090	8.1	--
Aug. 6-18.....	8.8	--	--	--	--	297	--	245	0	970	--	--	--	--	1,650	2.24	39.2	577	376	5.4	2,160	7.9	--
Aug. 19-31.....	3.5	--	--	--	--	278	--	274	0	815	--	--	--	--	1,440	1.96	13.6	436	211	5.8	1,950	8.0	--
Sept. 1-3.....	1.0	--	--	167	70	357	--	296	0	1,190	--	--	--	--	2,100	2.87	5.67	706	463	5.8	2,630	8.1	--
Sept. 9-15.....	216	11	.07	34	8.8	133	5.6	233	0	200	.6	.4	7.8	.17	538	.73	314	121	0	5.3	806	7.8	80
Sept. 16-22.....	60.0	--	--	49	13	180	--	216	0	371	--	--	--	--	778	1.06	126	176	0	5.9	1,130	7.9	--
Sept. 23-30.....	49.0	--	--	221	66	320	--	260	0	1,240	--	--	--	--	2,190	2.98	290	822	609	4.9	2,640	8.1	--
Weighted average.....	--	--	--	--	--	224	--	248	0	776	--	--	--	--	1,490	2.03	326	638	439	3.9	1,960	7.8	--
Time-weighted average.....	a 79.4	--	--	--	--	296	--	301	1	1,010	--	--	--	--	1,870	--	--	733	495	5.0	2,370	7.8	--
Tons per day..	--	--	--	--	--	49.0	--	54	0	169	--	--	--	--	--	--	--	--	--	--	--	--	--

a Mean discharge based on 365 days; mean discharge for 359 days of actual flow, 80.8 cfs.

Temperature (°F) of water, water year October 1960 to September 1961

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

YELLOWSTONE RIVER BASIN--Continued

6-3295. YELLOWSTONE RIVER NEAR SIDNEY, MONT.

LOCATION.--At bridge on State Highway 23, 2 miles south of Sidney, Richland County, 4.5 miles downstream from gaging station, 2 miles downstream from Fox Creek, and 30 miles upstream from mouth.
DRAINAGE AREA (revised).--69,103 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to September 1961.
Water temperatures: January 1951 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 798 ppm May 1-17; minimum, 212 ppm June 3-27.
Hardness: Maximum, 403 ppm Feb. 1-10; minimum, 113 ppm June 3-27.
Specific conductance: Maximum daily, 1,380 micromhos Aug. 16; minimum daily, 287 micromhos June 11.
Water temperatures: Maximum, 79°F July 17, 18, Aug. 5; minimum, freezing point on many days during November to March.
EXTREMES, 1951-61.--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, 84°F July 23, 1960; 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 point.

Chemical analyses, in parts per million, water year October 1960 to September 1961

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 $CaCO_3$		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, 1960.	3,868	10	0.01	78	31	108	4.8	229	0	341	13	0.5	2.0	0.25	728	0.99	7,600	324	136	2.6	1,030	7.8	4
Oct. 14-24.....	5,212	--	--	--	--	103	--	238	0	325	--	--	--	--	713	.97	10,030	329	134	2.5	988	7.9	--
Oct. 25-Nov. 20.	4,887	--	--	--	--	93	--	232	0	308	--	--	--	--	675	.92	8,910	323	133	2.2	964	8.0	--
Nov. 21-30.....	4,584	--	--	--	--	97	--	248	0	317	--	--	--	--	716	.97	8,860	344	141	2.3	1,010	7.8	--
Dec. 1-17.....	2,953	--	--	--	--	98	--	281	0	346	--	--	--	--	779	1.06	6,210	381	151	2.2	1,100	7.9	--
Dec. 18-31.....	3,100	--	--	--	--	95	--	297	0	329	--	--	--	--	770	1.05	6,440	388	144	2.1	1,100	7.9	--
Jan. 1-15, 1961.	4,547	--	--	--	--	91	--	268	0	294	--	--	--	--	626	.85	7,690	356	136	2.1	1,010	7.6	--
Jan. 16-31.....	4,081	--	--	--	--	94	--	260	0	304	--	--	--	--	676	.92	7,450	359	146	2.2	1,020	7.7	--
Feb. 1-10.....	4,010	--	--	--	--	102	--	308	0	339	--	--	--	--	778	1.06	8,420	403	150	2.2	1,100	7.9	--
Feb. 11-28.....	5,094	--	--	--	--	82	--	222	0	263	--	--	--	--	608	.83	8,360	313	131	2.0	882	7.9	--
Mar. 1-21.....	5,750	9.7	.02	74	29	80	4.3	213	0	273	17	.5	.7	.23	620	.84	9,630	303	128	2.0	910	7.7	6
Mar. 22-31.....	4,018	--	--	--	--	104	--	203	0	332	--	--	--	--	690	.94	7,490	325	158	2.5	1,030	7.7	--
Apr. 1-18.....	3,412	--	--	--	--	110	--	204	0	354	--	--	--	--	715	.97	6,590	342	175	2.6	1,060	7.9	--
Apr. 17-30.....	2,146	--	--	--	--	135	--	208	0	408	--	--	--	--	795	1.08	4,610	350	180	3.1	1,160	7.8	--
May 1-17.....	1,723	--	--	--	--	136	--	204	0	394	--	--	--	--	798	1.08	3,710	332	165	3.3	1,150	7.8	--
May 18-26.....	5,067	--	--	--	--	111	--	195	0	331	--	--	--	--	705	.96	9,640	298	138	2.8	1,020	8.0	--
May 27-June 2...	21,680	--	--	--	--	51	--	199	0	160	--	--	--	--	426	.58	24,940	241	78	1.4	642	7.8	--
June 3-27.....	22,620	12	.01	32	8.0	23	1.6	111	0	68	3.1	.2	.5	.03	212	.29	12,950	113	22	.9	334	7.6	7
June 28-July 13.	7,516	--	--	--	--	51	--	176	0	135	--	--	--	--	344	.47	6,980	153	9	1.8	540	7.7	--
July 14-30.....	3,692	--	--	--	--	71	--	193	0	226	--	--	--	--	504	.69	5,020	231	73	2.0	746	7.4	--

July 31-Aug. 4, 1961.....	3,778	--	--	--	--	95	--	229	0	273	--	--	--	--	576	.78	5,880	240	52	2.7	870	7.8	--
Aug. 5-19.....	1,546	--	--	--	--	126	--	253	0	364	--	--	--	--	750	1.02	3,130	314	107	3.1	1,090	7.9	--
Aug. 20-31.....	1,149	--	--	--	--	116	--	226	0	347	--	--	--	--	696	.95	2,160	280	95	3.0	1,010	8.1	--
Sept. 1-12.....	2,805	--	--	--	--	119	--	216	0	349	--	--	--	--	728	.99	5,510	287	110	3.1	1,040	7.9	--
Sept. 13-23.....	10,530	13	.00	65	21	105	5.6	199	0	278	14	.4	5.8	.16	626	.85	17,800	247	84	2.9	926	7.3	8
Sept. 24-30.....	11,020	--	--	--	--	95	--	190	0	278	--	--	--	--	604	.82	17,970	237	81	2.7	872	7.9	--
Weighted average.....	--	--	--	--	--	72	--	192	0	224	--	--	--	--	515	0.70	8,180	247	89	1.9	760	7.7	--
Time-weighted average.....	5,884	--	--	--	--	93	--	220	0	292	--	--	--	--	638	--	--	298	118	2.3	931	7.7	--
Tons per day..	--	--	--	--	--	1,150	--	3,050	0	3,560	--	--	--	--	--	--	--	--	--	--	--	--	--

Temperature (°F) of water, water year October 1960 to September 1961

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

MISSOURI RIVER MAIN STEM

6-3300. 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 1961.
Water temperatures: May 1951 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 540 ppm Dec. 1-13; minimum, 245 ppm June 8-19.
Hardness: Maximum, 284 ppm Dec. 1-13; minimum, 131 ppm June 8-19.
Specific conductance: Maximum daily, 899 micromhos Feb. 8; minimum daily, 347 micromhos June 14.
Water temperatures: Maximum, 76°F Aug. 5, 6; minimum, freezing point on many days during December to March.
EXTREMES, 1950-61.--Dissolved solids: Maximum, 604 ppm Mar. 9, 1955; minimum, 199 ppm June 21-26, 1959.
Hardness: Maximum, 308 ppm Mar. 9, 1955; minimum, 115 ppm June 21-26, 1959.
Specific conductance: Maximum daily, 957 micromhos Jan. 10, 12, 1958; minimum daily, 297 micromhos Mar. 19, 1960.
Water temperatures (1959-61): Maximum, 80°F July 21, 22, 1958; 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.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Strontium (Sr)	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 $CaCO_3$		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, 1960	12380	--	0.07	--	--		66	--	212	--	--	--	--	--	512	0.70	17110	260	86	1.8	778	7.6	--
Nov. 1-30.....	12610	--	.05	--	--		62	--	215	--	--	--	--	--	493	.67	16790	263	87	1.7	753	7.8	--
Dec. 1-13.....	10220	9.2	--	72	25		66	4.2	232	222	12	0.7	0.3	0.18	540	.73	14900	284	94	1.7	807	7.5	10
Dec. 14-28.....	9767	--	.07	--	--		62	--	229	--	--	--	--	--	515	.70	13580	279	91	1.6	781	7.8	--
Dec. 29.....	9940	9.4	--	69	25		59	4.5	231	199	9.0	.7	.3	.17	504	.69	13530	275	86	1.5	757	7.8	7
Dec. 30-Jan. 23, 1961.....	12450	--	.08	--	--		60	--	222	--	--	--	--	--	516	.70	17350	275	93	1.6	763	7.6	--
Jan. 24-Feb. 1.	9314	--	.06	--	--		63	--	225	--	--	--	--	--	522	.71	13130	282	97	1.6	783	7.5	--
Feb. 2-28.....	11760	--	.04	--	--		60	--	213	--	--	--	--	--	503	.68	15970	266	91	1.6	756	7.5	--
Mar. 1-15.....	13350	--	.11	--	--		61	--	196	--	--	--	--	--	480	.65	17300	251	90	1.7	736	7.5	--
Mar. 16-31.....	15260	6.8	.08	52	26		60	4.0	188	185	14	.7	.3	.15	462	.63	19040	238	84	1.7	705	7.4	7
Apr. 1-30.....	11160	--	.07	--	--		60	--	206	--	--	--	--	--	487	.66	14670	251	82	1.7	735	7.8	--
May 1-21.....	10270	--	.05	--	--		59	--	203	--	--	--	--	--	472	.64	13090	242	76	1.7	736	7.9	--
May 22-27.....	13970	--	.04	--	--		72	--	203	--	--	--	--	--	531	.72	20030	252	86	1.7	789	7.5	--
May 28-June 7..	30560	--	.16	--	--		36	--	162	--	--	--	--	--	328	.45	27060	185	52	1.2	522	7.4	--
June 8-19.....	34130	11	.13	37	9.4		25	2.3	122	78	4.3	.4	.6	.09	245	.33	22580	131	31	1.0	376	7.3	3
June 20-30.....	24360	--	.15	--	--		31	--	132	--	--	--	--	--	280	.38	18420	146	38	1.1	434	7.5	--
July 1-15.....	20420	--	.05	--	--		41	--	186	--	--	--	--	--	356	.48	19630	194	41	1.3	549	7.4	--
July 16-31.....	14590	--	.05	--	--		46	--	187	--	--	--	--	--	405	.55	15950	218	65	1.3	625	7.4	--
Aug. 1-31.....	9243	--	.06	--	--		54	--	202	--	--	--	--	--	443	.60	11060	229	63	1.5	677	7.5	--
Sept. 1-13.....	11530	--	.04	--	--		60	--	200	--	--	--	--	--	465	.63	14480	234	70	1.7	713	7.6	--

Sept. 14-22, 1961.....	19580	12	.00	61	20		74	4.5	194	215	11	.6	2.7	.11	523	.71	27650	233	74	2.1	797	7.3	6
Sept. 23-30....	24930	--	.04	--	--		65	--	189	--	--	--	--	--	489	.67	32920	230	75	1.9	728	7.8	--
Weighted average.....	--	--	0.08	--	--		54	--	192	--	--	--	--	--	440	0.60	17000	229	72	1.5	671	7.5	--
Time-weighted average....	14270	--	0.07	--	--		57	--	201	--	--	--	--	--	464	--	--	241	77	1.6	705	7.6	--
Tons per day.	--	--	2.90	--	--		2070	--	7400	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Temperature (°F) of water, water year October 1960 to September 1961

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

MISSOURI RIVER MAIN STEM--Continued

6-3390. MISSOURI RIVER BELOW GARRISON DAM, N. DAK.

LOCATION.--Temperature recorder at gaging station, 4.3 miles north of Stanton, 5 miles upstream from Knife River, and 9 miles downstream from Garrison Dam, Mercer County.
DRAINAGE AREA.--181,400 square miles, approximately.
RECORDS AVAILABLE.--Water temperatures: June 1952 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 63°F Sept. 3, 4; minimum, 33°F on many days during December to February.
EXTREMES, 1952, 1954-61.--Water temperatures: Maximum, 76°F July 27, 28, 1954; minimum, freezing point on many days during winter months in 1955-60.

Temperature (°F) of water, water year October 1960 to September 1961
/Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph/

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

6-3575. GRAND RIVER AT SHADEHILL, S. DAK.

LOCATION.--At irrigation outlet of Shadehill Reservoir, 0.2 mile upstream from gaging station, 0.8 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 1961.
Water temperatures: August 1954 to September 1959.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 1,080 ppm Sept. 1-30; minimum, 973 ppm Oct. 1-31.
Hardness: Maximum, 140 ppm Feb. 1-28; minimum, 122 ppm Aug. 1-31.
Specific conductance: Maximum daily, 1,620 micromhos Sept. 13; minimum daily, 1,450 micromhos Nov. 1.
EXTREMES, 1954-61.--Dissolved solids (1954-58, 1959-61): Maximum, 1,090 ppm Mar. 1 to Apr. 2, 1960 (irrigation outlet); minimum, 510 ppm Mar. 27, 1956 (spillway outlet).
Hardness: Maximum, 167 ppm Apr. 4-7, 1955 (irrigation outlet); minimum, 100 ppm Mar. 31 to Apr. 3, 1959 (spillway outlet).
Specific conductance: Maximum daily, 1,630 micromhos Feb. 27, 1959 (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 ungated spillway and by a regulated irrigation outlet.

Chemical analyses, in parts per million, water year October 1960 to September 1961

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 $CaCO_3$		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, 1960.	140	--	--	--	--	291	--	430	0	--	--	--	--	--	973	1.32	368	128	0	11	1,460	8.2	--
Nov. 1-30.....	203	--	--	--	--	291	--	407	14	--	--	--	--	--	987	1.34	541	132	0	11	1,460	8.5	--
Dec. 1-31.....	18.7	2.6	0.02	27	16	287	8.2	387	15	405	4.8	0.5	0.3	0.41	1,020	1.39	51.4	134	0	11	1,500	8.4	16
Jan. 1-31, 1961.	19.4	--	--	--	--	287	--	459	0	--	--	--	--	--	1,040	1.41	54.5	137	0	11	1,530	8.2	--
Feb. 1-28.....	18.0	--	--	--	--	293	--	441	15	--	--	--	--	--	1,060	1.44	51.5	140	0	11	1,560	8.5	--
Mar. 1-28.....	19.2	2.9	.00	28	17	300	8.2	460	0	404	6.2	.5	.6	.42	1,030	1.40	53.4	138	0	11	1,540	7.9	6
Mar. 29-31.....	19.3	2.2	.00	30	14	265	8.2	441	12	334	4.5	.5	.1	.37	1,020	1.39	53.2	133	0	10	1,530	8.4	5
Apr. 1-30.....	20.2	--	--	--	--	302	--	457	0	--	--	--	--	--	1,020	1.39	55.6	135	0	11	1,530	8.1	--
May 1-31.....	31.6	--	.00	--	--	296	--	430	13	--	--	--	--	--	1,020	1.39	87.0	132	0	11	1,510	8.4	--
June 1-30.....	45.2	2.4	.01	28	15	305	8.0	442	13	408	6.1	.5	.2	.39	1,030	1.40	126	130	0	12	1,520	8.4	9
July 1-31.....	46.4	--	--	--	--	311	--	454	0	--	--	--	--	--	1,040	1.41	130	125	0	12	1,530	8.1	--
Aug. 1-31.....	47.3	--	--	--	--	308	--	442	8	--	--	--	--	--	1,060	1.44	135	122	0	12	1,550	8.3	--
Sept. 1-30.....	22.5	3.6	--	25	16	327	8.6	468	0	441	8.3	.5	1.0	.39	1,080	1.47	65.6	128	0	13	1,600	7.7	--
Weighted average.....	--	--	--	--	--	297	--	429	8	--	--	--	--	--	1,010	1.37	143	130	--	11	1,490	8.3	--
Time-weighted average.....	52.7	--	--	--	--	300	--	440	7	--	--	--	--	--	1,030	--	--	132	--	11	1,520	8.2	--
Tons per day..	--	--	--	--	--	42.0	--	61	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--

CHEYENNE RIVER BASIN

6-4005. CHEYENNE RIVER NEAR HOT SPRINGS, S. DAK.

LOCATION.--At gaging station at bridge on State Highway 87, 0.2 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 1959.
Sediment records: April 1946 to September 1961.
EXTREMES, 1960-61.--Sediment concentrations: Maximum daily, 48,800 ppm Aug. 21; minimum daily, not determined.
Sediment loads: Maximum daily, 65,200 tons July 10; minimum daily, less than 0.50 ton on many days.
EXTREMES, 1946-61.--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 on several days in 1946-47.

Suspended sediment, water year October 1960 to September 1961
/Where no concentrations are reported, loads are estimated/

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..	18	--	1	16	--	T	22	5	T
2..	18	--	1	16	8	T	22	--	T
3..	15	18	1	18	11	1	22	--	T
4..	15	14 A	1	19	9	T	24	--	T
5..	17	11	1	18	7	T	23	5	T
6..	18	10	T	18	5	T	23	5	T
7..	21	--	1	18	6	T	23	5	T
8..	26	--	1	20	--	T	23	--	T
9..	27	10 A	1	18	6	T	24	--	T
10..	26	10	1	18	6	T	24	--	T
11..	26	8 A	1	18	5	T	22	--	T
12..	25	--	T	18	--	T	21	--	T
13..	25	6	T	18	3	T	22	5	T
14..	28	4	T	18	2	T	23	5	T
15..	27	4	T	19	3	T	22	6	T
16..	26	4	T	20	4	T	22	--	T
17..	26	4	T	18	5	T	23	9 A	1
18..	25	4	T	19	5	T	24	10	1
19..	26	3	T	19	5	T	23	10 A	1
20..	25	3	T	21	5	T	23	11	1
21..	25	3	T	20	5	T	24	10 A	1
22..	24	2	T	20	4	T	24	--	1
23..	23	1	T	21	4	T	25	6	T
24..	19	1	T	20	--	T	23	5	T
25..	18	--	T	22	--	T	22	7	T
26..	18	--	T	23	--	T	23	9	1
27..	15	2	T	22	3	T	23	8	T
28..	15	2	T	22	3	T	23	6	T
29..	15	2	T	23	4	T	24	4	T
30..	15	1	T	23	5	T	23	3	T
31..	16	4	T	--	--	--	23	2	T
Total	663	--	14	583	--	8	712	--	15

T Less than 0.50 ton.
A Computed from partly estimated concentration graph.

6-4005. CHEYENNE RIVER NEAR HOT SPRINGS, S. DAK.--Continued

Suspended sediment, water year October 1960 to September 1961--Continued
(Where no concentrations are reported, loads are estimated)

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	21	5		T	23	9	A	1	36	--		17
2	21	7		T	22	9		1	43	150		17
3	21	10		1	23	10	A	1	45	--		17
4	21	7		T	22	--		1	38	170		17
5	21	5		T	22	10	A	1	38	--		18
6	21	2		T	21	11		1	34	--		14
7	21	3		T	20	10	A	1	40	120	A	13
8	21	3		T	20	--		T	36	100	A	10
9	21	4		T	20	8		T	33	--		8
10	21	4		T	21	7		T	33	48	A	4
11	21	--		T	20	9		T	33	34	A	3
12	21	3		T	20	--		1	36	34		3
13	21	3		T	20	12	A	1	34	20	A	2
14	21	5		T	20	14		1	29	8		1
15	21	7		T	20	11	A	1	30	10	A	1
16	21	9		1	20	8		T	28	--		T
17	21	7		T	20	7		T	27	6		T
18	21	6		T	20	5		T	27	6		T
19	21	4		T	20	4		T	26	6		T
20	21	4		T	20	4		T	27	--		T
21	21	--		T	21	--		T	37	--		5
22	21	--		T	21	--		T	43	90		10
23	21	6		T	20	--		T	30	--		4
24	22	6		T	25	--		3	24	--		1
25	22	6		T	33	--		13	21	--		1
26	22	7		T	34	--		14	20	10	A	1
27	22	7		T	33	200	A	18	20	7		T
28	22	7		T	36	180		17	20	10	A	1
29	22	--		T	--	--		--	21	20		1
30	23	--		T	--	--		--	22	10	A	1
31	23	--		T	--	--		--	22	4		T
Total	661	--		11	637	--		80	953	--		173

	APRIL				MAY				JUNE			
1	23	10	A	1	19	8		T	14	--		T
2	23	--		1	15	9		T	14	--		T
3	22	--		1	16	10		T	16	10		T
4	20	10	A	1	20	8		T	17	9		T
5	17	11		1	22	--		T	18	10		T
6	17	10		T	20	--		T	17	10		T
7	17	--		T	16	4		T	18	11		1
8	17	10		T	14	2		T	17	9		T
9	20	11		1	14	2		T	16	7		T
10	20	10	A	1	14	3		T	16	10		T
11	21	--		T	14	3		T	19	--		1
12	22	--		T	12	3		T	22	--		2
13	21	--		T	10	--		T	26	31		2
14	28	--		T	10	--		T	143	8230	S	5490
15	30	4		T	10	4		T	209	18300	S	13600
16	27	4		T	12	4		T	91	14900	S	4340
17	22	5		T	21	--		10	31	1100		90
18	20	--		T	35	1000	J	108	18	270		13
19	28	--		1	27	820		60	16	230		10
20	34	--		1	18	60		3	20	200		11
21	42	6		1	19	45		2	21	180		10
22	36	5		T	14	--		1	23	180		11
23	26	--		T	14	--		1	22	160		10
24	22	3		T	29	24		2	24	140	A	9
25	22	3		T	28	20		2	28	120		9
26	20	3		T	18	20	A	1	30	130		11
27	20	3		T	13	20	A	1	30	140	A	11
28	19	2		T	12	24		1	30	130		11
29	19	4		T	13	20	A	1	30	110		9
30	19	7		T	13	15	A	1	30	100	A	8
31	--	--		--	12	10		T	--	--		--
Total	694	--		16	524	--		198	1026	--		23663

S Computed by subdividing day.
T Less than 0.50 ton.
A Computed from partly estimated concentration graph.
J Computed from partly estimated concentration graph and subdividing day.

CHEYENNE RIVER BASIN--Continued

6-4005. CHEYENNE RIVER NEAR HOT SPRINGS, S. DAK.--Continued

Suspended sediment, water year October 1960 to September 1961--Continued
(Where no concentrations are reported, loads are estimated)

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..	38	--	14	19	130	7	10	65 A	2
2..	40	86	9	125	37400 S	17500	10	38 A	1
3..	47	90 A	11	110	30000 S	9970	10	15	T
4..	50	100	14	83	18000	4030	10	15	T
5..	52	100 A	14	51	10000	1380	12	--	1
6..	52	93	13	27	460	34	12	--	1
7..	54	110	16	20	320 A	17	14	--	1
8..	49	130 A	17	16	--	10	14	--	1
9..	430	11100 S	25500	15	170 A	7	14	20 A	1
10..	849	26400 S	65200	14	120	4	14	21	1
11..	422	23200	26400	14	100 A	4	15	22 A	1
12..	281	17200	13000	14	--	4	16	26	1
13..	148	9200	3700	14	--	4	16	26 A	1
14..	59	2600	410	27	7400 J	2400	16	26 A	1
15..	37	340	34	99	41100	11400	15	24	1
16..	22	260 A	15	54	9500	1390	15	22 A	1
17..	20	190	10	30	1200	97	14	20	1
18..	13	180 A	6	12	--	13	15	17 A	1
19..	10	210	6	12	--	5	16	15 A	1
20..	9	230 A	6	67	7400 J	10000	14	12	T
21..	9	190 A	5	376	48800 S	56000	13	11	T
22..	12	130	4	135	26100	9510	20	18 A	1
23..	13	100 A	4	66	15900 S	2990	20	--	1
24..	12	80 A	3	30	3900	320	20	20 A	1
25..	11	70 A	2	17	430	20	21	15	1
26..	10	60	2	12	170 A	6	22	16 A	1
27..	10	50 A	1	12	100 A	9	22	20	1
28..	10	60	2	10	87	2	21	17 A	1
29..	9	70 A	2	10	83 A	2	20	12	1
30..	32	2060 S	980	9	80 A	2	21	12 A	1
31..	45	1880 S	290	9	76	2	--	--	--
Total	2855	--	135690	1509	--	127139	472	--	29

Total discharge for year (cfs-days)..... 11289
Total load for year (tons)..... 287036

S Computed by subdividing day.
T Less than 0.50 ton.
A Computed from partly estimated concentration graph.
J Computed from partly estimated concentration graph and subdividing day.

CHEYENNE RIVER BASIN--Continued

6-4005. CHEYENNE RIVER NEAR BOT SPRINGS, S. DAK.--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
June 14, 1961	0815	--		394	14600		54	66	83	94	98	100						VPWC
June 14	1450	59		206	14300		49	68	87	98	99	100						VPWC
June 14	1930	--		118	7570		53	72	90	98	98	100						VPWC
June 15	1000	60		341	17000		48	62	81	94	98	100						VPWC
June 15	1800	68		277	28500		47	55	63	74	90	100						VPWC
June 16	1800	58		58	8300		74	88	98	99	100	--						PWC
July 9	1800	--		1020	20900		59	73	88	96	98	100						VPWC
July 10	1950	72		922	35300		66	80	92	98	99	100						VPWC
July 11	1230	71		687	30600		64	79	91	96	98	98	100					VPWC
July 14	1310	79		56	2160		76	92	96	98	--	100						VPWC
Aug. 2	1730	84		224	62500		53	73	90	97	98	100						VPWC
Aug. 3	0930	75		115	33400		73	86	96	99	100	--						PWC
Aug. 5	1930	77		40	4490		81	94	96	96	98	100						VPWC
Aug. 21	0645	70		455	54500		62	77	92	98	99	100						VPWC
Aug. 22	0730	64		133	26000		74	85	97	99	--	100						VPWC
Aug. 23	0730	62		75	18200		79	93	99	--	100	--						PWC

CHEYENNE RIVER BASIN--Continued

6-4015. CHEYENNE RIVER BELOW ANGOSTURA DAM, S. DAK.

LOCATION.--At outlet to powerplant downstream from Angostura Dam, 800 feet upstream from gaging station, 4.8 miles upstream from Fall River, and 6.5 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 1961.

Monthly and annual summary of water and suspended-sediment discharge, water year October 1960 to September 1961
/Suspended-sediment load based on infrequent samples/

Month	Discharge (cfs-days)	Runoff (acre-feet)	Suspended sediment					
			Load (tons)	Daily load (tons)			Concentration (ppm)	
				Mean	Maximum	Minimum	Weighted mean	Maximum observed
October 1960	25.1	50	0.4	0.01			6	
November	23.8	47	.3	.01			5	
December	23.4	46	.4	.01			6	
January 1961	25.9	51	1.4	.05			20	
February	23.3	46	1.2	.04			19	
March	27.2	54	1.0	.03			14	
April	28.9	57	.3	.01			4	
May	24.1	48	.4	.01			6	
June	28.9	57	1.8	.06			23	
July	27.5	55	.9	.03			12	
August	21.8	43	.4	.01			7	
September	23.6	47	.4	.01			6	
Water year	303.5	601	8.9	0.02			11	

6-4380. BELLE FOURCHE RIVER NEAR ELM SPRINGS, S. DAK.

LOCATION.--At gaging station at highway bridge, 4.2 miles northwest of Elm Springs, Meade County, and 5.5 miles downstream from Hay Creek.
DRAINAGE AREA.--7,210 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to September 1951, July 1956 to September 1961.

Chemical analyses, in parts per million, water year October 1960 to September 1961

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)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 28, 1960	23.8	2.9		0.03	0.08	278	135	219	19	187	0	1,430	28	0.6	8.6	0.46	2,370	1,250	1,100	2.7	2,580	7.7	--
Dec. 9.....	2.8	--		--	--	--	--	399	--	350	0	--	--	--	--	--	4,020	2,010	1,720	3.9	4,110	7.7	--
Jan. 3, 1961.	19.7	--		--	--	412	188	291	--	384	0	--	--	--	11	--	3,430	1,800	1,490	3.0	3,520	7.7	--
Jan. 30.....	3.7	--		--	--	537	246	426	--	473	0	--	--	--	15	--	4,630	2,350	1,960	3.8	4,580	7.5	--
Mar. 6.....	74.0	4.1		.01	.59	204	105	168	14	188	0	1,040	30	.4	12	.24	1,830	942	788	2.4	2,100	7.2	--
Apr. 6.....	16.6	3.0		.03	--	324	117	215	22	204	0	1,550	40	.8	12	.40	2,610	1,290	1,120	2.6	2,810	7.7	--
May 3.....	12.4	.7		.07	.29	249	136	217	22	160	0	1,390	39	.6	8.4	.44	2,430	1,180	1,050	2.7	2,640	7.6	--
June 27.....	30.0	5.6		.02	--	147	73	212	23	101	0	970	31	.7	8.5	.30	1,720	667	584	3.6	2,100	7.2	5
July 28.....	6.3	14		.09	.11	146	31	115	18	35	0	673	6.0	.3	5.6	.27	1,090	490	461	2.3	1,350	6.5	--
Sept. 29 a...	13.6	.8		--	--	281	141	234	27	104	0	1,440	44	.6	.2	.42	2,620	1,280	1,200	2.8	2,830	7.0	20

a Also copper (Cu), 0.01 ppm; lead (Pb), 0.00 ppm; zinc (Zn), 0.00 ppm; arsenic (As), 0.00 ppm; selenium (Se), 0.00 ppm; cyanides as CN, 0.00 ppm.

NIOBRARA RIVER BASIN

6-4655. NIOBRARA RIVER NEAR VERDEL, NEBR.

LOCATION.--Temperature recorder at gaging station at Pishelville bridge, 6 miles south of Verdel, Knox County, and 7 miles upstream from Verdigre Creek.
DRAINAGE AREA.--10,900 square miles, approximately.
RECORDS AVAILABLE.--Water temperatures: June 1958 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 98°F June 30; minimum, freezing point on many days during November to March.
EXTREMES, 1958-61.--Water temperatures: Maximum, 99°F July 11, 1960; minimum, freezing point on many days during winter months each year.

Temperature (°F) of water, water year October 1960 to September 1961
/Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph/

Month	Day																													Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
October																																
Maximum	62	65	64	68	68	66	64	65	65	67	70	69	65	61	61	61	63	59	51	53	57	57	60	56	59	56	56	52	51	49	46	60
Minimum	50	51	52	55	57	54	53	53	48	56	56	61	55	54	55	50	53	49	43	41	45	49	48	47	50	35	44	44	47	43	41	50
November																																
Maximum	47	46	44	43	43	42	41	40	34	32	38	43	43	46	46	42	43	39	41	41	44	41	39	43	46	47	41	35	34	34	--	41
Minimum	40	44	38	41	38	38	36	34	32	32	32	37	38	39	41	37	38	35	38	35	36	37	35	37	38	41	35	33	33	33	--	37
December																																
Maximum	33	32	32	32	32	32	33	33	33	33	33	33	33	32	33	33	33	34	34	35	36	35	35	34	33	34	33	33	33	32	33	33
Minimum	32	32	32	32	32	32	32	32	32	32	33	33	32	32	32	33	32	33	34	34	35	35	34	32	33	33	32	32	32	32	32	32
January																																
Maximum	35	36	36	35	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	35	35	35	35	36	36	36	36	35	35	35	34	35
Minimum	33	35	34	33	33	32	34	34	33	34	33	32	34	34	34	33	33	33	34	34	34	34	34	35	35	35	34	35	34	34	33	34
February																																
Maximum	34	34	35	34	35	34	34	36	36	36	34	34	34	34	34	34	35	35	36	34	34	34	34	34	34	34	34	34	--	--	--	34
Minimum	34	34	34	34	34	34	34	34	34	34	33	33	33	33	33	32	34	35	33	32	32	33	33	34	33	33	33	33	--	--	--	33
March																																
Maximum	34	34	34	34	33	33	32	32	32	33	36	34	42	43	41	45	46	45	42	41	40	41	52	53	59	53	44	39	50	53	50	41
Minimum	33	33	34	33	33	32	32	32	32	32	33	33	34	35	39	36	38	40	41	38	38	38	39	41	45	44	37	35	34	38	40	36
April																																
Maximum	49	51	55	55	48	46	54	45	44	56	48	54	53	49	45	45	52	59	68	64	55	66	65	56	59	62	59	58	61	62	--	55
Minimum	39	39	41	41	38	39	38	41	40	39	39	37	42	39	35	35	35	40	49	54	50	46	52	47	44	44	45	42	46	51	--	42
May																																
Maximum	64	65	54	48	47	64	62	58	67	72	77	79	63	62	67	58	55	56	60	59	65	68	71	71	71	73	72	80	76	68	86	66
Minimum	47	47	48	46	45	47	54	51	47	52	57	62	55	52	48	53	52	51	51	54	55	57	56	56	60	54	56	59	63	60	61	53
June																																
Maximum	80	80	77	75	78	73	78	85	88	87	86	93	83	76	72	72	79	87	77	83	86	76	80	84	86	85	90	90	94	98	--	83
Minimum	67	65	60	62	64	66	66	64	67	68	68	69	73	61	59	61	61	65	67	61	65	65	61	63	64	65	69	74	74	76	--	66
July																																
Maximum	85	89	86	90	83	83	87	88	89	88	85	87	80	87	89	92	89	94	83	89	88	86	85	91	91	94	83	88	89	82	80	87
Minimum	74	68	70	65	70	70	67	68	69	67	69	67	67	66	68	68	70	70	68	68	71	69	65	68	73	74	73	70	73	74	73	69
August																																
Maximum	87	95	93	95	90	89	94	91	92	83	82	87	91	90	90	85	86	76	87	86	74	81	86	84	89	86	88	89	88	86	90	87
Minimum	71	71	74	71	71	68	67	73	72	69	67	68	69	72	71	70	73	73	68	67	66	64	65	66	67	68	72	69	73	69	70	69
September																																
Maximum	86	81	71	66	66	81	83	84	84	81	67	62	58	62	68	70	74	77	64	59	64	60	56	59	63	69	62	61	66	53	--	68
Minimum	70	63	57	62	58	57	63	67	70	67	61	58	50	46	49	53	58	61	59	55	53	54	52	50	47	51	53	48	51	45	--	56

6-4690. JAMESTOWN RESERVOIR NEAR JAMESTOWN, N. DAK.

LOCATION.--At gaging station, 800 feet north of glory hole on west end of Jamestown Dam on James River, 1.9 miles north of Jamestown Post Office, Stutsman County, and 4 miles upstream from Pipestem Creek.
DRAINAGE AREA.--1,670 square miles, approximately, of which about 460 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: October 1959 to September 1961.

Chemical analyses, in parts per million, water year October 1960 to September 1961

Date of collection	Lake content (acre-feet)	Silica (SiO_2)	Aluminum (Al)	Iron (Fe)	Manganese (Mn)	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 $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 3, 1960.	26,540	11		0.02	1.6	50	30	95	17	393	0	106	30	0.3	0.3	0.19	558	248	0	2.6	865	7.5	21
Nov. 9.....	25,830	4.3		.03	.03	49	31	97	18	397	0	108	31	.2	.4	.19	568	250	0	2.7	886	7.5	21
Jan. 28, 1961	25,410	30		.05	.80	60	43	118	5.5	496	0	124	41	.3	2.7	.32	698	328	0	2.8	1,070	8.1	4
Mar. 3.....	25,360	1.7		.00	.00	22	14	47	9.2	180	0	54	16	.2	.2	.11	276	111	0	1.9	445	7.0	11
Apr. 14.....	25,640	9.1		.03	1.8	46	39	103	17	439	0	115	33	.3	.1	.13	620	277	0	2.7	935	8.1	13
Apr. 24.....	25,680	6.7		.11	1.3	55	29	100	17	408	0	106	31	.3	.9	.16	579	258	0	2.7	911	7.3	10
May 26.....	25,210	4.4		.08	.19	53	30	100	16	409	0	109	32	.3	.4	.17	578	254	0	2.7	888	8.2	7
June 27.....	23,980	5.7		.05	1.0	53	30	100	18	415	0	110	32	.3	1.6	.18	589	257	0	2.7	901	7.9	15
July 12.....	23,460	1.6		.02	1.3	52	31	100	17	412	0	109	31	.3	.1	.18	580	257	0	2.7	916	7.4	10
July 24.....	23,550	1.5		.09	1.3	48	33	104	18	405	0	111	31	.3	7.0	.19	584	254	0	2.8	908	7.5	18
Aug. 28.....	23,030	6.3		.07	1.9	49	30	102	19	408	0	116	32	.4	1.1	.18	592	246	0	2.8	909	7.5	15
Sept. 15.....	22,830	9.2		.03	1.3	45	32	102	18	413	0	109	23	.3	.0	.21	573	245	0	2.8	890	7.2	3
Sept. 18 a...	22,780	9.8		.03	1.5	51	30	100	19	412	0	107	32	.2	.4	.23	600	250	0	2.8	895	7.8	--

a Also nitrite (NO_2), 0.02 ppm.

JAMES RIVER BASIN--Continued

6-4705. JAMES RIVER AT LA MOURE, N. DAK.

LOCATION.--At gaging station, downstream from bridge on State Highway 13, 0.5 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 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 85°F June 9.
EXTREMES, 1953-61.--Water temperatures: Maximum, 91°F July 12, 13, 1957; minimum, freezing point on many days during winter months.

Chemical analyses, in parts per million, water year October 1960 to September 1961

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)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 4, 1960.	2.3	25		0.07	--	61	36	119	12	376	0	173	67	0.3	0.7	0.45	677	300	0	3.0	1,060	7.7	17
Mar. 17, 1961	46	16		.03	0.00	59	22	69	7.6	282	0	116	33	.3	.1	.24	498	237	6	2.0	744	7.5	--
Apr. 13.....	28	6.8		.03	.01	59	20	63	6.0	252	0	116	31	.3	.1	.21	457	228	21	1.8	702	7.4	--
July 7.....	2.3	25		.03	.34	73	40	131	10	442	0	178	74	.5	.3	.44	760	346	0	3.1	1,170	7.6	15
Sept. 18 a...	11	15		.01	.00	67	33	132	11	410	0	156	83	.3	.3	.55	716	304	0	3.3	1,120	8.0	--

a Also Nitrite (NO_2), 0.00 ppm.

6-4705. JAMES RIVER AT LA MOURE, N. DAK.--Continued

Temperature (°F) of water, water year October 1960 to September 1961
(Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph)

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

JAMES RIVER BASIN--Continued

6-4710. JAMES RIVER AT COLUMBIA, S. DAK.

LOCATION.--At bridge on county road, 3.5 miles north of Columbia, Brown County, about 5 miles upstream from gaging station, and 0.1 mile downstream from Columbia Road Reservoir.
DRAINAGE AREA.--7,050 square miles, approximately, upstream from gaging station.
RECORDS AVAILABLE.--Chemical analyses: October 1951 to September 1952, November 1954 to September 1961.
REMARKS.--No flow on many days.

Chemical analyses, in parts per million, water year October 1960 to September 1961

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)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Dec. 8, 1960.	2.0	--		--		129	72	149	--	635	0	323	69	--	--	--	1,150	616	95	2.6	1,640	7.6	--
Jan. 5, 1961.	.3	29		0.02		182	111	206	24	919	0	475	103	0.6	1.8	0.62	1,660	910	156	3.0	2,310	7.8	29
Mar. 14.....	7.4	11		.22		52	26	49	7.3	185	0	146	34	.2	.2	.07	444	238	86	1.4	681	7.1	8
Apr. 13.....	1.8	2.1		.02	0.02	128	58	168	18	530	0	390	91	.4	.8	.42	1,160	559	124	3.1	1,680	8.0	18
May 3.....	.5	--		--		118	76	193	--	559	0	414	107	--	--	--	1,270	608	150	3.4	1,830	7.5	--
May 26.....	6.6	--		--		95	57	136	--	450	0	294	76	--	--	--	965	472	103	2.7	1,400	7.7	30
June 13.....	.5	--		--		91	54	131	--	520	0	226	66	--	--	--	928	450	24	2.7	1,370	7.6	33

6-4760. JAMES RIVER AT HURON, S. DAK.

LOCATION.--Just upstream from Chicago and North Western Railway Co. 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: April 1950 to September 1951, August 1956 to September 1961.
Water temperatures: August 1956 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 1,790 ppm Feb. 28 to Mar. 1; minimum, 200 ppm Mar. 4-5.
Hardness: Maximum, 892 ppm Feb. 28 to Mar. 1; minimum, 96 ppm Mar. 4-5.
Specific conductance: Maximum daily, 2,400 micrombos Feb. 28; minimum daily, 281 micromhos Mar. 5.
Water temperatures: Maximum, 83°F June 30; minimum, freezing point on many days during November to March.
EXTREMES, 1956-61.--Dissolved solids (1956-58, 1959-61): Maximum, 1,790 ppm Feb. 28 to Mar. 1, 1961; minimum, 147 ppm Apr. 5-7, 1960.
Hardness: Maximum, 892 ppm Feb. 28 to Mar. 1, 1961; minimum, 63 ppm Apr. 1-4, 1960.
Specific conductance: Maximum daily, 2,640 micrombos Mar. 1, 1959; minimum daily, 176 micrombos Mar. 30, Apr. 2, 1960.
Water temperatures: Maximum, 83°F July 17, 1957, June 30, 1961; minimum, freezing point on many days during winter months.
REMARKS.--Records of specific conductance of daily samples available in district office at Lincoln, Nebr. During some periods, all flow is diverted from the channel near the sampling site and, therefore, does not pass the gaging station.

Chemical analyses, in parts per million, water year October 1960 to September 1961

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 $CaCO_3$		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, 1960a	--	--	0.05	--	--	100	--	357	0	191	--	--	--	--	682	0.93	--	328	35	2.4	1,050	7.5	21
Nov. 1-30 a.....	--	--	.04	--	--	108	--	373	0	211	--	--	--	--	727	.99	--	348	42	2.5	1,110	7.6	24
Dec. 1-13 a.....	--	--	.03	--	--	119	--	411	0	241	--	--	--	--	819	1.11	--	389	52	2.6	1,220	7.8	21
Dec. 14-31 a....	--	16	.04	98	50	132	22	461	0	276	73	0.3	1.7	0.47	918	1.25	--	451	73	2.7	1,360	7.8	23
Jan. 1-18, 1961a	--	--	.04	--	--	142	--	478	0	299	--	--	--	--	978	1.33	--	477	85	2.8	1,440	7.9	--
Jan. 19-28 a....	--	--	.05	--	--	160	--	506	0	378	--	--	--	--	1,120	1.52	--	552	137	3.0	1,620	7.7	--
Jan. 29-Feb. 27a	--	--	.06	--	--	210	--	610	0	540	--	--	--	--	1,530	2.08	--	750	250	3.3	2,080	7.6	--
Feb. 28-Mar. 1..	12.5	--	--	--	--	240	--	691	0	650	--	--	--	--	1,790	2.43	60.4	892	325	3.5	2,370	8.0	--
Mar. 2.....	193	--	--	--	--	217	--	689	0	650	--	--	--	--	1,720	2.34	896	876	311	3.2	2,300	8.1	--
Mar. 3.....	244	16	--	95	44	110	16	308	0	332	47	.3	10	.35	860	1.17	567	416	163	2.4	1,240	8.0	7
Mar. 4-5.....	219	--	--	--	--	17	--	80	0	67	--	--	--	--	200	.27	118	96	30	.8	319	7.6	--
Mar. 6-8.....	101	--	--	--	--	19	--	85	0	74	--	--	--	--	220	.30	60.0	106	36	.8	341	7.3	--
Mar. 9-13.....	59.0	--	.11	--	--	49	--	175	0	162	--	--	--	--	442	.60	70.4	226	82	1.4	678	7.4	--
Mar. 14-23, 26-31.....	54.3	13	.07	68	40	86	12	273	0	239	37	.3	1.8	.27	666	.91	97.6	335	111	2.0	991	7.7	8
Apr. 1-6, 10-11, 14-16.....	23.2	--	.03	--	--	101	--	288	0	210	--	--	--	--	648	.88	40.6	297	61	2.6	1,010	7.8	--

a Not included in weighted average.

JAMES RIVER BASIN--Continued

6-4760. JAMES RIVER AT HURON, S. DAK.--Continued

Chemical analyses, in parts per million, water year October 1960 to September 1961--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 $CaCO_3$		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. 26-30, 1961	4.5	--	0.04	--	--	116	--	297	0	244	--	--	--	--	717	0.98	8.71	312	68	2.9	1,100	7.8	--
May 1-7 a	--	--	.04	--	--	126	--	305	0	267	--	--	--	--	762	1.04	--	326	76	3.0	1,160	7.5	--
May 8	29	--	--	--	--	129	--	306	0	278	--	--	--	--	784	1.07	61.4	330	79	3.1	1,180	8.0	--
May 12	11	--	--	--	--	135	--	309	0	295	--	--	--	--	809	1.10	24.0	342	89	3.2	1,220	7.5	--
May 13-15, 17-18	25.6	--	.03	--	--	146	--	310	0	328	--	--	--	--	873	1.19	60.8	358	104	3.3	1,310	7.4	--
May 19-31	42.5	--	.04	--	--	175	--	323	0	406	--	--	--	--	1,020	1.39	117	407	142	3.8	1,490	7.8	--
June 1-24	26.0	11	0.07	84	42	142	15	326	0	333	70	0.2	0.5	0.44	939	1.28	65.9	383	116	3.1	1,300	7.6	8
June 25	.8	--	.03	81	40	150	--	348	0	294	84	.3	--	--	881	1.20	1.90	366	83	3.4	1,330	7.6	--
July 1-31 a	--	--	.03	71	40	165	--	341	0	296	92	.3	--	--	900	1.22	--	343	63	3.9	1,360	7.7	--
Aug. 1-31 a	--	--	.06	--	--	200	--	307	0	304	--	--	--	--	963	1.31	--	286	34	5.2	1,480	7.3	--
Sept. 1-30 a	--	11	.05	43	49	269	22	332	0	374	165	.5	2.5	.92	1,160	1.58	--	307	35	6.7	1,770	7.3	25
Weighted average	b 10.9	--	0.06	--	--	104	--	273	0	269	--	--	--	--	733	1.00	87	334	110	2.3	1,060	7.6	--
Tons per day	--	--	0.01	--	--	12.0	--	32	0	32.0	--	--	--	--	--	--	--	--	--	--	--	--	--

a Not included in weighted average.
b Mean discharge based on 365 days; mean discharge for 91 days of actual flow, 43.9 cfs.

JAMES RIVER BASIN--Continued

6-4760. JAMES RIVER AT HURON, S. DAK.--Continued

Temperature (°F) of water, water year October 1960 to September 1961

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

JAMES RIVER BASIN--Continued

6-4785. 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 1961.
Water temperatures: January 1953 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 84°F July 26, 27; minimum, freezing point on many days during December to March.
EXTREMES, 1953-61.--Water temperatures: Maximum, 90°F Aug. 1, 2, 1957; minimum, freezing point on many days during winter months.

Chemical analyses, in parts per million, water year October 1960 to September 1961

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)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 14, 1960	14	--		--	--	--	--	135	--	330	0	--	--	--	--	--	1,210	644	373	2.3	1,610	7.9	--
Oct. 31.....	19	--		--	--	160	77	135	--	361	0	594	71	--	--	--	1,310	716	420	2.2	1,710	8.0	--
Nov. 22.....	20	--		--	--	--	--	133	--	368	0	--	--	--	--	--	1,440	813	511	2.0	1,830	7.8	--
Dec. 14.....	29	--		--	--	210	85	147	--	374	0	752	69	--	--	--	1,610	872	565	2.2	1,960	7.5	--
Jan. 6, 1961.	23	--		--	--	248	83	150	--	351	0	--	--	--	2.4	--	1,760	959	671	2.1	2,280	7.5	--
Jan. 24.....	19	--		--	--	282	87	165	--	452	0	895	105	--	15	--	1,930	1,060	689	2.2	2,460	7.4	--
Mar. 7.....	340	8.6		0.19	--	48	14	33	13	114	0	130	25	0.3	7.9	0.15	360	178	85	1.1	550	7.0	55
Mar. 28.....	202	7.9		.21	--	88	31	52	15	180	0	284	26	.2	4.1	.24	618	345	197	1.2	884	7.2	28
Apr. 9.....	72	6.3		.05	1.6	125	44	86	14	240	0	408	43	.3	1.6	.30	903	492	295	1.7	1,220	7.4	8
May 9.....	72	--		--	--	175	60	130	--	299	0	630	57	--	--	--	1,310	684	439	2.2	1,660	7.7	--
June 5.....	94	--		--	--	128	49	139	--	281	0	436	80	--	--	--	1,080	520	290	2.7	1,520	7.5	10
June 26.....	202	--		--	--	89	27	50	--	205	0	237	22	--	--	--	599	334	166	1.2	859	7.2	23
July 5.....	74	13		.04	.75	120	46	123	16	308	0	413	64	.4	.8	.43	990	489	236	2.4	1,480	7.4	--
Aug. 16.....	15	--		--	--	143	58	139	--	313	0	538	53	--	--	--	1,200	595	338	2.5	1,570	7.6	--
Sept. 5.....	9	20		.08	1.3	140	55	135	18	322	0	524	56	.5	4.8	.61	1,150	576	312	2.4	1,520	7.4	8
Sept. 14.....	8	17		.04	--	151	58	128	20	311	0	558	52	.5	1.2	.58	1,190	614	359	2.2	1,560	7.3	10
Sept. 28.....	8	--		--	--	--	--	113	--	296	0	--	--	--	--	--	1,070	548	305	2.1	1,390	7.0	--

6-4785. JAMES RIVER NEAR SCOTLAND, S. DAK.--Continued

Temperature (°F) of water, water year October 1960 to September 1961
/Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph/

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

LITTLE SIOUX RIVER BASIN

6-6066. LITTLE SIOUX RIVER AT CORRECTIONVILLE, IOWA

LOCATION.--At gaging station at bridge on State Highway 31, 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 1961.
Sediment records: May 1950 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 82°F July 1, 31; minimum, freezing point on many days during December to March.
Sediment concentrations: Maximum daily, 7,800 ppm June 27; minimum daily, 10 ppm Jan. 10.
Sediment loads: Maximum daily, 64,600 tons Aug. 9; minimum daily, 2 tons Feb. 1-3.
EXTREMES, 1950-61.--Water temperatures (1951-61): 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 (1958-61), 6 ppm Mar. 11, 1960.
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, 12,700 ppm June 27. Flow affected by ice Nov. 30 to Dec. 2, Dec. 6 to Mar. 3.

Temperature (°F) of water, water year October 1960 to September 1961

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

6-6066. LITTLE SIOUX RIVER AT CORRECTIONVILLE, IOWA--Continued

Suspended sediment, water year October 1960 to September 1961
/Where no concentrations are reported, loads are estimated/

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	760	350	718	266	29	21	150	24	10
2	700	300	567	266	30	22	180	22	11
3	657	255	452	266	32	23	218	21	12
4	605	230	376	266	28	20	248	33	22
5	579	205	320	266	24	17	293	45	36
6	540	195	284	266	24	17	180	32	16
7	518	170	238	266	23	17	130	19	7
8	485	160	210	266	24	17	140	18	7
9	463	140	175	257	24	17	160	16	7
10	430	130	151	240	22	14	170	20	9
11	420	120	136	248	20	13	190	23	12
12	400	120	130	257	24	17	200	23	12
13	380	105	108	240	27	17	200	23	12
14	360	99	96	240	25	16	195	22	12
15	350	87	82	257	23	16	190	22	11
16	330	79	70	248	21	14	180	24	12
17	330	72	64	240	19	12	170	26	12
18	311	67	56	240	20	13	160	24	10
19	302	57	46	240	22	14	150	23	9
20	293	35	28	232	22	14	140	24	9
21	293	40	32	232	22	14	130	24	8
22	284	38	29	223	19	11	120	26	8
23	284	50	38	220	16	10	110	28	8
24	275	44	33	220	16	10	110	22	7
25	266	45	32	221	17	10	110	16	5
26	240	46	30	218	22	13	110	18	5
27	257	44	31	218	28	16	110	19	6
28	248	42	28	240	28	18	110	16	5
29	275	46	34	220	27	16	110	14	4
30	302	49	40	130	27	9	115	19	6
31	284	39	30	--	--	--	120	24	8
Total	12221	--	4664	7209	--	458	4899	--	318

	JANUARY			FEBRUARY			MARCH		
1	120	25	8	60	15	2	800	640	1380
2	120	26	8	60	14	2	1500	1170	4740
3	120	20	6	56	14	2	2000	1600	8640
4	120	13	4	56	22	3	3490	1090	10300
5	120	14	5	56	31	5	3060	560	4630
6	120	15	5	56	38	6	1510	280	938
7	120	18	6	56	44	7	1400	350	1320
8	120	22	7	56	32	5	1400	520	1970
9	120	16	5	56	20	3	1510	350	1430
10	120	10	3	56	21	3	1620	750	3280
11	120	--	4	56	22	3	1660	500	2240
12	120	--	4	56	22	3	1470	670	2660
13	120	--	5	60	140 A	23	1190	450	1450
14	120	--	5	90	180	44	1570	775 S	4400
15	120	--	6	150	165	67	2450	2390 A	15800
16	120	--	6	200	120	65	2280	1990 A	12300
17	120	--	7	180	74	36	2490	2250 A	15100
18	120	--	7	150	77	31	2920	2770	21800
19	120	--	8	130	--	30	2510	1860	12600
20	110	30	9	120	--	30	2410	1580	10300
21	100	29	8	110	--	30	2320	1350	8460
22	90	29	7	140	220 A	83	2650	1820	13000
23	80	28	6	150	150 A	61	3430	2720	25200
24	75	27	5	150	80	32	4270	2470	28500
25	70	28	5	150	40	16	5230	1610	22700
26	65	30	5	150	120 A	49	6540	1090	19200
27	60	28	5	250	280 A	189	7810	770	16200
28	60	28	5	500	530	716	10800	820	23900
29	60	26	4	--	--	--	15600	500	21100
30	60	24	4	--	--	--	11600	400	12500
31	60	20	3	--	--	--	8760	360	8510
Total	3170	--	175	3360	--	1546	118250	--	336548

S Computed by subdividing day.
A Computed from partly estimated concentration graph.

LITTLE SIOUX RIVER BASIN--Continued

6-6066. LITTLE SIOUX RIVER AT CORRECTIONVILLE, IOWA--Continued

Suspended sediment, water year October 1960 to September 1961--Continued
(Where no concentrations are reported, loads are estimated)

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	7240	275	5380	826	180	401	1040	2700	A 7580
2	5800	390	6110	796	190	408	820	2300	5090
3	4640	605	7580	736	135	268	721	310	603
4	3730	650	6550	706	125	238	661	195	348
5	3140	675	5720	721	135	263	601	170	276
6	2600	530	3720	751	130	264	661	260	464
7	2270	565	3460	766	175	362	858	990	2290
8	2090	535	3020	796	135	290	796	820	1760
9	1910	470	2420	826	175	390	691	430	802
10	1740	445	2090	826	125	279	616	250	416
11	1620	435	1900	826	160	357	572	220	340
12	1580	435	1860	796	140	301	517	215	300
13	1540	380	1580	766	135	279	1370	3400	S 20900
14	1510	355	1450	736	125	248	4170	4190	47200
15	1510	330	1350	721	110	214	1850	2330	S 12400
16	1470	305	1210	691	125	233	1120	1250	3780
17	1400	240	907	751	225	456	1020	645	1780
18	1360	250	918	858	150	347	922	530	1320
19	1290	330	1150	986	360	958	858	420	973
20	1220	355	1170	1220	610	2010	796	365	784
21	1150	350	1090	1360	325	1190	736	325	646
22	1120	315	953	1400	395	1490	691	280	522
23	1050	300	850	1330	265	952	631	255	434
24	1020	275	757	1190	225	723	572	220	340
25	986	230	612	1120	200	605	517	205	286
26	986	195	519	1080	260	758	478	195	252
27	986	190	506	1050	245	695	1700	7800	S 42500
28	954	230	592	1050	205	581	1050	3600	S 11000
29	922	215	535	954	160	412	796	800	1720
30	858	200	463	890	95	228	646	475	828
31	--	--	--	890	115	276	--	--	--
Total	59692	--	66422	28415	--	16476	28477	--	167934

Day	JULY			AUGUST			SEPTEMBER		
1	572	275	425	890	3540	S 9890	172	59	27
2	530	225	322	558	700	1050	178	63	30
3	478	170	219	413	420	468	162	75	33
4	439	130	154	400	295	319	151	76	31
5	426	115	132	352	210	200	154	79	33
6	413	115	128	287	145	112	178	80	38
7	388	115	120	247	100	67	166	81	36
8	364	105	103	228	96	59	154	71	30
9	328	97	86	6430	3720	A 64600	149	73	29
10	316	97	83	3860	1910	19900	168	75	34
11	305	105	86	1360	795	2920	238	100	64
12	305	110	91	1120	790	2390	240	95	62
13	316	125	107	766	485	1000	340	155	142
14	316	110	94	616	270	449	316	120	102
15	340	165	151	504	225	306	278	85	64
16	413	175	195	439	165	196	253	100	68
17	400	145	157	388	115	120	230	105	65
18	340	165	151	340	73	67	202	110	60
19	336	155	S 150	316	57	49	178	115	55
20	738	1550	3090	291	62	49	166	105	47
21	400	730	788	316	105	90	194	120	63
22	303	250	205	439	100	119	230	135	84
23	284	175	134	388	85	89	251	135	91
24	413	375	418	352	83	79	210	82	46
25	491	250	331	316	64	55	192	86	45
26	607	1060	S 2200	282	51	39	190	93	48
27	1020	2550	7020	258	60	42	186	105	53
28	766	1380	2850	236	67	43	174	80	38
29	504	400	544	220	68	40	162	76	33
30	413	240	268	202	72	39	176	88	42
31	575	1260	S 4190	184	63	31	--	--	--
Total	13839	--	24992	22998	--	104877	6038	--	1593

Total discharge for year (cfs-days)..... 308568
Total load for year (tons)..... 726003

S Computed by subdividing day.
A Computed from partly estimated concentration graph.

LITTLE SIOUX RIVER BASIN--Continued

6-6066. LITTLE SIOUX RIVER AT CORRECTIONVILLE, IOWA--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Mar. 24, 1961.....	1830	40		4550	2530		46	47	57	63	81	91	94	98	100			SPWC
Mar. 24.....	1830	40		4550	2530		27	34	46	63	80	91	94	98	100			SPN
June 2.....	0700	68		858	2920		57	63	79	90	99	100	--	--	--			SPWC
June 14.....	0700	68		4060	4890		63	71	82	89	95	97	98	100	--			SPWC
June 14.....	1830	67		4640	3610		74	75	78	80	--	97	98	100	--			SPWC
June 14.....	1830	67		4640	3610		44	60	69	78	--	97	98	100	--			SPN
June 27.....	1000	71		2700	11800		49	55	68	81	97	99	100	--	--			SPWC
June 27.....	1900	71		1700	12700		53	62	75	88	99	100	--	--	--			SPWC
Aug. 1.....	0700	74		986	4110		--	51	--	79	--	99	100	--	--			SPWC
Aug. 9.....	1100	66		7240	2920		--	63	--	80	--	93	96	99	100			SPWC

PLATTE RIVER BASIN

6-6300. NORTH PLATTE RIVER ABOVE SEMINOE RESERVOIR, NEAR SINCLAIR, WYO.

LOCATION.--At old bridge 150 feet downstream from new bridge on U.S. Highways 30 and 287, 1.8 mile south of Fort Steele, 6 miles downstream from Pass Creek, 8.2 miles east of Sinclair, Carbon County, and about 13 miles upstream from gaging station.
DRAINAGE AREA.--8,124 square miles upstream from gaging station, of which 4,064 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: December 1960 to September 1961.
Water temperatures: December 1960 to September 1961.
EXTREMES, December 1960 to September 1961.--Dissolved solids: Maximum, 380 ppm Dec. 4-20; minimum, 133 ppm May 24 to June 3.
Hardness: Maximum, 223 ppm Dec. 4-20; minimum, 69 ppm May 24 to June 3.
Specific conductance: Maximum daily, 650 micromhos Aug. 14; minimum daily, 170 micromhos May 31.
Water temperatures: Maximum, 69°F July 7, Aug. 6, 7; minimum, freezing point on many days during February and March.
REMARKS.--Records of specific conductance of daily samples available in district office at Worland, Wyo. No appreciable inflow between sampling point and gaging station.

Chemical analyses, in parts per million, December 1960 to September 1961

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 $CaCO_3$		Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
															Parts per million	Tons per acre-foot	Tons per day	Calcium, Magnesium	Noncarbonate				
Dec. 4-20, 1960.	289	24	0.00	56	20	34	3.2	192	0	124	12	0.6	0.5	0.04	380	0.52	297	223	66	1.0	563	7.9	6
Dec. 21-31.....	268	36	.01	58	13	30	2.8	177	0	106	11	.5	.4	.08	352	.48	255	198	53	.9	513	7.8	4
Jan. 1-5, 1961..	300	--	.00	52	13	31	2.8	160	0	84	10	--	--	--	302	.41	245	186	54	1.0	472	8.0	--
Jan. 6-9.....	266	--	.00	55	13	31	2.8	164	0	97	10	--	--	--	310	.42	223	191	56	1.0	479	8.0	--
Jan. 10-12.....	217	--	.00	38	7.0	15	1.4	112	0	50	6.0	--	--	--	181	.25	106	119	27	.6	302	8.0	--
Jan. 13-31.....	186	--	.01	48	13	25	2.4	149	0	84	9.8	--	--	--	301	.41	151	174	52	.8	443	7.8	--
Feb. 1-28.....	280	18	.00	54	13	26	2.8	160	0	99	9.5	.4	.0	.05	311	.42	218	188	57	.8	482	7.8	4
Mar. 1-14.....	287	18	.01	55	11	26	2.6	160	0	92	9.8	.4	.0	.06	301	.41	233	183	52	.8	469	7.7	5
Mar. 15-31.....	506	15	.02	50	11	24	3.6	143	0	89	8.4	.4	.0	.06	286	.39	391	170	53	.8	438	7.6	8
Apr. 1-20.....	630	15	.03	42	11	24	3.1	140	0	76	7.9	.4	.4	.09	264	.36	449	150	35	.8	406	7.7	--
Apr. 21-27.....	1,129	15	.04	35	7.2	18	3.8	119	0	49	5.2	.3	.4	.06	204	.28	622	117	19	.7	313	7.5	--
Apr. 28-May 2...	790	14	.01	37	8.4	22	2.6	127	0	56	7.9	.3	1.1	.04	238	.32	508	127	23	.9	360	7.4	13
May 3-23.....	1,550	14	.02	28	6.3	15	1.8	99	0	43	3.4	.3	.0	.05	180	.24	753	96	15	.7	265	7.3	23
May 24-June 3...	3,511	14	.02	21	4.0	9.5	.8	78	0	26	.7	.3	1.0	.01	133	.18	1,260	69	5	.5	183	7.5	24
June 4-21.....	3,221	14	.03	27	6.0	13	1.8	106	0	30	.9	.3	.7	.00	182	.22	1,410	92	5	.6	237	7.6	27
June 22-30.....	1,467	17	.03	38	10	19	1.9	159	0	41	2.5	.5	.1	.06	238	.32	943	136	6	.7	333	7.7	17
July 1-15.....	639	11	.02	54	8.9	27	1.5	194	0	59	4.9	.5	.2	.07	305	.41	526	171	12	.9	436	8.0	2
July 16-31.....	596	9.6	.01	52	8.9	27	1.7	180	0	71	5.1	.5	.4	.05	292	.40	470	186	18	.9	430	7.7	2
Aug. 1-15.....	425	13	.00	47	12	24	2.9	168	0	79	6.4	.5	.6	.06	280	.38	321	167	29	.8	441	7.3	10
Aug. 16-31.....	230	10	.00	43	11	23	2.9	158	0	68	7.5	.5	.2	.06	257	.35	160	153	23	.8	405	7.6	10

Sept. 1-6, 1961.	321	13	.01	49	14	30	3.3	168	0	92	9.1	.4	.9	.06	308	.42	267	180	42	1.0	491	7.5	7
Sept. 7-20.....	486	13	.00	39	11	20	2.5	145	0	57	6.2	.3	.7	.05	233	.32	306	141	22	.7	367	7.6	6
Sept. 21-30.....	1,031	15	.01	34	9.5	20	2.3	129	0	53	5.9	.2	.4	.04	209	.29	582	124	18	.8	337	7.4	6
Weighted average.....	--	15	0.02	35	8.1	18	2.0	125	0	51	4.1	0.4	0.5	0.04	212	0.29	475	121	18	0.7	316	7.5	18
Time-weighted average.....	829	16	0.01	44	11	23	2.5	148	0	72	6.9	0.4	0.3	0.05	266	--	--	155	33	0.8	403	7.6	10
Tons per day..	--	33.0	0.04	78.0	18.0	40.0	4.6	279	0	114	9.1	0.8	1.1	0.08	--	--	--	--	--	--	--	--	--

Temperature (°F) of water, December 1960 to September 1961

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

PLATTE RIVER BASIN--Continued

6-6379.1. ROCK CREEK AT ATLANTIC CITY, WYO.

LOCATION.--At gaging station, 500 feet downstream from 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, November 1957 to September 1958.
Water temperatures: June to September 1957, May to September 1958, May to September 1959, April 1960 to September 1961.
Sediment records: June 1957 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 73°F July 29; minimum, freezing point on many days during November to April.
Sediment concentrations: Maximum daily, 1,000 ppm Aug. 5; minimum daily, not determined.
Sediment loads: Maximum daily, 13 tons June 13; minimum daily, less than 0.05 ton July 27-31.
EXTREMES, 1957-61.--Water temperatures: Maximum, 73°F July 29, 1961; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 1,000 ppm Aug. 5, 1961; minimum daily, not determined.
Sediment loads: Maximum daily, 14 tons May 17, 1958; minimum daily, less than 0.05 ton on many days.

Temperature (°F) of water, water year October 1960 to September 1961

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

6-6379.1. ROCK CREEK AT ATLANTIC CITY, WYO.--Continued

Suspended sediment, water year October 1960 to September 1961
/Where no concentrations are reported, loads are estimated/

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	1.8	C 44	0.2	2.7	C 28	0.2	2.3	C 21	0.1
2	1.9	C 44	.2	3.0	C 28	.2	2.4	C 21	.1
3	1.9	C 44	.2	2.8	C 28	.2	2.5	C 21	.1
4	1.8	C 44	.2	2.6	C 28	.2	2.6	C 21	.1
5	2.1	C 44	.2	2.4	C 28	.2	3.5	C 21	.2
6	2.8	C 44	.3	2.3	C 28	.2	5.4	C 21	.3
7	2.2	C 44	.3	2.5	C 28	.2	3.0	C 21	.2
8	2.8	C 44	.3	2.4	C 28	.2	2.5	C 21	.1
9	3.6	C 44	.4	2.2	C 28	.2	2.4	C 21	.1
10	5.8	C 44	.7	2.2	C 28	.2	2.2	C 21	.1
11	6.0	C 44	.7	2.4	C 28	.2	2.2	C 21	.1
12	4.8	C 44	.6	2.6	C 28	.2	2.2	C 21	.1
13	4.1	C 44	.5	2.4	C 28	.2	2.2	C 21	.1
14	3.2	C 44	.4	2.4	C 28	.2	2.2	C 21	.1
15	3.5	C 44	.4	2.4	C 28	.2	2.2	C 21	.1
16	2.7	C 44	.3	2.5	C 28	.2	2.2	C 21	.1
17	3.0	C 44	.4	2.5	C 28	.2	2.4	C 21	.1
18	3.1	C 44	.4	2.5	C 28	.2	2.6	C 21	.1
19	3.1	C 44	.4	2.5	C 28	.2	2.6	C 21	.1
20	3.2	C 44	.4	2.5	C 28	.2	2.6	C 21	.1
21	2.8	C 44	.3	2.6	C 28	.2	2.5	C 21	.1
22	3.1	C 44	.4	2.3	C 28	.2	2.4	C 21	.1
23	2.8	C 44	.3	2.2	C 28	.2	2.6	C 21	.1
24	2.8	C 44	.3	2.3	C 28	.2	2.8	C 21	.2
25	3.0	C 44	.4	2.5	C 28	.2	2.8	C 21	.2
26	3.3	C 44	.4	2.7	C 28	.2	2.8	C 21	.2
27	2.4	C 44	.3	2.6	C 28	.2	2.5	C 21	.1
28	2.6	C 44	.3	2.4	C 28	.2	2.2	C 21	.1
29	2.7	C 44	.3	2.3	C 28	.2	2.2	C 21	.1
30	2.4	C 44	.3	2.2	C 28	.2	2.5	C 21	.1
31	2.4	C 44	.3	--	--	--	2.4	C 21	.1
Total	93.7	--	11.1	73.9	--	6.0	79.9	--	3.8
	JANUARY			FEBRUARY			MARCH		
1	2.4	C 22	0.1	3.0	C 25	0.2	2.6	C 12	0.1
2	2.4	C 22	.1	3.0	C 25	.2	2.6	C 12	.1
3	2.4	C 22	.1	3.0	C 25	.2	2.6	C 12	.1
4	2.4	C 22	.1	2.8	C 25	.2	2.5	C 12	.1
5	2.4	C 22	.1	2.4	C 25	.2	2.4	C 12	.1
6	2.5	C 22	.1	2.3	C 25	.2	2.4	C 12	.1
7	2.5	C 22	.1	2.5	C 25	.2	2.4	C 12	.1
8	2.6	C 22	.2	2.7	C 25	.2	2.4	C 12	.1
9	2.7	C 22	.2	2.8	C 25	.2	2.4	C 12	.1
10	2.8	C 22	.2	3.0	C 25	.2	2.4	C 12	.1
11	2.7	C 22	.2	3.0	C 25	.2	2.4	C 12	.1
12	2.7	C 22	.2	3.0	C 25	.2	2.4	C 12	.1
13	3.0	C 22	.2	2.8	C 25	.2	2.4	C 12	.1
14	3.2	C 22	.2	2.8	C 25	.2	2.4	C 12	.1
15	3.2	C 22	.2	2.8	C 25	.2	2.6	C 12	.1
16	3.2	C 22	.2	2.8	C 25	.2	2.8	C 12	.1
17	3.0	C 22	.2	2.6	C 25	.2	2.8	C 12	.1
18	2.8	C 22	.2	2.6	C 25	.2	2.8	C 12	.1
19	2.7	C 22	.2	2.6	C 25	.2	2.8	C 12	.1
20	2.9	C 22	.2	2.6	C 25	.2	2.8	C 12	.1
21	3.4	C 22	.2	2.8	C 25	.2	2.8	C 12	.1
22	3.4	C 22	.2	2.8	C 25	.2	2.8	C 12	.1
23	3.2	C 22	.2	2.8	C 25	.2	2.8	C 12	.1
24	3.0	C 22	.2	2.8	C 25	.2	3.0	C 12	.1
25	3.0	C 22	.2	2.8	C 25	.2	3.5	C 12	.1
26	2.4	C 22	.1	2.6	C 25	.2	3.5	C 12	.1
27	2.0	C 22	.1	2.4	C 25	.2	3.5	C 12	.1
28	2.0	C 22	.1	2.4	C 25	.2	3.5	C 12	.1
29	2.2	C 22	.1	--	--	--	3.2	C 12	.1
30	2.8	C 22	.2	--	--	--	3.2	C 12	.1
31	3.0	C 22	.2	--	--	--	3.2	C 12	.1
Total	84.9	--	5.1	76.5	--	5.6	85.9	--	3.1

C Composite period.

PLATTE RIVER BASIN--Continued

6-6379.1. ROCK CREEK AT ATLANTIC CITY, WYO.--Continued

Suspended sediment, water year October 1960 to September 1961--Continued
/Where no concentrations are reported, loads are estimated/

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	3.5	--	1	17	56	2.6	30	70	5.7
2	4	--	1	22	120	7.1	36	36	3.5
3	5	--	1	23	--	6	36	28	2.7
4	8	--	1	23	54	3.4	31	18	1.5
5	7	--	1	15	35	1.4	27	37	2.7
6	6	--	1	12	30	1.0	29	37	2.9
7	5.5	--	2	10	36	1.0	30	--	4
8	5.5	--	2	10	20	.5	24	84	5.4
9	6.5	--	2	14	18	.7	20	22	1.2
10	9	--	3	27	--	4	19	20	1.0
11	15	--	5	30	80	6.5	18	10	.5
12	16	--	6	29	50	3.9	17	30	1.4
13	14	140	5.5	23	26	1.6	15	320	13
14	10	70	1.9	23	36	2.2	15	--	4
15	12	70	2.2	24	22	1.4	15	80	3.2
16	14	120	4.5	24	18	1.2	13	24	.8
17	15	180	7.5	22	--	1	12	11	.4
18	8.0	220	4.8	28	30	2.3	15	18	.7
19	9.5	--	5	30	27	2.2	14	13	.5
20	8.0	185	4.0	40	83	9.0	11	15	.4
21	7.0	120	2.3	41	67	7.4	9.0	--	.3
22	8.0	125	2.7	40	44	4.8	8.5	--	.2
23	7.0	72	1.4	41	48	5.3	8.0	10	.2
24	5.5	28	.4	40	--	5	8.0	22	.5
25	5.5	48	.7	41	48	5.3	7.5	11	.2
26	5.5	--	1	41	60	6.6	7.0	9	.2
27	5.5	95	1.4	38	36	3.7	5.0	15	.2
28	7.5	80	1.6	38	29	3.0	5.5	--	.5
29	13	115	4.0	36	21	2.0	5.3	110	1.6
30	14	115	4.3	37	18	1.8	5.3	20	.3
31	--	--	--	33	--	2	--	--	--
Total	260.0	--	81.2	872	--	105.9	496.1	--	59.7

Day	JULY			AUGUST			SEPTEMBER		
1	5.0	10	0.1	2.2	22	0.1	1.7	55	0.3
2	5.0	12	.2	2.2	--	.4	1.9	--	.2
3	5.0	6	.1	1.9	--	.1	2.6	17	.1
4	5.0	--	.1	1.8	56	.3	2.8	22	.2
5	4.6	--	.1	1.6	1000	4.3	2.7	16	.1
6	4.3	11	.1	1.6	320	1.4	2.4	--	.1
7	4.6	12	.1	1.8	980	4.8	2.0	21	.1
8	4.6	9	.1	2.0	150	.8	1.9	19	.1
9	4.3	7	.1	1.8	--	.4	2.2	27	.2
10	3.8	34	.3	2.2	32	.2	3.1	28	.2
11	4.1	6	.1	2.7	36	.3	2.0	18	.1
12	5.5	--	.2	2.7	31	.2	2.1	--	.1
13	5.3	12	.2	2.7	22	.2	2.6	--	.1
14	4.6	14	.2	2.7	22	.2	2.4	--	.1
15	4.3	9	.1	2.2	30	.2	2.2	50	.3
16	3.8	6	.1	2.1	75	.4	2.2	32	.2
17	3.3	11	.1	2.0	50	.3	2.1	12	.1
18	3.2	16	.1	1.8	25	.1	2.2	32	.2
19	3.0	--	.1	1.7	18	.1	2.2	36	.2
20	3.0	10	.1	1.9	20	.1	2.8	--	.2
21	4.1	23	.3	2.1	33	.2	3.0	21	.2
22	3.2	8	.1	2.0	50	.3	3.3	38	.3
23	3.1	6	.1	1.8	--	.4	3.1	35	.3
24	2.7	7	.1	1.7	166	.8	4.3	31	.4
25	2.4	14	.1	2.6	267	S 3.8	4.1	23	.3
26	2.7	--	.1	2.8	351	2.7	2.7	15	.1
27	2.3	8	T	1.8	86	.4	2.0	--	.1
28	2.6	--	T	1.8	--	.3	1.9	14	.1
29	2.2	--	T	1.4	--	.2	1.9	22	.1
30	2.4	6	T	1.6	--	.2	2.1	32	.2
31	2.3	6	T	1.6	108	.5	--	--	--
Total	116.3	--	3.6	62.8	--	24.7	74.5	--	5.3

Total discharge for year (cfs-days)..... 2376.5
Total load for year (tons)..... 315.1

S Computed by subdividing day.
T Less than 0.05 ton.

6-6468. NORTH PLATTE RIVER NEAR GLENROCK, WYO.

LOCATION.--At Dave Johnston powerplant, 0.2 mile upstream from Sand Creek, 1 mile upstream from gaging station, and 4.8 miles east of Glenrock, Converse County.
DRAINAGE AREA.--17,487 square miles upstream from gaging station, of which 5,123 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: December 1960 to September 1961.
Water temperatures: December 1960 to September 1961.
EXTREMES, December 1960 to September 1961.--Dissolved solids: Maximum, 594 ppm Sept. 23-30; minimum, 430 ppm May 1-18.
Hardness: Maximum, 282 ppm Sept. 23-30; minimum, 226 ppm May 1-18.
Specific conductance: Maximum daily, 920 micromhos Sept. 27; minimum daily, 610 micromhos Apr. 8.
Water temperatures: Maximum, 78°F July 10; minimum, freezing point Dec. 29.
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 sampling point and gaging station.

Chemical analyses, in parts per million, December 1960 to September 1961

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 $CaCO_3$		Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
															Parts per million	Tons per acre-foot	Tons per day	Calcium, Magnesium	Noncarbonate				
Dec. 8-31, 1960.	646	9.8	0.01	68	23	55	3.7	177	0	209	16	0.4	0.6	0.09	503	0.68	877	263	118	1.5	725	7.4	8
Jan. 1-18, 1961.	728	10	.00	69	18	52	3.4	170	0	199	15	.4	1.1	.08	462	.63	908	248	109	1.4	695	7.8	11
Jan. 19-31.....	667	11	.01	70	21	54	3.6	176	0	205	15	.4	1.6	.08	484	.66	872	259	115	1.5	719	7.7	10
Feb. 1-12.....	797	10	.02	63	20	51	3.2	167	0	190	14	.4	.6	.08	457	.62	983	240	103	1.4	682	7.7	5
Feb. 13-28.....	716	9.6	.01	67	23	60	3.6	173	0	216	15	.4	1.1	.09	510	.69	986	260	118	1.6	748	7.7	6
Mar. 1-17.....	707	7.9	.01	67	22	56	3.7	172	0	210	16	.4	.5	.11	496	.67	947	258	117	1.5	730	7.6	7
Mar. 18-31.....	813	5.7	.02	67	22	61	3.3	168	0	218	17	.6	.9	.11	511	.69	1,120	256	118	1.7	752	7.4	7
Apr. 1-30.....	1,054	8.7	.02	62	18	50	3.1	164	0	175	15	.4	.5	--	438	.60	1,250	227	93	1.5	654	7.5	--
May 1-18.....	1,046	9.5	.01	57	20	49	3.0	161	0	175	14	.5	.6	.04	430	.58	1,210	226	94	1.4	637	7.9	8
May 19-31.....	960	9.5	.02	59	21	52	3.1	166	0	187	14	.4	2.5	.07	448	.61	1,160	234	98	1.5	667	7.8	7
June 1-30.....	888	9.1	.02	61	21	55	3.5	168	0	202	13	.4	.3	.00	467	.64	1,120	240	102	1.5	682	7.8	8
July 1-31.....	1,359	11	.02	72	18	55	3.9	176	0	212	15	.4	1.0	.07	489	.67	1,790	254	110	1.5	725	7.6	3
Aug. 1-31.....	1,367	9.9	.00	64	23	57	4.3	174	0	214	17	.4	.5	.06	498	.68	1,840	256	113	1.6	727	7.5	5
Sept. 1-22.....	725	9.9	.01	68	24	67	4.1	172	0	236	18	.3	1.4	.11	540	.73	1,060	270	129	1.8	794	7.2	5
Sept. 23-30.....	712	9.7	.02	66	29	79	4.1	168	0	269	19	.3	3.2	.11	594	.81	1,140	282	144	2.1	864	7.1	5
Weighted average.....	--	9.6	0.01	65	21	56	3.6	171	0	205	15	0.4	0.9	0.07	482	0.66	1,220	249	109	1.5	711	7.5	6
Time-weighted average.....	934	9.5	0.01	65	21	56	3.6	170	0	206	15	0.4	0.9	0.07	484	--	--	250	110	1.5	714	7.5	7
Tons per day..	--	24.0	0.03	165	53.0	140	9.2	430	0	516	39.0	1.0	2.2	0.17	--	--	--	--	--	--	--	--	--

PLATTE RIVER BASIN--Continued

6-6468. NORTH PLATTE RIVER NEAR GLENROCK, WYO.--Continued

Temperature (°F) of water, December 1960 to September 1961

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

6-7580. KIOWA CREEK AT ELBERT, COLO.

LOCATION.--At gaging station, 0.2 mile southeast of Elbert, Elbert County, and 0.5 mile upstream from West Kiowa Creek.
DRAINAGE AREA.--28.6 square miles.
RECORDS AVAILABLE.--Sediment records: April 1956 to September 1961.
EXTREMES, 1960-61.--Sediment concentrations: Maximum daily, 220 ppm Aug. 16; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 1.4 tons Aug. 16; minimum daily, 0 tons on many days.
EXTREMES, 1956-61.--Sediment concentrations: Maximum daily, 6,500 ppm July 31, 1957; minimum daily, no flow on many days each year.
Sediment loads: Maximum daily, 1,400 tons Mar. 24, 1960; minimum daily, 0 tons on many days each year.
REMARKS.--No flow during period October to March; record is omitted.

Suspended sediment, water year October 1960 to September 1961

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			
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	.1	--	T	0		0			
11	.1	--	T	0		0			
12	.1	--	T	0		0			
13	.1	--	T	0		0			
14	0	--	0	0		0			
15	0	--	0	.1		T			
16	0	--	0	.1		T			
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	0		0			
23	0	--	0	0		0			
24	0	--	0	0		0			
25	.1	4	T	0		0			
26	.1	2	T	0		0			
27	.1	--	T	0		0			
28	0	--	0	0		0			
29	0	--	0	0		0			
30	0	--	0	0		0			
31	--	--	--	0		0			
Total	0.7	--	T	0.2	--	T	0		0

T Less than 0.05 ton.

PLATTE RIVER BASIN--Continued

6-7580. KIOWA CREEK AT ELBERT, COLO.--Continued

Suspended sediment, water year October 1960 to September 1961--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	0	--	0	0	--	0	0		0
3	0	--	0	0	--	0	0		0
4	0	--	0	0	--	0	.1		T
5	0	--	0	0	--	0	0		0
6	0	--	0	0	--	0	0		0
7	.1	110	T	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	2.3	220	1.4	0		0
17	0	--	0	.1	33	T	0		0
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	0	--	0	0	--	0	0		0
23	0	--	0	0	--	0	0		0
24	0	--	0	0	--	0	.1		T
25	0	--	0	0	--	0	0		0
26	0	--	0	0	--	0	0		0
27	0	--	0	0	--	0	0		0
28	.1	210	A .1	0	--	0	0		0
29	0	--	0	0	--	0	0		0
30	0	--	0	0	--	0	0		0
31	0	--	0	0	--	0	--		--
Total	0.2	--	0.1	2.4	--	1.4	0.2		T

Total discharge for year (cfs-days)..... 3.7
Total load for year (tons)..... 1.6

T Less than 0.05 ton.
A Computed from partly estimated concentration graph.

PLATTE RIVER BASIN--Continued

6-7582. KIOWA CREEK AT KIOWA, COLO.

LOCATION.--At gaging station, at cableway 0.7 mile 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 1961.
EXTREMES, 1960-61.--Sediment concentrations: Maximum daily, 4,400 ppm July 11; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 1,100 tons July 29; minimum daily, 0 tons on many days.
EXTREMES, 1956-61.--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.--Flow affected by ice during most of period Nov. 3 to Mar. 1.

Suspended sediment, water year October 1960 to September 1961
/Where no concentrations are reported, loads are estimated/

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		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				C .1		T
17	0		0				C .1		T
18	0		0				C .1		T
19	3.6		2				C .1		T
20	.3		T				C .1		T
21	0		0				C .1		T
22	0		0				C .1		T
23	0		0				C .1		T
24	0		0				C .1		T
25	0		0				C .1		T
26	0		0				C .1		T
27	0		0				C .1		T
28	0		0				C .1		T
29	0		0				C .1		T
30	0		0				C .1		T
31	0		0				C .1		T
Total	3.9		2	0		0	1.6		T

T Less than 0.50 ton.
C Composite period.

PLATTE RIVER BASIN--Continued

6-7582. KIOWA CREEK AT KIOWA, COLO.--Continued

Suspended sediment, water year October 1960 to September 1961--Continued
(Where no concentrations are reported, loads are estimated)

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	C 0.2			T	C 1.5			T	3.3	430		4
2	C .2			T	C 1.5			T	6.3	750	A	13
3	C .2			T	C 1.5			T	8.0	650		14
4	C .2			T	C 1.5			T	5.9	550	A	9
5	C .2			T	C 1.5			T	4.1	--		5
6	C .2			T	C 1.5			T	3.2	--		3
7	C .2			T	C 1.5			T	2.7	310		2
8	C .2			T	C 1.5			T	3.2	260	A	2
9	C .2			T	C 1.5			T	2.5	--		2
10	C .2			T	C 1.5			T	2.7	--		2
11	C .2			T	C 1.5			T	3.0	--		2
12	C .2			T	C 1.5			T	2.7	--		2
13	C .2			T	C 1.5			T	2.7	--		2
14	C .2			T	C 1.5			T	3.0	--		2
15	C .2			T	C 1.5			T	3.0	--		2
16	C .2			T	C 1.5			T	3.2	--		2
17	C .2			T	C 1.5			T	4.5	--		4
18	C .2			T	C 1.5			T	5.6	--		6
19	C .2			T	C 1.5			T	3.8	--		3
20	C .2			T	C 1.5			T	3.2	--		2
21	C .2			T	C 1.5			T	3.4	--		2
22	C .2			T	C 1.5			T	2.7	--		2
23	C .2			T	C 1.5			T	3.4	--		3
24	C .2			T	C 1.5			T	3.8	--		3
25	C .2			T	C 1.5			T	4.1	--		4
26	C .2			T	C 1.5			T	3.8	--		3
27	C .2			T	C 1.5			T	3.4	--		2
28	C .2			T	C 1.5			T	4.1	--		2
29	C .2			T	--			--	3.2	--		1
30	C .2			T	--			--	1.6	--		T
31	C .2			T	--			--	2.1	--		1
Total	6.2			1	42.0			5	112.2	--		106

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	2.1	--		1	0.2	90		T	3.8	--		1
2	2.3	--		1	.1	90		T	5.6	--		22
3	2.5	--		1	.2	90		T	7.5	--		15
4	2.7	130		1	.2	--		T	10	--		40
5	3.0	--		1	.4	--		T	6.3	--		5
6	2.3	--		1	.2	--		T	7.5	--		19
7	2.1	--		1	1.0	--		T	9.5	--		38
8	1.9	--		1	1.0	--		T	10	--		32
9	3.8	--		T	.6	--		T	6.3	--		4
10	2.5	--		1	.7	--		T	5.9	--		4
11	1.9	--		T	.4	--		T	5.2	--		3
12	2.5	--		1	.2	--		T	3.8	--		2
13	2.7	110	A	1	.6	--		T	3.3	--		2
14	2.7	130		1	13	--		13	2.3	--		2
15	2.5	150	A	1	8.0	340		7	3.0	260	A	2
16	2.5	--		1	6.6	--		5	1.9	220		1
17	2.7	--		1	6.3	--		4	1.1	--		T
18	2.7	--		1	6.3	--		3	.6	--		T
19	2.5	--		1	4.5	--		2	.8	120		T
20	2.7	--		1	3.2	--		1	1.6	--		T
21	2.7	--		1	4.1	--		1	.1	--		T
22	1.6	--		1	4.1	80	A	1	0	--		0
23	1.2	--		T	3.4	80		1	0	--		0
24	1.9	110		1	3.4	80	A	1	0	--		0
25	2.3	390		2	4.5	80	A	1	0	--		0
26	1.2	130		T	3.8	80		1	0	--		0
27	.2	70		T	3.8	80		1	0	--		0
28	.2	--		T	3.4	--		1	0	--		0
29	.2	--		T	3.4	--		1	0	--		0
30	.1	--		T	3.0	--		1	0	--		0
31	--	--		--	3.4	--		1	--	--		--
Total	62.2	--		24	94.0	--		48	96.1	--		193

T Less than 0.50 ton.
A Computed from partly estimated concentration graph.
C Composite period.

6-7582. KIOWA CREEK AT KIOWA, COLO.--Continued

Suspended sediment, water year October 1960 to September 1961--Continued
/Where no concentrations are reported, loads are estimated/

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	6.6	1100	20	5.9	--	10
2	0	--	0	9.5	460 A	12	5.2	--	8
3	0	--	0	9.0	580	14	7.5	--	12
4	0	--	0	4.1	--	4	8.0	--	13
5	0	--	0	1.9	--	1	4.5	--	6
6	0	--	0	.8	--	T	3.2	--	3
7	1.0	--	3	.5	60	T	2.5	270	2
8	2.5	--	2	1.2	--	T	2.5	--	2
9	.2	--	T	2.7	--	T	2.7	--	2
10	0	--	0	2.3	--	T	2.3	--	1
11	60	4440	710	2.7	--	T	2.5	--	2
12	38	2200	230	3.9	--	3	2.3	--	1
13	13	--	7	4.8	--	8	2.1	--	1
14	7.5	--	4	3.0	400	3	1.6	--	1
15	1.4	--	T	1.4	260 A	1	1.4	--	1
16	1.0	--	T	3.0	500	4	1.2	170 A	1
17	.6	--	T	7.0	590	11	1.1	160	T
18	.5	--	T	1.9	240	1	1.0	150	T
19	.3	--	T	.8	130	T	1.1	--	T
20	.5	--	T	.4	60	T	1.9	--	1
21	.8	--	T	.4	60	T	1.4	--	1
22	1.0	--	T	.4	50	T	1.4	--	1
23	.2	--	T	.1	--	T	2.5	--	2
24	0	--	0	0	--	0	4.1	--	4
25	0	--	0	0	--	0	3.2	--	3
26	.3	--	T	0	--	0	2.7	--	3
27	2.1	--	T	0	--	0	2.3	--	2
28	47	1750	220	0	--	0	2.5	--	2
29	101	4000	1100	0	--	0	2.3	--	2
30	80	3600	780	8.7	1000	23	2.1	--	2
31	22	3300	200	12	1600	52	--	--	--
Total	380.9	--	3258	89.1	--	159	85.0	--	90

Total discharge for year (cfs-days)..... 973.2
Total load for year (tons)..... 3886

T Less than 0.50 ton.
A Computed from partly estimated concentration grapb.

PLATTE RIVER BASIN--Continued

6-7582. KIOWA CREEK AT KIOWA, COLO.--Continued

Particle-size analyses of bed material, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Bed material											Method of analysis
							Percent finer than size indicated, in millimeters											
							0.062	0.125	0.250	0.500	1.000	2.000	4.000	8.000	16.00	32.00	64.00	
July 11, 1961.....			7	233				0	8	41	75	91	98	99	100			SV
July 12.....			6	33				0	7	44	76	89	98	100	--			SV
July 30.....			17	122				0	5	37	74	89	98	99	100			SV
Aug. 7.....			--	.5				0	8	39	72	88	97	100	--			SV
Aug. 30.....			26	78				0	8	44	77	91	99	100	--			SV
Aug. 31.....			19	11			0	1	8	42	73	88	97	100	--			SV

6-7640. SOUTH PLATTE RIVER AT JULESBURG, COLO.

LOCATION.--At gaging station at bridge on U.S. Highway 385 (revised), 0.9 mile southeast of Julesburg, Sedgwick County, 3 miles upstream from Colorado-Nebraska State line, and 8 miles downstream from Lodgepole Creek.
DRAINAGE AREA.--23,138 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1945 to September 1961.
Water temperatures: October 1945 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 1,720 ppm Dec. 1; minimum, 818 ppm June 1-16.
Hardness: Maximum, 860 ppm Dec. 1; minimum, 408 ppm June 1-16.
Specific conductance: Maximum daily, 2,310 micromhos Jan. 27; minimum daily, 943 micromhos June 16.
Water temperatures: Maximum, 88°F July 27, 29; minimum, 33°F Jan. 25, 26.
EXTREMES, 1945-61.--Dissolved solids: Maximum, 1,860 ppm Apr. 13, 1955; minimum, 429 ppm June 16, 1956.
Hardness: Maximum, 860 ppm Dec. 1, 1960; 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, 1950-61), 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.

Chemical analyses, in parts per million, water year October 1960 to September 1961

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 $CaCO_3$		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, 1960.	70.6	--	--	--	--	164	--	315	0	--	--	--	--	--	1,540	2.09	294	735	477	2.6	1,950	7.4	--
Nov. 1-30.....	94.4	--	--	--	--	161	--	317	0	--	--	--	--	--	1,520	2.07	387	738	478	2.6	1,930	7.4	--
Dec. 1.....	72	35	0.02	249	58	196	20	432	0	794	73	0.6	4.1	0.28	1,720	2.34	334	860	506	2.9	2,160	7.4	9
Dec. 2-31.....	210	30	.00	220	62	200	18	360	0	805	71	.7	2.3	.31	1,660	2.26	941	803	508	3.1	2,070	7.5	7
Jan. 1-31, 1961.	237	--	--	--	--	200	--	366	0	--	--	--	--	--	1,670	2.27	1,070	808	508	3.1	2,080	7.5	--
Feb. 1-28.....	235	--	--	--	--	195	--	318	0	--	--	--	--	--	1,600	2.18	1,020	762	501	3.1	2,000	7.8	--
Mar. 1.....	141	31	.00	195	60	183	15	299	0	688	72	.7	3.3	.25	1,510	2.05	575	732	487	2.9	1,830	8.0	5
Mar. 2-31.....	229	27	.00	198	59	188	15	296	0	748	69	.7	3.1	.27	1,560	2.12	965	736	493	3.0	1,980	7.7	2
Apr. 1-30.....	267	--	--	--	--	183	--	286	0	--	--	--	--	--	1,580	2.15	1,140	740	505	2.9	1,970	7.7	--
May 1-7.....	97.3	--	.00	--	--	184	--	286	0	--	--	--	--	--	1,550	2.11	407	727	492	3.0	1,920	8.0	--
May 8-21.....	130	--	.00	--	--	179	--	256	0	--	--	--	--	--	1,470	2.00	516	679	469	3.0	1,860	7.8	--
May 22-31.....	1,913	--	.01	--	--	118	--	225	0	--	--	--	--	--	1,010	1.37	5,220	481	296	2.3	1,350	7.8	--
June 1-16.....	4,078	17	.02	114	30	91	8.5	207	0	377	32	.7	1.4	.20	818	1.11	9,010	408	238	2.0	1,120	7.3	16
June 17-30.....	1,790	--	--	--	--	121	--	235	0	--	--	--	--	--	1,010	1.37	4,880	490	297	2.4	1,340	7.5	--
July 1-26.....	128	--	--	--	--	160	--	242	0	--	--	--	--	--	1,280	1.74	442	596	398	2.9	1,660	7.5	--

PLATTE RIVER BASIN--Continued

6-7640. SOUTH PLATTE RIVER AT JULESBURG, COLO.--Continued

Chemical analyses, in parts per million, water year October 1960 to September 1961--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 $CaCO_3$		Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
															Parts per million	Tons per acre-foot	Tons per day	Calcium, Magnesium	Noncarbonate				
July 27-31, 1961	152	--	--	--	--	130	--	203	0	--	--	--	--	--	1,020	1.39	419	466	300	2.6	1,360	7.4	--
Aug. 1-31.....	83.0	--	--	--	--	183	--	246	0	--	--	--	--	--	1,420	1.93	318	653	451	3.1	1,790	7.3	--
Sept. 1-30.....	199	29	0.01	185	56	169	16	262	0	713	64	0.8	2.3	0.24	1,510	2.05	811	690	475	2.8	1,900	7.4	3
Weighted average.....	--	--	--	--	--	130	--	246	0	--	--	--	--	--	1,120	1.52	1,360	539	337	2.4	1,460	7.4	--
Time-weighted average.....	452	--	--	--	--	172	--	290	0	--	--	--	--	--	1,460	--	--	693	455	2.8	1,850	7.5	--
Tons per day..	--	--	--	--	--	158	--	300	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Temperature (°F) of water, water year October 1960 to September 1961

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

6-7657. 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 1961.
Water temperatures: March 1951 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 795 ppm June 1-30; minimum, 434 ppm Dec. 25.
Hardness: Maximum, 391 ppm June 1-30; minimum, 192 ppm Oct. 1-31.
Specific conductance: Maximum daily, 1,180 micromhos July 7; minimum daily, 579 micromhos Mar. 10, 12.
Water temperatures: Maximum, 84°F June 29; minimum, 33°F on several days during November to February.
EXTREMES, 1951-61.--Dissolved solids: Maximum, 1,010 ppm Mar. 1-4, 1958; minimum, 368 ppm May 15, 1951.
Hardness: Maximum, 492 ppm Mar. 1-4, 1958; minimum, 171 ppm May 15, 1951.
Specific conductance: Maximum daily, 1,440 micromhos Mar. 1, 1958; 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 given in reports of State Engineer.

Chemical analyses, in parts per million, water year October 1960 to September 1961

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 $CaCO_3$		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, 1960.	940	--	--	--	--	62	--	212	0	--	--	--	--	--	442	0.60	1,120	192	18	1.9	665	7.2	--
Nov. 1-27.....	960	--	--	--	--	57	--	210	0	--	--	--	--	--	437	.59	1,130	196	24	1.8	653	7.2	--
Nov. 28-Dec. 24.	975	29	0.01	56	16	62	11	215	0	152	19	0.6	1.6	0.14	455	.62	1,200	207	31	1.9	682	7.7	5
Dec. 25.....	1,060	35	.05	57	15	56	9.6	207	0	143	13	.7	.2	.10	434	.59	1,240	204	34	1.7	650	7.4	--
Dec. 26-Jan. 20, 1961.....	954	--	--	--	--	63	--	216	0	--	--	--	--	--	491	.67	1,260	226	49	1.8	722	7.4	--
Jan. 21-Feb. 2..	1,086	--	--	--	--	79	--	235	0	--	--	--	--	--	603	.82	1,770	272	79	2.1	882	7.5	--
Feb. 3-28.....	955	--	--	--	--	61	--	228	0	--	--	--	--	--	514	.70	1,330	244	57	1.7	753	7.5	--
Mar. 1-31.....	923	35	.00	66	16	55	10	206	0	146	19	.4	2.0	.10	477	.65	1,190	231	62	1.6	693	7.4	6
Apr. 1-6.....	862	--	--	--	--	62	--	211	0	--	--	--	--	--	537	.73	1,250	253	80	1.7	782	8.0	--
Apr. 7-11.....	1,012	--	--	--	--	64	--	204	0	--	--	--	--	--	543	.74	1,480	256	89	1.7	788	7.7	--
Apr. 12-30.....	1,006	--	--	--	--	64	--	211	0	--	--	--	--	--	553	.75	1,500	264	91	1.7	801	7.6	--
May 1-16.....	1,190	--	--	--	--	75	--	211	0	--	--	--	--	--	610	.83	1,960	284	111	1.9	857	7.6	--
May 17-24.....	1,042	--	--	--	--	68	--	212	0	--	--	--	--	--	569	.77	1,600	271	97	1.8	814	7.6	--
May 25-31.....	940	--	--	--	--	80	--	208	0	--	--	--	--	--	657	.89	1,670	316	145	2.0	929	7.4	--
June 1-30.....	1,672	24	.02	98	36	91	11	227	0	353	29	.7	.4	.16	795	1.08	3,590	391	205	2.0	1,070	7.3	8
July 1-22.....	1,970	--	--	--	--	100	--	221	0	--	--	--	--	--	789	1.07	4,200	369	188	2.3	1,090	7.4	--
July 23-31.....	2,137	--	--	--	--	85	--	221	0	--	--	--	--	--	597	.81	3,440	264	83	2.3	875	7.5	--
Aug. 1-14.....	2,100	--	--	--	--	81	--	221	0	--	--	--	--	--	527	.72	2,990	223	42	2.3	790	7.5	--

PLATTE RIVER BASIN--Continued

6-7657. SUPPLY CANAL (TRI-COUNTY DIVERSION) NEAR MAXWELL, NEBR.--Continued

Chemical analyses, in parts per million, water year October 1960 to September 1961--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 $CaCO_3$		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. 15, 1961...	598	--	--	--	--	77	--	232	0	--	--	--	--	--	483	0.66	780	210	20	2.3	751	7.4	--
Aug. 18-31.....	1,255	--	--	--	--	76	--	219	0	--	--	--	--	--	491	.67	1,660	208	28	2.3	747	7.4	--
Sept. 1-30.....	1,450	21	0.01	61	13	73	10	231	0	145	21	0.6	1.2	0.16	474	.64	1,860	204	15	2.2	732	7.3	8
Weighted average.....	--	--	--	--	--	74	--	219	0	--	--	--	--	--	568	0.77	1,870	262	82	2.0	821	7.4	--
Time-weighted average.....	1,217	--	--	--	--	70	--	218	0	--	--	--	--	--	545	--	--	251	73	1.9	792	7.4	--
Tons per day..	--	--	--	--	--	243	--	720	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Temperature (°F) of water, water year October 1960 to September 1961

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

6-7660. PLATTE RIVER AT BRADY, NEBR.

LOCATION.--At gaging station at highway bridges, 0.5 mile and 2.5 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 1961.
Water temperatures: March 1951 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 701 ppm June 1-30; minimum, 381 ppm Apr. 7-11.
Hardness: Maximum, 345 ppm June 1-30; minimum, 195 ppm Apr. 7-11.
Specific conductance: Maximum daily, 1,060 micromhos July 5 (chan. 1); minimum daily, 420 micromhos Apr. 11 (chan. 1).
Water temperatures: Maximum, 77°F July 27 (chan. 1); minimum, freezing point on several days during December and January.
EXTREMES, 1951-61.--Dissolved solids: Maximum, 896 ppm Feb. 19-22, 1953; minimum, 270 ppm June 21, 1960.
Hardness: Maximum, 404 ppm Mar. 1-4, 1958; minimum, 133 ppm June 21, 1960.
Specific conductance: Maximum daily, 1,250 micromhos June 17, 1959 (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.

Chemical analyses, in parts per million, water year October 1960 to September 1961

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 $CaCO_3$		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, 1960.	114	--	--	--	--	52	--	220	0	--	--	--	--	--	443	0.60	136	211	31	1.6	653	7.2	--
Nov. 1-27.....	129	--	--	--	--	48	--	219	0	--	--	--	--	--	435	.59	152	211	31	1.4	640	7.5	--
Nov. 28-Dec. 24.	196	40	0.01	61	16	48	9.9	222	0	125	16	0.5	2.0	0.08	430	.58	228	216	34	1.4	637	7.4	6
Dec. 25.....	250	44	.03	58	13	43	9.4	215	0	110	11	.6	1.0	.08	396	.54	267	198	22	1.3	588	7.6	--
Dec. 26-Jan. 20, 1961.....	205	--	--	--	--	44	--	213	0	--	--	--	--	--	414	.56	229	205	30	1.3	602	7.5	--
Jan. 21-Feb. 2..	290	--	--	--	--	50	--	227	0	--	--	--	--	--	460	.63	360	223	37	1.5	670	7.6	--
Feb. 3-28.....	184	--	--	--	--	42	--	207	0	--	--	--	--	--	409	.56	203	206	36	1.3	603	7.5	--
Mar. 1-31.....	219	38	.00	59	16	42	9.8	214	0	110	14	.5	2.3	.09	410	.56	242	211	36	1.3	606	7.6	5
Apr. 1-6.....	167	--	--	--	--	47	--	214	0	--	--	--	--	--	438	.60	197	222	47	1.4	650	7.7	--
Apr. 7-11.....	210	--	--	--	--	38	--	208	0	--	--	--	--	--	381	.52	216	195	24	1.2	563	7.9	--
Apr. 12-30.....	218	--	--	--	--	46	--	219	0	--	--	--	--	--	443	.60	261	223	43	1.3	644	7.8	--
May 1-16.....	243	--	--	--	--	44	--	216	0	--	--	--	--	--	434	.59	285	224	47	1.3	635	7.3	--
May 17-24.....	402	--	--	--	--	46	--	224	0	--	--	--	--	--	454	.62	493	228	44	1.3	649	7.4	--
May 25-31.....	261	--	--	--	--	50	--	224	0	--	--	--	--	--	467	.64	329	234	50	1.4	677	7.5	--
June 1-30.....	807	28	.03	97	25	76	11	224	0	283	24	.6	.6	.15	701	.95	1530	345	161	1.8	956	7.3	16
July 1-22.....	915	--	--	--	--	72	--	236	0	--	--	--	--	--	485	.66	1200	215	21	2.2	726	7.6	--
July 23-31.....	1010	--	--	--	--	69	--	236	0	--	--	--	--	--	460	.63	1250	197	3	2.1	694	7.6	--

PLATTE RIVER BASIN--Continued

6-7660. PLATTE RIVER AT BRADY, NEBR.--Continued

Chemical analyses, in parts per million, water year October 1960 to September 1961--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 $CaCO_3$		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. 1-14, 1961.	880	--	--	--	--	68	--	233	0	--	--	--	--	--	458	0.62	1090	198	7	2.1	685	7.3	--
Aug. 15-17.....	2187	--	--	--	--	74	--	232	0	--	--	--	--	--	501	.68	2960	212	22	2.2	744	7.4	--
Aug. 18-31.....	291	--	--	--	--	65	--	231	0	--	--	--	--	--	490	.67	385	216	27	1.9	720	7.9	--
Sept. 1-30.....	124	33	0.00	60	16	59	10	220	0	133	18	0.6	1.5	0.16	460	.63	154	214	34	1.8	686	7.3	11
Weighted average.....	--	--	--	--	--	62	--	226	0	--	--	--	--	--	501	0.68	476	237	51	1.8	727	7.4	--
Time-weighted average.....	352	--	--	--	--	54	--	221	0	--	--	--	--	--	462	--	--	224	43	1.6	676	7.4	--
Tons per day..	--	--	--	--	--	59.0	--	214	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--

PLATTE RIVER BASIN--Continued

6-7660. PLATTE RIVER AT BRADY, NEBR.--Continued

CHANNEL 1

Temperature (°F) of water, water year October 1960 to September 1961

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

CHANNEL 4

Temperature (°F) of water, water year October 1960 to September 1961

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

PLATTE RIVER BASIN--Continued

6-7680. PLATTE RIVER NEAR OVERTON, NEBR.

LOCATION.--At gaging station at highway bridge, 4 miles south of Overton, Dawson County, and 4 miles downstream from Plum Creek.
DRAINAGE AREA.--58,400 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: December 1951 to September 1952, November 1958 to September 1961.
Water temperatures: November 1958 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 647 ppm June 1-30; minimum, 270 ppm Aug. 13.
Hardness: Maximum, 313 ppm June 1-30; minimum, 145 ppm Aug. 13.
Specific conductance: Maximum daily, 966 micromhos June 25 (south chan.); minimum daily, 362 micromhos Aug. 13 (south chan.).
Water temperatures: Maximum, 94°F June 29 (north and south chans.); minimum, freezing point Dec. 17, 21, 27 (north chan.), Dec. 21, Jan. 28 (south chan.).
EXTREMES, 1958-61.--Dissolved solids: Maximum, 650 ppm June 1-30, 1959; minimum, 270 ppm Aug. 13, 1961.
Hardness: Maximum, 313 ppm June 1-30, 1961; minimum, 145 ppm Aug. 13, 1961.
Specific conductance: Maximum daily, 1,070 micromhos July 9, 1959 (south chan.); minimum daily, 362 micromhos Aug. 13, 1961 (south chan.).
Water temperatures: Maximum, 98°F June 13, 1959 (south chan.), July 9, 1960 (north chan.); minimum, freezing point on many days during winter months.
REMARKS.--Daily samples for chemical analysis from each of two major channels composited by discharge. Records of specific conductance of daily samples, taken at each of the two major channels, available in district office at Lincoln, Nebr.

Chemical analyses, in parts per million, water year October 1960 to September 1961

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): Parts per million	Dissolved solids: Tons per acre-foot	Dissolved solids: Tons per day	Hardness as $CaCO_3$: Calcium, Magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 1-31, 1960.	827	18	0.00	56	18	71	12	221	0	161	21	0.6	1.6	0.12	477	0.65	1,070	212	31	2.1	733	7.7	--
Nov. 1-27.....	879	21	.00	60	20	63	11	227	0	160	19	.5	1.6	.11	476	.65	1,130	230	44	1.8	724	7.7	--
Nov. 28-Dec. 24.	935	26	.02	60	18	63	11	227	0	155	20	.6	2.1	.13	474	.64	1,200	222	36	1.8	719	7.7	6
Dec. 25.....	833	27	.05	59	17	64	11	226	0	156	16	.3	1.5	.12	473	.64	1,060	219	34	1.9	716	7.7	--
Dec. 26-Jan. 24, 1961.....	977	30	.01	55	24	60	11	234	0	158	20	.5	.0	.13	488	.66	1,290	234	42	1.7	724	7.7	7
Jan. 25-31.....	1,110	34	.00	72	19	66	12	251	0	175	22	.5	2.2	.18	543	.74	1,630	259	53	1.8	791	7.9	9
Feb. 1-28.....	983	31	.00	66	18	62	11	230	0	168	21	.5	1.8	.16	503	.68	1,340	240	51	1.7	742	7.7	7
Mar. 1-31.....	1,137	32	.00	66	20	59	11	229	0	158	20	.5	1.4	.10	496	.67	1,520	247	59	1.6	748	7.4	--
Apr. 1-30.....	1,009	30	.00	66	22	60	12	230	0	169	21	.5	2.0	.12	508	.69	1,380	253	64	1.6	757	8.0	--
May 1-24.....	905	29	.01	72	18	60	12	225	0	171	22	.4	2.1	.11	516	.70	1,260	254	69	1.6	752	7.5	--
May 25-31.....	835	32	.00	81	19	62	13	251	0	186	23	.6	2.0	.10	560	.76	1,260	282	76	1.6	817	7.5	--
June 1-30.....	1,428	27	.02	86	24	77	12	233	0	254	24	.5	.7	.10	647	.88	2,490	313	122	1.9	911	7.4	7
July 1-31.....	186	32	.02	75	22	75	15	230	0	223	25	.5	1.4	.14	592	.81	297	277	88	2.0	861	7.6	4
Aug. 1-12.....	147	29	.00	75	23	78	13	219	0	245	27	.6	.4	.16	620	.84	246	282	102	2.0	888	7.4	--
Aug. 13.....	955	18	.02	47	6.7	23	13	152	0	66	8.6	.4	6.5	.09	270	.37	696	145	20	.8	421	7.5	--

Aug. 14-31, 1961	626	31	.01	73	19	70	13	248	0	188	23	.6	1.1	.17	558	.76	943	261	58	1.9	808	7.5	--
Sept. 1-30.....	341	23	.01	68	21	76	12	220	0	208	29	.6	1.3	.06	568	.77	523	255	75	2.1	834	7.5	--
Weighted average.....	--	28	0.01	67	20	65	12	230	0	180	22	0.5	1.4	0.12	524	0.71	1,180	251	63	1.8	773	7.6	--
Time-weighted average.....	838	28	0.01	67	20	67	12	229	0	183	22	0.5	1.4	0.12	529	--	--	251	63	1.8	780	7.6	--
Tons per day..	--	63.0	0.02	152	46.0	148	26.0	521	0	407	49.0	1.0	3.2	0.27	--	--	--	--	--	--	--	--	--

PLATTE RIVER BASIN--Continued

6-7680. PLATTE RIVER NEAR OVERTON, NEBR.--Continued

NORTH CHANNEL

Temperature (°F) of water, water year October 1960 to September 1961

Month	Day																													Aver-age
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
October	57	52	71	63	71	63	68	61	65	64	72	65	59	55	56	54	62	55	55	43	60	53	64	56	64	52	60	52	61	47	55	59
November	47	54	48	47	45	50	42	52	36	43	41	45	45	59	46	48	42	48	44	47	41	46	39	43	44	55	39	33	37	34	--	45
December	35	35	43	43	41	34	41	36	40	33	35	33	39	35	36	34	32	35	40	40	32	33	35	34	35	35	32	33	35	34	35	36
January	34	33	34	35	35	38	35	37	35	41	35	37	35	41	35	43	38	37	35	33	35	34	34	--	35	34	34	33	33	35	35	36
February	38	34	33	34	34	35	33	34	40	36	45	39	46	39	48	44	35	34	41	47	43	41	45	37	43	42	40	40	--	--	--	39
March	43	42	40	37	35	34	34	38	36	41	46	40	47	45	54	45	46	44	50	46	45	45	53	48	62	49	54	42	56	48	56	45
April	48	56	50	57	46	53	47	45	42	48	41	58	49	58	43	51	46	62	59	68	56	--	64	61	53	53	51	65	56	61	--	53
May	51	53	50	45	47	67	63	62	60	72	61	80	59	56	57	60	57	59	55	62	57	68	61	70	67	74	61	83	76	83	77	63
June	81	79	72	64	81	77	84	75	85	76	84	75	84	73	62	63	74	70	73	72	79	74	77	68	84	75	88	77	94	80	--	77
July	77	83	81	76	93	71	81	76	88	73	83	72	87	74	91	76	81	76	73	73	71	70	89	76	90	78	87	79	92	80	73	80
August	76	90	80	90	76	86	76	92	75	93	74	70	79	83	74	78	74	80	74	75	74	81	73	82	78	87	85	88	89	85	79	81
September	85	76	62	73	76	62	71	72	85	86	69	63	66	55	71	60	75	65	67	53	75	57	59	54	66	59	65	55	72	54	--	67

SOUTH CHANNEL

Temperature (°F) of water, water year October 1960 to September 1961

Month	Day																													Aver-age
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
October	56	51	70	62	70	60	66	59	64	62	71	63	61	54	58	53	61	53	58	42	60	53	63	54	63	54	59	50	61	45	55	58
November	45	54	46	47	43	50	40	51	34	40	40	44	43	53	45	47	40	48	42	47	39	45	37	47	42	54	40	33	34	33	--	43
December	37	34	40	41	41	33	40	35	41	33	37	34	39	36	36	33	38	37	40	33	32	33	33	35	33	37	35	33	33	33	37	36
January	33	35	33	40	33	40	34	39	33	40	34	38	34	42	34	43	36	37	33	33	33	38	33	--	33	33	--	32	--	--	33	36
February	40	33	37	33	39	34	39	35	44	39	47	40	44	38	45	43	35	33	42	45	42	40	43	37	44	41	39	39	--	--	--	40
March	42	41	40	36	34	36	36	37	35	40	45	38	45	43	52	42	44	42	47	44	45	43	54	46	58	50	52	40	55	45	51	44
April	41	52	48	58	44	51	45	46	41	48	41	56	47	55	41	49	44	59	56	62	54	--	61	60	50	53	52	63	53	58	--	51
May	49	53	48	47	46	63	60	62	58	70	63	75	56	56	55	60	56	58	54	60	56	64	59	67	65	71	60	78	71	81	76	61
June	80	75	72	64	80	75	82	72	87	74	83	74	81	73	65	63	74	70	75	72	79	72	76	68	82	73	86	76	94	78	--	76
July	76	81	82	74	91	70	81	73	81	71	81	70	86	72	88	75	84	74	75	71	75	68	83	74	90	76	87	76	91	78	71	78
August	74	89	78	90	74	87	74	90	77	91	73	71	76	82	72	78	72	79	73	75	72	80	71	81	77	86	82	87	80	84	71	79
September	85	73	68	68	74	64	70	69	84	83	67	59	65	52	70	58	74	63	67	52	73	55	62	54	67	56	65	53	69	54	--	66

6-7975. ELKHORN RIVER AT EWING, NEBR.

LOCATION.--At bridge on State Highway 108, 350 feet upstream from gaging station, 0.8 mile north of Ewing, Holt County, and 1.5 miles upstream from South Fork Elkhorn River.
DRAINAGE AREA.--1,400 square miles, approximately, of which about 740 square miles contributes directly to surface runoff.
RECORDS AVAILABLE.--Chemical analyses: September 1960 to September 1961.

Chemical analyses, in parts per million, September 1960 to September 1961

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)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Sept. 27, 1960.....	68.4	42		0.08	0.00	27	3.3	9.5	5.0	119	0	5.8	1.0	0.3	5.5	0.04	163	81	0	0.5	207	7.3	7
Oct. 19.....	58	42		.07	--	29	2.8	9.4	5.2	124	0	5.0	1.0	.3	.8	.11	162	84	0	.4	217	7.4	9
Nov. 16.....	72	43		.08	--	29	2.1	8.9	5.1	119	0	5.5	.8	.3	.6	.06	160	81	0	.4	208	7.7	8
Dec. 12.....	77	46		.05	.00	27	3.6	9.4	5.3	119	0	5.3	1.0	.3	1.5	.02	163	82	0	.5	206	7.1	13
Jan. 5, 1961.	73	49		.09	.00	29	2.1	8.2	4.5	114	0	4.5	.0	.3	2.2	.07	161	81	0	.4	206	7.3	5
Jan. 31.....	56	50		.05	.00	31	2.3	9.3	5.1	123	0	6.5	.6	.3	2.6	.03	172	87	0	.4	222	7.4	5
Feb. 27.....	158	36		.06	.03	25	1.1	7.6	5.3	97	0	5.0	.0	.2	2.2	.02	139	67	0	.4	176	7.1	23
Mar. 23.....	367	27		.11	.04	27	3.8	13	7.7	123	0	9.5	.0	.6	2.0	.17	179	83	0	.6	225	7.1	75
Apr. 18.....	164	28		.08	.01	32	3.4	12	6.1	140	0	7.6	.0	.4	1.2	.11	192	94	0	.5	243	7.5	--
May 12.....	116	38		.06	.02	34	1.7	11	5.7	132	0	5.5	.0	.4	1.7	.03	175	92	0	.5	239	7.6	6
June 9.....	104	37		.03	.07	28	2.7	10	5.3	121	0	3.0	.0	.4	1.5	.03	164	81	0	.5	214	7.4	10
July 12.....	61	38		.03	.00	30	2.2	8.8	5.1	121	0	4.3	1.0	.4	1.8	.03	153	84	0	.4	213	7.1	7
Aug. 10.....	32	41		.01	.00	29	3.6	9.4	6.0	125	0	5.0	.0	.4	1.2	.03	167	87	0	.4	222	7.2	10
Sept. 28.....	56	38		.04	.00	27	2.8	8.7	6.4	115	0	6.0	1.4	.4	.4	.03	157	79	0	.4	205	6.8	--

PLATTE RIVER BASIN--Continued

6-7975. ELKHORN RIVER AT EWING, NEBR.--Continued

Periodic determinations of suspended-sediment discharge and particle size, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water;
P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Oct. 19, 1960	1530	50		59	7	1						--	--	--	--			
Nov. 16	1440	44		72	11	2.1						--	--	--	--			
Dec. 12	1800	32		78	9	2						--	--	--	--			
Jan. 5, 1961	1530	32		75	4	1						--	--	--	--			
Jan. 31	1535	32		54	8	1						--	--	--	--			
Feb. 27	1445	39		160	58	25						68	87	100	--			V
Mar. 23	1140	41		367	190	188	23	25		32		41	52	96	100			VPWC
Apr. 5	1330	46		150	49	20						--	--	--	--			
Apr. 18	1520	55		166	40	18						--	--	--	--			
May 12	1125	70		116	58	18						79	87	98	100			V
June 9	0840	--		104	70	20						87	90	99	100			V
June 22	0905	70		166	129	58						85	90	99	100			V
July 12	0920	76		61	42	6.9						--	--	--	--			
July 25	1100	82		43	30	3.5						--	--	--	--			
Aug. 10	1145	81		32	20	1.7						--	--	--	--			
Aug. 23	1745	83		57	52	8.0						92	96	98	100			V
Sept. 28	1520	60		53	20	2.9						89	94	100	--			V

PLATTE RIVER BASIN--Continued

6-7975. ELKHORN RIVER AT EWING, NEBR.--Continued

Particle-size analyses of bed material, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Bed material: Percent finer than size indicated, in millimeters											Method of analysis
							0.062	0.125	0.250	0.500	1.000	2.000	4.000	8.000	16.00	32.00	64.00	
Oct. 19, 1960.....	1530		8	59			--	0	23	84	99	100						SV
Nov. 16.....	1440		17	72			0	2	25	75	96	100						SV
Dec. 12.....	1800		11	78			0	2	32	84	97	100						SV
Jan. 5, 1961.....	1530		10	75			0	3	32	87	98	100						SV
Jan. 31.....	1535		11	54			0	1	37	89	97	100						SV
Feb. 27.....	1445		20	160			--	0	19	80	98	100						SV
Mar. 23.....	1140		19	367			0	4	47	91	99	100						SV
Apr. 5.....	1330		15	150			--	0	23	80	97	99	100					SV
Apr. 18.....	1520		17	166			0	1	28	84	98	100						SV
May 12.....	1125		12	116			--	0	24	85	98	100						SV
June 9.....	0840		19	104			--	0	35	91	98	100						SV
June 22.....	0905		17	166			--	0	31	92	98	100						SV
July 12.....	0920		18	61			--	1	39	92	99	100						SV
July 25.....	1100		14	43			0	4	42	89	99	100						V
Aug. 10.....	1145		15	32			0	1	35	89	99	100						SV
Aug. 23.....	1745		15	57			0	1	27	83	97	100						SV
Sept. 28.....	1520		19	53			0	1	33	87	99	100						SV

PLATTE RIVER BASIN--Continued

6-7980. SOUTH FORK ELKHORN RIVER AT EWING, NEBR.

LOCATION.--At gaging station at bridge on U.S. Highway 275 at southeast limits of Ewing, Holt County, and 0.8 mile above mouth.
DRAINAGE AREA.--320 square miles, approximately, of which about 190 square miles contributes directly to surface runoff.
RECORDS AVAILABLE.--Chemical analyses: September 1960 to September 1961.

Chemical analyses, in parts per million, September 1960 to September 1961

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)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Sept. 27, 1960	29.4	46		0.08	0.00	25	2.8	6.6	4.6	106	0	4.8	0.1	0.2	1.2	0.02	155	74	0	0.3	181	7.3	9
Oct. 19	40	46		.05	--	27	1.9	6.7	4.1	107	0	3.0	.0	.2	1.3	.01	147	75	0	.3	188	7.2	5
Nov. 16	33	45		.00	--	26	2.7	6.8	4.3	107	0	3.0	.0	.3	.5	.02	150	76	0	.3	186	7.2	7
Dec. 12	36	47		.06	.00	25	2.8	6.6	4.5	107	0	4.5	.0	.3	1.5	.01	150	74	0	.3	183	7.7	9
Jan. 5, 1961	44	47		.07	.00	26	2.2	6.5	3.9	103	0	3.0	.0	.2	2.2	.03	147	74	0	.3	183	7.4	6
Jan. 31	36	46		.05	.00	25	2.3	6.5	4.0	100	0	3.5	.0	.2	2.6	.03	140	72	0	.3	178	7.3	4
Feb. 27	76	42		.08	.04	26	1.7	6.5	4.2	98	0	3.5	.0	.2	1.7	.02	145	72	0	.3	179	7.3	14
Mar. 23	51	36		.09	.02	28	2.5	9.1	6.2	113	0	7.0	.0	.3	1.9	.02	162	80	0	.4	204	7.2	35
Apr. 18	31	35		.06	.00	33	.4	10	5.5	122	0	6.0	.0	.3	1.9	.03	175	84	0	.5	221	7.5	--
May 12	70	41		.07	.00	32	2.0	10	5.3	128	0	6.3	.0	.5	1.3	.04	172	88	0	.5	227	7.2	8
June 9	52	42		.03	.00	27	2.6	7.5	4.0	114	0	1.3	.0	.3	1.2	.03	155	78	0	.4	196	7.6	10
July 11	55	44		.02	.00	26	2.2	6.8	4.2	105	0	3.3	.0	.3	1.9	.04	161	74	0	.3	183	7.0	8
Aug. 10	30	46		.01	.00	25	3.6	6.7	3.9	109	0	3.3	.0	.2	.6	.02	150	77	0	.3	187	7.4	9
Sept. 28	35	46		.03	.03	27	1.4	6.5	3.8	105	0	4.5	.2	.3	.8	.04	152	73	0	.3	183	6.9	--

6-7980. *SOUTH FORK ELKHORN RIVER AT EWING, NEBR.*--Continued

Periodic determinations of suspended-sediment discharge, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment										Method of analysis
							Percent finer than size indicated, 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 22, 1961.....	1035	69		34	384	35											
July 11.....	1515	80		52	121	17											
Aug. 23.....	1555	87		30	158	13											

Particle-size analyses of bed material, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Bed material											Method of analysis
							Percent finer than size indicated, in millimeters											
							0.062	0.125	0.250	0.500	1.000	2.000	4.000	8.000	16.00	32.00	64.00	
June 22, 1961.....	1035		12	34			0	2	63	92	97	99	100					SV
July 11.....	1515		16	52			0	5	61	96	99	100						SV

PLATTE RIVER BASIN--Continued

6-7990. ELKHORN RIVER NEAR NORFOLK, NEBR.

LOCATION.--At gaging station at bridge on county road, 3.5 miles west-southwest of Norfolk, Madison County, and 7 miles upstream from North Fork Elkhorn River.
DRAINAGE AREA.--2,790 square miles, approximately, of which about 1,790 square miles contributes directly to surface runoff.
RECORDS AVAILABLE.--Chemical analyses: September 1960 to September 1961.

Chemical analyses, in parts per million, water year October 1960 to September 1961

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)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 19, 1960	231	41		0.06	--	50	6.3	9.2	6.6	201	0	7.0	0.6	0.3	1.2	0.06	225	151	0	0.3	335	7.7	6
Nov. 16.....	323	42		.13	--	45	7.2	9.1	6.4	194	0	8.0	.2	.3	.1	.04	216	142	0	.3	320	7.9	6
Dec. 12.....	311	45		.02	0.00	49	7.2	9.6	6.8	205	0	8.0	1.4	.3	.3	.03	240	152	0	.3	330	7.8	12
Jan. 6, 1961.	336	49		.01	.00	45	8.1	8.7	6.0	191	0	6.3	.7	.3	2.7	.06	225	146	0	.3	326	7.5	5
Feb. 1.....	238	49		.02	.07	48	7.8	9.0	6.3	200	0	7.8	.9	.3	2.5	.03	230	152	0	.3	339	7.7	4
Feb. 27.....	457	39		.04	.03	42	4.4	8.0	6.2	166	0	7.0	.1	.2	2.5	.02	200	123	0	.3	284	7.5	14
Mar. 23.....	630	30		.08	.01	39	5.0	12	7.5	161	0	15	.0	.4	2.2	.06	206	118	0	.5	283	7.0	45
Apr. 18.....	468	25		.05	.00	45	5.7	12	6.9	187	0	14	.1	.4	1.2	.12	227	136	0	.4	314	7.7	--
May 12.....	419	39		.09	.00	46	5.6	10	7.5	187	0	7.3	.0	.4	2.3	.04	223	138	0	.4	324	7.4	4
June 9.....	419	35		.04	.06	45	6.0	9.4	7.1	187	0	4.5	.3	.4	2.6	.03	217	137	0	.4	316	7.6	10
July 11.....	242	38		.07	.02	45	6.0	9.0	6.7	184	0	9.0	.0	.4	.7	.04	209	137	0	.3	304	7.2	7
Aug. 23.....	207	37		.03	--	45	5.7	8.3	7.9	185	0	3.8	.2	.4	1.3	.03	212	136	0	.3	313	7.5	5
Sept. 29.....	210	41		.04	.00	44	6.8	9.0	6.5	184	0	6.8	.7	.3	1.2	.04	219	138	0	.3	311	6.9	--

Periodic determinations of suspended-sediment discharge, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
June 22, 1961.....	1400	76		374	522	527												
July 11.....	1020	74		245	540	357												
Aug. 23.....	1115	74		207	203	113												

6-7991. NORTH FORK ELKHORN RIVER NEAR PIERCE, NEBR.

LOCATION.--At gaging station on county road bridge, 2.5 miles southeast of Pierce, Pierce County.
DRAINAGE AREA.--520 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: September 1960 to September 1961.

Chemical analyses, in parts per million, September 1960 to September 1961

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)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Sept. 28, 1960.....	58.5	35		0.03	0.00	66	13	12	5.5	262	0	26	2.5	0.3	5.3	0.06	303	218	3	0.4	465	7.3	3
Oct. 19.....	42	35		.07	--	67	10	12	5.4	257	0	18	2.1	.3	5.1	.08	280	210	0	.4	441	7.7	4
Nov. 16.....	46	32		.02	--	66	11	12	5.2	261	0	19	2.1	.3	2.4	.02	278	210	0	.4	438	8.1	5
Dec. 12.....	68	35		.01	.17	69	15	14	5.3	280	0	24	2.4	.4	3.5	.03	315	232	2	.4	483	7.5	7
Jan. 6, 1961.	51	36		.02	.45	63	13	12	4.3	256	0	18	2.4	.3	6.7	.03	282	209	0	.4	444	7.5	3
Feb. 1.....	36	34		.03	.33	62	11	11	4.2	242	0	19	2.0	.3	6.4	.02	271	198	0	.3	423	7.5	2
Feb. 27.....	112	24		.09	.17	55	9.7	11	11	208	0	32	1.9	.3	8.6	.04	274	177	6	.4	414	7.2	44
Mar. 23.....	122	28		.01	.05	73	16	19	8.1	296	0	37	3.6	.5	5.5	.05	346	248	5	.5	538	7.6	18
Apr. 18.....	73	6.2		.02	.18	74	14	19	5.2	291	0	39	3.0	.4	4.2	.11	338	244	5	.5	526	7.8	--
May 12.....	72	30		.05	.14	73	18	23	6.7	308	0	44	2.0	.5	4.1	.05	367	256	3	.6	567	7.4	8
June 9.....	91	26		.03	.03	60	11	14	6.5	230	0	29	2.6	.4	6.0	.05	279	193	4	.4	441	7.6	10
July 11.....	346	17		.05	.14	43	14	7.5	8.4	204	0	18	.0	.4	1.3	.04	207	164	0	.3	320	7.2	20
Aug. 23.....	51	34		.10	--	61	10	12	6.7	246	0	13	2.0	.4	4.4	.04	274	193	0	.4	425	7.4	7
Sept. 29.....	36	36		.01	.06	63	10	12	5.4	250	0	17	2.8	.4	4.9	.04	280	200	0	.4	434	7.0	--

Periodic determinations of suspended-sediment discharge, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
June 22, 1961.....	1240	70		88	200	48												
July 11.....	1225	70		360	3000	2920												
Aug. 23.....	1330	73		51	108	15												

MISSOURI RIVER MAIN STEM

6-8070. 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 1961.
Water temperatures: May 1951 to September 1961.
EXTREMES, 1960-61.--Dissolved solids: Maximum, 546 ppm Dec. 22-27; minimum, 329 ppm Mar. 7-25.
Hardness: Maximum, 282 ppm Dec. 22-27; minimum, 190 ppm Mar. 7-25.
Specific conductance: Maximum daily, 892 micromhos Dec. 27; minimum daily, 468 micromhos Mar. 19.
Water temperatures: Maximum, 83°F Aug. 4; minimum, freezing point on several days during January.
EXTREMES, 1951-61.--Dissolved solids: Maximum, 600 ppm Jan. 1-10, 1952; minimum, 217 ppm Mar. 31, 1960.
Hardness: Maximum, 344 ppm Jan. 1-10, 1952; minimum, 126 ppm Mar. 31, 1960.
Specific conductance: Maximum daily, 936 micromhos Jan. 6, 1953; minimum daily, 327 micromhos Apr. 4, 1960.
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 and some determinations of aluminum, manganese, phosphate, alpha activity, beta activity, radium, and uranium available in district offict at Lincoln, Nebr.

Chemical analyses, in parts per million, water year October 1960 to September 1961

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 $CaCO_3$		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, 1960.	32,590	--	--	--	--	59	--	197	0	--	--	--	--	--	455	0.62	40,040	225	63	1.7	696	7.8	--
Oct. 31.....	36,000	11	0.53	61	18	61	5.4	198	0	177	16	0.5	2.1	--	454	.62	44,130	227	65	1.8	690	8.2	5
Nov. 1-20.....	32,680	--	--	--	--	61	--	208	0	--	--	--	--	--	468	.64	41,290	234	63	1.7	717	7.6	--
Nov. 21-30.....	17,890	--	--	--	--	62	--	230	0	--	--	--	--	--	478	.65	23,090	248	59	1.7	741	7.7	--
Dec. 1-20.....	15,310	17	--	69	21	61	6.1	239	0	159	25	.5	3.2	0.11	491	.67	20,300	258	62	1.6	749	7.5	7
Dec. 21.....	11,000	19	--	68	20	60	7.0	232	0	166	17	.5	2.0	.12	482	.66	14,320	253	63	1.6	724	7.5	--
Dec. 22-27.....	8,750	--	--	--	--	67	--	265	0	--	--	--	--	--	546	.74	12,900	282	65	1.7	825	7.5	--
Dec. 28-Jan. 21, 1961.....	15,230	--	--	--	--	60	--	234	0	--	--	--	--	--	491	.67	20,190	253	61	1.6	755	7.5	--
Jan. 22-Feb. 9..	11,590	--	--	--	--	58	--	223	0	--	--	--	--	--	477	.65	14,930	245	62	1.6	730	7.4	--
Feb. 10-16.....	15,200	--	--	--	--	49	--	204	0	--	--	--	--	--	416	.57	17,070	214	47	1.5	640	7.4	--
Feb. 17-23.....	16,740	--	--	--	--	46	--	197	0	--	--	--	--	--	407	.55	18,400	213	51	1.4	631	7.3	--
Feb. 24-Mar. 6..	28,250	--	--	--	--	36	--	189	0	--	--	--	--	--	368	.50	28,070	198	43	1.1	568	7.3	--
Mar. 7-25.....	30,460	20	--	55	13	27	8.3	185	0	77	16	.2	6.5	.15	329	.45	27,060	190	38	.8	525	7.5	12
Mar. 26.....	37,800	17	--	56	13	30	7.3	183	0	92	12	.3	5.2	.06	344	.47	35,110	195	45	.9	524	7.9	10
Mar. 27-Apr. 5..	33,950	--	--	--	--	29	--	196	0	--	--	--	--	--	337	.46	30,890	204	43	.9	531	7.6	--
Apr. 6-19.....	34,310	--	--	--	--	45	--	212	0	--	--	--	--	--	424	.58	39,280	238	64	1.3	659	7.8	--
Apr. 20-30.....	32,260	--	--	--	--	54	--	220	0	--	--	--	--	--	467	.64	40,680	273	93	1.4	713	7.8	--
May 1-14, 16-31.	33,940	--	--	--	--	54	--	212	0	--	--	--	--	--	453	.62	41,510	239	65	1.5	698	7.7	--
May 15.....	32,700	13	.00	62	21	58	5.8	208	0	165	19	.5	2.7	--	469	.64	41,410	241	70	1.6	735	7.9	5

June 1-30, 1961.	35,900	14	--	63	16	46	6.5	200	0	135	18	.5	3.3	.10	418	.57	40,520	224	60	1.3	641	7.3	4
July 1-31.....	32,760	--	--	--	--	60	--	196	0	--	--	--	--	--	453	.62	40,070	229	68	1.7	697	7.3	--
Aug. 1-31.....	32,890	--	--	--	--	60	--	191	0	--	--	--	--	--	454	.62	40,320	225	68	1.7	691	7.4	--
Sept. 1-30.....	32,780	11	--	62	18	62	5.8	190	0	177	19	.4	.7	.11	465	.63	41,160	227	71	1.8	719	7.3	3
Weighted average.....	--	--	--	--	--	53	--	203	0	--	--	--	--	--	440	0.60	33,500	229	63	1.5	678	7.5	--
Time-weighted average.....	28,190	--	--	--	--	54	--	207	0	--	--	--	--	--	446	--	--	232	62	1.5	686	7.5	--
Tons per day..	--	--	--	--	--	4,060	--	15,440	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Temperature (°F) of water, water year October 1960 to September 1961

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

NISHNABOTNA RIVER BASIN

6-8080. MULE CREEK NEAR MALVERN, IOWA

LOCATION.--At gaging station at county 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.--Water temperatures: October 1958 to September 1961.
Sediment records: July 1954 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 85°F June 29; minimum, freezing point on many days during December to February.
Sediment concentrations: Maximum daily, 6,200 ppm Sept. 12; minimum daily, 13 ppm Aug. 30.
Sediment loads: Maximum daily, 2,760 tons June 27; minimum daily, 0.1 ton on several days during February, August, and September.
EXTREMES, 1954-61.--Water temperatures (1958-61): Maximum, 88°F Aug. 3, 1959; minimum, freezing point on many days during winter months each year.
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, 25,100 ppm June 27. Flow affected by ice Nov. 28 to Dec. 2, Dec. 6 to Jan. 14, Jan. 18 to Feb. 11, Feb. 18-20, 25, Mar. 8-10.

Temperature (°F) of water, water year October 1960 to September 1961

Month	Day																													Aver-age
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
October	52	54	64	62	60	62	60	55	52	65	68	62	64	66	56	50	60	56	60	50	42	52	44	50	51	53	54	56	52	49	45	55
November	42	--	48	--	41	42	--	46	--	38	--	44	42	--	46	--	44	--	43	43	--	42	--	42	--	46	44	--	33	--	--	--
December	32	--	38	46	--	--	--	32	--	--	32	--	32	--	32	--	32	32	--	32	--	32	--	--	32	--	--	32	--	32	--	--
January	32	--	32	--	36	--	34	32	--	32	--	32	--	32	32	--	32	--	32	--	32	32	--	32	--	32	--	32	32	--	32	--
February	--	32	--	32	--	32	--	32	--	32	--	32	--	32	--	32	--	32	32	--	32	--	32	--	32	37	--	38	--	--	--	--
March	--	44	--	38	34	--	36	--	44	--	48	40	--	42	40	46	--	40	44	--	40	--	50	--	54	46	--	47	--	42	--	--
April	52	--	--	56	56	54	56	40	50	50	44	50	57	58	48	50	38	48	48	65	50	68	54	45	54	60	56	46	46	51	--	52
May	--	46	58	50	52	62	52	59	62	52	74	56	70	70	--	54	54	56	60	64	56	61	68	72	62	64	70	57	76	58	62	61
June	80	75	71	60	76	73	79	70	64	66	70	68	67	68	64	63	60	60	72	58	60	64	60	62	60	62	70	78	85	72	--	68
July	83	78	66	78	70	70	66	79	80	62	66	66	64	64	65	72	65	70	70	82	68	64	64	66	70	72	70	75	72	74	72	70
August	76	70	70	72	70	64	63	70	70	72	78	66	64	64	--	63	66	68	68	66	61	64	62	62	64	74	70	65	67	79	68	68
September	69	82	68	60	70	72	75	80	70	70	66	64	61	54	56	66	54	58	62	56	54	60	56	54	50	50	54	50	56	54	--	62

NISHNABOTNA RIVER BASIN--Continued

6-S080. MULE CREEK NEAR MALVERN, IOWA--Continued

Suspended sediment, water year October 1960 to September 1961

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	5.6	62	0.9	4.9	100	1.3	3.6	33	0.3
2	5.2	61	.9	4.6	70	.9	4.2	32	.4
3	5.2	37	.5	4.6	53	.7	4.9	32	.4
4	5.2	22	.3	4.6	58	.7	7.2	51	1.0
5	5.2	32	.4	4.6	62	.8	7.6	70	1.4
6	4.9	26	.3	4.6	79	1.0	3.5	72	.7
7	4.9	20	.3	4.3	74	.9	3.1	74	.6
8	4.9	28	.4	4.6	68	.8	3.0	74	.6
9	4.6	30	.4	4.3	56	.7	3.0	74	.6
10	4.6	19	.2	4.3	44	.5	3.5	75	.7
11	4.6	38	.5	4.6	42	.5	4.1	76	.8
12	4.6	28	.3	4.6	40	.5	3.2	76	.7
13	8.6	220	S 10	4.6	49	.6	3.0	76	.6
14	6.8	110	2.0	4.3	54	.6	3.9	76	.8
15	4.6	38	.5	5.2	60	.8	4.3	77	.9
16	4.3	36	.4	4.6	53	.7	3.7	68	.7
17	4.3	31	.4	4.6	46	.6	3.2	59	.5
18	4.3	28	.3	4.6	44	.5	3.0	68	.6
19	4.6	25	.3	4.6	41	.5	2.8	62	.5
20	4.3	32	.4	4.6	37	.5	2.7	55	.4
21	4.3	30	.3	4.6	35	.4	2.6	58	.4
22	4.6	21	.3	4.6	33	.4	2.6	61	.4
23	4.3	36	.4	4.3	35	.4	2.7	56	.4
24	4.3	23	.3	4.6	37	.5	2.9	52	.4
25	5.6	80	1.2	4.6	40	.5	3.1	48	.4
26	4.6	20	.2	4.6	42	.5	3.2	44	.4
27	4.0	20	.2	4.6	48	.6	3.3	40	.4
28	4.0	15	.2	4.3	45	.5	3.3	36	.3
29	19	1220	S 104	3.9	42	.4	3.3	42	.4
30	11	460	14	3.3	38	.3	3.0	48	.4
31	5.6	120	1.8	--	--	--	3.2	46	.4
Total	172.6	--	142.6	135.1	--	18.6	110.7	--	17.5
	JANUARY			FEBRUARY			MARCH		
1	3.5	45	0.4	2.7	50	0.4	4.3	65	0.8
2	2.7	44	.3	2.8	49	.4	4.6	115	1.4
3	3.0	43	.3	2.8	40	.3	4.6	140	1.7
4	3.1	46	.4	2.8	32	.2	4.9	220	2.9
5	3.3	48	.4	3.0	37	.3	4.9	170	2.2
6	3.3	50	.4	3.2	42	.4	5.2	95	1.3
7	3.2	53	.5	3.2	28	.2	4.9	70	.9
8	3.2	39	.3	3.3	15	.1	4.6	150 A	1.9
9	3.1	44	.4	3.3	18	.2	4.4	165	1.9
10	3.1	48	.4	3.5	20	.2	6.0	700 A	11
11	3.2	46	.4	5.0	140 A	1.9	7.6	950	19
12	3.2	44	.4	7.2	260	5.0	33	1870 S	471
13	3.4	42	.4	5.6	280 A	4.2	36	3310 S	352
14	3.4	41	.4	4.9	195	2.6	13	1800	63
15	4.0	29	.3	4.3	140	1.6	11	1000	30
16	4.3	39	.5	4.6	140	1.7	9.5	930	24
17	3.7	49	.5	6.0	120 A	1.9	8.6	750	17
18	3.3	54	.5	5.6	55	.8	8.6	570	13
19	3.2	60	.5	5.0	90	1.2	8.2	570	13
20	3.1	68	.6	4.0	85	.9	8.2	650	14
21	3.0	75	.6	4.9	80	1.1	8.2	560	12
22	2.8	48	.4	6.4	140 A	2.4	8.2	550	12
23	2.5	57	.4	8.0	240 A	5.2	7.7	505	10
24	2.4	66	.4	4.6	140	1.7	7.3	455	9.0
25	2.4	66	.4	3.7	105	1.0	7.3	355	7.0
26	2.4	65	.4	4.3	63	.7	7.3	430	8.5
27	2.4	62	.4	4.0	63	.7	15	1900 A	77
28	2.5	60	.4	4.0	63	.7	9.0	1700 A	41
29	2.6	62	.4	--	--	--	7.7	1000 A	21
30	2.7	57	.4	--	--	--	7.3	630	12
31	2.7	52	.4	--	--	--	7.3	530 A	10
Total	94.7	--	12.9	122.7	--	38.0	284.4	--	1261.5

S Computed by subdividing day.
A Computed from partly estimated concentration graph.

NISHNABOTNA RIVER BASIN--Continued

6-8080. MULE CREEK NEAR MALVERN, IOWA--Continued

Suspended sediment, water year October 1960 to September 1961--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	6.9	495	9.2	5.4	68	1.0	6.1	810	13
2	6.9	500	9.3	5.8	80	1.3	5.1	350	4.8
3	7.3	650	13	5.8	43	.7	4.5	155	1.9
4	6.9	665	12	9.6	550 S	24	4.5	115	1.4
5	7.3	395	7.8	10	680	18	4.5	90	1.1
6	6.1	430	7.1	6.9	250	4.6	7.7	1800 S	41
7	6.1	300	4.9	7.3	220 A	4.3	8.8	1290 S	71
8	7.7	680	14	8.2	300 A	6.6	13	2790 S	129
9	9.5	950	24	5.8	170	2.6	5.4	460	6.7
10	7.3	440	8.7	5.4	135	2.0	4.5	310	3.8
11	15	2900 S	144	5.1	110	1.5	4.1	210	2.3
12	14	1950	74	5.1	160	2.2	3.8	165	1.7
13	10	1060	29	5.1	130	1.8	16	2250 S	133
14	9.5	990	25	5.4	105	1.5	13	1740 S	116
15	8.2	595	13	5.4	190	2.8	14	2000 A	76
16	7.3	430	8.5	5.8	420 A	6.6	6.5	410	7.2
17	6.5	315	5.5	9.5	950	24	6.1	370	6.1
18	6.9	230	4.3	6.1	250	4.1	5.8	220	4.0
19	7.3	240	4.7	5.8	130	2.0	5.8	195	3.1
20	7.7	320	6.6	5.8	140	2.2	5.8	290	4.6
21	6.1	185	3.0	5.4	150	2.2	5.1	260	3.6
22	6.5	160	2.8	5.1	105	1.4	5.4	280 A	4.1
23	6.9	120	2.2	4.8	77	1.0	4.5	105	1.3
24	6.1	100	1.6	4.8	80	1.0	4.1	93	1.0
25	5.8	89	1.4	5.4	110	1.6	4.1	105	1.2
26	5.4	91	1.3	4.8	47	.6	4.1	89	1.0
27	5.4	86	1.3	4.8	52	.7	70	5410 S	2760
28	5.4	71	1.0	4.5	61	.7	7.3	355	7.0
29	5.8	79	1.2	4.5	37	.4	5.4	385	5.6
30	5.8	68	1.1	12	2180 S	128	4.5	205	2.5
31	--	--	--	9.0	1550	38	--	--	--
Total	223.6	--	441.5	194.4	--	289.4	259.5	--	3415.0

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	4.1	90	1.0	4.1	180	2.0	2.4	27	0.2
2	4.1	97	1.1	3.5	155	1.5	14	2600 S	403
3	3.8	94	1.0	2.9	180	1.4	17	3400 S	209
4	2.9	52	.4	2.4	80	.5	5.4	305	4.4
5	3.2	57	.5	2.4	54	.3	4.1	58	.6
6	3.8	54	.6	2.2	49	.3	3.2	47	.4
7	4.1	130	1.4	2.2	39	.2	2.7	22	.2
8	3.8	65	.7	2.2	23	.1	2.9	20	.2
9	3.5	23	.2	2.2	30	.2	2.7	16	.1
10	3.5	46	.4	13	2900 S	145	2.7	16	.1
11	3.5	34	.3	11	1280 S	56	5.4	65	.9
12	3.8	75	.8	4.5	210	2.6	40	6200 S	1240
13	4.1	53	.6	3.2	98	.8	24	1650 S	157
14	3.5	66	.6	2.7	64	.5	7.3	225	4.4
15	3.2	66	.6	2.7	43	.3	5.1	90	1.2
16	2.9	73	.6	2.4	39	.3	5.1	67	.9
17	2.7	78	.6	2.4	46	.3	4.8	55	.7
18	4.1	260 A	2.9	2.2	27	.2	4.1	36	.4
19	3.5	71	.7	2.2	26	.2	4.1	34	.4
20	3.2	52	.4	2.2	25	.1	5.4	100	1.5
21	3.2	72	.6	7.4	1420 S	51	5.8	70	1.1
22	3.2	82	.7	9.0	800	19	33	3690 S	379
23	4.5	160	1.9	4.5	145	1.8	10	440	12
24	4.1	100	1.1	3.5	84	.8	6.5	130	2.3
25	3.2	80	.7	3.2	60	.5	5.8	105	1.6
26	3.2	68	.6	2.9	29	.2	5.4	54	.8
27	3.2	120	1.0	2.9	27	.2	5.1	45	.6
28	5.4	240 A	3.5	2.4	25	.2	4.8	35	.5
29	3.8	140	1.4	2.4	16	.1	5.1	26	.4
30	2.7	105	.8	2.4	13	.1	14	1080 S	46
31	2.4	65	.4	2.4	20	.1	--	--	--
Total	110.2	--	28.1	115.6	--	286.8	257.9	--	2469.9

Total discharge for year (cfs-days)..... 2081.4
Total load for year (tons)..... 8421.8

S Computed by subdividing day.
A Computed from partly estimated concentration graph.

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NISHNABOTNA RIVER BASIN--Continued

6-8080. MULE CREEK NEAR MALVERN, IOWA--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
May 30, 1961.....	1440	58		21.6	13400		--	42	--	64	--	98	99	100				SPWC
June 27.....	0430	70		65.5	25100		40	44	46	62	83	98	100	--				SPWC
June 27.....	0430	70		65.5	25100		23	25	33	54	82	98	100	--				SPN
June 27.....	0615	70		206	12700		28	29	30	46	79	96	99	100				SPWC
June 27.....	0615	70		206	12700		11	16	23	35	71	96	99	100				SPN

NISHNABOTNA RIVER BASIN--Continued

6-8090. DAVIDS CREEK NEAR HAMLIN, IOWA

LOCATION.--At gaging station at 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 1961.
EXTREMES, 1960-61.--Sediment concentrations: Maximum daily, 6,820 ppm Mar. 11, minimum daily, 33 ppm Aug. 17.
Sediment loads: Maximum daily, 3,380 tons Mar. 11; minimum daily, 0.2 ton Aug. 15, 17, Sept. 9, 10.
EXTREMES, 1952-61.--Sediment concentrations: Maximum daily, 10,700 ppm Apr. 23, 1955; minimum daily, no flow on many days in 1953-56.
Sediment loads: Maximum daily, 99,000 tons July 2, 1958; minimum daily, 0 tons on many days in 1953-56.
REMARKS.--Maximum observed sediment concentration during water year, 14,500 ppm Mar. 11. Flow affected by ice Nov. 9-11, 23, Nov. 28 to Dec. 3, Dec. 7 to Feb. 22, Feb. 25-27.

Suspended sediment, water year October 1960 to September 1961
/Where no concentrations are reported, loads are estimated/

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..	1.6	455	2.0	5.7	370	5.7	3.8	290	3.0
2..	1.2	440	1.4	5.2	340	4.8	4.1	275	3.0
3..	1.0	420	1.1	5.0	380	5.1	4.5	260	3.2
4..	1.0	435	1.2	4.8	355	4.6	5.9	260	4.1
5..	1.2	450	1.5	4.8	390	5.1	6.5	260	4.6
6..	1.0	490	1.3	4.6	340	4.2	5.0	280	3.8
7..	1.0	485	1.3	4.8	335	4.3	3.5	295	2.8
8..	1.0	460	1.2	4.6	330	4.1	3.8	270	2.8
9..	1.0	340	.9	3.7	365	3.6	3.9	245	2.6
10..	1.0	310	.8	3.5	405	3.8	3.8	220	2.3
11..	1.0	420	1.1	3.8	370	3.8	3.5	240	2.3
12..	1.0	450	1.2	4.3	340	3.9	3.0	265	2.1
13..	3.9	605	S 7.9	4.3	350	4.1	2.7	240	1.7
14..	4.1	350	3.9	4.3	375	4.4	3.1	215	1.8
15..	3.3	500	4.5	4.8	400	5.2	3.2	215	1.9
16..	3.1	650	5.4	4.1	380	4.2	3.2	205	1.8
17..	3.1	470	3.9	3.9	365	3.8	3.1	200	1.7
18..	3.1	310	2.6	3.9	300	3.2	2.9	210	1.6
19..	3.1	520	4.4	3.9	240	2.5	2.5	225	1.5
20..	3.1	530	4.4	4.0	305	3.3	2.2	200	1.2
21..	3.1	440	3.7	4.1	320	3.5	1.9	180	.9
22..	2.9	455	3.6	3.9	335	3.5	1.8	160	.8
23..	2.5	500	3.4	3.9	265	2.8	1.8	135	.7
24..	2.3	475	2.9	3.9	275	2.9	1.8	125	.6
25..	2.5	455	3.1	3.7	285	2.8	2.0	120	.6
26..	2.5	485	3.3	3.7	275	2.7	2.0	120	.6
27..	2.5	515	3.5	3.5	280	2.6	2.0	120	.6
28..	2.5	580	3.9	3.3	285	2.5	2.0	125	.7
29..	8.0	750	S 20	2.7	280	2.0	2.0	130	.7
30..	7.9	420	9.0	3.4	280	2.6	2.0	140	.8
31..	6.8	400	7.3	--	--	--	1.9	150	.8
Total	83.3	--	115.7	124.1	--	111.6	95.4	--	57.6

S Computed by subdividing day.

NISHNABOTNA RIVER BASIN--Continued

6-8090. DAVIDS CREEK NEAR HAMLIN, IOWA--Continued

Suspended sediment, water year October 1960 to September 1961--Continued
/Where no concentrations are reported, loads are estimated/

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	275	1.3	0.9	--	0.5	8.1	900	20
2..	1.4	285	1.1	.9	--	.5	8.1	1000	22
3..	1.5	300	1.2	.8	--	.4	6.8	750	14
4..	1.7	290	1.3	.8	185	.4	22	3450 S	259
5..	1.8	285	1.4	.8	--	.4	8.4	--	15
6..	1.8	285	1.4	.8	--	.4	10	--	20
7..	1.8	280	1.4	.9	165	.4	8.1	585	13
8..	1.6	295	1.3	.9	--	.5	9.0	--	10
9..	1.6	310	1.3	1.5	--	.8	11	340	10
10..	1.7	315	1.4	3.0	180	1.5	41	4530 S	740
11..	1.7	320	1.5	7.0	850 A	16	146	6820 S	3380
12..	1.7	325	1.5	30	--	100	48	3530 S	505
13..	1.8	330	1.6	15	600	24	25	1700	115
14..	1.8	320	1.6	10	550	15	38	2660 S	326
15..	1.9	300	1.5	8.0	400	8.6	88	3660 S	957
16..	1.9	275	1.4	6.0	250	4.0	92	4600 S	1380
17..	1.9	270	1.4	5.2	--	3.8	100	4770 S	1620
18..	1.8	270	1.3	6.4	215	3.7	44	2200	261
19..	1.6	270	1.2	7.2	--	5.0	49	3090 S	800
20..	1.5	250	1.0	8.0	335	7.2	35	2810 S	298
21..	1.3	225	.8	50	1500	202	24	1890 S	130
22..	1.1	--	.8	110	1700	505	99	3030 S	1330
23..	1.0	--	.7	97	1900	498	125	4430 S	2090
24..	.9	--	.6	19	1400	72	102	5020 S	1860
25..	.8	--	.5	13	2500 A	88	68	2910 S	593
26..	.8	--	.5	9.0	2900 A	70	40	1300	140
27..	.8	--	.5	11	2700 A	80	130	4120 S	2070
28..	.8	240	.5	10	2000 A	54	53	--	150
29..	.9	230	.6	--	--	--	38	880	90
30..	.9	220	.5	--	--	--	32	--	50
31..	.9	210	.5	--	--	--	28	470	36
Total	44.4	--	33.6	433.1	--	1762.1	1536.5	--	19304

	APRIL			MAY			JUNE		
1..	25	475	32	14	100	3.8	20	750	40
2..	24	480	31	14	90	3.4	16	450	19
3..	25	625	42	14	67	2.5	15	290	12
4..	30	775 S	66	15	70	2.8	14	275	10
5..	26	500	35	20	420 A	23	13	240	8.4
6..	22	415	25	17	200	9.2	23	1910 S	179
7..	20	310	17	16	130	5.6	40	3300 S	574
8..	20	285	15	15	86	3.5	23	615	38
9..	22	305	18	14	100	3.8	20	470	25
10..	19	300	15	13	100	3.5	18	375	18
11..	30	1340 S	129	12	98	3.2	16	365	16
12..	57	2670 S	532	12	105	3.4	15	365	15
13..	54	1210 S	180	12	63	2.0	88	5160 S	2080
14..	42	750	85	12	80	2.6	31	780	65
15..	32	460	40	11	98	2.9	26	450	32
16..	28	465	35	11	69	2.0	22	375	22
17..	26	470	33	21	605 S	44	20	355	19
18..	24	275	18	16	200	8.6	19	330	17
19..	23	290	18	14	125	4.7	19	310	16
20..	22	335	20	14	115	4.3	18	300	15
21..	20	225	12	13	105	3.7	16	265	11
22..	20	235	13	12	105	3.4	15	260	11
23..	20	175	9.5	11	105	3.1	14	225	8.5
24..	19	175	9.0	10	100	2.7	14	205	7.7
25..	17	150	6.9	10	92	2.5	13	225	7.9
26..	16	130	5.6	8.7	67	1.6	13	190	6.7
27..	16	125	5.4	8.7	64	1.5	14	230	8.7
28..	15	105	4.3	8.4	68	1.5	12	240	7.8
29..	16	100	4.3	7.4	75	1.5	12	235	7.6
30..	16	100	4.3	14	1540 S	158	11	275	8.2
31..	--	--	--	39	3890 S	614	--	--	--
Total	746	--	1460.3	429.2	--	932.3	610	--	3305.5

S Computed by subdividing day.
A Computed from partly estimated concentration graph.

NISHNABOTNA RIVER BASIN--Continued

6-8090. DAVIDS CREEK NEAR HAMLIN, IOWA--Continued

Suspended sediment, water year October 1960 to September 1961--Continued
(Where no concentrations are reported, loads are estimated)

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..	10	245	6.6	25	1730	S 187	2.1	73	0.4
2..	9.3	225	5.6	11	315	9.4	1.8	58	.3
3..	8.9	225	5.4	8.1	210	4.6	4.8	195	2.5
4..	8.1	235	5.1	6.0	175	2.8	2.3	125	.8
5..	8.1	260	5.7	4.8	140	1.8	2.0	125	.7
6..	8.9	240	5.8	4.4	175	2.1	2.1	115	.7
7..	8.1	155	3.4	4.2	210	2.4	2.0	65	.4
8..	7.7	130	2.7	5.4	150	2.2	1.8	56	.3
9..	6.9	140	2.6	5.1	83	1.1	1.4	60	.2
10..	6.5	145	2.5	3.4	76	.7	1.3	60	.2
11..	6.9	135	2.5	3.2	135	1.2	2.3	135	.8
12..	6.5	165	2.9	2.9	135	1.1	22	1720	S 232
13..	7.7	265	5.5	3.2	150	1.3	27	1060	S 138
14..	7.3	170	3.4	3.2	170	1.5	6.9	245	4.6
15..	6.5	195	3.4	2.5	36	.2	5.1	245	3.4
16..	5.8	--	3.4	2.7	42	.3	3.9	150	1.6
17..	5.4	--	3.4	2.5	33	.2	3.7	175	1.7
18..	6.1	220	3.6	10	1630	S 150	3.4	145	1.3
19..	6.1	145	2.4	17	1000	46	3.4	135	1.2
20..	5.8	155	2.4	4.2	300	3.4	2.2	170	1.0
21..	5.8	155	2.4	3.9	210	2.2	3.4	205	1.9
22..	5.4	175	2.6	6.5	160	2.8	3.7	145	1.4
23..	5.4	185	2.7	3.9	110	1.2	4.5	240	2.9
24..	5.1	195	2.7	3.7	58	.6	3.7	160	1.6
25..	4.9	190	2.5	3.2	59	.5	3.4	155	1.4
26..	4.8	435	S 9.0	3.4	155	1.4	3.2	150	1.3
27..	6.5	305	S 6.9	2.9	115	.9	2.7	135	1.0
28..	45	3230	S 764	2.7	125	.9	2.3	125	.8
29..	9.7	375	9.8	2.5	70	.5	26	875	S 479
30..	6.9	240	4.5	2.5	110	.7	175	3440	S 2990
31..	7.4	200	4.0	2.3	105	.7	--	--	--
Total	253.5	--	889.4	166.3	--	431.7	329.4	--	3873.4

Total discharge for year (cfs-days)..... 4851.2
Total load for year (tons)..... 32277.2

S Computed by subdividing day.

6-8090. DAVIDS CREEK NEAR HAMLIN, IOWA--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Feb. 21, 1961	1530	32		d 50	3580		--	28	--	49	--	94	97	99	100			SPWC
Feb. 22	1845	34		d 110	5020		--	34	--	51	--	92	96	100	--			SPWC
Mar. 11	1645	37		321	14500		23	26	--	33	--	90	95	99	100			SPWC
Mar. 11	1645	37		321	14500		12	17	--	33	--	90	95	99	100			SPN
June 7	0715	58		57	8560		39	44	56	69	93	99	100	--	--			SPWC
June 13	0800	62		172	9760		44	49	60	71	89	95	97	100	--			SPWC

d Daily mean discharge.

KANSAS RIVER BASIN

6-8566. REPUBLICAN RIVER AT CLAY CENTER, KANS.

LOCATION.--At gaging station at bridge on State Highway 15, 1 mile south of Clay Center, Clay County, and 4 miles downstream from Five Creeks.
DRAINAGE AREA.--24,570 square miles, approximately, of which a large area is noncontributing.
RECORDS AVAILABLE.--Water temperatures: October 1957 to September 1961.
Sediment records: October 1957 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 80°F on several days during July and August; minimum, freezing point Dec. 20, 21, 23, 24.
Sediment concentrations: Maximum daily, 5,100 ppm June 7; minimum daily, 20 ppm on several days during December and January.
Sediment loads: Maximum daily, 122,000 tons May 23; minimum daily, 8 tons Dec. 27, Jan. 2.
EXTREMES, 1957-61.--Water temperatures: Maximum, 94°F Aug. 12, 1958; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 6,060 ppm June 17, 1960; minimum daily, 10 ppm on several days during January 1960.
Sediment loads: Maximum daily, 277,000 tons Sept. 6, 1958; minimum daily, 3 tons Jan. 2, 3, 6, 1960.
REMARKS.--Flow affected by ice Dec. 20-24, Jan. 5, Jan. 22 to Feb. 15.

Temperature (°F) of water, water year October 1960 to September 1961

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

6-8566. REPUBLICAN RIVER AT CLAY CENTER, KANS.--Continued

Suspended sediment, water year October 1960 to September 1961

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..	274	120	89	181	110	54	121	310	101
2..	455	1480	1820	173	80	37	102	90	25
3..	360	1950	1900	181	120	59	141	50	19
4..	297	1010	810	185	160	80	157	40	25
5..	248	730	489	181	180	88	173	60	28
6..	225	570	346	177	140	67	169	30	14
7..	221	400	239	169	50	23	193	40	21
8..	213	420	242	169	50	23	189	30	15
9..	209	250	141	169	60	27	173	30	14
10..	205	190	105	165	100	44	169	40	18
11..	201	160	87	169	50	23	185	40	20
12..	193	140	73	169	80	36	177	30	14
13..	201	120	65	177	90	43	149	30	12
14..	252	560	381	177	60	29	113	30	9
15..	266	840	603	177	50	24	133	30	11
16..	209	190	107	181	60	29	133	40	14
17..	193	230	120	181	80	39	121	40	13
18..	193	140	73	181	120	59	129	30	10
19..	217	100	59	181	70	34	137	40	15
20..	217	130	76	185	70	35	120	50	16
21..	225	100	61	181	110	54	100	50	14
22..	209	100	56	173	140	65	100	30	8
23..	201	100	54	165	160	71	150	40	16
24..	205	100	55	169	190	87	200	50	27
25..	197	100	53	165	330	147	252	30	20
26..	189	80	41	161	100	43	213	40	23
27..	181	70	34	157	190	80	193	50	26
28..	177	60	29	153	160	66	209	160	90
29..	181	60	29	149	180	72	185	180	90
30..	185	80	40	109	140	41	181	50	24
31..	181	70	34	--	--	--	201	20	11
Total	6980	--	8311	5110	--	1579	4968	--	763

	JANUARY			FEBRUARY			MARCH		
1..	177	20	10	140	80	30	193	80	42
2..	98	30	8	130	80	28	185	110	55
3..	133	30	11	110	40	12	189	120	61
4..	165	20	9	100	50	14	185	110	55
5..	180	30	10	100	60	16	185	70	35
6..	189	20	10	110	110	33	193	70	36
7..	189	20	10	110	110	33	201	60	32
8..	165	20	9	120	40	13	213	60	34
9..	149	30	12	130	40	11	213	50	29
10..	193	80	42	150	50	20	217	160	94
11..	221	80	48	180	50	24	217	340	199
12..	225	70	42	210	40	22	347	460 S	508
13..	209	80	45	270	50	36	1170	4320 S	14400
14..	225	60	36	260	70	49	767	2770	5740
15..	213	70	40	260	80	56	480	1650	2140
16..	209	70	40	306	110	91	360	640	622
17..	217	70	41	370	300	300	328	380	337
18..	234	50	32	380	250	256	310	230	192
19..	234	80	50	284	110	84	292	120	95
20..	225	80	49	243	90	59	270	170	124
21..	181	80	39	230	80	50	266	80	57
22..	150	100	40	221	80	48	261	60	42
23..	160	100	43	225	80	49	248	130	87
24..	110	60	18	221	80	48	248	210	141
25..	100	80	22	209	70	40	234	120	76
26..	100	60	16	205	60	33	230	180	112
27..	100	60	16	197	70	37	274	200	148
28..	110	50	15	193	100	52	707	4020 S	4020
29..	130	60	21	--	--	--	636	2760	4740
30..	140	110	42	--	--	--	405	1070	1170
31..	160	60	26	--	--	--	297	610	489
Total	5291	--	852	5664	--	1544	10321	--	35912

S Computed by subdividing day.

KANSAS RIVER BASIN--Continued

6-8566. REPUBLICAN RIVER AT CLAY CENTER, KANS.--Continued

Suspended sediment, water year October 1960 to September 1961--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..	266	320	230	201	140	76	1640	980	4340
2..	230	220	137	185	150	75	3920	2810 S	34700
3..	221	230	137	181	140	68	4700	2680	34000
4..	205	170	94	324	800 S	800	4180	1740	19600
5..	201	160	87	3700	4880	48800	3310	980	8760
6..	193	140	73	2880	4730	36800	4460	2930 S	39300
7..	185	160	80	3200	4870	42100	6910	5100	95200
8..	225	220	134	3360	4630	42000	7650	1360	28100
9..	778	1490 S	3440	1280	3000	10400	8380	2730	61800
10..	795	1110	2380	816	1360	3000	5650	1840	28100
11..	636	740	1270	630	780	1330	3120	1310	11000
12..	642	790	1370	516	500	697	2320	1000	6260
13..	672	830	1510	460	340	422	2080	900	5050
14..	552	630	939	410	240	266	2970	1800	14400
15..	460	410	509	365	240	237	2730	2000	14700
16..	395	310	331	356	200	192	2240	960	5810
17..	346	190	177	655	700 S	1840	2090	800	4510
18..	333	160	144	1720	4020	18700	2660	1100	7900
19..	310	190	159	1290	2900	10100	2600	1100	7720
20..	292	160	126	2680	3360	24300	2970	880	7060
21..	279	160	120	4170	2930	33000	3000	860	6970
22..	261	150	106	15900	2830	121000	2960	980	7830
23..	252	160	109	15600	2900	122000	2860	680	5250
24..	243	140	92	10300	2150	59800	2840	730	5600
25..	230	130	81	7280	2200	40500	2870	640	4960
26..	217	130	76	4790	1710	22100	2860	600	4630
27..	225	90	55	3070	1180	9780	2860	510	3940
28..	225	40	24	2180	900	5300	2740	500	3700
29..	225	140	85	1770	710	3390	2400	480	3110
30..	221	140	84	1570	520	2200	2330	450	2830
31..	--	--	--	1480	500	2000	--	--	--
Total	10315	--	14159	93319	--	663273	104300	--	487130

	JULY			AUGUST			SEPTEMBER		
1..	2300	460	2860	390	190	200	356	140	134
2..	2230	500	3010	405	210	230	338	130	119
3..	2140	460	2660	356	200	192	324	130	114
4..	2640	530	3780	328	160	142	302	120	98
5..	2390	530	3420	297	160	128	306	140	116
6..	2040	460	2530	310	150	126	292	130	102
7..	1960	450	2380	320	130	112	306	150	124
8..	1930	400	2080	302	130	106	338	160	146
9..	1900	410	2100	306	110	91	342	200	185
10..	1810	380	1860	302	110	90	338	160	146
11..	1480	340	1360	385	350 S	580	328	150	133
12..	1080	340	991	558	1430	2150	407	290 S	428
13..	844	280	638	460	480	596	9110	3990	98100
14..	837	400	904	753	1100	2240	14300	3020	117000
15..	956	760	1960	642	1070	1850	14400	2190	85100
16..	725	800	1570	636	740	1270	5670	1850	28300
17..	618	470	784	450	540	656	3130	1310	11100
18..	570	320	492	430	570	662	2110	850	4840
19..	510	260	358	495	1140	1520	1670	670	3020
20..	495	230	307	1730	3000 S	17900	1370	530	1960
21..	612	220	364	2360	3480	22200	1120	440	1330
22..	642	240	416	2340	2380	15000	970	320	838
23..	1140	1410 S	4830	1680	1300	5900	1010	360	982
24..	1130	2260	6900	1180	910	2900	879	410	973
25..	1190	1820	5850	970	730	1910	788	400	851
26..	907	1750	4290	816	620	1370	739	420	838
27..	624	700	1180	606	430	704	697	260	489
28..	534	400	577	490	330	437	636	230	395
29..	495	240	321	425	240	275	612	240	397
30..	465	200	251	385	190	198	606	260	425
31..	420	140	159	351	160	152	--	--	--
Total	37614	--	61182	21458	--	81887	63794	--	358783

Total discharge for year (cfs-days)..... 369134
Total load for year (tons)..... 1715375

S Computed by subdividing day.

6-8566. REPUBLICAN RIVER AT CLAY CENTER, KANS.--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Oct. 3, 1960.....	0700	60		370	2220		60	81	--	95	--	100	--	--	--			SPWC
Oct. 4.....	0700	63		306	1090		66	85	--	99	--	100	--	--	--			SPWC
Oct. 5.....	1240	68		248	757		37	56	--	93	--	100	--	--	--			SPWC
Nov. 3.....	1145	52		181	142		--	23	--	39	--	56	88	100	--			VPWC
Mar. 13, 1961.....	0700	45		1140	3850		49	62	--	85	--	100	--	--	--			SPWC
Mar. 13.....	1800	45		1360	5150		58	67	--	85	--	100	--	--	--			SPWC
Mar. 14.....	0700	39		844	3040		66	80	--	95	--	100	--	--	--			SPWC
Mar. 15.....	0700	47		470	1870		74	87	--	95	--	100	--	--	--			SPWC
Apr. 9.....	1200	43		928	2060		56	63	--	82	--	100	--	--	--			SPWC
Apr. 10.....	0700	40		795	1090		71	71	--	90	--	100	--	--	--			SPWC
May 5.....	1215	51		4720	5040		45	52	59	69	85	95	98	99	100			VPWC
May 9.....	1415	64		1160	2780		68	75	82	90	94	98	99	100	--			VPWC
May 22.....	2010	59		20400	2480		48	51	56	61	71	82	86	96	100			VPWC
May 24.....	1045	62		11100	2260		62	70	73	77	82	92	94	98	100			VPWC
May 31.....	1215	79		1470	479		52	60	--	72	--	89	90	92	99	100		VPWC
June 6.....	1620	75		4900	2580		53	54	67	73	84	94	97	99	100			VPWC
June 20.....	1555	78		2970	830		7	21	--	63	--	94	97	100	--			PN
June 20.....	1555	78		2970	830		25	29	--	55	--	94	97	100	--			VPWC
July 6.....	1500	82		2030	351		19	30	42	54	94	92	96	99	100			VPWC
Sept. 13.....	1130	68		4790	5220		61	65	70	78	83	91	96	98	100			VPWC
Sept. 14.....	1250	58		14400	3080		58	62	66	69	74	84	89	97	100			VPWC

KANSAS RIVER BASIN--Continued

6-8566. REPUBLICAN RIVER AT CLAY CENTER, KANS.--Continued

Particle-size analyses of bed material, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Bed material: Percent finer than size indicated, in millimeters										Method of analysis
							0.062	0.125	0.250	0.500	1.000	2.000	4.000	8.000	16.00	32.00	64.00	
Oct. 5, 1960	1240		5	248			--	0	8	57	86	94	98	99	100			SV
Nov. 3	1145		5	181			--	0	7	45	75	90	98	100	--			SV
Dec. 7	1145		4	189			--	0	6	41	73	86	97	100	--			SV
Jan. 9, 1961	1120		4	121			--	0	7	45	79	91	98	100	--			SV
Feb. 27	1130		4	217			0	2	10	46	74	87	97	100	--			SV
Mar. 23	1145		6	248			0	1	6	45	80	95	99	100	--			SV
Apr. 5	1045		6	205			0	1	8	44	79	92	98	100	--			SV
May 3	1010		11	181			--	0	6	48	83	94	99	100	--			SV
May 5	1215		14	4720			4	5	12	48	74	86	95	99	100			SV
May 9	1415		12	1160			2	5	30	71	90	95	98	99	100			SV
May 22	2010		8	20400			0	1	14	62	89	96	99	100	--			SV
May 24	1045		14	11100			--	0	7	54	82	92	97	99	100			SV
May 31	1215		11	1470			4	5	8	39	72	86	97	100	--			SV
June 20	1555		34	2970			--	0	5	35	66	81	94	99	100			SV
July 6	1500		9	2030			--	0	8	46	80	90	97	100	--			SV
Sept. 13	1030		11	9440			--	1	14	52	79	89	96	99	100			SV
Sept. 18	1135		9	2110			--	0	10	68	89	95	99	100	--			SV

6-8695. SALINE RIVER AT TESCOTT, KANS.

LOCATION.--At gaging station at highway bridge, 0.5 mile south of Tescott, Ottawa County, and 0.5 mile upstream from Dry Creek.
DRAINAGE AREA.--2,620 square miles.
RECORDS AVAILABLE.--Chemical analyses: December 1949 to September 1953.
Water temperatures: April 1950 to September 1953, August 1959 to September 1961.
Sediment records: August 1959 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 82°F July 29; minimum, freezing point Dec. 3, Jan. 15.
Sediment concentrations: Maximum daily, 10,900 ppm July 24; minimum daily, 10 ppm Jan. 7.
Sediment loads: Maximum daily, 51,900 tons June 3; minimum daily, 3 tons Jan. 7.
EXTREMES, 1950-53, 1959-61.--Water temperatures: Maximum, 85°F Aug. 1, 1959; mininum, freezing point on many days during winter months.
Sediment concentrations (1959-61): Maximum daily, 10,900 ppm July 24, 1961; minimum daily, 10 ppm Dec. 6, 31, 1959, Jan. 7, 1961.
Sediment loads (1959-61): Maximum daily, 69,000 tons Mar. 25, 1960; minimum daily, 2 tons Dec. 6, 31, 1959.
REMARKS.--Flow affected by ice Dec. 13-24, 28-31, Jan. 3, 4, Jan. 20 to Feb. 9.

Temperature (°F) of water, water year October 1960 to September 1961

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

KANSAS RIVER BASIN--Continued

6-8695. SALINE RIVER AT TESCOTT, KANS.--Continued

Suspended sediment, water year October 1960 to September 1961
/Where no concentrations are reported, loads are estimated/

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	150	480	194	181	340	166	106	70	20
2	140	350	132	159	320	137	99	50	13
3	131	330	117	140	200	76	99	30	8
4	131	390	138	122	120	40	102	100	28
5	123	380	126	112	80	24	116	130	41
6	114	430	132	107	80	23	113	80	24
7	111	340	102	105	70	20	109	100	29
8	107	310	90	105	100	28	100	60	16
9	103	320	89	103	60	17	97	60	16
10	102	330	91	105	60	17	100	--	18
11	100	310	84	105	50	14	125	--	26
12	99	310	83	104	80	22	133	--	30
13	97	310	81	106	60	17	125	--	26
14	97	330	86	108	80	23	110	--	20
15	96	330	86	109	120	35	95	--	16
16	93	230	58	108	120	35	100	--	18
17	102	220	61	107	120	35	105	--	18
18	157	420	178	106	70	20	100	--	18
19	117	380	120	102	90	25	90	--	16
20	111	290	87	99	70	19	80	--	14
21	109	190	56	99	40	11	70	--	12
22	111	200	60	100	60	16	65	--	12
23	106	240	69	99	60	16	75	--	12
24	103	280	78	97	50	13	85	--	14
25	106	270	77	94	20	5	92	--	16
26	106	200	57	94	30	8	106	--	20
27	103	180	50	96	40	10	114	--	24
28	101	190	52	105	50	14	120	--	26
29	98	190	50	103	80	22	110	--	20
30	105	190	54	106	50	14	100	--	18
31	149	250	101	--	--	--	105	--	18
Total	3478	--	2839	3286	--	922	3146	--	607

Day	JANUARY			FEBRUARY			MARCH		
1	106	30	8	80	--	20	92	140	35
2	105	30	8	85	--	22	91	110	27
3	100	70	19	80	--	18	90	130	32
4	110	40	12	80	--	16	92	160	40
5	106	60	17	85	--	16	92	110	27
6	108	30	9	90	--	18	90	100	24
7	124	10	3	90	--	18	97	140	37
8	123	20	7	95	--	20	99	150	40
9	127	30	10	90	--	20	100	150	40
10	144	70	27	100	--	30	98	110	29
11	139	90	34	106	150	43	96	160	41
12	129	90	31	113	170	52	322	--	1600
13	138	190	71	135	170	62	883	8260	20000
14	139	200	75	192	220	114	269	6540	S 5060
15	129	150	52	173	200	93	169	2000	913
16	117	90	28	145	100	39	145	540	211
17	120	150	49	138	--	36	132	320	114
18	117	170	54	129	--	34	130	270	95
19	120	170	55	118	--	32	136	240	88
20	120	--	55	105	--	36	139	150	56
21	90	--	40	103	150	42	144	180	70
22	80	--	30	102	180	50	144	180	70
23	85	--	32	108	120	35	138	240	89
24	70	--	20	106	130	37	134	280	101
25	60	--	18	99	170	45	128	300	104
26	50	--	12	96	180	47	124	320	107
27	55	--	14	95	150	38	122	320	105
28	60	--	16	94	140	36	116	280	88
29	65	--	18	--	--	--	114	220	68
30	75	--	22	--	--	--	111	190	57
31	80	--	24	--	--	--	108	280	82
Total	3191	--	870	3032	--	1069	4745	--	29450

S Computed by subdividing day.

KANSAS RIVER BASIN--Continued

6-8695. SALINE RIVER AT TESCOTT, KANS.--Continued

Suspended sediment, water year October 1960 to September 1961--Continued
/Where no concentrations are reported, loads are estimated/

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	110	280	83	111	270	81	604	1500	2450
2	111	200	60	150	330	134	1970	4060	S 27700
3	109	200	59	166	430	193	4810	4000	51900
4	108	190	55	293	620	S 720	4720	2660	33900
5	106	170	49	2620	4210	S 32800	4380	2700	31900
6	105	180	51	2960	5140	41100	3610	3420	33300
7	101	130	35	1500	4100	16600	3100	3400	28500
8	113	200	61	776	3680	7710	3120	3220	27100
9	451	2180	S 2870	690	3860	7190	3000	3100	25100
10	324	2080	1820	558	2760	4160	2580	2940	20500
11	208	730	410	436	1890	2220	1960	3630	19200
12	193	190	99	330	1540	1370	1480	3100	12400
13	177	260	124	283	1090	833	1200	3020	9780
14	169	330	150	252	830	565	2550	4850	33400
15	214	400	231	227	700	429	2450	4920	S 34300
16	218	350	206	210	560	318	2080	2900	16300
17	184	250	124	220	610	362	1010	2420	6600
18	164	180	80	398	1190	S 1460	1140	3340	10300
19	153	270	112	466	2120	2670	1000	3080	8320
20	145	330	129	504	3380	S 5020	918	3420	8480
21	137	360	133	1000	5420	14600	760	2350	4820
22	131	400	141	3930	3600	S 35700	650	1380	2420
23	125	390	132	6270	2200	37200	610	1190	1960
24	122	390	128	8930	1420	34200	535	1040	1500
25	119	400	128	12100	1080	35300	497	1230	1650
26	111	430	129	11100	940	28200	462	980	1220
27	109	340	100	3710	2880	S 21900	444	860	1030
28	109	300	88	1120	3310	10000	421	800	909
29	105	310	88	915	2490	6150	402	770	836
30	106	300	86	779	2010	4230	385	780	811
31	--	--	--	679	1800	3300	--	--	--
Total	4637	--	7961	63683	--	356715	52848	--	458586
	JULY			AUGUST			SEPTEMBER		
1	366	780	771	337	1260	1150	342	1030	951
2	341	840	773	315	1060	902	327	850	750
3	323	890	776	333	1090	980	314	770	653
4	307	890	738	329	1040	924	292	730	576
5	292	930	733	337	1080	983	268	580	420
6	279	1000	753	288	1060	824	255	410	282
7	269	1000	726	261	850	599	245	480	318
8	260	1010	709	248	780	522	238	480	308
9	253	950	649	246	740	492	231	400	249
10	244	1150	758	236	720	459	229	390	241
11	235	1060	672	222	700	420	219	380	225
12	229	1080	668	214	680	393	238	590	414
13	240	1050	680	207	640	358	2030	6450	35400
14	239	1100	710	220	660	392	3080	3860	32100
15	393	1900	S 2660	364	1050	1030	2470	3070	20500
16	1200	8180	26500	461	2100	2610	2140	4400	25400
17	649	6800	11900	389	4400	4620	1250	3340	11300
18	402	4200	4560	376	4700	4770	680	2820	5180
19	331	2620	2340	342	2120	1960	536	1980	2860
20	292	1820	1430	291	1500	1180	462	1300	1620
21	312	1700	1430	317	1680	1440	410	1000	1110
22	402	2400	2600	1640	8690	S 41700	374	800	808
23	710	4500	S 9720	2540	6350	43500	353	620	591
24	1800	10900	S 51300	1450	4160	16300	332	600	538
25	2100	6400	36300	1090	4700	13800	320	560	484
26	1480	6000	24000	887	4120	9870	304	500	410
27	798	4650	10000	637	3280	5640	292	480	378
28	589	3400	5410	521	2540	3570	282	440	335
29	485	2440	3200	452	1720	2100	276	440	328
30	421	1870	2120	400	1260	1360	279	520	392
31	374	1410	1420	364	1030	1010	--	--	--
Total	16615	--	207006	16314	--	165858	19068	--	145121

Total discharge for year (cfs-days)..... 194043
Total load for year (tons)..... 1377004

S Computed by subdividing day.

KANSAS RIVER BASIN--Continued

6-8695. SALINE RIVER AT TESCOTT, KANS.--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters											Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Apr. 10, 1961	0920	43		342	2280		63	70	80	87	96	99	100	--	--			VPWC
May 5	1550	54		3230	6020		55	61	68	78	91	99	100	--	--			VPWC
May 6	0740	50		3150	5810		56	68	--	87	--	100	--	--	--			SPWC
May 6	1100	--		3080	5340		62	70	79	85	95	99	100	--	--			VPWC
May 9	1630	65		678	3860		56	70	81	89	95	100	--	--	--			VPWC
May 10	0815	62		571	2910		57	68	--	91	--	100	--	--	--			SPWC
May 12	0730	65		342	1570		60	74	--	90	--	100	--	--	--			SPWC
May 12	1245	71		324	1500		64	73	82	90	97	99	100	--	--			VPWC
May 21	0900	63		907	5610		48	62	--	81	--	100	--	--	--			SPWC
May 23	2000	61		6750	1840		44	68	80	91	96	98	99	99	100			VPN
May 23	2000	61		6750	1840		66	76	86	91	95	98	99	99	100			VPWC
May 25	1030	65		12200	1040		71	79	87	91	95	100	--	--	--			VPWC
May 26	1645	65		10600	1010		--	--	--	--	--	99	100	--	--			V
May 28	1525	71		1100	2720		43	51	--	71	--	98	100	--	--			VPWC
June 2	1030	74		1020	3240		29	35	41	51	74	97	100	--	--			VPWC
June 2	1700	74		3220	5860		38	47	--	66	--	98	100	--	--			VPWC
June 4	1600	71		4640	2620		65	--	84	91	96	100	--	--	--			VPWC
June 5	1400	74		4390	2620		69	79	84	91	96	100	--	--	--			VPWC
June 6	1200	73		3450	3750		57	68	--	88	--	100	--	--	--			SPWC
June 11	0715	75		2080	3970		52	67	--	86	--	100	--	--	--			SPWC
June 15	0635	72		1580	3700		39	50	--	66	--	100	--	--	--			SPWC
June 15	1530	72		3020	6390		44	52	58	68	85	99	100	--	--			VPWC
June 15	1600	70		3100	7550		35	48	--	69	--	99	100	--	--			VPWC
June 16	0620	66		2760	2830		59	68	--	86	--	100	--	--	--			SPWC
July 17	0730	73		719	7450		47	64	--	88	--	100	--	--	--			SPWC
July 18	0745	78		414	4610		56	70	--	92	--	100	--	--	--			SPWC
July 21	1450	82		302	1400		52	63	--	76	--	93	94	96	97	100		VPWC
July 24	0800	75		1780	12000		39	54	--	75	--	99	100	--	--			VPWC
July 24	1455	79		2140	10000		54	64	72	81	94	99	100	--	--			VPWC
July 25	1130	72		2090	5710		46	61	--	81	--	99	100	--	--			VPWC
July 27	0740	78		840	4890		49	66	--	88	--	100	--	--	--			SPWC
Aug. 22	0815	71		1430	7500		34	36	--	55	--	99	100	--	--			VPWC
Aug. 23	0805	68		2640	6960		52	68	--	85	--	99	100	--	--			VPWC
Aug. 25	0800	71		1100	4550		46	61	--	83	--	100	--	--	--			SPWC
Aug. 28	0755	74		535	2780		56	72	--	90	--	100	--	--	--			SPWC

Sept. 13, 1961.....	0720	63		1670	7950		32	44	--	67	--	99	100	--	--			VPWC
Sept. 13.....	1530	62		2520	6940		54	62	70	78	91	99	100	--	--			VPWC
Sept. 14.....	0710	58		3110	4270		54	68	--	84	--	99	100	--	--			VPWC
Sept. 16.....	0805	58		2200	4930		49	69	--	91	--	100	--	--	--			SPWC

6-8760. SOLOMON RIVER AT BELOIT, KANS.

LOCATION.--At bridge on State Highway 14 in Beloit, Mitchell County, 8.5 miles upstream from gaging station, about 1.5 miles upstream from Leban Creek, and 300 feet downstream from dam at city waterplant.
DRAINAGE AREA.--5,430 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: December 1949 to September 1952, September 1957 to September 1958, October 1959 to September 1961.
Water temperatures: February 1949 to September 1952, September 1957 to September 1958.
Sediment records: May 1948 to September 1952.

Chemical analyses, in parts per million, water year October 1960 to September 1961

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)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 8, 1960.	68	18		0.15	--	85	30	108	11	264	0	177	127	0.3	4.9	0.14	726	334	118	2.6	1,140	7.7	--
Nov. 11.....	70	18		.34	--	100	37	113	11	336	0	192	125	.3	4.2	.13	810	401	125	2.5	1,250	7.7	--
Dec. 16.....	85	17		.51	--	137	23	106	9.6	336	0	234	110	.3	6.7	.08	830	438	162	2.2	1,300	7.7	8
Jan. 12, 1961	a 79	20		.12	--	146	24	100	9.6	362	0	235	105	.3	8.3	.12	850	462	165	2.0	1,320	7.7	7
Feb. 25.....	84	19		.18	0.02	140	20	96	9.6	334	0	218	100	.4	6.0	.12	819	433	159	2.0	1,220	7.6	--
Mar. 31.....	78	13		.23	.01	129	20	109	10	278	0	239	120	.4	1.0	.14	826	405	177	2.4	1,240	7.8	--
Apr. 29.....	100	13		.13	.14	110	19	86	12	230	0	210	99	.5	1.4	.12	707	351	162	2.0	1,070	7.2	--
May 3.....	78	14		.36	--	112	23	163	10	301	0	208	194	.4	3.5	.16	908	376	129	3.7	1,450	7.3	--
May 14.....	140	18		.43	.00	133	16	80	13	273	0	216	94	.4	3.0	.11	740	398	174	1.7	1,100	7.3	--
May 24.....	25,100	15		.12	.04	49	2.8	6.1	9.2	151	0	25	4.0	.3	1.0	.04	197	134	10	.2	310	7.4	--
June 6.....	6,990	15		.05	.00	57	5.4	11	8.7	164	0	44	13	.4	1.4	.04	252	164	30	.4	394	7.2	--
Aug. 1.....	228	22		.02	--	128	17	87	11	316	0	167	99	.4	.3	.13	734	388	129	1.9	1,110	7.1	15
Aug. 31.....	404	15		.02	--	98	14	48	11	245	0	136	54	.5	.1	.12	523	301	100	1.2	810	7.0	3
Sept. 13.....	21,400	17		.08	--	26	8.5	7.8	6.9	118	0	14	2.2	.3	.2	.04	144	100	3	.3	231	6.8	25

a Daily mean discharge.

KANSAS RIVER BASIN--Continued

6-8760. SOLOMON RIVER AT BELOIT, KANS.--Continued

Periodic determinations of suspended-sediment discharge and particle size, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Oct. 7, 1959.....	1400	59		3740	4720	47700	--	--	--	--	--	--						
Nov. 18.....	1430	--		57	58	8.9	--	--	--	--	--	--						
Jan. 2, 1960.....	1630	--		d 70	24	4.5	--	--	--	--	--	--						
Feb. 12.....	1545	32		235	78	49	--	--	--	--	--	--						
Mar. 11.....	1300	32		d 60	85	14	--	--	--	--	--	--						
Apr. 15.....	1930	--		1250	1010	3410	24	31	--	50	--	--						PWC
May 8.....	1130	--		1280	1670	5770	37	52	--	71	--	--						PWC
June 4.....	1530	79		1000	594	1600	--	--	--	--	--	--						
July 13.....	2130	78		268	193	140	--	--	--	--	--	--						
Aug. 20.....	1050	77		153	143	59	--	--	--	--	--	--						
Sept. 11.....	0940	67		78	88	18	--	--	--	--	--	--						
Oct. 8.....	1730	62		68	216	40	--	--	--	--	--	--						
Jan. 12, 1961.....	1100	32		d 79	85	18	--	--	--	--	--	--						
Feb. 25.....	1330	43		84	113	26	--	--	--	--	--	--						
Mar. 31.....	1100	52		78	163	34	--	--	--	--	--	--						
May 24.....	1400	63		25100	1820	123000	82	92	96	97	98	99	99	100				VPWC
June 6.....	1630	71		6990	2480	46800	74	83	94	96	97	100						VPWC
Aug. 31.....	1600	76		404	479	522	--	--	--	--	--	--						
Sept. 13.....	1930	--		21400	2790	161000	--	--	--	--	--	100						V

d Daily mean discharge.

6-8769. SOLOMON RIVER AT NILES, KANS.

LOCATION.--At gaging station at county highway bridge, 0.8 mile west of Niles, Ottawa County.
DRAINAGE AREA.--6,770 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1958 to September 1961.

Chemical analyses, in parts per million, water year October 1960 to September 1961

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)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 5, 1960.	152	18		0.01	--	66	43	140	9.8	320	0	153	166	0.3	3.8	0.14	791	341	79	3.3	1,300	7.7	--
Nov. 3.....	155	20		.36	--	81	48	203	9.2	384	0	178	245	.3	3.7	.17	1,030	399	84	4.4	1,670	8.0	--
Dec. 7.....	142	15		.26	--	121	26	212	9.2	374	0	212	252	.3	.2	.17	1,060	408	101	4.6	1,800	7.6	4
Jan. 9, 1961.	142	18		.29	--	141	27	216	8.6	404	0	244	256	.3	2.9	.14	1,130	463	132	4.4	1,850	7.7	7
Feb. 12.....	175	18		.16	--	122	26	196	7.8	372	0	214	227	.3	5.1	.16	1,020	412	107	4.2	1,710	7.9	8
Mar. 23.....	170	13		.36	0.07	114	22	171	8.6	318	0	202	207	.4	3.0	.15	948	376	115	3.8	1,500	7.7	--
Apr. 5.....	121	11		.31	.02	103	25	200	9.2	290	0	221	263	.4	1.7	.17	1,000	361	123	4.6	1,620	7.2	--
May 27.....	15,100	14		.15	.00	54	2.1	8.6	8.7	160	0	28	7.2	.4	.7	.04	214	143	12	.3	332	7.3	--
June 2.....	4,220	12		.13	.00	62	6.7	32	6.7	164	0	71	40	.3	.2	.04	323	182	48	1.0	521	7.1	--
July 7.....	1,110	15		.05	.07	105	16	78	11	258	0	146	90	.4	3.9	.08	623	327	115	1.9	956	7.5	--
Aug. 22.....	3,960	17		.10	--	83	5.1	18	8.8	248	0	41	16	.4	.2	.04	327	228	25	.5	526	6.9	8
Sept. 14.....	3,000	16		.06	.00	64	9.1	69	8.2	186	0	93	85	.3	.8	.09	457	197	44	2.1	734	7.2	--

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KANSAS RIVER BASIN--Continued

6-8769. SOLOMON RIVER AT NILES, KANS.--Continued

Periodic determinations of suspended-sediment discharge and particle size, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Nov. 3, 1960	0850	50		155	362	151	--	--	--	--	--	--	--	--	--	--		
Dec. 7	1330	38		142	252	97	--	--	--	--	--	--	--	--	--	--		
Jan. 9, 1961	0900	34		142	143	55	--	--	--	--	--	--	--	--	--	--		
Feb. 12	1320	33		174	182	86	--	--	--	--	--	--	--	--	--	--		
Mar. 23	0900	50		170	283	130	--	--	--	--	--	--	--	--	--	--		
Apr. 5	0840	56		121	270	88	--	--	--	--	--	--	--	--	--	--		
May 3	0745	60		158	270	115	--	--	--	--	--	--	--	--	--	--		
May 5	1030	51		2050	2570	14200	50	57	--	70	--	97	99	100	--	--		VPWC
May 5	1700	57		1920	1900	9850	54	59	65	74	86	99	100	--	--	--		VPWC
May 6	1200	57		2180	4080	24000	52	59	69	74	86	99	100	--	--	--		VPWC
May 7	2000	56		2130	5020	28900	64	67	74	84	93	99	100	--	--	--		VPWC
May 9	1700	--		1720	4340	20200	65	73	81	89	98	100	--	--	--	--		VPWC
May 12	0930	67		573	1960	3030	65	78	81	91	97	100	--	--	--	--		VPWC
May 21	2130	--		1960	3020	16000	--	--	--	--	--	--	--	--	--	--		
May 22	0920	58		5680	3400	52100	44	51	57	65	80	98	99	100	--	--		VPWC
May 23	0145	--		13200	1220	43500	64	67	--	78	--	92	94	96	99	100		VPWC
May 23	1530	--		12700	1500	51400	60	82	89	91	94	99	99	100	--	--		VPWC
May 24	1640	65		12800	1440	49800	75	81	84	87	93	98	99	100	--	--		VPWC
May 31	0900	73		d 1880	2540	12900	--	--	--	--	--	--	--	--	--	--		
June 2	1430	70		4220	3880	44200	44	46	54	64	80	97	100	--	--	--		VPWC
June 4	1500	71		8800	1720	40900	66	73	81	87	94	99	100	--	--	--		VPWC
June 5	1230	72		d 9130	2040	50300	69	80	89	89	96	100	--	--	--	--		VPWC
June 5	1400	75		9140	1780	43900	62	80	--	90	--	99	100	--	--	--		VPWC
June 14	1430	69		9220	2750	68500	58	71	84	89	95	99	100	--	--	--		VPWC
June 15	1700	--		4220	3690	42000	51	58	--	77	--	96	97	97	99	100		VPWC
June 27	--	--		d 1710	1180	5450	--	--	--	--	--	--	--	--	--	--		
July 7	0920	78		1100	825	2450	--	--	--	--	--	--	--	--	--	--		
July 21	1600	82		939	1040	2640	45	59	--	79	--	99	100	--	--	--		VPWC
July 25	1345	83		1240	1370	4590	48	56	--	82	--	99	100	--	--	--		VPWC
Aug. 10	1050	--		d 588	752	1190	--	--	--	--	--	99	100	--	--	--		V

Aug. 22, 1961.....	1000	--		d 3900	4150	43700	63	75	83	89	96	99	99	99	100	--		VPWC
Sept. 13.....	0800	68		d 1670	721	3250	--	--	--	--	--	--	--	--	--	--		
Sept. 13.....	2345	60		3580	7360	71100	53	59	67	78	90	97	98	98	99	100		VPWC
Sept. 14.....	1130	59		4770	5740	73900	67	75	83	92	94	99	100	--	--	--		VPWC
Sept. 16.....	1045	--		d 8520	3390	78000	75	82	87	91	--	99	100	--	--	--		VPWC

d Daily mean discharge.

Particle-size analyses of bed material, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Bed material: Percent finer than size indicated, in millimeters										Method of analysis
							0.062	0.125	0.250	0.500	1.000	2.000	4.000	8.000	16.00	32.00	64.00	
May 9, 1961.....	1700		6	1720			30	34	45	79	91	96	99	100				SV
May 12.....	0930		7	573			7	8	19	66	91	97	99	100				SV
May 24.....	1640		2	12800			--	0	7	58	88	96	99	100				SV

KANSAS RIVER BASIN--Continued

6-8776. SMOKY HILL RIVER AT ENTERPRISE, KANS.

LOCATION.--At gaging station at bridge on State Highway 43 in Enterprise, Dickinson County, 18.6 miles upstream from Chapman Creek.
DRAINAGE AREA.--19,200 square miles, approximately.
RECORDS AVAILABLE.--*Chemical analyses:* October 1955 to September 1958.
Water temperatures: October 1955 to September 1961.
Sediment records: October 1957 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Maximum, 78°F July 29 to Aug. 1; minimum, freezing point Jan. 27.
Sediment concentrations: Maximum daily, 6,690 ppm Aug. 25; minimum daily, not determined.
Sediment loads: Maximum daily, 222,000 tons May 23; minimum daily, 26 tons (estimated) Jan. 2.
EXTREMES, 1955-61.--Water temperatures: Maximum, 88°F June 21, 1956; minimum, freezing point on many days during winter months.
Sediment concentrations (1957-61): Maximum daily, 7,520 ppm Sept. 26, 1960; minimum daily, 4 ppm Dec. 6, 22, 1958.
Sediment loads (1957-61): Maximum daily, 254,000 tons Mar. 27, 1960; minimum daily, 5 tons Dec. 6, 22, 1958.

Temperature (°F) of water, water year October 1960 to September 1961

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

6-8776. SMOKY HILL RIVER AT ENTERPRISE, KANS.--Continued

Suspended sediment, water year October 1960 to September 1961
(Where no concentrations are reported, loads are estimated)

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	1180	1150	3660	986	650	1730	869	140	328
2	1090	980	2880	1160	260	814	878	70	166
3	1010	710	1940	1030	190	528	887	110	263
4	932	450	1130	977	190	501	905	--	400
5	950	440	1130	932	540	1360	914	160	395
6	914	340	839	896	190	460	932	--	200
7	896	320	774	860	350	813	950	40	103
8	896	300	726	869	1120	2630	950	--	130
9	887	270	647	844	660	1500	923	150	374
10	878	240	569	836	360	812	950	--	460
11	860	240	560	844	110	251	1060	130	372
12	844	220	501	844	150	342	1270	--	480
13	844	210	478	844	120	273	1260	210	714
14	968	450	1180	860	110	255	1200	--	650
15	1140	500	1540	869	130	305	1110	130	390
16	1160	1160	3630	860	140	325	1040	--	340
17	968	830	2170	860	120	279	1010	110	300
18	914	340	839	860	110	255	959	--	160
19	887	310	742	860	230	534	828	50	112
20	914	210	518	860	230	534	716	--	100
21	977	250	659	860	90	209	578	90	140
22	950	280	718	869	100	235	380	--	100
23	914	170	420	860	90	209	448	80	97
24	887	170	407	860	70	162	564	--	110
25	887	190	455	860	140	325	628	80	136
26	950	420	1080	860	80	186	676	--	240
27	923	330	822	860	90	209	676	190	347
28	887	180	431	869	100	235	636	--	300
29	1210	720	2350	860	100	232	599	110	178
30	1240	960	3210	860	150	348	532	--	100
31	977	430	1130	--	--	--	564	50	76
Total	29934	--	38135	26569	--	16851	25892	--	8261

Day	JANUARY			FEBRUARY			MARCH		
1	599	30	48	460	230	27	526	190	270
2	496	--	26	466	--	280	526	--	280
3	508	50	68	466	220	277	520	240	337
4	585	--	200	466	--	260	526	--	360
5	599	200	323	490	250	331	514	220	304
6	578	--	420	496	--	340	520	--	280
7	578	380	593	502	210	285	514	220	305
8	571	--	650	502	--	400	526	--	300
9	550	200	297	514	370	513	526	210	297
10	544	--	150	544	--	440	526	--	320
11	550	270	401	571	230	354	520	260	365
12	550	--	400	592	--	340	526	--	460
13	557	130	196	644	240	417	564	970	1480
14	564	--	160	684	--	480	2120	4800	27500
15	571	230	354	684	260	480	2510	4260	28900
16	557	--	400	652	--	500	1210	2640	8620
17	557	180	271	700	250	472	756	1660	3390
18	550	--	280	764	--	750	613	1040	1720
19	544	240	352	732	250	494	606	510	834
20	538	--	420	732	--	460	620	730	1220
21	355	380	364	684	320	591	652	490	862
22	360	--	360	636	--	600	812	500	1100
23	414	320	358	606	280	458	896	440	1060
24	424	--	440	578	--	340	860	320	743
25	370	470	470	564	180	274	740	370	739
26	386	--	500	557	--	160	636	260	446
27	430	490	569	557	220	331	620	300	502
28	430	--	420	544	--	340	652	340	598
29	448	220	266	--	--	--	652	300	528
30	454	--	200	--	--	--	592	250	400
31	454	200	245	--	--	--	557	280	421
Total	15671	--	10201	16387	--	10994	22938	--	84941

KANSAS RIVER BASIN--Continued

6-8776. SMOKY HILL RIVER AT ENTERPRISE, KANS.--Continued

Suspended sediment, water year October 1960 to September 1961--Continued
(Where no concentrations are reported, loads are estimated)

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..	532	250	359	557	270	406	4960	4480	60000
2..	538	230	334	1420	2690 S	17800	7780	4050 S	92900
3..	514	290	402	1780	4300 S	22400	11100	4000	120000
4..	490	200	264	1390	2620 S	10800	11700	3070	97000
5..	490	220	291	4250	4020	46100	12300	3360	112000
6..	448	210	254	8490	5750 S	127000	14000	2920	110000
7..	424	250	286	8730	3780	89100	13600	2460	90300
8..	454	320	392	6600	4280	76300	12700	2000	68600
9..	1700	1690 S	8960	5110	3990	55000	12100	2120	69300
10..	3660	3210	31700	3640	3380	33200	11700	2120	67000
11..	3640	3220	31600	2650	2580	18500	11700	2400	75800
12..	2080	1790	10100	2540	2380	16300	11900	2220	71300
13..	1510	1180	4810	2330	2130	13400	13600	2000	73400
14..	1220	750	2470	2660	1870	13400	18600	2310	116000
15..	1120	570	1720	2580	1670	11600	16400	2040	90300
16..	1040	410	1150	2470	1280	8540	11000	2350	69800
17..	950	360	923	2470	1140	7600	8260	2340	52200
18..	887	340	814	2550	1120	7710	7720	2740	57100
19..	820	340	753	3030	1730	14200	6960	2140	40200
20..	660	360	642	3720	1680	16900	6700	2150	38900
21..	676	380	694	4120	2570	28600	6430	1890	32800
22..	676	380	694	13600	5580	205000	6170	1640	27300
23..	668	370	667	25900	3180	222000	5930	1800	28800
24..	676	430	785	24100	2230	145000	5690	1450	22300
25..	606	350	573	21800	2200	129000	5440	1200	17600
26..	592	410	655	20900	2020	114000	5370	1140	16500
27..	564	350	533	21400	1800	104000	5150	1080	15000
28..	544	310	455	22100	1980	118000	5070	1090	14900
29..	514	350	486	23300	1530	96200	4990	1070	14400
30..	514	360	500	19700	1290	68600	4850	1100	14400
31..	--	--	--	9510	2630	67500	--	--	--
Total	29207	--	104266	275397	--	1904156	279870	--	1776100

Day	JULY			AUGUST			SEPTEMBER		
1..	4670	1060	13400	1690	2900	13200	2380	980	6300
2..	4260	1000	11500	2270	2760	16900	2330	1160	7300
3..	3600	850	8260	1910	1130	5830	2270	820	5020
4..	3070	870	7210	2580	1170	8150	2080	740	4160
5..	2750	720	5350	2730	1060	7810	1980	530	2830
6..	2500	690	4660	2750	980	7280	1940	470	2460
7..	2400	680	4410	2690	1080	7840	1910	470	2420
8..	2360	680	4330	2640	980	6980	2100	580	3290
9..	2200	670	3980	2590	910	6360	1950	570	3000
10..	2030	660	3620	2540	900	6170	1830	440	2170
11..	1920	660	3420	2190	760	4490	1780	390	1870
12..	1950	660	3470	1780	690	3320	1830	420	2080
13..	1960	690	3650	1580	630	2690	4220	2720 S	32600
14..	2020	690	3760	1470	630	2500	4760	2560	32900
15..	2190	790	4670	1590	660	2830	7090	6600	126000
16..	2230	1120	6740	1740	880	4130	9320	5750	145000
17..	2090	1180	6660	1980	1070	5720	10400	4330	122000
18..	3360	1570	14200	2400	1300	8420	11800	3820	122000
19..	2720	2980	21900	2590	1530	10700	12800	3000	104000
20..	2200	2650	15700	3670	1980	19600	10300	2130	59200
21..	4490	4430	53700	6010	6100	99000	4460	4080	49100
22..	2990	2530	20400	6500	4350	76300	3240	2000	17500
23..	2360	1280	8160	5340	3520	50800	3940	1430	15200
24..	2260	1050	6410	4590	2910	36100	4590	3020	37400
25..	2640	1180	8410	4700	6690	84900	4550	2270	27900
26..	3980	2550	27400	3980	4010	43100	3950	1310	14000
27..	3950	5530	59000	3420	2580	23800	3830	1080	11200
28..	2960	3750	30000	3140	2250	19100	3720	1100	11000
29..	2150	3360	19500	2760	1840	13700	3640	--	9800
30..	1860	2420	12200	2520	1590	10800	3640	900	8840
31..	1640	1720	7620	2400	1350	8750	--	--	--
Total	83760	--	403690	90740	--	617270	134630	--	988540

Total discharge for year (cfs-days)..... 1030995
Total load for year (tons)..... 5963405

S Computed by subdividing day.

6-8776. SMOKY HILL RIVER AT ENTERPRISE, KANS.--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Feb. 9, 1961.....	0700	34		520	394		--	--	--	--	--	97	100	--	--			VW
Mar. 13.....	0700	47		544	1130		--	--	--	--	--	99	100	--	--			VW
Mar. 15.....	0700	48		2830	5080		64	74	81	89	97	100	--	--	--			VPWC
Mar. 24.....	0700	44		860	284		--	--	--	--	--	99	100	--	--			VW
Apr. 10.....	1800	45		4220	4090		36	41	--	57	--	96	99	100	--			VPWC
Apr. 14.....	0700	48		1220	797		68	74	--	89	--	--	--	--	--			PWC
May 3.....	1430	57		1340	2380		65	77	84	92	99	100	--	--	--			VPWC
May 4.....	1800	55		1560	3550		57	64	71	76	90	99	100	--	--			VPWC
May 6.....	1325	52		8520	6360		36	43	48	56	73	96	98	99	100			VPWC
May 6.....	1800	54		9380	2790		56	62	71	78	88	99	100	--	--			VPWC
May 7.....	0700	54		9470	3590		32	42	52	65	80	97	100	--	--			VPWC
May 12.....	0700	62		2540	2420		63	71	80	87	98	100	--	--	--			VPWC
May 24.....	1830	59		23000	2000		54	58	62	67	79	92	98	100	--			VPWC
May 26.....	1500	69		20800	1840		53	58	62	66	74	89	94	96	99	100		VPWC
May 27.....	0700	59		21300	2020		52	58	61	68	77	94	98	100	--			VPWC
May 28.....	1200	63		22100	1350		59	64	--	74	--	94	97	100	--			VPWC
May 29.....	0700	62		23400	1610		41	44	--	53	--	91	98	100	--			VPWC
June 1.....	1830	70		4680	4830		38	44	51	62	82	99	100	--	--			VPWC
June 11.....	1800	72		11600	2440		58	62	71	77	84	98	100	--	--			VPWC
June 14.....	1300	73		18900	2680		46	52	60	67	79	96	99	100	--			VPWC
June 14.....	1615	68		19000	1530		46	53	60	74	79	96	99	100	--			VPWC
July 6.....	1015	81		2500	638		--	--	--	--	--	100	--	--	--			VW
Sept. 13.....	1635	70		4900	3560		51	55	64	74	87	98	100	--	--			VPWC

KANSAS RIVER BASIN--Continued

6-8830. LITTLE BLUE RIVER NEAR DEWEESE, NEBR.

LOCATION.--At bridge on State Highway 14, 0.2 mile downstream from gaging station, 0.8 mile upstream from Walnut Creek, 4 miles southeast of Deweese, Clay County, and 5.8 miles northwest of Angus.
DRAINAGE AREA.--1,140 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: August 1956 to September 1958, October 1959 to June 1960, November 1960 to September 1961.
Water temperatures: August 1956 to September 1961 (discontinued).
Sediment records: August 1956 to September 1961 (discontinued).
EXTREMES, 1960-61.--Water temperatures: Maximum, 80°F July 23, 25, 30, Aug. 4; minimum, 33°F on several days during December and January.
Sediment concentrations: Maximum daily, 8,620 ppm June 7; minimum daily, 2 ppm Nov. 14.
Sediment loads: Maximum daily, 46,800 tons May 22; minimum daily, less than 0.50 ton Nov. 14.
EXTREMES, 1956-61.--Water temperatures: Maximum, 83°F Aug. 10, 1959; minimum, freezing point Feb. 26, 27, 1960.
Sediment concentrations: Maximum daily, 13,800 ppm May 16, 1960; minimum daily, 2 ppm Nov. 14, 1960.
Sediment loads: Maximum daily, 129,000 tons June 16, 1957; minimum daily, less than 0.50 ton Nov. 14, 1960.
REMARKS.--Flow affected by ice Nov. 29, 30, Dec. 21-25, Jan. 2, 3, Jan. 21 to Feb. 4, Feb. 19.

Chemical analyses, in parts per million, November 1960 to September 1961

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)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Nov. 29, 1960	66	31		0.06	--	61	7.5	15	6.8	216	0	33	8.4	0.3	2.1	0.07	273	183	6	0.5	433	7.5	--
Dec. 14.....	73	34		.01	0.10	61	9.2	15	6.3	223	0	33	8.2	.4	1.0	.03	287	190	7	.5	435	7.2	9
Jan. 4, 1961.	69	34		.02	--	58	11	15	5.7	217	0	33	8.2	.4	2.0	.03	284	191	13	.5	443	7.7	--
Jan. 30.....	75	33		.01	--	60	9.8	15	6.3	219	0	32	8.7	.4	1.6	.04	279	190	10	.5	437	7.7	3
Mar. 13.....	91	31		.02	.02	58	8.4	14	6.7	207	0	32	8.3	.0	1.9	.02	265	179	0	.5	411	7.8	6
Mar. 21.....	76	32		.00	--	63	7.8	15	6.6	220	0	30	9.1	.4	1.5	.04	279	189	9	.5	430	7.8	3
Apr. 19.....	76	27		.01	--	62	8.1	15	7.3	221	0	32	9.1	.3	.4	.09	273	188	7	.5	428	8.1	--
May 5.....	124	26		.08	.00	55	7.1	13	9.2	197	0	28	11	.4	1.2	.06	269	166	4	.4	438	7.2	--
May 22.....	4,260	16		.18	--	9.7	3.8	1.5	7.7	59	0	3.3	.0	.2	4.3	.02	92	40	0	.1	114	6.9	--
June 20.....	287	24		.05	--	51	5.6	12	9.2	180	0	29	11	.5	.9	.00	249	150	2	.4	388	7.0	7
July 13.....	71	30		.02	.01	58	9.4	15	7.1	212	0	33	8.8	.4	1.2	.07	272	183	9	.5	403	7.6	--
Aug. 21.....	199	18		.30	.16	17	3.6	5.2	10	76	0	11	1.8	.3	.2	.05	131	57	0	.3	160	7.0	--
Sept. 13.....	282	17		.05	.00	22	3.4	5.6	10	89	0	14	3.6	.3	.4	.04	171	69	0	.3	183	6.9	--
Sept. 29.....	63	32		.02	.01	61	8.3	15	6.5	217	0	31	8.9	.4	.9	.04	275	186	8	.5	439	7.1	--

6-8830. LITTLE BLUE RIVER NEAR DEWEESE, NEBR.--Continued

Temperature (°F) of water, water year October 1960 to September 1961

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

KANSAS RIVER BASIN--Continued

6-8830. LITTLE BLUE RIVER NEAR DEWEESE, NEBR.--Continued

Suspended sediment, water year October 1960 to September 1961

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..	255	340	230	67	26	5	74	28	6
2..	137	340	130	68	17	3	73	27	5
3..	100	330	89	67	22	4	74	29	6
4..	86	300	70	67	25	5	78	29	6
5..	80	200	43	67	15	3	77	26	5
6..	74	110	22	68	35	6	73	23	5
7..	72	88	17	68	22	4	73	34	7
8..	72	120	23	68	25	5	74	34	7
9..	70	130	25	68	20	4	73	29	6
10..	68	100	18	69	16	3	74	27	5
11..	70	95	18	69	24	4	76	26	5
12..	70	94	18	69	32	6	73	28	6
13..	71	87	17	70	4	1	73	32	6
14..	73	68	13	70	2	T	74	37	7
15..	72	42	8	70	3	1	74	38	8
16..	73	44	9	70	5	1	74	35	7
17..	72	45	9	70	17	3	74	35	7
18..	76	44	9	70	13	2	74	34	7
19..	73	40	8	70	16	3	74	34	7
20..	72	40	8	70	20	4	74	34	7
21..	73	39	8	70	22	4	65	61	11
22..	72	39	8	70	22	4	60	85	14
23..	71	39	7	70	25	5	68	94	17
24..	71	36	7	72	29	6	74	110	22
25..	71	32	6	72	32	6	80	78	17
26..	70	31	6	72	36	7	71	41	8
27..	70	32	6	73	33	7	71	32	6
28..	69	28	5	81	33	7	71	24	5
29..	69	26	5	68	28	5	71	24	5
30..	69	24	4	77	28	6	70	31	6
31..	68	26	5	--	--	--	71	36	7
Total	2509	--	851	2100	--	124	2255	--	243
	JANUARY			FEBRUARY			MARCH		
1..	72	54	10	95	56	14	74	25	5
2..	68	70	13	90	55	13	76	24	5
3..	67	72	13	80	54	12	76	22	5
4..	69	62	12	75	52	11	76	25	5
5..	69	42	8	72	47	9	77	28	6
6..	69	36	7	72	47	9	76	25	5
7..	69	34	6	71	50	10	74	26	5
8..	68	38	7	71	49	9	74	26	5
9..	68	40	7	73	47	9	73	27	5
10..	69	32	6	74	48	10	76	29	6
11..	69	25	5	74	49	10	77	30	6
12..	69	26	5	77	46	10	85	31	7
13..	70	21	4	76	46	9	91	32	8
14..	70	23	4	77	50	10	86	32	7
15..	70	40	8	76	50	10	82	18	4
16..	70	35	7	77	50	10	79	27	6
17..	70	30	6	77	50	10	78	34	7
18..	69	30	6	72	46	9	80	31	7
19..	66	34	6	73	39	8	77	29	6
20..	66	42	7	74	29	6	76	32	7
21..	65	51	9	76	26	5	76	41	8
22..	60	57	9	76	25	5	76	42	9
23..	55	52	8	76	27	6	76	39	8
24..	43	38	4	73	29	6	74	38	8
25..	45	34	4	73	28	6	76	35	7
26..	50	31	4	74	28	6	78	33	7
27..	55	26	4	74	28	6	86	32	7
28..	60	24	4	74	25	5	79	36	8
29..	70	25	5	--	--	--	77	45	9
30..	75	39	8	--	--	--	77	50	10
31..	80	51	11	--	--	--	76	53	11
Total	2035	--	217	2122	--	243	2414	--	209

T Less than 0.50 ton.

6-6830. LITTLE BLUE RIVER NEAR DEWEESE, NEBR.--Continued

Suspended sediment, water year October 1960 to September 1961--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..	74	47	9	76	60	12	126	120	41
2..	74	35	7	74	140	28	120	140	45
3..	73	30	6	74	210	42	114	150	46
4..	74	52	10	90	650	S 170	111	150	45
5..	72	57	11	115	870	270	158	490	210
6..	71	56	11	93	560	140	380	4670	4790
7..	70	53	10	87	320	75	1580	8620	36800
8..	81	48	10	81	170	37	2720	4820	35400
9..	82	46	10	77	300	62	869	2990	7020
10..	82	43	10	78	160	34	382	1690	1740
11..	88	40	10	78	66	14	224	780	470
12..	87	36	8	77	72	15	170	830	380
13..	84	34	8	78	160	34	148	2290	920
14..	84	40	9	86	750	170	213	2600	1500
15..	80	39	8	396	7000	S 9310	1200	6690	S 26300
16..	82	41	9	311	3200	2690	365	3250	S 3660
17..	78	42	9	207	2310	1290	173	750	350
18..	77	44	9	302	2630	2140	135	520	190
19..	77	40	8	380	2370	2430	120	390	130
20..	76	36	7	261	2130	1500	193	2480	S 1510
21..	73	45	9	1600	5850	25300	129	670	230
22..	73	51	10	4120	4210	46800	106	500	140
23..	74	44	9	3580	2480	24000	98	230	61
24..	73	38	7	2240	2560	15500	98	110	29
25..	71	40	8	538	1680	2440	94	130	33
26..	71	46	9	299	780	630	89	88	21
27..	73	44	9	217	460	270	86	75	17
28..	73	40	8	177	280	130	83	56	13
29..	73	39	8	156	250	110	82	67	15
30..	73	42	8	145	190	74	80	120	26
31..	--	--	--	135	190	69	--	--	--
Total	2293	--	264	16228	--	135786	10446	--	122132

	JULY			AUGUST			SEPTEMBER		
1..	78	86	18	45	190	23	55	77	11
2..	77	88	18	43	200	23	55	74	11
3..	75	95	19	119	760	S 270	52	49	7
4..	73	97	19	94	750	190	51	49	7
5..	72	160	31	68	470	86	51	50	7
6..	71	140	27	54	300	44	50	59	8
7..	73	110	22	49	240	32	50	81	11
8..	69	72	13	47	86	11	49	80	11
9..	68	85	16	44	120	14	50	160	22
10..	63	120	20	44	140	17	49	310	41
11..	60	120	19	206	2010	S 7710	51	430	59
12..	63	100	17	575	4530	S 8760	123	2550	S 960
13..	69	77	14	154	410	170	270	2340	1710
14..	66	130	23	109	310	91	183	1000	490
15..	61	130	21	80	310	67	116	270	85
16..	59	89	14	69	690	130	91	220	54
17..	55	110	16	85	2030	470	78	190	40
18..	52	200	28	104	2300	650	71	150	29
19..	52	240	34	300	3640	2950	67	110	20
20..	53	240	34	313	1460	1230	67	120	22
21..	61	290	48	213	1250	720	66	130	23
22..	60	120	19	144	590	230	63	85	14
23..	56	100	15	117	500	160	66	91	16
24..	54	110	16	98	150	40	68	84	15
25..	51	160	22	87	150	35	64	58	10
26..	48	180	23	80	140	30	64	67	12
27..	51	150	21	76	100	21	64	99	17
28..	45	150	18	70	100	19	63	59	10
29..	43	160	19	66	82	15	65	51	9
30..	42	140	16	62	70	12	67	61	11
31..	39	160	17	57	70	11	--	--	--
Total	1859	--	657	3672	--	24231	2279	--	3742

Total discharge for year (cfs-days)..... 50212
Total load for year (tons)..... 288699

S Computed by subdividing day.

KANSAS RIVER BASIN--Continued

6-8830. LITTLE BLUE RIVER NEAR DEWEESE, NEBR.--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters											Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
May 22, 1961.....	1200	58		4260	4270		48	53	63	65	78	91	92	97	99	100		VPWC
May 22.....	1430	60		4530	4200		48	55	62	70	84	92	93	97	100	--		VPWC
May 22.....	1700	61		4620	3840		50	56	63	69	80	89	91	94	98	100		VPWC
May 23.....	1100	60		3420	2440		56	62	67	72	79	92	94	98	100	--		VPWC
May 24.....	1120	67		2060	2610		--	--	--	--	--	94	96	98	100	--		V
June 20.....	0910	64		271	2460		47	55	63	73	87	99	100	--	--	--		VPWC
Sept. 13.....	1130	56		281	2220		--	--	--	--	--	93	96	99	100	--		V

Particle-size analyses of bed material, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Bed material: Percent finer than size indicated, in millimeters											Method of analysis
							0.062	0.125	0.250	0.500	1.000	2.000	4.000	8.000	16.00	32.00	64.00	
Oct. 21, 1960.....	1035		17	73			0	1	9	48	82	92	96	100	--	--		SV
Nov. 17.....	1415		16	69			0	1	9	49	84	93	98	100	--	--		SV
Dec. 14.....	1625		16	72			0	3	17	51	79	90	95	99	100	--		SV
Jan. 4, 1961.....	1000		6	70			--	0	4	39	77	90	97	99	100	--		SV
Jan. 30.....	1250		11	75			2	3	10	42	74	86	94	100	--	--		SV
Mar. 21.....	1115		16	76			--	0	12	46	74	83	91	99	100	--		SV
Apr. 4.....	1120		15	76			--	0	10	36	68	81	90	98	100	--		SV
Apr. 19.....	1355		15	76			--	0	12	46	83	93	97	100	--	--		SV
May 22.....	1430		10	4530			4	6	31	60	86	93	96	98	100	--		SV
May 23.....	1100		10	3420			3	4	28	56	84	93	96	99	100	--		SV
May 24.....	1120		4	2060			--	--	0	3	59	82	90	100	--	--		SV
June 7.....	1010		7	1980			4	8	19	35	71	87	95	99	100	--		SV
June 20.....	0910		19	271			1	2	6	33	59	71	83	93	98	100		SV
July 13.....	1410		16	71			0	1	6	37	63	74	85	96	99	100		SV
July 21.....	1250		17	60			1	1	5	37	69	81	90	96	100	--		SV
Aug. 21.....	1310		15	203			1	4	8	36	69	83	92	98	100	--		SV

6-8875. KANSAS RIVER AT WAMEGO, KANS.

LOCATION.--At gaging station at bridge on State Highway 99 at Wamego, Pottawatomie County, 3 miles downstream from Antelope Creek.
DRAINAGE AREA.--55,240 square miles, approximately, of which a large area is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: August 1956 to September 1958.
Water temperatures: August 1956 to September 1961.
Sediment records: October 1957 to September 1961.
EXTREMES, 1960-61.--Water temperatures: Minimum, freezing point Dec. 11, 13, 16, 17, Jan. 2.
Sediment concentrations: Maximum daily, 6,850 ppm Sept. 14; minimum daily, 80 ppm Jan. 10.
Sediment loads: Maximum daily, 713,000 tons May 23; minimum daily, 280 tons (estimated) Jan. 25, 26.
EXTREMES, 1956-61.--Water temperatures: Maximum (1956-60), 90°F Aug. 4, 1959; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily (1957-61), 10,000 ppm July 5, 1959; minimum daily (1960-61), 80 ppm Jan. 10, 1961.
Sediment loads: Maximum daily (1957-61), 752,000 tons May 7, 1959; minimum daily (1960-61), 280 tons (estimated) Jan. 25, 26, 1961.
REMARKS.--Flow affected by ice Dec. 20-25, Jan. 3, 4, Jan. 20 to Feb. 13.

Chemical analyses, in parts per million, water year October 1960 to September 1961

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 $CaCO_3$		Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
															Parts per million	Tons per acre-foot	Tons per day	Calcium, Magnesium	Noncarbonate				
Jan. 11, 1961...	1,540	18	0.03	122	27	137	6.4	334	0	174	196	0.4	4.1	0.11	881	1.20	3,660	416	142	2.9	1,420	7.9	5
May 8.....	24,300	13		44	7.3	24	5.9	141	0	43	28				266	.36	17,450	140	24	.9	403	7.3	
May 24.....	64,700	--		35	5.0	10	5.4	118	0	22	10				--	--	--	108	11	.4	271	7.4	

Temperature (°F) of water, water year October 1960 to September 1961

Month	Day																													Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
October.....	70	--	68	66	72	68	68	--	--	72	75	71	71	70	--	65	65	59	54	53	58	61	--	64	61	67	64	--	--	--	51	--
November.....	55	50	52	52	--	--	47	48	--	42	45	48	51	53	54	50	52	48	49	--	47	--	45	45	--	--	--	38	37	35	--	--
December.....	35	--	40	48	45	40	39	--	35	--	32	--	32	35	35	32	32	--	36	36	--	--	--	--	--	--	--	--	--	--	--	--
January.....	34	32	33	35	39	--	39	--	--	39	39	40	43	--	--	--	41	--	38	--	--	--	--	--	--	--	--	--	--	--	--	--
February.....	--	--	--	--	--	--	--	--	--	--	--	37	40	42	46	50	--	--	37	37	40	--	42	43	45	--	45	--	--	--	--	--
March.....	49	52	53	--	49	47	--	44	--	--	--	45	42	50	45	43	--	42	--	--	42	46	47	52	--	53	57	50	46	48	50	--
April.....	--	52	53	54	--	--	55	--	43	40	44	47	50	55	50	50	50	57	--	70	--	67	72	67	--	60	62	--	--	64	--	--
May.....	60	--	56	51	52	55	58	58	60	64	67	65	69	65	67	63	64	66	61	63	63	61	62	64	65	66	64	68	70	72	75	63
June.....	68	77	74	73	70	75	76	75	78	78	80	80	77	76	74	75	75	75	77	75	77	77	72	75	--	78	78	80	77	83	--	76
July.....	83	--	--	81	83	--	82	--	80	--	80	--	77	80	--	--	82	--	81	--	--	--	79	83	80	--	85	--	--	85	--	--
August.....	--	84	87	--	--	85	86	--	82	--	82	--	74	--	--	81	--	--	80	79	79	73	74	75	71	80	78	80	82	--	--	--
September.....	--	--	69	65	69	74	75	--	79	--	76	--	68	65	63	63	60	65	64	64	66	66	62	59	61	64	62	61	67	62	--	66

KANSAS RIVER BASIN--Continued

6-8875. KANSAS RIVER AT WAMEGO, KANS.--Continued

Suspended sediment, water year October 1960 to September 1961
(Where no concentrations are reported, loads are estimated)

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	3340	870	7840	2660	670	4810	1850	120	599
2	3060	790	6530	2440	450	2960	1870	110	555
3	2840	720	5520	2270	280	1720	1870	100	505
4	2750	670	4970	2280	250	1540	1850	110	549
5	2750	650	4830	2220	250	1500	1900	100	513
6	2610	580	4090	2160	230	1340	1950	120	632
7	2430	490	3210	2080	210	1180	1950	100	526
8	2240	430	2600	2030	190	1040	1930	90	469
9	2190	340	2010	2030	160	877	1900	100	513
10	2160	300	1750	2060	160	890	1870	100	505
11	2140	290	1680	2000	240	1300	2010	100	543
12	2080	250	1400	2000	150	810	2090	100	564
13	2060	230	1280	2000	160	864	2220	170	1020
14	2140	--	2000	2000	130	702	2160	190	1110
15	2300	320	1990	1980	120	642	2170	190	1110
16	2530	1050	7170	1980	110	588	2200	180	1070
17	2370	720	4610	1980	110	588	2090	140	790
18	2770	560	4190	1980	120	642	2010	120	651
19	2840	530	4060	1960	140	741	1980	120	642
20	2570	410	2840	1930	140	730	1800	130	632
21	2440	300	1980	1980	110	588	1600	--	600
22	2320	260	1630	1920	100	518	1300	--	550
23	2300	250	1550	1900	100	513	1300	--	550
24	2240	240	1450	1900	90	462	2000	--	650
25	2190	240	1420	1900	90	462	2600	--	750
26	2410	310	2020	1900	90	462	3240	--	900
27	2460	530	3520	1900	100	513	3000	--	800
28	2240	350	2120	1920	250	1300	2730	--	750
29	2410	230	1500	1840	170	845	2570	--	700
30	4300	1460	S 19200	1850	130	649	2460	--	650
31	3320	1240	S 11700	--	--	--	2390	--	650
Total	78800	--	122660	61050	--	31776	64860	--	21048

Day	JANUARY			FEBRUARY			MARCH		
1	1690	110	502	1400	--	380	1850	110	549
2	1680	110	499	1500	--	400	1850	120	599
3	1600	120	518	1500	--	400	1820	120	590
4	1600	130	562	1400	--	380	1810	110	538
5	1550	120	502	1400	--	380	1790	100	483
6	1550	120	502	1400	--	380	1760	100	475
7	1600	140	605	1500	--	400	1820	130	639
8	1570	120	509	1500	--	400	1790	160	773
9	1610	100	435	1500	--	400	1810	150	733
10	1710	80	369	1500	--	420	1850	150	749
11	1750	90	425	1600	--	700	1790	130	628
12	1720	100	464	1700	230	1060	2120	1110	6350
13	1710	90	416	1800	--	1500	2640	810	5770
14	1750	110	520	2040	220	1210	3840	1960	20300
15	1740	100	470	2060	220	1220	5350	3100	44800
16	1710	100	462	2110	240	1370	5260	2400	34100
17	1750	100	472	2140	310	1790	4440	1950	23400
18	1750	100	472	2500	--	8400	3380	1630	14900
19	1760	120	570	2960	1730	13800	2900	1320	10300
20	1500	--	500	2460	530	3520	2660	970	6970
21	1100	--	400	2240	300	1810	2680	530	3840
22	1000	--	360	2190	270	1600	2730	360	2650
23	1000	--	360	2140	230	1330	3100	430	3600
24	1100	--	300	1980	210	1120	3340	560	5050
25	1000	--	280	1950	150	790	3300	620	5520
26	1000	--	280	1920	100	518	2770	570	4260
27	1100	--	300	1880	100	508	2610	440	3100
28	1200	--	320	1870	100	505	2770	580	4340
29	1300	--	340	--	--	--	7680	4600	S 82800
30	1300	--	340	--	--	--	6310	3310	56400
31	1400	--	380	--	--	--	4560	2650	32600
Total	45800	--	13434	52140	--	46691	94380	--	377806

S Computed by subdividing day.

6-8875. KANSAS RIVER AT WAMEGO, KANS.--Continued

Suspended sediment, water year October 1960 to September 1961--Continued
/Where no concentrations are reported, loads are estimated/

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..	3590	1800	17400	1950	140	737	24700	1570	105000
2..	2900	850	6660	1930	130	677	17000	1540	70700
3..	2550	580	3990	1900	110	564	24500	2920	193000
4..	2410	420	2730	3150	800	S 10100	25200	2740	186000
5..	2170	330	1930	9760	4100	S 119000	21400	2250	130000
6..	2060	270	1500	20600	6220	346000	22900	2580	160000
7..	2010	200	1090	23800	5600	360000	25800	2730	190000
8..	2240	680	S 4720	23600	5180	330000	25200	2650	180000
9..	4420	2860	34100	19600	4030	213000	26700	2650	191000
10..	7720	2220	46300	12300	3960	132000	26000	2310	162000
11..	9180	2490	61700	8960	2700	65300	26000	2270	159000
12..	8790	2270	53900	6800	2030	37300	22900	2100	130000
13..	10400	3020	84800	5740	1470	22800	22100	2060	123000
14..	10900	3470	102000	5350	1320	19100	25000	2480	167000
15..	7750	2270	47500	5180	1240	17300	30400	2400	197000
16..	5330	1620	23300	5110	1030	14200	30400	2260	163000
17..	4300	1040	12100	5470	1120	16500	21900	1980	117000
18..	3750	780	7900	5710	850	13100	17100	1830	84500
19..	3420	630	5820	6510	1050	18500	16000	1640	70800
20..	3120	470	3960	7890	1400	29800	14700	1420	56400
21..	2800	360	2720	8910	1360	32700	14000	1330	50300
22..	2750	310	2300	28600	4180	S 372000	13500	1300	47400
23..	2620	300	2120	68600	3850	713000	13000	1130	39700
24..	2680	300	2170	63900	2620	452000	12300	1160	38500
25..	2530	270	1840	54600	2270	335000	11700	1050	33200
26..	2340	230	1450	45200	2160	264000	11000	940	27900
27..	2220	180	1080	40700	2440	268000	10500	1060	30100
28..	2090	140	790	38600	2210	230000	10500	1100	31200
29..	2060	140	779	37100	2190	219000	9600	950	24600
30..	2000	160	864	36400	1680	165000	9210	900	22400
31..	--	--	--	34300	1650	153000	--	--	--
Total	123100	--	539513	638220	--	4969678	581210	--	3180700
	JULY			AUGUST			SEPTEMBER		
1..	8680	890	20900	3730	1170	11800	4140	1240	13900
2..	8480	850	19500	3660	990	9780	3840	1140	11800
3..	8120	800	17500	5640	2240	34100	4100	1140	12600
4..	7500	790	16000	4560	2050	25200	12100	5470	179000
5..	7160	800	15500	3920	1230	13000	9820	3560	94400
6..	7080	800	15300	4170	920	10400	6150	1800	29900
7..	6460	730	12700	4320	830	9680	3990	730	7860
8..	6070	680	11100	4320	770	8980	3620	550	5380
9..	6050	650	10600	4210	700	7960	3640	540	5310
10..	6020	660	10700	4100	630	6970	3770	680	6920
11..	5890	650	10300	4080	620	6830	3340	620	5590
12..	5450	650	9560	4010	630	6820	3280	580	5140
13..	5210	630	8860	3920	530	5610	7380	1470	S 51000
14..	4940	620	8270	3640	460	4520	31400	6850	538000
15..	4990	610	8220	3420	440	4060	23500	3910	248000
16..	5180	620	8670	3550	480	4600	22300	3740	225000
17..	5740	750	11600	3700	630	6290	17000	4120	189000
18..	6020	1110	18000	3680	800	7950	20800	3610	203000
19..	5660	830	12700	3900	880	9270	27000	3090	225000
20..	5380	1120	16300	4060	860	9430	26100	2900	204000
21..	5470	880	13000	4210	930	10600	17900	2520	122000
22..	11000	2200	65300	7560	3570	72900	9910	2080	55700
23..	8790	1020	24200	9010	5190	126000	7580	1630	33400
24..	6020	910	14800	8370	3040	68700	8960	2210	53500
25..	5280	900	12800	7020	2550	48300	9570	2830	73100
26..	5160	900	12500	6540	2850	50300	9010	2000	48700
27..	6250	1290	21800	6050	3600	58800	8140	1090	24000
28..	6620	1180	21100	5300	2300	32900	7780	730	15300
29..	5760	2230	34700	5040	1590	21600	7500	640	13000
30..	4730	1800	23000	4780	1400	18100	6280	670	11400
31..	4060	1430	15700	4320	1260	14700	--	--	--
Total	195220	--	521180	148790	--	726150	329900	--	2710900

Total discharge for year (cfs-days)..... 2413470
Total load for year (tons)..... 13261536

S Computed by subdividing day.

KANSAS RIVER BASIN--Continued

6-8875. KANSAS RIVER AT WAMEGO, KANS.--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters											Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Nov. 1, 1960	1520	52		2920	742		74	80	85	89	95	98	99	100	--	--		VPWC
Jan. 11, 1961	1201	35		1730	86		36	47	--	62	--	73	76	85	99	100		VPWC
Mar. 15	0700	45		5400	3390		49	60	--	81	--	98	99	100	--	--		VPWC
Mar. 15	1440	50		5420	3020		51	59	67	78	92	99	100	--	--	--		VPWC
Mar. 29	1715	48		9040	5570		42	49	--	69	--	99	100	--	--	--		VPWC
Mar. 31	1845	50		4280	2590		64	75	--	87	--	--	--	--	--	--		PWC
Apr. 6	1410	56		2060	226		63	67	--	79	--	94	96	99	100	--		VPWC
Apr. 10	1720	45		8620	2410		40	43	--	60	--	96	98	100	--	--		VPWC
Apr. 13	1715	50		11200	3880		37	43	--	58	--	96	99	100	--	--		VPWC
Apr. 15	1830	50		6860	2200		53	55	--	71	--	97	99	100	--	--		VPWC
May 5	1625	--		11900	5520		35	40	46	57	79	97	99	99	100	--		VPWC
May 5	1700	52		12000	5270		28	41	--	59	--	96	99	100	--	--		VPWC
May 6	2230	55		23600	5230		40	50	--	65	--	93	98	100	--	--		VPWC
May 8	1505	58		22600	4470		44	52	61	72	82	95	98	100	--	--		VPWC
May 8	1505	58		22600	4470		19	36	50	68	80	95	98	100	--	--		VPN
May 10	1320	--		11800	3480		57	65	71	79	88	97	99	100	--	--		VPWC
May 16	1930	63		5000	944		55	61	--	79	--	94	96	100	--	--		VPWC
May 23	1400	62		72000	3370		40	44	--	56	--	80	87	93	99	100		VPWC
May 24	1245	--		66600	2700		34	50	57	62	70	84	88	96	100	--		VPWC
May 24	1245	--		66600	2700		27	41	49	59	70	84	88	96	100	--		VPN
May 30	2100	72		36200	1670		36	37	--	48	--	81	88	94	100	--		VPWC
June 2	1800	77		16600	1440		40	43	--	58	--	92	95	99	100	--		VPWC
June 6	2130	75		26600	3000		42	46	50	58	72	93	96	98	100	--		VPWC
June 22	1250	78		13400	1400		45	52	--	71	--	94	97	99	100	--		VPWC
June 22	1250	78		13400	1400		2	7	--	71	--	94	97	99	100	--		VPN
July 20	1135	--		5380	968		50	64	75	82	91	96	97	98	100	--		VPWC
Sept. 15	1005	--		21700	3920		57	61	66	71	86	96	98	99	100	--		VPWC

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KANSAS RIVER BASIN--Continued

6-8875. KANSAS RIVER AT WAMEGO, KANS.--Continued

Particle-size analyses of bed material, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Bed material: Percent finer than size indicated, in millimeters											Method of analysis
							0.062	0.125	0.250	0.500	1.000	2.000	4.000	8.000	16.00	32.00	64.00	
Nov. 1, 1960.....	1520		12	2920			--	0	8	46	73	83	92	96	99	100		SV
Jan. 11, 1961.....	1201		11	1730			--	0	5	35	62	76	90	97	98	100		SV
Apr. 6.....	1410		12	2060			3	6	16	45	74	86	95	98	99	100		SV
May 8.....	1505		15	22600			2	4	12	42	70	82	90	95	98	100		SV
May 24.....	1245		15	66600			--	0	7	38	67	79	88	91	95	100		SV
June 22.....	1250		10	13400			--	0	4	40	74	86	93	96	98	100		SV
July 20.....	1135		11	5380			--	0	2	35	63	73	83	89	92	100		SV
Sept. 19.....	1230		10	26300			1	2	10	44	73	85	95	98	100	--		SV

KANSAS RIVER BASIN--Continued

6-8880. VERMILLION CREEK NEAR WAMEGO, KANS.

LOCATION.--At gaging station at highway bridge, 1 mile upstream from Indian Creek and 14 miles northeast of Wamego, Pottawatomie County.
DRAINAGE AREA.--243 square miles.
RECORDS AVAILABLE.--Water temperatures: April 1958 to September 1959.
Sediment records: April 1958 to September 1961.
EXTREMES, 1960-61.--Sediment concentrations: Maximum daily, 8,220 ppm Apr. 24; minimum daily, not determined.
Sediment loads: Maximum daily, 37,300 tons May 7; minimum daily, less than 0.50 ton Jan. 10.
EXTREMES, 1958-61.--Sediment concentrations: Maximum daily, 11,400 ppm June 2, 1960; minimum daily, not determined.
Sediment loads: Maximum daily, 108,000 tons May 30, 1959; minimum daily, less than 0.50 ton Sept. 10, 15-17, 1959, Jan. 10, 1961.
REMARKS.--Maximum observed sediment concentration during water year, 18,100 ppm May 17. Flow affected by ice Dec. 22, 23, Jan. 20-23, 29, Feb. 1, 2, 5, 18-20.

Suspended sediment, water year October 1960 to September 1961
/Where no concentrations are reported, loads are estimated/

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	--	4	16	--	8	11	--	4
2..	11	--	4	12	--	7	9.8	--	3
3..	9.4	--	3	11	--	7	10	--	3
4..	9.0	--	3	11	--	7	11	--	4
5..	9.1	--	3	11	--	7	15	157	6
6..	9.4	--	3	11	--	7	17	--	7
7..	9.1	--	3	11	225	7	14	--	5
8..	8.8	--	3	11	--	6	12	--	5
9..	8.5	--	3	11	--	6	11	--	4
10..	8.2	--	3	11	--	6	10	--	4
11..	8.1	--	3	11	--	6	12	163	5
12..	7.9	--	3	11	--	6	13	88	3
13..	8.9	134	3	12	191	6	13	--	3
14..	9.1	--	3	13	--	6	11	--	3
15..	8.9	--	3	14	--	7	11	112	3
16..	8.8	--	3	14	--	7	11	--	3
17..	8.4	--	3	14	--	7	11	--	3
18..	8.3	96	2	13	--	6	11	--	3
19..	9.8	--	4	12	--	6	9.9	--	2
20..	11	--	4	12	--	5	9.6	--	2
21..	11	--	4	11	180	5	9.1	--	2
22..	10	--	4	11	--	5	8.0	--	2
23..	9.8	--	4	11	--	6	7.5	--	1
24..	9.5	104	3	11	198	6	8.1	40	1
25..	9.6	--	3	11	--	6	8.6	114	3
26..	11	--	4	12	--	7	9.0	--	3
27..	9.6	76	2	12	201	7	9.2	--	3
28..	9.4	--	2	12	384	12	9.5	--	3
29..	16	--	6	12	--	10	9.6	71	2
30..	36	--	13	12	--	7	9.6	84	2
31..	26	--	10	--	--	--	9.6	--	2
Total	341.6	--	118	357	--	201	331.1	--	99

6-8880. VERMILLION CREEK NEAR WAMEGO, KANS.--Continued

Suspended sediment, water year October 1960 to September 1961--Continued
(Where no concentrations are reported, loads are estimated)

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..	9.2	--		2	6.0	--		2	11	67	A	2
2..	8.9	--		1	6.5	--		2	12	62	A	2
3..	8.7	--		1	7.0	--		3	12	121		4
4..	8.6	28		1	6.0	--		2	13	57	A	2
5..	8.5	--		1	6.0	--		2	13	79		3
6..	8.6	39		1	7.0	--		3	12	62	A	2
7..	8.9	--		1	7.5	--		3	12	62	A	2
8..	8.9	--		1	8.0	--		3	13	53		2
9..	8.9	--		1	9.0	--		3	12	63		2
10..	9.1	16		T	9.4	--		3	11	67	A	2
11..	9.1	--		1	10	95		3	10	72	A	2
12..	9.0	--		1	12	170		6	218	1980	S	2700
13..	9.3	--		1	13	--		6	1150	7320	S	24600
14..	9.6	--		1	13	--		6	186	2850	S	2850
15..	9.0	--		1	14	--		6	103	820		228
16..	11	--		2	18	--		8	77	385	A	80
17..	10	--		2	20	--		8	65	350		61
18..	10	--		1	25	--		9	72	385	A	75
19..	11	--		2	30	--		12	78	400		84
20..	8.0	--		1	25	--		9	91	760	S	211
21..	7.0	--		1	17	--		6	198	1100		588
22..	5.5	--		1	17	--		6	460	2520		3130
23..	4.5	--		1	22	138		8	662	3760		6720
24..	4.0	--		1	22	--		7	181	1220		596
25..	4.0	--		1	17	101		5	110	438	A	130
26..	3.5	--		1	14	134		5	140	850	S	340
27..	3.5	--		1	14	152		6	860	4590	S	11400
28..	3.5	--		1	12	--		4	374	2610	S	3140
29..	4.0	--		1	--	--		--	157	720		305
30..	4.5	--		1	--	--		--	134	380		137
31..	5.0	--		1	--	--		--	122	280		92
Total	233.3	--		34	387.4	--		146	5569	--		56162

	APRIL				MAY				JUNE			
1..	106	227	A	65	93	167	A	42	114	200		62
2..	96	170		44	84	160		36	306	3380	S	3120
3..	95	180		46	80	120	A	26	138	1420		529
4..	88	170		40	456	2300	S	8650	119	400		128
5..	81	146	A	32	1940	4110	S	22500	103	270		75
6..	72	98	A	19	1000	2340		6320	142	860	S	353
7..	69	97	A	18	1800	5370	S	37300	108	--		65
8..	210	810	S	727	1780	3560	S	25000	155	--		550
9..	1370	2660		9840	304	2200	S	1550	127	--		500
10..	829	1540	S	3730	234	1420	A	900	84	--		150
11..	293	860		680	197	1030	A	550	73	350		69
12..	433	1370	A	1600	173	685	A	320	66	--		50
13..	249	600		403	156	522	A	220	218	--		440
14..	183	320		158	145	358	A	140	1600	3690	S	18100
15..	146	279	A	110	131	280		99	190	2060		1060
16..	122	230		76	117	222	A	70	130	--		460
17..	113	160		49	1330	5080	S	23100	100	--		160
18..	107	150		43	417	2690	S	3530	96	360		93
19..	103	122	A	34	239	1120		723	86	--		75
20..	99	108	A	29	245	680		450	94	400		102
21..	88	105	A	25	267	760	S	732	81	--		80
22..	86	146	A	34	1270	3340	S	12400	68	--		65
23..	86	330	S	88	971	2810	S	10700	59	--		50
24..	966	8220		21400	267	640		461	54	--		40
25..	170	2020	S	1130	211	351	A	200	55	--		40
26..	125	237	A	80	174	319	A	150	57	--		30
27..	115	193	A	60	153	290	A	120	49	--		25
28..	105	212	A	60	141	223	A	85	47	--		25
29..	98	200		53	129	215	A	75	43	--		22
30..	97	179	A	47	116	200		63	38	--		20
31..	--	--		--	100	163	A	44	--	--		--
Total	6800	--		40720	14720	--		156556	4595	--		26538

S Computed by subdividing day.
T Less than 0.50 ton.
A Computed from partly estimated concentration graph.

KANSAS RIVER BASIN--Continued

6-8880. VERMILLION CREEK NEAR WAMEGO, KANS.--Continued

Suspended sediment, water year October 1960 to September 1961--Continued
(Where no concentrations are reported, loads are estimated)

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..	35	--	15	165	1840	S 1830	143	3460	S 2280
2..	57	250	38	802	4360	S 11100	26	--	70
3..	44	180	21	81	1880	S 462	15	140	6
4..	32	--	16	40	--	75	20	450	24
5..	28	--	15	30	--	24	18	140	7
6..	29	--	15	24	190	12	15	--	6
7..	29	--	15	21	--	5	14	150	6
8..	29	--	15	19	--	4	21	--	17
9..	26	--	13	18	--	3	13	94	3
10..	24	--	12	17	--	3	12	--	2
11..	23	--	12	16	--	3	11	--	2
12..	21	--	11	18	--	3	26	--	75
13..	20	--	11	18	--	3	381	3310	3400
14..	21	--	11	16	--	2	93	--	340
15..	21	--	11	15	--	2	36	260	25
16..	20	--	10	14	--	2	26	120	8
17..	18	--	9	14	--	2	22	--	5
18..	16	--	8	13	--	2	19	--	4
19..	14	--	5	93	2220	732	18	--	4
20..	14	120	4	33	970	S 96	18	--	4
21..	119	2640	S 930	20	--	36	19	130	7
22..	174	2900	S 1470	41	--	110	27	--	44
23..	195	1700	S 1460	30	--	65	78	--	380
24..	53	--	150	19	--	20	561	--	6000
25..	31	--	30	16	--	12	221	1720	S 1180
26..	40	360	S 48	14	--	6	63	680	116
27..	51	--	50	13	--	5	44	--	45
28..	27	--	14	13	--	5	36	--	25
29..	20	--	10	12	--	4	34	--	16
30..	17	160	7	12	--	4	56	--	150
31..	15	--	5	11	--	3	--	--	--
Total	1263	--	4441	1668	--	14635	2086	--	14251

Total discharge for year (cfs-days)..... 38351.4
Total load for year (tons)..... 313901

S Computed by subdividing day.

6-8880. VERMILLION CREEK NEAR WAMEGO, KANS.--Continued

Particle-size analyses of suspended sediment, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Mar. 14, 1961.....	1020	42		178	2900		62	71	79	86	92	100	--					VPWC
Mar. 28.....	1400	--		241	1980		57	64	--	82	98	100	--					VPWC
May 7.....	0730	--		3300	9310		44	52	61	74	92	99	100					VPWC
May 7.....	1045	60		1130	7370		35	41	--	60	98	100	--					VPWC
May 8.....	0810	54		2270	4630		61	68	89	100	--	--	--					VPWC
May 17.....	0830	--		1560	18100		33	39	47	59	80	98	100					VPWC
May 22.....	1855	--		1630	3260		32	37	--	53	--	95	99	100				VPWC
May 23.....	1110	--		685	2260		41	48	--	69	--	99	100					VPWC
June 2.....	0825	--		283	3260		36	45	--	60	--	97	100					VPWC
Sept. 13.....	1810	--		394	2860		46	52	63	74	90	99	100					VPWC

CHARITON RIVER BASIN

6-9035. HONEY CREEK NEAR RUSSELL, IOWA

LOCATION.--At gaging station at county 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 1961.
EXTREMES, 1960-61.--Sediment concentrations: Maximum daily, 1,600 ppm Mar. 6; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 864 tons Mar. 6; minimum daily, 0 tons on many days.
EXTREMES, 1952-61.--Sediment concentrations: Maximum daily, 9,840 ppm June 20, 1952; minimum daily, no flow on many days each year.
Sediment loads: Maximum daily, 6,300 tons May 21, 1959; minimum daily, 0 tons on many days each year.
REMARKS.--Maximum observed sediment concentration during water year, 2,390 ppm Sept. 12. Flow affected by ice Dec. 7-21, Dec. 25 to Jan. 22, Feb. 9-17.

Suspended sediment, water year October 1960 to September 1961
/Where no concentrations are reported, loads are estimated/

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	20	--	5.0	0.6	--	0.1
2..	0	--	0	7.0	--	2.0	.5	--	.1
3..	0	--	0	3.0	100	.8	.9	49	.1
4..	0	--	0	2.2	61	.4	1.0	--	.2
5..	0	--	0	1.9	--	.2	5.3	80	1.1
6..	0	--	0	1.7	--	.2	2.3	--	.4
7..	0	--	0	1.5	39	.2	1.5	--	.2
8..	0	--	0	1.4	38	.1	1.1	--	.1
9..	0	--	0	1.3	37	.1	1.0	--	.1
10..	0	--	0	1.2	--	.1	1.1	--	.1
11..	0	--	0	1.1	--	.1	1.1	--	.1
12..	0	--	0	1.1	--	.1	.8	--	.1
13..	0	--	0	1.1	--	.1	.7	--	.1
14..	0	--	0	1.2	24	.1	.8	43	.1
15..	0	--	0	35	400	S 50	1.0	--	.1
16..	0	--	0	8.4	--	3.0	.7	--	T
17..	0	--	0	3.1	--	.8	.6	--	T
18..	0	--	0	2.2	--	.4	.5	--	T
19..	0	--	0	1.9	--	.2	.5	--	T
20..	0	--	0	1.7	--	.2	.5	--	T
21..	0	--	0	1.5	34	.1	.4	--	T
22..	0	--	0	1.4	30	.1	.3	--	T
23..	0	--	0	1.2	25	.1	.2	--	T
24..	0	--	0	1.1	24	.1	.2	--	T
25..	.1	--	.1	1.3	40	.1	.5	--	T
26..	1.2	--	.2	1.3	55	.2	.6	--	T
27..	.5	--	.2	1.3	--	.2	.6	--	T
28..	.2	--	.1	1.5	--	.2	.6	--	T
29..	.4	--	.1	1.5	--	.2	.6	--	T
30..	6.4	72	1.2	.9	--	.1	.7	--	T
31..	80	500	A 108	--	--	--	.7	22	T
Total	88.8	--	109.9	111.0	--	65.5	27.9	--	3.6

S Computed by subdividing day.
T Less than 0.05 ton.
A Computed from partly estimated concentration graph.

6-9035. HONEY CREEK NEAR RUSSELL, IOWA--Continued

Suspended sediment, water year October 1960 to September 1961--Continued
(Where no concentrations are reported, loads are estimated)

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..	0.7	--	T	0	--	0	2.1	74	0.4
2..	.7	--	T	0	--	0	2.1	--	.4
3..	.6	30	T	0	--	0	2.3	--	.4
4..	.5	--	T	0	--	0	94	1350 S	417
5..	.4	--	T	0	--	0	47	675 S	317
6..	.5	--	T	0	--	0	200	1600	864
7..	.6	26	T	0	--	0	20	650 A	35
8..	.4	--	T	0	--	0	70	750	142
9..	.4	--	T	.5	--	.1	40	240	26
10..	.4	--	T	4.0	24	.3	30	320	26
11..	.4	--	T	10	160	4.3	28	420	32
12..	.4	--	T	20	--	2.0	26	415 S	69
13..	.4	--	T	5.0	67	.9	200	1200	648
14..	.5	25	T	3.0	48	.4	40	340	37
15..	.5	--	T	2.0	46	.2	25	130	8.8
16..	.5	23	T	1.8	45	.2	15	--	4.0
17..	.4	--	T	1.6	38	.2	12	85	2.8
18..	.4	--	T	100	1110	300	9.9	--	2.0
19..	.3	--	T	25	--	20	32	--	10
20..	.3	--	T	15	125	5.1	55	260 A	39
21..	.2	24	T	10	91	2.5	89	735 S	278
22..	.1	--	T	20	270	15	170	1100 A	505
23..	0	--	0	9.0	--	2.6	70	500 A	95
24..	0	--	0	5.5	--	1.5	50	--	12
25..	0	--	0	3.4	97	.9	45	74	9.0
26..	0	--	0	2.8	--	.5	40	--	6.0
27..	0	--	0	1.3	--	.4	200	650 A	351
28..	0	--	0	1.9	50	.3	20	135	7.3
29..	0	--	0	--	--	--	12	--	3.2
30..	0	--	0	--	--	--	8.6	100	2.3
31..	0	--	0	--	--	--	6.8	--	1.0
Total	9.6	--	0.7	241.8	--	357.4	1661.8	--	3950.6

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..	5.5	--	0.8	2.6	44	0.3	0.3	79	0.1
2..	4.6	--	.7	2.1	22	.1	.3	--	.1
3..	4.8	45	.6	1.9	25	.1	.2	--	T
4..	4.6	63	.8	2.0	53	.3	.2	--	T
5..	5.3	36	.5	6.2	--	3.0	.1	--	T
6..	4.1	41	.5	6.8	61	1.1	.6	160	.3
7..	3.5	58	.5	5.0	--	.9	2.0	--	1.0
8..	3.5	40	.4	5.8	--	.7	1.1	--	.4
9..	4.3	38	.4	3.2	64	.6	.7	105	.2
10..	4.0	36	.4	2.2	--	.3	.4	--	.1
11..	6.7	105 S	2.9	1.9	35	.2	.3	--	.1
12..	25	320 A	22	1.6	36	.2	.2	--	.1
13..	12	73	2.4	1.3	19	.1	3.1	225 S	2.7
14..	8.6	53	1.2	1.4	--	.1	3.6	--	1.8
15..	5.5	54	.8	1.3	44	.2	1.1	--	.4
16..	4.3	66	.8	.9	--	.2	.5	130	.2
17..	4.1	78	.9	1.7	52	.2	.4	130	.1
18..	4.0	25	.3	2.1	--	.2	.2	--	.1
19..	3.6	37	.4	1.6	40	.2	.2	--	.1
20..	4.1	46	.5	1.5	42	.2	.3	110	.1
21..	4.6	72	.9	1.3	--	.2	.2	105	.1
22..	13	130 A	4.6	1.0	--	.1	.2	100	.1
23..	6.3	--	2.6	.6	--	.1	.1	--	T
24..	7.6	75 A	1.5	.5	57	.1	0	--	0
25..	8.1	43	.9	.6	--	.1	0	--	0
26..	4.1	28	.3	.5	--	.1	0	--	0
27..	3.5	30	.3	.4	--	.1	0	--	0
28..	3.1	25	.2	.3	--	T	0	--	0
29..	2.7	24	.2	.3	--	T	0	--	0
30..	3.5	22	.2	.1	--	T	0	--	0
31..	--	--	--	.2	--	T	--	--	--
Total	178.6	--	49.5	58.9	--	10.2	16.3	--	8.2

S Computed by subdividing day.
T Less than 0.05 ton.
A Computed from partly estimated concentration graph.

CHARITON RIVER BASIN--Continued

6-9035. HONEY CREEK NEAR RUSSELL, IOWA--Continued

Suspended sediment, water year October 1960 to September 1961--Continued
(Where no concentrations are reported, loads are estimated)

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	0.2	--	T	0	--		0
2	0	--	0	.8	--	0.2	0	--		0
3	0	--	0	.5	--	.1	0	--		0
4	0	--	0	1.3	180	.6	0	--		0
5	0	--	0	1.4	--	.4	0	--		0
6	0	--	0	.3	--	.1	0	--		0
7	0	--	0	.2	83	T	0	--		0
8	0	--	0	.1	--	T	0	--		0
9	0	--	0	.1	--	T	0	--		0
10	0	--	0	0	--	0	0	--		0
11	0	--	0	0	--	0	0	--		0
12	0	--	0	0	--	0	53	255	S	76
13	0	--	0	0	--	0	300	320		259
14	0	--	0	0	--	0	50	50		6.8
15	.4	--	.1	0	--	0	5.0	--		1.0
16	1.6	--	.8	0	--	0	3.0	--		.3
17	.7	185	.3	0	--	0	2.2	25		.1
18	.2	125	.1	0	--	0	1.9	--		.1
19	.4	--	.1	0	--	0	1.7	31		.1
20	.7	--	.4	0	--	0	1.4	--		.1
21	1.5	--	.8	0	--	0	1.2	--		.1
22	3.8	135	1.4	0	--	0	1.1	--		.1
23	1.3	--	.4	0	--	0	3.0	--		1.5
24	.3	--	.2	0	--	0	7.9	--		4.0
25	.2	--	.1	0	--	0	5.8	55		.9
26	.1	--	.1	0	--	0	3.2	47		.4
27	1.7	--	.9	0	--	0	2.2	--		.3
28	4.6	--	2.0	0	--	0	2.1	--		.3
29	2.7	--	.3	0	--	0	2.0	46		.2
30	.7	--	.1	0	--	0	140	200		76
31	.2	42	T	0	--	0	--	--		--
Total	21.1	--	8.1	4.9	--	1.5	586.7	--		427.3

Total discharge for year (cfs-days)..... 3007.4
Total load for year (tons)..... 4992.5

S Computed by subdividing day.
T Less than 0.05 ton.

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN MISSOURI RIVER BASIN

Chemical analyses, in parts per million, water year October 1960 to September 1961

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)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
MILK RIVER BASIN																							
6-1544. PEOPLES CREEK NEAR HAYS, MONT.																							
June 1, 1960.	6.6	6.7		0.01		62	44	64	9.3	251	0	256	5.9	0.6	0.3	0.21	588	335	129	1.5	868	7.5	8
July 7.....	a .4	3.3		.09		52	43	86	9.8	236	0	305	7.7	.6	.4	.33	646	314	120	2.1	974	7.4	7
May 3, 1961..	1.0	12		.02		136	75	368	5.1	450	0	1040	27	.8	.6	.71	1950	647	278	6.3	2520	7.9	15
6-1745. MILK RIVER AT NASHUA, MONT.																							
Oct. 5, 1960.	120	5.0		0.01		60	26	118	4.5	278	0	255	19	0.3	0.8	0.21	650	256	28	3.2	1000	7.7	6
June 7, 1961.	180	8.3		.02		106	36	258	9.0	421	0	534	54	.6	1.2	.46	1250	413	68	5.5	1770	7.9	--
July 7.....	9.7	7.7		.01		67	30	178	7.8	300	0	392	34	.4	2.2	.28	886	291	45	4.5	1310	7.7	4
Sept. 7.....	49	8.7		.25		66	31	171	8.0	320	0	336	37	.4	.3	.23	961	293	31	4.3	1260	7.5	4
LITTLE PORCUPINE CREEK BASIN																							
6-1754. FRAZER RESERVOIR OUTLET AT FRAZER, MONT.																							
June 7, 1961.	(b)	7.9		0.25		51	17	94	10	247	0	181	12	0.4	0.3	0.27	522	197	0	2.9	796	7.3	--
July 7.....	(b)	12		.14		43	15	117	10	179	0	244	15	.5	1.4	.22	575	168	21	3.9	881	7.2	10
Aug. 1.....	(b)	6.8		.50		33	22	138	13	158	0	351	3.2	.4	.0	.40	691	174	44	4.5	1030	7.5	23
Sept. 7.....	(b)	16		.13		36	21	193	13	282	0	323	29	.8	.2	.45	951	178	0	6.3	1220	7.3	30
TURTLE CREEK BASIN																							
6-3413.9. LAKE ORDWAY NEAR TURTLE LAKE, N. DAK.																							
Apr. 21, 1961	(c)	2.9		0.09	0.00	0.8	24	1980	45	2130	578	1590	52	0.4	0.8	2.9	5600	99	0	87	7340	9.3	
July 14.....	(c)	3.4		.11		.0	57	5010	113	4110	1950	3990	166	.7	1.4	12	13800	233	0	142	16100	9.3	
Sept. 11.....	(c)	.2		1.3		.0	58	13600	255	6460	7480	11100	244	1.2	2.1	23	36600	240	0	382	37300	9.8	

a Estimated.
b Analyses represent reservoir water; no outflow at time of sampling.
c Lake content not known. Information on lake stage available in district office at Lincoln, Nebr.

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN MISSOURI RIVER BASIN--Continued

Chemical analyses, in parts per million, water year October 1960 to September 1961--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)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
PAINTED WOODS CREEK BASIN																							
6-3418. PAINTED WOODS CREEK NEAR WILTON, N. DAK.																							
Mar. 14, 1961	2.4	12		0.31		37	19	71	17	228	0	150	3.7	0.2	2.1	0.22	452	171	0	2.4	667	7.3	100
Apr. 21.....	.4	.4		.04		47	34	184	9.6	451	0	286	7.5	.3	.3	.30	832	256	0	5.0	1230	8.2	
CHEYENNE RIVER BASIN																							
6-4020. FALL RIVER AT HOT SPRINGS, S. DAK.																							
Sept. 4, 1959	15.3	23		0.01		162	38	74	8.1	223	0	377	92	0.7	1.0	0.21	947	560	377	1.4	1300	7.6	3
June 9, 1960.	23.0	23		.01	0.00	160	45	72	8.0	245	0	400	94	.6	.5	.19	1010	582	381	1.3	1 10	7.7	2
June 14, 1961	24.4	21		.00		182	33	64	8.1	224	0	390	85	.7	1.5	.15	969	588	404	1.1	13.0	7.8	4
OKOBOJO CREEK BASIN																							
6-4397.8. COTTONWOOD LAKE NEAR AGAR, S. DAK.																							
Mar. 31, 1961	(c)	4.0		0.09	--	23	11	58	12	114	0	118	18	0.1	1.3	0.12	321	102	9	2.5	514	7.1	
Apr. 25.....	(c)	8.7		.03	--	57	40	208	38	390	0	378	62	.2	.3	.54	1050	308	0	5.1	1520	8.1	
July 19.....	(c)	11		.02	0.23	65	42	235	42	437	0	438	70	.3	.4	.53	1170	334	0	5.6	1700	8.2	10
Sept. 20.....	(c)	15		.03	1.2	62	45	248	48	399	24	470	73	.3	.1	.63	1160	341	0	5.9	1770	8.6	
6-4398.2. SULLY LAKE NEAR ONEIDA, S. DAK.																							
Mar. 31, 1961	(c)	6.4		0.10	--	42	11	20	12	160	0	64	1.7	0.2	5.8	0.05	265	152	21	0.7	411	7.2	
Apr. 25.....	(c)	.1		.00	--	46	13	24	12	175	5	75	1.6	.2	.2	.07	291	170	18	.8	452	8.4	
July 19.....	(c)	14		.01	0.00	44	17	33	14	200	0	96	2.3	.2	.1	.10	347	180	16	1.1	529	7.1	8
Sept. 20.....	(c)	12		.06	.00	46	17	42	15	205	8	110	.2	.2	.4	.15	371	183	2	1.4	553	8.4	

NIOBRARA RIVER BASIN

6-4565. NIOBRARA RIVER NEAR HAY SPRINGS, NEBR.

Oct. 6, 1960.	22	52		0.03	--	11	30	27	9.8	237	0	19	3.0	0.7	1.2	0.07	281	152	0	0.9	414	7.7	4
Jan. 23, 1961	20	50		.01	0.00	44	11	23	7.1	230	0	19	2.6	.6	2.3	.04	274	157	0	.8	405	7.9	3
June 1.....	16	49		.01	.00	48	8.8	26	10	237	0	19	3.1	.7	1.1	.09	289	156	0	.9	418	8.1	7
June 19.....	87	53		.07	.00	45	7.4	29	11	230	0	22	4.4	.8	1.8	.07	292	143	0	1.1	415	7.6	3
Aug. 17.....	10	46		.10	--	46	8.5	25	10	234	0	16	3.1	.6	.2	.05	275	150	0	.9	403	7.7	6

6-4620. NIOBRARA RIVER NEAR NORDEN, NEBR.

Sept. 28, 1960.....	777	58		0.05	--	30	3.7	8.0	5.9	128	0	6.3	0.2	0.3	1.1	0.02	186	90	0	0.4	222	7.1	2
Dec. 13.....	798	57		.07	0.00	33	4.3	8.9	6.1	140	0	6.5	.0	.4	1.5	.03	194	100	0	.4	243	7.4	8
Mar. 22, 1961	1050	52		.01	.00	31	2.8	8.6	6.3	127	0	5.0	.0	.4	1.3	.05	181	89	0	.4	223	7.5	13
July 11.....	763	59		.01	.00	28	3.4	8.5	4.2	122	0	4.5	.0	.4	.9	.00	178	84	0	.4	214	7.5	6

JAMES RIVER BASIN

6-4682. LAKE JUANITA NEAR GRACE CITY, N. DAK.

Oct. 1, 1960.	(c)	40		0.03	--	20	37	63	13	306	0	75	21	0.3	3.3	0.16	448	202	0	1.9	665	7.5	23
Apr. 14, 1961	(c)	.1		.03	--	28	25	39	12	237	0	53	18	.3	.4	.12	338	174	0	1.3	523	8.1	
July 13.....	(c)	29		.05	0.00	21	43	73	15	348	0	82	24	.3	.4	.15	496	229	0	2.1	761	7.4	
Sept. 17.....	(c)	36		.07	.41	15	38	77	14	232	39	94	26	.3	.7	.32	511	192	0	2.4	719	9.0	

6-4683. NICCUM RESERVOIR ON KELLY CREEK, NEAR BORDULAC, N. DAK.

Oct. 1, 1960.	(c)	18		0.03		25	23	42	10	231	0	49	12	0.1	3.4	0.13	313	156	0	1.5	488	7.2	26
Apr. 14, 1961	(c)	7.6		.03		32	24	40	9.1	262	0	38	12	.2	1.4	.11	326	177	0	1.3	517	7.5	--
July 12.....	(c)	5.8		.04	0.00	15	26	41	9.7	244	0	37	12	.3	.3	.13	303	145	0	1.5	506	7.6	15
Sept. 17.....	(c)	14		.05		15	19	46	10	207	0	37	13	.3	.4	.29	288	117	0	1.8	433	8.2	--

c Lake content not known. Information on lake stage available in district office at Lincoln, Nebr.

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN MISSOURI RIVER BASIN--Continued

Chemical analyses, in parts per million, water year October 1960 to September 1961--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)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
JAMES RIVER BASIN--Continues																							
6-4695. PIPESTEM CREEK NEAR BUCHANAN, N. DAK.																							
Oct. 3, 1960.	0.1	1.6		0.09	--	37	44	161	11	362	0	267	51	0.2	1.0	0.34	775	274	0	4.2	1200	7.6	27
Mar. 15, 1961	9.2	12		.10	--	41	19	49	6.6	205	0	99	15	.1	.2	.06	370	180	12	1.6	563	7.4	--
Mar. 29.....	3.8	12		.29	--	46	22	65	5.6	252	0	110	24	.2	.3	.05	441	204	0	2.0	673	7.5	--
Apr. 14.....	2.8	11		.04	0.08	60	29	85	6.7	332	0	149	31	.2	.8	.12	564	270	0	2.3	866	7.5	--
July 12.....	.2	4.5		.06	.01	34	42	192	12	360	0	316	62	.4	.3	.34	859	259	0	5.2	1320	7.6	45
Sept. 17.....	.2	3.2		.10	.00	38	45	174	13	344	0	314	52	.3	.4	.45	828	278	0	4.5	1250	7.8	--
6-4700. JAMES RIVER AT JAMESTOWN, N. DAK.																							
Oct. 3, 1960.	2.8	25		0.03	--	87	29	113	9.2	431	0	183	33	0.3	0.6	0.48	695	335	0	2.7	1050	7.6	11
Mar. 15, 1961	12	16		.37	--	56	18	62	7.7	251	0	116	28	.2	.2	.24	449	215	9	1.8	695	7.2	
Apr. 14.....	9.2	11		.04	--	63	27	79	6.2	328	0	138	29	.2	.0	.22	535	269	0	2.1	837	7.6	
June 27.....	1.0	22		.07	--	99	36	200	10	390	0	372	92	.3	.0	.74	1050	396	76	4.4	1530	7.5	
July 12.....	3.2	13		.07	0.04	45	7.4	50	5.5	163	0	76	31	.2	1.8	.27	333	143	9	1.8	520	6.8	
Aug. 28.....	1.6	20		.06	--	70	28	176	8.8	366	0	242	89	.4	.3	.62	846	289	0	4.5	1300	7.7	
Sept. 18.....	2.7	24		.02	.45	59	27	112	7.3	393	0	131	40	.2	.3	.39	610	256	0	3.0	929	7.5	
6-4715. ELM RIVER AT WESTPORT, S. DAK.																							
Aug. 9, 1949.	3.3	19		0.04		37	21	123		268	0	98	87	0.2	2.5	0.46	552	179	0	4.0	851	7.6	
Aug. 2, 1950.	4.1	6.0		.04		49	35	116		251	0	172	93	0.3	1.6	.26	636	267	61	3.1	994	7.4	
Apr. 13, 1961	3.8	--		1.4	0.29	39	17	--		183	0	--	--	--	--	--	399	169	19	--	660	7.3	
6-4719. MOCCASIN CREEK NEAR NAHON, S. DAK.																							
Oct. 4, 1960.	a 0.1	18		0.13	0.00	86	53	384	40	345	0	684	258	1.7	6.0	1.2	1780	431	148	8.1	2560	7.3	43
Mar. 23, 1961	8	--		--	--	40	18	--	--	214	0	164	82	--	--	--	592	173	0	--	951	7.1	--
Apr. 12.....	a 8	20		.01	.00	51	25	183	27	306	0	234	120	1.5	.4	.13	844	228	0	5.2	1310	7.5	33

6-4737.55. LAKE LOUISE NEAR MILLER, S. DAK.

Mar. 13, 1961	(c)	1.2		0.11	--	15	2.3	2.8	3.7	60	0	3.8	1.0	0.1	0.1	0.00	70	47	0	0.2	117	6.9	
Apr. 12.....	(c)	2.3		.04	--	31	7.9	7.9	8.7	143	0	13	3.5	.1	.3	.02	164	110	0	.3	266	7.1	
July 6.....	(c)	2.4		.03	0.10	28	9.5	9.7	9.8	141	0	16	4.3	.2	.1	.07	159	109	0	.4	283	7.0	11
Sept. 20.....	(c)	7.1		.07	.01	27	9.6	11	11	139	0	17	5.6	.1	.4	.09	176	107	0	.5	277	6.9	

6-4743.1. COTTONWOOD LAKE NEAR REDFIELD, S. DAK.

Oct. 4, 1960.	(c)	21		0.05	--	38	37	244	26	407	0	322	106	0.4	3.1	0.53	1010	247	0	6.8	1530	7.7	17
Mar. 13, 1961	(c)	8.4		1.1	--	16	4.4	27	4.1	108	0	20	6.9	.2	1.1	.03	157	58	0	1.5	245	7.3	--
Apr. 12.....	(c)	21		.03	--	41	42	243	23	420	0	326	105	.4	.3	.52	1060	275	0	6.4	1570	8.0	--
July 6.....	(c)	21		.02	0.00	48	41	256	25	437	0	368	115	.4	1.1	.54	1120	288	0	6.5	1700	7.6	10
Sept. 19.....	(c)	27		.07	.08	47	44	296	33	472	9	412	131	.4	.3	.73	1260	298	0	7.4	1860	8.4	--

6-4745. TURTLE CREEK AT REDFIELD, S. DAK.

Oct. 4, 1960.	0.3	8.7		0.06		50	20	387	23	257	0	643	128	2.2	39	1.8	1470	208	0	12	2190	7.1	28
Mar. 13, 1961	3.2	6.0		.17		31	14	100	8.5	164	0	154	52	.4	3.0	.36	474	137	3	3.7	754	7.2	
Apr. 12.....	.3	1.5		.03		51	37	226	16	323	0	343	128	.5	1.6	.52	1020	281	16	5.9	1540	7.8	

6-4759. LAKE BYRON NEAR HURON, S. DAK.

Mar. 14, 1961	d1248.84	7.9		0.23	--	28	15	63	12	100	0	163	26	0.5	0.9	0.19	399	131	49	2.4	611	7.0	
Apr. 12.....	d1248.81	16		.04	--	74	72	296	34	268	0	765	114	.4	.3	.85	1600	480	260	5.9	2200	7.6	
July 6.....	d1248.44	16		.03	0.00	84	77	340	36	308	0	848	123	.5	.4	.92	1740	526	273	6.5	2390	7.3	10
Sept. 20.....	d1247.66	18		.03	.01	94	85	377	42	309	0	1020	142	.5	.3	1.7	2010	584	331	6.7	2670	7.9	

a. Estimated.
c Lake content not known. Information on lake stage available in district office at Lincoln, Neb.
d Lake elevation, in feet.

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN MISSOURI RIVER BASIN--Continued

Chemical analyses, in parts per million, water year October 1960 to September 1961--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)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
VERMILLION RIVER BASIN																							
EAST FORK VERMILLION RIVER AT PARKER, S. DAK.																							
May 31, 1960.	a 2.5	--		0.02	0.98	166	58	32	9.2	299	0	--	--	--	--	--	953	652	407	0.5	1210	7.5	--
Oct. 10.....	a 1	22		.05	.80	268	88	54	8.7	368	0	815	5.6	0.3	1.1	0.32	1520	1030	728	.7	1770	7.6	3
Mar. 17, 1961	a 115	9.8		.12	.05	55	17	7.1	13	146	0	104	.0	.2	5.9	.08	305	206	86	.2	454	6.9	55
6-4787. WEST FORK VERMILLION RIVER AT PARKER, S. DAK.																							
May 31, 1960.	45.2	12		0.01	0.72	124	58	36	9.8	256	0	371	11	0.2	4.3	0.11	830	548	338	0.7	1090	7.6	11
Oct. 10.....	.9	12		.04	.68	150	69	50	11	298	0	486	17	.3	7.9	.27	993	658	414	.8	1300	7.0	7
Mar. 17, 1961	a 55	12		.11	.00	43	16	13	14	126	0	96	4.4	.2	4.3	.09	296	173	70	.4	432	6.9	65
6-4787.2. VERMILLION RIVER NEAR CHANCELLOR, S. DAK.																							
May 31, 1960.	65.9	8.1		--	--	130	53	31	9.2	269	0	366	7.0	0.1	1.6	0.12	822	542	321	0.6	1050	7.6	--
Oct. 10.....	11.6	16		0.03	0.32	190	78	45	8.3	302	0	619	7.1	.2	2.0	.26	1170	793	545	.7	1440	7.3	4
Mar. 17, 1961	190.5	12		.10	.00	47	17	8.8	14	132	0	94	2.6	.1	7.2	.14	288	186	78	.3	429	6.9	50
6-4790. VERMILLION RIVER NEAR WAKONDA, S. DAK.																							
May 31, 1960.	218	13		0.02	0.10	149	62	35	8.6	280	0	439	5.6	0.2	3.1	0.13	931	627	397	0.6	1180	7.6	17
Oct. 10.....	24	21		.03	.66	181	54	34	8.2	324	0	467	6.2	.3	1.8	.20	965	674	408	.6	1240	7.6	3
Mar. 17, 1961	699	13		.07	.67	79	20	11	12	174	0	155	.0	.2	9.6	.08	412	279	136	.3	593	7.2	40

BIG SIOUX RIVER BASIN

LAKE KAMPESKA NEAR WATERTOWN, S. DAK.

June 2, 1960.		4.9		0.04	0.01	45	25	12	7.7	204	0	66	2.7	0.1	0.3	0.07	280	216	49	0.4	432	7.8	
Oct. 11.....		17				56	25	11	9.8	228	0	78	3.8	.3	8.1	.08	322	242	55	.3	508	7.3	8

HIDEWOOD CREEK NEAR ESTELLINE, S. DAK.

June 2, 1960.	3.2	9.6		--		83	42	24	4.5	229	0	221	3.8	0.1	0.2	0.15	554	380	192	0.5	770	7.8	--
Oct. 11.....	a .1	23		0.02	0.00	94	33	17	4.5	266	0	181	4.3	.2	.6	.10	505	372	154	.4	731	7.5	1
Mar. 18, 1961	a 35	9.4		.13		38	10	5.1	7.8	120	0	51	.0	.2	1.4	.05	204	138	40	.2	312	6.8	50

SIXMILE CREEK AT BROOKINGS, S. DAK.

June 2, 1960.	a 0.5	12		0.14		149	78	391	7.1	171	0	284	816	0.2	0.1	0.15	2110	693	553	6.4	3220	7.2	
Mar. 18, 1961	a 15	12				48	12	4.6	7.3	151	0	51	2.1	.1	5.8	.06	235	171	47	.2	367	6.9	45

MEDARY CREEK NEAR BROOKINGS, S. DAK.

June 2, 1960.	7.2	11		--		75	34	9.9	3.0	256	0	125	2.3	0.1	0.0	0.07	436	325	115	0.2	640	7.8	--
Oct. 11.....	1.4	18		0.03	0.06	90	37	10	4.2	279	0	162	4.0	.3	.8	.08	476	378	149	.2	701	7.5	9
Mar. 18, 1961	99.5	12		.13		58	10	3.9	12	187	0	43	.0	.2	6.7	.06	261	186	33	.1	397	7.1	45

SPRING CREEK NEAR FLANDREAU, S. DAK.

June 2, 1960.	a 1	5.2		--		84	40	12	2.7	336	0	109	6.3	0.2	0.4	0.11	466	374	98	0.3	568	7.9	--
Oct. 11.....	a 1	7.9		0.05	0.01	72	31	11	3.1	268	0	103	4.9	.3	.9	.09	382	307	87	.3	600	7.6	5
Mar. 18, 1961	a 25	16		.05		55	17	5.3	6.0	202	0	42	3.0	.2	8.8	.05	263	207	41	.2	421	7.0	50

a Estimated.

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN MISSOURI RIVER BASIN--Continued

Chemical analyses, in parts per million, water year October 1960 to September 1961--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)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
BIG SIOUX RIVER BASIN--Continued																							
WILLOW CREEK NEAR FLANDREAU, S. DAK.																							
June 2, 1960.	5.3	11				116	49	27	5.9	339	0	251	0.6	0.2	0.1	0.17	674	490	212	0.5	922	7.9	
Mar. 18, 1961	26.7	11		0.10	0.00	37	9.8	3.2	7.7	129	0	41	.0	.2	6.3	.06	190	133	27	.1	293	6.9	55
6-4820. BIG SIOUX RIVER AT SIOUX FALLS, S. DAK.																							
June 1, 1960.	280	11		0.02	0.00	95	45	28	7.3	288	0	219	12	0.2	2.0	0.11	612	421	185	0.6	857	7.6	13
Oct. 10.....	44	13		.02	.15	40	71	25	6.3	263	0	207	14	.3	.0	.12	546	390	174	.6	800	7.3	--
Mar. 17, 1961	738	11		.07	.01	43	11	5.5	10	130	0	55	3.2	.2	3.0	.05	231	153	46	.2	348	6.9	45
BEAVER CREEK NEAR BRANDON, S. DAK.																							
June 1, 1960.	20.7	--		--		98	34	16	--	353	0	--	--	--	--	--	--	384	95	0.4	721	7.8	--
Oct. 11.....	6.1	13		0.04		93	31	14	6.3	317	0	122	5.9	0.3	3.0	0.08	455	358	98	.3	704	7.5	9
Mar. 18, 1961	52.2	10		.07		39	10	3.5	8.9	144	0	30	.7	.2	7.2	.04	198	139	21	.1	305	6.9	40
6-4830. ROCK RIVER AT LUVERNE, MINN.																							
Oct. 4, 1960.	a 8	13		0.01		26	61	9.9	4.0	267	0	103	6.7	0.3	2.4	0.07	390	314	95	0.2	613	7.6	4
Mar. 18, 1961	297	9.6		.10	0.00	37	10	2.5	6.5	132	0	27	.7	.2	8.5	.04	189	135	27	.1	291	6.8	55
6-4835. ROCK RIVER NEAR ROCK VALLEY, IOWA																							
May 31, 1960.	682	14		0.02	0.00	95	34	13	2.7	290	0	135	5.3	0.3	16	0.20	503	376	138	0.3	716	7.4	15
Oct. 10.....	132	16		.02	.02	103	40	16	3.4	325	0	161	9.0	.5	8.6	.10	529	420	153	.3	795	7.7	7
Mar. 17, 1961	2510	11		.09	.00	41	11	3.4	7.3	140	0	33	1.2	.3	11	.05	210	149	34	.1	321	6.9	55

6-4842.1. INDIAN CREEK NEAR CHATSWORTH, IOWA

May 31, 1960.	a 2	9.3		--		140	52	22	5.7	269	0	347	7.3	0.2	8.1	0.11	796	563	342	0.4	1030	7.7	--
Oct. 10.....	.6	15		0.05		147	47	19	5.4	333	0	310	4.7	.4	1.4	.14	742	559	286	.4	1010	7.6	6
Mar. 17, 1961	a 25	13		.11		35	9.1	3.3	12	115	0	40	1.4	.2	4.9	.08	204	125	31	.1	290	6.9	75

6-4855. BIG SIOUX RIVER AT AKRON, IOWA

May 31, 1960.	1570	13		0.01	0.00	90	35	20	4.7	273	0	149	11	0.3	13	0.09	526	368	144	0.5	732	7.6	13
Oct. 10.....	302	12		.00	.00	70	43	30	5.5	239	0	182	29	.4	.3	.11	510	351	155	.7	766	7.2	7
Mar. 17, 1961	5810	12		.10	.01	41	11	5.0	10	153	0	40	4.2	.3	2.3	.07	231	146	21	.2	333	7.2	50

6-4856. WESTFIELD CREEK AT WESTFIELD, IOWA

May 31, 1960.	a 1					102	40	23		284	0							418	185	0.5	826	7.6	
Oct. 10.....						91	42	19		297	0						534	398	154	.4	776	7.6	

BRULE CREEK NEAR RICHLAND, S. DAK.

May 31, 1960.	17.3	9.0		--		155	63	32	8.6	356	0	386	5.1	0.3	2.9	0.16	964	645	353	0.5	1180	7.6	--
Oct. 10.....	7.9	9.9		0.02		167	58	36	9.6	316	0	462	5.6	.4	1.1	.19	943	655	396	.6	1230	7.4	7
Mar. 17, 1961	193	12		.17		39	11	2.7	8.8	137	0	37	.0	.2	5.8	.05	203	144	32	.1	308	6.8	55

6-4859.1. BROKEN KETTLE CREEK NEAR SIOUX CITY, IOWA

May 31, 1960.	9.4	--		--		108	4.5	16	--	338	0	--	--	--	--	--	--	288	11	0.4	645	7.7	--
Oct. 10.....	2.7	12		0.02		96	33	13	6.3	345	0	119	2.7	0.3	0.9	0.10	460	374	91	.3	714	7.6	4
Mar. 17, 1961	52.8	12		.29		41	8.1	2.7	11	144	0	26	.0	.3	5.2	.05	208	136	18	.1	302	7.2	55

a Estimated.

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN MISSOURI RIVER BASIN--Continued

Chemical analyses, in parts per million, water year October 1960 to September 1961--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)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
PLATTE RIVER BASIN																							
6-6807. WINTER CREEK AT TRI-STATE CANAL, NEAR SCOTTSBLUFF, NEBR.																							
July 8, 1961.	14.5	63		0.00		71	15	59	6.7	237	0	143	15	0.4	8.6	0.09	523	238	44	1.7	720	7.9	2
Aug. 7.....	22.3	62		.01		76	11	59	7.7	240	0	142	16	.6	8.0	.14	531	236	39	1.7	730	7.6	3
Aug. 18.....	33.3	62		.01		76	15	56	7.1	234	0	149	15	.6	8.9	.15	532	252	60	1.5	732	7.8	3
Sept. 15.....	39.8	53		.03		61	16	55	6.5	188	0	144	15	.5	5.6	.13	494	216	62	1.6	691	7.9	2
6-6813. GERING DRAIN AT MITCHELL-GERING CANAL, NEAR GERING, NEBR.																							
July 8, 1961.	220	40		0.08		26	19	34	12	226	0	37	5.4	0.5	1.8	0.09	314	145	0	1.2	455	7.1	35
Aug. 7.....	22.2	40		.02		52	11	138	10	328	0	174	22	.6	9.1	.29	698	173	0	4.6	1010	7.6	8
Aug. 18.....	22.3	41		.01		57	12	148	10	334	0	189	22	.6	9.2	.30	686	191	0	4.7	989	7.5	8
Sept. 15.....	15.9	63		.02		47	9.4	195	12	416	0	204	26	.8	14	.44	789	156	0	6.8	1130	7.3	--
6-6822. ALLIANCE DRAIN NEAR MINATARE, NEBR.																							
July 8, 1961.	8.7	40		0.03		89	19	63	13	227	0	216	21	0.5	0.6	0.11	611	300	114	1.6	853	7.4	8
Aug. 7.....	10.1	49		.01		83	14	62	10	233	0	177	18	.5	1.1	.11	567	265	74	1.7	781	7.4	7
Aug. 18.....	14.5	48		.01		81	15	61	10	230	0	178	18	.6	.6	.11	559	264	75	1.6	778	7.5	8
Sept. 15.....	12.8	55		.01		83	16	60	10	234	0	192	18	.7	1.6	.14	564	272	80	1.6	778	7.8	--
6-6823. NINEMILE DRAIN NEAR MINATARE, NEBR.																							
July 8, 1961.	15.0	64		0.01		79	14	47	7.9	220	0	145	16	0.6	6.9	0.07	514	254	74	1.3	706	7.7	2
Aug. 7.....	28.1	57		.01		77	13	48	7.7	217	0	137	15	.6	7.0	.12	511	244	66	1.3	695	7.6	6
Aug. 18.....	32.8	57		.01		70	13	43	7.9	202	0	127	14	.7	6.2	.12	510	226	60	1.2	667	8.0	6
Sept. 15.....	40.5	64		.01		79	15	50	8.0	222	0	157	16	.7	6.3	.11	520	257	75	1.4	707	7.1	--

6-7670.4. JOHNSON RESERVOIR BELOW POWER PLANT NO. 2, NEAR LEXINGTON, NEBR.

Mar. 30, 1957	e40550	32		--	--	--	--	60	--	193	0	140	18	0.7	0.5	--	--	200	42	1.9	634	7.6	--
Nov. 6, 1958.	e41465	16		0.11	--	59	19	73	11	200	0	200	23	.5	.9	0.15	514	226	62	2.1	772	7.7	--
Sept. 8, 1960	e42685	12		.01	0.01	41	24	76	10	212	0	184	21	.6	.2	.14	496	202	28	2.3	751	7.2	4
Sept. 6, 1961	e41935	18		.03	.00	65	23	82	10	211	0	241	25	.7	.1	.17	595	257	84	2.2	863	7.3	4

6-7725. WOOD RIVER NEAR CHAPMAN, NEBR.

Dec. 14, 1960	1.6	30		0.15	0.00	81	12	44	82	327	0	71	33	0.5	87	0.14	612	251	0	1.2	915	7.1	48
Mar. 21, 1961	12.7	29		.03	.08	65	15	37	13	234	0	75	24	.5	35	.17	412	223	31	1.1	642	7.0	5
June 20.....	34.8	25		.02	.00	68	14	25	11	214	0	81	16	.4	13	.30	379	226	51	.7	572	7.0	9
June 29.....	20	28		.01	.01	70	13	28	10	212	0	84	16	.5	16	.09	383	226	52	.8	576	7.1	11
Sept. 27.....	7.6	29		.02	.00	71	13	36	11	200	0	94	21	.6	39	.16	421	229	65	1.0	625	6.9	6

KANSAS RIVER BASIN

6-8650. KANOPOLIS RESERVOIR NEAR KANOPOLIS, KANS.

Nov. 11, 1960	e63400	8.4		0.25		41	31	70	9.0	144	0	103	118	0.4	1.9	0.06	500	232	114	2.0	824	7.4	--
Feb. 12, 1961	e36900	10		.20		119	20	135	9.2	214	0	162	242	.4	2.0	.09	854	379	204	3.0	1450	7.7	5
June 5.....	e67400	6.3		.02	0.00	85	13	85	7.2	145	0	112	158	.4	1.9	.05	606	264	145	2.3	966	7.1	--
Aug. 24.....	e71600	10		.03		75	7.5	44	11	155	0	96	72	.3	.1	.08	415	218	91	1.3	669	7.2	15

6-8810. BIG BLUE RIVER NEAR CRETE, NEBR.

May 24, 1961.	235	21		0.05	0.00	51	10	22	9.8	203	0	37	10	0.4	6.8	0.05	277	168	2	0.7	431	7.0	--
June 9.....	356	22		.04	.00	45	9.4	20	10	188	0	35	8.4	.5	3.9	.10	257	151	0	.7	384	7.5	16
July 21.....	149	22		.05	.03	51	2.7	17	9.4	167	0	29	8.6	.4	6.2	.06	236	138	1	.6	374	7.2	--
Aug. 21.....	106	28		.06	.19	62	11	25	9.4	250	0	40	11	.4	.4	.06	314	200	0	.8	495	7.6	11
Sept. 12.....	648	14		.10	.09	22	5.9	8.8	11	114	0	19	3.2	.3	2.1	.06	153	79	0	.4	218	7.0	--

6-8840. LITTLE BLUE RIVER NEAR FAIRBURY, NEBR.

Mar. 31, 1960	4130	11		0.12		15	2.1	3.2	7.5	52	0	9.5	1.4	0.2	2.8	0.05	110	46	3	0.2	125	6.6	150
May 23, 1961.	11400	15		.21	0.00	12	2.0	2.4	9.4	50	0	7.8	.0	.3	1.7	.04	84	38	0	.2	107	6.7	

e Lake content in acre-feet.

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN MISSOURI RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge and particle size, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water;
P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
YELLOWSTONE RIVER BASIN																	
BUTCHER CREEK NEAR LUTHER, MONT.																	
Oct. 4, 1960	0750	46		1.1	15	0.04											
Oct. 7	1300	53		1.6	16	.07											
Oct. 10	1005	43		.4	4	t											
Oct. 14	1200	42		.3	9	.01											
Oct. 18	1230	42		3.3	11	.10											
Oct. 21	0940	43		.3	7	.01											
Oct. 24	0910	46		.3	6	t											
Oct. 29	1110	43		.3	5	t											
Nov. 1	1020	38		1.2	16	.05											
Nov. 4	1230	38		.4	4	t											
Nov. 7	1305	37		.4	21	.02											
Nov. 10	1230	36		.4	16	.02											
Nov. 15	1255	33		.8	4	.01											
Nov. 21	0950	36		.3	10	.01											
Nov. 25	1015	41		.3	2	t											
Nov. 29	1435	32	e	.3	6	t											
Dec. 2	0920	32		.3	4	t											
Dec. 5	1450	32	e	.4	12	.01											
Dec. 9	1355	32	e	.4	16	.02											
Dec. 12	1210	32	e	.4	13	.01											
Dec. 16	0950	32	e	.5	13	.02											
Dec. 19	1230	32		.5	15	.02											
Dec. 23	1535	32		.5	10	.01											
Dec. 27	0950	32		.6	27	.04											
Jan. 3, 1961	1000	32	e	.5	25	.03											
Jan. 6	1445	33	e	.5	35	.05											
Jan. 10	1045	33		.5	31	.04											

Jan. 14, 1961.....	1330	33		.5	25	.03
Jan. 17.....	1145	34		.5	15	.02
Jan. 20.....	1440	33		.5	38	.05
Jan. 23.....	1325	33		.5	16	.02
Jan. 26.....	1440	33	e	.5	15	.02
Jan. 31.....	1145	32		.5	9	.01
Feb. 3.....	0915	33		.5	19	.03
Feb. 6.....	1420	33		.4	14	.02
Feb. 10.....	1335	32	e	.5	99	.13
Feb. 14.....	1520	33		.5	19	.03
Feb. 16.....	1240	33		.6	42	.07
Feb. 20.....	1010	33		.4	29	.03
Feb. 24.....	1245	33		.4	12	.01
Feb. 27.....	0940	33		.4	26	.03
Mar. 2.....	1320	32		.7	21	.04
Mar. 6.....	1400	33	e	1.0	14	.04
Mar. 10.....	1030	35		1.0	7	.02
Mar. 14.....	1030	35		.8	50	.11
Mar. 17.....	1400	43		.8	25	.05
Mar. 20.....	1315	42		.7	11	.02
Mar. 24.....	1315	48		.8	14	.03
Mar. 27.....	0900	47		1.0	12	.03
Mar. 30.....	1445	38		.9	14	.03
Apr. 3.....	0905	41		.8	18	.04
Apr. 7.....	1030	39		.9	46	.11
Apr. 10.....	1310	42		.8	95	.21
Apr. 14.....	1110	38		.8	22	.05
Apr. 17.....	1100	42		.7	15	.03

e Estimated.
t Less than 0.005 ton.

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN MISSOURI RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge and particle size, water year October 1960 to September 1961--Continued
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water;
P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
YELLOWSTONE RIVER BASIN--Continued																		
BUTCHER CREEK NEAR LUTHER, MONT.--Continued																		
Apr. 21, 1961	1350	52		0.8	35	0.08												
Apr. 25	1015	42		.7	67	.13												
Apr. 28	1430	54		1.2	24	.08												
May 2		41		1.2	141	.46												
May 4	1305	45		.5	47	.06												
May 8	1100	50		.5	36	.05												
May 12	1000	--		.5	43	.06												
May 16	1400	44		4.8	167	2.2												
May 18	0930	43		6.3	71	1.2												
May 23	0910	54		.6	24	.04												
May 24	1225	60		1.0	27	.07												
May 26	1315	66		1.2	25	.08												
May 29	1420	64		2.2	55	.33												
June 2	1230	59		1.5	42	.17												
June 5	1245	64		1.2	43	.14												
June 9	1500	60		1.0	28	.08												
June 12	1100	56		.7	48	.09												
June 16	1345	65		.4	88	.10												
June 19	1450	67		.2	29	.02												
June 23	1500	66	e	.2	52	.03												
June 26	1420	66	e	.2	117	.06												
June 29	1340	67	e	.2	49	.03												
July 5	1230	65		.2	50	.03												
July 7	1315	--		.2	70	.04												
July 11	1545	61		.2	3	t												
July 14	1310	67		.2	173	.09												
July 17	1050	59		.1	19	.01												

July 21, 1961.....	1400	64		.1	87	.02
July 24.....	1400	63		.2	117	.06
July 28.....	1300	60		.2	54	.03
July 31.....	1110	58		.1	2	t
Aug. 4.....	1310	64	e	.1	13	t
Aug. 7.....	1400	61	e	.1	7	t
Aug. 11.....	1330	62	e	.1	4	t
Aug. 14.....	1120	62	e	.1	4	t
Aug. 21.....	1330	60	e	.1	3	t
Aug. 25.....	1200	60	e	.1	1	t
Aug. 28.....	1710	60		.3	3	t
Sept. 1.....	1155	58	e	.1	44	.01
Sept. 4.....	1405	58	e	.1	6	t
Sept. 8.....	1200	53	e	.1	16	t
Sept. 11.....	1315	50	e	.1	30	.01
Sept. 13.....	1120	46	e	.1	7	t
Sept. 18.....	1345	53	e	.1	25	.01
Sept. 25.....	1345	46		1.6	15	.06
Sept. 29.....	1335	42		2.6	51	.36

BUTCHER CREEK NEAR ROSCOE, MONT.

Oct. 4, 1960.....	0850	46		10	14	0.4
Oct. 7.....	1330	56		9.1	19	.5
Oct. 10.....	1030	44		10	131	3.5
Oct. 14.....	1220	44		6.5	5	.1
Oct. 18.....	1355	44		8.1	5	.1

e Estimated.
t Less than 0.005 ton.

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN MISSOURI RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge and particle size, water year October 1960 to September 1961--Continued
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water;
P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
YELLOWSTONE RIVER BASIN--Continued																		
BUTCHER CREEK NEAR ROSCOE, MONT.--Continued																		
Oct. 21, 1960	1005	44		9.1	8	0.2												
Oct. 24	0940	47		8.0	8	.2												
Oct. 29	1130	44		7.2	5	.1												
Nov. 1	1130	40		5.6	9	.1												
Nov. 4	1300	39		6.7	10	.2												
Nov. 7	1325	37		5.8	10	.2												
Nov. 10	1300	37		5.2	21	.3												
Nov. 15	1320	36		3.8	8	.1												
Nov. 21	1015	37		4.1	10	.1												
Nov. 25	1045	41		3.3	17	.2												
Nov. 29	1445	32	e	3	20	.2												
Dec. 2	0945	32	e	4	6	.1												
Dec. 5	1520	32		3.2	10	.1												
Dec. 9	1420	32		3.2	27	.2												
Dec. 12	1230	32		3.1	16	.1												
Dec. 16	1020	32	e	4	12	.1												
Dec. 19	1300	34	e	4	19	.2												
Dec. 23	1615	32	e	2	30	.2												
Dec. 27	1030	32	e	1	13	.04												
Jan. 3, 1961	1035	32		1.3	34	.1												
Jan. 6	1515	33	e	1	41	.1												
Jan. 10	1115	33	e	1	15	.04												
Jan. 14	1400	33		1.4	21	.1												
Jan. 17	1215	34		1.5	16	.1												
Jan. 20	1515	33		2.4	45	.3												
Jan. 23	1350	33	e	1	20	.1												
Jan. 26	1510	33	e	1	27	.1												
Jan. 31	1310	32	e	1	9	.02												

Feb. 3, 1961.......	0945	33		1.7	31	.1											
Feb. 6.............	1445	33		1.4	6	.02											
Feb. 10............	1355	40		2.2	37	.2											
Feb. 14............	1545	34		1.6	132	.6											
Feb. 16............	1310	35		1.8	33	.2											
Feb. 20............	1045	33		1.5	30	.1											
Feb. 24............	1300	33		2.5	277	1.9											
Feb. 27............	1015	33		2.4	20	.1											
Feb. 28............	1040	32		1.9	16	.1											
Mar. 2.............	1300	35		2.2	32	.2											
Mar. 6.............	1425	33		2.2	15	.1											
Mar. 10............	1105	35		1.9	8	.04											
Mar. 14............	1100	42		1.5	18	.1											
Mar. 17............	1430	45		1.6	23	.1											
Mar. 20............	1415	46		1.6	25	.1											
Mar. 24............	1345	49		1.7	34	.2											
Mar. 27............	0935	37		4.9	40	.5											
Mar. 30............	1515	40		4.9	29	.4											
Apr. 3.............	1005	46		8.7	32	.8											
Apr. 5.............	1045	38		4.7	38	.5											
Apr. 7.............	1100	--		5.2	57	.8											
Apr. 10............	1335	45		5.2	29	.4											
Apr. 14............	1145	39		5.3	27	.4											
Apr. 17............	1130	44		5.0	23	.3											
Apr. 21............	1415	54		4.7	44	.6											
Apr. 25............	1040	41		6.4	53	.9											
Apr. 28............	1520	57		7.2	103	2.0											
May 2..............	0955	48		4.2	25	.3											
May 2..............	1045	47		4.2	21	.2											
May 4..............	1130	47		3.1	29	.2											

e Estimated.

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN MISSOURI RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge and particle size, water year October 1960 to September 1961--Continued
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
YELLOWSTONE RIVER BASIN--Continued																		
BUTCHER CREEK NEAR ROSCOE, MONT.--Continued																		
May 4, 1961	1615	48		3.3	20	0.2												
May 8	1115	50		2.1	31	.2												
May 12	1030	44		2.1	29	.2												
May 16	1430	47		3.6	108	1.0												
May 18	1010	46		10	159	4.3												
May 19	1225	56		7.4	69	1.4												
May 23	0930	57		4.2	31	.4												
May 24	1350	64		4.2	42	.5												
May 26	1350	70		4.1	47	.5												
May 26	1410	65		6.4	135	2.3												
May 29	1450	69		4.5	51	.6												
June 5	1335	71		4.5	68	.8												
June 6	1140	61		4.5	45	.5												
June 9	1540	64		6.9	90	1.7												
June 12	1035	56		14	205	7.7												
June 14	1245	58		14	162	6.1												
June 16	1415	66		15	224	9.1												
June 19	1525	67		19	622	32												
June 23	1525	66		17	1121	5.6												
June 26	1350	65		19	116	6.0												
June 29	1405	67		16	91	3.9												
July 5	1345	66		23	132	8.2												
July 7	1345	--		24	448	29												
July 11	1600	63		25	246	17												
June 14	1330	63		22	302	18												
July 17	1120	62		27	166	12												
July 21	1435	65		22	134	8.0												
July 24	1440	68		23	126	7.8												
July 28	1330	66		20	105	5.7												
July 31	1205	61		20	88	4.8												

Aug. 4, 1961	1340	67		21	71	4.0												
Aug. 7	1420	62		18	60	2.9												
Aug. 11	1400	62		20	87	4.7												
Aug. 14	1100	59		20	57	3.1												
Aug. 17	1115	63		22	62	3.7												
Aug. 21	1400	64		21	74	4.2												
Aug. 25	1235	62		25	106	7.2												
Aug. 28	1615	62		24	92	6.0												
Sept. 1	1225	58		25	361	24												
Sept. 4	1450	60		27	217	16												
Sept. 8	1130	56		20	49	2.6												
Sept. 11	1245	52		22	44	2.6												
Sept. 13	1100	48		16	51	2.2												
Sept. 18	1430	55		17	51	2.3												
Sept. 25	1320	48		14	19	.7												
Sept. 29	1400	46		12	16	.5												

BUTCHER CREEK NEAR FISHTAIL, MONT.

Oct. 4, 1960	0945	49		16	54	2.3												
Oct. 7	1345	54		16	49	2.1												
Oct. 10	1045	44		22	109	6.5												
Oct. 14	1240	44		16	9	.4												
Oct. 18	1540	45		12	11	.4												
Oct. 21	1020	44		13	17	.6												
Oct. 24	0955	46		12	10	.3												
Oct. 29	1145	44		10	15	.4												
Nov. 1	1230	41		9.1	9	.2												
Nov. 4	1325	40		9.1	8	.2												

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN MISSOURI RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge and particle size, water year October 1960 to September 1961--Continued
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
YELLOWSTONE RIVER BASIN--Continued																		
BUTCHER CREEK NEAR FISHTAIL, MONT.--Continued																		
Nov. 7, 1960	0900	38		14	20	0.8												
Nov. 10	1315	37		8.5	20	.5												
Nov. 15	1340	37		7.2	14	.3												
Nov. 21	1030	37	e	6	25	.4												
Nov. 25	1105	42	e	4	15	.2												
Nov. 29	1500	32	e	3	39	.3												
Dec. 2	1000	32	e	4	19	.2												
Dec. 5	1540	32	e	4	35	.4												
Dec. 9	1440	32	e	3	16	.1												
Dec. 12	1245	32	e	4	43	.5												
Dec. 16	1045	32	e	4	49	.5												
Dec. 19	1440	32		4.3	38	.4												
Dec. 23	1630	32	e	3	38	.3												
Dec. 27	1045	32	e	1	36	.1												
Jan. 3, 1961	1145	32	e	1	47	.1												
Jan. 6	1530	33	e	1	42	.1												
Jan. 10	1135	33	e	1	31	.1												
Jan. 14	1415	33	e	3	26	.2												
Jan. 17	1240	34		3.6	85	.8												
Jan. 20	1530	33	e	2	45	.2												
Jan. 23	1415	33	e	1	26	.1												
Jan. 26	1530	33	e	1	23	.1												
Jan. 31	1330	32	e	2	23	.1												
Feb. 3	1000	33	e	2	45	.2												
Feb. 6	1500	34	e	2	27	.1												
Feb. 10	1420	36		2.4	25	.2												
Feb. 14	1600	35		2.2	27	.2												
Feb. 16	1400	35		2.6	19	.1												

Feb. 20, 1961......	1100	33		1.9	20	.1											
Feb. 24............	1330	34		2.2	23	.1											
Feb. 27............	1030	33		2.2	24	.1											
Feb. 28............	1055	33		2.8	24	.2											
Mar. 2.............	1240	35		2.7	27	.2											
Mar. 6.............	1435	34		2.8	13	.1											
Mar. 10............	1125	37		2.8	5	.04											
Mar. 14............	1115	43		2.6	23	.2											
Mar. 17............	1445	46		2.1	27	.2											
Mar. 20............	1435	44		2.1	31	.2											
Mar. 24............	1400	50		3.4	37	.3											
Mar. 27............	0950	38		5.6	27	.4											
Mar. 30............	1530	42		5.0	57	.8											
Apr. 3.............	1020	47		5.4	70	1.0											
Apr. 5.............	1030	38		7.2	32	.6											
Apr. 7.............	1115	40		4.4	18	.2											
Apr. 10............	1345	45		5.4	24	.3											
Apr. 14............	1210	39		5.6	53	.8											
Apr. 17............	1150	46		5.6	33	.5											
Apr. 21............	1430	53		5.4	41	.6											
Apr. 25............	1050	42		6.3	46	.8											
Apr. 28............	1625	58		8.5	109	2.5											
May 2..............	1020	50		5.5	32	.5											
May 2..............	1200	50		5.5	33	.5											
May 4..............	1345	50		7.4	59	1.2											
May 4..............	1600	51		5.8	28	.4											
May 8..............	1200	51		5.0	203	2.7											
May 12.............	1045	44		5.4	32	.5											
May 16.............	1445	47		8.0	108	2.3											
May 18.............	1030	48		11	116	3.4											

e Estimated.

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN MISSOURI RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge and particle size, water year October 1960 to September 1961--Continued
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
YELLOWSTONE RIVER BASIN--Continued																		
BUTCHER CREEK NEAR FISHTAIL, MONT.--Continued																		
May 19, 1961	1200	56		5.4	93	1.4												
May 23	0945	58		5.8	43	.7												
May 24	1435	64		18	347	17												
May 29	1520	66		11	84	2.5												
June 2	1120	58		8.8	59	1.4												
June 5	1350	67		6.5	73	1.3												
June 9	1545	64		4.2	167	1.9												
June 12	1020	58		5.2	125	1.8												
June 14	1310	59		24	395	26												
June 16	1430	67		34	241	22												
June 19	1550	67		17	338	16												
June 23	1540	64		32	261	23												
June 26	1335	64		16	204	8.8												
June 29	1420	66		32	224	19												
July 5	1410	65		31	163	14												
July 7	1415	--		34	354	32												
July 11	1615	63		38	514	53												
July 14	1400	64		33	290	26												
July 17	1140	64		28	230	17												
July 21	1450	62		35	185	17												
July 24	1500	68		23	153	9.5												
July 28	1350	66		26	150	11												
July 31	1225	62		25	155	10												
Aug. 4	1400	67		26	166	12												
Aug. 7	1440	63		24	159	10												
Aug. 11	1415	64		28	136	10												
Aug. 14	1030	60		34	166	15												
Aug. 17	1245	61		42	132	15												
Aug. 21	1420	64		35	126	12												
Aug. 25	1300	65		39	208	22												

Aug. 28, 1961.....	1545	62		29	174	14													
Sept. 1.....	1245	60		35	176	17													
Sept. 4.....	1600	58		41	161	18													
Sept. 8.....	1100	55		44	179	21													
Sept. 11.....	1225	53		47	117	15													
Sept. 13.....	1040	48		41	125	14													
Sept. 18.....	1445	57		28	75	5.7													
Sept. 25.....	1255	47		23	41	2.5													
Sept. 29.....	1420	47		19	37	1.9													

NORTH FORK BLUEWATER CREEK NEAR BRIDGER, MONT.

Oct. 3, 1960.....	1120	55		11	6	0.2													
Oct. 7.....	1000	55		10	4	.1													
Oct. 10.....	1400	54		11	23	.7													
Oct. 14.....	1520	54		11	13	.4													
Oct. 19.....	0825	52		11	14	.4													
Oct. 21.....	1300	55		11	10	.3													
Oct. 24.....	1315	56		11	14	.4													
Oct. 29.....	1445	54		11	75	2.2													
Oct. 31.....	1030	53		11	13	.4													
Nov. 4.....	0940	52		11	18	.5													
Nov. 7.....	1030	54		11	7	.2													
Nov. 10.....	1600	53		11	3	.1													
Nov. 16.....	0830	51		11	32	1.0													
Nov. 21.....	1500	52		11	8	.2													
Nov. 25.....	1400	54		11	4	.1													
Nov. 29.....	1040	50		11	26	.8													
Dec. 2.....	1345	53		11	7	.2													
Dec. 5.....	1130	50		11	6	.2													
Dec. 9.....	1105	50		11	6	.2													
Dec. 12.....	1510	51		11	5	.1													

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN MISSOURI RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge and particle size, water year October 1960 to September 1961--Continued
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters: 0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	Method of analysis
YELLOWSTONE RIVER BASIN--Continued																		
NORTH FORK BLUEWATER CREEK NEAR BRIDGER, MONT.--Continued																		
Dec. 16, 1960	1445	52		11	12	0.4												
Dec. 20	0845	51		11	7	.2												
Dec. 23	1130	52		11	20	.6												
Dec. 27	1500	51		11	15	.4												
Dec. 30	1150	51		11	9	.3												
Jan. 3, 1961	1035	49		11	8	.2												
Jan. 6	1100	51		11	22	.7												
Jan. 9	1140	52		11	79	2.3												
Jan. 12	1420	51		11	20	.6												
Jan. 14	1100	52		11	12	.4												
Jan. 18	0910	51		11	22	.7												
Jan. 20	1120	50		11	19	.6												
Jan. 23	1030	50		11	9	.3												
Jan. 26	1105	49		11	8	.2												
Feb. 1	0815	51		12	22	.7												
Feb. 3	1415	52		12	23	.7												
Feb. 6	1030	51		12	6	.2												
Feb. 10	1050	52		12	6	.2												
Feb. 14	1140	53		12	10	.3												
Feb. 17	0820	51		12	19	.6												
Feb. 20	1500	53		12	14	.5												
Feb. 24	1000	51		12	16	.5												
Feb. 27	1415	52		12	8	.3												
Mar. 3	0950	51		12	14	.5												
Mar. 6	1110	52		11	59	1.8												
Mar. 10	1515	53		11	8	.2												
Mar. 13	1115	53		11	8	.2												
Mar. 17	1115	55		11	13	.4												
Mar. 21	0700	50		11	10	.3												
Mar. 24	1030	55		11	12	.4												

Mar. 27, 1961.....	1315	53	12	11	.4		
Mar. 30.....	1100	55	11	9	.3		
Apr. 3.....	1015	53	11	9	.3		
Apr. 6.....	1045	54	12	18	.6		
Apr. 7.....	1430	55	12	17	.6		
Apr. 10.....	1005	52	11	12	.4		
Apr. 14.....	1425	54	12	18	.6		
Apr. 18.....	0830	53	12	16	.6		
Apr. 21.....	1050	56	11	17	.5		
Apr. 24.....	1520	56	11	17	.5		
Apr. 28.....	1030	56	11	20	.6		
May 1.....	1250	59	12	22	.7		
May 1.....	1330	59	12	36	1.2		
May 4.....	1030	56	11	25	.7		
May 5.....	1335	58	11	24	.7		
May 8.....	1500	56	11	18	.5		
May 17.....	1605	54	12	36	1.2		
May 23.....	0900	56	11	49	1.5		
May 23.....	1000	54	12	138	4.5		
May 23.....	1430	60	11	7	.2		
May 25.....	1445	59	11	34	1.0		
May 26.....	1300	61	12	26	.8		
May 29.....	1045	58	11	17	.5		
May 31.....	1335	58	11	19	.6		
June 2.....	1645	56	11	19	.6		
June 5.....	1005	58	11	7	.2		
June 7.....	0915	57	11	14	.4		
June 9.....	1040	61	11	31	.9		
June 12.....	1340	58	11	9	.3		
June 14.....	0915	56	11	369	11		

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN MISSOURI RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge and particle size, water year October 1960 to September 1961--Continued
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
YELLOWSTONE RIVER BASIN--Continued																		
NORTH FORK BLUEWATER CREEK NEAR BRIDGER, MONT.--Continued																		
June 16, 1961	1000	58		11	16	0.5												
June 23	1125	58		11	18	.5												
June 26	1700	58		11	16	.5												
June 29	1030	58		11	24	.7												
July 7	1000	59		11	2450	73												
July 9	1155	60		11	14	.4												
July 11	1115	56		10	38	1.0												
July 14	1015	58		11	7	.2												
July 18	0945	57		11	11	.3												
July 21	1205	60		10	3	.1												
July 24	1020	58		10	5	.1												
July 28	1020	58		11	6	.2												
July 31	1145	59		10	5	.1												
Aug. 3	1340	60		10	6	.2												
Aug. 4	1115	58		10	7	.2												
Aug. 7	1030	57		11	12	.4												
Aug. 11	1115	58		11	8	.2												
Aug. 14	1445	59		10	14	.4												
Aug. 18	0810	55		10	13	.4												
Aug. 21	1010	57		10	11	.3												
Aug. 25	0900	57		10	40	1.1												
Aug. 28	1210	60		10	9	.2												
Sept. 1	0905	57		10	68	1.8												
Sept. 5	1430	58		10	16	.4												
Sept. 8	1445	58		10	21	.6												
Sept. 11	1710	56		11	35	1.0												
Sept. 13	1405	58		10	24	.6												
Sept. 16	0710	55		10	98	2.6												
Sept. 25	1640	58		10	34	.9												
Sept. 29	1035	53		10	15	.4												

BLUEWATER CREEK AT SANFORD RANCH, NEAR BRIDGER, MONT.

Oct. 3, 1960.....	1330	57		22	19	1.1											
Oct. 7.....	1000	55		24	27	1.7											
Oct. 10.....	1440	54		25	131	8.8											
Oct. 14.....	1600	52		25	71	4.8											
Oct. 19.....	1405	52		27	60	4.4											
Oct. 21.....	1355	54		28	278	21											
Oct. 24.....	1350	55		28	40	3.0											
Oct. 29.....	1520	52		28	65	4.9											
Oct. 31.....	1550	52		29	248	19											
Nov. 4.....	1020	48		30	70	5.7											
Nov. 7.....	1100	49		28	81	6.1											
Nov. 10.....	1630	48		28	66	5.0											
Nov. 16.....	2240	47		22	60	3.6											
Nov. 21.....	1540	46		29	16	1.3											
Nov. 29.....	1150	44		28	88	6.7											
Dec. 5.....	1205	42		27	87	6.3											
Dec. 9.....	1140	44		28	109	8.2											
Dec. 12.....	1545	46		27	86	6.3											
Dec. 16.....	1515	45		27	120	8.7											
Dec. 20.....	1035	43		27	122	8.9											
Dec. 23.....	1215	46		27	114	8.3											
Dec. 27.....	1540	46		27	176	13											
Dec. 30.....	1330	46		27	145	11											
Jan. 3, 1961.....	1215	43		27	162	12											
Jan. 6.....	1135	45		27	316	23											
Jan. 9.....	1615	47		27	173	13											
Jan. 12.....	1530	48		28	207	16											
Jan. 14.....	1130	46		27	191	14											
Jan. 18.....	1105	46		27	169	12											
Jan. 20.....	1145	43		27	143	10											

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MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN MISSOURI RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge and particle size, water year October 1960 to September 1961--Continued
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
YELLOWSTONE RIVER BASIN--Continued																		
BLUEWATER CREEK AT SANFORD RANCH, NEAR BRIDGER, MONT.--Continued																		
Jan. 23, 1961	1100	44		27	235	17												
Jan. 26	1140	41		26	133	9.3												
Feb. 1	0755	45		27	218	16												
Feb. 3	1445	48		28	182	14												
Feb. 6	1100	45		28	169	13												
Feb. 10	1125	48		32	404	35												
Feb. 14	1215	47		28	139	10												
Feb. 17	1030	44		28	128	9.7												
Feb. 20	1535	48		28	81	6.1												
Feb. 24	1020	45		30	106	8.6												
Feb. 27	1445	45		27	135	9.8												
Feb. 28	0930	46		28	103	7.8												
Mar. 3	1155	47		28	119	9.0												
Mar. 6	1145	46		27	67	4.9												
Mar. 10	1545	50		28	195	15												
Mar. 13	1145	48		28	60	4.5												
Mar. 17	1145	51		28	131	9.9												
Mar. 21	0955	46		28	68	5.1												
Mar. 24	1100	52		28	181	14												
Mar. 27	1345	49		28	114	6.6												
Mar. 30	1130	51		24	136	8.8												
Apr. 3	1055	51		28	197	15												
Apr. 6	1015	47		26	145	10												
Apr. 7	1500	54		26	117	8.2												
Apr. 10	1045	48		26	140	9.8												
Apr. 14	1450	49		25	63	4.3												
Apr. 18	1015	54		16	186	8.0												
Apr. 21	1125	54		12	25	.8												
Apr. 24	1615	53		16	571	25												
Apr. 28	1120	56		13	156	5.5												

May 4, 1961.....	1100	53	14	56	2.1
May 8.....	1540	63	12	40	1.3
May 12.....	1510	51	12	115	3.7
May 16.....	1100	51	17	648	30
May 17.....	1220	54	13	230	8.1
May 17.....	1640	56	13	202	7.1
May 18.....	1220	54	13	354	12
May 19.....	0825	52	15	219	8.9
May 23.....	1540	69	18	174	8.5
May 24.....	1920	61	18	180	8.7
May 25.....	1400	63	18	191	9.3
May 25.....	1600	64	18	384	19
May 25.....	1745	63	17	402	18
May 26.....	1040	61	18	212	10
May 26.....	1515	69	17	204	9.4
May 26.....	1730	66	17	207	9.5
May 27.....	1735	68	18	179	8.7
May 29.....	1145	64	18	150	7.3
May 31.....	1425	64	18	145	7.0
June 2.....	1535	64	18	122	5.9
June 5.....	1150	62	19	150	7.7
June 9.....	1055	65	11	146	4.3
June 12.....	1250	62	11	43	1.3
June 13.....	1015	60	11	38	1.1
June 14.....	1020	63	11	41	1.2
June 16.....	1105	62	21	540	31
June 20.....	1410	72	13	49	1.7
June 23.....	1220	66	11	50	1.5
June 26.....	1600	66	11	56	1.7
June 29.....	1000	61	12	89	2.9

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN MISSOURI RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge and particle size, water year October 1960 to September 1961--Continued
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
YELLOWSTONE RIVER BASIN--Continued																		
BLUEWATER CREEK AT SANFORD RANCH, NEAR BRIDGER, MONT.--Continued																		
July 6, 1961	1100	65		13	102	3.6												
July 7	1055	--		26	524	37												
July 9	1130	67		12	42	1.4												
July 11	1030	59		10	80	2.2												
July 14	1050	62		11	97	2.9												
July 18	1145	64		12	82	2.7												
July 21	1050	62		11	91	2.7												
July 24	1145	61		21	662	38												
July 28	1110	61		11	279	8.3												
July 31	1115	64		11	47	1.4												
Aug. 3	1405	70		10	22	.6												
Aug. 4	1030	62		11	281	8.3												
Aug. 7	1130	61		12	114	3.7												
Aug. 11	1045	59		20	549	30												
Aug. 14	1400	66		15	117	4.7												
Aug. 18	1045	60		15	139	5.6												
Aug. 21	1050	61		18	272	13												
Aug. 25	0945	60		18	108	5.2												
Aug. 28	1120	60		26	236	17												
Sept. 1	1000	58		18	132	6.4												
Sept. 5	1615	63		19	120	6.2												
Sept. 8	1545	63		21	750	43												
Sept. 11	1620	56		25	611	41												
Sept. 12	1515	52		24	708	46												
Sept. 13	1335	56		24	365	24												
Sept. 13	1440	57		24	174	11												
Sept. 14	1545	64		22	153	9.1												
Sept. 18	1000	57		28	505	38												
Sept. 25	1545	56		25	208	14												
Sept. 29	1050	49		26	205	14												

BLUEWATER CREEK NEAR FROMBERG, MONT.

Oct. 3, 1960.....	1425	58		17	44	2.0											
Oct. 7.....	1110	54		16	51	2.2											
Oct. 10.....	1455	52		23	316	20											
Oct. 14.....	1615	51		22	244	14											
Oct. 19.....	1440	51		24	195	13											
Oct. 21.....	1405	52		27	245	18											
Oct. 24.....	1410	54		26	101	7.1											
Oct. 29.....	1235	56		29	279	22											
Oct. 31.....	1700	48		28	424	32											
Nov. 4.....	1040	44		28	160	12											
Nov. 7.....	1120	47		28	200	15											
Nov. 10.....	1650	46		28	189	14											
Nov. 16.....	1055	43		28	202	15											
Nov. 21.....	1610	41		29	152	12											
Nov. 25.....	1530	49		28	205	15											
Nov. 29.....	1235	39		28	177	13											
Dec. 2.....	1430	45		29	188	15											
Dec. 5.....	1225	39		28	159	12											
Dec. 9.....	1150	40		28	159	12											
Dec. 12.....	1600	41		30	160	13											
Dec. 16.....	1530	40		29	186	15											
Dec. 20.....	1110	40		28	184	14											
Dec. 23.....	1230	49		28	164	12											
Dec. 27.....	1600	43		28	200	15											
Dec. 30.....	1410	41		27	186	14											
Jan. 3, 1961.....	1230	38		27	177	13											
Jan. 6.....	1215	42		27	202	15											
Jan. 9.....	1630	44		28	208	16											
Jan. 12.....	1540	45		28	797	60											
Jan. 14.....	1145	43		28	172	13											

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN MISSOURI RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge and particle size, water year October 1960 to September 1961--Continued
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
YELLOWSTONE RIVER BASIN--Continued																		
BLUEWATER CREEK NEAR FROMBERG, MONT.--Continued																		
Jan. 18, 1961	1150	44		29	155	12												
Jan. 20	1200	39		28	146	11												
Jan. 23	1115	40		28	144	11												
Jan. 26	1200	37		27	110	8.0												
Feb. 1	1010	44		27	227	17												
Feb. 3	1500	45		28	192	15												
Feb. 6	1200	43		28	150	11												
Feb. 10	1145	46		29	131	10												
Feb. 14	1305	44		29	124	9.7												
Feb. 17	1045	40		29	128	10												
Feb. 20	1600	45		27	118	8.6												
Feb. 24	1035	41		28	89	6.7												
Feb. 27	1500	42		27	125	9.1												
Feb. 28	0940	43		28	90	6.8												
Mar. 3	1210	44		28	86	6.5												
Mar. 10	1600	47		28	74	5.6												
Mar. 13	1200	46		28	59	4.5												
Mar. 17	1200	49		28	150	11												
Mar. 21	1015	44		28	72	5.4												
Mar. 24	1115	51		27	136	9.9												
Mar. 27	1400	47		28	130	9.8												
Mar. 30	1145	49		28	131	9.9												
Apr. 3	1110	49		28	159	12												
Apr. 6	0945	43		27	135	9.8												
Apr. 7	1515	51		26	115	8.1												
Apr. 10	1100	46		26	123	8.6												
Apr. 14	1505	47		16	31	1.3												
Apr. 18	1050	52		7	130	2.5												
Apr. 21	1140	52		5	21	0.3												
Apr. 24	1635	49		12	98	3.2												

Apr. 28, 1961.....	1140	52	14	252	9.5
May 1.....	1735	62	14	53	2.0
May 4.....	1130	52	17	51	2.3
May 5.....	1255	57	18	61	3.0
May 8.....	1555	61	14	48	1.8
May 12.....	1525	51	4	167	1.8
May 16.....	1130	50	19	365	19
May 17.....	1230	51	16	409	18
May 17.....	1520	52	16	337	15
May 17.....	1655	52	16	324	14
May 18.....	1235	52	16	854	37
May 19.....	0805	50	18	235	11
May 19.....	1110	57	18	266	13
May 23.....	1630	70	18	230	11
May 24.....	1935	61	19	235	12
May 25.....	1345	62	19	255	13
May 25.....	1545	66	19	239	12
May 25.....	1800	65	19	272	14
May 26.....	0905	58	19	382	20
May 26.....	1055	62	19	340	17
May 26.....	1745	68	19	315	16
May 27.....	1445	71	19	366	19
May 27.....	1650	70	18	341	17
May 29.....	1215	66	14	312	12
May 31.....	1445	64	14	233	8.8
June 2.....	1515	66	12	183	5.9
June 5.....	1205	67	11	173	5.1
June 9.....	1045	70	2	113	.6
June 12.....	1230	66	3	49	.4
June 13.....	1000	62	3	46	.4

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN MISSOURI RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge and particle size, water year October 1960 to September 1961--Continued
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water;
P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters											Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
YELLOWSTONE RIVER BASIN--Continued																		
BLUEWATER CREEK NEAR FROMBERG, MONT.--Continued																		
June 14, 1961	1035	69		3	94	0.8												
June 16	1130	71		3	121	1.0												
June 20	1425	80		3	58	.5												
June 23	1235	70		3	756	6.1												
June 26	1545	71		3	483	3.9												
June 29	0945	64		3	87	.7												
July 6	1115	72		2	74	.4												
July 7	1115	--		14	777	29												
July 9	1120	72		3	71	.6												
July 11	1015	60		2	160	.9												
July 14	1110	68		2	54	.3												
July 18	1200	70		4	72	.8												
July 21	1030	64		3	14	.1												
July 24	1200	68		6	61	1.0												
July 28	1125	69		13	628	22												
July 31	1100	66		5	193	2.6												
Aug. 3	1415	79		4	18	.2												
Aug. 4	1000	65		4	16	.2												
Aug. 7	1200	67		4	30	.3												
Aug. 11	1030	60		5	36	.5												
Aug. 14	1330	72		5	936	13												
Aug. 18	1100	64		5	45	.6												
Aug. 21	1115	66		6	217	3.5												
Aug. 25	1000	62		7	57	1.1												
Aug. 28	1100	60		14	437	17												
Sept. 1	1020	60		9	193	4.7												
Sept. 5	1630	64		9	155	3.8												
Sept. 6	0800	54		10	163	4.4												
Sept. 8	1600	62		11	2400	71												
Sept. 11	1605	56		12	426	14												

Sept. 12, 1961.....	1450	49		16	3420	148											
Sept. 13.....	1315	54		14	404	15											
Sept. 13.....	1455	56		14	271	10											
Sept. 14.....	1600	--		14	341	13											
Sept. 18.....	1050	58		14	638	24											
Sept. 25.....	1530	54		18	316	15											
Sept. 29.....	1115	48		20	325	18											

6-2079. BLUEWATER CREEK AT FROMBERG, MONT.

Oct. 3, 1960.....	1445	54		47	452	57		--		--		--	--	--	--		
Oct. 7.....	1130	54		27	239	17		--		--		--	--	--	--		
Oct. 10.....	1510	50		66	1060	189		--		--		--	--	--	--		
Oct. 14.....	1635	49		27	392	29		--		--		--	--	--	--		
Oct. 19.....	1545	46		55	360	53		--		--		--	--	--	--		
Oct. 21.....	1420	49		57	385	59		--		--		--	--	--	--		
Oct. 24.....	1430	52		66	124	22		--		--		--	--	--	--		
Oct. 29.....	1600	47		71	244	47		--		--		--	--	--	--		
Nov. 4.....	1100	42		41	219	24		--		--		--	--	--	--		
Nov. 7.....	1130	46		58	322	50		--		--		--	--	--	--		
Nov. 10.....	1705	39		53	492	70		--		--		--	--	--	--		
Nov. 16.....	1110	41		29	145	11		--		--		--	--	--	--		
Nov. 21.....	1555	43		32	193	17		--		--		--	--	--	--		
Nov. 25.....	1545	47		29	180	14		--		--		--	--	--	--		
Nov. 29.....	1300	35		30	121	9.8		--		--		--	--	--	--		
Dec. 2.....	1445	42		30	159	13		--		--		--	--	--	--		
Dec. 5.....	1240	32		29	103	8.1		--		--		--	--	--	--		
Dec. 9.....	1210	32		30	230	19		--		--		--	--	--	--		
Dec. 12.....	1620	37		34	143	13		--		--		--	--	--	--		
Dec. 16.....	1545	35		35	504	48		--		--		--	--	--	--		

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN MISSOURI RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge and particle size, water year October 1960 to September 1961--Continued
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
YELLOWSTONE RIVER BASIN--Continued																	
6-2079. BLUEWATER CREEK AT FROMBERG, MONT.--Continued																	
Dec. 20, 1960	1300	36		28	161	12		--		--		--	--	--	--		
Dec. 23	1245	40		29	239	19		--		--		--	--	--	--		
Dec. 27	1610	40		28	223	17		--		--		--	--	--	--		
Dec. 30	1440	37		28	228	17		--		--		--	--	--	--		
Jan. 3, 1961	1325	34		27	638	47		--		--		--	--	--	--		
Jan. 6	1230	38		27	209	15		--		--		--	--	--	--		
Jan. 9	1645	40		26	200	14		--		--		--	--	--	--		
Jan. 12	1600	42		28	340	26		--		--		--	--	--	--		
Jan. 14	1200	37		27	172	13		--		--		--	--	--	--		
Jan. 18	1205	41		29	227	18		--		--		--	--	--	--		
Jan. 20	1210	36		28	174	13		--		--		--	--	--	--		
Jan. 23	1130	38		28	175	13		--		--		--	--	--	--		
Jan. 26	1220	34		34	253	23		--		--		--	--	--	--		
Feb. 1	1025	41		27	246	18		--		--		--	--	--	--		
Feb. 3	1515	41		28	183	14		--		--		--	--	--	--		
Feb. 6	1215	40		28	141	11		--		--		--	--	--	--		
Feb. 10	1210	45		26	209	15		--		--		--	--	--	--		
Feb. 14	1315	41		27	154	11		--		--		--	--	--	--		
Feb. 17	1100	37		26	180	13		--		--		--	--	--	--		
Feb. 20	1615	42		26	114	8.0		--		--		--	--	--	--		
Feb. 24	1050	38		26	113	7.9		--		--		--	--	--	--		
Feb. 27	1515	39		24	132	8.6		--		--		--	--	--	--		
Feb. 28	0955	40		26	121	8.5		--		--		--	--	--	--		
Mar. 3	1320	41		26	121	8.5		--		--		--	--	--	--		
Mar. 6	1215	40		26	97	6.8		--		--		--	--	--	--		
Mar. 10	1615	44		26	68	4.8		--		--		--	--	--	--		
Mar. 13	1215	45		26	82	5.8		--		--		--	--	--	--		
Mar. 17	1215	46		28	154	12		--		--		--	--	--	--		
Mar. 21	1120	44		27	68	5.0		--		--		--	--	--	--		
Mar. 24	1130	50		27	149	11		--		--		--	--	--	--		

Mar. 27, 1961.....	1415	44		31	153	13	--	--	--	--	--	--		
Mar. 30.....	1200	46		31	130	11	--	--	--	--	--	--		
Apr. 3.....	1130	50		31	135	11	--	--	--	--	--	--		
Apr. 6.....	0930	39		54	372	54	--	--	--	--	--	--		
Apr. 7.....	0330	47		41	261	29	--	--	--	--	--	--		
Apr. 10.....	1130	46		32	108	9.3	--	--	--	--	--	--		
Apr. 14.....	1515	46		26	97	6.8	--	--	--	--	--	--		
Apr. 18.....	1315	54		14	154	5.8	--	--	--	--	--	--		
Apr. 21.....	1150	56		10	89	2.4	--	--	--	--	--	--		
Apr. 24.....	1650	46		11	228	6.8	--	--	--	--	--	--		
Apr. 28.....	1155	50		17	219	10	--	--	--	--	--	--		
May 1.....	1835	60		19	76	3.9	--	--	--	--	--	--		
May 4.....	1140	48		18	71	3.4	--	--	--	--	--	--		
May 5.....	1245	57		17	74	3.4	--	--	--	--	--	--		
May 8.....	1610	62		14	56	2.1	--	--	--	--	--	--		
May 12.....	1540	52		27	395	29	--	--	--	--	--	--		
May 16.....	1150	49		55	1010	150	--	--	--	--	--	--		
May 17.....	1250	50		44	3070	365	72	93	99	100	--	--		VPWC
May 17.....	1530	50		42	3230	366	--	--	--	--	--	--		
May 17.....	1705	50		41	6950	769	--	--	--	--	--	--		
May 18.....	1245	51		40	4420	477	--	--	--	--	--	--		
May 19.....	0735	49		49	4020	532	--	--	--	--	--	--		
May 19.....	1230	54		51	3240	446	--	--	--	--	--	--		
May 23.....	1725	66	e	30	727	59	--	--	--	--	--	--		
May 24.....	1950	60	e	28	1820	140	--	--	--	--	--	--		
May 25.....	1330	60	e	26	3240	230	--	--	--	--	--	--		
May 25.....	1520	62	e	26	2590	180	--	--	--	--	--	--		
May 25.....	1830	61	e	26	9690	680	59	84	93	96	99	100		VPWC
May 26.....	0845	58	e	24	1270	82	--	--	--	--	--	--		

e Estimated.

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN MISSOURI RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge and particle size, water year October 1960 to September 1961--Continued
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
YELLOWSTONE RIVER BASIN--Continued																		
6-2079. BLUEWATER CREEK AT FROMBERG, MONT.--Continued																		
May 26, 1961	1115	61		e 24	1160	75		--		--		--	--	--	--			
May 26	1800	63		e 24	1590	100		--		--		--	--	--	--			
May 27	0905	58		e 20	2460	130		51		74		90	95	99	100			VPWC
May 27	1220	60		e 20	2610	140		--		--		--	--	--	--			
May 27	1315	64		e 20	2640	140		--		--		--	--	--	--			
May 31	1500	60		e 18	477	23		--		--		--	--	--	--			
June 2	1445	65		e 16	190	8.2		--		--		--	--	--	--			
June 5	1350	69		15	193	7.8		--		--		--	--	--	--			
June 9	1030	64		e 20	763	41		--		--		--	--	--	--			
June 12	--	60		e 27	320	23		--		--		--	--	--	--			
June 13	0745	56		e 29	275	22		--		--		--	--	--	--			
June 14	1055	58		30	389	32		--		--		--	--	--	--			
June 16	1145	64		19	10	.5		--		--		--	--	--	--			
June 20	1545	69		27	987	72		--		--		--	--	--	--			
June 23	1250	66		18	8	.4		--		--		--	--	--	--			
June 26	1530	70		10	34	.9		--		--		--	--	--	--			
June 29	0920	--		13	341	12		--		--		--	--	--	--			
July 6	1135	70		14	111	4.2		--		--		--	--	--	--			
July 7	1130	--		38	1030	106		--		--		--	--	--	--			
July 9	1100	68		32	538	46		--		--		--	--	--	--			
July 11	1000	56		7.8	464	9.8		--		--		--	--	--	--			
July 14	1130	66		26	387	27		--		--		--	--	--	--			
July 18	1215	67		27	575	42		--		--		--	--	--	--			
July 21	1015	63		14	123	4.6		--		--		--	--	--	--			
July 24	1230	70		32	490	42		--		--		--	--	--	--			
July 28	1110	69		13	32	1.1		--		--		--	--	--	--			
July 31	1040	68		23	526	33		--		--		--	--	--	--			
Aug. 3	1430	75		13	91	3.2		--		--		--	--	--	--			
Aug. 4	0930	65		11	86	2.6		--		--		--	--	--	--			

Aug. 7, 1961.....	1215	68		8.7	83	1.9		--		--		--	--	--	--		
Aug. 11.....	1000	60		31	783	66		--		--		--	--	--	--		
Aug. 14.....	1300	68		32	567	49		--		--		--	--	--	--		
Aug. 18.....	1200	66		26	338	24		--		--		--	--	--	--		
Aug. 21.....	1200	65		19	792	41		--		--		--	--	--	--		
Aug. 25.....	1030	65		16	93	4.0		--		--		--	--	--	--		
Aug. 28.....	1030	62		25	359	24		--		--		--	--	--	--		
Sept. 1.....	1030	62		16	169	7.3		--		--		--	--	--	--		
Sept. 5.....	1700	64		34	539	49		--		--		--	--	--	--		
Sept. 6.....	0845	59		37	451	45		--		--		--	--	--	--		
Sept. 7.....	1030	54		41	533	59		--		--		--	--	--	--		
Sept. 8.....	1630	60		36	427	42		--		--		--	--	--	--		
Sept. 11.....	1530	55		91	2860	703		--		--		--	--	--	--		
Sept. 12.....	1430	50		120	5570	1800		--		--		--	--	--	--		
Sept. 13.....	1100	48		70	5330	1010		--		--		--	--	--	--		
Sept. 13.....	1250	51		69	4580	853		--		--		--	--	--	--		
Sept. 13.....	1530	52		68	3660	672		--		--		--	--	--	--		
Sept. 14.....	1500	50		70	743	140		--		--		--	--	--	--		
Sept. 17.....	1535	64		71	789	151		--		--		--	--	--	--		
Sept. 18.....	1145	60		74	800	160		--		--		--	--	--	--		
Sept. 21.....	1430	47		63	5080	864		--		--		--	--	--	--		
Sept. 25.....	1505	50		50	444	60		--		--		--	--	--	--		
Sept. 29.....	1130	47		50	455	61		--		--		--	--	--	--		

6-2280. WIND RIVER AT RIVERTON, WYO.

Oct. 6, 1960.....	1040	52		481	246	319	19	24		52		70	75	84	100	--	VBWC
Nov. 3.....	0845	37		335	34	31		--		--		--	--	--	--	--	
Dec. 5.....	1325	32		384	45	47		--		--		--	--	--	--	--	
Jan. 4, 1961.....	1330	32	d	200	25	14		--		--		--	--	--	--	--	

e Estimated.
d Daily mean discharge.

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN MISSOURI RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge and particle size, water year October 1960 to September 1961--Continued
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water;
P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
YELLOWSTONE RIVER BASIN--Continued																		
6-2280. WIND RIVER AT RIVERTON, WYO.--Continued																		
Jan. 31, 1961	1315	32		d 260	76	53		--		--		--	--	--	--	--		
Feb. 14	1105	32		d 260	20	14		--		--		--	--	--	--	--		
Feb. 28	0840	32		d 160	22	10		--		--		--	--	--	--	--		
Mar. 14	1410	38		d 100	804	220		--		--		--	--	--	--	--		
Mar. 31	1245	51		d 96	17	4.4		--		--		--	--	--	--	--		
Apr. 11	1635	54		172	80	37		--		--		--	--	--	--	--		
Apr. 28	1715	61		120	41	13		--		--		--	--	--	--	--		
May 5	1700	58		206	48	27		--		--		--	--	--	--	--		
May 22	0930	59		254	144	99		--		--		--	--	--	--	--		
May 23	1600	53		502	23	31		--		--		--	--	--	--	--		
May 25	0900	57		771	1070	2230		22		36		55	65	82	99	100		VPWC
May 26	1600	67		1350	1490	5430		--		--		--	--	--	--	--		
May 29	1030	61		2100	1430	8110		--		--		--	--	--	--	--		
May 30	1800	60		3820	2570	26500		--		--		--	--	--	--	--		
May 31	1645	63		2540	1220	8370		--		--		--	--	--	--	--		
June 5	1815	62		2260	3240	19800		--		--		--	--	--	--	--		
June 7	1735	69		3000	1940	15700		--		--		--	--	--	--	--		
June 8	1550	66		3610	2780	27100		10		25		63	80	95	99	100		VPWC
June 9	2025	67		3820	1900	19600		--		--		--	--	--	--	--		
June 10	2045	66		4330	2850	33300		--		--		--	--	--	--	--		
June 11	1610	67		3560	1700	16300		--		--		--	--	--	--	--		
June 12	1555	67		3060	1360	11200		--		--		--	--	--	--	--		
June 13	1625	66		2780	1030	7730		10		19		51	71	97	100	--		VPWC
June 14	1635	65		2350	1020	6470		--		--		--	--	--	--	--		
June 15	1630	70		1450	720	2820		--		--		--	--	--	--	--		
June 16	1515	74		1550	1050	4390		--		--		--	--	--	--	--		
June 20	1645	83		1520	1360	5580		--		--		--	--	--	--	--		
June 23	1425	69		1030	339	943		--		--		--	--	--	--	--		

June 30, 1961.....	1345	75		122	55	18		--		--		--	--	--	--	--	
July 31.....	1435	76		268	100	72		--		--		--	--	--	--	--	
Aug. 29.....	1555	67		40	50	5.4		--		--		--	--	--	--	--	
Sept. 5.....	0915	67		145	158	62		--		--		--	--	--	--	--	
Sept. 21.....	1100	48		474	862	1100		--		--		--	--	--	--	--	

6-2355. LITTLE WIND RIVER NEAR RIVERTON, WYO.

Oct. 6, 1960.....	1120	54		172	66	31						--	--	--			
Nov. 3.....	0930	36		256	60	41						--	--	--			
Dec. 5.....	1400	32	d	185	20	10						--	--	--			
Jan. 4, 1961.....	1400	32	d	80	23	5.0						--	--	--			
Jan. 31.....	1335	32	d	140	8	3.0						--	--	--			
Feb. 14.....	1035	32	d	175	92	43						--	--	--			
Feb. 28.....	0815	32	d	160	28	12						--	--	--			
Mar. 14.....	1340	34	d	225	208	130						--	--	--			
Mar. 31.....	1310	51		188	252	128						--	--	--			
Apr. 11.....	1615	54		197	223	119						--	--	--			
Apr. 28.....	1650	61		107	85	25						--	--	--			
May 5.....	1645	59		178	119	57						--	--	--			
May 22.....	0915	60		630	351	597						--	--	--			
May 23.....	1615	51		1020	197	543						--	--	--			
May 25.....	1010	58		1320	714	2540		35		56		84	97	100			VPWC
May 26.....	1515	63		1640	857	3790						--	--	--			
May 29.....	1000	58		2510	900	6100						--	--	--			
May 30.....	1745	58		2840	715	5480						--	--	--			
May 31.....	1615	59		2530	502	3430						--	--	--			
June 5.....	1730	61		2160	586	3420						--	--	--			

d Daily mean discharge.

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN MISSOURI RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge and particle size, water year October 1960 to September 1961--Continued
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
YELLOWSTONE RIVER BASIN--Continued																		
6-2355. LITTLE WIND RIVER NEAR RIVERTON, WYO.--Continued																		
June 7, 1961	1755	64		2010	371	2010						--	--	--				
June 8	1620	62		2370	549	3510						--	--	--				
June 9	2050	62		2710	708	5180						--	--	--				
June 10	2020	68		2850	325	2500						--	--	--				
June 11	1545	62		2720	287	2110						--	--	--				
June 12	1610	63		2380	216	1390						--	--	--				
June 13	1600	64		2080	276	1550						53	62	81	100			V
June 14	1625	62		1830	174	860						--	--	--				
June 15	1615	65		1680	129	585						--	--	--				
June 19	1625	62		1230	168	558						--	--	--				
June 23	1405	69		888	90	216						--	--	--				
June 30	1330	76		331	149	133						--	--	--				
July 31	1420	77		60	45	7.3						--	--	--				
Aug. 29	1540	68		53	75	11						--	--	--				
Sept. 21	1030	50		367	88	87						--	--	--				
6-2803. SOUTH FORK SHOSHONE RIVER NEAR VALLEY, WYO.																		
Oct. 10, 1960	1010	43		155	4	1.7		--		--		--	--	--	--	--		
Oct. 31	0935	36		87	20	4.7		--		--		--	--	--	--	--		
Dec. 2	0810	35		68	4	.7		--		--		--	--	--	--	--		
Mar. 2, 1961	1645	39		59	4	.6		--		--		--	--	--	--	--		
Apr. 5	1445	44		94	18	4.6		--		--		--	--	--	--	--		
May 5	0730	35		222	13	7.8		--		--		--	--	--	--	--		
May 19	1555	57		285	6	4.6		--		--		--	--	--	--	--		
June 8	0800	49		2470	624	4160		14		24		53	69	86	98	100		VPWC
June 21	1700	60		1580	160	683		--		--		45	59	82	94	100		V
July 8	1545	62		535	37	53		--		--		--	--	--	--	--		

July 17, 1961.....	0735	51			372	59	59		--		--		--	--	--	--	--	
Aug. 2.....	1605	63		d	260	7	5		--		--		--	--	--	--	--	
Sept. 19.....	0850	39			460	316	392		28		60		88	91	94	98	100	VPWC

PLATTE RIVER BASIN

6-6807. WINTER CREEK AT TRI-STATE CANAL, NEAR SCOTTSBLUFF, NEBR.

July 8, 1961.....	1145			e	12	106	3.4											
Aug. 7.....	1430				22	87	5.2											
Aug. 18.....	1300				33	85	7.6											
Sept. 15.....	1415				40	75	8.1											

6-6813. GERING DRAIN AT MITCHELL-GERING CANAL, NEAR GERING, NEBR.

July 8, 1961.....	1415			e	190	41700	22200	23	31	41	54	63	83	94	97	100		VPWC
July 8.....	1525				170	12900	5900	36	48	62	75	86	99	100	--			VPWC
Aug. 7.....	1615				22	1110	66	--	--	--	--	--	83	99	100			V
Aug. 18.....	0945				22	1580	94	--	--	--	--	--	83	98	100			V
Sept. 15.....	1640				16	389	17	--	--	--	--	--	--	--	--			

6-6822. ALLIANCE DRAIN NEAR MINATARE, NEBR.

July 8, 1961.....	1040			e	5	460	6						98	100	--	--		V
Aug. 7.....	1000				10	1200	32						51	92	99	100		V
Aug. 18.....	1520				14	616	23						64	91	99	100		V
Sept. 15.....	1245				13	205	7.2						--	--	--	--		

e Estimated.
d Daily mean discharge.

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN MISSOURI RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge and particle size, water year October 1960 to September 1961--Continued
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
PLATTE RIVER BASIN--Continued																		
6-6823. NINEMILE DRAIN NEAR MINATARE, NEBR.																		
July 8, 1961	0930			e 10	70	1.9												
Aug. 7	0915			28	105	7.9												
Aug. 18	1445			33	222	20												
Sept. 15	1110			40	113	12												
6-7915. CEDAR RIVER NEAR SPALDING, NEBR.																		
Oct. 20, 1960	1010	45		153	176	73						31	45	96	100			V
Nov. 16	1725	43		106	73	21						59	79	98	100			V
Dec. 13	1755	39		157	260	110						38	61	92	100			V
Jan. 5, 1961	1005	32		e 170	112	51						76	90	98	100			V
Jan. 31	1045	32		228	181	111						54	89	99	100			V
Feb. 27	1825	44		69	174	32						29	40	97	100			V
Mar. 22	1000	43		223	400	241	10	11		11		37	53	89	100			VPWC
Apr. 5	0840	43		184	324	161						26	40	88	100			V
Apr. 18	1825	58		44	99	12						--	--	--	--			
May 11	1615	72		206	272	151						47	62	97	100			V
June 8	0855	70		274	512	379						49	70	97	100			V
June 21	0940	71		204	374	206						47	64	99	100			V
July 12	1445	79		105	149	42						80	88	99	100			V
July 25	1930	82		61	79	13						85	96	100	--			V
Aug. 10	1740	86		63	147	25						51	64	99	100			V
Aug. 24	1300	74		188	296	150						54	74	99	100			V
Sept. 28	1050	53		158	170	73						--	--	--	--			
6-7918. CEDAR RIVER AT BELGRADE, NEBR.																		
Oct. 20, 1960	1405	51		168	412	187	--	--	--	--	--	56	68	97	100			V
Nov. 17	0845	37		192	1770	918	4	4	--	--	--	12	17	39	90	100		VPWC

Dec. 14, 1960.....	1100	32		242	931	608	--	--	--	--	--	28	57	92	100			V
Jan. 4, 1961.....	1425	32		194	266	139	--	--	--	--	--	54	74	99	100			V
Jan. 30.....	1830	32		190	262	134												
Feb. 28.....	1100	40		230	1080	674	16	18	20	23	30	57	73	95	100			VPWC
Mar. 21.....	1710	42		281	1040	789	10	10	10	14	22	44	65	95	100			VPWC
Apr. 4.....	1650	57		184	657	326	--	--	--	--	--	59	81	99	100			V
Apr. 19.....	0925	55		252	762	518	--	--	--	--	--	52	70	96	100			V
May 11.....	1240	71		268	650	470	--	--	--	--	--	64	81	99	100			V
June 7.....	1135	72		258	4280	2980	50	61	70	77	81	91	95	100	--			VPWC
June 20.....	1420	69		278	944	709	--	--	--	--	--	62	75	99	100			V
July 13.....	0830	69		153	421	174	--	--	--	--	--	69	82	99	100			V
July 25.....	1610	89		120	308	100	--	--	--	--	--	76	85	98	100			V
Aug. 11.....	0940	75		156	368	155	--	--	--	--	--	76	87	100	--			V
Aug. 24.....	0925	71		198	388	207	--	--	--	--	--	68	83	98	100			V
Sept. 27.....	1615	63		198	448	240	--	--	--	--	--	57	68	97	100			V

KANSAS RIVER BASIN

6-8545. REPUBLICAN RIVER AT SCANDIA, KANS.

Sept. 5, 1958.....	1700	--		15700	2650	112000	75	83		92		96	96	97	100			VPWC
June 6, 1961.....	1215	72		2850	3500	26900	56	62		76		95	96	98	100			VPWC
Sept. 13.....	1610	60		1270	1500	5140	--	--		--		--	--	--	--			

6-8560. REPUBLICAN RIVER AT CONCORDIA, KANS.

Apr. 30, 1958.....	1040	54		1060	218	624	--	--		--		--	--	--	--	--		
Sept. 6.....	0940	--		16000	2400	104000	71	75		82		85	86	90	99	100		VPWC
June 6, 1961.....	1300	72		4650	2530	31800	62	69	74	79	87	94	95	98	100	--		VPWC
Sept. 13.....	1830	--		19500	2370	125000	--	--		--		72	73	76	91	100		V

e Estimated.

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN MISSOURI RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge and particle size, water year October 1960 to September 1961--Continued
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
KANSAS RIVER BASIN--Continued																		
6-8570. REPUBLICAN RIVER AT MILFORD, KANS.																		
June 9, 1958.....	1245			1860	2640	13300												
Aug. 31, 1959.....	1700			1170	5920	18700												
Mar. 24, 1960.....	1500			d 604	367	598												
June 23.....	1515			3690	1840	18300												
June 7, 1961.....	1530			6350	2940	50400												
6-8595. LADDER CREEK BELOW CHALK CREEK, NEAR SCOTT CITY, KANS.																		
June 4, 1958.....	0900	72		37	330	33												
Apr. 18, 1961.....	1435	62		2.4	52	.3												
June 6.....	1920	79		120	1150	373												
6-8725. NORTH FORK SOLOMON RIVER NEAR DOWNS, KANS.																		
May 21, 1958.....	1425	80		52	738	104						--						
June 6, 1961.....	1400	68		9030	4050	98700	73	84	90	93	96	100						VPWC
Sept. 13.....	1745	58		537	2460	3570						100						V
6-8740. SOUTH FORK SOLOMON RIVER AT OSBORNE, KANS.																		
June 6, 1961.....	1300	69		3780	2010	20500	55	66	74	80	89	99	100					VPWC
Sept. 3.....	1700	58		83	2380	533						100						V
6-8775. TURKEY CREEK NEAR ABILENE, KANS.																		
Aug. 18, 1960.....	1040	75		210	2610	1480	16	21	--	38	--	98	--					SPWC
Jan. 9, 1961.....	1400	--		18	174	8.5	--	--	--	--	--	--	--					
Feb. 14.....	1545	--		17	272	12	--	--	--	--	--	--	--					

Mar. 23, 1961.....	1600	--		17	578	27	--	--	--	--	--	--	--				
Apr. 2.....	1420	--		30	201	16	--	--	--	--	--	--	--				
May 3.....	1400	--		30	186	15	--	--	--	--	--	--	--				
May 4.....	1930	--		450	2580	3130	--	--	--	--	--	--	--				
May 4.....	2245	50		560	3560	5380	50	56	83	72	86	96	98	98	99	100	VPWC
May 6.....	1500	--		70	765	145	--	--	--	--	--	--	--				
May 23.....	1440	--		3800	1140	12000	69	73	80	88	94	99	100				VPWC
June 2.....	1100	66		640	5360	9270	48	56	64	75	90	100	--				VPWC
June 14.....	1745	--		1500	2860	11600	62	71	77	84	92	99	100				VPWC
June 14.....	2300	--		900	3160	7670	--	--	--	--	--	--	--				
July 7.....	1320	--		28	418	32	--	--	--	--	--	--	--				
Sept. 13.....	1605	--		1500	2300	9320	--	--	--	--	--	--	--				

6-8780. CHAPMAN CREEK NEAR CHAPMAN, KANS.

Dec. 2, 1958.....	1000	32		15	104	4.2	--	--	--	--	--	80	87	87	92	100	V
Mar. 28, 1960.....	1850	48		5700	3080	47400	56	68	--	86	--	98	--	--			SPWC
Oct. 11.....	1455	70		15	178	7.2	--	--	--	--	--	--	--	--			
Nov. 3.....	0930	48		13	200	7.0	--	--	--	--	--	--	--	--			
Dec. 7.....	1000	37		18	299	14	--	--	--	--	--	--	--	--			
Jan. 9, 1961.....	1235	37		25	104	7.0	--	--	--	--	--	--	--	--			
Feb. 27.....	1345	47		19	89	4.6	--	--	--	--	--	--	--	--			
Mar. 23.....	1405	52		22	150	8.9	--	--	--	--	--	--	--	--			
Apr. 5.....	1220	57		21	119	6.7	--	--	--	--	--	--	--	--			
May 3.....	1145	58		24	152	9.8	--	--	--	--	--	--	--	--			
May 4.....	2200	50		1400	6190	23400	53	58	65	74	90	99	100	--			VPWC
May 5.....	1430	51		2000	3190	17200	62	68	--	86	--	99	100	--			VPWC
May 22.....	1230	--		7500	3180	64400	59	68	--	86	--	99	100	--			VPWC
May 22.....	1710	63		9000	2590	62900	59	65	73	83	94	99	100	--			VPWC
May 23.....	0030	59		8000	1640	35400	71	80	--	94	--	99	100	--			VPWC

d Daily mean discharge.

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN MISSOURI RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge and particle size, water year October 1960 to September 1961--Continued
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
KANSAS RIVER BASIN--Continued																	
6-8780. CHAPMAN CREEK NEAR CHAPMAN, KANS.--Continued																	
May 23, 1961	1845	62		7500	1030	20800	65	69	--	79	--	98	99	100				VPWC
May 24	1835	62		1900	726	3720	--	--	--	--	--	100	--	--				V
June 2	1330	69		2200	8090	48000	48	54	61	73	92	100	--	--				VPWC
June 14	1510	69		2300	5420	33600	55	62	--	81	--	100	--	--				VPWC
June 15	0115	69		4500	2060	25000	67	74	--	87	--	99	100	--				VPWC
July 7	1020	--		29	278	22	--	--	--	--	--	--	--	--				
Sept. 13	1420	--		692	1570	2930	--	--	--	--	--	--	--	--				
6-8785. LYON CREEK NEAR WOODBINE, KANS.																	
Nov. 10, 1960	1500	80		35	151	14	--	--	--	--	--	--	--					
Jan. 9, 1961	1330	38		38	144	15	--	--	--	--	--	--	--					
Feb. 14	1505	33		50	144	19	--	--	--	--	--	--	--					
Mar. 23	1530	52		110	256	76	--	--	--	--	--	--	--					
Apr. 5	1350	59		55	142	21	--	--	--	--	--	--	--					
May 3	1330	59		70	252	48	--	--	--	--	--	--	--					
May 4	2030	49		1000	2520	6800	--	--	--	--	--	--	--					
May 4	2330	50		1500	3330	13500	48	52	60	71	86	99	100					VPWC
May 22	1500	--		17000	1510	69300	70	79	85	90	97	98	99	99	99	100		VPWC
May 23	1545	60		5200	1170	16400	64	69	--	82	--	100	--					VPWC
June 2	1145	69		1000	4150	11200	--	--	--	--	--	--	--					
June 14	1700	--		1600	3000	13000	--	--	--	--	--	98	100					V
June 14	2330	--		2200	4050	24000	54	61	68	78	92	99	100					VPWC
July 7	1250	80		56	702	106	--	--	--	--	--	--	--					
Sept. 13	1525	69		3800	3020	31000	--	--	--	--	--	--	--					

6-8792. CLARK CREEK NEAR JUNCTION CITY, KANS.

Nov. 10, 1960.....	1410	42		47	161	20	--	--	--	--	--	--	--					
Jan. 9, 1961.....	1300	37		33	38	3.4	--	--	--	--	--	--	--					
Feb. 14.....	1445	33		36	72	7.0	--	--	--	--	--	--	--					
Mar. 23.....	1500	--		173	400	187	--	--	--	--	--	--	--					
Apr. 5.....	1320	55		65	87	15	--	--	--	--	--	--	--					
May 3.....	1300	59		74	90	18	--	--	--	--	--	--	--					
May 4.....	2100	50		3800	6440	66100	37	42	47	56	80	99	100					VPWC
May 5.....	1215	50		1640	3210	14200	44	48	54	66	85	99	100					VPWC
May 22.....	1345	58		20600	3400	189000	48	54	61	71	88	97	99	100				VPWC
May 23.....	0100	--		14600	1780	70200	52	56	--	73	--	98	100					VPWC
May 23.....	1710	62		2050	3180	17600	30	33	--	52	--	99	100					VPWC
May 23.....	1710	62		2050	3180	17600	7	12	--	42	--	99	100					VPN
June 2.....	1230	69		1400	7880	29800	--	--	--	--	--	--	--					
June 15.....	1230	--		480	472	612	--	--	--	--	--	--	--					
July 7.....	1120	77		45	141	17	--	--	--	--	--	--	--					
Sept. 13.....	1450	68		1220	3340	11000	--	--	--	--	--	--	--					

6-8810. BIG BLUE RIVER NEAR CRETE, NEBR.

May 22, 1961.....	1010	61		202	208	114	--	--	--	--	--	--						
May 24.....	1115	54		233	452	284	--	--	--	--	--	--						
June 9.....	1120	73		363	543	532	--	--	--	--	--	--						
June 10.....	0920	74		554	1200	1800	--	--	--	--	--	--						
June 10.....	1105	75		587	1250	1980	67	76	83	90	95	100						VPWC
June 10.....	1335	75		633	1370	2340	66	77	84	89	95	100						VPWC
July 21.....	0910	75		149	286	115	--	--	--	--	--	--						
Aug. 21.....	0910	67		103	116	32	--	--	--	--	--	--						
Sept. 12.....	1640	66		642	2580	4470	75	86	93	94	99	100						VPWC
Sept. 13.....	1020	60		1010	1800	4910	--	--	--	--	--	--						
Sept. 13.....	1840	56		1540	2280	9480	64	69	75	80	88	99	100					VPWC
Sept. 29.....	1520	61		417	886	998	--	--	--	--	--	--						

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN MISSOURI RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge and particle size, water year October 1960 to September 1961--Continued
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
KANSAS RIVER BASIN--Continued																	
6-8815. BIG BLUE RIVER AT BEATRICE, NEBR.																	
Mar. 31, 1960.....	1500	--		24000	1700	110000	65	75	83	88	92	96	97	98	100			VPWC
Apr. 1.....	1100	--		24200	1440	94100	--	--	--	--	--	--	--	--	--			
Apr. 1.....	1150	--		24200	1690	110000	64	71	78	78	88	90	90	91	93	100		VPWC
Apr. 1.....	1625	42		24000	1360	88100	--	--	--	--	--	--	--	--	--			
Apr. 2.....	1730	--		20000	1240	67000	--	--	--	--	--	--	--	--	--			
May 24, 1961.....	1335	65		e 1000	1920	5180	68	74	--	89	--	99	100	--	--			VPWC
May 24.....	2010	--		e 1000	1640	4430	64	71	--	86	--	99	100	--	--			VPWC
Sept. 13.....	1500	62		e 2800	1680	12700	--	--	--	--	--	--	--	--	--			
6-8820. BIG BLUE RIVER AT BARNESTON, NEBR.																	
May 24, 1961.....	1545	64		1380	1120	4170												
Sept. 13.....	1425	63		9460	6180	158000												
6-8835.7. LITTLE BLUE RIVER NEAR GILEAD, NEBR.																	
May 22, 1961.....	1210	59		6290	5300	90000	40	45	55	64	77	93	96	98	100			VPWC
May 23.....	1410	63		9360	2800	70800	59	65	69	75	84	94	96	99	100			VPWC
May 24.....	1430	64		4200	4220	47900	45	49	52	58	71	91	95	98	99	100		VPWC
June 7.....	1630	71		4600	6740	83700	50	58	65	74	88	99	99	100	--			VPWC
6-8840. LITTLE BLUE RIVER NEAR FAIRBURY, NEBR.																	
May 22, 1961.....	1345	60		10700	4930	142000	42	46	51	57	67	76	78	88	95	100		VPWC
May 22.....	1805	61		11100	3900	117000	50	56	61	67	77	88	90	96	100	--		VPWC
May 23.....	1245	62		11800	3940	126000	39	42	45	48	53	59	61	81	95	100		VPWC
May 23.....	1650	62		11570	3080	96200	51	56	60	65	72	78	81	88	98	100		VPWC

June 7, 1961.....	1800	71		5840	7720	122000	--	--	--	--	--	--	--	--	--	--		
Sept. 13.....	1400	57		715	1940	3750	--	--	--	--	--	--	--	--	--	--		
6-8842. MILL CREEK AT WASHINGTON, KANS.																		
May 22, 1961.....	1710	60		3640	2110	20700	55	63	69	77	89	97	98	99	100			VPWC
May 23.....	1445	61		1860	2020	10100	64	69	75	80	90	98	99	100	--			VPWC
Sept. 13.....	1510	59		7670	2750	56900	61	64	70	72	88	98	99	99	100			VPWC
Sept. 14.....	1720	58		3400	1250	11500	--	--	--	--	--	--	--	--	--			
6-8845. LITTLE BLUE RIVER AT WATERVILLE, KANS.																		
May 6, 1959.....	1715	--		11700	7780	246000	--	--	--	--	--	--	--	--	--	--		
May 22, 1961.....	1555	59		10300	5960	166000	43	48	54	64	81	97	99	100	--	--		VPWC
May 22.....	1640	59		10500	10100	286000	28	32	36	41	51	58	59	62	74	91		VPWC
May 23.....	1515	61		14900	3430	138000	52	59	64	69	81	94	97	100	--	--		VPWC
May 24.....	1730	66		13600	4440	163000	39	41	44	49	57	64	66	68	82	94		VPWC
Sept. 13.....	1425	62		6640	4680	83900	47	51	58	66	81	94	96	99	100	--		VPWC
Sept. 14.....	1830	59		7620	3360	69100	--	--	--	--	--	--	--	--	--	--		
6-8885. MILL CREEK NEAR PAXICO, KANS.																		
Mar. 9, 1958.....	1220	35		1140	253	779												
July 21, 1961.....	1025	77		170	276	127												

e Estimated.

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN MISSOURI RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge and particle size, water year October 1960 to September 1961--Continued
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
KANSAS RIVER BASIN--Continued																	
6-8895. SOLDIER CREEK NEAR TOPEKA, KANS.																	
Mar. 8, 1958	1400	38		1080	2300	6710	50	55		78		99	99	99	100			VPWC
May 5, 1961	1900	--		2620	5880	41600	38	43	50	61	79	94	97	99	100			VPWC
July 21	0810	74		90	1680	408	--	--		--		--	--	--	--			
Sept. 14	0800	59		1530	2480	10200	--	--		--		--	--	--	--			
Sept. 14	2330	51		680	1280	2350	--	--		--		--	--	--	--			
6-8915. WAKARUSA RIVER NEAR LAWRENCE, KANS.																	
Feb. 14, 1961	1145	32		13	124	4.4	--	--	--	--	--	--	--					V
Apr. 18	1720	56		190	164	84	--	--	--	--	--	75	97	100				V
May 5	2100	49		6600	2890	51500	52	60	69	80	93	99	100					VPWC
May 5	2200	--		6800	2690	49400	55	62	71	83	94	99	100					VPWC
May 5	2300	--		7000	2740	51800	54	62	69	81	94	100	100					VPWC
May 8	1605	61		1100	1050	3120	--	--	--	--	--	--	--					
May 24	0950	66		2300	694	4310	--	--	--	--	--	99	100					V
July 20	1900	86		8.5	202	4.6	--	--	--	--	--	--	--					
Sept. 14	1020	63		6200	778	13000	--	--	--	--	--	100	--					S
Sept. 14	2200	62		3300	830	7400	--	--	--	--	--	--	--					
6-8920. STRANGER CREEK NEAR TONGANOXIE, KANS.																	
Oct. 5, 1959	1400	60		3010	1650	13400	--	--		--		--						
Dec. 1	1820	34		29	34	2.7	--	--		--		--						
Apr. 21, 1960	1945	65		141	210	80	--	--		--		--						
May 27	0915	68		84	329	75	--	--		--		--						
June 22	1945			780	5590	11800	36	54		88		100						SPWC
July 12	1245	76		358	2740	2650	51	57		90		100						SPWC
Aug. 15	1345	82		50	195	26	--	--		--		--						
Aug. 18	1645	73		1990	3800	20400	--	--		--		--						
Aug. 19	0215	--		2030	2100	11500	47	62		84		100						SPWC

Aug. 19, 1960.....	0625	--		2060	2660	14800	--	--		--		--						
Sept. 22.....	1915	--		6.5	77	1.3	--	--		--		--						
Mar. 27, 1961.....	2245	--		4900	2130	28200	64	76		88		96	97	98	100			VPWC
Mar. 28.....	1720	--		3800	1470	15100	74	86		97		--						PWC

6-9135. MARAIS DES CYGNES RIVER NEAR OTTAWA, KANS.

Mar. 11, 1958.....	1210	37		6400	469	8100						98	99	100				V
May 8, 1961.....	1655	61		16500	556	24800						99	100	--				V
May 24.....	0900	--		13200	1030	36700	65	75		88		97	99	100				VPWC
Sept. 14.....	1200	64		24800	832	55700						--	--	--				

6-9166. MARAIS DES CYGNES NEAR KANSAS-MISSOURI STATE LINE

May 8, 1961.....	1850			47400	167	21400	82	91		99		100						VPWC
May 24.....	0730			10600	1400	40100						99	100					V
Sept. 14.....	1545	65		29300	729	57700						--						

6-9175. MARMATON RIVER NEAR FORT SCOTT, KANS.

Mar. 11, 1958.....	1840	34		834	184	414						--						
May 8, 1961.....	2025	60		10300	546	15200	70	73		94		100						VPWC
May 24.....	0240	--		877	179	424						97	99	100				V
Sept. 14.....	1740	64		13000	380	13300						--						

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN MISSOURI RIVER BASIN--Continued

Particle-size analyses of bed material, water year October 1960 to September 1961
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Bed material: Percent finer than size indicated, in millimeters											Method of analysis
							0.062	0.125	0.250	0.500	1.000	2.000	4.000	8.000	16.00	32.00	64.00	
PLATTE RIVER BASIN																		
6-6813. GERING DRAIN AT MITCHELL-GERING CANAL, NEAR GERING, NEBR.																		
July 8, 1961			9	170			11	18	47	80	91	95	98	99	100			SV
Aug. 7			1	22			11	24	41	78	92	94	96	98	100			SV
Aug. 18			1	22			20	40	57	78	85	88	91	93	95	100		SV
Sept. 15			1	16			5	17	58	92	98	99	100	--	--			SV
6-7915. CEDAR RIVER NEAR SPALDING, NEBR.																		
Oct. 20, 1960	1010		19	153			1	13	51	96	100	--						V
Nov. 16	1725		17	106			0	4	47	96	99	100						SV
Dec. 13	1755		17	157			1	6	47	95	99	100						SV
Jan. 5, 1961	1005		15	e 170			5	16	59	99	100	--						V
Feb. 27	1825		14	69			--	2	53	97	99	100						SV
Mar. 22	1000		18	223			2	6	57	97	100	--						V
Apr. 5	0840		23	184			1	6	55	95	99	100						SV
Apr. 18	1825		12	44			1	2	38	96	99	100						SV
May 11	1615		16	206			0	3	59	97	100	--						V
June 8	0855		13	274			0	4	51	97	100	--						V
June 21	0940		22	204			0	1	57	98	100	--						V
July 12	1445		17	105			0	1	50	98	100	--						SV
July 25	1930		13	61			0	4	55	96	99	100						SV
Aug. 10	1740		10	63			1	4	49	98	100	--						V
Aug. 24	1300		15	188			0	2	50	97	100	--						V
Sept. 28	1050		17	158			0	5	62	98	100	--						V
6-7918. CEDAR RIVER AT BELGRADE, NEBR.																		
Oct. 20, 1960	1405		16	168			0	7	67	98	100	--						V
Nov. 17	0845		14	192			0	8	67	97	100	--						V

Dec. 14, 1960.....	1100		15	242			5	12	70	99	100	--						V
Jan. 4, 1961.....	1425		19	194			15	31	66	96	99	100						SV
Jan. 30.....	1830		13	190			0	1	44	96	100	--						V
Feb. 28.....	1100		12	230			2	9	57	98	100	--						V
Mar. 21.....	1710		21	281			2	9	59	97	100	--						V
Apr. 4.....	1650		17	184			2	10	62	97	99	100						SV
Apr. 19.....	0925		18	252			0	8	74	99	100	--						SV
May 11.....	1240		10	268			0	6	67	99	100	--						V
June 7.....	1135		19	258			1	9	84	100	--	--						V
June 20.....	1420		30	278			4	13	77	99	100	--						V
July 13.....	0830		19	153			6	12	63	98	99	99	100					SV
July 25.....	1610		15	120			2	8	59	98	100	--						V
Aug. 11.....	0940		12	156			4	19	64	98	100	--						V
Aug. 24.....	0925		17	198			1	5	57	98	100	--						V
Sept. 27.....	1615		18	198			2	12	74	99	100	--						V

KANSAS RIVER BASIN

6-8810. BIG BLUE RIVER NEAR CRETE, NEBR.

May 24, 1961.....	1115		3	233			50	55	58	65	80	91	96	100				SV
Aug. 21.....	0910		5	103			2	16	18	22	42	66	80	100				SV
Sept. 12.....	1640		5	642			5	7	12	33	69	86	95	100				SV
Sept. 13.....	1840		5	1540			3	5	17	38	60	75	89	98	100			SV

6-8835.7. LITTLE BLUE RIVER NEAR GILEAD, NEBR.

May 22, 1961.....	1210		4	6290			10	0	2	23	84	98	100	--	--			SV
May 23.....	1410		8	9360				15	34	50	66	78	90	96	100			SV
May 24.....	1430		3	4200				--	0	4	44	66	77	94	100			SV

6-8840. LITTLE BLUE RIVER NEAR FAIRBURY, NEBR.

May 22, 1961.....	1345		8	10700			0	0	1	9	50	78	95	100	--	--		SV
May 23.....	1245		6	11800				1	9	59	81	88	94	98	99	100		SV
May 23.....	1650		6	11570				0	3	50	85	91	96	98	99	100		SV

e Estimated.

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