Quality of Surface Waters of the United States 1960

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

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

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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. The data were collected and prepared for publication under the supervision of the following district engineers or district chemists:

V. R. Bennion---------- Iowa City, Iowa
D. M. Culbertson---------- Lincoln, Nebr.
T. F. Hanly---------- Worland, Wyo.
G. W. Whetstone ---------- Columbus, Ohio

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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, 1960

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, 1959, to September 30, 1960. 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.

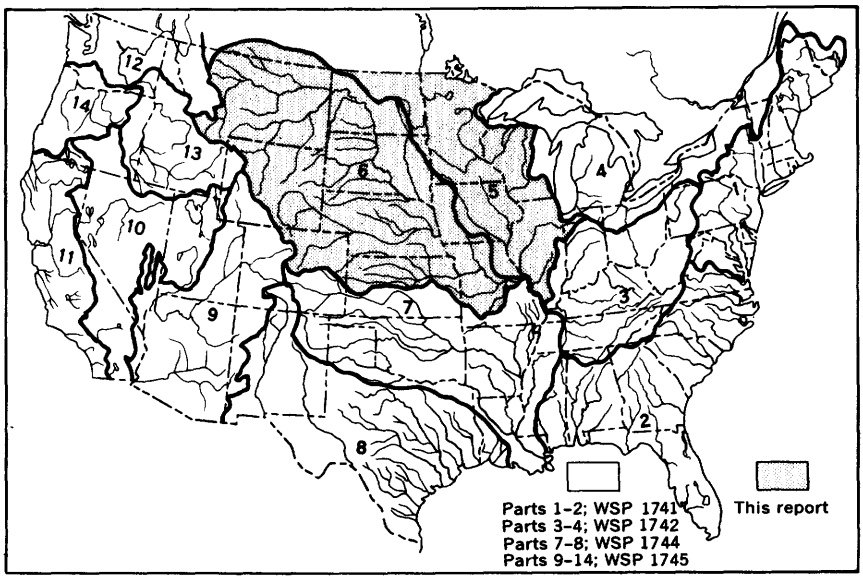

Figure 1.—Map of the conterminous United States showing basins covered by the five water-supply papers on quality of surface waters in 1960. The shaded portion represents the section of the country covered by this volume; the unshaded portion represents the section of the country covered by other water-supply 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 six 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 5-100 for a station whose complete identification number is 05-0100.00.

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, 1960, the Geological Survey maintained 84 stations on 64 streams for the study of chemical and physical characteristics of surface water. Samples were collected daily and monthly at 45 of these locations for chemical-quality studies. Samples were also collected less frequently at meny other points. Water temperatures were measured daily at 49 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 26.

Quantities of suspended sediment are reported for 37 stations during the year ending September 30, 1960. Sediment samples were collected one or more times daily at most stations, depending on the rate of low and changes in stage of the stream. Particle-size distributions of sediments were determined at 31 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 concentration 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). (See table on p. 7)

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

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})	.02283
Fluoride (F^{-1})	.05264	Sulfate (SO_4^{-2})	.02083
Hydrogen (H^{+1})	.99209	Zinc (Zn^{+2})	.03060

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. 23) 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 groundwater-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). 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 methemoglobinemia ("blue babies") Faucett and Miller, 1946, p. 593), and more recent investigations conducted in Ohio show that drinking water containing nitrates in the range of 44 to 88 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 a 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).

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 by 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.). 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 in 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 considerable 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.

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 1941–60, are listed below:

Numbers of water-supply papers containing records for Parts 5 and 6, 1941–60

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		
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.
*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

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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 of Agriculture for some of the investigations in Colorado, Iowa and Nebraska; and by the Corps of Engineers, United States Army for some of the investigations in North Dakota and South Dakota.

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 27.

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.

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, Kaarlo J. Otava, Commissioner.	Hudson Bay and upper Mississippi River	
Montana	Montana Fish and Game Commission, W. J. Everin, director.	Missouri River	
Nebraska	Nebraska Mid-State Reclamation District, J. R. McKinney, secretary.	Missouri River	Cotner Terrace Bldg. 225 North Cotner Blvd. Lincoln, Nebr. 68505

State	Cooperating agency	Drainage basin	District office
South Dakota	South Dakota Water Resources Commission, J. W. Grimes, chief engineer.		
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

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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.--6,600 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1955 to September 1960.
Water temperatures: October 1955 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 363 ppm Apr. 29 to May 4; minimum, 195 ppm Apr. 1-6.
Hardness: Maximum, 275 ppm Nov. 20-30; minimum, 131 ppm Apr. 1-6.
Specific conductance: Maximum daily, 611 micromhos May 12; minimum daily, 292 micromhos Apr. 4, 5.
Water temperatures: Maximum, 82°F July 21, 24-27; minimum, 34°F Mar. 6.
EXTREMES, 1955-60.--Dissolved solids (1955-56, 1959-60): 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. Prior to June 1960, gaging station 2 miles upstream. Records of discharge for water year October 1959 to September 1960 given in WSP 1708.

Chemical analyses, in parts per million, water year October 1959 to September 1960

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 160°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, 1959	144	--	--	--	--		10	--	262	32	--	--	--	--	266	0.36	103	230	15	0.3	463	7.1	--
Nov. 1-19.....	96.8	--	0.01	--	--		12	--	282	39	--	--	--	--	267	.39	75.0	246	15	.3	492	8.1	--
Nov. 20-30.....	172	--	.01	--	--		13	--	312	43	--	--	--	--	327	.44	152	275	19	.3	546	7.9	--
Dec. 1-31.....	206	12	.01	45	35		12	4.5	295	39	6.8	0.3	0.7	0.08	304	.41	169	256	16	.3	513	7.5	6
Jan. 1-31, 1960	208	--	.01	--	--		11	--	306	38	--	--	--	--	313	.43	176	266	13	.3	521	7.6	--
Feb. 1-29.....	228	--	.00	--	--		11	--	311	29	--	--	--	--	317	.43	195	268	13	.3	526	7.6	--
Mar. 1-29.....	261	--	.01	--	--		11	--	313	29	--	--	--	--	314	.43	221	266	9	.3	519	7.8	--
Mar. 30-31.....	1,006	--	.03	--	--		7.7	--	178	25	--	--	--	--	213	.29	579	154	8	.3	341	7.8	--
Apr. 1-6.....	1,263	--	.04	--	--		7.8	--	136	36	--	--	--	--	195	.27	676	131	19	.3	304	7.3	--
Apr. 7-11.....	2,998	14	.03	38	16		8.3	7.8	156	47	1.5	.2	4.7	.06	229	.31	1,850	160	32	.3	356	7.3	35
Apr. 12-18.....	1,199	17	.03	47	20		12	9.8	161	87	2.7	.1	5.1	.13	292	.40	945	198	66	.4	448	7.1	27
Apr. 19-25.....	802	--	.02	--	--		14	--	206	96	--	--	--	--	338	.46	732	236	67	.4	514	7.5	--
Apr. 26-26.....	1,740	--	--	--	--		12	--	184	79	--	--	--	--	296	.40	1,390	212	61	.4	460	7.4	--
Apr. 29-May 4..	1,208	--	--	--	--		17	--	200	115	--	--	--	--	363	.49	1,180	252	86	.5	546	7.4	--
May 5-24.....	961	--	--	--	--		16	--	224	97	--	--	--	--	344	.47	893	252	68	.4	539	7.6	--

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

Chemical analyses, in parts per million, water year October 1959 to September 1960--Continued

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				
May 25-June 15, 1960	858	--	0.01	--	--		12	--	236	59	--	--	--	--	294	0.40	681	235	41	0.3	479	7.4	--
June 16-30	813	--	.01	--	--		13	--	241	69	--	--	--	--	317	.43	696	245	47	.4	502	7.3	--
July 1-14	665	--	.00	--	--		15	--	236	84	--	--	--	--	340	.46	610	253	59	.4	527	7.5	--
July 15-27	467	--	.01	--	--		13	--	246	73	--	--	--	--	330	.45	416	254	52	.4	515	7.6	--
July 28-Aug. 24	193	--	.00	--	--		9.6	--	250	30	--	--	--	--	258	.35	134	218	13	.3	433	7.6	--
Aug. 25	275	--	.03	--	--		8.9	--	206	29	--	--	--	--	215	.29	160	180	11	.3	366	7.5	--
Aug. 26-Sept. 18	129	11	.01	42	29		11	4.4	246	41	3.7	0.3	0.1	0.09	274	.37	95.4	226	24	.3	457	7.4	7
Sept. 19-30	84.3	--	.00	--	--		11	--	262	37	--	--	--	--	275	.37	62.6	235	20	.3	465	7.7	--
Weighted average a	442	--	0.01	--	--		12	--	229	63	--	--	--	--	299	0.41	357	229	41	0.3	478	--	--

a Includes estimates where data are missing. Represents 100 percent of runoff for water year.

Temperature (°F) of water, water year October 1959 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	
October	55	54	54	54	55	55	56	56	53	47	46	49	47	46	46	46	45	45	46	45	45	46	47	46	47	46	44	44	44	44	43	48
November	43	42	41	42	38	38	38	38	38	40	38	37	37	--	37	37	36	36	36	36	36	37	36	36	36	37	36	--	--	36	--	38
December	36	36	36	36	36	35	36	36	36	36	36	37	36	36	36	36	36	36	36	36	36	36	36	36	37	37	36	36	36	36	36	36
January	36	36	36	35	35	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	35	37	37	36	35	36	35	35	36	36	36
February	36	36	36	36	35	36	36	36	35	36	36	36	36	36	36	36	36	36	35	36	36	36	36	36	36	35	35	35	35	--	--	36
March	35	35	35	35	35	34	35	35	35	35	35	36	36	35	35	35	35	35	35	35	35	35	35	35	35	36	35	35	36	35	35	35
April	36	35	36	35	35	36	36	36	36	40	38	39	41	44	50	51	52	51	51	52	55	56	54	53	52	48	48	48	48	48	--	45
May	49	51	49	49	50	50	50	51	53	55	55	58	60	61	62	62	63	64	63	64	64	64	66	67	68	68	66	66	66	66	66	60
June	68	68	68	68	67	66	66	66	66	65	65	66	68	70	70	70	70	70	71	71	68	68	69	67	68	71	71	73	73	71	--	69
July	71	71	72	72	71	72	73	73	73	73	77	77	76	76	77	--	77	77	79	80	82	81	81	82	82	82	82	80	80	79	77	77
August	79	77	77	76	76	77	77	76	74	75	75	75	75	75	73	72	76	74	73	74	74	75	76	75	73	73	72	73	72	73	74	75
September	73	75	75	75	77	76	75	73	71	70	68	68	66	65	65	65	65	65	63	64	66	64	63	63	62	61	61	60	59	58	--	67

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.--2,100 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: January 1951 to September 1960.
Water temperatures: January 1951 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 583 ppm May 22-27; minimum, 150 ppm Apr. 5-9.
Hardness: Maximum, 300 ppm Jan. 1-31; minimum, 71 ppm Apr. 5-9.
Specific conductance: Maximum daily, 949 micromhos May 26; minimum daily, 208 micromhos Apr. 7.
Water temperatures: Maximum, 82°F July 20; minimum, freezing point Jan. 2, 4, 6, 7.
EXTREMES, 1951-60.--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, 1956-60), 86°F July 21, 1955; minimum, freezing point on several days during winter months.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Records of discharge for water year October 1959 to September 1960 given in WSP 1708.

Chemical analyses, in parts per million, water year October 1959 to September 1960

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, 1959.	2.4	--	0.06	--	--	21	--	232	0	--	--	--	--	--	272	0.37	1.76	192	2	0.7	446	7.6	--
Oct. 15-27.....	6.9	--	.05	--	--	66	--	284	0	--	--	--	--	--	390	.53	7.27	186	0	2.1	627	7.6	--
Oct. 28-Nov. 5..	25.9	--	.09	--	--	84	--	336	0	--	--	--	--	--	497	.68	34.8	232	0	2.4	777	8.0	--
Nov. 6-30.....	9.0	--	.03	--	--	53	--	330	0	--	--	--	--	--	422	.57	10.3	250	0	1.5	672	7.8	--
Dec. 1-31.....	4.2	21	.04	63	29	47	5.5	338	0	81	13	0.4	1.2	0.19	433	.59	4.91	275	0	1.2	684	7.5	15
Jan. 1-31, 1960.	2.8	--	.04	--	--	37	--	366	0	--	--	--	--	--	440	.60	3.33	300	0	.9	691	7.8	--
Feb. 1-29.....	1.8	--	.07	--	--	31	--	356	0	--	--	--	--	--	421	.57	2.05	291	0	.8	656	7.8	--
Mar. 1-26.....	2.1	--	.05	--	--	26	--	318	0	--	--	--	--	--	369	.50	2.09	262	1	.7	580	7.8	--
Mar. 27-30.....	73.3	14	--	30	11	13	6.5	144	0	29	4.6	.1	3.6	.10	200	.27	39.6	120	2	.5	311	7.1	40
Mar. 31-Apr. 1..	440	--	--	--	--	28	--	144	0	--	--	--	--	--	242	.33	287	118	0	1.1	375	7.8	--
Apr. 2-4.....	719	--	--	--	--	27	--	115	0	--	--	--	--	--	179	.24	347	72	0	1.4	278	7.8	--
Apr. 5-9.....	1,192	10	--	17	7.0	17	5.9	102	0	28	.6	.1	3.4	.08	150	.20	483	71	0	.9	234	7.1	45
Apr. 10-17.....	301	--	--	--	--	23	--	142	0	--	--	--	--	--	203	.28	165	102	0	1.0	313	7.5	--
Apr. 18-23.....	70.0	--	--	--	--	40	--	214	0	--	--	--	--	--	316	.43	59.7	160	0	1.4	482	7.7	--
Apr. 24-May 13..	27.1	--	.10	--	--	51	--	264	0	--	--	--	--	--	421	.57	30.8	204	0	1.6	607	7.6	--
May 14-19.....	27.5	--	.15	--	--	67	--	324	0	--	--	--	--	--	487	.66	36.2	255	0	1.8	741	7.6	--
May 20-21.....	161	--	--	--	--	56	--	312	0	--	--	--	--	--	457	.62	199	251	0	1.5	695	7.8	--
May 22-27.....	174	--	.06	--	--	89	--	357	0	--	--	--	--	--	583	.79	274	267	0	2.4	863	7.7	--
May 28-30.....	328	--	--	--	--	66	--	294	0	--	--	--	--	--	476	.65	422	224	0	1.9	703	7.9	--
May 31-June 4...	161	--	.28	--	--	35	--	205	0	--	--	--	--	--	318	.43	138	171	3	1.2	482	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 1959 to September 1960--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): Parts per million	Dissolved solids (residue at 180°C): Tons per acre-foot	Dissolved solids (residue at 180°C): 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
June 5-19, 1960.	86.2	--	0.13	--	--	64	--	304	0	--	--	--	--	--	478	0.65	85.1	240	0	1.8	708	7.7	--
June 20-30.....	29.8	--	.09	--	--	90	--	386	0	--	--	--	--	--	582	.79	46.5	272	0	2.4	881	7.7	--
July 1-27.....	13.9	--	.07	--	--	100	--	403	0	--	--	--	--	--	582	.79	21.6	253	0	2.7	875	7.5	--
July 28-Aug. 12.	6.2	--	.06	--	--	69	--	324	0	--	--	--	--	--	429	.58	7.18	214	0	2.0	669	7.7	--
Aug. 13-31.....	2.9	--	.09	--	--	48	--	255	0	--	--	--	--	--	334	.45	2.62	186	0	1.5	536	7.4	--
Sept. 1-30.....	1.0	18	.03	43	18	33	3.8	240	0	52	4.1	0.1	2.8	0.10	299	.41	.81	182	0	1.1	484	7.7	8
Weighted average a.....	51.2	--	0.09	--	--	37	--	187	0	--	--	--	--	--	283	0.38	39.1	138	0	1.4	430	--	--

a Includes estimates where data are missing. Represents 100 percent of runoff for water year.

Temperature (°F) of water, water year October 1959 to September 1960

Month	Day 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	Average
October.....	47	50	52	--	50	52	48	--	42	--	40	36	38	41	--	41	42	--	41	40	41	45	44	44	--	40	40	39	39	39	42	43
November.....	--	37	37	40	38	36	40	--	40	37	35	37	36	35	--	35	35	37	37	38	37	--	--	38	36	36	37	38	--	39	--	37
December.....	38	39	40	40	36	--	38	38	38	38	37	38	--	37	39	39	36	35	37	--	35	35	35	37	--	40	--	36	35	36	36	37
January.....	--	32	--	32	33	32	32	35	36	--	37	36	38	37	36	37	--	35	35	35	35	35	35	--	34	34	37	38	37	38	--	35
February.....	35	35	35	35	37	36	--	33	33	35	34	34	35	--	36	35	36	35	37	36	--	--	35	36	35	35	35	--	34	--	--	35
March.....	35	34	34	34	34	--	35	36	35	35	36	35	--	35	35	35	36	36	36	--	35	35	37	37	40	40	--	41	35	35	34	36
April.....	34	34	--	36	37	37	36	35	37	--	43	43	45	49	50	--	--	--	50	55	55	53	49	--	46	44	49	48	45	42	--	44
May.....	--	47	46	50	51	52	54	--	52	58	60	65	66	62	--	61	60	63	65	65	65	--	67	70	68	60	67	67	--	--	72	61
June.....	69	65	66	65	--	65	66	65	65	65	68	--	65	68	68	67	69	68	--	67	65	65	64	68	68	--	69	70	71	70	--	67
July.....	73	72	--	--	69	72	73	76	80	--	72	79	75	76	77	75	--	80	80	82	80	79	79	--	77	79	79	77	78	--	--	--
August.....	77	79	69	79	75	77	--	69	70	72	69	70	68	--	66	66	74	71	71	75	--	74	78	72	66	66	68	--	68	72	67	71
September.....	64	77	70	--	--	77	68	65	65	65	--	65	64	60	62	66	65	--	67	67	60	60	57	57	--	57	56	56	58	53	--	63

RED RIVER OF THE NORTH BASIN--Continued

5-564. *MAUVAIS COULEE NEAR CHURCHS FERRY, N. DAK.*

LOCATION.--At gaging station at bridge on U.S. Highway 281, 1 mile downstream from Little Coulee and 6 miles south of Churchs Ferry, Ramsey County.
DRAINAGE AREA.--2,500 square miles, approximately, of which about 800 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: June 1954 to September 1960.
REMARKS.--Records of discharge for water year October 1959 to September 1960 given in WSP 1708. No flow during most of 1960 water year.

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

LOCATION.--At gaging station at county bridge, 5 miles east of Cooperstown, Griggs County.
DRAINAGE AREA.--6,780 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1959 to September 1960 (discontinued).
REMARKS.--Records of discharge for water year October 1959 to September 1960 given in WSP 1708.

Chemical analyses, in parts per million, water year October 1959 to September 1960

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. 11, 1959	5.8	21		0.05		65	32	77	11	380	0	139	18	0.3	1.5	0.25	560	294	0	2.0	848	7.4	23
Dec. 2.....	8.2	16		.29		77	36	91	7.3	441	0	142	23	.3	1.3	.18	618	339	0	2.1	939	7.6	--
Jan. 6, 1960.	6.0	23		.31		92	40	96	8.1	518	0	162	26	.4	.2	.16	719	396	0	2.1	1,080	7.8	15
Feb. 2.....	3.6	30		.91		96	39	86	8.0	521	0	144	22	.3	1.8	.17	694	399	0	1.9	1,040	7.8	15
Mar. 1.....	4.2	33		.90		89	36	78	7.0	465	0	127	19	.2	2.5	.22	631	371	0	1.8	973	7.1	--
Apr. 3.....	370	11		.33		19	6.5	10	7.4	80	0	29	.1	.1	6.6	.06	143	74	8	.5	213	6.5	--
Apr. 28.....	110	--		--		--	--	41	--	253	0	--	--	--	--	--	365	203	0	1.2	565	7.5	--
May 10.....	58	18		.02	0.04	64	25	54	7.6	311	0	111	12	.2	.4	.12	455	261	6	1.5	696	7.4	--
May 27.....	201	--		--		--	--	63	--	329	0	--	--	--	--	--	549	306	36	1.6	812	7.6	--
June 30.....	39	21		.06		54	34	67	7.8	352	0	123	12	.3	1.8	.20	507	276	0	1.8	770	7.7	--
Aug. 4.....	7.0	26		.03		64	29	78	6.2	359	0	129	15	.3	1.7	.24	547	277	0	2.0	811	8.0	--
Sept. 2.....	17	21		.27		65	20	54	7.2	268	0	136	11	.2	1.6	.16	456	244	24	1.5	693	7.7	--

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.--8,560 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: August 1956 to September 1960.
Water temperatures: August 1956 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 860 ppm Dec. 14-18; minimum, 185 ppm Apr. 3-5.
Hardness: Maximum, 409 ppm Dec. 14-18; minimum, 102 ppm Apr. 3-5.
Specific conductance: Maximum daily, 1,350 micromhos Dec. 15, 16; minimum daily, 243 micromhos Apr. 2.
Water temperatures: Maximum, 80°F on several days during July and August; minimum, freezing point on many days during November to April.
EXTREMES, 1956-60.--Dissolved solids (1956-58, 1959-60): 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. Records of discharge for water year October 1959 to September 1960 given in WSP 1708.

Chemical analyses, in parts per million, water year October 1959 to September 1960

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. 1-7, 1959..	8.6	--	0.13	--	--	68	--	238	0	147	--	--	--	--	492	0.67	11.4	236	41	1.9	764	8.2	--
Oct. 8-31.....	18.1	--	.06	--	--	80	--	275	0	175	--	--	--	--	575	.78	28.1	286	60	2.1	893	7.7	--
Nov. 1-13.....	12.4	--	.07	--	--	95	--	319	0	180	--	--	--	--	623	.85	20.9	296	34	2.4	977	7.9	--
Nov. 14-24.....	8.0	--	.05	--	--	118	--	368	0	203	--	--	--	--	717	.98	15.5	330	28	2.8	1110	7.9	--
Nov. 25-Dec. 13.	23.6	--	.08	--	--	123	--	403	0	230	--	--	--	--	781	1.06	49.8	369	39	2.8	1210	7.6	--
Dec. 14-18.....	25.0	8.3	.06	85	48	143	15	459	0	228	78	0.4	5.4	0.31	860	1.17	58.1	409	33	3.1	1320	7.5	14
Dec. 19-31.....	28.1	--	.07	--	--	112	--	411	0	209	--	--	--	--	732	1.00	55.5	353	16	2.6	1120	7.6	--
Jan. 1-31, 1960.	19.5	--	.04	--	--	108	--	394	0	190	--	--	--	--	698	.95	36.7	338	15	2.5	1060	7.8	--
Feb. 1-29.....	21.9	--	.05	--	--	113	--	412	0	198	--	--	--	--	738	1.00	43.6	355	17	2.6	1110	7.7	--
Mar. 1-24.....	23.5	24	.04	77	41	115	12	417	0	206	50	.4	5.7	.26	765	1.04	48.5	360	18	2.6	1140	7.9	14
Mar. 25-26.....	160	--	.06	--	--	77	--	284	0	149	--	--	--	--	548	.75	237	252	19	2.1	822	8.1	--
Mar. 27-28.....	750	--	--	--	--	30	--	162	0	59	--	--	--	--	282	.38	571	141	8	1.1	435	7.8	--
Mar. 29-30.....	1100	--	--	--	--	16	--	160	0	39	--	--	--	--	230	.31	683	136	5	.6	362	7.8	--
Mar. 31-Apr. 2..	623	--	.21	--	--	14	--	115	0	40	--	--	--	--	190	.26	320	108	14	.6	295	7.5	--
Apr. 3-5.....	270	--	--	--	--	13	--	104	0	40	--	--	--	--	185	.25	135	102	17	.6	289	7.4	--
Apr. 6-9.....	1088	--	--	--	--	14	--	151	0	40	--	--	--	--	233	.32	684	136	12	.5	349	7.6	--
Apr. 10-11.....	1675	--	--	--	--	66	--	291	0	121	--	--	--	--	475	.65	2150	236	0	1.9	719	7.9	--
Apr. 12-22.....	1284	--	--	--	--	67	--	294	0	127	--	--	--	--	480	.65	1660	236	0	1.9	736	7.7	--
Apr. 23-May 13..	157	--	.11	--	--	65	--	257	0	138	--	--	--	--	473	.64	201	231	20	1.9	723	7.3	--
May 14-29.....	65.8	--	.11	--	--	66	--	260	0	148	--	--	--	--	475	.65	84.4	238	25	1.9	751	7.6	--

May 30-June 8, 1960.....	167	--	.05	--	--	70	--	280	0	157	--	--	--	--	521	.71	235	294	64	1.8	806	7.4	--
June 9-17.....	320	--	.15	--	--	51	--	240	0	103	--	--	--	--	396	.54	342	208	11	1.5	614	7.7	--
June 18-30.....	66.3	--	.06	--	--	54	--	247	0	113	--	--	--	--	416	.57	74.5	211	8	1.6	651	7.6	--
July 1-14.....	66.4	--	.10	--	--	58	--	246	0	118	--	--	--	--	431	.59	77.3	218	16	1.7	665	7.6	--
July 15-26.....	13.1	--	.06	--	--	61	--	257	0	118	--	--	--	--	443	.60	15.7	224	13	1.8	683	7.5	--
July 27-Aug. 12.	4.3	18	.15	52	26	66	11	281	0	124	28	.4	.4	.24	472	.64	5.48	236	6	1.9	740	7.8	8
Aug. 13-25.....	16.1	--	.10	--	--	74	--	286	0	147	--	--	--	--	528	.72	23.0	256	21	2.0	800	7.6	--
Aug. 26-28.....	80.3	--	.01	--	--	68	--	249	0	154	--	--	--	--	502	.68	109	246	42	1.9	761	7.6	--
Aug. 29-Sept. 2.	38.8	--	--	--	--	62	--	237	0	126	--	--	--	--	448	.61	46.9	216	22	1.8	690	7.7	--
Sept. 3-30.....	13.3	--	.04	--	--	75	--	252	0	123	--	--	--	--	481	.65	17.3	222	15	2.2	754	7.5	--
Weighted average a.....	120	--	0.13	--	--	57	--	254	0	112	--	--	--	--	430	0.58	139	218	10	1.7	660	--	--

a Includes estimates where data are missing. Represents 100 percent of runoff for water year.

Temperature (°F) of water, water year October 1959 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	
October.....	50	54	55	60	52	51	52	50	45	45	40	40	39	44	44	45	47	--	49	44	40	41	48	49	48	48	40	44	40	40	42	46
November.....	41	40	32	36	39	32	32	34	40	40	40	40	36	32	34	32	32	39	32	40	35	40	40	40	36	35	36	34	34	39	--	36
December.....	39	34	36	40	34	34	40	34	39	36	34	32	32	32	32	32	32	36	32	32	32	32	32	32	32	32	32	32	32	32	32	34
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
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.....	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	36	32	32	32	32	49	49	49	45	45	43	44	44	45	46	--	37
May.....	49	49	46	49	49	50	50	50	50	52	52	60	59	62	60	60	64	65	65	65	65	65	70	65	65	65	65	69	65	65	71	59
June	70	70	69	66	66	65	65	65	66	65	66	66	70	69	69	66	70	70	69	65	60	60	60	70	70	72	75	75	75	74	--	68
July.....	75	75	75	75	70	70	70	76	75	77	79	76	76	75	77	77	79	79	79	80	80	80	79	80	80	79	80	80	80	75	79	77
August.....	79	76	75	75	79	80	76	76	75	75	77	80	76	75	76	70	75	74	74	75	74	76	75	74	74	73	70	70	69	70	70	75
September.....	70	70	75	77	70	70	72	70	72	70	66	60	60	62	62	65	60	65	61	60	63	60	60	61	60	61	60	60	55	55	--	64

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 1960.
Water temperatures: October 1956 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 465 ppm Nov. 23-27; minimum, 225 ppm Apr. 6-16.
Hardness: Maximum, 359 ppm Nov. 23-27; minimum, 160 ppm Apr. 6-16.
Specific conductance: Maximum daily, 783 micromhos Nov. 28; minimum daily, 307 micromhos Apr. 5.
Water temperatures: Maximum, 79°F on several days during July; minimum, 35°F on many days during January to April.
EXTREMES, 1956-60.--Dissolved solids (1956-58, 1959-60): 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 micrombos 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 available in district office at Lincoln, Nebr. Records of discharge for water year October 1959 to September 1960 given in WSP 1708.

Chemical analyses, in parts per million, water year October 1959 to September 1960

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. 1-11, 1959.	322	--	--	--	--	19	--	272	0	64	--	--	--	--	333	0.45	299	256	33	0.5	534	7.7	--
Oct. 12-31.....	592	--	--	--	--	17	--	254	0	54	--	--	--	--	305	.41	488	238	30	.5	499	7.5	--
Nov. 1-22.....	444	--	0.36	--	--	20	--	308	0	64	--	--	--	--	367	.50	440	286	33	.5	593	7.8	--
Nov. 23-27.....	430	--	.10	--	--	24	--	368	0	92	--	--	--	--	465	.63	540	359	57	.5	725	7.8	--
Nov. 28-Dec. 8..	481	--	.15	--	--	24	--	351	0	83	--	--	--	--	436	.59	566	337	49	.6	690	7.8	--
Dec. 9-31.....	418	12	.10	66	33	21	4.7	325	0	62	13	0.2	2.3	0.09	386	.52	436	300	33	.5	628	7.2	7
Jan. 1-31, 1960.	500	--	.16	--	--	23	--	243	0	61	--	--	--	--	394	.54	532	297	98	.6	624	7.5	--
Feb. 1-29.....	481	--	.06	--	--	21	--	331	0	50	--	--	--	--	378	.51	491	294	23	.5	614	7.5	--
Mar. 1-28.....	472	--	.06	--	--	22	--	333	0	46	--	--	--	--	383	.52	488	294	21	.6	617	7.6	--
Mar. 29-Apr. 1..	2,033	--	--	--	--	24	--	263	0	53	--	--	--	--	341	.46	1,870	240	24	.7	556	7.4	--
Apr. 2-5.....	6,838	--	.13	--	--	8.8	--	176	0	34	--	--	--	--	227	.31	4,190	162	18	.3	365	7.5	--
Apr. 6-16.....	13,270	11	.14	41	14	8.0	7.7	156	0	42	2.7	.1	6.1	.06	225	.31	8,060	160	32	.3	358	7.0	34
Apr. 17-20.....	7,883	--	.13	--	--	17	--	196	0	74	--	--	--	--	308	.42	6,560	202	41	.5	471	7.4	--
Apr. 21-29.....	5,341	--	.09	--	--	25	--	228	0	102	--	--	--	--	371	.50	5,350	238	51	.7	565	7.5	--
Apr. 30-May 5...	5,353	--	--	--	--	18	--	218	0	125	--	--	--	--	396	.54	5,720	274	95	.5	592	7.4	--
May 6-30.....	2,718	--	.08	--	--	18	--	248	0	110	--	--	--	--	399	.54	2,930	287	84	.5	602	7.5	--
May 31-June 27..	2,475	11	.14	62	33	17	4.9	273	0	94	6.4	.3	.7	.09	388	.53	2,590	292	68	.4	602	7.6	32
June 28-July 7..	3,503	--	.19	--	--	12	--	222	0	76	--	--	--	--	324	.44	3,060	243	61	.3	495	7.1	--
July 8-23.....	1,546	--	.09	--	--	18	--	264	0	99	--	--	--	--	393	.53	1,640	287	71	.5	597	7.4	--
July 24-31.....	799	--	.06	--	--	22	--	269	0	112	--	--	--	--	420	.57	906	297	76	.6	630	7.4	--

Aug. 1-31, 1960.	481	--	.06	--	--	21	--	263	0	79	--	--	--	--	371	.50	482	270	54	.6	579	7.4	--
Sept. 1-17.....	679	13	.10	52	30	18	5.9	255	0	69	8.7	.4	.5	.12	336	.46	616	252	43	.5	538	7.6	17
Sept. 18-30.....	405	--	.13	--	--	20	--	270	0	64	--	--	--	--	342	.47	374	256	35	.5	540	7.7	--
Weighted average a.....	1,675	--	0.12	--	--	16	--	227	0	75	--	--	--	--	331	0.45	1,500	239	53	0.5	514	--	--

a Includes estimates where data are missing. Represents 100 percent of runoff for water year.

Temperature (°F) of water, water year October 1959 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	
October.....	58	58	56	55	55	55	54	53	52	--	50	50	50	50	48	47	46	--	46	46	46	45	45	44	44	42	42	42	42	42	42	48
November.....	42	41	41	41	41	43	43	43	43	43	42	42	40	40	41	41	41	41	42	42	42	42	41	41	41	41	41	41	41	41	--	41
December.....	42	42	42	42	42	42	--	45	40	40	40	40	40	40	43	47	45	40	40	38	40	43	43	43	43	40	45	40	40	37	36	41
January.....	37	35	35	35	35	35	40	37	40	38	38	38	38	35	35	35	36	35	35	35	35	35	35	37	35	35	36	36	35	36	37	36
February.....	35	35	36	37	37	36	37	35	35	35	35	35	35	37	37	36	35	35	35	35	36	35	35	35	36	36	36	36	35	--	--	36
March.....	36	36	36	36	36	37	38	38	39	40	40	39	39	39	39	40	41	40	40	42	42	38	40	37	37	37	36	36	35	38	40	38
April.....	36	36	39	38	37	36	36	35	34	35	35	35	38	40	42	45	45	46	50	50	50	51	51	50	51	47	48	49	48	48	--	43
May.....	48	49	48	48	49	50	50	52	53	55	55	55	57	59	60	--	60	60	62	64	64	64	65	66	67	66	65	66	66	67	68	59
June.....	68	68	68	68	67	65	65	65	66	65	66	67	68	69	70	69	70	69	69	70	70	69	69	68	69	70	70	71	71	71	--	68
July.....	71	70	69	70	70	69	70	71	74	75	75	75	75	75	75	76	76	77	77	78	78	78	78	79	79	79	79	79	79	76	76	75
August.....	78	78	76	76	76	77	76	76	74	74	74	75	75	73	72	73	75	74	73	73	73	74	75	75	74	71	71	70	70	71	70	74
September.....	70	71	74	74	75	74	74	72	70	70	67	66	67	64	63	64	63	62	61	61	63	61	61	60	58	59	59	59	59	56	--	65

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 1960.
EXTREMES, 1959-60.--Water temperatures: Maximum, 82°F July 20-23; minimum, freezing point on many days during November, February, and April.
EXTREMES, 1956-60.--Water temperatures: Maximum (1956-58, 1959-60), 82°F July 20-23, 1960; minimum, freezing point on many days during winter months in 1958, 1960.
REMARKS.--Records of discharge for water year October 1959 to September 1960 given in WSP 1708.

Temperature (°F) of water, water year October 1959 to September 1960
/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	53	54	54	54	52	51	47	41	39	40	40	40	40	40	40	41	40	40	40	41	41	42	42	41	40	40	40	40	40	44
Minimum	49	48	49	53	54	52	51	47	40	38	39	39	37	38	39	38	37	38	39	38	40	40	41	41	41	38	39	39	38	38	39	42
November																																
Maximum	39	39	38	37	37	37	37	36	33	32	32	32	33	33	33	34	34	34	34	34	34	34	34	34	35	35	35	35	35	35	--	35
Minimum	37	37	36	34	35	37	36	32	32	32	32	32	32	32	33	33	34	34	34	34	34	34	34	34	34	35	35	35	35	35	--	34
December																																
Maximum	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	34	35	35	35	35	35	34	34	34	34	34	34	34	34	35
Minimum	35	35	35	35	35	35	34	35	34	34	35	35	35	35	35	35	34	34	34	35	35	35	34	34	34	34	34	34	34	34	34	34
January																																
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	34	34	34
Minimum	34	34	34	34	34	34	34	34	34	34	34	33	33	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	33	34
February																																
Maximum	33	33	33	33	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	35	34	34	34	34	34	34	34	--	--	34
Minimum	33	32	32	32	33	34	34	34	34	33	34	34	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	33	33	33	33	33	33	34	34	34	34	34	34	34	34	34	34	33	33	33	33	33	34
Minimum	34	34	34	34	34	34	34	34	34	33	33	33	33	33	33	33	33	34	34	34	33	33	33	33	33	33	33	33	33	33	33	33
April																																
Maximum	33	32	32	32	32	32	32	32	32	32	33	34	36	38	40	41	41	42	44	45	46	46	46	46	46	45	45	45	45	44	--	39
Minimum	32	32	32	32	32	32	32	32	32	32	32	33	34	36	38	40	41	41	42	44	45	46	46	46	45	45	44	45	44	44	--	38
May																																
Maximum	44	44	44	45	46	46	47	47	48	49	50	52	54	54	55	56	57	57	58	58	60	62	63	63	63	63	63	64	64	65	67	55
Minimum	44	44	44	44	45	46	46	47	47	48	49	50	52	54	54	55	56	57	57	58	58	60	62	63	63	62	62	62	64	64	65	54
June																																
Maximum	67	66	66	66	65	66	66	66	66	66	68	69	71	70	70	69	69	70	71	71	71	70	69	71	72	73	75	75	75	74	--	69
Minimum	66	65	66	65	65	65	65	65	66	66	66	67	69	70	69	69	69	69	70	71	70	69	69	69	71	72	73	74	74	73	--	68
July																																
Maximum	74	74	74	73	73	73	74	76	77	77	78	79	79	78	79	80	80	81	81	82	82	82	82	81	81	81	81	81	81	79	77	78
Minimum	73	74	73	73	72	72	73	74	76	77	77	78	77	77	78	79	80	80	80	81	82	81	81	81	81	81	81	81	79	74	76	77
August																																
Maximum	78	79	79	78	79	79	79	79	79	79	77	78	79	78	75	75	75	77	77	76	78	78	79	78	76	71	70	69	69	70	71	76
Minimum	77	78	78	77	78	79	78	79	77	75	76	77	78	73	74	74	75	75	75	75	76	78	78	74	71	66	69	68	68	69	70	75
September																																
Maximum	72	74	76	77	79	79	77	75	73	69	69	67	66	64	64	65	65	64	64	64	64	64	64	63	61	60	60	60	60	59	--	67
Minimum	71	72	74	76	77	77	75	73	68	68	67	66	63	64	64	64	64	64	64	64	64	64	63	61	59	60	59	60	59	55	--	66

RED RIVER OF THE NORTH BASIN--Continued

5-1200. SOURIS 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.--12,200 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1949 to August 1951, August 1952 to September 1960.
REMARKS.--Records of discharge for water year October 1959 to September 1960 given in WSP 1708.

Chemical analyses, in parts per million, water year October 1959 to September 1960

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. 6, 1959.	14	--		0.48	--	43	32	98	--	336	0	141	33	--	--	--	559	238	0	2.7	868	7.5	--
Oct. 23.....	33	--		.15	--	51	33	116	--	355	0	169	41	--	--	--	634	264	0	3.1	972	7.4	--
Nov. 24.....	19	6.5		.05	--	74	44	152	14	476	0	243	54	0.6	12	0.22	852	364	0	3.5	1,300	7.5	25
Dec. 12.....	19	--		--	--	--	--	157	15	550	0	--	--	--	--	--	839	336	0	3.7	1,320	7.5	--
Jan. 7, 1960.	16	--		--	--	76	47	160	--	586	0	217	63	--	--	--	914	384	0	3.5	1,390	7.5	--
Jan. 27.....	13	--		--	--	--	--	160	--	600	0	--	--	--	--	--	897	380	0	3.6	1,410	8.0	--
Feb. 16.....	14	--		.49	--	82	50	173	--	516	0	269	61	--	--	--	992	409	0	3.7	1,450	7.6	--
Mar. 8.....	10	--		.45	--	83	57	200	--	676	0	254	85	--	--	--	1,070	440	0	4.1	1,660	7.4	--
Mar. 30.....	1,150	5.5		.24	--	20	7.3	17	8.5	90	0	38	1.6	.1	8.7	.05	184	80	6	.8	260	6.4	85
May 10.....	292	--		.04	0.00	--	--	82	--	326	0	--	--	--	--	--	515	233	0	2.3	784	7.4	--
June 30.....	35	--		--	--	49	27	100	--	338	0	146	23	--	--	--	559	232	0	2.9	852	7.2	--
July 22.....	46	--		--	--	--	--	88	--	325	0	--	--	--	--	--	509	221	0	2.6	789	7.4	--
Aug. 25.....	41	--		--	--	--	--	73	--	277	0	--	--	--	--	--	457	203	0	2.2	719	7.1	--
Sept. 22.....	25	8.0		.09	--	47	25	79	12	318	0	110	27	.4	5.0	.14	498	220	0	2.3	774	7.4	14
Sept. 28.....	27	--		.04	.00	48	26	86	--	328	0	109	32	--	--	--	506	225	0	2.5	808	7.9	--

RED RIVER OF THE NORTH BASIN--Continued

5-1234. WILLOW CREEK NEAR WILLOW CITY, N. DAK.

LOCATION.--At gaging station at bridge on county road, 1.5 miles upstream from Snake Creek and 7 miles west of Willow City, Bottineau County.
RECORDS AVAILABLE.--Chemical analyses: October 1959 to July 1960 (discontinued).
REMARKS.--Records of discharge for water year October 1959 to September 1960 given in WSP 1708.

Chemical analyses, in parts per million, October 1959 to July 1960

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. 22, 1959	31	16		0.11		52	36	107	11	279	0	243	32	0.2	0.7	0.23	649	277	48	2.8	969	7.5	--
Nov. 24.....	38	21		.08		66	50	20	11	329	0	144	5.8	.3	1.2	.10	508	370	100	.5	714	7.5	--
Dec. 10.....	30	17		.09		64	48	19	11	322	0	134	6.0	.0	.7	.13	492	356	92	.4	716	7.4	40
Jan. 8, 1960.	3.8	25		.16		81	58	24	13	396	0	173	9.2	.3	1.4	.13	626	442	117	.5	866	7.3	8
Jan. 28.....	3.0	28		.65		89	63	30	13	434	0	179	11	.3	3.7	.13	664	480	124	.6	953	7.5	--
Feb. 17.....	2.6	32		.72		93	68	36	14	456	0	198	13	.2	2.1	.21	738	513	139	.7	1,030	7.1	--
Mar. 10.....	.9	17		.53		104	77	37	15	524	0	206	11	.3	3.6	.16	811	578	146	.7	1,120	7.2	--
Apr. 4.....	23	12		.13		29	15	8.3	9.6	134	0	42	.9	.2	6.5	.06	214	136	26	.3	322	6.6	--
Apr. 7.....	780	9.8		.12		17	7.2	16	8.5	86	0	32	1.9	.1	7.1	.07	169	72	1	.8	239	6.5	--
May 10.....	202	11		.03	0.00	51	32	11	9.2	263	0	69	.7	.3	.3	.08	343	260	44	.3	529	7.5	34
June 29.....	70	13		.13		56	42	22	6.9	335	0	83	.0	.2	1.8	.12	415	314	39	.5	647	7.8	--
July 26.....	14	2.1		.06		48	48	32	10	359	0	69	3.8	.3	1.2	.15	447	317	23	.8	690	7.9	--

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.
RECORDS AVAILABLE.--Chemical analyses: June 1954 to September 1960.
Water temperatures: October 1954 to September 1955, October 1956 to September 1959.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 1,520 ppm Mar. 1-27; minimum, 188 ppm Apr. 8-17.
Hardness: Maximum, 728 ppm Mar. 1-27; minimum, 94 ppm Apr. 8-17.
Specific conductance: Maximum daily, 2,100 micromhos Mar. 11; minimum daily, 279 micromhos Apr. 16.
Water temperatures: Maximum, 82°F July 14, 19; minimum, freezing point on many days during November to Fehruary, April.
EXTREMES, 1954-55, 1956-60.--Dissolved solids (1954-55, 1956-58, 1959-60): Maximum, 1,520 ppm Mar. 1-27, 1960; minimum, 162 ppm Apr. 13-18, 1957.
Hardness: Maximum, 1,050 ppm Mar. 17-31, 1959; minimum, 85 ppm Apr. 13-18, 1957.
Specific conductance: Maximum daily (1956-60), 3,910 micromhos Mar. 22, 1959; minimum daily, 232 micromhos Apr. 18, 1957.
Water temperatures: Maximum (1959-60), 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. Records of discharge for water year October 1959 to September 1960 given in WSP 1708.

Chemical analyses, in parts per million, water year Octoher 1959 to September 1960

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. 1-22, 1959.	14.2	--	0.50	--	--	145	--	283	0	288	42	--	--	0.20	777	1.06	29.8	253	21	4.0	1,120	7.2	--
Oct. 23-29.....	25.6	--	.32	--	--	118	--	284	0	245	32	--	--	.16	682	.93	47.1	226	0	3.4	997	7.4	--
Oct. 30-Nov. 10.	137	--	--	--	--	109	--	308	0	205	30	--	--	.19	658	.89	243	270	17	2.9	954	7.5	--
Nov. 11-30.....	20.9	--	.48	--	--	116	--	348	0	231	32	--	--	.19	717	.98	40.5	301	16	2.9	1,050	7.1	--
Dec. 1-27.....	14.4	11	.23	55	50	128	14	411	0	240	34	0.4	9.5	.25	790	1.07	30.7	341	4	3.0	1,140	7.2	47
Dec. 28-Jan. 5, 1960.....	16.4	--	--	--	--	139	--	480	0	228	37	--	--	.14	862	1.17	38.2	390	0	3.1	1,250	7.6	--
Jan. 6-19.....	19.9	--	.09	--	--	152	--	540	0	270	42	--	--	.23	966	1.31	51.9	441	0	3.2	1,380	7.6	--
Jan. 20-Feb. 10.	20.8	--	.41	--	--	177	--	641	0	308	48	--	--	.28	1,120	1.52	62.9	518	0	3.4	1,570	7.5	--
Feh. 11-29.....	19.8	--	.26	--	--	193	--	747	0	346	58	--	--	.34	1,280	1.74	68.4	592	0	3.5	1,760	7.3	--
Mar. 1-27.....	18.9	34	.40	126	101	232	23	933	0	395	67	.7	1.2	.39	1,520	2.07	77.6	728	0	3.7	2,100	7.2	100
Mar. 28-Apr. 2..	514	15	.30	116	80	161	18	799	0	288	53	.6	.9	.25	1,180	1.60	1,640	619	0	2.8	1,680	7.1	70
Apr. 3-7.....	1,140	--	--	--	--	32	--	155	0	54	12	--	--	.08	261	.35	803	127	0	1.2	416	7.3	--
Apr. 8-17.....	1,628	8.4	.21	22	9.5	21	7.3	108	0	41	8.5	.1	5.9	.05	188	.26	826	94	5	.9	301	6.9	25
Apr. 18-30.....	1,937	--	--	--	--	35	--	178	0	64	8.6	--	--	.10	282	.38	1,470	146	0	1.3	443	7.2	--
May 1-11.....	1,530	--	.09	--	--	43	--	245	0	84	10	--	--	.12	361	.49	1,490	190	0	1.4	544	7.7	--
May 12-19.....	807	--	.10	--	--	53	--	300	0	103	14	--	--	.14	439	.60	957	244	0	1.5	674	7.5	--
May 20-27.....	188	--	.09	--	--	60	--	337	0	120	14	--	--	.16	496	.67	252	275	0	1.6	749	7.7	--
May 28-June 13..	494	--	.09	--	--	67	--	354	0	140	15	--	--	.15	539	.73	719	290	0	1.7	808	7.6	--
June 14-24.....	540	--	--	--	--	76	--	373	0	148	14	--	--	.18	562	.76	819	296	0	1.9	847	7.7	--
June 25-July 4..	84.4	--	.14	--	--	81	--	370	0	151	17	--	--	.19	577	.78	131	291	0	2.1	861	7.6	--

RED RIVER OF THE NORTH BASIN--Continued

5-1240. SOURIS RIVER NEAR WESTHOPE, N. DAK.--Continued

Chemical analyses, in parts per million, water year October 1959 to September 1960--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 5-17, 1960.	20.8	--	0.10	--	--	88	--	310	0	151	22	--	--	0.20	547	0.74	30.7	234	0	2.5	816	7.6	--
July 18-31.....	9.6	--	.14	--	--	94	--	280	0	146	20	--	--	.21	527	.72	13.7	193	0	2.9	776	7.2	--
Aug. 1-22.....	8.2	19	.21	23	26	97	12	263	0	136	19	0.2	19	.21	511	.69	11.3	166	0	3.3	751	7.1	60
Aug. 23-31.....	27.1	--	--	--	--	105	--	277	0	128	20	--	--	.23	519	.71	38.0	159	0	3.6	758	7.4	--
Sept. 1-19.....	34.7	--	.09	--	--	114	--	322	0	131	23	--	--	.25	559	.76	52.4	183	0	3.7	816	7.5	--
Sept. 20-30.....	30.2	--	.06	--	--	123	--	400	0	138	23	--	--	.22	637	.87	51.9	234	0	3.5	936	7.5	--
Weighted average a.....	264	--	0.16	--	--	52	--	253	0	97	14	--	--	0.12	398	0.54	284	203	0	1.6	602	--	--

a Includes estimates where data are missing. Represents 100 percent of runoff for water year.

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 1960.
EXTREMES, 1959-60.--Water temperatures: Maximum, 83°F on several days during July and August; minimum, freezing point on several days during December and January.
EXTREMES, 1956-60.--Water temperatures: Maximum, 85°F on several days during August 1958; minimum, freezing point on many days during winter months.
REMARKS.--Records of discharge for water year October 1959 to September 1960 given in WSP 1708.

Temperature (°F) of water, water year October 1959 to September 1960
/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	57	56	56	55	54	54	53	52	52	51	51	50	49	48	49	50	50	50	50	50	49	48	47	47	47	46	45	45	44	51
Minimum	58	57	56	56	55	54	54	53	52	52	51	51	50	49	48	48	48	49	50	50	50	49	48	47	47	47	46	45	45	44	43	50
November																																
Maximum	43	43	43	42	42	41	41	40	40	40	39	38	37	36	36	35	35	35	35	35	35	34	34	35	35	35	35	35	34	34	--	37
Minimum	43	43	42	42	41	41	40	40	40	39	38	37	36	36	35	35	35	35	35	35	34	34	34	34	35	35	35	34	34	34	--	37
December																																
Maximum	34	34	34	34	34	34	34	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	32	33	33	33
Minimum	34	34	34	34	34	34	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	32	32	32	33	33
January																																
Maximum	33	33	32	33	33	32	32	33	33	33	33	32	32	33	33	34	34	34	34	34	34	34	35	35	35	35	35	34	33	33	33	33
Minimum	33	32	32	32	32	32	32	32	33	33	32	32	32	32	33	33	34	34	34	34	34	34	34	35	35	35	34	33	33	33	33	33
February																																
Maximum	33	33	33	33	33	33	33	33	34	34	34	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	--	--	33
Minimum	33	33	33	33	33	33	33	33	33	34	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	--	--	33
March																																
Maximum	33	33	33	33	33	33	34	34	34	34	34	35	36	37	38	38	39	40	40	41	42	42	43	43	44	44	44	44	45	45	45	38
Minimum	33	33	33	33	33	33	33	34	34	34	34	34	35	36	37	38	38	39	40	40	41	42	42	43	43	44	44	44	44	45	45	38
April																																
Maximum	45	46	45	44	42	42	43	43	44	44	45	45	45	46	46	47	48	49	49	50	50	51	52	53	53	54	55	55	55	55	--	48
Minimum	45	45	44	42	42	42	42	43	43	44	44	45	45	45	46	46	47	48	49	49	50	50	51	52	53	53	54	55	55	55	--	47
May																																
Maximum	55	56	56	56	56	56	56	56	57	57	57	57	58	58	59	59	60	60	61	62	64	66	67	67	66	68	69	70	70	70	70	61
Minimum	55	55	56	56	56	56	56	56	56	57	57	57	57	58	58	59	59	60	60	61	62	64	66	66	66	66	68	69	70	70	70	61
June																																
Maximum	70	70	70	70	71	71	71	70	70	70	69	69	69	69	69	71	71	70	70	70	71	71	71	72	72	72	72	73	74	74	--	71
Minimum	70	70	70	70	70	71	70	70	70	69	69	69	69	69	69	69	70	70	69	69	70	71	70	71	71	71	72	72	73	74	--	70
July																																
Maximum	74	75	75	75	75	75	75	75	75	76	76	76	77	77	77	77	77	77	77	78	78	79	81	82	82	82	82	83	83	83	83	78
Minimum	74	74	75	75	75	74	74	75	75	75	75	76	76	77	77	77	76	76	77	77	78	78	79	81	82	82	82	82	83	83	83	78
August																																
Maximum	83	83	82	82	82	82	82	82	81	81	81	81	81	81	81	81	81	80	80	79	79	79	79	79	78	79	79	78	78	78	77	80
Minimum	83	82	82	82	82	82	82	81	81	81	81	81	81	81	81	81	80	80	79	79	79	79	79	78	78	78	78	78	78	77	77	80
September																																
Maximum	77	76	76	77	77	78	79	79	79	78	77	77	76	75	74	74	73	72	72	71	71	70	70	70	69	68	68	67	67	67	--	73
Minimum	76	76	76	76	77	77	78	79	78	77	77	76	75	74	74	73	72	72	71	71	70	70	70	69	68	68	67	67	67	66	--	73

WISCONSIN RIVER BASIN

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

LOCATION.--At gaging station on right bank 50 feet upstream from highway bridge, 6 miles southwest of Lake Delton, Sauk County, and 7 miles upstream from mouth.
DRAINAGE AREA.--44.9 square miles.
RECORDS AVAILABLE.--Water temperatures: October 1957 to September 1960.
Sediment records: October 1957 to September 1960.
EXTREMES, 1959-60.--Water temperatures: Maximum, 64°F June 29, July 26, Sept. 1; minimum, freezing point on many days during November to March.
Sediment concentrations: Maximum daily, not determined; minimum daily, 1 ppm several days during February, March and September.
Sediment loads: Maximum daily, 56 tons May 7, July 3; minimum daily, less than 0.05 ton Feb. 21, 28, Mar. 1.
EXTREMES, 1957-60.--Water temperatures: Maximum, 69°F Aug. 22, 1959; minimum, freezing point on many days during winter months each year.
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 Nov. 14-17, 24-29, Dec. 11-18, Dec. 31 to Jan. 10, Jan. 15 to Mar. 27. Records of discharge for water year October 1959 to September 1960 given in WSP 1708.

Temperature (°F) of water, water year October 1959 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	
October	50	52	54	49	52	52	53	54	46	48	45	43	44	45	46	50	46	45	44	45	44	48	50	47	41	39	40	39	42	44	46	47
November	43	41	42	42	38	34	32	33	38	40	39	35	34	33	32	35	32	32	32	33	37	38	38	38	32	33	32	32	32	32	--	35
December	38	39	38	38	37	35	33	34	36	35	39	39	37	38	39	38	37	35	34	34	33	32	32	32	32	40	38	35	32	32	34	36
January	34	36	33	32	32	32	32	32	32	32	32	32	34	36	34	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
February	36	32	32	32	35	36	35	36	34	32	32	32	32	32	32	32	35	32	32	32	32	32	33	32	32	32	32	32	32	--	--	33
March	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	--	34	32	32	32	32	32	32	44	33	36	36	35	33
April	37	40	38	38	38	41	42	39	36	41	43	45	48	48	47	50	40	38	45	48	50	53	57	59	54	48	46	47	49	49	--	45
May	42	50	54	54	55	54	--	37	40	40	44	47	49	51	55	54	53	52	58	56	56	56	56	56	54	56	56	55	55	54	54	52
June	57	54	56	56	53	53	53	50	52	54	57	55	54	54	55	58	53	56	57	56	54	56	57	56	54	57	58	60	64	62	--	56
July	58	57	61	57	55	54	55	56	58	57	56	59	59	55	54	56	59	61	59	58	59	62	63	60	60	64	62	61	60	61	56	58
August	57	61	62	60	59	60	62	60	60	59	56	57	59	59	53	56	57	60	61	63	61	59	60	59	59	62	57	62	62	59	62	59
September	64	62	62	63	62	63	62	63	59	53	--	53	52	51	53	54	56	54	53	54	54	56	55	57	57	54	53	50	52	50	--	56

WISCONSIN RIVER BASIN--Continued

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

Suspended sediment, water year October 1959 to September 1960

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	20	17	0.9	32	10	0.9	24	C 7	0.4
2	20	11	.6	29	10	.8	25	C 7	.5
3	23	10	.6	28	10	.8	26	C 7	.5
4	21	10	.6	57	16	2.5	26	C 7	.5
5	30	15	1.2	97	25	6.5	26	C 7	.5
6	27	19	1.4	56	18	2.7	25	C 7	.5
7	24	15	1.0	39	11	1.2	23	C 5	.5
8	26	12	.8	36	C 9	.9	23	C 5	.3
9	34	20	1.8	39	C 9	.9	22	C 5	.3
10	25	17	1.1	40	C 9	1	22	C 5	.3
11	22	17	1.0	40	C 9	1	22	C 5	.3
12	21	C 4	.2	34	C 9	.8	22	C 5	.3
13	21	C 4	.2	31	C 9	.8	22	C 5	.3
14	21	C 4	.2	30	C 9	.7	22	C 5	.3
15	20	C 4	.2	29	C 9	.7	22	C 5	.3
16	20	C 4	.2	28	C 9	.7	23	C 5	.3
17	20	C 4	.2	27	C 9	.6	22	5	.3
18	20	C 4	.2	27	7	.5	21	5	.3
19	20	C 4	.2	27	C 6	.4	20	C 5	.3
20	21	C 4	.2	27	C 6	.4	20	C 5	.3
21	21	C 4	.2	28	C 6	.4	20	C 5	.3
22	22	8	.5	28	C 6	.4	19	C 5	.3
23	60	55	S 10	30	C 6	.5	20	C 5	.3
24	149	52	21	28	C 6	.4	20	C 5	.3
25	194	41	21	27	C 6	.4	21	C 5	.3
26	96	22	5.7	26	C 6	.4	25	7	.5
27	43	19	2.2	25	C 6	.4	60	86	S 15
28	37	C 10	1	24	4	.2	113	65	20
29	33	C 10	.9	24	7	.4	55	38	5.6
30	31	C 10	.8	24	6	.4	32	26	2.2
31	35	C 10	.9	--	--	--	26	15	1.0
Total	1177	--	77.0	1017	--	28.7	869	--	53.1

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	24	14	0.9	21	9	0.5	18	1	T
2	23	10	.6	20	11	.6	18	4	0.2
3	22	9	.5	20	7	.4	18	4	.2
4	21	9	.5	20	8	.4	18	2	.1
5	21	5	.3	20	2	.1	17	4	.2
6	20	4	.2	20	1	.1	17	14	.6
7	20	7	.4	20	1	.1	17	13	.6
8	20	8	.4	20	3	.2	17	3	.1
9	20	6	.3	20	1	.1	17	3	.1
10	20	5	.3	20	3	.2	17	4	.2
11	20	6	.3	20	1	.1	17	9	.4
12	92	103	S 30	19	4	.2	17	4	.2
13	99	53	S 15	19	4	.2	17	2	.1
14	36	22	2.1	19	5	.2	17	5	.2
15	27	14	1.0	18	2	.1	17	C 8	.4
16	24	11	.7	18	2	.1	17	C 8	.4
17	22	10	.6	18	3	.1	17	C 8	.4
18	22	10	.6	18	3	.1	17	C 8	.4
19	22	9	.5	18	2	.1	17	C 8	.4
20	22	9	.5	18	3	.1	17	C 8	.4
21	21	11	.6	18	1	T	17	C 8	.4
22	21	10	.6	18	3	.1	17	C 8	.4
23	21	10	.6	18	2	.1	17	C 8	.4
24	21	6	.3	18	2	.1	17	5	.2
25	21	8	.4	18	4	.2	17	5	.2
26	21	6	.3	18	2	.1	17	8	.4
27	21	5	.3	18	3	.1	150	--	E 45
28	21	7	.4	18	1	T	351	36	34
29	21	7	.4	18	3	.1	181	47	23
30	21	5	.3	--	--	--	136	54	20
31	21	7	.4	--	--	--	51	39	5.4
Total	828	--	60.3	548	--	4.9	1315	--	135.0

E Estimated.
S Computed by subdividing day.
C Composite period.

WISCONSIN RIVER BASIN--Continued

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

Suspended sediment, water year October 1959 to September 1960--Continued

Day	APRIL			MAY			JUNE		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	36	20	1.9	60	34	S 6.4	30	16	1.3
2	42	19	2.2	35	10	.9	32	22	1.9
3	39	14	1.5	30	7	.6	29	24	1.9
4	33	14	1.2	28	10	.8	28	19	1.4
5	30	11	.9	35	13	S 1.3	30	16	1.5
6	29	10	.8	156	61	S 28	26	19	1.3
7	29	10	.8	339	61	56	25	12	.8
8	27	8	.6	167	28	13	25	19	1.3
9	25	10	.7	108	23	6.7	24	20	1.3
10	26	9	.6	80	32	6.9	24	34	2.2
11	27	6	.4	56	25	3.8	24	30	1.9
12	29	7	.5	44	18	2.1	24	36	2.3
13	37	12	1.2	40	19	2.0	24	29	1.9
14	39	11	1.2	37	10	1.0	23	28	1.7
15	34	6	.6	34	6	.6	21	43	2.4
16	50	28	3.8	42	8	.9	38	72	7.4
17	117	51	16	47	14	1.8	28	33	2.5
18	98	34	9.0	38	12	1.2	31	41	3.4
19	51	19	2.6	46	16	2.0	27	29	2.1
20	39	17	1.8	47	12	1.5	25	24	1.6
21	35	12	1.1	64	50	S 9.4	26	20	1.4
22	30	9	.7	50	24	3.3	34	27	2.5
23	29	8	.6	36	13	1.3	39	36	S 4.2
24	28	6	.4	33	10	.9	55	48	7.1
25	27	9	.6	31	10	.8	28	26	2.0
26	32	5	.4	31	12	1.0	26	28	2.0
27	27	3	.2	31	11	.9	25	20	1.4
28	25	7	.5	31	7	.6	69	--	E 50
29	26	7	.5	32	9	.8	152	132	54
30	72	61	S 14	32	8	.7	80	57	S 13
31	--	--	--	30	19	1.5	--	--	--
Total	1168	--	67.3	1871	--	158.7	1072	--	179.5

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	30	31	2.5	20	11	0.6	23	7	0.4
2	41	47	S 7.3	28	60	B 5	24	7	.4
3	128	162	56	39	84	8.8	22	10	.6
4	41	64	7.1	28	15	1.1	22	6	.4
5	32	32	2.8	24	C 11	.7	22	5	.3
6	29	27	2.1	23	C 11	.7	21	4	.2
7	28	21	1.6	23	C 11	.7	21	3	.2
8	26	23	1.6	21	C 11	.7	21	5	.3
9	25	22	1.5	37	30		20	2	.1
10	26	C 11	.8	28	11	.8	20	3	.2
11	26	C 11	.8	23	C 9	.6	20	1	.1
12	25	C 11	.9	22	C 9	.5	20	2	.1
13	27	C 11	.8	21	C 9	.5	20	4	.2
14	25	C 11	.7	25	C 9	.5	20	2	.1
15	24	C 11	.7	23	C 9	.6	20	1	.1
16	23	C 11	.7	22	C 9	.5	22	4	.2
17	23	C 11	.7	21	C 9	.5	24	3	.2
18	24	C 11	.7	21	5	.3	30	12	S 1.2
19	30	15	1.2	24	6	.4	56	36	5.4
20	24	3	.2	79	80	B 19	33	17	1.5
21	22	2	.1	50	37	S 5.9	27	6	.4
22	23	5	.3	28	13	1.0	64	53	S 10
23	37	35	3.5	25	10	.7	41	17	1.9
24	24	28	1.8	25	10	.7	59	25	4.0
25	23	11	.7	25	9	.6	100	49	13
26	56	135	S 22	24	9	.6	54	39	5.7
27	29	35	2.7	23	6	.4	33	21	1.9
28	23	C 26	2	24	7	.4	30	18	1.4
29	22	C 26	2	42	39	4.4	33	15	1.3
30	21	C 26	2	28	16	1.2	31	14	1.2
31	20	C 26	1	24	9	.6	--	--	--
Total	957	--	128.8	870	--	62.1	953	--	53.0

Total discharge for year (cfs-days)..... 12645
Total load for year (tons)..... 1008.4

E Estimated.
S Computed by subdividing day.
B Computed from estimated-concentration graph.
C Composite period

WISCONSIN RIVER BASIN--Continued

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

LOCATION.--At gaging station on right bank 0.7 mile east of Black Earth, Dane County, and 2.1 miles upstream from Vermont Creek.
DRAINAGE AREA.--45.9 square miles.
RECORDS AVAILABLE.--Water temperatures: February 1954 to September 1960.
Sediment records: February 1954 to September 1960.
EXTREMES, 1959-60.--Water temperatures: Maximum, 73°F July 22; minimum, freezing point Jan. 23, Feb. 10, 19.
Sediment concentrations: Maximum daily, 1,200 ppm July 3; minimum daily, 5 ppm on several days during February.
Sediment loads: Maximum daily, 2,600 tons July 3; minimum daily, 0.4 ton on several days during October and February.
EXTREMES, 1954-60.--Water temperatures: Maximum, 78°F July 7, 1955, July 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 Nov. 24, Jan. 1-8, 15-22, Feb. 9-10, Mar. 9-24, 27. Records of discharge for water year October 1959 to September 1960 given in WSP 1708.

Temperature (°F) of water, water year October 1959 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	
October	56	--	57	53	54	55	56	55	48	54	46	52	49	--	56	--	52	57	56	55	53	57	56	46	45	45	45	45	56	54	50	52
November	45	43	54	--	39	39	41	45	48	50	44	41	37	--	40	40	33	40	43	39	45	42	--	--	40	35	39	--	33	40	--	41
December	43	42	46	43	40	35	36	40	41	43	--	43	41	40	42	41	45	38	40	40	40	40	34	40	39	--	39	38	38	38	41	40
January	38	40	38	33	33	33	37	37	34	39	36	36	35	40	43	38	33	34	34	35	33	33	37	38	--	36	34	36	35	43	43	36
February	41	40	35	36	41	40	37	41	36	32	36	33	38	38	40	40	40	35	32	34	39	--	42	41	40	38	35	38	37	--	--	38
March	36	37	39	35	38	35	42	40	36	42	38	--	--	44	41	34	38	40	44	46	40	37	36	41	34	36	--	39	40	38	42	39
April	40	48	43	46	49	47	43	41	40	45	52	60	60	55	54	54	43	45	51	55	63	--	61	62	53	51	52	58	55	46	--	51
May	54	62	57	65	57	55	43	45	43	44	56	--	51	50	57	56	55	61	57	61	50	50	61	60	61	68	59	63	60	62	62	56
June	61	64	64	62	65	57	61	--	65	64	60	56	63	65	67	61	66	68	--	58	60	68	57	64	66	69	69	68	66	62	--	63
July	62	62	67	62	--	67	68	69	--	69	--	65	66	60	--	65	62	69	67	61	71	73	--	--	--	65	71	72	72	64	61	--
August	68	63	65	65	64	63	65	65	67	63	66	63	63	62	--	65	68	66	67	66	65	60	64	67	--	65	68	70	67	68	72	66
September	65	68	68	67	65	--	68	68	58	60	59	55	56	55	66	55	61	53	54	57	56	55	54	56	53	55	56	55	50	--	--	59

WISCONSIN RIVER BASIN--Continued

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

Suspended sediment, water year October 1959 to September 1960

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	24	8	0.5	37	18	1.8	28	C 11	0.8
2	23	8 B	.5	35	20	1.9	30	C 11	.9
3	24	8	.5	34	18	1.6	30	C 11	.9
4	24	6	.4	66	60 S	14	31	C 11	.9
5	47	28 S	3.9	91	53	13	30	C 11	.9
6	38	16	1.6	63	49	8.3	28	C 11	.8
7	50	24	3.2	51	30	4.1	27	C 11	.8
8	36	C 8	.8	46	21	2.6	27	C 11	.8
9	38	C 8	.8	45	24	2.9	26	C 11	.8
10	33	C 8	.7	44	26	3.1	26	C 11	.8
11	30	C 8	.6	40	20	2.2	26	-- E	.8
12	29	C 8	.6	38	23	2.4	26	15	1.0
13	28	C 8	.6	38	20	2.0	26	C 9	.6
14	28	C 8	.6	35	17	1.6	26	C 9	.6
15	27	C 8	.6	34	20	1.8	26	C 9	.6
16	26	-- E	.6	34	C 15	1	26	C 9	.6
17	26	-- E	.6	33	C 15	1	26	C 9	.6
18	25	-- E	.5	32	C 15	1	25	C 9	.6
19	24	-- E	.5	31	C 15	1	24	C 9	.6
20	24	-- E	.5	31	C 15	1	24	C 9	.6
21	24	--	.5	31	C 15	1	24	C 9	.6
22	24	-- E	.5	32	C 15	1	23	C 9	.6
23	130	-- E	140	34	C 15	1	24	10	.6
24	136	-- E	50	33	-- E	1	23	13	.8
25	101	52	14	31	C 15	1	23	15	.9
26	65	24	4.2	30	C 15	1	27	19 B	1
27	55	16	2.4	29	C 15	1	109	200 J	65
28	45	18	2.2	28	C 15	1	113	150 J	55
29	42	20	2.3	28	C 15	1	65	29	5.1
30	39	20	2.1	28	C 15	1	49	17	2.2
31	39	18	1.9	--	--	--	42	16	1.8
Total	1304	--	238.7	1162	--	78.3	1060	--	148.6

Day	JANUARY			FEBRUARY			MARCH		
1	37	C 12	1	30	10	0.8	26	17	1.2
2	35	C 12	1	30	C 9	.7	26	C 10	.7
3	33	C 12	1	30	C 9	.7	26	C 10	.7
4	31	C 12	1	30	C 9	.7	26	C 10	.7
5	30	C 12	1	30	C 9	.7	26	C 10	.7
6	29	C 12	.9	30	C 9	.7	25	C 10	.7
7	28	C 12	.9	29	C 9	.7	25	C 10	.7
8	28	C 12	.9	30	C 9	.7	25	C 10	.7
9	28	C 12	.9	29	C 9	.7	24	C 10	.6
10	28	C 12	.9	28	C 9	.7	24	C 10	.6
11	28	12	.9	29	C 9	.7	24	C 10	.6
12	170	438 S	252	29	C 8	.6	24	-- E	.6
13	193	280 J	200	28	C 8	.6	24	C 12	.8
14	63	55 S	9.8	28	C 8	.6	24	C 12	.8
15	45	C 18	2	27	C 8	.6	24	C 12	.8
16	39	C 18	2	27	C 8	.6	24	C 12	.8
17	37	C 18	2	27	C 8	.6	24	-- E	.8
18	36	C 18	2	27	C 8	.6	24	-- E	.8
19	34	C 18	2	27	C 8	.6	24	-- E	.8
20	33	C 18	2	26	C 8	.6	24	-- E	.8
21	33	C 18	2	26	C 8	.6	24	-- E	.8
22	32	C 18	2	26	-- E	.6	24	-- E	.8
23	32	C 18	2	26	C 5	.4	24	-- E	.8
24	32	C 18	2	26	C 5	.4	24	-- E	.8
25	32	-- E	1	26	C 5	.4	24	-- E	.8
26	31	C 10	.8	26	C 5	.4	24	-- E	.8
27	31	C 10	.8	26	C 5	.4	50	-- E	30
28	30	C 10	.8	26	C 5	.4	190	-- E	160
29	30	C 10	.8	26	C 5	.4	255	-- E	360
30	30	C 10	.8	--	--	--	249	-- E	300
31	30	C 10	.8	--	--	--	90	49	12
Total	1328	--	498.0	805	--	17.2	1471	--	881.7

E Estimated.
S Computed by subdividing day.
B Computed from estimated concentration graph.
C Composite period.
J Computed from partly estimated-constration graph and subdividing day.

WISCONSIN RIVER BASIN--Continued

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

Suspended sediment, water year October 1959 to September 1960--Continued

Day	APRIL			MAY			JUNE		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	67	31	5.6	60	17	2.8	55	38	5.6
2	69	34	6.3	51	30	4.1	60	46	7.4
3	57	24	3.7	46	21	2.6	54	54	7.9
4	52	21	2.9	44	24	2.8	51	45	6.2
5	49	35	4.4	47	29	3.7	51	34	5.1
6	47	24	3.0	221	420 B	400	49	26	3.4
7	44	26	3.1	250	220 B	200	48	31	4.0
8	43 C	25	3	140	43 B	16	48	40 B	5
9	41 C	25	3	126	29	9.9	46	40	5.0
10	39 C	25	3	106	20	5.7	46	34	4.2
11	40 C	25	3	91	19	4.7	47	28	3.3
12	68 C	25	2	81	20 B	4	47	27	3.4
13	38 C	25	2	75	21	4.2	47	19	2.4
14	38 C	25	2	71	18	3.4	47	15	1.9
15	37 C	25	2	67	23	4.2	45	25	3.0
16	44	-- E	5	76	26	5.3	46	36	4.5
17	126	-- E	80	101	65	18	45	31	3.8
18	80	40 B	10	70	28	5.3	45	32	3.9
19	57	18	2.8	90	44 S	13	43	40 B	5
20	51	20	2.8	97	39	9.9	42	40	4.5
21	50	21	2.8	91	35	8.6	43	33	3.8
22	46	-- E	2	76	29	6.0	43	27	3.1
23	44 C	17	2	67	27	4.9	45	30	3.6
24	43 C	17	2	59	28	4.5	44	35	4.2
25	42 C	17	2	60	35	5.7	42	34	3.8
26	47 C	17	2	59	56	8.9	43	27	3.1
27	41 C	17	2	57	46	7.1	42	31	3.5
28	40 C	17	2	56	39	5.9	47	34	4.3
29	40 C	17	2	57	30	4.6	47	42	5.3
30	79	37 S	8.5	58	30	4.7	43	29	3.4
31	--	--	--	55	42	6.2	--	--	--
Total	1529	--	176.9	2602	--	786.7	1401	--	127.6

	JULY			AUGUST			SEPTEMBER		
1	43	31	3.6	43	47	5.4	37	34	3.4
2	153	1000 S	1190	37	43	4.3	37	43	4.3
3	602	1200 B	2600	38	24	2.5	38	24	2.5
4	126	231	78	39	18	1.9	39	18	1.9
5	87	110 B	25	39	30	3.2	39	30	3.2
6	75	91	18	39	18	1.9	39	18	1.9
7	66	86	15	38	9	.9	38	9	.9
8	60	87	14	42	8	.9	42	8	.9
9	58	85 B	13	129	132 S	55	40	8	.9
10	56	72	11	64	44	7.6	38	9	.9
11	56	65 B	10	51	25	3.4	38	9	.9
12	52	63	8.8	47	21	2.7	38	8	.8
13	56	58	8.8	43	27	3.1	38	8	.8
14	51	60	8.3	63	65	11	38	7	.7
15	49	50 B	7	47	40 B	5	38	7	.7
16	49	41	5.4	44	20	2.4	39	7	.7
17	48	44	5.7	43	13	1.5	41	9	1.0
18	49	56	7.4	42	13	1.5	51	-- E	9
19	48	53	6.9	44	8	1.0	120	-- E	35
20	47	47	6.0	45	16	1.9	60	18	2.9
21	46	34	4.2	16	48	6.0	50	16	2.2
22	47	41	5.2	41	33	3.6	58	20	3.1
23	57	55 B	8	40	28	3.0	59	20	3.2
24	49	45 B	6	40	34	3.7	84	47	11
25	48	50 B	6	40	35 B	4	59	22	3.5
26	71	70	13	39	30	3.2	46	19	2.4
27	51	57	7.8	38	23	2.4	45	20	2.4
28	47	48	6.1	39	28	2.9	44	20	2.4
29	44	44	5.2	56	20	3.0	42	19	2.2
30	44	42	5.0	42	51	5.8	42	19 B	2
31	44	36	4.3	39	32	3.4	--	--	--
Total	2379	--	4112.7	1499	--	176.0	1417	--	107.7

Total discharge for year (cfs-days)..... 17957
Total load for year (tons)..... 7350.1

E Estimated.
S Computed by subdividing day.
B Computed from estimated-concentration graph.
C Composite period.

WISCONSIN RIVER BASIN--Continued

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

Particle size analyses of suspended sediment, water year October 1959 to September 1960
(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. 23, 1959.....	1045			164	338		76	79	86	89	95	99	100					SBWC
May 6, 1960.....	1550			309	664		50	61	66	81	95	99	100					SBWC
May 6.....	1550			309	664		38	50	65	80	95	99	100					SBN
July 2.....	1830			176	2640		43	55	68	85	97	99	100					SBWC
July 2.....	1830			176	2640		24	40	62	79	95	99	100					SBN

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 1960.
Sediment records: October 1957 to September 1960.
EXTREMES, 1959-60.--Water temperatures: Maximum, 80°F July 20, 28; minimum, freezing point on many days during November to March.
Sediment concentrations: Maximum daily, 11,400 ppm June 2; minimum daily, 7 ppm Jan. 5.
Sediment loads: Maximum daily, 168,000 tons June 2; minimum daily, 10 tons Nov. 1.
EXTREMES, 1957-60.--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 (1959-60), 7 ppm Jan. 5, 1960.
Sediment loads: Maximum daily, 294,000 tons June 26, 1959; minimum daily (1959-60), 10 tons Nov. 1, 1959.
REMARKS.--Maximum observed sediment concentration during water year, 34,700 ppm May 16. Records of discharge for water year October 1959 to September 1960 given in WSP 1708. Flow affected by ice Nov. 16-22, 24, Nov. 26 to Dec. 1, Dec. 6-10, Jan. 2-12, Jan. 15 to Mar. 28.

Temperature (°F) of water, water year October 1959 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	
October	49	54	58	55	58	56	56	55	48	50	--	43	41	44	--	50	--	50	--	--	44	--	54	54	48	42	--	40	--	44	--	--
November	45	--	41	44	38	36	33	34	36	40	39	36	34	32	32	--	32	--	--	42	--	34	34	--	34	--	--	33	33	--	--	--
December	34	--	34	--	34	--	34	--	33	--	34	--	35	--	35	--	35	--	32	--	32	--	34	--	33	37	39	39	36	35	32	--
January	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	--	--	--
March	--	33	--	32	--	32	--	32	--	32	--	32	--	32	32	--	32	32	32	32	32	--	32	--	32	39	45	33	35	35	36	--
April	38	38	38	38	38	40	46	40	40	38	45	46	54	56	56	54	46	45	46	50	54	54	60	64	62	56	42	44	56	48	--	48
May	46	50	56	56	56	56	48	42	42	45	48	46	52	56	64	60	60	58	60	60	60	60	58	64	62	62	58	58	60	57	66	56
June	64	60	64	68	68	60	64	60	60	62	66	61	60	62	72	68	60	64	68	66	61	62	67	63	64	68	70	70	68	69	--	65
July	66	70	68	72	64	--	72	70	68	68	66	70	70	66	68	76	68	74	78	80	72	76	--	72	76	78	78	80	72	70	66	72
August	68	74	76	74	76	76	74	72	70	68	65	66	74	68	60	66	68	70	72	68	70	70	72	78	70	78	74	74	70	70	74	69
September	74	76	74	76	76	76	74	74	68	60	62	64	57	56	58	62	61	62	52	59	64	62	61	62	58	56	60	54	58	56	--	64

TURKEY RIVER BASIN--Continued

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

Suspended sediment, water year October 1959 to September 1960

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..	905	205	501	380	10	10	640	79	137
2..	775	110	230	367	14	14	700	66	125
3..	750	94	190	359	17	16	675	52	95
4..	700	64	121	1780	2300	S 16300	650	41	72
5..	725	100	196	3710	2280	S 23300	650	30	53
6..	700	115	217	3200	720	6220	560	40	60
7..	700	90	170	2480	415	2780	510	49	67
8..	675	55	100	1840	220	1090	460	46	57
9..	620	69	116	1650	130	579	450	44	53
10..	590	64	102	1590	150	644	500	46	62
11..	557	48	72	1530	98	405	528	47	67
12..	514	32	44	1500	75	304	538	38	55
13..	505	40	55	1590	86	370	519	29	41
14..	486	54	71	1260	65	221	491	26	34
15..	472	48	61	1020	53	146	486	22	29
16..	444	41	49	900	--	E 100	491	20	27
17..	417	31	35	800	--	E 2600	486	19	25
18..	398	21	23	1000	--	E 3500	472	17	22
19..	385	22	23	1200	--	E 2400	453	15	18
20..	359	23	22	1500	400	1620	444	17	20
21..	351	24	23	1200	400	1300	444	19	23
22..	338	43	39	1020	260	716	430	20	23
23..	440	62	74	878	105	249	403	20	22
24..	453	51	62	840	74	168	435	20	23
25..	449	42	51	800	44	95	426	19	22
26..	449	33	40	700	45	85	557	200	S 377
27..	426	30	35	640	45	78	1320	1080	S 3850
28..	363	28	27	560	46	70	2260	1400	S 8760
29..	403	26	28	500	49	66	3360	1100	S 10000
30..	394	24	26	560	64	97	2960	550	S 4820
31..	408	17	19	--	--	--	1910	200	S 1000
Total	16151	--	2822	37354	--	65543	25208	--	30039
	JANUARY			FEBRUARY			MARCH		
1..	1470	80	318	520	36	51	370	24	24
2..	1200	68	220	500	38	51	350	14	13
3..	860	56	130	480	41	53	350	29	27
4..	950	25	64	500	42	57	340	44	40
5..	1100	7	21	510	42	58	330	32	29
6..	1200	8	26	500	50	68	320	19	16
7..	1100	10	30	480	58	75	310	18	15
8..	1000	16	43	470	125	158	295	18	14
9..	900	21	51	480	190	246	290	26	20
10..	850	18	41	510	125	172	280	33	25
11..	800	14	30	600	80	130	280	34	26
12..	4000	2350	A 25400	560	41	62	280	34	26
13..	5630	--	E 38000	480	46	60	280	25	19
14..	2050	680	3760	440	50	59	280	16	12
15..	1400	300	1130	460	46	57	280	21	16
16..	1000	210	567	430	43	50	290	20	16
17..	850	120	275	420	47	53	290	20	16
18..	940	110	279	420	51	58	300	18	15
19..	1100	60	178	410	73	81	300	23	19
20..	1000	15	40	410	72	80	310	35	29
21..	900	13	32	410	71	79	310	33	28
22..	820	11	24	400	47	51	310	33	28
23..	760	14	29	400	23	25	310	33	28
24..	720	16	31	390	22	23	310	38	32
25..	680	16	29	390	20	21	290	44	34
26..	640	16	28	380	19	19	280	51	39
27..	600	20	32	380	18	18	1500	2200	8910
28..	590	23	37	370	26	26	7000	3800	71800
29..	560	33	50	370	33	33	14600	3280	129000
30..	550	43	64	--	--	--	17900	3080	149000
31..	520	40	56	--	--	--	8780	2880	68300
Total	36740	--	71015	13070	--	1974	57715	--	427616

E Estimated.
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 1959 to September 1960--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	4300	1780	20700	4900	1600	A 21200	3760	7420	S 144000
2	3120	980	8260	3120	500	4210	4900	11400	S 168000
3	2540	560	3840	2540	385	2640	2620	2900	20500
4	2220	400	2400	2140	420	2430	2070	740	4140
5	1790	320	1550	1930	240	1250	1760	480	2280
6	1520	370	1520	7550	4980	S 153000	1520	365	1500
7	1340	340	1230	15400	3100	129000	1370	290	1070
8	1220	280	922	11800	1800	57400	1280	230	795
9	1070	120	347	7240	1050	20500	1190	185	594
10	962	97	252	4600	690	8570	1160	195	611
11	910	66	162	3660	480	4740	1160	195	611
12	860	70	163	3030	320	2620	1100	140	416
13	835	60	135	2620	275	1950	1070	125	361
14	835	75	169	2380	245	1570	1020	110	303
15	910	91	224	2070	205	1150	1580	99	422
16	1130	190	580	3170	5200	S 86600	1280	2070	S 7780
17	4720	4860	S 67200	4020	4400	S 53700	990	2300	6150
18	8320	2830	63600	2700	710	5180	1340	740	S 3090
19	5000	1270	17100	2620	400	2830	1280	550	1900
20	3300	670	5970	2540	700	A 4800	1130	380	A 1160
21	2780	480	3600	3300	1300	A 11600	1250	360	A 1220
22	2300	365	2270	2860	570	4400	1160	240	752
23	2000	245	1320	2700	330	2410	1190	310	A 996
24	1720	190	882	2460	600	A 3990	1520	1050	S 4470
25	1550	175	732	2300	1400	A 8690	3300	3280	A 29200
26	1930	1110	S 5930	2000	410	2210	2380	1100	7070
27	2070	470	2630	1930	230	1200	1490	550	2210
28	1680	250	1130	1930	170	886	2380	5360	S 38600
29	1550	150	628	1930	175	912	1580	2910	12400
30	3300	1630	S 19500	1760	155	737	2140	2510	S 15300
31	--	--	--	1580	115	491	--	--	--
Total	67782	--	234946	114780	--	602866	51970	--	477901

	JULY			AUGUST			SEPTEMBER		
1	1460	760	3000	446	110	132	526	190	270
2	1190	390	1250	418	110	124	450	150	182
3	1070	270	780	446	140	A 169	395	110	117
4	990	210	561	504	260	A 354	366	96	95
5	962	180	468	430	120	A 139	330	97	86
6	910	160	393	403	85	92	330	115	102
7	835	140	316	475	230	S 411	307	95	79
8	785	82	174	635	420	720	294	90	71
9	760	84	172	522	240	A 338	284	73	56
10	760	115	236	660	360	A 642	278	67	50
11	735	110	218	492	145	193	259	54	38
12	735	135	268	422	140	160	281	79	60
13	835	480	A 1080	391	110	116	262	57	40
14	685	270	499	391	100	106	262	55	39
15	635	170	291	418	98	111	262	70	50
16	588	155	246	395	90	96	265	74	53
17	574	150	232	373	87	88	288	79	61
18	566	150	229	530	2720	S 4260	317	80	A 68
19	552	135	201	600	1150	S 1940	685	1420	S 2800
20	522	110	155	1010	1760	S 5120	418	240	271
21	496	115	154	735	1000	1980	362	110	108
22	475	105	135	556	315	473	446	320	385
23	1100	5290	S 18900	462	180	225	517	370	516
24	835	1200	2710	410	135	149	735	600	1190
25	810	2010	S 5810	384	89	92	962	570	1480
26	785	2130	S 4710	369	110	110	860	380	882
27	760	1800	S 3840	362	92	90	1070	650	1880
28	660	430	766	373	110	111	760	260	534
29	566	225	344	588	800	1270	635	150	257
30	513	180	249	548	280	414	566	110	168
31	471	135	172	479	160	207	--	--	--
Total	23620	--	48559	15227	--	20432	13772	--	11988

Total discharge for year (cfs-days)..... 473389
Total load for year (tons)..... 1995701

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 1959 to September 1960
(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. 4, 1959.....	1600	44		3120	3760		10	15		47		92	93	97	100			SPN
Nov. 4.....	1600	44		3120	3760		28	35		55		92	93	97	100			SPWC
Nov. 5.....	0715	40		4160	2420		15	34		52		85	88	94	100			SPWC
Mar. 27, 1960.....	1830	45		d 1500	5220		--	14		30		84	89	98	100			SPWC
Mar. 28.....	0550	33		d 7000	4420		--	25		45		90	93	97	100			SPWC
Mar. 29.....	1050	35		12600	3240		--	26		40		92	95	99	100			SPWC
Mar. 29.....	2130	35		18700	2400		--	37		63		98	99	100	--			SPWC
Apr. 30.....	1710	48		4800	2740		20	25		42		91	94	98	100			SPWC
May 7.....	0710	48		15700	3280		20	26		45		91	94	98	100			SPWC
May 8.....	0700	42		12500	2060		17	23		42		91	95	99	100			SPWC
May 16.....	1950	62		5910	34700		--	24		43		98	100	--	--			SPWC
June 1.....	1745	64		8700	26600		--	35		61		98	99	100	--			SPWC
June 1.....	1745	64		8700	26600		--	23		54		98	99	100	--			SPN
June 16.....	1240	60		1400	4980		--	46		76		99	100	--	--			SPWC
June 16.....	1240	60		1400	4980		--	20		56		99	100	--	--			SPN
June 28.....	0730	70		4200	11300		27	36		62		98	98	100	--			SPWC
July 23.....	0830	74		1790	11400		--	43		62		99	100	--	--			SPWC
Aug. 20.....	1900	70		1070	1800		--	54		82		97	99	100	--			SPWC

d Daily mean discharge.

5-4305. ROCK RIVER AT AFTON, WIS.

LOCATION.--Temperature recorder at gaging station on right bank, 0.2 mile downstream from highway bridge in Afton, Rock County, and 0.8 mile upstream from Bass Creek.
DRAINAGE AREA.--3,300 square miles, approximately.
RECORDS AVAILABLE.--Water temperatures: September 1954 to September 1960.
EXTREMES, 1950-60.--Water temperatures: Maximum, 81°F July 22-24, 29, 30, Sept. 4; minimum, freezing point on many days November to March.
EXTREMES, 1954-60.--Water temperatures: Maximum, 89°F July 27-30, Aug. 4, 1955; minimum, freezing point on many days during winter months.
REMARKS.--Records of discharge for water year October 1959 to September 1960 given in WSP 1708

Temperature (°F) of water, water year October 1959 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	
October																																
Maximum	62	61	61	59	59	58	57	57	56	55	54	51	50	49	49	51	51	51	51	50	50	51	52	51	49	47	45	43	42	43	43	52
Minimum	59	59	60	58	58	57	57	56	54	54	51	49	49	47	47	49	50	49	49	49	48	49	51	49	47	45	43	41	41	42	43	50
November																																
Maximum	43	43	43	43	42	42	40	38	38	39	40	39	37	35	33	33	33	33	33	33	33	32	35	35	35	34	34	34	34	--		37
Minimum	43	43	41	42	42	40	38	37	37	38	39	37	35	33	33	33	33	32	32	33	32	32	32	34	34	34	34	34	34	--		36
December																																
Maximum	34	35	36	36	37	36	36	34	35	33	34	35	35	35	35	35	35	35	34	34	33	33	32	32	32	32	33	36	36	35	34	34
Minimum	34	34	35	36	35	35	34	33	33	33	33	34	34	35	35	34	35	34	33	33	33	32	32	32	32	32	32	33	35	34	34	34
January																																
Maximum	34	34	34	33	33	33	32	32	33	33	33	34	34	33	33	33	32	32	32	32	32	32	32	32	32	32	32	32	33	33	33	33
Minimum	34	34	33	33	32	32	32	32	32	32	33	33	33	33	33	32	32	32	32	32	32	32	32	32	32	32	32	32	33	33	33	32
February																																
Maximum	34	34	34	34	34	34	34	35	34	34	33	33	33	33	33	33	33	33	33	33	32	33	33	33	33	33	34	34	34	--	--	33
Minimum	33	34	33	33	33	33	34	34	34	32	32	32	32	32	33	33	32	32	32	32	32	32	32	32	32	32	32	32	32	--	--	33
March																																
Maximum	35	35	35	35	34	34	35	35	34	36	34	36	36	36	38	37	37	39	39	41	39	39	37	38	36	37	39	39	43	41	37	37
Minimum	33	33	33	33	33	33	33	33	33	33	33	33	33	33	34	34	34	34	35	36	35	36	36	35	35	35	35	38	39	37	37	34
April																																
Maximum	37	37	37	35	36	37	38	38	37	36	38	41	45	47	48	49	49	47	49	51	54	57	60	62	62	61	60	59	59	57	--	47
Minimum	36	36	35	35	35	36	37	37	35	35	36	38	41	45	47	48	47	46	47	49	51	54	57	60	61	59	59	58	57	54	--	46
May																																
Maximum	55	56	58	60	60	59	58	52	50	48	47	49	52	54	56	56	56	59	59	60	62	63	67	67	67	67	67	66	65	65	67	59
Minimum	53	54	56	57	59	58	52	50	48	47	46	46	49	52	53	56	56	56	59	59	60	62	63	66	65	66	66	65	64	64	65	57
June																																
Maximum	69	70	71	71	71	71	70	69	70	69	69	69	67	66	67	69	69	70	71	70	68	69	69	70	73	73	76	75	77	77	--	70
Minimum	67	69	69	70	69	69	68	68	67	68	68	67	65	65	64	65	65	66	67	68	67	66	67	66	66	69	71	73	73	74	--	68
July																																
Maximum	77	75	76	73	72	72	74	75	74	73	72	75	76	76	76	76	78	78	78	78	78	81	81	81	80	79	79	80	81	81	79	77
Minimum	73	71	71	71	70	69	70	71	73	70	70	70	73	72	72	72	74	74	74	74	74	75	76	76	77	75	75	75	76	77	74	73
August																																
Maximum	77	76	76	76	76	77	77	77	76	75	73	73	73	73	71	70	71	72	72	73	73	75	77	76	75	75	75	75	75	76	77	75
Minimum	73	74	74	75	74	76	74	74	74	73	70	71	71	71	69	67	69	70	71	71	71	72	74	75	73	73	73	73	74	74	75	73
September																																
Maximum	79	79	80	81	79	79	79	78	77	74	72	70	69	67	68	67	67	66	65	63	62	63	63	65	66	67	67	66	65	64	--	70
Minimum	76	77	78	79	78	78	78	77	74	71	69	68	66	64	64	65	65	65	63	62	62	62	63	63	64	65	65	65	64	63	--	68

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ROCK RIVER BASIN--Continued

5-4335. YELLOWSTONE RIVER NEAR BLANCHARDVILLE, WIS.

LOCATION.--At gaging station on right bank 0.6 mile upstream from highway bridge 7 miles southwest of Blanchardville, Lafayette County, and about 9 miles upstream from mouth.
DRAINAGE AREA.--29.1 square miles.
RECORDS AVAILABLE.--Water temperatures: August 1954 to September 1960.
Sediment records: August 1954 to September 1960.
EXTREMES, 1959-60.--Water temperatures: Maximum, 74°F on many days during July to September; minimum, freezing point on several days during February.
Sediment concentrations: Maximum daily, 2,400 ppm Mar. 29; minimum daily, 3 ppm Dec. 30.
Sediment loads: Maximum daily, 7,500 tons Mar. 29; minimum daily, 0.2 5on Dec. 30.
EXTREMES, 1954-60.--Water temperatures: Maximum, 89°F July 27, 1955; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 2,400 ppm Mar. 29, 1960; minimum daily, 1 ppm on many days during 1954, 1955, and 1958
Sediment loads: Maximum daily, 7,500 tons Mar. 29, 1960; minimum daily, less than 0.05 ton on many days most years.
REMARKS.--Flow affected by ice Nov. 14 to Dec. 2, 20-25, Dec. 31 to Jan. 10, Jan. 18, 20, Feb. 8-9, Feb. 11 to Mar. 27. Records of discharge for water year October 1959 to September 1960 given in WSP 1708.

Temperature (°F) of water, water year October 1959 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	
October	60	59	58	56	56	57	57	54	54	55	53	45	45	46	46	45	47	48	48	41	50	51	49	46	44	42	44	41	45	47	50	50
November	53	55	55	46	38	38	34	39	46	53	49	49	43	33	34	34	35	35	36	35	35	36	34	34	34	35	33	34	36	35	--	40
December	36	36	35	38	39	39	38	38	38	40	46	46	48	48	48	49	49	41	40	39	38	39	40	40	40	43	41	40	40	40	40	41
January	40	40	40	--	--	37	38	38	38	39	39	39	39	39	37	38	38	39	39	39	37	37	37	38	37	37	39	40	38	40	38	38
February	33	38	32	33	33	33	34	34	35	33	32	32	32	32	32	33	32	32	36	35	34	34	34	35	36	32	37	37	37	--	--	34
March	36	35	36	34	34	39	39	38	39	--	--	37	37	35	34	34	34	35	36	37	--	--	--	39	--	--	37	40	38	38	38	--
April	38	38	39	39	39	40	41	41	44	41	--	--	--	--	55	55	56	54	55	54	53	55	55	54	54	55	55	55	55	54	--	49
May	53	56	56	56	54	52	50	46	46	47	50	53	54	54	58	56	58	58	61	59	60	62	62	63	60	60	61	61	62	63	63	57
June	64	64	63	64	--	--	--	--	63	63	63	63	63	63	63	63	62	63	64	63	--	64	62	63	64	64	63	--	63	62	--	63
July	--	63	62	63	63	62	63	63	62	63	63	63	65	65	67	68	70	69	74	--	--	73	74	74	73	74	74	74	74	--	--	68
August	74	74	74	74	74	74	73	74	74	--	73	74	--	74	74	--	74	74	74	73	74	--	--	--	68	69	69	69	68	70	70	72
September	71	71	72	73	74	74	72	69	64	60	61	60	61	--	60	59	60	59	--	--	55	55	--	54	54	55	55	--	--	--	--	--

ROCK RIVER BASIN--Continued

5-4335. YELLOWSTONE RIVER NEAR BLANCHARDVILLE, WIS.--Continued

Suspended sediment, water year October 1959 to September 1960

Day	OCTOBER			NOVEMBER			DECEMBER		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	10.7	33	1.0	21	13	0.7	14	13	0.5
2	12.4	26	.9	19.5	13 B	.7	14	15	.6
3	12.1	24	.8	18.6	13 B	.6	15.0	18	.7
4	13.2	25 S	1.0	32	23	2.0	15.4 C	19	.8
5	28	-- E	12	34	22	2.0	15.0 C	19	.8
6	28	-- E	50	28	C 30	2	14.6 C	19	.7
7	31	74	6.2	26	C 30	2	14.2 C	19	.7
8	29	48	3.8	26	C 30	2	14.2 C	19	.7
9	26	47	3.3	26	C 30	2	13.9 C	19	.7
10	21	35	2.0	24	C 30	2	13.9 C	19	.7
11	18.6	32	1.6	22	7	.4	13.9 C	19	.7
12	17.0 C	29	1	21	15	.8	13.9 C	19	.7
13	17.0 C	29	1	20	20	1.1	13.5 C	19	.7
14	16.2 C	29	1	19	C 25	1	13.5	16	.6
15	15.8 C	29	1	18	C 25	1	13.5 C	13	.5
16	15.4 C	29	1	17	C 25	1	13.5 C	13	.5
17	14.2 C	29	1	16	C 25	1	13.2 C	13	.5
18	13.9 C	29	1	16	C 25	1	12.8 C	13	.4
19	13.9 C	29	1	16	C 25	1	12.4 C	13	.4
20	13.9 C	29	1	16	C 25	1	12 C	13	.4
21	13.2 C	29	1	16	C 25	1	12 C	13	.4
22	13.2	23	.8	17	C 25	1	12 C	13	.4
23	41	-- E	30	17	C 25	1	11	10	.3
24	40	-- E	10	16	C 15	.6	11	10	.3
25	34	75 R	7	15	C 15	.6	11	10	.3
26	30	68	5.5	15	C 15	.6	16.6	-- E	3
27	28	C 73	6	14	C 15	.6	90	-- E	310
28	24	C 73	5	14	C 15	.6	52	-- E	40
29	23	C 73	4	13	C 15	.5	36	13	1.3
30	21	C 73	4	14	C 15	.6	30	3	.2
31	18.6	C 73	4	--	--	--	25	7	.5
Total	663.3	--	168.9	587.1	--	32.4	583	--	370.0

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	23	11 B	0.7	16.2	10	0.4	11	19	0.6
2	21	15	.8	15.8	12	.5	11	48	1.4
3	19	18	.9	15.8	10	.4	11	54	1.6
4	18	22	1.1	15.4 C	14	.6	11	32	1.0
5	17	21	1.0	15.8 C	14	.6	11	25	.7
6	17	14	.6	15.8 C	14	.6	11	23	.7
7	17	13	.6	15.0 C	14	.6	11	17	.5
8	16	17	.7	15 C	14	.6	11 C	18	.5
9	16	17	.7	14 C	14	.5	10 C	18	.5
10	16	15	.6	9.7 C	14	.4	10 C	18	.5
11	16.6	14	.6	13 C	13	.4	10 C	18	.5
12	736	2010 S	4960	15 C	13	.5	10 C	18	.5
13	130	488 S	421	15 C	13	.5	10 C	18	.5
14	32	22	1.9	14 C	13	.5	10 C	18	.5
15	29	15	1.2	14 C	13	.5	10 C	18	.5
16	26	12	.8	14 C	13	.5	10 C	18	.5
17	23	11	.7	14	11	.4	10 C	18	.5
18	22	12	.7	13	8	.3	10 C	31	.8
19	21	15	.8	13	8	.3	10 C	31	.8
20	20	19	1.0	12	14	.4	10 C	31	.8
21	19.5	23	1.2	12	11	.4	10 C	31	.8
22	18.6	22	1.1	12	17	.6	10 C	31	.8
23	18.6	27	1.4	12	23	.7	10 C	31	.8
24	18.6	33	1.6	12	14	.4	10 C	31	.8
25	18.6	30	1.5	12	14	.4	10 C	31	.8
26	18.2	26	1.3	12	15	.5	11 C	31	.9
27	17.8	25	1.2	12	22	.7	20	50 B	4
28	17.4	17	.8	12	21	.7	77	684 S	234
29	16.6	11	.5	12	15	.5	680	2400 J	7500
30	16.6	7	.3	--	--	--	350	571 S	1060
31	16.6	8	.4	--	--	--	76	148	30
Total	1432.7	--	5407.7	393.5	--	14.4	1472	--	8846.8

E Estimated.
S Computed by subdividing day.
B Computed from estimated coacentratioa graph.
C Composite period.

ROCK RIVER BASIN--Continued

5-4335. YELLOWSTONE RIVER NEAR BLANCHARDVILLE, WIS.--Continued

Suspended-sediment, water year October 1959 to September 1960--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	62	110		18	32	33		2.8	33	53		4.7
2	70	101		19	31	30	B	2	32	50		4.3
3	52	69		9.7	29	25	B	2	31	39		3.3
4	46	50		6.2	28	25	B	2	31	47		3.9
5	40	28		3.0	33	40	S	4.5	31	37		3.1
6	39	30		3.2	160	1450	S	933	29	35	B	3
7	35	C 21		2	151	510	S	308	29	35	B	3
8	32	C 21		2	85	56		13	29	35	B	3
9	30	C 21		2	70	31		5.8	28	48		3.6
10	29	C 21		2	60	30		4.9	28	C 52		4
11	30	--	E	2	52	29		4.1	29	C 52		4
12	29	--	E	2	47	28		3.6	30	C 52		4
13	28	--	E	2	46	25	B	3	30	C 52		4
14	28	--	E	2	42	25	B	3	29	C 52		4
15	26	--	E	1	40	21		2.3	28	C 52		4
16	29	--	E	3	49	55	S	7.7	29	C 52		4
17	55	--	E	5	52	60	B	8	28	C 52		4
18	41	29		3.2	40	30	B	3	27	C 52		4
19	36	28		2.7	52	81	S	14	26	C 52		4
20	34	C 30		3	52	73		13	26	--	E	4
21	34	C 30		3	63	--	E	18	27	--	E	4
22	30	C 30		2	51	55		7.6	26	--	E	4
23	29	C 30		2	46	49		6.1	29	--	E	4
24	28	C 30		2	42	54		6.1	27	--	E	4
25	29	C 30		2	40	60		6.5	24	80		5.2
26	32	C 30		3	42	53		6.0	24	103		6.7
27	27	37		2.7	40	44		4.8	24	108		7.0
28	26	27		1.9	38	49		5.0	101	--	E	500
29	26	33		2.3	38	38		3.9	30	--	E	12
30	43	40	A	5	36	35		3.4	28	131		10
31	--	--		--	33	43		3.8	--	--		--
Total	1075	--		118.9	1620	--		1407.9	923	--		632.8

Day	JULY				AUGUST				SEPTEMBER			
1	27	120	B	9	17.4	60		2.8	16.2	57		2.5
2	36	--	E	120	17.8	60		2.9	15.8	68		2.9
3	46	--	E	100	23	60		3.7	15.4	78		3.2
4	27	116		8.4	18.6	57		2.9	15.4	66		2.7
5	25	C 88		6	17.8	58		2.8	15.4	69		2.9
6	24	C 88		6	17.8	59		2.8	15.4	70		2.9
7	24	C 88		6	22	70	A	4	15.0	88		3.6
8	23	C 88		6	18.2	52		2.6	15.4	92		3.8
9	23	C 88		6	20	60		3.2	14.6	86		3.4
10	24	C 88		6	18.2	68		3.3				
11	24	C 88		6	17.4	69		3.2	14.6	68		2.7
12	43	566	S	191	17.0	72		3.3	14.6	72		2.8
13	30	487	S	46	17.0	75	B	3	14.6	99		3.9
14	24	94		6.1	19.5	68		3.6	14.6	95	B	4
15	22	90	B	5	17.8	55		2.6	14.6	73		2.9
16	22	112		6.6	17.0	40	B	2	17.0	45		2.1
17	21	110		6.2	16.6	32		1.4	17.4	27		1.3
18	24	121		7.8	16.6	30		1.3	122	--	E	800
19	23	70		4.3	53	--	E	200	69	--	E	130
20	20	50	B	3	24	64		4.1	24	90	B	6
21	19.9	55	B	3	20	--	E	3	20	50		2.7
22	19.5	58		3.0	18.6	--	E	2	21	46		2.6
23	19.5	62		3.3	17.8	--	E	3	23	--	E	3
24	19.0	60		3.1	17.4	--	E	3	37	--	E	25
25	23	75	B	6	17.0	64		2.9	28	100	A	8
26	26	95	A	7	16.6	75		3.4	22	45		2.7
27	20	63		3.4	16.2	68		3.0	19.9	28		1.5
28	19.5	68		3.6	16.6	47		2.1	19.0	25	B	1
29	18.6	61		3.1	26	--	E	6	18.6	25	B	1
30	18.2	55	B	3	17.8	50		2.4	18.2	25	B	1
31	17.8	55	B	3	17.0	69		3.2	--	--		--
Total	753.0	--		596.9	607	--		289.5	702.3	--		1035.5

Total discharge for year (cfs-days)..... 10812.6
Total load for year (tons)..... 18921.7

E Estimated
A Computed from partly estimated concentration graph.
B Computed from estimated concentration graph.
C Composite period.

ROCK RIVER BASIN--Continued

5-4335. YELLOWSTONE RIVER NEAR BLANCHARDVILLE, WIS.--Continued

Particle size analyses of suspended sediment, water year October 1959 to September 1960
(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	
Jan. 12, 1960.....	1700			394	3120		28	35	44	64	88	98	100	—				SBWC
Jan. 12.....	1700			394	3120		20	27	42	66	91	98	100	—				SBN
Jan. 12.....	2100			1960	3660		23	30	38	55	79	96	99	100				SBWC
Mar. 28.....	1830			166	1710		23	29	39	60	84	99	100	—				SBWC
Mar. 29.....	1830			1350	2010		31	36	43	63	88	98	99	100				SBWC
Mar. 29.....	1830			1350	2010		17	25	39	59	84	97	99	100				SBN
July 12.....	2200			210	3860		33	44	58	78	92	99	100	—				SBWC
July 12.....	2200			210	3860		15	25	42	70	98	99	100	—				SBN

ROCK RIVER BASIN--Continued

5-4360. MOUNT VERNON CREEK NEAR MOUNT VERNON, WIS.

LOCATION.--At gaging station on right bank 400 feet downstream from bridge on State Highway 92, 0.9 mile upstream from West Branch Sugar River, and 2.5 miles southeast of Mount Vernon, Dane County.
DRAINAGE AREA.--16.1 square miles.
RECORDS AVAILABLE.--Water temperatures: January 1954 to September 1960.
Sediment records: January 1954 to September 1960.
EXTREMES, 1959-60.--Water temperatures: Maximum, 69°F Sept. 5-8; minimum, freezing point, Nov. 17, Jan. 4, 5, Feb. 11, 12.
Sediment concentrations: Maximum daily, 500 ppm Mar. 29; minimum daily, 5 ppm Jan. 15.
Sediment loads: Maximum daily, 500 tons Mar. 30; minimum daily, 0.2 ton Feb. 29.
EXTREMES, 1954-60.--Water temperatures: Maximum, 76°F Aug. 21, 1959; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 2,010 ppm Apr. 7, 1954; minimum daily, 1 ppm Sept. 20, 1955.
Sediment loads: Maximum daily, 1,120 tons Apr. 1, 1959; minimum daily, less than 0.05 ton Sept. 20, 1955.
REMARKS.--Flow affected by ice Nov. 17, Nov. 24 to Dec. 2, Dec. 6, 7, 18-25, Dec. 30 to Jan. 10, Jan. 15 to Feb. 2, Feb. 8 to Mar. 27.

Temperature (°F) of water, water year October 1959 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	
October	54	54	55	50	54	54	55	53	53	52	50	45	47	47	52	52	51	52	50	52	53	53	51	50	51	50	52	49	48	45	43	51
November	43	43	43	45	41	43	39	40	45	49	48	45	45	44	36	35	32	33	40	39	40	41	--	34	35	--	36	33	33	41	--	40
December	40	40	44	41	40	36	38	38	40	41	42	40	40	41	42	42	40	37	36	34	35	33	36	36	37	42	39	37	37	36	40	39
January	36	37	33	32	32	37	40	40	39	39	38	35	33	40	39	--	38	35	36	36	37	37	37	38	38	36	37	40	39	39	40	37
February	40	38	38	40	41	39	39	39	38	38	32	32	34	38	38	40	40	38	36	38	39	40	40	37	36	39	40	40	36	--	--	38
March	38	36	38	39	38	38	39	38	38	41	39	42	42	40	41	35	41	42	44	42	40	40	40	38	39	39	--	39	40	35	41	39
April	40	41	42	46	47	52	50	42	45	49	53	56	58	54	52	52	--	52	51	--	58	62	--	60	59	57	56	56	50	44	--	51
May	54	58	60	61	53	47	42	43	40	43	54	55	58	60	62	52	56	59	57	55	56	60	62	61	59	54	55	56	58	60	60	55
June	60	61	62	60	58	62	56	62	62	58	56	52	57	58	61	60	60	60	58	53	53	60	56	58	60	60	62	62	54	58	--	59
July	58	60	58	58	60	62	60	60	58	59	60	61	60	60	60	60	58	59	63	64	61	63	61	63	58	59	60	61	62	60	65	60
August	66	66	64	65	67	64	64	--	63	60	59	61	60	--	60	65	68	67	67	65	56	57	55	60	60	61	61	62	62	63	65	63
September	66	--	68	68	69	69	69	69	68	66	65	65	63	62	61	61	61	60	55	--	53	53	54	53	--	53	53	--	51	--	--	61

ROCK RIVER BASIN--Continued

5-4360. MOUNT VERNON CREEK NEAR MOUNT VERNON, WIS.--Continued

Suspended sediment, water year October 1959 to September 1960

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..	13	C 20	0.7	17	29	1.3	15	C 14	0.6
2..	13	C 20	.7	16	28	1.2	15	C 14	.6
3..	14	C 20	.8	16	--	E 1	16	C 14	.6
4..	13	C 20	.7	32	--	E 11	17	C 14	.6
5..	31	135	S 14	38	--	E 12	16	C 14	.6
6..	29	36	S 3.7	22	--	E 2	15	C 14	.6
7..	27	45	S 3.6	21	C 24	1	15	C 14	.6
8..	22	37	2.2	19	C 24	1	15	C 14	.6
9..	21	28	1.6	20	C 24	1	15	C 14	.6
10..	16	19	.8	19	C 24	1	15	C 14	.6
11..	16	20	.9	18	C 24	1	15	C 14	.7
12..	15	20	.8	18	C 24	1	15	C 14	.7
13..	15	18	.7	18	C 31	2	15	C 14	.7
14..	15	C 24	1	17	C 31	1	15	C 14	.7
15..	14	C 24	1	17	C 31	1	15	14	.6
16..	14	C 24	.9	17	C 31	1	16	C 12	.5
17..	14	C 24	.9	16	C 31	1	15	C 12	.5
18..	14	C 24	.9	16	C 31	1	14	C 12	.4
19..	14	C 24	.9	16	C 31	1	14	C 12	.4
20..	14	C 24	.9	16	23	1.0	14	C 12	.4
21..	14	C 24	.9	17	11	.5	13	C 12	.4
22..	14	C 24	.9	17	16	.7	13	C 12	.4
23..	27	--	E 10	17	18	B .8	13	C 12	.4
24..	42	--	E 7	17	C 17	.8	13	C 12	.4
25..	28	--	E 3	16	C 17	.7	14	10	.4
26..	21	C 28	2	15	C 17	.7	16	16	.7
27..	20	C 28	2	15	C 17	.7	47	--	E 30
28..	18	C 28	1	15	C 17	.7	73	150	B 40
29..	17	C 28	1	15	C 17	.7	26	41	2.9
30..	17	C 28	1	15	C 17	.7	19	25	1.3
31..	17	C 28	1	--	--	--	17	19	.9
Total	579	--	67.5	548	--	50.5	566	--	89.4

	JANUARY			FEBRUARY			MARCH		
1..	17	C 18	0.8	18	17	0.8	16	C 7	0.3
2..	46	C 18	.8	18	18	.9	16	C 7	.3
3..	16	C 18	.8	18	16	.8	16	C 7	.3
4..	16	C 18	.8	18	13	.6	16	C 7	.3
5..	15	C 18	.7	18	C 17	.8	16	C 7	.3
6..	15	C 18	.7	18	C 17	.8	16	C 7	.3
7..	15	C 18	.7	18	C 17	.8	15	C 7	.3
8..	15	C 18	.7	18	C 17	.8	15	C 7	.3
9..	15	C 18	.7	18	C 17	.8	15	C 7	.3
10..	15	C 18	.7	17	38	S 1.9	15	C 7	.3
11..	16	7	.3	18	165	8.0	15	C 7	.3
12..	200	450	B 440	18	84	4.1	15	C 7	.3
13..	180	280	B 390	17	14	.6	15	C 7	.3
14..	27	12	.9	17	C 14	.6	15	C 7	.3
15..	22	5	.3	17	C 14	.6	15	C 7	.3
16..	21	8	B .4	17	C 14	.6	15	C 7	.3
17..	20	21	1.1	17	C 14	.6	15	C 7	.3
18..	20	C 16	.9	16	C 14	.6	15	C 7	.3
19..	19	C 16	.8	16	C 14	.6	15	C 7	.3
20..	19	C 16	.8	16	C 14	.6	15	C 7	.3
21..	19	C 16	.8	16	C 14	.6	15	C 11	.4
22..	18	C 16	.8	16	C 14	.6	15	C 11	.4
23..	18	C 16	.8	16	C 14	.6	15	C 11	.4
24..	18	C 18	.9	16	C 13	.6	15	C 11	.4
25..	18	C 18	.9	16	C 16	.6	15	C 11	.4
26..	18	C 1	B .9	16	C 13	.6	15	C 11	.4
27..	18	C 18	.9	16	C 13	.6	18	14	B .7
28..	18	C 18	.9	16	21	.9	30	80	B 7
29..	18	C 18	.9	16	6	.2	127	500	B 340
30..	18	C 18	.9	--	--	--	270	480	B 500
31..	18	C 18	.9	--	--	--	54	172	25
Total	898	--	852.5	192	--	31.2	895	--	881.1

E Estimated.
S Computed by subdividing day.
B Computed from estimated concentration graph.
C Composite period.

ROCK RIVER BASIN--Continued

5-4360. MOUNT VERNON CREEK NEAR MOUNT VERNON, WIS.--Continued

Suspended sediment, water year October 1959 to September 1960--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	38	96	9.8	27	62	4.5	26	20	1.4
2	42	81	9.2	25	37	2.5	26	20	1.4
3	32	49	4.2	23	27	1.7	25	23	1.6
4	29	46	3.6	23	32	2.0	25	17	1.1
5	27	47	3.4	25	33	2.2	25	13	.9
6	26	49	3.4	112	191 S	91	24	18	1.2
7	25	45	3.0	80	167 S	45	24	26	1.7
8	24	39	2.5	46	56	7.0	24	23	1.5
9	23	39	2.4	42	41	4.6	24	23	1.5
10	23	39	2.4	36	26	2.5	24	18	1.2
11	24	42	2.7	32	37	3.2	24 C	24	2
12	23	46	2.8	29	46	3.6	24 C	24	2
13	23	48	3.0	29	57	4.5	25 C	24	2
14	23	44	2.7	28	34	2.6	24 C	24	2
15	23	37	2.3	27	55	4.0	24 C	24	2
16	25	50	3.4	33	64	5.7	28	50 A	5
17	54	175 S	30	42	35	4.0	24 C	35	2
18	31	113	9.4	29	30	2.3	25 C	35	2
19	25	66	4.4	46	26 S	3.7	24 C	35	2
20	25	26	1.8	38	27	2.8	23 C	35	2
21	26	37	2.6	39	38	4.0	23 C	35	2
22	24	48	3.1	31	33	2.8	23 C	35	2
23	23	34	2.1	29	47	3.7	24 C	35	2
24	22	26	1.5	28	41	3.1	23 C	35	2
25	23	25	1.6	27	30	2.2	22 C	35	2
26	27	34	2.5	27	30	2.2	22 C	35	2
27	23	28	1.7	27	25	1.8	22	43	2.6
28	22	24	1.4	27	13	.9	25	67	4.5
29	23	18	1.1	28	22	1.7	24	57	3.7
30	51	248 S	39	28	71	5.4	23	48	3.0
31	--	--	--	26	32	2.2	--	--	--
Total	829	--	163.0	1089	--	229.4	723	--	62.5

Day	JULY			AUGUST			SEPTEMBER		
1	23	60 B	4	20	17	0.9	17	22	1.0
2	32	-- E	15	21	16	.9	17	19	.9
3	76	-- E	120	22	26	1.5	18	24	1.2
4	24	78	5.0	21	22	1.2	17	24	1.1
5	22 C	61	4	20	16	.9	17	26	1.2
6	22 C	61	4	20	15	.8	17	51	2.3
7	21 C	61	3	23	20	1.2	17	50	2.3
8	21 C	61	3	20	15 B	.8	18	36	1.7
9	21 C	61	3	24	15	1.0	16	24	1.0
10	22 C	61	4	21	22	1.2	16	25	1.1
11	22 C	51	3	19	18	.9	16	26	1.1
12	22 C	51	3	19	21	1.1	16	30	1.3
13	22 C	51	3	19	30	1.5	16	20	.9
14	22 C	51	3	20	34	1.8	16	25	1.1
15	21 C	51	3	19	18	.9	15	28	1.1
16	21 C	51	3	19	25	1.3	16	30	1.3
17	21 C	51	3	19	28	1.4	16	42	1.8
18	22 C	51	3	19	29	1.5	31	-- E	35
19	22 C	51	3	20	33	1.8	57	-- E	110
20	22 C	51	3	21	28	1.6	20	21	1.1
21	22 C	23	1	20	27	1.4	18	25	1.2
22	22 C	23	1	19	33	1.7	20	56	3.0
23	26 C	23	2	18	27	1.3	18	34	1.6
24	20 C	23	1	18	32	1.6	22	30	1.8
25	22 C	23	1	18	26	1.3	21	40 B	2
26	32 C	23	2	18	21	1.0	17	33	1.5
27	21 C	23	1	17	29	1.3	17	58	2.7
28	21 C	23	1	18	20	1.0	17	60 B	3
29	21 C	23	1	24	27	1.7	17	49	2.2
30	21 C	23	1	18	18	.9	16	45 B	2
31	20	30	1.6	18	34	1.6	--	--	--
Total	749	--	208.6	612	--	39.0	572	--	189.5

Total discharge for year (cfs-days) 8552.0
Total load for year (tons) 2864.0

E Estimated
S Computed by subdividing day.
A Computed from partly estimated concentration graph
B Computed from estimated concentration graph
C Composite period.

IOWA RIVER BASIN

5-4495. IOWA RIVER NEAR ROWAN, IOWA

LOCATION.--At gaging station at county higbway 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 1960.
Sediment records: October 1957 to September 1960.
EXTREMES, 1959-60.--Water temperatures: Maximum, 85°F July 22; minimum, freezing point on several days during November, January to March.
Sediment concentrations: Maximum daily, 170 ppm Mar. 30; minimum daily, 3 ppm Mar. 19.
Sediment loads: Maximum daily, 1,060 tons Mar. 30; minimum daily, 0.2 ton Mar. 19.
EXTREMES, 1957-60.--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 (1959-60), 3 ppm Mar. 19, 1960.
Sediment loads: Maximum daily, 1,100 tons May 31, 1959; minimum daily (1959-60), 0.2 ton Mar. 19, 1960.
REMARKS.--Records of discharge for water year October 1959 to September 1960 given in WSP 1708. Flow affected by ice Nov. 6 to Dec. 16, Dec. 19, Dec. 30 to Mar. 30.

Temperature (°F) of water, water year October 1959 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	
October	54	56	56	54	62	60	60	50	50	52	44	46	42	54	50	--	46	--	54	--	42	--	--	40	--	46	--	48	--	47	--	--
November	48	--	50	46	34	--	--	36	--	41	--	40	--	32	--	32	--	36	--	--	--	44	--	35	--	36	--	--	34	--	--	--
December	36	--	40	--	38	--	34	--	34	--	--	37	--	--	40	--	38	--	36	--	34	--	36	--	--	--	42	--	42	--	36	--
January	--	36	--	--	36	--	36	--	36	--	--	36	--	34	--	35	--	36	--	33	--	--	33	--	32	--	--	34	--	32	--	--
February	--	33	--	--	34	34	--	--	34	--	33	--	33	--	36	--	34	--	33	33	--	32	--	32	--	--	33	--	32	--	--	--
March	--	32	--	32	32	--	--	32	--	32	--	32	--	32	--	32	--	--	32	--	32	--	32	--	32	33	39	34	36	38	38	--
April	41	40	42	42	--	47	--	41	42	46	49	52	58	60	57	50	46	38	56	46	64	66	71	69	56	60	56	58	54	50	--	52
May	55	59	64	64	48	48	50	54	55	52	56	58	62	66	68	62	66	58	64	64	68	62	66	62	64	60	58	60	68	66	67	59
June	68	68	64	70	68	70	70	--	65	66	66	67	72	70	72	70	72	72	65	68	68	70	70	72	73	75	72	72	66	--		69
July	70	73	70	70	70	77	76	78	78	75	78	78	78	79	78	80	78	79	80	80	82	85	84	83	84	82	81	80	80	75	76	80
August	79	84	82	80	78	80	72	76	74	76	74	76	75	72	68	76	68	74	70	78	76	79	78	74	76	73	--	68	78	79	82	76
September	82	82	78	80	80	78	65	68	66	65	64	65	64	58	64	63	61	61	73	57	62	58	60	58	60	64	61	61	60	56	--	66

IOWA RIVER BASIN--Continued

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

Suspended sediment, water year October 1959 to September 1960

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	60	30	4.9	45	5	0.6	63	36	6.1
2	54	38	5.5	44	10	1.2	68	27	5.0
3	52	43	6.0	42	14	1.6	70	18	3.4
4	53	47	6.7	45	8	1.0	72	30	5.8
5	58	53	8.3	62	10	1.7	70	42	7.9
6	56	46	7.0	45	13	1.6	64	40	6.9
7	49	51	6.7	52	16	2.2	58	38	6.0
8	44	43	5.1	58	20	3.1	54	28	4.1
9	46	38	4.7	63	24	4.1	50	17	2.3
10	43	49	5.7	70	27	5.1	47	30	3.8
11	42	47	5.3	76	28	5.7	46	40	5.0
12	40	45	4.9	82	28	6.2	46	52	6.5
13	37	40	4.0	84	25	5.7	46	45	5.6
14	37	60	6.0	80	22	4.8	46	38	4.7
15	35	55	5.2	74	27	5.4	48	31	4.0
16	34	40	3.7	66	32	5.7	49	22	2.9
17	33	25	2.2	63	25	4.3	51	14	1.9
18	32	20	1.7	60	18	2.9	49	12	1.6
19	32	16	1.4	61	19	3.1	49	10	1.3
20	32	14	1.2	62	20	3.3	48	14	1.8
21	33	12	1.1	64	20	3.5	48	17	2.2
22	34	10	.9	66	21	3.7	47	14	1.8
23	34	8	.7	70	20	3.8	47	10	1.3
24	35	6	.6	70	19	3.6	44	11	1.3
25	37	6	.6	66	24	4.3	43	12	1.4
26	38	5	.5	57	30	4.6	50	14	1.9
27	41	5	.6	52	30	4.2	73	16	3.2
28	42	4	.5	50	30	4.0	174	35	16
29	42	6	.7	54	30	4.4	309	53	44
30	44	8	1.0	58	33	5.2	300	34	28
31	45	6	.7	--	--	--	250	14	9.5
Total	1294	--	104.1	1841	--	110.6	2479	--	197.2
	JANUARY			FEBRUARY			MARCH		
1	220	14	8.3	70	20	3.8	24	56	3.6
2	170	14	6.4	70	20	3.8	23	62	3.9
3	140	14	5.3	70	16	3.0	22	35	2.1
4	110	14	4.2	70	12	2.3	22	8	.5
5	92	13	3.2	70	7	1.3	21	32	1.8
6	100	26	7.0	70	6	1.1	21	33	1.9
7	115	38	12	72	7	1.4	21	34	1.9
8	130	34	12	82	8	1.8	21	36	2.0
9	130	31	11	99	10	2.7	22	28	1.7
10	125	27	9.1	76	8	1.6	23	19	1.2
11	120	23	7.5	60	5	.8	23	18	1.1
12	110	19	5.6	54	6	.9	23	18	1.1
13	105	24	6.8	48	7	.9	23	12	.7
14	105	30	8.5	45	10	1.2	23	5	.3
15	105	27	7.7	43	13	1.5	23	6	.4
16	104	24	6.7	41	10	1.1	23	6	.4
17	103	25	7.0	40	7	.8	24	5	.3
18	102	26	7.2	38	16	1.6	24	4	.3
19	100	24	6.5	37	26	2.6	24	3	.2
20	95	22	5.6	35	19	1.8	25	15	1.0
21	93	20	5.0	34	15	1.4	26	27	1.9
22	90	18	4.4	33	11	1.0	26	20	1.4
23	87	15	3.5	32	10	.9	27	12	.9
24	85	27	6.2	30	10	.8	28	18	1.4
25	80	39	8.4	29	17	1.3	28	24	1.8
26	78	39	8.2	28	24	1.8	28	10	.8
27	77	40	8.3	27	31	2.3	80	35	7.6
28	75	40	8.1	25	41	2.8	700	95	180
29	72	30	5.8	25	51	3.4	1600	115	497
30	70	20	3.8	--	--	--	2300	170	1060
31	70	20	3.8	--	--	--	1840	105	522
Total	3258	--	213.1	1453	--	51.7	7138	--	2301.2

IOWA RIVER BASIN--Continued

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

Suspended sediment, water year October 1959 to September 1960--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	55	178	157	46	19	150	65	26
2	840	110	249	138	53	20	135	81	30
3	618	40	67	122	58	19	119	77	25
4	460	75	93	109	38	11	107	65	19
5	372	165	166	116	35	11	97	53	14
6	301	165	134	152	35	14	88	51	12
7	246	95	63	261	51	36	82	41	9.1
8	209	35	20	285	83	64	76	40	8.2
9	175	38	18	238	51	33	71	34	6.5
10	142	29	11	202	36	20	69	43	8.0
11	138	34	13	167	65	29	70	57	11
12	133	30	11	144	62	24	68	73	13
13	119	29	9.3	130	60	21	67	66	12
14	122	27	8.9	117	50	16	63	67	11
15	129	33	11	108	44	13	61	62	10
16	151	45	18	111	43	13	62	70	12
17	261	88	62	115	55	17	64	71	12
18	246	38	25	122	56	18	87	91	21
19	209	33	19	185	55	27	92	66	16
20	187	34	17	301	38	31	80	75	16
21	173	50	23	335	58	52	74	85	17
22	155	36	15	362	69	67	74	65	13
23	139	37	14	372	72	72	75	66	13
24	133	36	13	309	76	63	78	68	14
25	126	40	14	301	76	62	67	73	13
26	151	42	17	293	78	62	59	67	11
27	184	95	47	261	79	56	53	54	7.7
28	159	54	23	231	66	41	50	53	7.2
29	147	54	21	209	86	49	49	57	7.5
30	152	48	20	187	86	43	46	31	3.9
31	--	--	--	166	100	45	--	--	--
Total	7777	--	1400.2	6306	--	1068	2333	--	399.1
	JULY			AUGUST			SEPTEMBER		
1	42	38	4.3	15	76	3.1	29	50	3.9
2	39	49	5.2	14	76	2.9	22	39	2.3
3	37	38	3.8	14	82	3.1	19	48	2.5
4	37	39	3.9	14	44	1.7	17	39	1.8
5	36	39	3.8	13	94	3.3	15	57	2.3
6	34	35	3.2	14	81	3.1	14	59	2.2
7	32	30	2.6	15	94	3.8	13	62	2.2
8	30	23	1.9	15	94	3.8	13	70	2.5
9	29	38	3.0	15	76	3.1	13	71	2.5
10	29	35	2.7	15	70	2.8	13	58	2.0
11	29	32	2.5	15	73	3.0	12	69	2.2
12	26	36	2.5	14	72	2.7	12	44	1.4
13	28	34	2.6	14	72	2.7	12	48	1.6
14	25	38	2.6	16	71	3.1	12	43	1.4
15	22	33	2.0	16	82	3.5	12	46	1.5
16	22	46	2.7	15	68	2.8	12	50	1.6
17	20	31	1.7	16	80	3.5	12	67	2.2
18	22	40	2.4	22	91	5.4	17	73	3.4
19	22	39	2.3	30	92	7.5	19	73	3.7
20	20	42	2.3	25	90	6.1	18	57	2.8
21	17	42	1.9	22	90	5.3	16	59	2.5
22	18	41	2.0	19	88	4.5	19	92	4.7
23	19	47	2.4	18	71	3.5	23	79	4.9
24	19	52	2.7	16	89	3.8	33	71	6.3
25	18	51	2.5	15	79	3.2	36	50	4.9
26	18	48	2.3	14	81	3.1	28	62	4.7
27	18	48	2.3	13	81	2.8	24	68	4.4
28	18	63	3.1	18	130	6.3	20	65	3.5
29	14	51	1.9	44	130	15	17	52	2.4
30	14	42	1.6	39	96	10	16	48	2.1
31	14	55	2.1	39	73	7.7	--	--	--
Total	768	--	82.8	584	--	136.2	538	--	86.4

Total discharge for year (cfs-days)..... 35769
Total load for year (tons)..... 6150.6

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 1960.
Sediment records: October 1943 to September 1960.
EXTREMES, 1959-60.--Water temperatures: Maximum, 88°F Sept. 1; minimum, freezing point on several days during January to March.
Sediment concentrations: Maximum daily, 2,990 ppm June 4; minimum daily, 7 ppm Nov. 29, 30.
Sediment loads: Maximum daily, 57,500 tons June 4; minimum daily, 16 tons Mar. 17, 18.
EXTREMES, 1943-60.--Water temperatures (1944-60): 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.--Records of discharge for water year October 1959 to September 1960 given in WSP 1708. 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, revised).

Temperature (°F) of water, water year October 1959 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	
October	66	66	66	62	62	62	62	60	60	60	56	58	58	60	--	60	59	--	58	58	58	60	60	54	52	52	50	50	52	52	52	58
November	52	52	54	54	48	44	54	54	52	50	50	42	40	38	36	36	--	44	46	46	46	46	46	38	36	36	38	36	36	40	--	45
December	38	40	42	40	36	36	36	36	38	36	38	39	38	38	38	36	38	36	36	36	36	34	36	36	--	44	44	40	38	38	38	38
January	--	36	36	34	34	36	38	36	38	36	36	38	38	38	36	34	34	34	34	34	34	32	34	34	34	34	34	34	--	--	--	35
February	--	35	--	34	34	34	32	36	32	--	32	34	34	34	34	34	34	34	34	34	34	34	36	34	34	36	34	34	34	--	--	34
March	34	34	34	32	32	32	34	32	32	34	34	34	34	34	34	34	34	34	36	36	36	36	36	34	34	36	36	36	36	38	38	35
April	38	38	38	38	38	38	38	36	36	38	41	46	46	46	46	48	46	48	52	50	54	60	60	60	60	60	60	60	60	60	--	48
May	60	62	62	62	62	60	58	54	54	54	58	62	62	62	62	58	58	60	58	62	64	64	64	62	62	62	62	66	64	68	68	61
June	70	70	77	--	72	70	70	72	72	--	72	68	66	72	74	73	--	74	72	72	72	72	72	74	76	76	76	74	74	74	--	73
July	71	78	76	76	76	76	76	76	76	76	76	74	76	78	78	78	78	78	78	80	82	82	82	80	80	80	80	80	80	78	78	78
August	80	82	82	80	80	80	79	74	80	80	80	80	80	78	80	80	80	80	80	78	80	80	80	80	80	80	80	80	82	80	82	80
September	88	86	86	86	86	86	86	86	78	76	74	74	74	74	76	76	76	74	70	74	72	70	70	72	72	72	72	72	68	68	--	76

IOWA RIVER BASIN--Continued

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

Suspended sediment, water year October 1959 to September 1960

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..	502	66	89	633	16	27	988	9	24
2..	480	67	87	565	24	37	795	16	34
3..	484	64	84	543	13	19	795	11	24
4..	462	65	81	1370	220	S 1410	890	14	34
5..	723	135	264	3460	370	3460	1020	8	22
6..	1000	130	351	3280	140	1240	1060	10	29
7..	1340	155	561	3280	55	487	1060	19	54
8..	1400	105	397	2770	50	374	1060	13	37
9..	1120	90	272	2050	36	199	1060	12	34
10..	645	61	106	1770	42	201	1060	16	46
11..	416	49	55	1740	50	235	1060	24	69
12..	570	59	91	1550	47	197	1060	13	37
13..	449	68	82	1340	52	188	1060	13	37
14..	459	60	74	1300	54	190	922	23	57
15..	495	62	83	1300	50	176	795	15	32
16..	581	65	102	1160	53	166	795	13	28
17..	493	58	77	858	46	107	795	12	26
18..	473	78	100	645	39	68	765	12	25
19..	450	98	119	575	35	54	765	14	29
20..	553	49	73	580	28	44	765	9	19
21..	480	35	45	609	60	99	795	17	36
22..	415	58	65	795	26	56	795	16	34
23..	600	42	68	1020	23	63	795	42	90
24..	711	26	50	1160	29	91	795	18	39
25..	693	42	79	1160	22	69	795	18	39
26..	693	18	34	1200	34	110	890	200	481
27..	693	14	26	1160	16	50	1400	250	945
28..	723	12	23	1160	8	25	1810	360	1760
29..	669	10	18	1120	7	21	2290	265	1640
30..	657	12	21	1160	7	22	2370	115	736
31..	663	15	27	--	--	--	2370	77	493
Total	20092	--	3604	41313	--	9485	33675	--	6990
	JANUARY			FEBRUARY			MARCH		
1..	2370	60	384	4300	55	639	1060	24	69
2..	2290	50	309	3640	39	384	1060	14	40
3..	2210	37	221	3370	35	318	988	48	128
4..	2210	43	257	2850	30	231	922	11	27
5..	1850	50	250	2610	20	141	825	53	118
6..	1300	46	162	2290	23	142	825	40	89
7..	1090	36	106	2290	24	149	825	18	40
8..	825	26	58	2050	31	172	795	8	17
9..	825	58	129	1850	33	165	795	11	24
10..	825	60	134	1770	25	119	765	26	54
11..	825	60	134	1810	17	83	795	11	24
12..	4040	1510	S 21300	1400	16	61	765	11	23
13..	5850	1010	S 17600	890	19	46	765	8	17
14..	1540	330	1370	890	22	53	765	14	29
15..	1580	430	1830	922	16	40	765	8	17
16..	1930	315	S 1870	1260	26	88	687	12	22
17..	3640	370	3640	1400	16	60	669	9	16
18..	5550	240	3600	1400	29	110	669	9	16
19..	6940	345	6470	1400	38	144	681	9	17
20..	7060	420	8010	1370	23	85	681	11	20
21..	6940	395	7400	1370	35	129	687	9	17
22..	6940	400	7500	1370	24	89	693	11	21
23..	7060	350	6670	1300	25	88	693	18	34
24..	6940	340	6370	1090	24	71	699	32	60
25..	6940	305	5720	1090	14	41	693	22	41
26..	6820	240	4420	1090	10	29	747	20	40
27..	6940	170	3190	1090	10	29	795	280	601
28..	6580	135	2400	1090	15	44	1370	550	2000
29..	5770	120	1870	1120	20	60	4680	575	S 9820
30..	5880	100	1590	--	--	--	5950	590	S 10400
31..	5440	70	1030	--	--	--	3400	480	4410
Total	127000	--	115994	50372	--	3810	36509	--	28251

S Computed by subdividing day.

IOWA RIVER BASIN--Continued

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

Suspended sediment, water year October 1959 to September 1960--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..	2920	310	2440	8660	84	1960	6900	715 S	14700
2..	2560	290	2000	8550	91	2100	5790	1080	16900
3..	1720	290	1350	8660	92	2150	5500	2940 S	44700
4..	3130	570 S	6290	8660	79	1850	7120	2990 A	57500
5..	7090	540	10300	8660	82	1920	5700	2880 S	48100
6..	9580	490	12700	8770	370 A	8760	4780	180	2320
7..	9700	405	10600	5590	430 S	7560	6690	80	1450
8..	9580	350	9050	2240	80	484	6690	62	1120
9..	9580	330	8540	1340	40	145	6690	62	1120
10..	9580	310	8020	1300	35	123	6690	57	1030
11..	9580	270	6980	2920	190 S	2040	6690	52	939
12..	9580	235	6080	6490	90	1580	5790	51	798
13..	9580	225	5820	6690	54	975	1520	180	739
14..	9700	230	6020	6690	46	831	2080	180	1010
15..	9580	310	8020	6690	41	741	5790	100	1560
16..	9790	315	8330	6790	110	2020	6590	67	1190
17..	9100	370	9090	6790	61	1120	6590	100	1780
18..	8660	155	3620	6690	48	867	6490	98	1720
19..	9700	155	4060	6690	48	867	5790	37	579
20..	9700	160	4190	6690	60	1080	5500	43	639
21..	9820	135	3580	6690	53	957	5500	51	758
22..	9820	130	3450	6690	48	867	5230	44	622
23..	9820	135	3580	6590	60	1070	3160	31	265
24..	9820	145	3840	6690	57	1030	2480	42	281
25..	9820	130	3450	6900	46	857	2320	45	282
26..	9820	145	3840	6690	59	1070	2160	28	164
27..	9820	130	3450	6690	43	777	2000	32	173
28..	9820	115	3050	6690	50	903	1840	34	169
29..	9820	120	3180	6590	47	836	1600	31	134
30..	9580	125	3230	6590	68	1210	1480	29	116
31..	--	--	--	6590	54	961	--	--	--
Total	258370	--	168150	198960	--	49711	143150	--	202858

Day	JULY			AUGUST			SEPTEMBER		
1..	1480	24	96	752	54	110	608	64	105
2..	1480	30	120	644	67	117	612	52	86
3..	1380	41	153	581	50	78	612	62	102
4..	1250	56	189	581	56	88	612	64	106
5..	1200	57	185	581	55	86	612	62	102
6..	1300	44	155	581	53	83	581	54	85
7..	1160	45	141	572	71	110	516	56	78
8..	902	46	112	568	56	86	430	52	60
9..	1600	170 A	734	572	55	85	445	53	64
10..	2000	165	891	558	56	84	426	62	71
11..	1250	130	439	545	56	82	417	48	54
12..	1800	400 A	1940	541	56	82	509	61	84
13..	2640	1080 A	7700	554	55	82	279	72	54
14..	2240	210 A	1270	1730	150 S	970	268	65	47
15..	1840	105	522	4060	295	3230	204	54	30
16..	2000	57	308	4060	315	3450	222	50	30
17..	2000	65	351	4420	305	3640	314	51	43
18..	1760	66	314	4870	225	2960	274	49	36
19..	1430	68	263	4780	150	1940	264	58	41
20..	1160	57	179	4690	160	2030	262	50	35
21..	970	47	123	3800	85	872	283	59	45
22..	910	60	147	2920	54	426	216	60	35
23..	895	60	145	2850	62	477	462	110	137
24..	850	59	135	2780	55	413	598	105	170
25..	850	34	78	2320	56	351	436	105	124
26..	858	58	134	1680	54	245	670	100	181
27..	850	55	126	1080	55	160	1000	93	251
28..	850	51	117	1080	44	128	1120	100	303
29..	850	43	99	1080	70	204	1120	100	303
30..	843	43	98	1080	70	204	1300	89	313
31..	836	36	81	808	58	127	--	--	--
Total	41434	--	17345	57718	--	23000	15672	--	3175

Total discharge for year (cfs-days)..... 1024265
Total load for year (tons)..... 632373

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

IOWA RIVER BASIN--Continued

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

Particle-size analyses of suspended sediment, water year October 1959 to September 1960
(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. 7, 1960.....	1515	38		9580	388		--	57		71		87	89	99	100			SPWC
June 2.....	0930	66		5890	1040		53	65		86		99	100					SPWC
June 2.....	0930	66		5890	1040		24	47		72		99	100					SPN

Particle-size analyses of bed material, water year October 1959 to September 1960
(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	
Jan. 18, 1960.....	0900		5	5590			0	4	19	72	79	84	90	100				S
Jan. 25.....	1000		5	6590			0	1	11	69	77	81	86	100				S
Apr. 7.....	1515		5	9580			0	1	25	84	94	98	99	100				S

IOWA RIVER BASIN--Continued

5-4550. RALSTON CREEK AT IOWA CITY, IOWA

LOCATION.--At gaging station at bridge on State Highway 1, at east edge of Iowa City, Johnson County, and 2.2 miles upstream from mouth.
DRAINAGE AREA.--3.01 square miles.
RECORDS AVAILABLE.--Sediment records: April 1952 to September 1960.
EXTREMES, 1959-60.--Sediment concentrations: Maximum daily, 8,240 ppm Jan. 12; minimum daily, not determined.
Sediment loads: Maximum daily, 3,080 tons June 4; minimum daily, less than 0.05 ton on many days.
EXTREMES, 1952-60.--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, 25,700 ppm Apr. 16. Records of discharge for water year October 1959 to September 1960 given in WSP 1708. Flow affected by ice Nov. 15, 16, Nov. 28 to Dec. 1, Dec. 8-10, Jan. 4, 5, 22-25, Feb. 10-13, 20-26, Mar. 6-8, 16, 26-29.

Suspended sediment, water year October 1959 to September 1960
/Where no concentrations are reported, loads are estimated/

Day	OCTOBER			NOVEMBER			DECEMBER		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1..	0.05	34	T	0.69	--	T	0.87	--	0.1
2..	.06	--	T	.55	--	T	.88	--	.1
3..	.07	--	T	.60	--	T	.93	31	.1
4..	.85	150	S 0.4	9.2	--	24	.93	--	.1
5..	20	1010	S 198	4.2	360	4.1	.88	34	.1
6..	23	940	S 137	2.4	120	.8	.80	--	.1
7..	4.2	185	2.1	1.9	100	.5	.63	--	.1
8..	2.2	130	.8	1.3	90	.3	.56	--	.1
9..	1.5	115	.5	1.1	82	.2	.52	--	T
10..	1.2	90	.3	1.0	--	.2	.54	34	T
11..	.84	70	.2	1.0	--	.2	.98	--	.1
12..	.76	50	.1	1.0	--	.2	.93	57	.1
13..	.69	40	.1	1.0	--	.2	.76	--	.1
14..	.66	38	.1	.93	--	.1	.72	--	.1
15..	.55	36	.1	.86	--	.1	.76	--	.1
16..	.50	--	.1	.80	--	.1	.72	51	.1
17..	.41	--	T	.63	--	.1	.66	--	.1
18..	.37	--	T	.88	--	.1	.57	--	.1
19..	.34	--	T	.84	--	.1	.60	--	.1
20..	.31	--	T	.84	--	.1	.63	--	.1
21..	.30	--	T	.93	--	.1	.57	--	.1
22..	.29	--	T	1.3	150 A	.5	.55	--	.1
23..	1.8	135	S 1.2	1.7	100 A	.5	1.0	42	.1
24..	.66	44	.1	2.4	280 A	1.8	.93	--	.1
25..	.57	34	.1	1.5	100 A	.4	.98	--	.5
26..	.84	30	.1	1.2	80	.3	.98	700	1.9
27..	.93	--	.1	1.0	50	.1	26	2570	S 273
28..	.72	--	.1	.88	--	.1	11	450	13
29..	.69	--	.1	.80	--	.1	6.4	150	2.6
30..	.60	75	.1	.86	--	.1	3.8	100	1.0
31..	.80	--	.1	--	--	--	2.6	80	.6
Total	66.76	--	342.0	44.29	--	35.5	69.68	--	294.9

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 1959 to September 1960--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	2.4	--	0.5	1.1	30	0.1	0.72	--	T
2	2.3	75	.5	1.1	13	T	.76	--	T
3	1.4	--	.3	1.0	34	.1	.76	--	T
4	1.1	--	.2	1.1	47	.1	.72	--	T
5	.95	--	.2	1.4	45	.2	.69	--	T
6	1.3	--	.2	1.4	35	.1	.72	--	T
7	1.2	--	.2	1.1	29	.1	.68	--	T
8	.93	--	.1	2.0	325	1.8	.70	--	T
9	.98	--	.1	1.6	175	.8	.76	--	T
10	.98	--	.1	2.3	96	.6	.72	18	T
11	4.4	--	42	2.1	61	.3	.69	--	T
12	75	8240	S 1980	1.8	66	.3	.69	--	T
13	11	650	19	1.6	66	.3	.69	--	T
14	12	1110	S 90	1.5	41	.2	.69	--	T
15	10	695	S 26	1.5	25	.1	.69	8	T
16	5.8	115	1.8	1.4	26	.1	.72	--	T
17	3.8	--	1.0	1.1	57	.2	.76	--	T
18	3.2	--	.8	1.0	24	.1	.76	--	T
19	3.0	--	.6	.88	--	T	.76	15	T
20	2.8	--	.6	.92	--	T	.72	--	T
21	2.8	--	.6	.86	--	T	.76	--	T
22	2.7	--	.5	.84	--	T	.80	12	T
23	2.5	--	.4	.82	--	T	.84	12	T
24	2.3	--	.4	.82	11	T	.80	5	T
25	2.1	66	.4	.82	--	T	.76	--	T
26	1.6	--	.3	.82	--	T	.82	--	T
27	1.5	--	.3	.80	--	T	4.0	700	7.6
28	1.3	--	.2	.80	--	T	15	1600	65
29	1.2	--	.2	.76	--	T	50	3400	A 459
30	1.3	--	.2	--	--	--	30	500	41
31	1.2	--	.2	--	--	--	20	200	11
Total	165.04	--	2167.9	35.24	--	5.8	138.18	--	584.2

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	15	--	4.0	2.6	--	0.7	21	2910	S 658
2	11	--	2.4	2.0	--	.4	6.8	750	14
3	8.4	--	1.6	1.7	--	.3	3.4	140	1.3
4	7.1	--	1.3	1.6	--	.2	53	7200	S 3080
5	5.2	--	.8	2.5	--	2.4	20	2570	S 381
6	3.8	--	.6	44	1710	S 367	7.1	195	3.7
7	3.2	58	.5	12	345	11	4.7	105	1.3
8	2.4	45	.3	7.4	200	4.0	3.8	84	.9
9	2.0	--	.3	5.2	100	1.4	2.8	81	.6
10	1.9	--	.3	4.0	--	1.0	2.6	58	.4
11	1.9	50	.3	3.2	--	.6	3.7	165	S 2.6
12	1.7	--	.3	2.6	--	.5	10	400	S 12
13	1.7	--	.3	2.3	58	.4	6.4	190	S 3.4
14	2.0	--	.4	1.9	67	.3	4.0	110	1.2
15	1.9	--	.4	1.7	72	.3	3.4	110	1.0
16	21	2850	S 840	6.4	885	S 27	3.0	115	.9
17	26	3800	A 267	3.4	135	1.2	2.0	100	.5
18	10	465	13	2.4	55	.4	3.2	75	.6
19	7.1	--	6.0	2.4	90	.6	2.3	50	.3
20	5.8	--	3.2	2.8	90	.7	2.0	52	.3
21	4.2	135	1.5	2.6	78	.5	1.9	48	.2
22	3.2	--	.9	2.0	37	.2	1.7	66	.3
23	2.6	--	.6	1.7	41	.2	1.4	90	.3
24	2.3	--	.4	5.4	430	S 19	1.2	84	.3
25	2.2	--	.4	3.6	160	1.6	1.1	61	.2
26	1.8	--	.3	2.8	81	.6	.98	76	.2
27	1.5	--	.2	2.4	80	.5	.93	58	.1
28	1.5	--	.2	2.2	48	.3	.93	58	.1
29	1.9	--	.4	1.8	--	.3	.88	71	.2
30	6.6	--	24	1.6	43	.2	.88	64	.2
31	--	--	--	1.3	40	.1	--	--	--
Total	166.9	--	1171.9	139.5	--	443.9	177.10	--	4166.1

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 1959 to September 1960--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	0.88	74	0.2	0.41	33	T	0.06	25	T
2	1.1	94	S .5	.38	23	T	.05	--	T
3	1.4	90	.3	.36	17	T	.04	--	T
4	.69	92	.2	.36	15	T	.04	--	T
5	.92	150	S .5	.32	19	T	.03	--	T
6	.72	100	.2	.43	16	T	.03	33	T
7	.55	58	.1	.69	70	0.1	.03	34	T
8	.52	62	.1	.48	56	.1	.02	24	T
9	25	1860	S 485	.38	65	.1	.02	17	T
10	4.7	185	2.3	.33	56	.1	.02	25	T
11	2.6	145	1.0	.29	42	T	.02	21	T
12	32	2590	S 887	.25	58	T	.02	20	T
13	8.0	350	7.6	.23	42	T	.02	28	T
14	3.8	150	1.5	.21	44	T	.02	49	T
15	2.6	120	.8	.20	40	T	.06	26	T
16	2.0	82	.4	.18	38	T	.12	26	T
17	1.8	81	.4	.17	27	T	.15	25	T
18	1.5	81	.3	.16	33	T	.12	22	T
19	1.2	73	.2	.15	31	T	.07	15	T
20	1.2	59	.2	.20	41	T	.05	23	T
21	1.2	48	.2	.17	39	T	.04	10	T
22	1.0	43	.1	.15	40	T	.04	29	T
23	.93	34	.1	.13	31	T	.32	120	A 0.1
24	.84	40	.1	.11	34	T	6.5	700	S 14
25	.88	51	.1	.10	20	T	.46	460	.6
26	.88	55	.1	.08	21	T	.13	120	T
27	.63	48	.1	.07	33	T	.09	80	T
28	.60	45	.1	.20	36	T	.07	53	T
29	.55	36	.1	.40	23	T	.09	58	T
30	.45	48	.1	.14	17	T	.11	56	T
31	.41	27	T	.08	22	T	--	--	--
Total	101.55	--	1389.9	7.81	--	0.9	8.84	--	14.9

Total discharge for year (cfs-days)..... 1120.69
Total load for year (tons)..... 10617.9

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

Particle-size analyses of suspended sediment, water year October 1959 to September 1960
(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. 5, 1959.....	0145	56		159	5670		29	36	49	61	90	98	99	99	100			SPWC
Oct. 5.....	0145	56		159	5670		21	30	40	59	88	98	99	99	100			SPN
June 1, 1960.....	1730	60		196	21300		--	39	--	69	--	95	96	98	99	100		SPWC
June 4.....	2220	65		150	22000		--	42	--	70	--	98	99	100	--			SPWC
June 4.....	2220	65		150	22000		--	27	--	64	--	98	99	100	--			SPN
July 9.....	1520	65		176	8730		--	25	--	32	--	97	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 1960.
EXTREMES, 1959-60.--Water temperatures: Maximum, 77°F Sept. 5; minimum, 34°F on many days during November to March.
EXTREMES, 1953-60.--Water temperatures: Maximum, 88°F June 19, 1953; minimum, freezing point on several days during December 1953, January 1954, and March and April 1956.
REMARKS.--Records of discharge for water year October 1959 to September 1960 given in WSP 1708.

Temperature (°F) of water, water year October 1959 to September 1960
/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	55	54	54	54	55	55	55	55	53	51	51	47	47	47	48	49	49	48	50	50	50	51	51	51	48	46	46	44	44	44	45	50
Minimum	53	53	53	53	53	55	55	53	50	51	47	46	46	46	46	48	47	47	48	49	48	49	51	48	46	46	44	43	43	44	44	49
November																																
Maximum	46	46	45	45	44	40	39	38	38	39	39	39	38	37	36	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	--	38
Minimum	44	44	44	44	40	39	37	37	37	37	39	38	37	36	35	35	35	34	34	34	34	34	34	34	34	34	35	35	35	34	--	37
December																																
Maximum	35	35	35	35	35	35	35	35	35	35	35	35	35	36	37	37	37	37	36	36	36	36	35	35	35	37	38	38	38	38	36	36
Minimum	34	34	34	34	34	34	34	34	34	34	34	34	35	35	35	35	36	36	36	36	36	35	35	35	35	35	37	38	37	36	35	35
January																																
Maximum	35	34	35	35	35	35	35	34	34	34	34	34	34	34	34	34	35	34	35	35	35	35	35	35	35	35	35	35	34	34	34	35
Minimum	34	34	34	35	35	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
February																																
Maximum	34	34	34	34	34	34	34	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	--	--	35
Minimum	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	35	34	35	--	--	34
March																																
Maximum	35	35	35	35	35	35	35	35	35	35	35	36	36	36	36	36	37	37	38	38	38	37	37	37	37	37	38	38	34	35	35	36
Minimum	35	35	34	35	35	35	35	35	35	35	35	35	35	36	35	35	35	36	36	36	36	36	36	36	36	35	36	34	34	34	35	35
April																																
Maximum	36	36	37	38	40	43	45	45	43	43	46	47	50	52	54	54	52	47	49	50	54	56	58	58	58	58	56	55	54	54	--	49
Minimum	35	36	36	37	38	40	43	43	41	41	42	45	47	50	52	51	47	45	46	49	50	54	55	57	58	56	54	54	54	51	--	47
May																																
Maximum	51	54	56	56	56	56	52	48	48	49	52	54	57	59	60	60	60	60	60	62	62	62	63	63	63	63	62	60	60	63	64	58
Minimum	49	51	54	56	56	52	48	46	48	48	49	51	54	56	59	59	60	60	59	60	62	60	60	62	62	62	60	58	58	60	62	56
June																																
Maximum	66	67	68	68	66	66	66	66	64	64	64	64	62	64	66	66	65	67	69	68	64	65	65	67	68	69	71	71	71	71	--	67
Minimum	64	64	65	66	65	64	64	63	63	63	64	62	61	62	64	63	60	64	66	64	63	62	64	65	65	66	68	71	70	69	--	64
July																																
Maximum	69	69	68	68	68	67	67	68	68	68	67	67	68	68	68	69	70	72	72	72	74	75	75	74	74	73	73	74	74	74	72	70
Minimum	67	68	68	67	67	66	66	67	68	66	66	67	66	67	68	68	68	70	71	72	72	73	74	74	73	72	72	73	73	72	70	69
August																																
Maximum	71	72	74	74	74	72	72	72	72	71	70	70	70	69	68	68	68	68	68	68	70	71	71	71	70	70	70	70	72	72	73	71
Minimum	69	71	72	73	72	70	70	70	71	69	68	68	68	68	65	65	67	68	68	68	68	69	70	70	69	69	68	69	68	70	72	69
September																																
Maximum	73	75	76	76	77	76	76	74	72	69	66	66	62	62	62	62	62	62	61	58	60	60	60	59	60	61	61	60	60	59	--	66
Minimum	72	73	74	74	75	74	74	72	68	64	63	61	60	59	58	61	61	61	58	57	58	60	59	59	58	59	59	58	58	57	--	65

DES MOINES RIVER BASIN

5-4820. DES MOINES RIVER AT DES MOINES, IOWA
(Formerly published as 5-4820. Des Moines River at Euclid Avenue Bridge, at Des Moines, Iowa)

LOCATION.--At Euclid Avenue Bridge in Des Moines, Polk County, 2.1 miles upstream from gaging station, 4.9 miles upstream from Raccoon River, and 2.4 miles downstream from Beaver Creek.
DRAINAGE AREA.--6,245 square miles upstream from gaging station.
RECORDS AVAILABLE.--Chemical analyses: November 1954 to June 1955.
Water temperatures: November 1954 to September 1960.
Sediment records: November 1954 to September 1960.
EXTREMES, 1959-60.--Water temperatures: Maximum, 89°F July 14, 24; minimum, freezing point on many days during November to March.
Sediment concentrations: Maximum daily, 2,620 ppm May 6; minimum daily, 10 ppm Feb. 25, 26.
Sediment loads: Maximum daily, 68,200 tons May 6; minimum daily, 13 tons Mar. 11.
EXTREMES, 1954-60.--Water temperatures: Maximum (1954-57, 1958-60), 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 (1959-60), 10 ppm Feb. 25, 26, 1960.
Sediment loads: Maximum daily, 99,000 tons June 16, 1957; minimum daily (1959-60), 13 tons Mar. 11, 1960.
REMARKS.--Maximum observed sediment concentration during water year, 4,230 ppm May 6. Records of discharge for water year October 1959 to September 1960 given in WSP 1708. No appreciable inflow between sampling point and gaging station except during periods of heavy local runoff. Flow affected by ice Nov. 15 to Mar. 29.

Temperature (°F) of water, water year October 1959 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	
October	54	54	54	54	54	56	59	54	51	51	50	51	51	51	52	51	51	51	51	50	50	51	51	51	50	50	49	48	48	48	50	51
November	50	50	50	50	46	39	36	36	36	49	34	36	34	32	32	32	32	32	32	38	34	42	39	32	32	32	32	32	32	32	--	37
December	32	32	36	34	34	34	32	36	38	38	38	38	38	36	38	38	38	38	38	38	36	32	34	36	36	39	36	36	34	36	32	36
January	32	32	32	32	32	32	32	32	32	32	36	36	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
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	--	--	39	32
April	35	39	--	40	40	49	40	40	39	42	42	42	46	46	56	50	50	50	51	56	60	60	60	69	69	59	59	59	59	50	--	50
May	52	60	60	64	69	50	49	58	56	50	50	60	61	60	70	70	60	69	65	70	70	70	70	60	64	64	64	67	60	70	64	62
June	70	70	72	72	70	74	70	70	--	76	72	66	70	76	80	70	68	78	80	70	70	72	69	70	78	79	79	80	78	70	--	73
July	75	80	80	76	78	73	74	80	74	78	80	80	79	89	80	76	80	80	88	86	84	85	80	89	86	82	86	88	80	75	78	81
August	80	78	82	80	80	74	80	78	78	76	78	79	76	72	72	80	76	80	84	78	80	80	80	82	78	74	80	83	72	76	79	78
September	80	80	84	82	80	78	82	79	74	64	78	64	70	69	77	70	69	69	70	72	68	62	62	62	68	70	64	64	62	61	--	72

DES MOINES RIVER BASIN--Continued

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

Suspended sediment, water year October 1959 to September 1960

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	641	105	182	347	27	25	600	52	84
2	725	67	131	358	27	26	700	55	104
3	770	45	94	347	21	20	780	105	221
4	755	43	88	500	245	A 331	790	66	141
5	785	43	91	760	215	A 441	740	120	240
6	740	41	82	760	50	103	620	100	167
7	641	36	62	730	100	A 197	500	69	93
8	654	53	94	700	135	A 255	540	65	95
9	600	33	53	680	28	51	580	73	114
10	560	50	76	660	48	86	640	77	133
11	560	62	94	650	40	70	640	61	105
12	510	34	47	660	51	91	620	73	122
13	485	40	52	680	40	73	600	78	126
14	448	48	58	620	22	37	580	27	42
15	448	38	46	600	105	170	570	23	35
16	472	40	51	450	80	97	550	55	82
17	435	32	38	415	32	36	540	45	66
18	424	28	32	450	25	30	540	60	87
19	402	32	35	610	41	68	540	30	44
20	391	60	63	660	38	68	540	20	29
21	347	39	37	680	50	92	540	38	55
22	336	37	34	670	56	101	530	25	36
23	380	39	40	640	61	105	520	21	29
24	336	27	24	700	150	284	520	25	35
25	347	20	19	785	31	66	520	19	27
26	347	18	17	670	54	98	530	18	26
27	347	21	20	620	51	85	560	110	A 166
28	336	38	34	540	88	128	700	120	227
29	305	19	16	480	40	52	1000	110	297
30	325	28	25	550	31	46	1400	345	1300
31	347	41	38	--	--	--	1800	300	1460
Total	15199	--	1773	17972	--	3332	20830	--	5788

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	2300	45	280	860	52	121	480	46	60
2	1800	36	175	820	26	58	465	16	20
3	1400	76	287	790	43	92	450	16	19
4	1100	100	A 297	760	34	70	440	22	26
5	800	62	134	730	37	73	430	36	42
6	550	18	27	730	33	65	420	33	37
7	600	12	20	720	36	70	415	26	29
8	720	92	179	720	36	70	400	33	36
9	1000	115	311	710	17	33	400	24	26
10	1500	66	267	680	16	29	400	31	33
11	1900	95	488	680	18	33	400	12	13
12	2100	145	A 822	680	20	37	400	14	15
13	2300	75	466	680	20	37	400	18	19
14	2100	76	431	700	19	36	400	23	25
15	1800	77	374	730	19	37	400	51	55
16	1550	72	301	720	22	43	400	36	39
17	1350	68	248	700	15	28	410	56	62
18	1150	58	180	670	23	42	420	21	24
19	1050	65	184	650	18	32	430	22	26
20	1150	55	171	640	28	48	440	21	25
21	1200	64	207	630	13	22	440	26	31
22	1200	36	117	620	16	27	440	18	21
23	1150	25	78	620	20	33	440	17	20
24	1130	54	165	600	13	21	445	13	16
25	1100	42	125	600	10	16	450	16	19
26	1050	52	147	570	10	15	440	95	113
27	1000	45	122	540	18	26	430	285	331
28	970	31	81	500	17	23	1200	180	583
29	930	49	123	500	52	70	3800	530	A 5440
30	900	31	75	--	--	--	8400	760	A 17200
31	900	31	75	--	--	--	20300	630	34500
Total	39750	--	6957	19550	--	1307	45185	--	58905

A Computed from partly estimated concentration graph.

DES MOINES RIVER BASIN--Continued

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

Suspended sediment, water year October 1959 to September 1960--Continued

Day	APRIL			MAY			JUNE		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	35000	510	48200	4790	310	4010	8960	460	11100
2	35400	365	34900	4600	205	2550	7790	480	10100
3	27800	325	24400	4320	190	2220	6950	515	9660
4	21100	305	17400	4050	185	2020	6350	485	8320
5	16800	465	21100	4050	175	1910	5950	490	7870
6	14100	420	16000	8190	2620 S	68200	5360	410	5930
7	12600	240	8170	12600	1600	54400	5170	330	4610
8	11100	460	13800	10200	760	20900	4790	320	4140
9	9680	525	13700	8240	560	12500	4300	330	3830
10	8720	390	9180	6550	475	8400	4000	295	3190
11	8240	405	9010	5550	365	5470	3700	290	2900
12	7570	375	7670	4980	375	5040	3500	295	2790
13	6950	320	6010	4410	385	4580	3300	310	2760
14	6350	325	5570	3850	325	3380	3000	245	1980
15	6150	345	5730	3500	275	2600	2850	165	1270
16	5750	330	5120	3150	325	2760	2800	220	1660
17	6150	760	12600	2900	280	2190	2750	215	1600
18	8010	755	16300	2700	190	1390	3000	275	2230
19	8480	475	10900	3000	290	2350	5170	635	8860
20	7570	315	6440	3250	420	3690	6150	805	13400
21	6550	295	5220	3850	1270	13200	5950	685	11000
22	5950	245	3940	4980	580	7800	5170	490	6840
23	5550	235	3520	6150	880	14600	4700	415	5270
24	5170	240	3350	7350	900	17900	4410	390	4640
25	5170	320	4470	10200	2360 A	65000	4140	375	4190
26	5360	485	7020	13600	1210	44400	3780	345	3520
27	4980	380	5110	14600	770	30400	3420	285	2630
28	4600	275	3420	14100	575	21900	3240	280 A	2450
29	4320	210	2450	13600	420	15400	3510	845 A	8010
30	4700	315	4000	12400	480	16100	3780	890 A	9080
31	--	--	--	10400	460	12900	--	--	--
Total	315870	--	334700	216110	--	470160	137940	--	165830

Day	JULY			AUGUST			SEPTEMBER		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	4140	510	5700	755	85	173	1080	200	583
2	3690	450	4480	695	73	137	969	195	510
3	3240	390	3410	641	73	126	845	205	468
4	2860	310	2400	587	86	136	710	130	249
5	2600	285	2000	574	90 S	157	574	130	202
6	2040	285	1570	984	440 A	1170	560	140	212
7	1890	170	868	830	340	762	560	105	159
8	1800	125	608	770	200	416	472	83	106
9	2360	625 S	4790	682	170	313	435	86	101
10	3220	790	6870	654	110	194	402	82	89
11	3000	400	3240	641	84	145	369	50	50
12	2900	560 A	4380	600	76	123	325	36	32
13	3220	680 A	5910	574	72	112	347	26	24
14	3840	1000 A	10400	472	48	61	347	24	22
15	3640	550	5410	535	175 A	253	472	16	20
16	3220	410	3560	510	55 A	76	560	65 A	98
17	2600	350	2460	485	100 A	131	587	40	63
18	2240	285	1720	1190	620 S	2140	614	40	66
19	1990	255	1370	1370	520 A	1920	560	44	67
20	1800	245	1190	1070	260	751	548	46	68
21	1640	225	996	938	205	519	560	48	73
22	1550	215	900	860	160	372	535	54	78
23	1460	225	887	740	145	290	587	58	92
24	1370	215	795	654	170 A	300	755	140 A	285
25	1240	170	569	817	310 S	935	1140	84	259
26	1190	130	418	1120	875 A	2650	1080	80	233
27	1070	130	376	785	330 A	699	1030	120	334
28	1030	125	348	757	430 S	915	969	220	576
29	922	110	274	1370	350 A	1290	984	220	585
30	892	105	253	1390	420 A	1580	1020	190	523
31	815	105	231	1140	270	831	--	--	--
Total	69469	--	78383	25190	--	19677	19996	--	6227

Total discharge for year (cfs-days)..... 943061
Total load for year (tons)..... 1153039

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

DES MOINES RIVER BASIN--Continued

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

Particle-size analyses of suspended sediment, water year October 1959 to September 1960
(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	
July 7, 1958	1215	75		4060	414		--	43		67		94	97	99	100	--	--	SPWC
May 31, 1959	1400	69		11100	4060		--	32		63		83	85	90	95	100	--	SPWC
June 1	1600	67		14900	538		--	65		74		87	91	97	99	99	100	SPWC
June 1	1600	67		14900	538		--	45		68		87	91	97	99	99	100	SPN
May 7, 1960	1230	45		13100	1520		48	55		77		97	98	100	--	--	--	SPWC
May 7	1230	45		13100	1520		9	36		75		97	98	100	--	--	--	SPN
May 26	0900	64		12600	1250		--	47		62		72	78	96	100	--	--	SPWC

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

Chemical analyses, in parts per million, water year October 1959 to September 1960

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																							
5-497. LAKE TRAVERSE AT RESERVATION DAM, NEAR WHEATON, MINN.																							
Feb. 17, 1960	(a)	15		0.13		218	179	187	30	379	0	1280	42	0.3	3.8	0.75	2300	1280	969	2.3	2640	7.2	35
Apr. 27.....	(a)	9.8		.05		90	59	47	12	164	0	428	12	.1	1.1	.16	800	468	334	.9	1050	7.3	--
May 5.....	(a)	3.9		.03		83	56	48	13	142	0	405	11	.2	1.6	1.7	756	437	321	1.0	994	7.2	46
5-499. MUD LAKE NEAR WHEATON, MINN.																							
May 4, 1960..	b 973.30	2.2		0.05		79	55	43	14	122	0	381	12	0.2	6.1	0.14	728	424	324	0.9	973	6.7	45
May 5.....	b 973.05	5.6		.05		79	57	49	12	130	0	403	11	.2	1.4	.18	747	430	323	1.0	988	6.9	40
May 6.....	b 972.94	2.7		.03		77	57	47	12	123	0	403	11	.2	1.1	.17	736	428	327	1.0	979	6.9	34
May 7.....	b 972.93	2.3		.03		77	57	49	12	122	0	424	13	.2	2.4	.20	744	426	326	1.0	991	6.9	33
5-517. WILD RICE RIVER NEAR CAYUGA, N. DAK.																							
Dec. 16, 1959	0.1	7.8		0.20		39	15	975	12	426	0	1290	414	6.3	1.4	3.3	2970	161	0	33	4290	7.8	6
Mar. 30, 1960	10.2	8.7		.33		20	10	27	11	67	0	81	13	.3	8.6	.12	228	91	36	1.2	364	6.6	44
Apr. 20.....	118	22		.07		74	39	34	14	157	0	274	13	.2	.6	.16	584	344	215	.8	800	7.0	40
5-550.8. BUFFALO LAKE NEAR ESMOND, N. DAK.																							
Apr. 28, 1960	(a)	13		0.02		15	14	283	15	620	0	169	28	0.4	4.7	0.47	903	96	0	13	1310	7.6	55
Sept. 27.....	(a)	20		.12	0.00	14	24	440	26	994	8	248	45	.5	.4	.66	1390	134	0	17	2010	8.3	45
5-550.9. CRANBERRY LAKE NEAR FILLMORE, N. DAK.																							
June 17, 1949		22		0.02		4	5	8220	65	2250	3270	9730	591		3.8	--	23500	31	0	642	25600	9.8	
Aug. 2, 1950.		27		.02		2.0	15	4340	74	1500	1580	5060	347		.4	--	12400	67	0	230	14400	9.7	

a Lake content not known. Information on lake stage available in district office at Lincoln, Nebr.
b Lake elevation, in feet.

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

Chemical analyses, in parts per million, water year October 1959 to September 1960--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)	Fluorides (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																							
5-550.9. CRANBERRY LAKE NEAR FILLMORE, N. DAK.--Continued																							
May 15, 1952.		11		0.10		2.9	9.5	8690	138	3600	3010	10500	668		5.8	8.6	25000	46	0	557	27500	9.8	
Oct. 3.....		--		--		--	--	--	--	12800	11300	--	--		--	--	35700	49	0	--	36600	9.6	
May 3, 1960..		.0		.45	0.00	28	4.4	21700	280	6090	8160	25700	1290	1.8	1.0	21	61200	88	0	1010	55000	9.4	45
5-560.1. BATTLE LAKE NEAR WARWICK, N. DAK.																							
June 20, 1949		29		0.06		14	28	19	8.8	148	31	18	10	0.2	1.0		320	150	0	0.7	358	9.0	
May 5, 1960..	(a)	22		.03	0.00	21	41	18	8.8	282	0	19	7.6	.4	8.0	0.19	329	220	0	.5	505	7.4	13
5-562.1. EDMORE COULEE NEAR WEBSTER, N. DAK.																							
June 19, 1949		23		0.04		55	23	35	6.4	302	0	58	9.5	0.2	1.9		390	232	0	1.0	590	7.3	
May 8, 1960..	(a)	31		.01	0.00	39	15	20	9.4	194	0	44	4.9	.2	.4	0.06	277	158	0	.7	398	7.5	50
5-562.3. DRY LAKE NEAR WEBSTER, N. DAK.																							
June 19, 1949		12		0.04		42	14	8.2	14	230	0	8.4	1.5	0.2	1.6		232	163	0	0.3	380	7.4	
May 2, 1960..	(a)	28		.07	0.00	44	34	51	23	326	0	82	28	.2	3.0	0.13	502	248	0	1.4	717	7.5	32
5-562.4. STINK LAKE NEAR CHURCHS FERRY, N. DAK.																							
June 17, 1949		17		0.09		41	590	6370	185	464	43	13000	1670	3.4	2.1		23300	2530	2080	55	23900	8.3	
May 3, 1960..	(a)	1.2		.12	0.00	68	895	9830	236	482	103	21600	2210	.2	.6	7.7	37300	3850	3280	89	34800	8.8	41

5-563.8. SILVER LAKE NEAR BRINSMADE, N. DAK.

June 17, 1949		11		0.02		48	17	27	9.6	222	0	54	18	0.6	4.9		324	190	8	0.8	508	7.3	
May 3, 1960..	(a)	15		.03	0.00	51	43	99	24	286	0	235	33	.2	8.7	0.17	720	302	87	2.5	1030	7.1	26

5-565. DEVILS LAKE NEAR DEVILS LAKE, N. DAK.

Oct. 4, 1959.	b 1415.44	18		0.06	--	72	341	1780	219	727	0	3850	844	0.2	0.7	1.3	7610	1580	984	19	9370	8.2	22
Jan. 21, 1960	--	19		.04	--	74	352	1840	199	751	0	3960	888	.2	8.2	1.4	7820	1630	1010	20	9640	8.0	26
May 4.....	b 1415.85	19		.04	0.00	77	347	1790	187	757	0	3940	878	.2	1.8	1.6	7930	1620	999	19	9580	7.6	23
Sept. 29.....	b 1415.09	12		.08	.00	84	367	1890	211	799	0	4160	900	.2	5.3	1.6	8240	1720	1070	20	9970	7.9	28

5-585.1. LONG LAKE NEAR MINNEWAUKON, N. DAK.

June 20, 1949	--	5		0.02		73	82	144	30	305	0	538	55	0.6	3.8		1180	519	269	2.8	1600	7.9	
Apr. 28, 1957	(a)	3.7		.01		57	118	218	60	390	0	675	78	.2	1.8	0.29	1480	620	300	3.8	2020	7.9	
May 3, 1960..	(a)	18		.05	0.00	42	158	294	77	400	0	963	114	.3	1.0	.24	1970	754	426	4.7	2630	6.9	43

5-565.2. ROUND LAKE NEAR MINNEWAUKON, N. DAK.

June 20, 1949	--	25		0.02		45	36	71	15	223	0	194	21	0.8	6.8	--	538	261	78	1.9	783	7.4	
Apr. 28, 1957	(a)	22		.01		71	56	100	26	293	0	340	29	.2	2.8	0.25	818	408	186	2.2	1160	7.4	
May 3, 1960..	(a)	21		.03	0.00	37	54	115	29	193	0	375	39	.2	3.5	.16	818	315	157	2.8	1150	6.9	42

5-565.3. TWIN LAKES NEAR FORT TOTTEN, N. DAK.

June 20, 1949		7.6		0.04		37	65	101	26	281	14	312	43	0.2	2.3		802	380	123	2.3	1140	8.4	
May 3, 1960..	(a)	9.5		.03	0.00	42	149	288	56	440	0	876	108	.3	2.9	0.57	1860	718	357	4.7	2480	7.3	44

a Lake content not known. Information on lake stage available in district office at Lincoln, Nebr.
b Lake elevation, in feet.

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

Chemical analyses, in parts per million, water year October 1959 to September 1960--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																							
5-565.4. WOOD LAKE NEAR TOKIO, N. DAK.																							
May 19, 1949.		12		0.02		29	52	25	13	297	20	70	6.0	0.3	0.2	0.23	407	286	9	0.6	719	8.6	
June 16.....		13		.08		27	55	27	9.6	316	8	72	7.5	.2	1.5	--	384	294	22	.7	647	8.2	
May 15, 1952.		13		.04		28	48	23	15	308	10	54	6.5	.2	1.6	.11	376	268	0	6	629	8.4	
Oct. 3.....		--		--		--	--	--	--	336	0	--	--	--	--	--	362	274	0	--	610	8.1	
Apr. 30, 1960	(a)	12		.01	0.02	27	43	21	13	324	0	39	4.6	.4	.4	.09	338	246	0	.6	550	7.8	12
5-565.5. SQUARE LAKE NEAR TOKIO, N. DAK.																							
June 20, 1949		12		0.08		33	22	22	11	208	0	60	4.0	0.2	1.8		282	173	2	0.7	438	7.7	
May 1, 1960..	(a)	16		.03	0.00	27	21	26	8.3	213	0	37	3.0	.3	3.1	0.11	268	154	0	.9	413	7.0	35
5-565.6. SPRING LAKE NEAR TOKIO, N. DAK.																							
June 20, 1949		13		0.06		112	280	819	55	406	24	2300	380	0.4	1.3		4360	1430	1060	9.4	5410	8.2	
July 7, 1950.		8.6		.08		29	234	734	111	410	0	1950	327	.4	1.4		3850	1030	694	9.9	4810	7.8	
Apr. 30, 1960	(a)	15		.03	0.00	59	485	1350	155	552	0	3980	619	.2	6.3	2.3	7370	2140	1690	13	8440	7.4	45
5-565.7. EAST DEVILS LAKE NEAR HAMAR, N. DAK.																							
Oct. 3, 1958.	b 1401.67	4.7		0.08	--	57	2930	14400	1290	1600	355	35300	5760	0.5	57	8.3	63100	12200	10300	57	52800	8.5	45
Oct. 3, 1959.	b 1399.94	7.2		.08	--	27	3530	17800	1610	1950	422	42500	6670	.1	5.3	9.1	75000	14600	12300	64	59700	8.6	55
May 7, 1960..	b 1400.81	4.2		.05	0.03	52	2810	12100	1080	1590	325	30200	5100	.2	2.5	7.1	56800	11700	9850	49	47900	8.6	45
Sept. 30.....	b 1399.74	2.4		.08	.00	121	3650	17500	1570	1970	290	44200	6940	.1	.4	12	80300	15300	13200	62	62700	8.5	43

5-565.8. HORSESHOE LAKE NEAR WARWICK, N. DAK.

June 20, 1949		20		0.08		30	31	1890	78	1040	185	2100	770	0.8	1.4		5930	203	0	58	8090	8.9	
May 1, 1960..	(a)	14		.02	0.00	13	30	2280	172	1350	169	2790	849	.2	5.6	2.2	7180	155	0	80	9530	8.8	34

5-565.9. MALLARD LAKE NEAR TOKIO, N. DAK.

June 20, 1949		15		0.08		78	34	52	5.6	524	0	14	1.5	0.2	2.7		498	335	0	1.2	760	7.9	
May 1, 1960..	(a)	17		.04	0.00	39	52	53	19	447	0	60	9.3	.5	13	0.20	537	312	0	1.3	793	7.7	43

5-566. ELBOW LAKE NEAR WARWICK, N. DAK.

June 20, 1949		13		0.08		20	41	268	22	608	47	160	50	0.2	1.2		944	219	0	7.9	1460	8.5	
Apr. 30, 1960	(a)	20		.02	0.06	19	41	188	23	624	0	87	34	.3	.5	0.50	755	215	0	5.6	1170	7.8	21

5-566.1. FREE PEOPLES LAKE NEAR WARWICK, N. DAK.

June 20, 1949		38		0.6		80	92	2810	104	1410	358	3600	800	0.8	3.0		8830	578	0	51	11200	9.0	
Apr. 30, 1960	(a)	16		.02	0.00	13	93	2390	128	1560	153	3000	741	.2	1.5	4.5	7490	415	0	51	9690	8.6	25

5-566.2. SHINBONE LAKE AT WARWICK, N. DAK.

June 20, 1949		33		0.06		16	30	536	50	1010	106	109	180	0.2	2.6		1660	164	0	18	2480	8.8	
Apr. 30, 1960	(a)	23		.04	0.00	8.6	21	638	75	1270	50	124	243	.5	.4	1.7	1930	108	0	27	2970	8.6	70

a Lake content not known. Information on lake stage available in district office at Lincoln, Nebr.
b Lake elevation, in feet.

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

Chemical analyses, in parts per million, water year October 1959 to September 1960--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																							
5-566.3. EASTERN STUMP LAKE NEAR LAKOTA, N. DAK.																							
Oct. 3, 1958.	b 1383.84	11		0.09	--	393	9080	26200	1930	1640	0	73200	16000	1.2	84	20	136000	38300	37000	58	85900	7.9	75
Oct. 9, 1959.	b 1383.21	9.1		.28	--	381	11000	19500	2360	1990	0	59900	19000	.2	14	22	121000	46100	44500	39	79800	8.2	190
May 7, 1960..	b 1383.77	6.8		.10	0.00	319	7690	21200	1950	1430	0	59200	13400	.2	4.2	22	117000	32400	31200	51	77500	8.1	120
Sept. 30.....	b 1382.76	10		.09	.11	323	11400	29900	2280	1540	0	88400	19500	.2	.0	22	170000	47700	46400	60	94900	7.9	230
5-566.4. COON LAKE NEAR LAKOTA, N. DAK.																							
June 20, 1949		25		0.02		108	78	97	15	358	0	504	20	0.8	6.1		1140	590	296	1.7	1470	7.6	
May 5, 1960..	(a)	17		.04	0.00	83	92	158	29	272	0	651	36	.2	6.3	0.29	1300	584	361	2.8	1690	7.0	45
5-566.5. ROSE LAKE NEAR BARTLETT, N. DAK.																							
June 20, 1949		19		0.02		76	45	153	14	268	0	434	47	0.7	6.5		1000	375	155	3.4	1390	7.4	
May 5, 1960..	(a)	14		.06	0.00	65	61	248	20	285	0	615	83	.2	1.4	0.27	1350	413	179	5.3	1860	7.6	42
5-566.6. SWAN LAKE NEAR BARTLETT, N. DAK.																							
June 20, 1949		14		0.02		74	48	118	14	247	0	40	39	0.6	3.3		888	382	179	2.6	1270	7.3	
May 5, 1960..	(a)	12		.06	0.07	65	56	174	20	180	0	564	60	.1	.5	0.26	1150	393	245	3.8	1500	6.9	28
5-566.7. WESTERN STUMP LAKE NEAR LAKOTA, N. DAK.																							
Oct. 3, 1958.	b 1395.0	29		0.83		304	2930	12000	755	975	0	28900	7100	0.6	38	9.0	54400	12800	12000	46	48400	7.6	100
Oct. 10, 1959	b 1394.60	4.4		.41		152	842	3520	249	233	0	8360	2180	.1	2.1	2.4	16500	3840	3650	25	17800	7.2	32
May 6, 1960..	b 1395.59	3.6		.02	0.00	107	232	1180	116	249	0	2470	850	.1	.5	1.3	5240	1220	1020	15	6790	7.7	23
Sept. 30.....	b 1394.58	19		.08		538	2570	10500	837	569	0	25600	7120	.1	.0	6.9	51200	11900	11400	42	45500	7.6	72

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

Oct. 3, 1956.	--	23		0.01	--	41	27	32	6.0	291	0	39	7.0	0.2	5.6	0.10	336	214	0	0.9	534	7.6	--
May 5, 1960..	(a)	7.3		.01	0.00	33	25	34	7.4	246	0	52	9.1	.3	.6	.07	313	186	0	1.1	500	7.3	23
Sept. 30.....	(a)	18		.02	.00	31	30	39	8.9	276	0	54	11	.3	.9	.10	338	199	0	1.2	555	7.5	18

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

Oct. 11, 1959	10	21		0.03		51	31	80	11	325	5	137	19	0.2	1.1	0.21	523	255	0	2.2	792	8.3	17
Feb. 19, 1960	24	22		.07		56	38	92	11	367	0	158	26	.2	1.4	.23	593	294	0	2.3	912	7.5	27
Apr. 7.....	1260	20		.06		53	35	82	11	350	0	144	19	.3	2.3	.19	556	274	0	2.2	650	7.6	23
May 10.....	94	15		.02	0.00	42	22	53	8.8	246	0	98	13	.3	1.4	.13	395	197	0	1.6	612	7.2	21

5-885. HOMME RESERVOIR NEAR PARK RIVER, N. DAK.

Dec. 8, 1959.	c 3380	20		0.05		84	31	43	7.9	240	0	218	16	0.4	0.4	0.09	555	338	141	1.0	792	7.4	10
Apr. 26, 1960	c 3710	17		.05	0.12	31	9.1	17	4.3	104	0	62	2.5	.2	2.5	.05	221	115	30	.7	316	7.0	33

5-1202. WINTERING RIVER NEAR BERGEN, N. DAK.

Mar. 29, 1960	232	6.8		0.18		7.8	4.3	35	7.4	96	0	39	0.1	0.2	3.4	0.15	176	37	0	2.5	251	6.6	90
Apr. 2.....	92	9.9		.19		8.5	5.1	51	7.3	126	0	52	.1	.2	1.2	.20	228	42	0	3.4	324	6.7	100

5-1234.5. BROKEN BONES LAKE AT PLEASANT LAKE, N. DAK.

June 17, 1949		26		0.02		46	35	39	8.0	296	0	108	2.0	0.5	5.1		486	259	16	1.0	680	7.6	
May 10, 1960.	(a)	16		.01	0.00	24	118	169	35	698	0	352	20	.6	.5	0.53	1170	544	0	3.1	1610	7.6	47

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

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

Chemical analyses, in parts per million, water year October 1959 to September 1960--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																							
5-1236.5. BUFFALO LODGE LAKE NEAR GRANVILLE, N. DAK.																							
Oct. 6, 1959.	(a)	24		0.06	--	28	87	238	30	544	0	462	64	0.3	0.7	0.28	1310	428	0	5.0	1770	7.8	48
May 10, 1960.	(a)	15		.03	0.00	29	58	153	21	376	0	295	40	.2	5.2	.17	871	309	1	3.8	1230	7.4	42
Sept. 28.....	(a)	33		.08	.03	38	75	187	25	488	0	371	50	.3	1.9	.24	1080	404	4	4.0	1500	7.7	28
LAKE OF THE WOODS BASIN																							
5-1284. SAND RIVER NEAR BRITT, MINN.																							
July 6, 1960.	8.6	5.4		--		4.9	1.9	1.9	0.6	16	0	11	0.1	0.0	2.0		75	20	7	0.2	43	6.1	232
Aug. 10.....		10		1.1	0.00	5.2	2.4	1.4	.6	18	0	9.3	.1	.1	1.9		102	23	8	.1	44	6.5	336
Sept. 30.....		12		1.9		11	1.1	2.0	1.0	35	0	7.8	.0	.1	1.5	0.01	75	32	3	.2	70	6.5	110
5-1296.5. LITTLE FORK RIVER AT COOK, MINN.																							
July 6, 1960.	6.5	3.8				13	4.5	3.7	0.8	50	0	14	0.0	0.3	0.5		115	51	10	0.2	108	6.5	170
Aug. 10.....		8.2		0.31	0.00	22	6.6	6.7	1.6	86	0	16	2.0	.3	2.6		175	82	11	.3	179	6.7	180
5-1298. RICE RIVER NEAR ANGORA, MINN.																							
July 6, 1960.	22	4.8				6.1	2.1	1.8	1.0	21	0	13	0.0	0.1	0.5		65	24	7	0.2	50	6.4	120
Aug. 10.....		8.0		0.52	0.00	6.7	2.3	1.5	.8	22	0	13	.5	.2	.6		100	26	8	.1	50	6.6	200

5-1299. SOUTH BRANCH LITTLE FORK RIVER NEAR COOK, MINN.

July 6, 1960.	36	4.9				8.1	2.9	1.8	0.8	32	0	6.8	0.0	0.1	0.7		80	32	6	0.1	67	6.5	110
Aug. 10.....		9.2		0.36	0.00	8.1	2.6	1.9	1.0	29	0	13	.1	.2	.4		94	31	7	.1	65	6.7	150

5-1305. STURGEON RIVER NEAR CHISHOLM, MINN.

July 6, 1960.	61	5.0		--	--	10	2.9	2.1	1.0	41	0	11	0.7	0.1	0.3		78	37	3	0.1	77	6.7	96
Aug. 10.....	83	8.8		0.46	0.00	10	2.9	1.8	1.0	37	0	8.8	.0	.2	.9		94	37	7	.1	70	6.8	148
Sept. 20.....	22	9.1		.78	.00	14	3.2	2.7	1.2	60	0	6.5	.0	.2	.5		92	48	0	.2	104	7.0	47

a Lake content not known. Information on lake stage available in district office at Lincoln, Nebr.

233-902 O - 66 - 7

PART 6. MISSOURI RIVER BASIN

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 (discontinued).
Sediment records: October 1959 to September 1960.
EXTREMES, 1959-60.--Water temperatures: Minimum, freezing point on several days during November to March.
Sediment concentrations: Maximum daily, 2,830 ppm Oct. 23; minimum daily, 3 ppm on many days during September.
Sediment loads: Maximum daily, 32,300 tons Oct. 23; minimum daily, 6 tons on many days during September.
REMARKS.--Records of discharge for water year October 1959 to September 1960 given in WSP 1709. Flow affected by ice Jan. 1, 3, 4, 14, 16-18, Feb. 4, 12, 14, Mar. 3, 10, 11, 13.

Temperature (°F) of water, water year October 1959 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	
October	46	50	50	--	--	--	--	44	--	--	--	46	50	50	50	51	44	49	47	47	46	46	48	47	44	44	44	44	45	43	42	--
November	44	44	45	41	39	38	43	45	41	43	40	35	32	36	36	32	35	36	37	37	38	36	39	39	37	35	33	32	34	35	--	38
December	34	35	36	35	34	34	35	35	36	35	34	34	36	34	35	35	--	36	35	34	35	35	36	37	39	37	35	34	34	32	35	35
January	32	32	33	32	32	--	--	--	32	--	--	35	--	--	--	32	--	--	32	--	--	--	33	--	--	35	--	--	--	32	--	--
February	35	35	36	--	--	35	--	--	35	--	--	--	34	--	--	33	--	--	--	33	--	--	32	--	--	--	32	--	--	--	--	--
March	32	--	--	--	36	--	--	41	--	--	--	42	--	--	33	--	--	--	35	--	--	35	--	--	--	43	--	--	36	--	--	--
April	--	35	--	--	39	--	44	--	49	40	--	40	--	--	--	37	--	--	--	40	--	--	40	--	--	39	--	--	--	39	--	--
May	--	--	41	--	--	--	43	--	--	--	44	--	--	40	--	--	39	--	--	--	55	--	--	--	47	63	--	--	--	--	--	--
June	48	--	--	51	--	--	50	--	--	--	--	52	--	49	51	48	--	--	--	--	37	--	--	--	--	39	--	--	49	--	--	--
July	--	49	--	--	--	47	66	--	56	--	--	49	--	--	--	62	--	--	--	--	--	--	--	56	--	--	54	--	--	56	--	--
August	--	--	--	--	66	--	--	--	--	46	--	--	46	--	--	44	--	--	--	55	--	--	--	--	--	--	43	--	--	44	--	--
September	--	--	43	--	--	40	--	--	--	--	39	--	39	--	--	--	36	--	--	35	--	--	--	--	--	--	--	--	--	--	--	--

MADISON RIVER BASIN--Continued

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

Suspended sediment, water year October 1959 to September 1960
(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..	1720	220	S 1080	3580	670	6480	1690	23	105
2..	2540	1590	10900	3600	740	7190	1670	15	68
3..	1940	1490	S 8200	3700	910	9090	1650	14	62
4..	1510	--	4000	3700	600	5990	1670	16	72
5..	1490	--	1500	3700	590	5890	2620	95	672
6..	1510	--	2000	3700	440	4400	3160	90	768
7..	1950	--	4000	3700	370	3700	3040	66	542
8..	1740	330	1550	3700	260	2600	3040	57	468
9..	2360	--	5000	3700	300	3000	3390	67	613
10..	2260	--	3000	3800	300	3080	3430	64	593
11..	2040	--	2500	3800	240	2460	3580	57	551
12..	2340	540	3410	3700	210	2100	3550	51	489
13..	2120	630	3610	3500	190	1800	3390	34	311
14..	2560	970	6700	2300	150	932	3320	37	332
15..	2140	680	3930	1700	74	340	3510	42	398
16..	2010	550	2980	1500	45	182	3430	36	333
17..	2220	740	4440	1600	40	173	3580	40	387
18..	1870	450	2270	1700	80	367	3510	36	341
19..	1950	705	S 4190	1900	160	821	3410	30	276
20..	3480	2350	22100	2300	160	994	3360	26	236
21..	3890	2470	25900	3000	168	1360	3410	32	295
22..	3250	1460	12800	3300	150	1340	3410	31	285
23..	4230	2830	32300	2800	60	454	3360	24	218
24..	4060	2040	22400	2300	42	261	3250	20	176
25..	2820	1210	9210	2100	35	198	3160	16	136
26..	2670	900	6490	2000	31	167	3130	17	144
27..	1180	280	892	1900	29	149	3020	15	122
28..	2120	740	4240	1700	24	110	2860	16	124
29..	3250	920	8070	1720	26	121	2770	19	142
30..	3460	950	8870	1700	21	96	2620	15	106
31..	3550	620	5940	--	--	--	2160	13	76
Total	76230	--	234472	83400	--	65845	93150	--	9441

	JANUARY			FEBRUARY			MARCH		
1..	1720	7	32	1040	C 6	17	915	C 7	17
2..	1330	10	36	1020	C 6	17	945	C 7	18
3..	1150	13	40	1020	C 6	17	920	C 7	17
4..	1080	6	17	1000	C 6	16	900	C 7	17
5..	1070	12	35	990	C 6	16	915	C 7	17
6..	1070	C 6	17	990	C 6	16	960	C 7	18
7..	1070	C 6	17	990	C 6	16	960	C 7	18
8..	1080	C 6	17	1000	C 6	16	960	C 7	18
9..	1100	C 6	18	1020	C 6	17	960	C 7	18
10..	1080	C 6	17	1020	C 6	17	940	C 7	18
11..	1050	C 6	17	1020	C 6	17	950	C 7	18
12..	1100	C 6	18	1020	C 6	17	945	C 7	18
13..	1130	C 6	18	1020	C 6	17	930	C 7	18
14..	1110	C 6	18	1000	C 6	16	945	C 7	18
15..	1110	C 6	18	1050	C 6	17	1350	C 13	47
16..	1100	C 6	18	1490	C 9	36	1490	C 13	52
17..	1100	C 6	18	1670	C 9	41	1930	C 13	68
18..	1100	C 6	18	1650	C 9	40	2120	C 13	74
19..	1080	C 6	17	1630	C 9	40	2100	C 13	74
20..	1070	C 6	17	1650	C 9	40	2020	C 13	71
21..	1050	C 6	17	1670	C 9	41	1930	C 13	68
22..	1020	C 6	17	1700	C 9	41	1890	C 13	66
23..	1040	C 6	17	1650	C 9	40	1840	C 13	65
24..	1050	C 6	17	1190	C 5	16	1700	C 13	60
25..	1050	C 6	17	1000	C 5	14	1650	C 13	58
26..	1050	C 6	17	990	C 5	13	1580	C 13	55
27..	1050	C 6	17	975	C 5	13	1510	C 13	53
28..	1050	C 6	17	945	C 5	13	1450	C 13	51
29..	1050	C 6	17	930	C 5	13	1380	C 13	48
30..	1050	C 6	17	--	--	--	1350	C 13	47
31..	1050	C 6	17	--	--	--	1350	C 13	47
Total	34210	--	610	34340	--	650	41785	--	1252

S Computed by subdividing day.
C Composite period.

MADISON RIVER BASIN--Continued

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

Suspended sediment, water year October 1959 to September 1960--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..	1300	C 10	35	1160	C 19	59	520	C 23	32
2..	1240	C 10	33	1160	C 19	59	595	C 23	37
3..	1210	C 10	33	1210	C 19	62	710	C 23	44
4..	1190	C 10	32	1230	C 19	63	796	C 23	49
5..	1230	C 10	33	1280	C 19	66	796	C 23	49
6..	1240	C 10	33	1280	C 19	66	770	C 23	48
7..	1260	C 10	34	1280	C 19	66	758	C 23	47
8..	1300	C 10	35	1110	C 19	57	796	C 23	49
9..	1330	C 10	36	639	C 13	22	734	C 23	46
10..	1400	C 10	38	432	C 13	15	686	C 23	43
11..	1420	C 10	38	384	C 13	13	639	C 23	40
12..	1450	C 10	39	424	C 13	15	628	C 23	39
13..	1400	C 10	38	551	C 13	19	617	C 23	38
14..	1380	C 10	37	530	C 13	19	617	C 23	38
15..	1380	C 10	37	480	C 13	17	650	C 23	40
16..	1330	C 10	36	432	C 13	15	674	C 23	42
17..	1300	C 10	35	416	C 13	15	628	C 23	39
18..	1310	C 10	35	384	C 13	13	584	C 23	36
19..	1330	C 10	36	348	C 13	12	530	C 23	33
20..	1300	C 10	35	312	C 13	11	500	C 23	31
21..	1230	C 10	33	300	C 13	11	450	C 23	28
22..	1230	C 10	33	300	C 13	11	408	C 23	25
23..	1230	C 10	33	295	C 13	10	376	C 23	23
24..	1130	C 10	31	295	C 13	10	368	C 23	23
25..	1100	C 10	30	285	C 13	10	360	C 23	22
26..	1100	C 10	30	280	C 13	10	440	C 23	27
27..	1110	C 10	30	280	C 13	10	617	C 23	38
28..	1130	C 10	31	285	C 13	10	758	C 23	47
29..	1150	C 10	31	312	C 13	11	783	C 23	49
30..	1150	C 10	31	348	C 13	12	770	C 23	48
31..	--	--	--	432	C 13	15	--	--	--
Total	37860	--	1021	18454	--	804	18558	--	1150

	JULY			AUGUST			SEPTEMBER		
1..	734	C 9	18	758	C 6	12	746	C 3	6
2..	710	C 9	17	746	C 6	12	746	C 3	6
3..	710	C 9	17	734	C 6	12	746	C 3	6
4..	710	C 9	17	722	C 6	12	746	C 3	6
5..	686	C 9	17	722	C 6	12	746	C 3	6
6..	734	C 9	18	722	C 6	12	746	C 3	6
7..	758	C 9	18	710	C 6	11	734	C 3	6
8..	770	C 9	19	710	C 6	11	722	C 3	6
9..	770	C 9	19	710	C 6	11	722	C 3	6
10..	770	C 9	19	710	C 6	11	722	C 3	6
11..	770	C 9	19	710	C 6	11	722	C 3	6
12..	770	C 9	19	710	C 6	11	722	C 3	6
13..	770	C 9	19	698	C 6	11	722	C 3	6
14..	770	C 9	19	698	C 6	11	722	C 3	6
15..	758	C 9	18	710	C 6	11	722	C 3	6
16..	746	C 9	18	734	C 6	12	722	C 3	6
17..	746	C 9	18	734	C 6	12	722	C 3	6
18..	734	C 9	18	722	C 6	12	722	C 3	6
19..	746	C 9	18	722	C 6	12	710	C 3	6
20..	722	C 9	18	734	C 6	12	722	C 3	6
21..	722	C 9	18	722	C 6	12	722	C 3	6
22..	722	C 9	18	746	C 6	12	722	C 3	6
23..	722	C 9	18	770	C 6	12	722	C 3	6
24..	734	C 9	18	770	C 6	12	734	C 3	6
25..	710	C 9	17	770	C 6	12	734	C 3	6
26..	698	C 9	17	770	C 6	12	734	C 3	6
27..	698	C 9	17	758	C 6	12	746	C 3	6
28..	710	C 9	17	758	C 6	12	746	C 3	6
29..	722	C 9	18	758	C 6	12	746	C 3	6
30..	722	C 9	18	758	C 6	12	758	C 3	6
31..	746	C 9	18	746	C 6	12	--	--	--
Total	22790	--	557	22742	--	363	21948	--	180

Total discharge for year (cfs-days)..... 505467
Total load for year (tons)..... 316345

C Composite period.

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

Particle-size analyses of suspended sediment, water year October 1959 to September 1960
(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	
Sept. 10, 1959.....	2040	56		416	605		29	48		88		100	--	--	--			PWC
Sept. 16.....	1310	--		1080	204		8	14		34		84	97	100	--			VBWC
Oct. 8.....	1645	44		1670	330		7	11		31		74	87	99	100			VBWC
Oct. 13.....	1110	50		2200	595		5	9		27		73	87	98	100			VBWC
Oct. 27.....	1410	48		975	169		1	8		28		80	95	99	100			VBWC
Nov. 6.....	1050	38		d 3700	385		--	4		19		50	64	83	95	99	100	VPWC
June 15, 1960.....	1800	51		662	27		--	--		--		89	97	100	--			V

d Daily mean discharge.

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.--9,910 square miles, approximately, of which 1,570 square miles is generally noncontributing.
RECORDS AVAILABLE.--Chemical analyses: June to September 1960.
Water temperatures: August and September 1960.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Worland, Wyo. Records of discharge for water year October 1959 to September 1960 given in WSP 1709.

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

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, 1959....	--	5.6	0.02	31	13	31	2.9	179	0	49	2.1	0.1	1.2	0.06	234	0.32	--	130	0	1.2	389	7.9	13
June 1, 1960....	a 423	6.7	.01	34	15	46	2.9	188	0	84	4.5	.2	1.1	.07	299	.41	341	148	0	1.6	478	7.4	14
July 7.....	a 639	5.8	.01	34	13	39	2.9	191	0	70	3.3	.2	1.0	.08	265	.36	457	140	0	1.4	442	7.4	11
Aug. 3-10.....	572	5.8	.01	32	13	30	2.7	176	0	56	3.3	.3	.1	.08	234	.32	361	135	0	1.1	389	7.8	9
Aug. 11-20.....	460	5.3	.01	32	13	30	2.6	171	0	60	3.9	.2	.4	.06	233	.32	289	135	0	1.1	388	7.8	9
Aug. 21-31.....	473	4.9	.02	30	13	27	2.3	161	0	52	3.8	.1	.0	.06	212	.29	271	128	0	1.0	363	7.6	8
Sept. 1-10.....	394	4.5	.01	30	13	27	2.6	157	0	53	4.4	.1	.0	.05	214	.29	228	127	0	1.0	363	7.5	8
Sept. 11-21.....	348	3.9	.01	29	12	26	2.0	152	0	52	4.6	.1	.1	.06	207	.28	194	123	0	1.0	348	7.7	9
Sept. 22-30.....	341	4.1	.01	29	12	25	1.9	149	0	45	4.1	.1	.0	.07	205	.28	189	123	1	1.0	338	7.6	7

a Discharge at time of sampling.

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.....			74	73	72	72	70	69	69	70	73	73	73	72	72	68	70	69	71	71	71	70	65	58	63	60	63	65	66	64	63	69
September.....	66	68	70	70	68	67	60	62	67	69	62	66	70	64	65	63	62	60	59	60	59	59	56	56	57	65	68	65	60	58		63

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.--536 square miles.
RECORDS AVAILABLE.--Sediment records: October 1953 to September 1960.
EXTREMES, 1959-60.--Sediment concentrations: Maximum daily, not determined; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 73,000 tons (estimated) Mar. 23; minimum daily, 0 tons on many days.
EXTREMES, 1953-60.--Sediment concentrations: Maximum daily, 58,000 ppm Apr. 5, 1954; minimum daily, no flow on many days each year.
Sediment loads: Maximum daily, 390,000 tons Apr. 6, 1954; minimum daily, 0 tons on many days each year.
REMARKS.--Records of discharge for water year October 1959 to September 1960 given in WSP 1709. Flow affected by ice Nov. 5 to Jan. 14, Feb. 3 to Mar. 19. 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 1959 to September 1960

(Suspended-sediment loads computed from partly estimated data)

Month	Discharge (cfs-days)	Runoff (acre-feet)	Suspended sediment					
			Load (tons)	Daily load (tons)			Concentration (ppm)	
				Mean	Maximum	Minimum	Weighted mean	Maximum observed
October 1959.....	1621.1	3220	37300	1200	e 7700	--		5840
November.....	133.3	264	190	6	e 80	0		576
December.....	215.0	426	260	8	41	0		530
January 1960.....	0	0	0	0	0	0		--
February.....	151.5	300	e 210	8	--	0		--
March.....	19084	37850	515400	16600	e 73000	0		17100
April.....	1320.7	2620	41400	1380	e 20000	--		3240
May.....	1146.2	2270	30900	997	15900	0		12200
June.....	11.0	22	30	1	e 24	0		336
July.....	0	0	0	0	0	0		--
August.....	0	0	0	0	0	0		--
September.....	0	0	0	0	0	0		--
Water year.....	23682.8	46970	625690	1710	e 73000	0		17100

e Estimated.

MILK RIVER BASIN--Continued

6-1740. WILLOW CREEK NEAR GLASGOW, MONT.--Continued

Particle-size analyses of suspended sediment, water year October 1959 to September 1960
(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, 1959.....	1620	42		2.6	3600			100		--		--						PWC
Mar. 22, 1960.....	1210	--		2850	8940			71		90		100						VPWC
Mar. 24.....	1050	--		1570	14200			67		89		100						VPWC
Mar. 27.....	1430	43		588	17100			64		88		100						VPWC
Mar. 29.....	1045	--		287	8480			71		95		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 to September 1960.
Sediment records: May to September 1960.
EXTREMES, May to September 1960.--Water temperatures: Maximum, 79°F July 7, 18.
REMARKS.--Records of discharge for May to September 1960 in WSP 1709.

Temperature (°F) of water, May to September 1960
/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	
May																																
Maximum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	56	59	53	65	62	--
Minimum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	46	41	37	37	48	--
June																																
Maximum	63	70	72	58	63	67	60	64	57	63	72	72	70	54	47	53	57	61	55	57	63	52	70	68	70	70	63	76	66	67	--	63
Minimum	39	45	43	41	41	45	38	42	46	46	38	45	51	43	37	34	39	35	36	35	38	42	40	39	44	43	42	42	40	40	--	41
July																																
Maximum	75	70	74	66	70	75	79	75	78	70	71	72	69	77	64	76	78	79	74	71	73	73	64	64	72	67	68	69	73	71	74	72
Minimum	54	50	43	47	45	45	49	51	48	50	49	46	48	47	47	47	47	49	51	50	51	50	49	46	40	45	46	46	45	46	54	48
August																																
Maximum	77	69	70	74	75	76	60	64	69	74	74	74	72	74	69	56	62	69	74	70	72	65	68	62	66	67	55	60	60	66	58	68
Minimum	53	49	47	47	46	51	53	47	44	47	50	50	48	50	52	49	46	42	45	47	46	52	50	45	48	45	48	37	39	40	42	47
September																																
Maximum	58	69	69	74	74	69	62	61	66	60	68	68	54	65	62	55	66	69	60	56	48	54	54	55	62	55	56	61	60	62	--	62
Minimum	40	46	39	55	48	44	41	37	36	37	37	40	40	45	38	46	49	46	48	41	42	40	40	39	43	39	38	40	41	38	--	42

Monthly summary of water and suspended-sediment discharge, May to September 1960
/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
May 1960.....	430.3	853	55	1.8			47	102
June.....	1008	2000	418	14			154	205
July.....	1117	2220	438	14			145	227
August.....	1209	2400	404	13			124	182
September.....	1002	1990	164	5.5			61	93
May to September...	4766.3	9460	1479	9.7			115	227

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 to September 1960.
Sediment records: April to September 1960.
EXTREMES, May to September 1960.--Water temperatures: Maximum, 80°F July 17; minimum, 34°F June 21.
REMARKS.--Records of discharge for April to September 1960 given in WSP 1709.

Temperature (°F) of water, May to September 1960
/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	
May																																
Maximum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	64	66	60	57	66	63	58	56	58	59	64	51	59	67	67	62	--
Minimum	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	49	43	44	44	42	43	38	40	37	38	35	45	40	36	42	42	--
June																																
Maximum	59	62	66	58	48	64	60	56	53	63	67	62	68	60	57	66	52	64	60	64	60	51	63	64	60	60	65	66	64	66	--	61
Minimum	39	39	38	36	35	37	41	39	40	39	39	44	40	48	47	42	37	42	44	40	34	38	39	40	39	40	37	38	42	46	--	40
July																																
Maximum	74	73	74	70	74	77	78	70	75	78	73	74	73	75	74	73	80	74	79	77	76	69	62	65	67	69	68	74	64	67	68	72
Minimum	60	55	49	50	52	50	50	52	52	57	54	47	50	49	47	51	50	51	54	50	48	44	46	44	42	41	43	43	43	41	46	49
August																																
Maximum	68	64	66	65	64	61	60	63	68	71	73	73	71	71	63	53	63	66	74	75	73	68	64	64	59	64	57	58	62	68	62	66
Minimum	46	43	44	42	43	42	42	46	43	46	46	46	48	47	52	49	48	45	46	50	50	52	47	42	41	49	45	40	42	40	43	45
September																																
Maximum	58	67	68	67	68	60	54	57	59	60	63	67	62	66	64	56	59	68	70	71	54	54	60	62	58	59	51	59	56	57	--	61
Minimum	42	51	50	50	48	52	40	37	37	40	40	41	44	49	48	48	47	50	51	52	47	46	46	44	49	46	41	41	38	42	--	45

Monthly summary of water and suspended-sediment discharge, April to September 1960
/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	Weigbted mean	Maximum observed
April 1960.....	890	1770	276	9.2			115	186
May.....	787	1560	260	8.4			122	197
June.....	734	1460	153	6.1			92	154
July.....	736	1460	143	4.6			72	111
August.....	802	1590	105	3.4			49	69
September.....	788	1560	48	1.6			22	39
April to September.	4737	9400	1015	5.5			79	197

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 and September 1960.
Water temperatures: August and September 1960.
REMARKS.--Records of specific conductance of daily samples available in district office at Worland, Wyo. Records of discharge for August and September 1960 furnished by U.S. Indian Service, Fort Washakie.

Chemical analyses, in parts per million, August and September 1960

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. 1-15, 1960.	26.9	3.4	0.00	33	28	74	0.7	94	0	271	8.1	0.2	0.1	0.09	511	0.69	37.1	198	121	2.3	724	7.2	4
Aug. 16-31.....	29.3	3.3	.00	35	27	75	.4	93	0	279	8.0	.2	.1	.08	509	.69	40.3	200	124	2.3	743	7.3	5
Sept. 1-14.....	20.6	3.6	.00	34	27	78	.3	83	0	278	9.0	.2	1.3	.10	511	.69	28.4	196	128	2.4	749	7.6	5
Sept. 15-26.....	6.1	3.1	.00	35	28	79	.4	87	0	289	8.4	.2	.4	.08	523	.71	8.61	201	130	2.4	764	7.0	4

Temperature (°F) of water, August and 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.....	74	72	74	73	73	71	71	69	68	69	70	71	71	69	70	67	64	63	68	68	69	69	64	62	61	61	63	63	64	65	62	68
September.....	61	64	63	63	62	61	63	61	60	60	60	60	59	60	60	60	58	56	58	59	57	54	54		56	57						59

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 Sboshoni, Fremont County.
DRAINAGE AREA (revised).--733 square miles.
RECORDS AVAILABLE.--Sediment records: June 1950 to September 1958, October 1959 to September 1960.
EXTREMES, 1959-60.--Sediment concentrations: Maximum daily, not determined; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 150 tons (estimated) Sept. 22; minimum daily, 0 tons on many days.
EXTREMES, 1950-58, 1959-60.--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.
REMARKS.--Records of discharge for water year October 1959 to September 1960 given in WSP 1709.

Monthly and annual summary of water and suspended-sediment discharge, water year October 1959 to September 1960

Month	Discharge (cfs-days)	Runoff (acre-feet)	Suspended sediment					
			Load (tons)	Daily load (tons)			Concentration (ppm)	
				Mean	Maximum	Minimum	Weigbted mean	Maximum observed
October 1959.....	0	0	0	0	0	0		--
Novemher.....	0	0	0	0	0	0		--
December.....	0	0	0	0	0	0		--
January 1960.....	0	0	0	0	0	0		--
February.....	0	0	0	0	0	0		--
March.....	1.3	2.6	e 80	2.6	e 20	0		17500
April.....	0	0	0	0	0	0		--
May.....	0	0	0	0	0	0		--
June.....	0	0	0	0	0	0		--
July.....	4	7.9	68	2.2	68	0		66100
August.....	0	0	0	0	0	0		--
September.....	2.5	5.0	e 190	6.3	e 150	0		--
Water year.....	7.8	16	338	0.9	e 150	0		66100

e Estimated.

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 (revised).--356 square miles, of wbich 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 1960.
Sediment records: October 1949 to September 1958, October 1959 to September 1960.
EXTREMES, 1959-60.--Water temperatures: Maximum, 70°F July 3; minimum, freezing point on many days during November to March.
Sediment concentrations: Maximum daily, 15,500 ppm June 10; minimum daily, 130 ppm Jan. 3.
Sediment loads: Maximum daily, 8,230 tons June 10; minimum daily, 4 tons Feb. 29, Mar. 1.
EXTREMES, 1949-58, 1959-60.--Water temperatures: Maximum (1959-60), 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.--Records of discharge for water year October 1959 to September 1960 given in WSP 1709. Flow affected by ice Nov. 16-21, Dec. 29 to Jan. 26, Feb. 10-17, 25, Feb. 29 to Mar. 10.

Temperature (°F) of water, water year October 1959 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	
October	--	--	--	--	45	48	47	43	45	44	44	46	42	44	50	44	42	42	42	42	44	43	45	42	48	39	41	42	41	38	37	43
November	39	40	38	--	33	32	32	34	33	36	32	32	32	--	32	32	32	32	32	32	32	32	34	32	34	32	32	32	33	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	33	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
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	--	--	32
March	32	32	32	32	32	32	32	34	32	32	32	32	32	32	32	32	32	32	33	41	34	37	--	37	40	42	42	44	41	39	39	35
April	39	36	39	40	--	--	48	42	47	47	42	47	43	46	40	40	41	41	43	41	47	46	45	43	40	39	40	37	37	40	--	42
May	42	45	46	45	45	45	48	48	46	50	52	52	55	47	51	47	50	46	44	46	52	52	52	51	52	52	52	56	52	56	54	49
June	59	61	61	61	56	60	--	56	63	56	56	54	65	58	--	52	57	57	56	58	49	52	52	55	60	62	56	55	56	60	--	57
July	59	60	70	57	58	60	65	62	64	64	60	62	59	60	60	66	60	60	61	62	62	67	62	63	64	59	67	69	61	61	64	62
August	63	61	--	60	59	61	59	57	--	61	60	66	61	61	62	61	52	54	58	60	61	63	53	52	50	52	60	55	54	56	58	58
September	57	63	60	63	61	59	56	50	51	52	52	52	53	53	51	56	53	50	53	52	51	48	47	47	52	53	53	51	50	48	--	53

YELLOWSTONE RIVER BASIN--Continued

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

Suspended sediment, water year October 1959 to September 1960

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..	130	--	E 360	53	760	109	45	550	J 80
2..	119	1160	373	53	1010	144	46	607	S 80
3..	118	--	E 380	54	840	122	48	750	97
4..	118	--	E 380	49	800	106	42	760	86
5..	114	1260	388	46	1000	A 120	42	675	S 83
6..	97	1330	348	48	810	105	42	601	S 80
7..	79	1220	260	49	750	99	46	666	83
8..	72	1190	231	49	800	A 110	42	770	87
9..	70	1120	212	50	800	108	41	749	S 92
10..	65	1200	211	51	870	120	45	810	98
11..	64	1120	194	49	980	130	42	910	103
12..	64	980	169	40	690	74	40	900	97
13..	63	1000	170	40	680	73	39	869	S 104
14..	63	930	158	44	1070	127	42	780	88
15..	62	950	159	47	721	S 99	39	750	79
16..	62	1060	177	35	300	28	38	900	92
17..	62	800	134	40	260	28	39	920	97
18..	61	820	135	45	220	27	38	770	79
19..	61	930	153	50	180	24	34	730	67
20..	61	780	128	55	240	36	36	850	83
21..	60	920	149	60	650	110	36	460	45
22..	60	1100	178	63	750	128	38	550	J 60
23..	56	980	148	69	1740	S 342	36	650	J 85
24..	55	820	122	60	2050	332	39	750	J 100
25..	55	860	128	50	1950	263	42	853	97
26..	53	630	90	29	592	S 53	36	1050	102
27..	53	630	90	24	482	S 33	36	850	A 83
28..	52	980	138	46	605	S 85	35	603	S 71
29..	56	980	148	51	1030	142	35	550	A 52
30..	56	850	128	47	791	S 110	30	600	A 49
31..	52	820	115	--	--	--	25	380	A 26
Total	2213	--	6154	1446	--	3387	1214	--	2525

	JANUARY			FEBRUARY			MARCH		
1..	20	480	A 26	34	920	84	5	280	4
2..	18	190	9	34	720	66	6	360	6
3..	16	130	6	36	800	78	7	420	8
4..	16	190	8	34	740	68	8	1000	22
5..	16	160	7	31	690	58	10	1100	A 30
6..	18	190	9	33	500	44	14	1000	A 38
7..	20	300	16	34	450	41	20	800	43
8..	20	260	14	39	750	79	25	1100	74
9..	20	400	22	52	940	132	20	2200	120
10..	20	650	35	55	700	100	18	2400	120
11..	25	600	40	55	700	100	13	1320	S 57
12..	25	550	37	55	800	120	13	1400	S 58
13..	30	400	32	55	850	130	15	2270	S 112
14..	30	480	39	55	1200	180	12	1640	53
15..	30	380	31	55	1900	280	12	2340	S 107
16..	30	400	32	55	2200	330	11	1790	S 68
17..	25	420	28	55	2900	430	12	2400	J 90
18..	20	440	24	52	2460	345	19	3500	S 233
19..	16	320	14	51	2440	336	24	3820	S 270
20..	12	240	8	52	2190	307	26	4160	S 340
21..	12	280	9	49	1880	249	29	5780	S 522
22..	12	300	10	46	840	104	46	6290	S 910
23..	16	400	17	48	780	101	69	7180	1340
24..	20	380	21	48	1150	149	75	7600	A 1500
25..	25	340	23	40	1400	150	75	8100	1640
26..	30	300	24	7.2	890	17	75	7000	1420
27..	33	300	27	6.6	490	9	74	5500	1100
28..	31	350	29	4.8	740	10	73	5600	1100
29..	37	420	42	5	300	4	70	4650	879
30..	34	500	46	--	--	--	67	4350	787
31..	34	580	53	--	--	--	66	3950	704
Total	711	--	738	1176.6	--	4101	1009	--	13755

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

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

Suspended sediment, water year October 1959 to September 1960--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	63	3450	587	61	3180	524	86	4280	994
2	62	3000	502	69	3470	646	88	4600	1090
3	62	3050	510	73	2730	538	84	4050	918
4	60	2700	437	76	3300	677	80	4000	864
5	60	2980	483	79	4100	874	81	4100	897
6	58	3300	517	74	3180	635	86	3510	815
7	56	3120	472	70	3130	592	119	8150 S	2800
8	56	2810	425	72	3420	665	110	5000	1480
9	56	2300	348	67	3030	548	124	7660 S	3550
10	57	2800	431	63	3470	590	170	15500 S	8230
11	52	2660	373	66	3710	661	92	7700	1910
12	52	2680	376	69	3200	596	92	6720	1670
13	52	2680	376	59	2630	419	93	5740	1440
14	59	2700	430	53	2780	398	82	5180	1150
15	51	2100	289	59	3300	526	80	6200 A	1300
16	55	2220	330	63	3200	544	81	5510	1200
17	50	2190	296	55	2400	356	94	5130	1300
18	51	2300	317	61	3130	515	86	4330	1000
19	79	6000	1280	69	4800	894	84	4350	986
20	85	4900	1120	67	3600 A	650	85	4300	987
21	84	4320	980	74	3200	639	89	4420	1060
22	81	4000	875	70	2900	548	81	3980	870
23	78	4260	897	73	3380	666	81	3710	811
24	74	3500	699	70	3100	586	82	3550	786
25	68	3180	584	70	3380	639	87	4200	986
26	55	2660	395	71	3650	700	101	5250	1430
27	55	2800	416	78	3510	739	113	5190	1580
28	73	3990	786	84	3800	862	82	3690	817
29	75	3280	664	84	3630	823	82	3300	731
30	68	3000 A	550	88	4250	1010	86	4110	954
31	--	--	--	88	4100	974	--	--	--
Total	1887	--	16745	2175	--	20034	2781	--	44606

Day	JULY			AUGUST			SEPTEMBER		
1	71	3730	715	93	3010	756	92	2200	546
2	69	3850	717	83	2600	583	88	2170	516
3	72	3320	645	88	2410	573	92	2030	504
4	76	3460	710	86	2650	615	94	2310	586
5	92	4110	1020	88	2120	504	94	1900	482
6	94	3830	972	87	2200	517	92	1960	487
7	95	3820	980	92	2350	584	85	1800	413
8	86	3550	824	96	2280	591	83	1910	428
9	78	3420	720	90	1190	289	89	1650	396
10	78	3250	684	87	2070	486	94	1600	406
11	80	3200	691	86	1900	441	94	1720	436
12	79	3050	650	86	1950	453	97	1840	482
13	79	3080	657	84	1740	395	101	1800	491
14	84	4540	1030	92	2240	556	104	1610	452
15	80	2820	609	102	2300	633	99	1840	492
16	79	2860	610	99	2690	719	94	1950	495
17	80	4300 A	930	100	3000	810	96	2050	531
18	79	3600 A	770	84	2250	510	95	1900	487
19	85	3380	776	77	2480	516	96	2110	547
20	90	3420	831	73	1980	390	93	1850	464
21	86	3000	696	77	2060	428	95	1690	433
22	80	2610	564	77	1800	374	106	1800	515
23	86	2700	627	77	1620	337	105	1850	524
24	86	2600	604	79	1710	365	101	1640	447
25	89	2800	673	83	1800	403	93	1560	392
26	93	3600	904	83	1700	381	92	1700	422
27	101	3900	1060	102	2050	564	90	1500	364
28	99	3400	909	102	2000	551	86	1550	360
29	95	3250	834	97	1890	495	82	1550	343
30	90	3040	739	90	1810	440	80	1250	270
31	94	3160	802	86	1770	411	--	--	--
Total	2625	--	23953	2726	--	15670	2802	--	13711

Total discharge for year (cfs-days)..... 22765.6
Total load for year (tons)..... 165379

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

YELLOWSTONE RIVER BASIN--Continued

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

Particle-size analyses of suspended sediment, water year October 1959 to September 1960
(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. 2, 1959	1425	48		116	1170		8	17		24		38	48	74	92	98	100	VBWC
Oct. 16	1420	48		62	711		9	13		21		30	35	53	84	100	--	VBWC
Nov. 3	1535	42		52	489		11	17		25		37	45	62	83	95	100	VBWC
Feb. 17, 1960	1405	32		d 55	4840		--	10		15		64	91	97	99	100	--	VPWC
Mar. 9	1010	32		d 20	1170		--	26		45		54	58	65	76	95	100	VPWC
Mar. 11	1445	36		24	3340		--	29		51		81	91	96	98	100	--	VPWC
Mar. 21	1745	46		39	10300		--	18		31		89	93	96	98	100	--	VPWC
Mar. 25	1035	40		67	6150		--	13		23		76	91	96	98	99	100	VPWC
Mar. 29	1330	49		68	3650		--	12		19		64	88	97	99	100	--	VPWC
Apr. 7	1105	48		55	2380		--	21		33		51	65	83	92	99	100	VPWC
Apr. 14	1230	54		62	1980		--	12		19		58	71	86	94	99	100	VPWC
Apr. 18	1420	56		50	1670		--	23		35		57	68	84	92	99	100	VPWC
May 16	1650	64		62	3080		--	27		40		62	76	85	92	99	100	VPWC
June 6	0925	60		90	3570		--	25		35		58	77	90	95	100	--	VPWC
June 8	1355	61		125	6670		--	16		24		74	89	95	98	99	100	VPWC
June 10	1340	64		133	12400		--	34		50		73	85	94	97	99	100	VPWC
June 24	1120	66		89	3520		--	21		26		51	71	89	95	100	--	VPWC
July 21	1145	72		93	2580		--	25		36		54	72	88	96	99	100	VPWC
Aug. 3	1440	77		89	2340		--	23		33		48	62	83	92	100	--	VPWC
Aug. 30	1430	72		90	1680		--	20		28		43	58	81	96	100	--	VPWC
Sept. 21	1140	53		98	1890		--	17		25		46	60	82	93	98	100	VPWC

d Daily mean discharge.

6-2530. FIVEMILE CREEK NEAR SHOSHONI, WYO.

LOCATION.--At gaging station, 1,2 miles upstream from normal high waterline of Boysen Reservoir at elevation 4,725 feet and 5 miles west of Shoshoni, Fremont County.
DRAINAGE AREA (revised).--418 square miles, of which 133 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: September 1949 to November 1951.
Water temperatures: December 1948 to September 1960.
Sediment records: August 1948 to September 1960.
EXTREMES, 1959-60.--Water temperatures: Maximum, 73°F July 31; minimum, freezing point on many days during November to March.
Sediment concentrations: Maximum daily, 15,000 ppm June 10; minimum daily, not determined.
Sediment loads: Maximum daily, 13,000 tons June 10; minimum daily, 10 tons Mar. 1-3.
EXTREMES, 1948-60.--Water temperatures: Maximum (1948-58, 1959-60), 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.--Records of discharge for water year October 1959 to September 1960 given in WSP 1709. Flow affected by ice Nov. 13-25, Dec. 21 to Mar. 16.

Temperature (°F) of water, water year October 1959 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	
October	44	41	44	47	47	48	47	40	47	47	40	46	42	44	47	43	41	42	44	42	40	45	46	44	48	41	44	42	42	37	35	43
November	39	40	42	33	33	34	35	35	35	37	35	33	33	--	--	--	--	--	32	--	--	--	34	35	37	33	33	33	35	34	--	--
December	--	--	32	32	32	32	33	33	32	33	34	35	32	35	32	32	32	34	32	33	32	34	33	--	--	35	34	32	--	--	--	--
January	36	34	--	--	--	--	--	--	--	--	--	--	--	--	32	--	--	--	--	32	32	32	32	33	32	35	36	33	35	32	34	--
February	34	33	32	33	32	32	33	34	34	34	34	34	35	34	33	35	33	--	--	33	34	33	33	32	33	--	--	--	--	--	--	--
March	32	--	--	32	--	38	34	32	35	32	32	35	37	33	32	34	33	35	35	40	37	37	40	39	40	49	45	48	40	47	46	37
April	41	40	47	45	45	59	47	45	47	54	45	54	44	45	41	37	37	36	45	47	50	50	49	45	47	45	42	38	39	45	--	45
May	--	47	52	47	48	50	59	59	55	56	58	57	58	50	51	52	52	49	50	50	55	54	57	55	55	51	56	54	57	60	57	54
June	60	61	59	60	58	63	69	57	60	54	59	61	62	61	61	57	68	70	61	69	55	58	54	55	65	65	64	62	64	63	--	61
July	71	--	58	61	63	66	67	63	65	--	65	67	66	65	65	65	--	66	68	65	67	70	69	--	65	63	64	67	65	70	73	66
August	68	65	67	65	64	64	64	60	60	63	61	65	68	63	64	58	53	55	59	59	68	66	57	51	53	55	61	55	55	60	63	61
September	58	62	64	66	64	60	61	54	55	53	59	52	62	57	60	53	53	52	54	53	51	49	47	51	54	55	55	53	51	50	--	56

YELLOWSTONE RIVER BASIN--Continued

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

Suspended sediment, water year October 1959 to September 1960
(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..	225	1040	632	86	392	91	72	--	100
2..	217	1020	598	86	539	125	72	--	100
3..	205	1020	564	82	350	77	72	600	117
4..	200	1190	643	79	360	77	71	470	90
5..	194	1130	592	71	400	77	64	280	48
6..	171	940	434	74	370	74	66	540	96
7..	147	781	310	77	410	85	71	1110	213
8..	124	560	187	75	410	83	66	840	150
9..	108	510	149	75	480	97	63	640	109
10..	107	500	144	77	510	106	66	600	107
11..	103	486	135	74	410	82	66	510	91
12..	103	669	186	69	320	60	67	600	108
13..	103	478	133	65	600	110	64	600	104
14..	99	415	111	60	--	90	64	520	90
15..	99	474	127	55	--	70	64	420	72
16..	98	398	105	55	--	65	61	610	100
17..	98	379	100	60	--	60	61	800	132
18..	98	435	115	70	--	50	63	700	119
19..	96	370	96	75	200	40	61	750	124
20..	96	457	118	80	--	80	56	800	121
21..	92	398	99	85	--	130	55	460	68
22..	92	428	106	90	--	180	55	420	62
23..	89	468	112	85	950	220	55	380	56
24..	87	380	89	75	3100	630	50	440	59
25..	89	356	86	70	2400	450	50	--	70
26..	86	396	92	63	860	146	50	600	81
27..	86	438	102	49	440	58	50	750	100
28..	84	351	80	71	842	S 175	50	360	49
29..	89	405	97	77	800	166	45	--	48
30..	89	379	91	75	450	91	40	--	48
31..	86	387	90	--	--	--	35	--	48
Total	3660	--	6523	2185	--	3845	1845	--	2880

Day	JANUARY			FEBRUARY			MARCH		
1..	30	600	49	50	550	74	16	240	10
2..	25	700	47	50	600	81	16	--	10
3..	20	--	40	50	900	120	16	--	10
4..	20	--	34	50	650	88	18	260	13
5..	20	--	30	50	480	65	20	--	20
6..	20	--	30	50	360	49	25	650	A 44
7..	25	--	30	50	380	51	30	700	57
8..	25	--	30	55	400	59	35	1200	A 110
9..	25	--	30	70	600	110	35	950	90
10..	25	--	30	80	600	130	30	1100	89
11..	30	--	30	80	420	91	25	1200	81
12..	30	--	30	80	500	110	20	2400	130
13..	35	--	30	80	500	110	20	1700	A 92
14..	35	--	20	80	600	130	20	1200	65
15..	40	167	18	80	750	160	20	1700	92
16..	40	--	18	80	800	170	20	1300	70
17..	35	--	18	80	950	210	26	990	69
18..	30	--	17	75	--	180	29	1300	102
19..	25	--	17	75	--	160	38	1600	164
20..	20	300	16	75	800	160	40	2750	297
21..	20	800	43	75	1100	220	48	4100	A 530
22..	20	360	19	70	900	170	63	6110	S 1110
23..	25	260	18	70	600	110	92	8600	A 2100
24..	30	190	15	70	600	110	99	7000	A 1900
25..	35	200	19	65	480	84	98	8200	A 2200
26..	40	240	26	35	--	40	96	7200	A 1900
27..	45	220	27	25	--	20	94	5800	A 1500
28..	50	340	46	16	--	12	91	5200	A 1300
29..	50	300	40	16	--	11	87	4400	A 1000
30..	50	320	43	--	--	--	80	3800	A 820
31..	50	400	54	--	--	--	80	3200	A 690
Total	970	--	914	1782	--	3085	1427	--	16665

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

YELLOWSTONE RIVER BASIN--Continued

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

Suspended sediment, water year October 1959 to September 1960--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..	75	2700	A 550	145	1540	603	189	2090	1070
2..	75	2500	A 510	156	1720	724	192	2350	1220
3..	74	2500	A 500	152	1800	739	178	2240	1080
4..	72	2460	478	154	1660	690	176	1970	936
5..	69	2340	436	171	2550	1180	183	2150	1060
6..	69	2170	404	159	1860	798	197	2140	1140
7..	67	2060	373	143	1530	591	231	3400	A 2100
8..	66	1900	339	143	1600	618	231	2800	A 1700
9..	66	1850	330	136	1340	492	220	3120	1850
10..	66	1990	355	128	1500	518	295	15000	J 13000
11..	63	1890	322	128	1610	556	217	4800	2810
12..	81	2500	J 800	143	2000	772	211	3600	2050
13..	153	4500	J 2100	141	1640	624	211	3420	1950
14..	136	3530	1300	143	1500	579	194	2960	1550
15..	139	3050	1140	166	1700	762	171	2600	1200
16..	136	2700	992	178	1960	942	159	2500	1070
17..	128	2600	898	161	1540	669	173	3320	1550
18..	128	2120	733	164	1500	664	173	2900	1350
19..	147	4000	A 1600	166	1940	870	171	2550	1180
20..	171	3800	A 1800	154	1900	790	173	2540	1190
21..	156	2930	1230	164	1950	863	178	2760	1330
22..	152	3110	1280	161	1760	765	159	2210	949
23..	147	2840	1130	173	1900	887	152	2180	895
24..	154	2200	915	173	1710	799	156	2200	927
25..	159	2060	884	178	1830	879	164	2470	1090
26..	147	1600	635	176	1600	760	173	2850	1330
27..	128	1440	498	178	1820	875	192	3700	1920
28..	154	2460	1020	186	1940	974	166	3450	1550
29..	178	2290	1100	181	2000	977	156	2040	859
30..	159	1700	730	183	2290	1130	161	2650	1150
31..	--	--	--	186	1480	743	--	--	--
Total	3515	--	25382	4970	--	23833	5602	--	53056

Day	JULY			AUGUST			SEPTEMBER		
1..	145	2230	873	194	1800	943	171	1400	646
2..	143	2240	865	181	1670	816	168	1140	517
3..	139	2240	841	194	1700	890	166	1200	538
4..	150	2110	844	200	1660	896	164	1250	553
5..	183	3000	1480	202	1500	818	168	1350	612
6..	186	2480	1240	197	1400	745	168	1320	599
7..	183	2380	1180	208	1480	831	166	1300	A 580
8..	173	2220	1040	217	1650	967	194	2000	J 1100
9..	161	2000	869	208	1470	826	171	1260	582
10..	161	2110	917	186	1300	653	171	980	452
11..	161	1920	835	173	1300	607	168	1000	454
12..	152	1700	698	171	1250	577	178	1130	543
13..	152	1790	735	168	1070	485	186	1080	542
14..	164	2700	A 1200	181	1300	635	197	1220	649
15..	156	1840	775	192	1580	819	202	1270	693
16..	156	1700	716	186	1800	904	192	1040	539
17..	161	1680	730	194	1860	974	173	1070	500
18..	159	1740	747	178	1410	678	183	1060	524
19..	164	1700	753	171	1420	656	189	1120	572
20..	176	2210	1050	168	1180	535	189	1180	602
21..	178	2100	1010	168	1120	508	197	1180	628
22..	173	1850	864	161	1020	443	208	1150	646
23..	178	1800	865	154	1100	457	208	1280	719
24..	178	1650	793	159	1000	429	200	1240	670
25..	181	1800	880	166	1100	493	189	1090	556
26..	181	2060	1010	173	1200	560	186	1090	547
27..	205	2440	1350	197	1560	830	178	1080	519
28..	217	2200	1290	197	1300	691	171	1020	471
29..	214	1990	1150	194	1140	597	166	800	358
30..	200	1810	977	173	990	462	161	800	348
31..	200	1800	972	164	1060	469	--	--	--
Total	5330	--	29559	5675	--	21194	5428	--	17259

Total discharge for year (cfs-days)..... 42389
Total load for year (tons)..... 204195

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

YELLOWSTONE RIVER BASIN--Continued

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

Particle-size analyses of suspended sediment, water year October 1959 to September 1960
(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. 2, 1959.....	1210	45		214	1060		9	13		22		33	43	73	92	99	100	VBWC
Oct. 19.....	1655	50		96	367		17	24		39		46	50	69	97	100	--	VBWC
Nov. 3.....	1215	41		82	313		18	28		41		48	51	70	97	100	--	VBWC
Dec. 3.....	1630	32		91	1110		--	19		35		56	67	87	99	100	--	VPWC
Mar. 21, 1960.....	1625	52		23	2220		--	48		75		88	93	98	100	--	--	VPWC
Mar. 24.....	1640	52		92	4850		--	49		77		71	86	95	100	--	--	VPWC
Apr. 7.....	1555	52		64	1790		--	25		40		61	78	93	100	--	--	VPWC
Apr. 18.....	1650	54		124	1920		--	15		26		44	60	85	99	100	--	VPWC
May 6.....	1750	61		161	1870		--	26		39		58	73	88	98	100	--	VPWC
May 16.....	1310	61		183	1990		--	23		35		61	75	88	97	99	100	VPWC
June 9.....	1555	69		217	3190		--	24		36		71	85	92	97	99	100	VPWC
June 10.....	1650	66		250	8240		--	34		50		80	94	97	99	100	--	VPWC
June 24.....	1540	73		159	2270		--	20		30		50	73	89	96	100	--	VPWC
July 7.....	1605	74		189	2720		--	25		35		54	71	89	96	100	--	VPWC
July 21.....	0840	65		192	2440		--	20		31		52	68	85	95	100	--	VPWC
Aug. 3.....	1055	67		202	1810		--	18		26		44	63	84	96	100	--	VPWC
Aug. 18.....	1150	63		186	1570		--	20		32		50	64	84	95	99	100	VPWC
Aug. 31.....	1155	62		166	1250		--	15		24		43	58	82	95	99	100	VPWC
Sept. 21.....	1710	56		200	1400		--	18		29		43	56	81	96	100	--	VPWC
Sept. 30.....	1530	58		168	984		--	21		31		46	58	79	94	100	--	VPWC

YELLOWSTONE RIVER BASIN--Continued

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 (revised).--808 square miles.
RECORDS AVAILABLE.--Sediment records: October 1947 to February 1954, August 1954 to September 1960.
EXTREMES, 1959-60.--Sediment concentrations: Maximum daily, 31,800 ppm June 12; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 2,160 tons Mar. 29; minimum daily, 0 tons on many days.
EXTREMES, 1947-60.--Sediment concentrations: Maximum daily, 108,000 ppm July 11, 1949; minimum daily, no flow on many days each year.
Sediment loads: Maximum daily, 210,000 tons May 29, 1956; minimum daily, 0 tons on many days each year.
REMARKS.--Records of discharge for water year October 1959 to September 1960 given in WSP 1709. No flow during Octoher to December; record is omitted.

Suspended sediment, water year October 1959 to September 1960

Day	JANUARY			FEBRUARY			MARCH			
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)		Tons per day
1							0	--		0
2							0	--		0
3							0	--		0
4							0	--		0
5							0	--		0
6							0	--		0
7							0	--		0
8							0	--		0
9							0	--		0
10							0	--		0
11							0	--		0
12							0	--		0
13							0	--		0
14							0	--		0
15							0	--		0
16							0	--		0
17							0	--		0
18							0	--		0
19							0	--		0
20							3.1	1100	S	150
21							21	8200	J	750
22							28	7300	J	600
23							20	12000	S	602
24							27	6800	J	750
25							12	6700	J	340
26							9.7	6700	J	260
27							34	7900	J	800
28							82	8690		1920
29							89	9000		2160
30							75	8700		1760
31							23	5600		348
Total	0		0	0		0	423.8	--		10440

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

YELLOWSTONE RIVER BASIN--Continued

6-2570. BADWATER CREEK AT BONNEVILLE, WYO.--Continued

Suspended sediment, water year October 1959 to September 1960--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..	15	4160	168				0		0
2..	15	3600	146				0		0
3..	12	3300	107				0		0
4..	8.8	3100	74				0		0
5..	8.0	3100	67				0		0
6..	7.3	1900	37				0		0
7..	1.4	2660	S 8				0		0
8..	2.2	3600	S 56				0		0
9..	.6	700	1				0		0
10..	0	--	0				1		E 2
11..	0	--	0				0		0
12..	0	--	0				7.5	31800	S 1500
13..	0	--	0				0		0
14..	0	--	0				0		0
15..	0	--	0				0		0
16..	0	--	0				0		0
17..	0	--	0				0		0
18..	0	--	0				0		0
19..	0	--	0				0		0
20..	0	--	0				0		0
21..	0	--	0				0		0
22..	0	--	0				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..	--	--	--				--	--	--
Total	70.3	--	664	0		0	8.5	--	1502

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..	0	--	0				0		0
2..	0	--	0				0		0
3..	0	--	0				0		0
4..	0	--	0				0		0
5..	10	709	S 663				0		0
6..	3.7	5250	S 160				0		0
7..	0	--	0				0		0
8..	0	--	0				0		0
9..	0	--	0				0		0
10..	0	--	0				0		0
11..	0	--	0				0		0
12..	0	--	0				0		0
13..	0	--	0				0		0
14..	0	--	0				0		0
15..	0	--	0				0		0
16..	0	--	0				0		0
17..	0	--	0				0		0
18..	0	--	0				0		0
19..	0	--	0				0		0
20..	0	--	0				0		0
21..	0	--	0				0		0
22..	0	--	0				1	4300	A 12
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	13.7	--	823	0		0	1		12

Total discharge for year (cfs-days)..... 517.3
Total load for year (tons)..... 13441

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

6-2570. BADWATER CREEK AT BONNEVILLE, WYO.--Continued

Particle-size analyses of suspended sediment, water year October 1959 to September 1960
(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, 1960.....	1010	46		6.6	4090			59		84		92	98	100				VPWC
Mar. 29.....	1440	63		45	9200			40		64		94	99	100				VPWC
June 12.....	1625	52		29	71500			80		100		--	--	--				PWC
July 6.....	0040	57		40	40200			44		64		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 (revised).--332 square miles.
RECORDS AVAILABLE.--Water temperatures: March to July 1949, October 1956 to September 1960.
Sediment records: March 1949 to September 1960.
EXTREMES, 1959-60.--Water temperatures: Maximum, 91°F July 19; minimum, freezing point on many days during November to March.
Sediment concentrations: Maximum daily, 16,000 ppm June 10; minimum daily, no flow on many days during December and January.
Sediment loads: Maximum daily, 6,000 tons June 10; minimum daily, 0 tons on many days during December and January.
EXTREMES, 1949-60.--Water temperatures: Maximum (1956-58, 1959-60), 91°F July 19, 1960; minimum (1949, 1956-60), freezing point on many days during winter months.
Sediment concentrations: Maximum daily (1951-58, 1959-60), 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.--Records of discharge for water year October 1959 to September 1960 given in WSP 1709. Flow affected by ice Nov. 5 to Mar. 28.

Temperature (°F) of water, water year October 1959 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	
October	--	51	--	--	41	--	43	--	49	--	--	57	--	45	--	51	--	--	--	40	--	51	--	--	--	42	--	--	39	--	39	
November	--	49	41	--	--	32	--	--	32	--	--	33	--	--	--	--	--	--	32	--	--	--	32	--	--	--	--	--	--	33	--	
December	--	--	32	32	--	--	--	33	--	--	--	--	--	--	33	--	--	32	--	--	--	--	--	--	--	--	--	32	--	--	--	
January	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	32	--	32	--	--	
February	32	--	--	--	--	--	--	32	--	32	--	--	--	--	--	--	32	--	--	--	--	--	--	--	32	--	--	--	--	--	--	
March	--	--	--	32	--	--	--	--	32	32	32	--	--	32	--	32	--	32	--	--	32	32	32	32	32	33	36	35	41	--	46	
April	42	--	--	--	--	62	54	44	--	--	63	59	48	56	44	--	--	48	--	64	--	--	54	--	54	--	60	--	37	--	--	
May	--	67	--	--	--	65	--	--	--	73	78	73	69	--	--	69	56	59	54	53	--	--	--	69	65	76	62	60	61	--	--	
June	68	80	--	--	--	68	79	66	64	65	--	--	67	74	67	--	64	67	--	76	67	70	76	72	--	--	70	--	81	77	--	
July	80	--	72	--	76	76	76	81	--	--	75	79	82	79	82	--	--	84	91	81	75	--	--	--	--	84	82	79	81	--	--	
August	79	70	80	85	77	--	--	72	79	75	82	75	--	--	74	72	65	60	78	--	--	69	68	65	54	56	--	--	72	--	61	
September	61	69	--	--	--	67	67	68	71	--	--	73	68	72	70	73	--	--	71	73	58	49	63	--	--	73	74	67	66	63	--	

YELLOWSTONE RIVER BASIN--Continued

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

Suspended sediment, water year October 1959 to September 1960
/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..	21	1010	57	11	C 313	9	5	C 264	4
2..	15	C 499	20	10	C 313	8	5	C 264	4
3..	12	C 499	16	10	C 313	8	5	C 264	4
4..	12	C 499	16	6.0	C 313	5	4	C 264	3
5..	11	C 499	15	6	C 313	5	4	C 264	3
6..	11	C 499	15	6	C 313	5	4	C 264	3
7..	10	C 499	13	7	C 313	6	4	C 264	3
8..	9.6	C 499	13	8	C 313	7	4	C 264	3
9..	9.6	C 499	13	9	C 313	8	4	C 264	3
10..	9.6	C 499	13	10	C 313	8	4	C 264	3
11..	8.6	C 499	12	10	C 313	8	4	C 264	3
12..	9.1	C 499	12	9	C 313	8	4	C 264	3
13..	8.6	C 499	12	6	C 313	5	3.5	C 264	2
14..	10	C 499	13	4	C 313	3	3.5	C 264	2
15..	10	C 499	13	4	C 313	3	3.5	C 264	2
16..	9.6	C 499	13	4	C 313	3	3.5	C 264	2
17..	10	C 499	13	4	C 313	3	3.5	C 264	2
18..	11	C 499	15	4.5	C 313	4	3.5	C 264	2
19..	11	C 499	15	5	C 313	4	3.5	C 264	2
20..	11	C 499	15	6	C 313	5	3	C 264	2
21..	11	C 499	15	6	C 313	5	3	C 264	2
22..	10	C 499	13	6	C 313	5	3	C 264	2
23..	9.6	C 499	13	6	C 313	5	3	C 264	2
24..	9.6	C 499	13	6	C 313	5	3	C 264	2
25..	9.1	C 499	12	6	C 313	5	3	C 264	2
26..	9.1	C 499	12	5	C 313	4	3	C 264	2
27..	8.2	C 499	11	5	C 313	4	1	C 264	1
28..	9.1	C 499	12	5	C 313	4	.5	C 264	T
29..	11	C 499	15	5	C 313	4	0	--	0
30..	12	C 499	16	5	C 313	4	0	--	0
31..	12	C 499	16	--	--	--	0	--	0
Total	330.4	--	472	194.5	--	160	98.0	--	68

Day	JANUARY			FEBRUARY			MARCH		
1..	0	--	0	0.1	C 142	T	2	C 132	1
2..	0	--	0	.1	C 142	T	2	C 132	1
3..	0	--	0	.1	C 142	T	2	C 132	1
4..	0	--	0	.1	C 142	T	2	C 132	1
5..	0	--	0	.1	C 142	T	2	C 132	1
6..	0	--	0	.2	C 142	T	3	C 132	1
7..	0	--	0	.4	C 142	T	4	C 132	1
8..	0	--	0	.5	C 142	T	4	C 132	1
9..	0	--	0	.5	C 142	T	4	C 132	1
10..	0	--	0	.5	C 142	T	4	C 132	1
11..	0	--	0	.5	C 142	T	4	C 132	1
12..	0	--	0	.5	C 142	T	4	C 132	1
13..	0	--	0	.5	C 142	T	5	C 132	2
14..	0	--	0	.5	C 142	T	5	C 132	2
15..	0	--	0	.5	C 142	T	5	C 132	2
16..	0	--	0	.5	C 142	T	5	C 132	2
17..	0	--	0	.5	C 142	T	10	--	4
18..	0	--	0	.5	C 142	T	15	140	6
19..	0	--	0	.5	C 142	T	20	--	20
20..	0	--	0	1	C 142	T	25	--	65
21..	0	--	0	2	C 142	1	30	1600	130
22..	0	--	0	3.5	C 142	1	35	1600	150
23..	0	--	0	3.5	C 142	1	40	1100	120
24..	0	--	0	3.5	C 142	1	50	1100	150
25..	0	--	0	3.5	C 142	1	55	1400	210
26..	.1	C 184	T	2	C 142	1	60	2100	340
27..	.1	C 184	T	2	C 142	1	80	12000	2600
28..	.1	C 184	T	2	C 142	1	70	15000	2800
29..	.1	C 184	T	2	C 142	1	40	9400	1020
30..	.1	C 184	T	--	--	--	23	5700	354
31..	.1	C 184	T	--	--	--	23	5000	310
Total	0.6	--	T	32.1	--	12	633	--	8299

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 1959 to September 1960--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	19	3900	200	15	--	60	22	1300	77
2	15	--	150	11	1230	36	23	1300 A	80
3	16	--	150	18	--	110	31	--	200
4	15	3600	146	48	--	600	25	--	120
5	14	--	110	30	3800 J	340	21	--	80
6	13	2790	98	21	2900 J	170	25	1320	89
7	13	2830	99	18	--	100	25	2500 A	170
8	11	C 1530	45	21	--	110	23	1620	101
9	11	C 1530	45	24	2040	132	28	1500 J	130
10	10	C 1530	41	20	--	95	87	16000 J	6000
11	10	C 1530	41	15	1540	62	41	5300 A	600
12	10	C 1530	41	14	1280	48	27	3100 A	220
13	9.6	C 1530	40	12	1000	32	23	1780	110
14	8.6	C 1530	36	17	--	100	21	1160	66
15	8.6	C 1530	36	16	--	70	24	1900 J	130
16	8.6	C 1530	36	25	2900 A	200	38	3200 J	340
17	9.1	C 1530	38	30	3000 J	260	29	1880	147
18	8.6	C 1530	36	35	4100 J	400	34	2500 J	240
19	8.2	C 1530	34	34	2680	246	29	--	150
20	7.8	C 1530	32	35	2500	236	24	1500 J	100
21	6.8	C 1530	28	36	--	300	19	1000	51
22	6.8	C 1530	28	45	--	400	17	1100 J	55
23	7.3	C 1530	30	42	2800	318	21	1040	59
24	8.6	C 1530	36	47	3400	431	25	1500 J	110
25	9.1	C 1530	38	35	3100	293	36	--	160
26	8.2	C 1530	34	29	2100	164	43	--	240
27	7.3	C 1530	30	20	1340	72	46	2900 A	360
28	9.6	C 1530	40	35	2700 A	260	50	--	460
29	12	C 1530	50	36	--	250	29	2100 J	170
30	12	C 1530	50	37	--	180	17	1110	51
31	--	--	--	25	1520	103	--	--	--
Total	313.8	--	1818	846	--	6178	903	--	10866

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	17	1180	54	15	560	23	12	420	14
2	14	--	44	22	780	46	14	200	8
3	19	1320	68	21	800	45	39	--	180
4	19	1090	56	22	720	43	48	--	260
5	34	9100 J	950	14	470	18	50	--	280
6	26	7030 S	550	15	--	24	57	2200	338
7	22	1900	113	19	--	40	50	1880	254
8	34	2800 A	260	25	1180	80	35	1160	110
9	46	--	500	28	1350	102	27	890	65
10	21	--	120	29	1180	92	22	--	48
11	9.6	700	18	26	910	64	21	--	42
12	13	1100 J	60	17	580	27	26	880	62
13	8.6	950 J	24	17	--	26	23	630	39
14	8.2	630	14	16	--	24	17	390	18
15	7.3	510	10	17	660	30	15	430	17
16	4.8	--	6	22	900 A	55	16	410	18
17	6.0	--	7	42	3600 J	480	16	470	20
18	6.4	440	8	36	2600 A	260	20	550	30
19	9.1	410	10	34	2580	237	20	570	31
20	15	970	39	35	--	240	22	480	28
21	19	1000	51	21	--	70	25	750 A	50
22	17	680	31	11	730	22	29	1600 A	130
23	19	--	44	9.1	890	22	26	2100 A	150
24	18	--	36	10	740	20	17	--	50
25	17	680	31	15	680	28	13	--	20
26	20	720	39	24	1030	67	12	470	15
27	18	620	30	32	--	150	12	370	12
28	17	610	28	22	--	50	12	320	10
29	17	680	31	15	480	19	12	280	9
30	15	--	22	17	480	22	11	270	8
31	15	--	22	15	380	15	--	--	--
Total	532.0	--	3276	663.1	--	2441	719	--	2316

Total discharge for year (cfs-days)..... 5265.5
Total load for year (tons)..... 35906

S Computed by subdividing day.
A Computed from partly estimated concentration graph.
C Composite period.
J Computed from partly estimated concentration graph and subdividing day.

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

Particle-size analyses of suspended sediment, water year October 1959 to September 1960
(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. 29, 1960.....	1735	41		36	9420		--	44		64		82	89	98	100	--		VPWC
Mar. 31.....	1155	43		23	4760		--	49		67		79	87	98	100	--		VPWC
Apr. 7.....	1335	58		13	2950		--	44		54		88	93	99	100	--		VPWC
Apr. 18.....	1030	48		6.8	1240		34	42		58		78	89	97	97	100		VBWC
May 6.....	1240	62		23	2780		--	33		51		69	84	98	100	--		VPWC
June 8.....	1450	66		27	1450		9	11		18		36	62	93	100	--		VBWC
June 10.....	1045	54		96	24800		--	44		66		87	94	99	100	--		VPWC
June 23.....	1530	76		20	1000		--	25		34		54	76	97	100	--		VPWC
July 7.....	1125	76		21	1640		--	43		59		72	90	99	100	--		VPWC
July 13.....	1215	82		8.2	820		17	36		51		65	81	100	--	--		VBWC
Aug. 3.....	1225	80		22	770		12	14		24		42	68	97	100	--		VBWC
Aug. 17.....	1140	58		78	6780		--	21		35		60	74	92	99	100		VPWC
Sept. 19.....	1245	71		20	590		10	13		23		33	53	93	100	--		VBWC
Sept. 22.....	1020	49		26	1400		40	49		61		68	78	99	100	--		VBWC
Sept. 23.....	1445	63		25	3440		--	77		88		89	93	99	100	--		VPWC

Particle-size analyses of bed material, water year October 1959 to September 1960
(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	
Apr. 18, 1960.....	1030		--	6.8			1	4	45	84	91	93	95	98	100	--		SV
May 6.....	1240		15	23			2	9	54	79	85	87	89	93	97	100		SV
Aug. 17.....	--		15	63			3	10	40	78	89	92	94	97	99	100		SV

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 (revised).--518 square miles.
RECORDS AVAILABLE.--Sediment records: March 1951 to September 1960.
EXTREMES, 1959-60.--Sediment concentrations: Maximum daily, 108,000 ppm June 10; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 64,900 tons Sept. 15; minimum daily, 0 tons on many days.
EXTREMES, 1951-60.--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.--Records of discharge for water year October 1959 to September 1960 given in WSP 1709. Flow affected by ice Nov. 27 to Dec. 6, Feb. 15-19, Mar. 6-19. Bureau of Land Management has extensive spreader systems on some of the tributaries upstream from station.

Suspended sediment, water year October 1959 to September 1960
/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	0.9	--	19	0	--	0	0.2	--	1
2	.2	--	2	0	--	0	.3	2600	2
3	0	--	0	0	--	0	.2	--	2
4	0	--	0	0	--	0	.1	--	1
5	0	--	0	0	--	0	.1	4400	1
6	0	--	0	0	--	0	0	--	0
7	0	--	0	0	--	0	0	--	0
8	0	--	0	0	--	0	0	--	0
9	.2	--	1	0	--	0	0	--	0
10	.2	--	2	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	120	32600	S 23500	0	--	0	0	--	0
17	82	45300	10400	0	--	0	0	--	0
18	18	35600	S 1920	0	--	0	0	--	0
19	11	21900	650	0	--	0	0	--	0
20	8.8	17300	411	0	--	0	0	--	0
21	8.4	14700	333	0	--	0	0	--	0
22	7.9	12800	273	0	--	0	0	--	0
23	6.6	10500	187	0	--	0	0	--	0
24	2.5	8500	57	0	--	0	0	--	0
25	.6	7200	12	0	--	0	0	--	0
26	0	--	0	0	--	0	0	--	0
27	0	--	0	.1	9700	3	0	--	0
28	.3	3370	S 18	.2	15000	A 8	0	--	0
29	.2	9290	8	.2	9600	5	0	--	0
30	0	--	0	.2	--	2	0	--	0
31	0	--	0	--	--	--	0	--	0
Total	267.8	--	37793	0.7	--	18	0.9	--	7

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

YELLOWSTONE RIVER BASIN--Continued

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

Suspended sediment, water year October 1959 to September 1960--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	--	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	2	--	24
8				0	--	0	20	13000 A	700
9				0	--	0	180	14000	6800
10				0	--	0	100	18000	4900
11				0	--	0	10	11000	300
12				0	--	0	9	8400	200
13				0	--	0	8	5800	130
14				0	--	0	7	3600	68
15				.2	3000	2	6	5200	84
16				.3	--	2	4	5500	59
17				.4	1400	2	2	2500	14
18				.2	1000	1	3	2800	23
19				0	--	0	60	37000	6200
20				0	--	0	54	45600 S	7700
21				0	--	0	25	35500	2480
22				0	--	0	9.8	29600 S	896
23				0	--	0	3.5	27200	257
24				0	--	0	1.8	24200 S	127
25				0	--	0	.2	2050 S	2
26				0	--	0	0	--	0
27				0	--	0	0	--	0
28				0	--	0	0	--	0
29				0	--	0	0	--	0
30				--	--	--	0	--	0
31				--	--	--	0	--	0
Total	0		0	1.1	--	7	505.3	--	30964

Day	APRIL			MAY			JUNE		
1	0	--	0	9.4	43300	1140	0	--	0
2	0	--	0	3.5	43400	328	0	--	0
3	0	--	0	1.2	38400	129	0	--	0
4	0	--	0	.6	31600	51	0	--	0
5	0	--	0	.2	13000	7	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	47	25000 S	14400
10	0	--	0	0	--	0	189	8000 S	63200
11	0	--	0	0	--	0	27	54200 S	4320
12	0	--	0	0	--	0	102	67700 S	21300
13	0	--	0	0	--	0	20	55200 S	3360
14	0	--	0	0	--	0	5.9	24700 S	446
15	0	--	0	0	--	0	1.6	16300	70
16	0	--	0	0	--	0	.7	12700	24
17	0	--	0	0	--	0	.3	--	7
18	0	--	0	0	--	0	.1	--	1
19	0	--	0	0	--	0	0	--	0
20	0	--	0	0	--	0	0	--	0
21	0	--	0	0	--	0	1.0	--	32
22	0	--	0	0	--	0	.6	--	16
23	0	--	0	0	--	0	.6	--	9
24	0	--	0	0	--	0	.5	2000	3
25	6.0	22800 S	1000	0	--	0	.5	--	1
26	10	58000 J	1700	0	--	0	.2	367	T
27	11	60100	1850	0	--	0	0	--	0
28	2.4	40300	271	0	--	0	0	--	0
29	31	53000 S	5280	0	--	0	0	--	0
30	24	39000 A	2600	0	--	0	0	--	0
31	--	--	--	0	--	0	--	--	--
Total	84.4	--	12701	14.9	--	1655	397.0	--	107189

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.

YELLOWSTONE RIVER BASIN--Continued

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

Suspended sediment, water year October 1959 to September 1960--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	--	0	0	--	0
2	0	--	0	0	--	0	0	--	0
3	0	--	0	0	--	0	0	--	0
4	0	--	0	0	--	0	0	--	0
5	0	--	0	0	--	0	0	--	0
6	0	--	0	0	--	0	0	--	0
7	0	--	0	0	--	0	0	--	0
8	0	--	0	0	--	0	0	--	0
9	0	--	0	0	--	0	0	--	0
10	0	--	0	0	--	0	0	--	0
11	0	--	0	0	--	0	0	--	0
12	.9	5980	S 41	0	--	0	0	--	0
13	0	--	0	0	--	0	0	--	0
14	26	32000	J 3100	0	--	0	0	--	0
15	.5	11400	S 19	0	--	0	313	60700	S 64900
16	0	--	0	3.0	14500	S 293	49	41600	S 6360
17	0	--	0	39	44000	S 5740	26	22400	1570
18	0	--	0	17	44000	J 2300	17	15000	688
19	0	--	0	2.6	37800	275	11	15000	446
20	0	--	0	.8	24400	53	5.7	15500	238
21	0	--	0	.3	4600	S 5	1.6	12800	55
22	0	--	0	0	--	0	1.0	13300	S 40
23	0	--	0	0	--	0	.4	8130	S 10
24	0	--	0	0	--	0	.1	--	1
25	0	--	0	0	--	0	0	--	0
26	0	--	0	0	--	0	0	--	0
27	0	--	0	0	--	0	0	--	0
28	0	--	0	0	--	0	0	--	0
29	0	--	0	0	--	0	0	--	0
30	0	--	0	0	--	0	0	--	0
31	0	--	0	0	--	0	--	--	--
Total	27.4	--	3160	62.7	--	8666	424.8	--	74308

Total discharge for year (cfs-days)..... 1787.0
Total load for year (tons)..... 276488

S Computed by subdividing day.
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 1959 to September 1960
(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. 16, 1959.....	2215	--		231	59000			49		66		93	98	100	--			VPWC
Oct. 19.....	1025	44		10	21400			97		100		--	--	--	--			PWC
Mar. 9, 1960.....	1100	34		d 180	19000			63		78		94	99	100	--			VPWC
Mar. 9.....	1145	34		d 180	21400			63		75		93	98	100	--			VPWC
Mar. 19.....	1140	35		d 60	69800			45		65		91	97	100	--			VPWC
Mar. 20.....	2020	44		43	40900			63		85		98	99	100	--			VPWC
Mar. 23.....	1725	54		4.0	27400			99		100		--	--	--	--			PWC
Apr. 29.....	1030	--		50	69300			72		92		98	99	100	--			VPWC
June 10.....	0905	--		458	127000			53		72		94	97	99	100			VPWC
June 10.....	1040	58		415	133000			52		72		93	97	99	100			VPWC
June 10.....	2050	64		50	93400			74		93		99	100	--	--			VPWC
June 13.....	1645	77		15	50000			87		100		--	--	--	--			VPWC
Aug. 17.....	0835	55		43	41600			72		90		99	100	--	--			VPWC
Sept. 15.....	1145	64		522	68300			46		58		92	97	99	100			VPWC
Sept. 16.....	0900	56		41	42700			82		96		98	99	99	100			VPWC

d Daily mean discharge.

YELLOWSTONE RIVER BASIN--Continued

6-2780. DRY CREEK AT GREYBULL, WYO.

LOCATION.--At gaging station, 0.5 mile north of Greybull, Big Horn County, and 0.5 mile upstream from mouth.
DRAINAGE AREA.--433 square miles.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1951, August 1957 to August 1960 (discontinued).
Water temperatures: October 1951 to June 1953.
Sediment records: April 1951 to June 1953.
REMARKS.--Records of discharge for water year October 1959 to September 1960 given in WSP 1709.

Chemical analyses, in parts per million, October 1959 to August 1960

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. 1, 1959....	44	21	0.00	126	53	271	4.5	368	0	800	20	1.5	12	0.30	1,520	2.07	181	534	232	5.1	1,990	7.6	11
Nov. 5.....	a 14	23	.00	216	103	545	5.6	453	0	1,640	42	1.5	20	.48	2,980	4.05	113	962	591	7.7	3,590	7.6	11
Dec. 1.....	a 13	24	.02	176	86	429	5.4	413	0	1,310	38	1.7	18	.40	2,400	3.26	84.2	793	454	6.6	2,990	7.8	12
Jan. 4, 1960....	a 7	25	.01	189	121	513	5.0	524	0	1,580	37	1.8	22	.46	2,880	3.92	54.4	969	539	7.2	3,460	7.7	8
Feb. 1.....	a 5	21	.01	196	88	462	4.5	460	0	1,400	33	1.5	20	.38	2,520	3.43	34.0	852	475	6.9	3,050	7.9	7
Mar. 1.....	a 5.0	24	.00	209	90	472	3.6	491	0	1,460	35	1.5	21	.38	2,630	3.58	35.5	892	489	6.9	3,200	7.6	8
Apr. 6.....	a 12	18	.03	177	94	500	7.5	378	0	1,510	52	1.3	9.8	.36	2,680	3.64	86.8	829	519	7.5	3,250	7.4	10
May 6.....	2.8	6.8	.01	188	110	581	7.7	307	0	1,820	51	1.1	9.1	.42	3,110	4.23	23.5	922	670	8.3	3,700	7.5	18
June 2.....	2.9	12	.01	146	83	400	5.2	301	0	1,300	34	1.4	9.6	.34	2,220	3.02	17.4	704	457	6.6	2,780	7.5	19
July 5.....	1.6	6.2	.01	268	149	740	8.3	371	0	2,510	60	.9	9.2	.63	4,140	5.63	17.9	1,280	976	9.0	4,660	7.4	17
Aug. 3.....	1.2	17	2.7	137	65	460	15	399	0	1,170	68	.8	.3	.57	2,250	3.06	7.29	610	283	8.1	2,960	7.2	28

a Daily mean discharge.

YELLOWSTONE RIVER BASIN--Continued

6-2780. DRY CREEK AT GREYBULL, WYO.--Continued

Periodic determinations of suspended-sediment discharge and particle size, water year October 1959 to September 1960
(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	
July 1, 1959	1110	64		67	8120	1470		81		96		98	99	100				VPWC
Oct. 1	--	47		44	362	43		--		--		--	--	--				
Nov. 5	--	32		d 14	236	9		--		--		--	--	--				
Nov. 30	--	32		d 12	344	11		--		--		--	--	--				
Dec. 1	--	34		d 13	308	11		--		--		--	--	--				
Jan. 4, 1960	--	32		d 7	192	4		--		--		--	--	--				
Feb. 1	--	33		d 5	60	1		--		--		--	--	--				
Mar. 1	--	33		d 5.0	100	1		--		--		--	--	--				
Mar. 23	1810	49		d 60	18800	3040		43		61		95	98	99	99	100		VPWC
Apr. 6	--	48		d 12	263	8		--		--		--	--	--				
Apr. 22	--	57		2.6	143	1		--		--		--	--	--				
May 6	--	71		2.8	99	1		--		--		--	--	--				
June 2	--	75		2.9	72	1		--		--		--	--	--				
June 10	1350	70		127	10400	3570		--		--		--	--	--				
June 10	1525	69		132	30600	10900		59		88		99	100	--				VPWC
June 11	0900	61		58	20900	3270		71		95		100	--	--				VPWC
July 5	--	--		1.6	75	.3		--		--		--	--	--				
Aug. 3	1055	71		1.2	35200	118		89		100		--	--	--				PWC

d Daily mean discharge.

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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 (revised).--15,846 square miles.
RECORDS AVAILABLE.--Chemical analyses: December 1949 to September 1953, June 1955 to September 1957.
Water temperatures: July to September 1949, October 1950 to September 1960.
Sediment records: March 1946 to September 1960.
EXTREMES, 1959-60.--Water temperatures: Maximum, 84°F July 15; minimum, freezing point on several days during November to March.
Sediment concentrations: Maximum daily, 25,100 ppm June 11; minimum daily, not determined.
Sediment loads: Maximum daily, 424,000 tons June 11; minimum daily, 114 tons Nov. 14.
EXTREMES, 1946-60.--Water temperatures (1950-60): Maximum, 88°F July 14, 30, 1953, July 12, 1954; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 33,000 ppm Apr. 20, Sept. 21, 1948; minimum daily, not determined.
Sediment loads: Maximum daily, 972,000 tons June 25, 1946; minimum daily, not determined.
REMARKS.--Records of discharge for water year October 1959 to September 1960 given in WSP 1709. No appreciable inflow between gaging station and sampling point except during periods of intense local precipitation. Flow affected by ice Nov. 20 to Dec. 6, Dec. 25 to Jan. 2, Feb. 29 to Mar. 3, Mar. 10-12.

Temperature (°F) of water, water year October 1959 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	
October	53	48	56	60	50	54	48	47	47	46	49	58	56	55	53	--	52	54	53	52	53	47	46	47	48	45	47	45	44	39	44	50
November	45	46	46	39	32	32	--	--	34	--	--	36	--	--	--	35	--	--	34	--	--	--	34	--	--	36	--	--	--	34	--	--
December	--	--	33	--	--	--	33	--	--	34	--	--	--	33	--	--	32	--	--	--	33	--	--	33	--	--	--	33	--	--	33	--
January	--	--	--	32	--	--	34	--	--	--	34	--	--	34	--	--	--	32	--	--	32	--	--	--	34	--	--	34	--	--	--	--
February	33	--	--	33	--	--	--	33	--	--	33	--	--	--	33	--	--	34	--	--	--	32	--	--	32	--	--	--	32	--	--	--
March	32	--	34	--	--	--	34	--	--	36	34	34	34	34	34	34	34	39	40	40	45	46	45	51	53	54	56	55	50	51	47	42
April	45	48	54	57	60	60	55	59	65	64	56	53	56	54	45	43	42	46	48	--	54	49	50	42	41	50	52	46	47	54	--	52
May	55	56	56	56	55	60	63	59	64	68	66	71	64	64	62	63	63	56	56	65	61	65	66	63	66	68	64	66	70	74	73	63
June	68	73	74	69	68	72	76	67	68	65	66	61	70	67	65	69	69	70	68	64	65	52	58	63	63	65	70	73	76	80	--	68
July	80	76	75	69	77	82	80	80	76	76	78	78	79	78	78	78	81	84	81	82	82	80	80	77	80	80	81	76	78	82	80	79
August	80	79	78	78	77	75	69	70	74	78	78	80	79	77	71	64	68	71	75	75	77	76	70	66	68	70	63	67	68	72	70	73
September	69	75	77	76	78	71	66	64	67	65	69	68	60	67	67	56	57	64	66	65	52	52	55	57	64	64	66	64	59	61	--	65

YELLOWSTONE RIVER BASIN--Continued

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

Suspended sediment, water year October 1959 to September 1960
/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	1310	850	3010	1560	420	1770	1450	C 249	970
2	1330	500	1800	1600	560	2420	1400	C 249	940
3	1370	490	1810	1610	580	2520	1450	C 249	970
4	1370	470	1740	1620	660	2890	1450	C 249	970
5	1380	430	1600	1510	700	2850	1400	C 249	940
6	1350	470	1710	1450	680	2660	1350	C 249	910
7	1330	450	1620	1520	C 62	254	1340	C 249	901
8	1370	400	1480	1580	C 62	264	1370	C 249	921
9	1370	550	2030	1610	C 62	270	980	C 249	659
10	1370	600	2220	1640	C 62	275	892	C 249	600
11	1440	820	3190	1570	C 62	263	920	C 249	619
12	1410	610	2320	1570	C 62	263	950	C 249	639
13	1400	380	1440	692	C 62	116	1180	C 249	793
14	1400	500	1890	684	C 62	114	1220	C 249	820
15	1400	1150	4350	764	C 62	128	1310	C 249	881
16	1960	1690	8940	812	C 62	136	1340	C 249	901
17	2320	7690	48200	856	C 62	143	1320	C 249	887
18	1830	5970	29500	1020	C 62	171	1320	C 249	887
19	1570	3200	13600	1290	C 62	216	1310	C 249	881
20	1560	920	3880	1400	C 267	1000	1260	C 249	847
21	1550	530	2220	1600	C 267	1200	1220	C 249	820
22	1530	470	1940	1500	C 267	1100	1200	C 249	807
23	1550	390	1630	1500	C 267	1100	1190	C 249	800
24	1530	480	1980	1500	C 267	1100	1100	C 249	740
25	1420	510	2090	1550	C 267	1100	1150	C 249	770
26	1510	540	2200	1500	C 267	1100	1500	C 249	1000
27	1500	410	1660	1450	C 267	1000	1500	C 249	1000
28	1510	380	1550	1450	C 267	1000	1250	C 249	840
29	1510	360	1470	1400	C 267	1000	1100	C 249	740
30	1570	420	1780	1450	C 267	1000	1100	C 249	740
31	1560	410	1730	--	--	--	1050	C 249	710
Total	46680	--	156580	41258	--	29423	38572	--	25903

Day	JANUARY			FEBRUARY			MARCH		
1	1050	C 198	560	1300	C 289	1010	900	70	170
2	1050	C 198	560	1320	C 289	1030	900	--	220
3	930	C 198	497	1320	C 289	1030	950	120	310
4	1000	C 198	535	1320	C 289	1030	970	--	500
5	910	C 198	486	1280	C 289	999	970	--	1000
6	1070	C 198	572	1230	C 289	960	1250	--	1700
7	980	C 198	524	1220	C 289	952	1460	762	3000
8	1110	C 198	593	1220	C 289	952	2000	--	6000
9	1460	C 198	781	1250	C 289	975	2500	--	10000
10	1470	C 198	786	1330	C 289	1040	2850	1600	12000
11	1450	C 198	775	1340	C 289	1050	3050	1800	15000
12	1410	C 198	754	1290	C 289	1010	2160	2100	12000
13	1410	C 198	754	1250	C 289	975	2140	2010	11600
14	1380	C 198	738	1290	C 289	1010	2050	1200	6640
15	1390	C 198	743	1250	C 289	975	1760	1440	6840
16	1330	C 198	711	1240	C 151	506	1670	1340	6040
17	1350	C 198	722	1260	C 151	514	1600	1480	6390
18	1430	C 198	764	1260	C 151	514	1620	1450	6340
19	1250	C 198	668	1260	C 151	514	1990	3680	S 21800
20	1090	C 198	583	1230	C 151	501	3430	8980	S 92700
21	874	C 198	467	1190	C 151	485	3340	10600	95600
22	856	C 198	458	1240	C 151	506	3480	10200	95800
23	1160	C 198	620	1230	C 151	501	3290	7400	65700
24	1320	C 198	706	1080	C 59	172	3020	5090	41500
25	1250	C 198	668	1150	C 59	183	2480	3310	22200
26	1260	C 198	674	1090	C 59	174	2160	2120	12400
27	1340	C 198	716	1000	C 59	159	2000	1680	9070
28	1350	C 198	722	847	C 59	135	1930	1450	7560
29	1320	C 198	706	850	C 59	140	1830	1300	6420
30	1320	C 198	706	--	--	--	1690	1280	5840
31	1300	C 198	695	--	--	--	1610	990	4300
Total	37870	--	20244	35137	--	20002	63050	--	586640

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 1959 to September 1960--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	1520	860	3530	960	1560	4040	1130	430	1310
2	1450	680	2660	901	2490	6060	1240	410	1370
3	1370	575	2130	960	1790	4640	1280	380	1310
4	1120	520	1570	748	885	1790	1490	530	2130
5	1070	520	1500	724	495	968	1490	495	1990
6	1080	700	2040	724	455	889	1430	440	1700
7	1100	875	2600	732	445	879	1320	390	1390
8	1140	955	2940	684	360	665	1260	340	1160
9	1130	795	2420	660	430	766	1500	440	1780
10	1120	715	2160	692	305	570	4850	12700	S 299000
11	1190	645	2070	668	265	478	6250	25100	424000
12	1090	540	1590	804	315	684	3820	19400	200000
13	1060	390	1120	1330	1060	3810	3660	10100	99800
14	1050	380	1080	2060	2620	14600	3480	5420	50900
15	950	380	975	1810	1730	8450	3210	1980	17200
16	892	310	747	1330	885	3180	3230	1560	13600
17	892	345	831	1050	495	1400	3110	1210	10200
18	910	335	823	960	305	791	2620	1190	8420
19	874	290	684	960	230	596	2590	1020	7130
20	780	255	537	883	230	548	2240	865	5230
21	764	230	474	780	255	537	1940	845	4430
22	724	265	518	724	240	469	1620	610	2670
23	716	325	628	847	330	755	1310	485	1720
24	847	655	1500	1380	740	2760	1090	440	1290
25	1200	790	2560	1550	875	3660	940	340	863
26	1180	645	2050	1180	420	1340	847	290	663
27	980	435	1150	980	305	807	812	250	548
28	865	430	1000	1070	325	939	812	225	493
29	856	505	1170	1060	360	1030	716	215	416
30	1030	710	1970	980	295	781	654	180	318
31	--	--	--	960	325	842	--	--	--
Total	30950	--	47027	31151	--	69724	61941	--	1163031

	JULY			AUGUST			SEPTEMBER		
1	606	155	254	560	205	310	676	110	201
2	585	145	229	600	220	356	692	110	206
3	570	145	223	565	985	1500	676	130	237
4	560	135	204	550	595	884	676	160	292
5	550	145	215	545	270	397	692	130	243
6	550	155	230	550	255	379	692	190	355
7	560	145	219	545	210	309	692	220	411
8	560	135	204	550	185	275	692	220	411
9	580	125	196	555	185	277	692	210	392
10	560	160	242	530	135	193	700	180	340
11	560	145	219	535	155	224	708	180	344
12	555	135	202	540	135	197	716	160	309
13	565	155	236	530	135	193	708	160	306
14	590	130	207	535	120	173	708	170	325
15	585	130	205	545	120	177	812	320	702
16	545	110	162	618	1940	S 3460	1980	9080	48500
17	545	120	177	724	1560	S 2890	1210	15500	50600
18	535	120	173	1320	2520	8980	1160	6770	21200
19	530	130	186	990	6990	18700	1310	2900	10300
20	540	110	160	812	6480	14200	1180	3300	10500
21	525	100	142	796	1240	2660	1140	1150	3540
22	515	100	139	796	720	1550	1300	690	S 2550
23	515	95	132	788	480	1020	1930	7020	36600
24	525	120	170	748	310	626	1380	9740	36300
25	535	135	195	724	250	489	1160	4050	12700
26	550	95	141	716	190	367	1050	1220	3460
27	525	100	142	708	180	344	1010	740	2020
28	540	120	175	700	130	246	980	495	1310
29	540	100	146	668	130	234	892	360	867
30	560	110	166	668	150	270	856	285	659
31	575	100	155	668	120	216	--	--	--
Total	17136	--	5846	20679	--	62096	29070	--	246180

Total discharge for year (cfs-days)..... 453494
Total load for year (tons)..... 2432696

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 1959 to September 1960
(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. 1, 1959.....	1515	51		1300	805		--	62		76		80	86	97	100			VPWC
Mar. 18, 1960.....	1030	35		1620	986		--	47		71		92	96	100	--			VPWC
Mar. 24.....	1700	51		3030	5440		--	56		79		91	94	98	100			VPWC
Apr. 6.....	0910	--		1210	624		12	17		31		47	56	94	100			VBWC
Apr. 21.....	1120	54		748	235		26	32		54		69	75	100	--			VBWC
May 6.....	0945	54		724	415		43	52		69		80	85	99	100			VBWC
June 10.....	1830	65		4380	9000		--	24		43		76	82	92	99	100		VPWC
June 11.....	0640	59		11300	28400		--	68		92		96	98	99	100			VPWC
June 14.....	1340	70		3520	6510		--	67		89		95	97	99	100			VPWC
June 17.....	1530	69		3160	1160		--	28		48		71	83	94	100			VPWC
Aug. 20.....	1120	72		820	9550		--	85		97		99	100	--	--			VPWC
Sept. 20.....	1500	67		1190	4950		--	80		96		98	99	100	--			VPWC

YELLOWSTONE RIVER BASIN--Continued

6-2845. BITTER CREEK NEAR GARLAND, WYO.

LOCATION.--At gaging station, 0.8 mile upstream from mouth, 4 miles southeast of Garland, Park County, and 5 miles southwest of Byron.
DRAINAGE AREA (revised).--80.5 square miles.
RECORDS AVAILABLE.--Chemical analyses: August 1958 to September 1960 (discontinued).
REMARKS.--Records of discharge for water year October 1959 to September 1960 given in WSP 1709.

Chemical analyses, in parts per million, water year October 1959 to September 1960

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. 2, 1959....	213	17	0.01	67	21	113	3.1	243	0	284	7.8	0.8	6.3	0.18	649	0.88	373	253	54	3.1	947	7.7	6
Nov. 6.....	43	21	.00	81	31	244	3.1	354	0	515	14	1.1	17	.24	1,120	1.52	130	331	41	5.8	1,590	7.8	7
Dec. 1.....	26	19	.02	85	35	284	3.3	366	0	635	16	1.4	16	.24	1,310	1.78	92.0	356	56	6.6	1,800	7.7	13
Jan. 4, 1960....	a 19	22	.01	80	31	241	3.2	381	0	497	16	1.4	21	.26	1,100	1.50	56.4	325	13	5.8	1,500	7.7	5
Feb. 1.....	a 17	18	.00	85	33	283	4.1	368	0	630	16	1.0	17	.22	1,270	1.73	56.3	349	47	6.6	1,790	8.1	13
Mar. 1.....	a 15	21	.00	81	31	240	2.8	374	0	495	16	1.1	21	.24	1,090	1.48	44.1	330	23	5.7	1,560	7.6	9
May 6.....	137	18	.01	67	20	107	3.5	240	0	259	7.9	.6	6.3	.16	620	.84	229	248	51	2.9	943	7.1	9
May 31.....	a 160	16	.01	63	20	106	3.4	242	0	257	7.5	.8	5.3	.18	611	.83	264	240	42	3.0	895	7.1	15
July 5.....	224	18	.00	63	18	113	3.4	229	0	270	7.2	.7	9.1	.17	630	.86	381	231	43	3.2	912	7.1	7
Aug. 20.....	320	18	.00	59	27	111	3.2	249	0	268	7.1	.8	8.7	.27	629	.86	543	257	53	3.0	924	7.6	6
Sept. 1.....	182	19	.01	57	30	124	3.6	266	0	296	8.5	.9	8.6	.21	693	.94	341	264	46	3.3	1,000	7.7	4

a Daily mean discharge.

6-2848. WHISTLE CREEK NEAR GARLAND, WYO.

LOCATION.--At gaging station, 300 feet upstream from Elk-Lovell canal and 5.3 milee southeast of Garland, Park County.
DRAINAGE AREA.--101 square miles.
RECORDS AVAILABLE.--Chemical analyses: July 1959 to May 1960 (discontinued).
REMARKS.--Records of discharge for October 1959 to May 1960 given in WSP 1709.

Chemical analyses, in parts per million, July 1959 to May 1960

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 160°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, 1959....	45	16	0.01	52	16	78	3.6	156	0	226	6.9	0.4	3.2	0.12	488	0.66	59.3	195	65	2.4	729	7.7	4
July 30.....	24	14	.01	57	21	99	3.7	162	0	286	9.2	.4	3.9	.10	600	.82	38.9	227	94	2.9	671	7.8	8
Sept. 3.....	39	13	.00	58	18	66	3.5	157	0	232	3.7	.3	.6	.14	482	.66	50.8	216	89	1.9	713	7.6	22
Oct. 2.....	42	13	.01	64	21	80	3.3	175	0	263	6.6	.4	1.6	.14	551	.75	62.5	245	101	2.2	608	7.6	7
Nov. 6.....	2.1	11	.00	273	158	1,280	6.0	526	0	3,430	78	.5	46	.27	5,750	7.62	32.6	1,330	899	15	6,620	7.6	18
Dec. 1.....	2.8	9.3	.01	196	119	940	6.5	428	0	2,570	66	.5	29	.19	4,300	5.65	32.5	980	629	13	5,160	7.6	9
Apr. 6, 1960....	2.6	10	.03	251	164	1,370	12	422	0	3,740	105	.2	29	.24	6,370	6.66	44.7	1,300	954	17	6,960	7.5	16
May 6.....	42	14	.01	56	22	81	3.9	166	0	243	6.4	.3	.4	.13	534	.73	60.6	232	78	2.3	793	7.3	11

YELLOWSTONE RIVER BASIN--Continued

6-2854. SAGE CREEK AT SIDON CANAL, NEAR DEAVER, WYO.

LOCATION.--At gaging station, 300 feet downstream from mouth of Pole Cat Creek, 400 feet upstream from Sidon Canal crossing, and 2.5 miles east of Deaver, Big Horn County.
DRAINAGE AREA.--341 square miles.
RECORDS AVAILABLE.--Chemical analyses: August 1958 to May 1960 (discontinued).
REMARKS.--Records of discharge for October 1959 to May 1960 given in WSP 1709.

Chemical analyses, in parts per million, October 1959 to May 1960

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, 1959....	150	14	0.00	98	44	154	3.7	213	0	561	11	0.5	2.9	0.25	1,020	1.39	413	424	249	3.3	1,360	7.9	8
Nov. 6.....	30	13	.00	249	150	575	5.8	406	0	2,020	34	.8	12	.58	3,510	4.77	284	1,240	907	7.1	3,990	7.6	8
Nov. 30.....	20	12	.03	247	169	605	6.3	409	0	2,230	40	.9	14	.62	3,800	5.17	205	1,310	975	7.3	4,250	7.6	13
Feb. 1, 1960....	1	17	.01	402	281	1,240	13	700	0	4,180	55	.7	30	.91	6,850	9.32	18.5	2,160	1,590	12	7,090	7.6	9
Apr. 6.....	14	9.3	.03	226	160	616	7.8	344	0	2,190	45	.8	9.0	.53	3,700	5.03	140	1,220	938	7.7	4,150	7.7	18
May 6.....	a 67	17	.02	119	54	220	4.8	248	0	733	16	.2	4.8	.30	1,370	1.86	248	517	314	4.2	1,770	7.4	9

a Discharge at time of sampling.

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 1960.
Water temperatures: October 1959 to September 1960.
Sediment records: October 1959 to September 1960.
EXTREMES, 1959-60.--Water temperatures: Maximum, 80°F June 26; minimum, freezing point on several days during January to March.
Sediment concentrations: Maximum daily, 6,420 ppm June 11; minimum daily, 140 ppm Apr. 9.
Sediment loads: Maximum daily, 28,900 tons June 11; minimum daily, 157 tons Apr. 9.
REMARKS.--Records of discharge for water year October 1959 to September 1960 given in WSP 1709. Flow affected by ice Nov. 25, Dec. 20-24, Jan. 23-28, Feb. 13-21, Mar. 9.

Chemical analyses, in parts per million, water year October 1959 to September 1960

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. 1, 1959....	1,510	16	0.00	85	31	117	3.7	229	0	391	9.3	0.5	1.0	0.20	782	1.06	3,190	339	151	2.8	1,100	7.7	7
Nov. 30.....	1,000	15	.01	98	39	127	4.5	266	0	433	13	.8	4.1	.26	903	1.23	2,440	406	188	2.7	1,240	7.1	7
Jan. 4, 1960....	a 1,200	15	.02	107	36	116	3.8	290	0	391	13	.8	4.4	.23	859	1.17	2,780	415	177	2.5	1,190	7.6	4
Feb. 1.....	1,200	14	.02	102	32	109	4.5	276	0	379	13	.5	3.6	.21	805	1.09	2,610	385	159	2.4	1,130	7.8	7
Mar. 1.....	a 900	15	.00	104	32	101	3.3	282	0	345	13	.4	3.1	.22	762	1.04	1,850	391	160	2.2	1,090	7.7	7
Apr. 6.....	470	11	.02	111	50	173	5.8	258	0	593	20	.7	2.0	.29	1,150	1.56	1,460	483	271	3.4	1,520	7.6	5
May 6.....	328	17	.02	106	43	164	4.5	253	0	556	16	.6	.1	.20	1,100	1.50	974	441	234	3.4	1,460	7.2	90
June 2.....	496	14	.01	116	44	186	4.5	258	0	629	17	.7	3.2	.23	1,180	1.60	1,580	472	260	3.7	1,570	7.3	19
July 5.....	496	17	.01	115	40	170	4.2	249	0	585	15	.6	3.6	.25	1,130	1.54	1,510	452	248	3.5	1,480	7.3	11
Aug. 3.....	876	17	.00	103	32	144	3.7	237	0	478	12	.6	5.4	.26	955	1.30	2,260	390	196	3.2	1,290	7.3	8
Sept. 1.....	455	14	.01	126	45	193	4.4	275	0	655	16	.7	4.4	.29	1,240	1.69	1,520	501	275	3.8	1,630	7.5	7

a Daily mean discharge.

YELLOWSTONE RIVER BASIN--Continued

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

Temperature (°F) of water, water year October 1959 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	
October	--	48	54	--	--	53	--	--	--	--	--	--	--	--	--	--	--	48	--	--	--	--	--	--	--	--	45	45	46	--	--	--
November	--	--	--	--	33	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	38	--	--
December	--	--	36	--	--	--	34	--	--	35	--	--	--	34	--	--	35	--	--	--	36	--	--	34	--	--	--	34	--	--	33	--
January	--	--	--	34	--	--	34	--	--	--	33	--	--	35	--	--	--	32	--	--	32	--	--	--	34	--	--	34	--	--	--	--
February	39	--	--	34	--	--	--	36	--	--	38	--	--	--	35	--	--	34	--	--	--	32	--	--	32	--	--	--	32	--	--	--
March	32	--	34	--	--	--	35	--	--	35	34	32	--	36	33	35	32	40	39	41	41	44	45	42	45	50	47	50	50	46	45	--
April	39	41	45	46	48	53	50	48	50	53	47	51	46	48	44	43	45	46	50	48	50	48	45	38	36	41	42	43	38	37	--	45
May	44	49	51	48	47	48	51	52	51	54	55	61	61	51	52	52	52	49	49	46	54	51	54	55	52	55	60	53	54	56	61	53
June	60	58	59	63	56	55	66	64	60	60	61	62	59	64	61	58	62	58	65	59	53	54	42	50	50	80	56	60	64	68	--	59
July	70	67	64	65	64	65	70	70	71	65	65	66	66	66	65	64	66	66	69	69	66	69	69	68	65	65	65	67	65	65	69	67
August	69	65	64	65	66	64	64	61	68	61	63	64	67	64	66	60	59	61	62	65	64	65	60	56	55	54	56	55	53	54	60	62
September	58	59	62	65	64	60	58	51	50	54	54	55	58	58	59	57	54	52	54	54	51	47	46	50	52	54	54	55	54	48	--	55

YELLOWSTONE RIVER BASIN--Continued

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

Suspended sediment, water year October 1959 to September 1960
(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	1500	550	2230	1790	660	3190	1040	C 594	1670
2	1490	560	2250	1720	500	2320	1080	C 594	1730
3	1420	520	1990	1610	460	2000	1220	C 594	1960
4	1420	540	2070	1540	310	1290	1250	C 594	2000
5	1460	580	2290	1000	C 432	1170	1200	C 594	1920
6	1500	560	2270	939	C 432	1100	1240	C 594	1990
7	1520	600	2460	984	C 432	1150	1240	C 594	1990
8	1480	600	2400	966	C 432	1130	1520	C 594	2440
9	1490	530	2130	966	C 432	1130	1250	C 594	2000
10	1500	580	2350	966	C 432	1130	1200	C 594	1920
11	1520	520	2130	957	C 432	1120	1160	C 594	1860
12	1550	470	1970	792	C 432	924	1140	C 594	1830
13	1550	520	2180	950	C 432	1100	634	C 370	633
14	1510	470	1920	1000	C 432	1200	1030	C 370	1030
15	1500	--	1700	1000	C 432	1200	957	C 370	956
16	2030	2810	S 16200	1000	C 432	1200	1010	C 370	1010
17	1780	1860	8940	1000	C 432	1200	930	C 370	929
18	1670	830	3740	1100	C 432	1300	939	C 370	938
19	1630	540	2380	1100	C 432	1300	948	C 370	947
20	1680	520	2360	1050	C 432	1200	980	C 370	980
21	1800	620	3010	1000	C 432	1200	1000	C 370	1000
22	1700	500	2300	900	C 432	1000	1050	C 370	1000
23	1610	440	1910	950	C 432	1100	1050	C 370	1000
24	1540	410	1700	1050	C 432	1200	1050	C 370	1000
25	1550	380	1590	1050	C 432	1200	930	C 370	929
26	1930	985	5130	1080	C 432	1260	921	C 370	920
27	1900	510	2620	1030	C 432	1200	921	C 370	920
28	1740	500	2350	1000	C 432	1170	950	C 370	950
29	1720	500	2320	1000	C 432	1170	950	C 370	950
30	1730	410	1920	1000	C 432	1170	1050	C 370	1000
31	1720	410	1900	--	--	--	1150	C 370	1100
Total	50140	--	92710	32490	--	39024	32990	--	41502

Day	JANUARY			FEBRUARY			MARCH		
1	1150	C 550	1700	1180	C 386	1230	900	170	410
2	1100	C 550	1600	1200	C 386	1250	950	--	550
3	1150	C 550	1700	1190	C 386	1240	1000	280	760
4	1200	C 550	1800	1180	C 386	1230	1050	--	1200
5	1200	C 550	1800	1210	C 386	1260	1100	--	2000
6	1250	C 550	1900	1200	C 386	1250	1200	--	3000
7	1250	C 550	1900	1190	C 386	1240	1200	1400	4500
8	1250	C 550	1900	1220	C 386	1270	1200	--	6000
9	1200	C 550	1800	1280	C 386	1330	1050	--	5000
10	1200	C 550	1800	1210	C 386	1260	849	1810	4150
11	1150	C 550	1700	1210	C 386	1260	598	1070	1730
12	1050	C 550	1600	1230	C 386	1280	580	750	1170
13	1050	C 550	1600	1200	C 386	1300	574	590	914
14	1050	C 550	1600	1200	C 386	1300	604	690	1120
15	1000	C 550	1500	1200	C 386	1300	568	720	1100
16	960	C 550	1400	1200	C 386	1300	550	510	757
17	900	C 550	1300	1200	C 386	1300	556	510	766
18	850	C 550	1300	1150	C 386	1200	610	690	1140
19	800	C 550	1200	1100	C 386	1100	832	2900	6510
20	800	C 550	1200	1150	C 386	1200	840	3440	7800
21	800	C 550	1200	1150	C 386	1200	1010	3700	10100
22	850	C 550	1300	1150	C 386	1200	894	3280	7920
23	900	C 550	1300	1100	C 386	1100	768	2610	5410
24	950	C 550	1400	1100	C 386	1100	784	2650	5610
25	1000	C 550	1500	1050	C 386	1100	824	1970	4380
26	1050	C 550	1600	1000	C 386	1000	808	1520	3320
27	1050	C 550	1600	900	C 386	940	784	1340	2840
28	1050	C 550	1600	900	C 386	940	744	1090	2190
29	1070	C 550	1590	900	C 386	940	508	780	1070
30	1080	C 550	1600	--	--	--	460	330	410
31	1170	C 550	1740	--	--	--	508	580	796
Total	32530	--	48730	33150	--	34620	24903	--	94623

S Computed by subdividing day.
C Composite period.

YELLOWSTONE RIVER BASIN--Continued

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

Suspended sediment, water year October 1959 to September 1960--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	286	440	340	544	1610	2360	514	700	971
2	401	460	498	532	1580	2270	450	540	656
3	420	200	227	526	1840	2610	445	540	649
4	465	420	527	475	1950	2500	425	530	608
5	470	310	393	400	880	950	568	960	1470
6	465	240	301	338	600	548	800	1450	3130
7	465	220	276	296	630	503	617	770	1280
8	435	190	223	331	700	626	580	670	1050
9	415	140	157	345	620	578	957	2730 S	7780
10	368	300	298	270	500	364	1130	2610	7960
11	400	700	756	260	450	316	1670	6420	28900
12	460	680	845	258	660	460	1300	2300	8070
13	410	420	465	234	490	310	939	1580	4000
14	400	640	691	250	480	324	728	1280	2520
15	465	740	929	272	580	426	784	1230	2600
16	376	600	609	300	640	518	858	1400	3240
17	475	730	936	317	590	505	728	1030	2020
18	480	490	635	338	620	566	610	910	1500
19	300	420	340	363	590	578	592	820	1310
20	562	1710	2590	381	540	555	666	1010	1820
21	610	1390	2290	415	670	751	631	1000	1700
22	568	1160	1780	465	1130	1420	544	840	1230
23	680	1060	1950	568	1140	1750	508	880	1210
24	1040	2760 S	8460	550	820	1220	450	760	923
25	1190	1880 S	6470	485	620	812	415	860	964
26	595	2100 S	2820	440	570	677	415	710	796
27	435	2660	3120	490	740	979	450	800	972
28	526	1830	2600	652	1160	2040	381	640	658
29	680	1430	2620	712	1470	2830	334	430	388
30	598	1350	2180	688	1060	1970	334	470	424
31	--	--	--	631	800	1360	--	--	--
Total	15440	--	46326	13126	--	33676	19823	--	90799

	JULY			AUGUST			SEPTEMBER		
1	338	400	365	1070	1210	3500	475	220	280
2	320	380	328	1070	945	2730	460	260	323
3	310	320	268	858	630	1460	470	230	292
4	345	500	466	728	480	943	470	230	292
5	502	920	1250	652	450	792	544	260	382
6	514	780	1080	760	685	1410	538	220	320
7	450	590	717	849	620	1420	490	200	265
8	386	470	490	1020	880	2420	480	180	233
9	395	550	587	1030	865	2400	631	330	562
10	475	660	846	966	700	1830	696	420	789
11	532	730	1050	858	560	1300	680	330	606
12	496	515	690	728	485	953	712	380	730
13	460	430	534	680	450	826	728	380	747
14	475	455	584	659	405	721	800	410	890
15	470	435	552	744	460	924	900	390	950
16	455	360	442	1570	2990 S	18600	950	410	1100
17	440	350	416	2270	4370 S	28300	950	525	1300
18	480	430	557	1630	2000	8800	950	790	2000
19	430	340	395	1540	1140	4740	950	630	1600
20	415	330	370	1420	960	3680	950	485	1200
21	470	410	520	1330	810	2910	950	525	1300
22	526	505	717	1200	710	2300	950	715	1800
23	592	570	911	1040	620	1740	950	925	2400
24	752	1060	2150	921	505	1260	950	735	1900
25	1090	3670	10800	832	410	921	950	695	1800
26	939	1150	2920	736	380	755	950	630	1600
27	849	840	1920	610	340	560	950	570	1500
28	800	790	1710	595	300	480	950	440	1100
29	776	720	1510	565	270	410	950	390	1000
30	752	630	1280	535	270	390	950	390	1000
31	824	740	1650	505	200	270	--	--	--
Total	17058	--	38075	29971	--	99745	23324	--	30261

Total discbarge for year (cfs-days)..... 324945
Total load for year (tons)..... 690091

S Computed by subdividing day.

YELLOWSTONE RIVER BASIN--Continued

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

Particle-size analyses of suspended sediment, water year October 1959 to September 1960
(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. 1, 1959	1350	--		1520	555		16	18		28		51	74	97	100	--		VBWC
Nov. 5	1545	33		957	446		16	21		29		58	76	92	99	100		VBWC
Nov. 30	1440	38		984	279		20	28		42		62	72	93	99	100		VBWC
Mar. 18, 1960	1515	--		666	657		--	48		77		93	96	99	100	--		VPWC
Mar. 24	1535	54		688	2260		--	66		90		98	99	100	--	--		VPWC
Apr. 21	1440	58		680	1220		--	43		70		95	98	100	--	--		VPWC
May 6	1130	54		334	539		53	62		83		97	99	100	--	--		VBWC
May 18	0850	49		331	539		45	57		82		98	100	--	--	--		VBWC
June 2	1350	70		490	574		31	40		64		92	99	100	--	--		VBWC
June 10	1755	67		1120	2070		--	37		53		81	96	100	--	--		VPWC
June 11	0740	60		1720	6070		--	48		64		84	95	99	100	--		VPWC
June 17	1325	72		720	1020		--	33		51		74	86	97	100	--		VPWC
July 5	0930	64		496	631		--	28		54		88	96	100	--	--		VPWC
July 20	0810	70		410	323		31	40		62		88	95	99	100	--		VBWC
Aug. 3	1250	75		858	619		11	17		27		36	69	95	100	--		VBWC
Aug. 20	1010	67		1400	971		--	26		38		58	72	94	100	--		VPWC
Sept. 20	1320	64		d 950	454		12	17		29		51	66	89	100	--		VBWC

d Daily mean discharge.

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.
RECORDS AVAILABLE.--Chemical analyses: February 1950 to September 1960.
Water temperatures: April 1949 to September 1951, August 1952 to November 1958, June 1959 to September 1960.
Sediment records: July 1947 to September 1954, October 1955 to September 1958, October 1959 to September 1960.
EXTREMES, 1959-80.--Dissolved solids: Maximum, 1,110 ppm July 6-25, Sept. 1-10; minimum, 559 ppm Mar. 9-21.
Hardness: Maximum, 441 ppm Sept. 1-10; minimum, 279 ppm Mar. 9-21.
Specific conductance: Maximum daily, 1,550 micromhos Sept. 6, 8; minimum daily, 540 micromhos Mar. 11.
Water temperatures: Maximum, 78°F July 19, 23; minimum, freezing point on several days during November to March.
Sediment concentrations: Maximum daily, 18,300 ppm June 13; minimum daily, 55 ppm Sept. 9.
Sediment loads: Maximum daily, 269,000 tons June 13; minimum daily, 117 tons July 22.
EXTREMES, 1947-60.--Dissolved solids (1951-60): Maximum, 1,190 ppm July 28-31, 1955; minimum, 304 ppm June 23, 1951.
Hardness (1951-80): Maximum, 544 ppm July 28-31, 1955; minimum, 151 ppm June 23, 1951.
Specific conductance (1951-60): Maximum daily, 1,640 micromhos Nov. 18, 1955; minimum daily, 364 micromhos June 20, 1951.
Water temperatures (1949-51, 1952-60): Maximum, 89°F Aug. 7, 1953; minimum, freezing point on many days during winter months.
Sediment concentrations (1947-54, 1955-58, 1959-60): Maximum daily, 23,200 ppm May 24, 1952; minimum daily, not determined.
Sediment loads (1947-54, 1955-58, 1959-60): 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. Records of discharge for water year October 1959 to September 1960 given in WSP 1709. Flow affected by ice Nov. 5-26, Dec. 15 to Mar. 22.

Chemical analyses, in parts per million, water year October 1959 to September 1960

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. 1-19, 1959.	2,997	--	--	--	--	115	--	226	0	--	--	--	--	--	810	1.10	6,550	370	185	2.6	1,120	7.4	--
Oct. 20-31.....	3,032	--	--	--	--	108	--	227	0	--	--	--	--	--	769	1.05	6,300	354	188	2.5	1,080	7.4	--
Nov. 1-14.....	2,533	--	--	--	--	113	--	252	0	--	--	--	--	--	822	1.12	5,620	387	180	2.5	1,130	7.8	--
Nov. 22-30.....	3,527	--	--	--	--	116	--	256	0	--	--	--	--	--	836	1.14	7,960	390	160	2.6	1,150	7.8	--
Dec. 1-10.....	3,037	--	--	--	--	110	--	257	0	--	--	--	--	--	804	1.09	6,590	386	175	2.4	1,120	7.9	--
Dec. 11-20.....	2,448	12	0.00	102	32	106	4.0	255	0	384	15	0.4	1.1	0.16	794	1.08	5,250	388	179	2.3	1,160	7.7	6
Dec. 21-31.....	2,614	--	--	--	--	103	--	257	0	--	--	--	--	--	777	1.06	5,480	378	167	2.3	1,060	7.6	--
Mar. 9-21, 1960.	3,219	--	--	--	--	70	--	190	0	--	--	--	--	--	559	.76	4,880	279	123	1.8	813	7.2	--
Mar. 22-24.....	6,170	--	--	--	--	83	--	228	0	--	--	--	--	--	649	.88	10,810	316	129	2.0	922	7.6	--
Mar. 25-Apr. 2..	3,308	--	--	--	--	103	--	228	0	--	--	--	--	--	793	1.08	7,080	374	187	2.3	1,100	7.6	--
Apr. 3-20.....	2,100	--	--	--	--	122	--	244	0	--	--	--	--	--	917	1.25	5,200	422	222	2.6	1,240	7.8	--
Apr. 21-May 18..	1,769	--	--	--	--	121	--	223	0	442	--	--	--	--	872	1.19	4,180	394	211	2.6	1,190	7.2	--
May 17-31.....	1,526	--	--	--	--	108	--	190	0	373	--	--	--	--	746	1.01	3,070	338	182	2.4	1,040	7.0	--
June 1-11.....	1,944	--	--	--	--	113	--	202	0	404	--	--	--	--	789	1.07	4,140	354	188	2.6	1,080	8.0	--
June 12-15.....	5,670	17	.01	110	32	114	6.9	222	0	448	13	.4	2.6	.18	673	1.19	13,360	408	226	2.4	1,170	6.2	11

June 16-25, 1960	3,232	--	--	--	--	95	--	204	0	351	--	--	--	--	718	.96	6,270	334	167	2.3	1,000	7.6	--
June 26-July 5..	1,131	--	--	--	--	123	--	196	0	446	--	--	--	--	852	1.16	2,600	374	212	2.8	1,170	7.5	--
July 6-25.....	612	--	--	--	--	167	--	195	0	606	--	--	--	--	1,110	1.51	1,830	438	276	3.5	1,460	7.4	--
July 26-Aug. 17.	998	--	--	--	--	163	--	199	0	577	--	--	--	--	1,050	1.43	2,830	407	244	3.5	1,430	7.5	--
Aug. 16-31.....	1,680	--	--	--	--	149	--	227	0	523	--	--	--	--	1,010	1.37	4,580	410	224	3.2	1,370	7.1	--
Sept. 1-10.....	959	8.9	.01	104	44	171	5.1	206	0	604	21	.6	.3	.25	1,110	1.51	2,870	441	272	3.5	1,490	7.7	9
Sept. 11-17.....	1,263	--	--	--	--	168	--	224	0	579	--	--	--	--	1,070	1.46	3,650	433	249	3.5	1,440	7.9	--
Sept. 16-30.....	2,336	--	--	--	--	156	--	247	0	519	--	--	--	--	1,010	1.37	6,380	431	226	3.3	1,360	7.7	--
Weighted average a.....	2,224	--	--	--	--	113	--	232	0	--	--	--	--	--	616	1.11	4,900	376	186	2.5	1,130	--	--

a Includes estimated data for missing periods. Represents 100 percent of runoff for water year.

Temperature (°F) of water, water year October 1959 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	
October.....	45	45	49	50	50	51	46	43	44	41	40	44	44	52	50	50	54	54	49	45	50	51	53	55	53	49	45	47	43	45	45	48
November.....	45	43	43	--	32	34	36	36	34	34	34	--	--	--	--	--	--	--	--	--	--	33	33	33	--	33	32	--	33	32	--	--
December.....	33	33	32	33	--	--	--	--	32	33	33	33	32	32	33	33	33	32	33	32	32	--	--	32	--	32	--	32	--	32	--	--
January.....	--	32	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
February.....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
March.....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35	35	34	37	42	45	47	48	50	48	47	47	--
April.....	44	45	48	48	50	52	49	49	50	55	50	49	49	49	48	44	44	46	51	47	50	50	49	49	40	44	46	49	42	43	--	48
May.....	49	52	51	49	48	50	55	58	56	58	51	65	65	59	59	59	57	55	54	54	58	56	59	60	60	58	62	59	62	64	65	57
June	64	66	66	65	61	59	62	66	63	64	66	67	63	67	64	64	67	64	67	66	60	60	59	64	69	70	69	69	70	70	--	65
July.....	71	71	69	68	65	69	72	73	72	76	71	73	73	75	72	75	75	76	78	77	77	75	78	72	73	71	71	74	75	72	74	73
August.....	76	73	73	74	73	70	70	65	64	66	70	72	72	71	70	69	64	66	68	72	69	70	64	61	59	59	60	59	59	64	63	67
September.....	71	69	--	68	--	69	64	57	67	61	60	58	69	65	61	58	--	57	62	59	54	56	56	57	60	60	54	54	54	58	--	61

YELLOWSTONE RIVER BASIN--Continued

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

Suspended sediment, water year October 1959 to September 1960
/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..	2880	690	5360	3040	405	3330	3260	C 682	6000
2..	2750	735	5460	3040	315	2590	3100	C 682	5710
3..	2770	1640	12300	3080	310	2580	3100	C 682	5710
4..	2770	790	5910	3100	--	3000	3060	C 682	5630
5..	2770	480	3590	3000	480	3890	3240	C 682	5970
6..	2900	560	4380	2800	C 347	2600	3080	C 682	5670
7..	2880	550	4280	2400	C 347	2200	2810	C 682	5170
8..	2860	770	5950	2450	C 347	2300	2830	C 682	5210
9..	2750	455	3380	2550	C 347	2400	3060	C 682	5630
10..	2880	480	3730	2600	C 347	2400	2830	C 682	5210
11..	2900	510	3990	2650	C 347	2500	2370	C 682	4360
12..	2900	415	3250	2500	C 347	2300	2180	C 682	4010
13..	3000	510	4130	1600	C 155	670	2310	C 682	4250
14..	2980	520	4180	650	C 155	270	2370	C 682	4360
15..	2980	430	3460	900	C 155	380	2250	C 682	4100
16..	2940	575	4560	1200	C 155	500	2500	C 436	2900
17..	3400	785	7210	1400	C 155	590	2500	C 436	2900
18..	4060	1460	16000	1600	C 155	670	2600	C 436	3100
19..	3570	2640	25400	2000	C 649	3500	2700	C 436	3200
20..	3180	3380	29000	3000	C 649	5300	2700	C 436	3200
21..	3100	2020	16900	3500	C 649	6100	2600	C 436	3100
22..	3100	1120	9370	3000	C 649	5300	2500	C 436	2900
23..	3080	645	5360	3200	C 649	5600	2450	C 436	2900
24..	3020	435	3550	3400	C 649	6000	2600	C 436	3100
25..	2980	350	2820	3750	C 649	6600	2500	C 436	2900
26..	2880	330	2570	4000	C 649	7000	2700	C 436	3200
27..	2940	370	2940	3950	C 649	6920	2800	C 436	3300
28..	3120	460	3880	3640	C 649	6380	2800	C 436	3300
29..	3000	420	3400	3400	C 649	5960	2700	C 436	3200
30..	2980	405	3260	3400	C 649	5960	2600	C 436	3100
31..	3000	310	2510	--	--	--	2500	C 436	2900
Total	93320	--	212080	80800	--	105790	83600	--	126190

Day	JANUARY			FEBRUARY			MARCH		
1..	2300		1500	2600		1000	1900	--	1200
2..	2100		1500	2600		1000	2000	--	1200
3..	1900		1500	2700		1000	2100	--	1200
4..	2100		1500	2700		1000	2200	--	1200
5..	2000		1500	2600		1000	2200	--	1200
6..	2100		1500	2600		1000	2500	--	1400
7..	2200		1500	2600		1000	2800	--	1400
8..	2400		1500	2600		1000	3000	--	1400
9..	2500		1500	2600		1000	3400	180	1700
10..	2700		1500	2700		1000	3750	170	1700
11..	2900		1500	2750		1000	3800	320	3300
12..	3000		1500	2700		1000	3800	260	2700
13..	2900		1500	2600		1000	3800	160	1600
14..	2800		1500	2600		1000	3400	180	1700
15..	2600		1500	2500		1000	3000	170	1400
16..	2600		1500	2500		1000	2700	240	1700
17..	2600		1500	2500		1000	2500	360	2400
18..	2500		1500	2500		1000	2500	1000	6800
19..	2400		1500	2500		1000	2700	1800	13000
20..	2200		1500	2400		1000	3000	2100	17000
21..	2100		1500	2500		1000	3500	4200	40000
22..	2100		1500	2500		1000	6000	9000	150000
23..	2100		1500	2300		1000	6780	9360	171000
24..	2100		1500	2200		1000	5730	6300	97500
25..	2300		1500	2100		1000	4600	4890	60700
26..	2400		1500	2000		1000	3840	3490	36200
27..	2500		1500	1800		1000	3510	2700	25600
28..	2500		1500	1800		1000	3380	1900	17300
29..	2500		1500	1800		1000	3300	1390	12400
30..	2600		1500	--		--	3020	1190	9700
31..	2600		1500	--		--	2810	935	7090
Total	74600		46500	70850		29000	103520	--	692690

C Composite period.

YELLOWSTONE RIVER BASIN--Continued

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

Suspended sediment, water year October 1959 to September 1960--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..	2730	960	7080	1930	710	3700	1470	270	1070
2..	2580	900	6270	2000	630	3400	1500	190	770
3..	2310	690	4300	1980	600	3210	1580	170	725
4..	2410	570	3710	1830	720	3560	1660	190	852
5..	2330	510	3210	1800	1060	5150	1730	200	934
6..	2180	425	2500	1550	1130	4730	1860	220	1100
7..	2160	435	2540	1440	880	3420	1860	300	1510
8..	2130	485	2790	1400	700	2650	1950	360	1900
9..	2160	380	2220	1290	470	1640	1830	270	1330
10..	2180	470	2770	1200	325	1050	1980	300	1600
11..	2200	495	2940	1130	250	763	3970	1620	S 21300
12..	2140	485	2800	1090	305	898	7670	13800	S 263000
13..	2220	325	1950	1140	290	893	5440	18300	269000
14..	2020	365	1990	1630	225	990	4970	15200	204000
15..	2020	355	1940	2410	380	2470	4600	8600	107000
16..	2000	330	1780	3040	945	7760	4210	5600	63600
17..	1920	265	1370	2500	980	6620	3970	2800	30000
18..	1760	185	879	1950	610	3210	3730	1830	18400
19..	1880	170	863	1530	350	1450	3340	1260	11400
20..	1780	185	889	1350	235	856	3180	1120	9620
21..	1600	180	778	1310	225	796	3280	1060	9390
22..	1640	205	908	1270	180	617	3180	880	7560
23..	1690	270	1230	1200	135	437	2840	800	6130
24..	1740	355	1670	1180	115	366	2450	775	5130
25..	1850	415	2070	1290	200	697	2140	735	4250
26..	2390	595	3840	1760	430	2040	1860	460	2310
27..	2500	810	5470	1760	405	1920	1610	400	1740
28..	2040	575	3170	1410	285	1080	1350	285	1040
29..	1880	425	2160	1320	190	677	1200	250	810
30..	1800	740	3600	1500	--	900	1070	220	636
31..	--	--	--	1560	300	1260	--	--	--
Total	62240	--	79687	49750	--	69210	83480	--	1048107
	JULY			AUGUST			SEPTEMBER		
1..	960	210	544	960	105	272	936	105	265
2..	852	185	426	1010	105	286	912	105	258
3..	818	185	409	1090	125	368	864	75	175
4..	807	200	436	1110	105	315	900	75	182
5..	785	175	371	972	75	197	960	75	194
6..	710	165	316	936	95	240	972	85	223
7..	785	180	381	936	135	341	1020	85	234
8..	774	160	334	1030	180	500	1010	65	177
9..	621	120	201	1110	140	420	984	55	146
10..	558	120	181	1170	125	395	1030	95	264
11..	567	130	199	1200	160	518	1140	115	354
12..	549	110	163	1140	180	554	1180	95	303
13..	567	140	214	1060	140	401	1180	105	334
14..	585	140	221	960	85	220	1220	135	445
15..	558	110	166	888	65	156	1280	140	484
16..	630	120	204	864	85	198	1280	220	760
17..	612	120	198	1070	190	549	1560	--	1800
18..	621	100	168	2110	1470	S 9600	2500	1040	7020
19..	558	100	151	2460	1070	7110	2140	2950	17000
20..	567	90	138	2660	2350	16900	2260	5600	34200
21..	558	90	136	2310	1340	8360	2200	4080	24200
22..	540	80	117	2050	1790	9910	2070	1580	8830
23..	576	90	140	1810	2040	9970	2130	1710	9830
24..	612	95	157	1640	1360	6020	2730	1720	12700
25..	700	95	180	1500	650	2630	2920	1270	10000
26..	774	115	240	1380	465	1730	2540	3100	21300
27..	996	180	484	1280	400	1380	2350	4160	26400
28..	972	125	328	1210	325	1060	2280	2980	18300
29..	876	125	296	1140	255	785	2200	870	5170
30..	900	125	304	1010	200	545	2070	555	3100
31..	924	105	262	960	180	466	--	--	--
Total	21912	--	8065	41026	--	82396	48818	--	204648

Total discharge for year (cfs-days)..... 813916
Total load for year (tons)..... 2704363

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 1959 to September 1960
(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. 5, 1959.....	1445	52		2790	464		27	34		49		59	69	97	100			VBWC
Nov. 2.....	1450	47		3040	272		18	21		35		44	54	94	100			VBWC
Apr. 4, 1960.....	1410	54		2410	563		--	32		44		51	60	97	100			VPWC
May 2.....	1515	54		1970	592		--	61		79		61	84	98	100			VPWC
June 3.....	1055	70		1660	167		22	31		64		91	94	99	100			VBWC
June 13.....	1220	67		5470	16400		--	71		94		98	99	100	--			VPWC
June 13.....	1610	70		5320	16200		--	71		93		98	99	100	--			VPWC
June 13.....	1900	70		5230	15700		--	71		94		98	99	100	--			VPWC
June 14.....	0815	67		5040	16200		--	71		95		98	99	100	--			VPWC
July 5.....	1600	76		763	182		23	34		73		98	99	100	--			VBWC
Aug. 1.....	1245	81		972	104		33	42		64		95	96	100	--			VBWC
Sept. 2.....	0845	69		924	109		37	49		80		93	95	98	98	100		VBWC

6-3055. GOOSE CREEK BELOW SHERIDAN, WYO.

LOCATION.--At gaging station, 700 feet north of Sheridan city limits, Sheridan County, and 1,200 feet downstream from Soldier Creek.
DRAINAGE AREA.--392 square miles.
RECORDS AVAILABLE.--Chemical analyses: August 1959 to September 1960 (discontinued).
REMARKS.--Records of discharge for water year October 1959 to September 1960 given in WSP 1709.

Chemical analyses, in parts per million, August 1959 to September 1960

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. 5, 1959....	18	3.7	0.01	84	70	54	5.7	342	0	305	8.3	0.4	5.8	0.19	745	1.01	36.2	497	217	1.1	1,070	7.5	17
Aug. 31.....	24	7.6	.24	84	66	54	6.0	359	0	302	9.9	.3	.5	.20	726	.99	47.0	480	166	1.1	1,050	7.2	16
Oct. 5.....	54	6.6	.17	75	55	44	4.4	363	0	217	6.8	.4	.2	.14	594	.81	86.6	412	114	.9	925	7.4	18
Nov. 2.....	86	8.6	.02	75	49	38	3.9	328	0	186	6.1	.3	.3	.12	549	.75	127	390	121	.8	852	7.1	12
Dec. 4.....	66	12	.02	63	47	37	3.5	292	0	163	9.1	.6	16	.11	510	.69	118	350	111	.9	780	6.7	17
Jan. 4, 1960....	68	12	.16	68	44	33	2.8	325	0	152	3.7	.3	.4	.10	475	.65	87.2	350	83	.8	750	7.5	10
Feb. 4.....	50	12	.18	70	43	33	3.8	328	0	162	5.3	.0	.0	.10	496	.67	67.0	353	84	.8	783	7.3	11
Feb. 29.....	46	12	.01	75	49	32	2.0	344	0	163	6.3	.2	11	.09	522	.71	67.7	386	106	.7	809	7.4	8
Apr. 4.....	70	7.4	.10	64	42	30	2.7	278	0	163	6.1	.3	5.6	.12	472	.64	89.2	331	103	.7	722	7.4	10
May 5.....	51	8.6	.07	64	42	34	3.8	224	0	189	6.0	.6	21	.11	494	.67	68.0	334	150	.8	767	7.3	19
June 3.....	14	11	.08	68	61	51	7.5	407	0	194	16	.5	.3	.19	683	.93	25.8	420	86	1.1	984	7.8	28
Aug. 1.....	12	10	.06	74	62	50	6.4	325	0	280	15	.3	.2	.17	651	.89	21.1	441	174	1.0	1,010	7.8	13
Sept. 2.....	18	11	.13	59	37	45	9.4	224	0	218	23	.2	.4	.23	462	.36	22.5	300	116	1.1	853	7.9	12

YELLOWSTONE RIVER BASIN--Continued

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.--5,420 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: January 1951 to September 1960.
Water temperatures: April 1949 to September 1960.
Sediment records: June 1946 to September 1951.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 1,130 ppm Sept. 16-30; minimum, 266 ppm Mar. 19-24.
Hardness: Maximum, 490 ppm Nov. 12-22, Jan. 16-31; minimum, 150 ppm Mar. 19-24.
Specific conductance: Maximum daily, 1,730 micromhos July 22; minimum daily, 361 micromhos Mar. 20.
Water temperatures: Maximum, 69°F July 17, 20, Aug. 1, 2; minimum, freezing point on many days during November to March.
EXTREMES, 1949-60.--Dissolved solids (1951-60): Maximum, 1,790 ppm Sept. 11, 1958; minimum, 200 ppm June 23-27, 1953.
Hardness (1951-60): Maximum, 688 ppm Sept. 11, 1958; minimum, 94 ppm May 4, 1955.
Specific conductance (1951-60): 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. Records of discharge for water year October 1959 to September 1960 given in WSP 1709.

Chemical analyses, in parts per million, water year October 1959 to September 1960

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. 1-9, 1959..	122	--	--	--	--	63	--	258	0	--	--	--	--	--	560	0.76	184	319	107	1.5	835	7.5	--
Oct. 10-31.....	111	--	--	--	--	76	--	296	0	--	--	--	--	--	642	.87	192	370	127	1.7	944	7.6	--
Nov. 1-11.....	182	--	--	--	--	66	--	302	0	--	--	--	--	--	643	.87	316	386	138	1.5	931	7.6	--
Nov. 12-22.....	137	8.8	0.01	94	62	88	6.1	400	0	348	4.9	0.3	0.2	0.19	818	1.11	303	490	162	1.7	1,160	8.0	3
Nov. 23-30.....	188	--	--	--	--	62	--	296	0	--	--	--	--	--	607	.83	308	367	124	1.4	889	7.8	--
Dec. 1-15.....	209	--	--	--	--	62	--	332	0	--	--	--	--	--	663	.90	374	413	141	1.3	955	7.8	--
Dec. 16-31.....	211	--	--	--	--	64	--	357	0	--	--	--	--	--	701	.95	399	443	150	1.3	1,000	7.7	--
Jan. 1-15, 1960.	189	--	--	--	--	69	--	379	0	--	--	--	--	--	747	1.02	381	476	165	1.4	1,070	7.6	--
Jan. 16-31.....	195	--	--	--	--	69	--	394	0	--	--	--	--	--	764	1.04	402	490	167	1.4	1,090	7.6	--
Feb. 1-22.....	201	--	--	--	--	58	--	338	0	--	--	--	--	--	638	.87	346	414	137	1.2	943	7.3	--
Feb. 23-Mar. 18.	177	--	--	--	--	59	--	310	0	--	--	--	--	--	615	.84	294	379	125	1.3	896	7.6	--
Mar. 19-24.....	2,994	10	.05	41	12	27	6.4	178	0	62	.0	.3	3.0	.07	266	.36	2,150	150	4	1.0	410	7.1	40
Mar. 25-Apr. 13.	483	--	--	--	--	53	--	258	0	--	--	--	--	--	520	.71	678	313	101	1.3	786	7.5	--
Apr. 14-28.....	378	--	--	--	--	53	--	252	0	--	--	--	--	--	524	.71	535	317	110	1.3	788	7.4	--
Apr. 29-May 9...	203	--	--	--	--	71	--	288	0	--	--	--	--	--	629	.86	345	358	122	1.6	931	7.6	--
May 10-15.....	40.0	--	--	--	--	85	--	306	0	300	--	--	--	--	684	.93	73.9	373	122	1.9	1,000	7.5	--
May 16-24.....	7.8	9.5	.01	81	55	147	8.3	406	0	404	6.3	.3	.0	.25	930	1.26	19.6	429	96	3.1	1,330	7.7	9
May 25-June 4...	51.1	--	--	--	--	103	--	310	0	291	--	--	--	--	687	.93	94.8	332	78	2.5	1,000	7.3	--
June 5-16.....	22.4	--	--	--	--	120	--	348	0	304	--	--	--	--	736	1.00	44.5	340	55	2.8	1,110	7.4	--
June 17-26.....	101	--	--	--	--	99	--	274	0	237	--	--	--	--	589	.80	161	255	30	2.7	877	7.6	--

June 27-July 13, 1960.....	10.0	--	--	--	--	176	--	430	0	427	--	--	--	--	987	1.34	26.6	394	41	3.9	1,410	7.4	--
July 14-24.....	6.4	--	--	--	--	201	--	458	0	475	--	--	--	--	1,080	1.47	18.7	392	16	4.4	1,520	7.7	--
July 25-Aug. 12.	31.1	--	--	--	--	97	--	318	0	274	--	--	--	--	662	.90	55.6	325	64	2.3	994	7.1	--
Aug. 13-31.....	8.2	--	--	--	--	183	--	439	0	447	--	--	--	--	1,010	1.37	22.4	392	32	4.0	1,460	7.4	--
Sept. 1-15.....	5.4	--	--	--	--	225	--	466	0	494	--	--	--	--	1,100	1.50	16.0	393	11	4.9	1,550	8.2	--
Sept. 16-30.....	5.3	13	0.01	64	58	236	7.7	472	0	493	5.9	0.4	0.0	0.37	1,130	1.54	16.2	400	13	5.1	1,580	8.1	11
Weighted average a.....	188	--	--	--	--	55	--	275	0	--	--	--	--	--	534	0.73	271	318	92	1.3	788	--	--

a Represents 100 percent of runoff for water year.

Temperature (°F) of water, water year October 1959 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	
October.....	42	47	48	48	47	50	45	35	35	34	--	36	38	44	48	40	43	41	42	41	40	40	42	44	48	42	38	39	36	36	35	41
November.....	38	40	40	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
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	--	--	32
March.....	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	34	33	35	38	41	39	41	45	50	51	46	46	--	35
April.....	--	--	47	46	48	52	48	48	42	48	44	50	45	45	44	45	41	44	47	46	50	51	46	45	38	41	39	41	40	38	--	45
May.....	45	48	50	46	47	50	49	56	55	53	54	59	58	49	50	51	52	53	47	45	54	49	55	57	57	53	57	56	54	59	62	53
June.....	58	58	60	60	55	52	61	62	62	59	60	62	55	63	62	58	--	--	62	61	53	54	52	57	65	65	63	61	62	61	--	59
July.....	63	65	56	60	56	60	64	66	65	68	66	65	61	65	68	65	69	65	66	69	68	67	65	64	65	64	63	68	66	62	66	65
August.....	69	69	65	67	66	66	62	--	--	--	62	62	63	63	61	62	60	57	57	65	62	64	61	50	55	51	56	50	52	56	58	60
September.....	56	63	63	67	63	56	55	48	65	51	52	51	53	59	55	55	47	47	52	53	48	48	45	45	50	47	42	47	44	44	--	52

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.--12,900 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: December 1949 to September 1960.
Water temperatures: February 1951 to May 1954, October 1954 to September 1960.
Sediment records: March 1950 to September 1953.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 2,550 ppm Nov. 8-18; minimum, 322 ppm Mar. 19.
Hardness: Maximum, 1,070 ppm Nov. 8-18; minimum, 158 ppm Mar. 19.
Specific conductance: Maximum daily, 3,040 micromhos Nov. 14; minimum daily, 487 micromhos Mar. 19.
Water temperatures: Maximum, 86°F July 28, Aug. 15; minimum, freezing point on many days during November to March.
EXTREMES, 1951-60.--Dissolved solids: Maximum, 5,430 ppm Dec. 15-17, 1955; minimum, 278 ppm Mar. 29, 1952.
Hardness: Maximum, 2,120 ppm Dec. 15-17, 1955; minimum, 62 ppm Oct. 22-24, 1953.
Specific conductance: Maximum daily, 9,270 micromhos Dec. 16, 1955; minimum daily, 407 micromhos Feb. 14, 1952.
Water temperatures: Maximum (1951-53, 1954-60), 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. Records of discharge for water year October 1959 to September 1960 given in WSP 1709.

Chemical analyses, in parts per million, water year October 1959 to September 1960

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 (residue at 180°C): Tons per acre-foot	Dissolved solids (residue at 180°C): 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. 1-18, 1959.	50.2	--	--	--	--	269	--	262	0	--	--	--	--	--	1750	2.38	237	881	486	4.5	2170	7.4	--
Oct. 19-31.....	95.2	--	--	--	--	208	--	258	0	--	--	--	--	--	1520	2.07	391	672	460	3.5	1900	7.4	--
Nov. 1-7.....	98.3	--	--	--	--	245	--	309	0	--	--	--	--	--	1780	2.42	472	772	519	3.8	2150	7.9	--
Nov. 8-18.....	102	13	0.02	250	108	371	9.8	439	0	1370	75	0.4	3.0	0.24	2550	3.47	702	1070	710	4.9	3000	8.0	17
Nov. 19-30.....	122	--	--	--	--	236	--	335	0	--	--	--	--	--	1560	2.12	514	648	373	4.0	1980	7.9	--
Dec. 1-10.....	190	--	--	--	--	188	--	324	0	--	--	--	--	--	1520	2.07	780	734	468	3.0	1890	7.8	--
Dec. 11-22.....	175	--	--	--	--	190	--	331	0	--	--	--	--	--	1500	2.04	709	720	449	3.1	1880	7.8	--
Dec. 23-31.....	133	--	--	--	--	211	--	366	0	--	--	--	--	--	1640	2.23	589	785	485	3.3	2020	7.8	--
Jan. 1-18, 1960.	111	--	--	--	--	229	--	387	0	--	--	--	--	--	1750	2.38	524	824	507	3.5	2160	8.0	--
Jan. 19-31.....	93.5	--	--	--	--	222	--	398	0	--	--	--	--	--	1730	2.35	437	828	502	3.4	2130	8.0	--
Feb. 1-10.....	165	--	--	--	--	192	--	328	0	--	--	--	--	--	1500	2.04	668	703	434	3.1	1880	7.4	--
Feb. 11-29.....	157	--	--	--	--	174	--	303	0	--	--	--	--	--	1420	1.93	602	675	427	2.9	1780	7.4	--
Mar. 1-14.....	235	--	--	--	--	203	--	350	0	--	--	--	--	--	1640	2.23	1040	765	478	3.2	2040	7.9	--
Mar. 15-18.....	975	--	--	--	--	73	--	163	0	--	--	--	--	--	660	.90	1740	331	197	1.8	925	7.3	--
Mar. 19.....	4000	--	--	--	--	38	--	137	0	--	--	--	--	--	322	.44	3480	158	46	1.3	487	7.5	--
Mar. 20-22.....	11470	8.3	.03	71	15	53	6.2	183	0	183	6.2	.3	3.6	.07	458	.62	14180	239	89	1.5	876	7.4	30
Mar. 23-25.....	3843	--	--	--	--	69	--	176	0	--	--	--	--	--	634	.86	6580	327	183	1.7	899	7.5	--
Mar. 26-Apr. 2..	1173	--	--	--	--	132	--	208	0	--	--	--	--	--	1030	1.40	3260	465	294	2.7	1360	7.4	--
Apr. 3-25.....	500	--	--	--	--	177	--	249	0	--	--	--	--	--	1320	1.80	1780	581	377	3.2	1700	7.6	--

Apr. 26-May 9, 1960.....	282	--	--	--	--	200	--	247	0	--	--	--	--	--	--	1420	1.93	1080	605	402	3.5	1620	7.6	--
May 10-31.....	114	--	--	--	--	259	--	256	0	--	--	--	--	--	--	1670	2.27	514	636	428	4.5	2140	7.8	--
June 1-13.....	47.1	13	.01	156	63	294	9.6	250	0	1010	57	.4	.5	1.16		1810	2.46	230	646	443	5.0	2260	7.9	11
June 14-23.....	431	--	--	--	--	181	--	236	0	945	--	--	--	--		1700	2.31	1980	630	636	2.7	1990	7.3	--
June 24-July 11.	107	--	--	--	--	276	--	256	0	1120	--	--	--	--		2000	2.72	578	847	637	4.2	2430	7.1	--
July 12-22.....	19.7	--	--	--	--	346	--	266	0	1260	--	--	--	--		2230	3.03	119	816	600	5.3	2710	7.5	--
July 23-26, July 28-Aug. 15....	3.7	--	--	--	--	356	--	256	0	1270	--	--	--	--		2220	3.02	22.2	759	549	5.6	2740	7.3	--
Aug. 16-31.....	1.0	11	.02	183	79	375	11	274	0	1300	58	.5	.2	.29		2320	3.16	6.27	776	553	5.8	2790	7.6	16
Sept. 1-20, 28-30.....	.2	--	--	--	--	344	--	261	0	1190	--	--	--	--		2080	2.83	1.13	767	553	5.4	2560	8.0	--
Weighted average a.....	301	--	--	--	--	128	--	228	0	--	--	--	--	--		1000	1.36	613	464	277	2.6	1300	--	--

a Represents 100 percent of runoff for water year.

Temperature (°F) of water, water year October 1959 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	
October.....	41	34	41	39	41	36	34	41	39	40	38	40	45	46	42	41	42	41	42	44	43	45	46	44	42	39	37	43	45	41	33	41
November.....	36	32	32	34	32	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
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
March.....	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	34	34	33	36	40	34	47	47	49	47	44	46	47	36
April.....	44	44	44	--	47	50	48	49	51	53	51	49	50	52	50	44	47	48	55	55	54	51	48	47	45	44	41	--	49	50	--	49
May.....	51	55	53	52	47	48	51	51	54	55	61	60	58	60	--	58	57	55	53	55	56	59	61	63	59	61	63	66	67	68	69	58
June.....	70	66	62	60	61	63	64	65	61	--	69	67	65	64	66	68	69	70	69	69	64	67	69	69	75	78	79	78	69	71	--	68
July.....	73	66	68	66	65	78	84	71	70	74	72	75	78	79	80	81	74	74	76	78	75	70	68	68	82	78	--	86	81	75	81	75
August.....	85	81	79	82	80	80	79	79	78	74	76	75	77	81	86	81	76	70	71	70	70	67	64	69	67	68	67	69	72	67	65	74
September.....	69	67	64	66	66	67	63	64	63	65	64	62	67	68	69	67	64	59	59	57	--	--	--	--	--	--	--	49	49	50	--	62

YELLOWSTONE RIVER BASIN--Continued

6-3295. YELLOWSTONE RIVER NEAR SIDNEY, MONT.

LOCATION.--At bridge on State Bighway 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.--69,450 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to September 1960.
Water temperatures: January 1951 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 741 ppm Sept. 21-30; minimum, 266 ppm June 6-25.
Hardness: Maximum, 354 ppm Jan. 1-16; minimum, 135 ppm June 26 to July 1.
Specific conductance: Maximum daily, 1,110 micromhos Mar. 11; minimum daily, 292 micromhos June 12.
Water temperatures: Maximum, 84°F July 23; minimum, freezing point on many days during November to March.
EXTREMES, 1951-60.--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. Records of discharge for water year October 1959 to September 1960 given in WSP 1709. No appreciable inflow between gaging station and sampling point.

Chemical analyses, in parts per million, water year October 1959 to September 1960

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. 1-12, 1959.	7,691	--	--	--	--	78	--	210	0	--	--	--	--	--	560	0.76	11,630	272	100	2.1	832	7.6	--
Oct. 13-31.....	8,136	--	--	--	--	76	--	228	0	--	--	--	--	--	553	.75	12,150	269	82	2.0	817	7.6	--
Nov. 1-14.....	6,951	--	--	--	--	69	--	211	0	--	--	--	--	--	523	.71	9,820	261	88	1.9	776	7.7	--
Nov. 15-30.....	5,812	--	--	--	--	84	--	270	0	--	--	--	--	--	644	.88	10,110	324	103	2.0	932	7.8	--
Dec. 1-10.....	7,710	--	--	--	--	77	--	228	0	--	--	--	--	--	576	.78	11,990	286	99	2.0	838	7.8	--
Dec. 11-20.....	6,420	--	--	--	--	77	--	247	0	--	--	--	--	--	598	.81	10,370	306	103	1.9	873	7.7	--
Dec. 21-31.....	5,227	14	0.00	79	31	79	4.6	256	0	275	13	0.5	0.9	0.21	629	.86	8,880	324	114	1.9	918	7.8	7
Jan. 1-16, 1960.	3,688	--	--	--	--	89	--	282	0	--	--	--	--	--	694	.94	6,910	354	123	2.1	994	8.0	--
Jan. 17-31.....	4,393	--	--	--	--	83	--	260	0	--	--	--	--	--	663	.90	7,860	343	130	1.9	957	7.5	--
Feb. 1-20.....	6,380	--	--	--	--	73	--	230	0	--	--	--	--	--	572	.78	9,850	297	108	1.9	845	7.4	--
Feb. 21-Mar. 13.	4,209	--	--	--	--	83	--	248	0	--	--	--	--	--	660	.90	7,500	336	133	2.0	951	7.6	--
Mar. 14-19.....	7,717	--	--	--	--	59	--	204	7	--	--	--	--	--	482	.66	10,040	251	72	1.6	720	8.4	--
Mar. 20-25.....	42,133	11	.04	54	13	40	5.4	173	0	124	4.2	.3	3.7	.10	354	.48	40,270	190	48	1.3	544	7.2	17
Mar. 26-31.....	12,900	--	--	--	--	66	--	188	0	--	--	--	--	--	525	.71	18,290	256	102	1.8	768	7.2	--
Apr. 1-30.....	6,954	--	--	--	--	77	--	200	0	--	--	--	--	--	582	.79	10,930	280	116	2.0	848	7.4	--
May 1-15.....	5,961	--	--	--	--	74	--	189	0	241	--	--	--	--	539	.73	8,680	259	104	2.0	791	7.1	--
May 16-20.....	12,260	--	--	--	--	36	--	148	0	115	--	--	--	--	316	.43	10,460	166	45	1.2	488	7.0	--
May 21-31.....	6,803	--	--	--	--	40	--	136	0	133	--	--	--	--	325	.44	5,970	160	48	1.4	498	7.1	--
June 1-5.....	9,584	--	--	--	--	45	--	148	0	142	--	--	--	--	354	.48	9,160	174	53	1.5	541	7.1	--

June 6-25, 1960.	24,650	--	--	--	--	28	--	135	0	86	--	--	--	--	266	.36	17,700	142	31	1.0	411	7.1	--
June 26-July 1..	14,130	--	--	--	--	31	--	118	0	102	--	--	--	--	267	.36	10,190	135	38	1.2	415	6.9	--
July 2-10.....	8,521	--	--	--	--	37	--	129	0	119	--	--	--	--	308	.42	7,090	152	46	1.3	469	6.9	--
July 11-21.....	5,117	--	--	--	--	52	--	161	0	153	--	--	--	--	375	.51	5,180	178	46	1.7	577	7.0	--
July 22-31.....	3,149	9.7	.01	49	21	67	3.4	180	0	195	8.4	.5	.4	.17	448	.61	3,810	207	59	2.0	681	7.3	8
Aug. 1-20.....	2,938	--	--	--	--	86	--	191	0	264	--	--	--	--	566	.77	4,490	243	86	2.4	844	7.1	--
Aug. 21-31.....	4,352	--	--	--	--	88	--	206	0	272	--	--	--	--	613	.83	7,200	260	91	2.4	887	7.3	--
Sept. 1-8.....	2,522	--	--	--	--	90	--	191	0	279	--	--	--	--	584	.79	3,980	250	93	2.5	855	7.8	--
Sept. 9-20.....	2,442	--	--	--	--	108	--	208	0	332	--	--	--	--	680	.92	4,480	284	113	2.8	980	7.8	--
Sept. 21-30.....	4,030	--	--	--	--	115	--	224	0	363	--	--	--	--	741	1.01	8,060	322	138	2.8	1,060	7.7	--
Weighted average a.....	7,591	--	--	--	--	60	--	b 190	--	--	--	--	--	--	470	0.64	9,630	234	78	1.7	696	--	--

a Represents 100 percent of runoff for water year.
b Includes carbonate as bicarbonate.

Temperature (°F) of water, water year October 1959 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	
October	44	47	47	49	50	44	--	37	--	34	33	34	33	38	40	39	41	44	42	--	42	42	43	--	41	40	39	38	38	37	--	41
November	39	38	38	32	32	--	32	32	32	32	32	--	32	32	--	32	32	32	--	32	32	--	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
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
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	33	33	--	33	33	33	33	32
April.....	46	49	--	50	51	52	50	48	50	50	53	53	51	50	50	49	52	53	52	53	54	--	50	46	42	42	46	47	46	49	--	49
May.....	52	54	53	54	--	54	57	--	58	62	63	--	63	62	63	64	64	59	58	62	62	63	64	64	63	--	--	64	65	65	66	61
June	65	--	65	65	65	67	67	67	67	67	67	64	67	67	64	63	--	68	68	65	63	63	64	65	66	71	72	--	73	74	--	67
July.....	74	73	74	--	73	74	76	78	78	79	76	77	77	79	79	80	81	82	81	83	82	83	84	79	76	76	78	78	75	--	78	78
August.....	79	78	78	--	79	75	72	70	72	--	77	79	--	79	79	77	75	75	76	76	75	76	74	72	70	68	67	--	65	65	64	74
September.....	--	74	73	77	74	72	67	66	66	65	64	65	67	68	68	--	65	--	65	63	58	58	58	57	--	58	57	55	55	54	--	64

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 1960.
Water temperatures: May 1951 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 593 ppm Nov. 26-30; minimum, 214 ppm Mar. 19-20.
Hardness: Maximum, 304 ppm Nov. 26-30; minimum, 119 ppm Mar. 19-20.
Specific conductance: Maximum daily, 915 micromhos Nov. 28; minimum daily, 297 micromhos Mar. 19.
Water temperatures: Maximum, 79°F July 20; minimum, freezing point on many days during November to March.
EXTREMES, 1950-60.--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 (1951-60): 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. Records of discharge for water year October 1959 to September 1960 given in WSP 1709.

Chemical analyses, in parts per million, water year October 1959 to September 1960

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, 1959.	16,690	--	0.13	--	--	62	--	202	0	--	--	--	--	--	486	0.66	21,900	246	60	1.7	727	7.2	--
Nov. 1-13.....	15,950	--	.10	--	--	58	--	201	0	--	--	--	--	--	468	.64	20,150	247	62	1.6	703	7.6	--
Nov. 14-25.....	10,500	--	.03	--	--	67	--	234	0	--	--	--	--	--	539	.73	15,260	263	91	1.7	802	7.4	--
Nov. 26-30.....	16,000	--	--	--	--	75	--	243	0	--	--	--	--	--	593	.81	25,620	304	105	1.9	669	7.7	--
Dec. 1-23.....	15,630	11	.09	65	25	68	4.0	211	0	215	11	0.5	0.5	0.19	511	.69	21,560	265	92	1.8	768	7.3	5
Dec. 24-31.....	11,610	--	.03	--	--	65	--	231	0	--	--	--	--	--	531	.72	16,650	261	92	1.7	791	7.6	--
Jan. 1-14, 1960.	10,210	--	.03	--	--	63	--	230	0	--	--	--	--	--	526	.72	14,500	260	91	1.6	777	7.4	--
Jan. 15-22.....	13,600	--	.05	--	--	67	--	238	0	--	--	--	--	--	555	.75	20,680	297	102	1.7	819	7.4	--
Jan. 23-Feb. 1..	12,430	--	.05	--	--	60	--	226	0	--	--	--	--	--	508	.69	17,050	275	90	1.6	766	7.6	--
Feb. 2-16.....	15,660	--	.04	--	--	59	--	212	0	--	--	--	--	--	490	.67	20,720	264	90	1.6	739	7.6	--
Feb. 19-Mar. 13.	13,090	--	.04	--	--	62	--	221	0	--	--	--	--	--	505	.69	17,850	268	67	1.6	755	7.5	--
Mar. 14-16.....	16,520	--	.12	--	--	64	--	235	0	--	--	--	--	--	542	.74	24,180	293	100	1.6	611	7.5	--
Mar. 19-20.....	19,400	--	--	--	--	24	--	108	0	--	--	--	--	--	214	.29	11,210	119	30	1.0	356	7.2	--
Mar. 21.....	35,000	--	--	--	--	45	--	163	0	--	--	--	--	--	380	.52	35,910	188	54	1.4	575	7.4	--
Mar. 22-24.....	95,000	6.4	.20	41	12	31	4.7	148	0	92	4.0	.2	2.2	.11	282	.38	72,330	150	29	1.1	449	7.4	45
Mar. 25-28.....	78,950	--	--	--	--	31	--	149	0	--	--	--	--	--	264	.39	60,540	153	31	1.1	441	7.5	--
Mar. 29-31.....	46,070	--	--	--	--	36	--	164	0	--	--	--	--	--	320	.44	41,530	168	34	1.2	498	7.6	--
Apr. 1-10.....	29,170	--	.05	--	--	46	--	172	0	--	--	--	--	--	369	.50	29,060	190	49	1.5	569	7.5	--
Apr. 11-18.....	17,780	--	.15	--	--	59	--	196	0	--	--	--	--	--	456	.62	21,990	231	70	1.7	694	8.0	--
Apr. 19-30.....	14,240	--	.06	--	--	58	--	196	0	--	--	--	--	--	459	.62	17,650	232	71	1.7	696	7.7	--

May 1-17, 1960..	14,580	--	.05	--	--	85	--	194	0	--	--	--	--	--	479	.65	18,860	234	75	1.8	726	7.5	--
May 18-31.....	17,300	--	.10	--	--	46	--	168	0	--	--	--	--	--	367	.50	17,140	188	50	1.5	566	7.4	--
June 1-5.....	15,520	--	.00	--	--	53	--	172	0	--	--	--	--	--	400	.54	16,760	200	59	1.6	610	7.8	--
June 6-9.....	27,900	--	.09	--	--	35	--	152	0	--	--	--	--	--	308	.42	23,200	162	37	1.2	472	7.5	--
June 10-15.....	30,320	11	.12	36	10	26	2.4	126	0	80	3.7	.4	.9	.08	237	.32	19,400	133	30	1.0	384	7.3	10
June 16-25.....	32,370	--	.04	--	--	35	--	138	0	--	--	--	--	--	311	.42	27,180	159	46	1.2	475	7.6	--
June 26-July 9..	20,120	--	.05	--	--	38	--	149	0	--	--	--	--	--	319	.43	17,330	168	46	1.3	497	7.3	--
July 10-25.....	12,290	--	.04	--	--	46	--	174	0	--	--	--	--	--	377	.51	12,510	196	53	1.4	581	7.0	--
July 26-Aug. 22.	11,260	--	.04	--	--	53	--	190	0	--	--	--	--	--	419	.57	12,740	217	61	1.6	648	7.1	--
Aug. 23-Sept. 21.....	11,280	8.6	.18	56	23	61	4.2	199	0	184	9.1	.7	.6	.16	480	.63	14,010	236	73	1.7	703	7.8	6
Sept. 22-30.....	11,530	--	.04	--	--	72	--	203	0	--	--	--	--	--	530	.72	16,500	256	90	2.0	783	7.3	--
Weighted average a.....	17,130	--	0.09	--	--	52	--	187	0	--	--	--	--	--	422	0.57	19,520	219	66	1.5	640	--	--

a Includes estimates where data are missing. Represents 100 percent of runoff for water year.

Temperature (°F) of water, water year October 1959 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	
October.....	48	48	46	46	46	45	43	--	40	36	35	35	37	37	40	40	41	42	39	39	40	42	42	44	43	41	41	40	40	39	39	41
November.....	39	39	38	35	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	--	33
December.....	32	32	33	32	32	32	32	32	32	32	32	33	33	33	33	33	33	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	--	--	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	34	38	32
April.....	41	43	44	42	43	44	44	43	43	44	44	44	44	44	44	45	45	47	47	47	47	47	43	39	38	37	40	41	--	44	--	43
May.....	46	46	48	49	50	51	51	52	52	53	57	59	62	62	58	55	58	58	55	54	56	60	61	60	61	60	60	--	60	62	65	56
June	63	62	60	61	61	63	64	63	64	65	66	67	65	65	65	63	63	63	--	65	60	58	60	63	66	68	68	68	68	69	--	64
July.....	70	70	69	69	69	70	72	74	75	74	73	73	73	73	75	72	74	--	77	79	78	77	76	76	75	74	73	73	72	70	73	73
August.....	74	75	72	72	73	71	71	66	67	69	69	71	71	69	67	69	70	68	70	69	69	69	69	66	66	65	61	--	61	63	62	68
September.....	66	66	69	71	72	67	64	63	60	60	60	59	60	62	62	61	57	59	57	60	58	54	54	54	56	55	55	55	53	--	--	60

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 1960.
EXTREMES, 1959-60.--Water temperatures: Maximum, 62°F Sept. 27; minimum, freezing point on many days during December to February.
EXTREMES, 1952, 1954-60.--Water temperatures: Maximum, 76°F July 27, 28, 1954; minimum, freezing point on many days during winter months in 1955-60.
REMARKS.--Records of discharge for water year October 1959 to September 1960 given in WSP 1709.

Temperature (°F) of water, water year October 1959 to September 1960
/Recorder witb 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	56	56	56	56	56	55	55	53	51	51	49	48	48	48	47	47	47	47	47	46	46	46	46	46	46	46	45	45	45	44	44	49
Minimum	56	55	56	56	55	55	53	49	50	49	46	48	48	47	47	45	46	46	46	46	46	46	46	46	46	45	45	45	44	44	44	48
November																																
Maximum	44	44	44	44	42	41	41	41	41	41	41	40	39	39	39	37	34	35	35	35	35	35	35	35	34	33	33	33	33	33	--	38
Minimum	44	44	44	42	41	41	41	41	41	41	40	39	39	39	37	33	34	34	35	35	35	35	35	34	33	33	33	33	33	33	--	37
December																																
Maximum	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	32	32	32	32	32	32	32	32	32	32	32	33
Minimum	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	32	32	32	32	32	32	32	32	32	32	32	32	33
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	33	33	33	33	33	33	33	33	33	33	--	--	32
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	33	33	33	33	33	33	33	33	33	--	--	32
March																																
Maximum	33	33	33	33	34	34	33	33	33	33	33	33	34	33	34	34	34	34	34	34	34	33	34	34	34	34	34	34	34	34	34	34
Minimum	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	34	33	33	33	33	33	33	33	34	34	34	34	34	34	33
April																																
Maximum	34	35	36	35	35	35	35	35	35	35	36	35	36	36	36	36	36	36	36	37	38	38	38	39	39	40	41	41	41	41	--	37
Minimum	34	34	34	34	34	34	34	34	34	34	35	35	35	35	35	35	36	35	35	36	36	37	38	38	38	39	39	39	39	39	--	36
May																																
Maximum	42	41	40	41	42	41	42	41	42	43	42	42	43	44	45	46	44	45	45	46	46	46	46	45	46	49	49	49	49	49	49	44
Minimum	40	40	40	40	40	41	41	41	41	42	41	41	41	42	42	44	44	44	44	44	45	44	43	44	45	46	47	47	47	46	46	43
June																																
Maximum	49	50	50	50	51	51	50	49	48	51	50	50	51	51	51	51	51	52	52	52	51	50	53	53	53	52	53	53	52	55	--	51
Minimum	47	47	48	49	49	49	49	48	48	48	49	49	49	50	50	50	50	50	50	51	50	49	49	51	50	50	49	50	51	52	--	49
July																																
Maximum	55	55	56	56	57	57	58	59	58	57	57	58	57	58	59	59	58	58	59	59	59	58	59	58	58	59	59	59	59	59	57	58
Minimum	53	54	54	55	55	55	55	55	56	56	56	56	56	56	56	57	56	56	57	56	56	56	56	56	56	56	56	56	56	56	55	56
August																																
Maximum	57	56	57	57	57	55	57	58	58	57	58	58	57	56	57	57	58	57	58	58	58	58	58	58	57	57	57	57	57	58	58	57
Minimum	56	55	55	55	55	55	55	57	56	56	56	56	56	55	56	56	56	56	56	56	56	56	55	56	56	55	56	56	56	57	57	56
September																																
Maximum	57	58	58	59	59	58	57	57	59	59	59	58	59	60	59	58	59	59	59	60	60	60	60	60	61	61	62	61	61	60	--	59
Minimum	56	56	56	57	57	57	56	57	57	57	57	57	58	58	58	57	58	57	57	58	57	60	58	59	59	60	61	60	59	59	--	58

6-3575. GRAND RIVER AT SHADEHILL, S. DAK.
(Formerly published as 6-3575. Grand River near 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 1960.
Water temperatures: August 1954 to September 1959.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 1,090 ppm Mar. 1 to Apr. 2; minimum, 876 ppm Apr. 3-4.
Hardness: Maximum, 154 ppm Mar. 1-31; minimum, 118 ppm Feb. 24-25.
Specific conductance: Maximum daily, 1,620 micromhos on several days during March; minimum daily, 1,310 micromhos Apr. 3, 4.
EXTREMES, 1954-60.--Dissolved solids (1954-58, 1959-60): 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. Records of discharge for water year October 1959 to September 1960 given in WSP 1709.

Chemical analyses, in parts per million, water year October 1959 to September 1960

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, 1959.	13.3	--	--	--	--	296	--	433	0	--	--	--	--	--	1,010	1.37	36.3	137	0	11	1,490	8.0	--
Nov. 1-14.....	12.9	--	--	--	--	298	--	433	0	--	--	--	--	--	1,010	1.37	35.2	136	0	11	1,490	8.0	--
Nov. 15-30.....	11.5	--	--	--	--	305	--	442	0	--	--	--	--	--	1,030	1.40	32.0	140	0	11	1,520	8.1	--
Dec. 1-31.....	10.3	3.1	0.15	28	18	308	9.6	454	0	432	6.1	0.4	0.6	0.39	1,050	1.43	29.2	143	0	11	1,560	8.0	15
Jan. 1-31, 1960.	10.2	--	--	--	--	310	--	464	0	--	--	--	--	--	1,070	1.46	29.5	146	0	11	1,560	8.1	--
Feb. 1-6.....	10.3	--	--	--	--	301	--	442	0	--	--	--	--	--	1,030	1.40	28.6	132	0	11	1,520	8.1	--
Feb. 7-9.....	10.7	--	--	--	--	279	--	403	0	--	--	--	--	--	942	1.28	27.2	121	0	11	1,400	8.2	--
Feb. 10-16.....	11.7	--	--	--	--	319	--	467	0	--	--	--	--	--	1,080	1.47	34.1	144	0	12	1,590	8.2	--
Feb. 17.....	12	--	--	--	--	310	--	442	0	--	--	--	--	--	1,050	1.43	34.0	129	0	12	1,550	7.8	--
Feb. 18-23.....	11.8	--	--	--	--	317	--	471	0	--	--	--	--	--	1,080	1.47	34.4	144	0	11	1,600	8.2	--
Feb. 24-25.....	11.0	--	--	--	--	304	--	427	0	--	--	--	--	--	1,010	1.37	30.0	118	0	12	1,510	7.8	--
Feb. 26-27.....	11.0	--	--	--	--	320	--	471	0	--	--	--	--	--	1,080	1.47	32.1	144	0	12	1,600	8.1	--
Feb. 28-29.....	11.0	--	--	--	--	320	--	454	0	--	--	--	--	--	1,070	1.46	31.8	133	0	12	1,580	8.1	--
Mar. 1-31.....	14.0	2.5	.05	28	20	324	8.2	472	0	460	7.0	.5	.5	.40	1,090	1.48	41.2	154	0	11	1,580	8.1	17
Apr. 1-2.....	41.0	--	--	--	--	323	--	484	0	--	--	--	--	--	1,090	1.48	121	148	0	12	1,610	8.2	--
Apr. 3-4.....	42.5	--	--	--	--	257	--	390	0	--	--	--	--	--	876	1.19	101	120	0	10	1,310	7.9	--
Apr. 5-30.....	25.5	--	--	--	--	287	--	430	0	--	--	--	--	--	975	1.33	67.1	131	0	11	1,440	8.1	--
May 1-31.....	20.5	--	--	--	--	289	--	416	0	--	--	--	--	--	967	1.32	53.5	128	0	11	1,440	7.9	--
June 1-30.....	215	2.4	.00	25	16	289	7.5	420	0	382	5.0	.4	1.4	.34	956	1.30	554	130	0	11	1,420	8.0	21
July 1-13.....	61.7	--	--	--	--	278	--	402	0	--	--	--	--	--	944	1.28	157	132	0	11	1,400	7.6	--

GRAND RIVER BASIN--Continued

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

Chemical analyses, in parts per million, water year October 1959 to September 1960--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 160°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 14-29, 1960	15.5	--	--	--	--	279	--	405	0	--	--	--	--	--	942	1.26	39.4	126	0	11	1,400	7.9	--
July 30-Aug. 16.	8.7	--	--	--	--	261	--	404	0	--	--	--	--	--	944	1.28	22.2	124	0	10	1,400	7.5	--
Aug. 17-31.....	9.2	--	--	--	--	265	--	408	0	--	--	--	--	--	954	1.30	23.7	125	0	10	1,410	7.6	--
Sept. 1-12, 15-30.....	12.1	3.4	0.03	27	14	282	8.0	423	0	386	5.3	0.5	0.5	0.36	961	1.31	31.4	126	0	11	1,420	8.1	23
Weighted average a.....	32.2	--	--	--	--	291	--	423	0	--	--	--	--	--	973	1.32	85.1	132	0	11	1,440	--	--

a Represents 100 percent of runoff for water year.

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 1960.
EXTREMES, 1959-60.--Sediment concentrations: Maximum daily, 38,000 ppm July 9; minimum daily, not determined.
Sediment loads: Maximum daily, 60,100 tons June 11; minimum daily, less than 0.50 ton on many days during October, November, and August.
EXTREMES, 1946-60.--Sediment concentrations: Maximum daily, 55,000 ppm June 19, 1960; 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.
REMARKS.--Maximum observed sediment concentration during water year, 75,600 ppm June 10. Records of discharge for water year October 1959 to September 1960 given in WSP 1709.

Suspended sediment, water year October 1959 to September 1960
/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	20	--	4	17	C 8	T	20	C 15	1
2	18	59	3	17	C 8	T	20	C 15	1
3	18	--	3	17	C 8	T	20	C 15	1
4	17	--	2	17	C 8	T	21	C 15	1
5	17	--	2	17	C 8	T	20	C 15	1
6	17	--	2	17	C 8	T	20	C 15	1
7	17	--	2	17	C 8	T	21	C 15	1
8	17	34	2	17	C 8	T	20	C 15	1
9	17	--	1	17	C 8	T	20	C 15	1
10	17	--	1	17	C 8	T	20	C 15	1
11	17	C 12	1	17	C 8	T	20	C 15	1
12	17	C 12	1	17	C 8	T	19	C 15	1
13	17	C 12	1	17	C 8	T	18	C 15	1
14	17	C 12	1	17	C 8	T	18	C 15	1
15	14	C 12	T	17	C 8	T	20	C 15	1
16	14	C 12	T	17	C 8	T	20	C 15	1
17	14	C 12	T	17	C 8	T	20	C 15	1
18	14	C 12	T	17	C 8	T	21	C 15	1
19	14	C 12	T	17	C 8	T	21	C 15	1
20	13	C 12	T	17	C 8	T	21	C 15	1
21	13	C 12	T	17	C 8	T	21	C 15	1
22	13	C 12	T	20	C 8	T	21	C 15	1
23	14	C 12	T	21	C 8	T	21	C 15	1
24	14	C 12	T	20	C 8	T	21	C 15	1
25	14	C 12	T	22	C 8	T	21	C 15	1
26	14	C 12	T	19	C 8	T	21	C 15	1
27	16	C 12	1	20	C 8	T	20	C 15	1
28	17	C 12	1	20	C 8	T	20	C 15	1
29	17	C 12	1	20	C 8	T	17	C 15	1
30	17	C 12	1	20	C 8	T	17	C 15	1
31	17	C 12	1	--	--	--	18	C 15	1
Total	492	--	36	539	--	12	618	--	31

T Less than 0.50 ton.
C Composite period.

CHEYENNE RIVER BASIN--Continued

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

Suspended sediment, water year October 1959 to September 1960--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..	18	C 14	1	18	C 26	1	17	C 26	1
2..	18	C 14	1	18	C 26	1	15	C 26	1
3..	19	C 14	1	18	C 26	1	15	C 26	1
4..	19	C 14	1	18	C 26	1	15	C 26	1
5..	19	C 14	1	17	C 26	1	16	C 26	1
6..	19	C 14	1	20	C 26	1	16	C 26	1
7..	19	C 14	1	22	--	2	16	C 26	1
8..	19	C 14	1	23	--	2	17	C 26	1
9..	20	C 14	1	25	--	2	22	44	3
10..	20	C 14	1	30	--	4	35	62	6
11..	20	C 14	1	28	--	4	65	160 S	41
12..	20	C 14	1	35	94 S	9	125	670 S	280
13..	20	C 14	1	31	64	5	126	460	156
14..	20	C 14	1	40	100	11	100	280	76
15..	19	C 14	1	37	120 S	14	124	610 S	251
16..	19	C 14	1	32	86 S	8	152	540	222
17..	19	C 14	1	27	86 S	7	90	520	126
18..	19	C 14	1	23	88 S	6	167	1840	830
19..	19	C 14	1	23	47	3	135	1180	430
20..	19	C 14	1	23	C 31	2	140	1100	416
21..	19	C 14	1	24	C 31	2	160	1380	596
22..	19	C 14	1	22	C 31	2	238	3950 S	3050
23..	20	C 14	1	22	C 31	2	454	7620	9340
24..	22	C 14	1	23	C 31	2	524	8530	12100
25..	22	C 14	1	24	C 31	2	399	7200	7760
26..	22	C 14	1	24	C 31	2	223	5620	3380
27..	22	C 14	1	22	C 31	2	128	3040	1050
28..	22	C 14	1	19	C 31	2	95	1440	369
29..	22	C 14	1	18	C 31	2	54	680	99
30..	21	C 14	1	--	--	--	36	420	41
31..	18	C 14	1	--	--	--	36	360	34
Total	613	--	31	706	--	103	3755	--	40664

	APRIL			MAY			JUNE		
1..	30	--	28	32	180	16	11	180	5
2..	26	--	24	38	200	21	11	150	4
3..	27	--	20	39	170	18	12	110	4
4..	24	--	18	32	140	12	12	--	3
5..	23	--	16	32	140	12	14	--	5
6..	22	230	14	29	140	11	12	--	4
7..	21	220	12	56	280 S	48	14	--	4
8..	21	220	12	84	16200	3670	14	86	3
9..	20	220	12	58	5190 S	881	15	210	8
10..	20	240	13	35	600	57	399	21000 S	59200
11..	20	220	12	28	200	15	704	31600	60100
12..	20	200	11	26	190	13	320	10300 S	10900
13..	19	--	11	23	200	12	198	9790 S	8520
14..	18	--	10	22	200	12	247	22600	15100
15..	18	--	9	23	180	11	161	16300 S	7720
16..	22	--	12	23	170	11	214	16800	9710
17..	31	210	18	22	170	10	98	8170 S	2290
18..	28	200	15	23	160	10	41	2850 S	335
19..	38	300 S	36	22	150	9	20	920 S	53
20..	37	270	27	21	150	9	15	320	13
21..	30	220	18	18	150	7	11	380	11
22..	25	240	16	16	140	6	8	210	5
23..	25	240	16	15	140	6	7	95	2
24..	27	220	16	15	140	6	7	82	2
25..	24	200	13	16	170	7	7	82	2
26..	24	190	12	15	160	6	7	64	1
27..	30	190	15	14	170	6	7	59	1
28..	34	180	17	11	180	5	7	60	1
29..	39	160	17	11	190	6	8	110	2
30..	35	180	17	11	170	5	10	120	3
31..	--	--	--	11	180	5	--	--	--
Total	778	--	487	821	--	4923	2611	--	174011

S Computed by subdividing day.
C Composite period.

CHEYENNE RIVER BASIN--Continued

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

Suspended sediment, water year October 1959 to September 1960--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	13	110	4	13	--	2	14	C 21	1
2	12	110	4	13	--	1	13	C 21	1
3	12	120	4	12	40	1	14	C 21	1
4	12	120	4	13	--	1	14	C 21	1
5	9	97	2	8	C 35	1	14	C 21	1
6	7	86	2	8	C 35	1	14	C 21	1
7	7	89	2	8	C 35	1	14	C 21	1
8	27	11600	S 4140	9	C 35	1	15	C 21	1
9	100	38000	S 11500	10	C 35	1	15	C 21	1
10	33	6800	S 698	10	C 35	1	14	C 21	1
11	16	570	25	10	C 35	1	14	C 21	1
12	14	330	12	11	C 20	1	14	C 21	1
13	11	170	5	10	C 20	1	14	C 21	1
14	10	C 140	4	10	C 20	1	14	C 21	1
15	9	C 140	3	10	C 20	1	14	C 21	1
16	9	C 140	3	10	C 20	1	14	C 21	1
17	8	C 140	3	9	C 8	T	12	C 21	1
18	8	C 140	3	8	C 8	T	10	C 21	1
19	8	--	3	8	C 8	T	12	C 21	1
20	7	--	2	9	C 8	T	12	C 21	1
21	7	--	2	10	C 8	T	12	C 21	1
22	7	100	2	10	C 8	T	14	C 21	1
23	7	--	2	10	C 8	T	12	C 21	1
24	7	--	1	11	C 8	T	14	C 21	1
25	6	60	1	12	C 8	T	15	C 21	1
26	6	--	1	13	C 8	T	15	C 21	1
27	7	--	1	14	C 8	T	19	C 21	1
28	7	60	1	13	C 8	T	17	C 21	1
29	7	--	1	14	C 8	T	15	C 21	1
30	8	--	1	13	C 8	T	16	C 21	1
31	12	--	2	13	C 8	T	--	--	--
Total	413	--	16438	332	--	21	420	--	30

Total discharge for year (cfs-days)..... 12098
Total load for year (tons)..... 236787

S Computed by subdividing day.
T Less than 0.50 ton.
C Composite period.

CHEYENNE RIVER BASIN--Continued

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

Periodic determinations of suepended-sediment discharge and particle size, water year October 1959 to September 1980
(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, 1960.....	1100	37		653	10100	17800	50	60	70	77	82	67	93	99	100			VPWC
May 8.....	1830	59		87	16100	3780	75	89	96	99	99	100	--	--				PWC
June 10.....	1705	--		1060	67000	199000	56	69	87	97	96	99	99	100				VPWC
June 10.....	1730	--		1110	67000	208000	57	70	85	94	96	98	99	100				VPWC
June 11.....	2130	59		669	33400	62600	61	75	88	95	97	98	99	100				VPWC
July 9.....	0745	67		117	45900	15000	67	82	95	99	100	--	--	--				PWC

Particle-size analyses of bed material, water year October 1959 to September 1960
(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 3, 1960.....	1015		13	39			2	5	17	36	66	84	92	96	98	100		SV
June 9.....	1025		13	17			--	1	10	29	63	84	95	97	99	100		SV
Aug. 31.....	1515		15	13			2	4	14	30	56	77	89	93	96	100		SV

CHEYENNE RIVER BASIN--Continued

6-4015. CHEYENNE RIVER BELOW ANGOSTURA DAM, S. DAK.
(Formerly published as 6-4015. Cheyenne River at Angostura Reservoir Outlet, S. Dak.)

LOCATION.--At outlet to powerplant downstream from Angostura Dam, 800 feet upstream from gaging station, 4.6 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 1960.
REMARKS.--Records of discharge for water year October 1959 to September 1960 given in WSP 1709.

Monthly and annual summary of water and suspended-sediment discharge, water year October 1959 to September 1960
/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 1959.....	39.2	76	1.6	0.1			15	
November.....	37.8	75	1.5	.1			15	
December.....	35.9	71	2.1	.1			22	
January 1960.....	30.6	61	2.6	.1			31	
February.....	41.4	82	3.1	.1			26	
March.....	61.4	122	3.6	.1			22	
April.....	45.9	91	3.5	.1			26	
May.....	45.5	90	3.5	.1			28	
June.....	72.0	143	9.1	.3			47	
July.....	51.6	103	4.8	.2			34	
August.....	32.1	64	1.4	.1			16	
September.....	21.1	42	.6	t			11	
Water year.....	514.7	1020	37.4	0.10			27	

t Less than 0.05 ton.

CHEYENNE RIVER BASIN--Continued

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 1960.
REMARKS.--Records of discharge for water year October 1959 to September 1960 given in WSP 1709.

Chemical analyses, in parts per million, water year October 1959 to September 1960

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. 6, 1959.	32.4	1.3		0.05	0.01	256	137	200	17	170	0	1,370	28	0.7	5.4	0.42	2,300	1,200	1,060	2.5	2,530	8.0	4
Nov. 9.....	26.2	--		.06	.45	--	--	260	--	238	0	--	--	--	--	--	2,780	1,410	1,220	3.0	2,960	7.7	--
Dec. 3.....	56.2	--		.16	.41	--	--	296	17	294	0	--	--	--	--	--	3,210	1,550	1,310	3.3	3,400	7.5	--
Jan. 8, 1960.	7.1	--		.08	1.9	--	--	426	--	500	0	--	--	--	--	--	4,820	2,440	2,030	3.8	4,750	7.6	--
Feb. 11.....	48.0	5.7		.32	.52	255	123	199	15	244	0	1,280	32	.5	13	.35	2,280	1,140	940	2.6	2,520	7.7	--
Mar. 11.....	13.7	8.5		.07	1.6	353	192	305	16	380	0	1,890	46	.5	16	.57	3,340	1,670	1,360	3.2	3,460	7.2	--
Apr. 16.....	50.3	5.5		.00	.29	206	111	169	16	184	0	1,100	28	.5	6.0	.30	1,930	970	819	2.4	2,190	7.8	5
May 24.....	33.2	1.5		.01	.01	217	116	172	22	162	0	1,190	30	.6	5.0	.35	2,040	1,020	887	2.3	2,280	7.3	4
June 16.....	224	5.5		.04	.03	165	74	150	23	166	0	834	18	.6	7.0	.29	1,470	714	578	2.4	1,760	7.5	--
July 18.....	59.3	2.6		.00	.00	203	117	188	21	114	0	1,220	24	.6	2.0	.49	2,020	988	895	2.6	2,310	7.2	8
Aug. 21.....	161	6.7		.01	.00	199	93	175	25	164	0	1,050	28	.7	14	.27	1,820	879	745	2.6	2,090	7.1	14
Sept. 23.....	16.4	1.2		.00	.01	228	127	243	19	149	0	1,370	32	.5	8.6	.44	2,280	1,090	968	3.2	2,520	7.4	--

Date of collection	Copper (Cu)	Lead (Pb)	Zinc (Zn)	Arsenic (As)	Cyanides as CN
Oct. 6, 1959....	0.02	0.01	0.22	0.07	0.46
Nov. 9.....	.02	.00	.27	.10	.18
Dec. 3.....	.13	.03	.22	.06	.33
Jan. 8, 1960....	.20	.01	.21	.14	.19
Feb. 11.....	.22	.01	.12	.09	.39
Mar. 11.....	.07	.03	.13	.06	.03
Apr. 16.....	.09	.02	.04	.08	.01
May 24.....	.00	.00	.06	.04	.01
June 16.....	.00	.00	.29	.09	.05
July 18.....	.00	.00	.13	.07	.02
Aug. 21.....	.01	.02	.06	.10	.02
Sept. 23.....	.00	.00	.10	.13	.02

CHEYENNE RIVER BASIN--Continued

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

Periodic determinations of suspended-sediment discharge and particle size, water year October 1959 to September 1960
(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, 1959	1135	61		32	7	0.6	--	--	--	--	--	--	--					
Nov. 9	1010	33		27	7	.5	--	--	--	--	--	--	--					
Dec. 3	1400	32		56	157	24	--	--	--	--	--	--	--					
Jan. 8, 1960	1435	32		7.1	66	1.3	--	--	--	--	--	--	--					
Feb. 11	1300	32		48	12	1.6	--	--	--	--	--	--	--					
Mar. 11	1430	32		14	94	3.6	--	--	--	--	--	--	--					
Mar. 25	1610	39		1530	13600	56200	31	40	48	65	85	96	98	99	100			VPWC
Apr. 16	1325	46		50	133	18	18	32	--	89	--	99	100					VPWC
May 24	1100	72		36	68	6.6	--	--	--	--	--	--	--					
June 16	1250	70		215	3750	2180	--	--	--	--	--	--	--					
July 18	1020	82		59	94	15	--	--	--	--	--	--	--					
Aug. 21	1000	72		161	1960	850	37	51	75	93	99	100	--					PWC
Sept. 23	1045	56		16	33	1.4	--	--	--	--	--	--	--					

OKOBOJO CREEK BASIN

6-4397.8. COTTONWOOD LAKE NEAR AGAR, S. DAK.

LOCATION.--In SE¼SE¼ sec. 19, T. 116 N., R. 75 W., near bridge on county road, 6 milee east of Agar, Sully County.
RECORDS AVAILABLE.--Chemical analyses: October 1959 to September 1960 (discontinued).
REMARKS.--Lake content not known. Information on lake stage available in district office at Lincoln, Nebr.

Chemical analyses, in parts per million, water year October 1959 to September 1960

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, magneeium	Hardness as $CaCO_3$: Noncarbonate	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 14, 1959		41		0.07		99	83	470	76	760	0	846	134	0.4	0.3	1.0	2,210	589	0	8.4	2,980	8.2	17
Nov. 19.....		--		--		--	--	--	--	614	0	--	--	--	1.0	1.0	2,410	634	0	--	3,280	8.1	--
Dec. 17.....		16		.04		31	55	244	39	384	0	470	78	.2	.7	.49	1,180	304	0	6.1	1,670	7.7	8
Jan. 14, 1960		--		--		--	--	--	--	866	0	--	--	.5	.5	1.2	--	666	0	--	3,450	8.2	--
Feb. 11.....		43		.06		101	104	581	89	848	20	1,060	169	.5	.6	1.2	2,650	680	0	9.7	3,530	8.3	20
Mar. 16.....		--		--		--	--	--	--	937	0	--	--	.5	.9	1.3	--	739	0	--	3,750	7.9	--
Apr. 7.....		5.6		.14		12	7.1	29	11	70	0	66	9.5	.1	1.7	.09	193	59	2	1.6	296	6.6	--
Apr. 26.....		17		.08		43	38	200	36	330	0	396	63	.2	.7	.36	983	263	0	5.3	1,420	7.4	--
June 18.....		--		--		57	35	--	--	367	0	--	--	.2	.1	.43	1,020	284	0	--	1,480	7.7	--
July 8.....		--		--		--	--	--	--	373	0	--	--	--	--	--	1,040	291	0	--	1,510	7.7	--
July 26.....		29		.11		59	39	219	43	403	0	415	71	.2	.2	.53	1,100	309	0	5.4	1,640	7.9	23
Aug. 18.....		--		--		76	32	--	--	419	0	--	73	.3	.5	.53	--	320	0	--	1,730	7.9	--
8ept. 26.....		16		.05	0.00	51	38	202	39	370	0	379	59	.2	.4	.52	976	285	0	5.2	1,440	8.0	23

OKOBOJO CREEK BASIN--Continued

6-4396.2. SULLY LAKE NEAR ONIDA, S. DAK.

LOCATION.--In SW¼ sec. 2, T. 114 N., R. 78 W., at dam north of county road, 6 miles west of Onida, Sully Co.
RECORDS AVAILABLE.--Chemical analyses: October 1959 to September 1960 (discontinued).
REMARKS.--Lake content not known. Information on lake stage available in district office at Lincoln, Nebr.

Chemical analyses, in parts per million, water year October 1959 to September 1960

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. 13, 1959		5.7		0.12	--	151	65	362	43	139	0	1,400	50	0.5	0.8	0.34	2,360	726	614	6.2	2,670	6.4	55
Nov. 19.....		6.4		1.3	--	245	148	702	91	445	0	2,280	119	.8	1.6	.47	4,000	1,220	855	8.7	4,600	7.4	100
Dec. 17.....		15		--	--	226	135	700	118	--	--	--	136	.4	1.1	.72	3,240	1,120	--	9.1	5,760	7.9	200
Apr. 7, 1960.		6.2		.25	--	15	3.3	5.9	6.3	51	0	27	1.0	.0	3.6	.06	116	51	9	.4	155	6.4	--
Apr. 26.....		11		.10	0.00	22	5.9	8.7	9.0	73	0	41	.0	.2	3.3	.04	155	79	19	.4	229	6.7	47
June 16.....		--		--	--	38	8.5	--	--	126	0	--	--	.2	3.8	.06	223	130	27	--	344	7.6	--
July 8.....		13		.03	--	40	9.5	16	12	141	0	66	.0	.2	1.8	.06	240	139	23	.6	366	7.8	17
July 26.....		--		--	--	44	11	--	--	162	0	--	.0	.2	5.4	.11	273	154	21	--	409	7.6	--
Aug. 16.....		22		.06	--	47	13	21	14	173	0	60	.0	.2	7.0	.06	302	170	28	.7	443	7.6	20
Sept. 26.....		9.1		.02	.00	31	8.4	16	11	127	0	58	.0	.2	.2	.06	206	112	6	.7	322	7.4	23

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 1960.
EXTREMES, 1959-60.--Water temperatures: Maximum, 99°F July 11; minimum, freezing point on many days during November to March.
EXTREMES, 1958-60.--Water temperatures: Maximum, 99°F July 11, 1960; minimum, freezing point on many days during winter months each year.
REMARKS.--Records of discharge for water year October 1959 to September 1960 given in WSP 1709.

Temperature (°F) of water, water year October 1959 to September 1960
/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	50	47	57	57	64	66	65	56	53	54	49	53	55	60	61	57	53	58	62	56	56	54	51	53	54	49	45	46	41	42	43	54
Minimum	46	45	43	47	50	52	55	43	41	46	38	42	44	46	50	47	42	44	48	48	47	46	45	42	45	40	35	39	35	39	37	44
November																																
Maximum	48	49	51	47	38	37	34	35	39	39	38	35	33	34	33	34	35	34	35	33	33	34	33	33	33	33	33	34	33	33	--	36
Minimum	39	41	44	37	37	34	34	34	33	33	33	33	33	32	32	33	33	32	32	32	32	33	32	33	33	33	33	33	32	32	--	34
December																																
Maximum	33	33	36	34	33	33	34	37	33	33	34	34	34	36	35	37	36	34	34	33	33	33	33	33	38	39	35	33	33	33	33	34
Minimum	33	32	33	33	33	32	32	32	32	32	33	33	34	33	33	33	33	33	33	33	33	33	32	33	33	35	33	32	32	32	32	33
January																																
Maximum	32	32	34	35	33	33	33	33	33	34	33	32	32	32	33	33	32	32	32	33	32	33	34	34	33	33	33	33	34	34	33	33
Minimum	32	32	32	33	33	32	33	33	32	33	33	32	32	32	32	32	32	32	32	32	32	32	33	32	32	32	32	32	32	32	32	32
February																																
Maximum	32	32	32	33	32	33	33	32	33	33	34	34	33	33	33	33	34	33	34	34	34	34	34	33	33	33	33	34	34	--	--	33
Minimum	32	32	32	32	32	32	32	32	32	33	33	32	33	32	32	32	33	32	32	33	33	33	33	32	32	32	32	33	32	--	--	32
March																																
Maximum	33	33	33	33	33	33	32	32	32	32	32	33	33	34	33	33	33	33	32	32	34	36	34	33	33	33	33	33	34	40	39	33
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	33	32	32	32	32	32	32	32	34	32	32	32	32	32	33	33	34	38	32
April																																
Maximum	39	36	45	46	49	55	54	53	53	52	60	55	61	64	65	57	56	58	63	62	70	75	69	59	59	64	52	48	47	52	--	56
Minimum	33	34	35	40	41	46	46	44	43	42	48	50	51	50	53	48	44	47	51	53	53	58	59	53	50	48	45	44	43	40	--	46
May																																
Maximum	61	67	66	62	58	53	58	59	62	63	66	67	67	65	69	70	68	67	64	58	70	75	76	79	72	68	76	68	67	76	83	67
Minimum	44	50	53	52	49	46	48	51	54	53	51	54	55	59	57	62	61	59	58	56	53	59	64	64	60	56	60	63	59	60	65	56
June																																
Maximum	76	79	82	80	71	77	77	70	69	68	67	68	78	83	76	71	77	83	79	85	80	82	73	80	80	84	82	85	79	73	--	77
Minimum	67	65	66	68	64	64	64	66	64	64	65	65	64	67	71	64	62	69	70	68	68	65	64	62	66	67	68	70	72	66	--	66
July																																
Maximum	82	86	84	83	84	88	88	86	95	96	99	87	89	87	86	87	93	93	95	92	91	96	94	92	98	--	--	--	87	87	85	81	89
Minimum	66	71	71	71	70	68	76	76	76	79	81	80	75	71	71	71	76	74	77	77	74	76	78	77	79	--	--	--	74	73	68	68	74
August																																
Maximum	84	94	84	88	78	86	80	76	78	81	83	82	81	80	77	78	79	71	73	84	87	88	81	77	81	77	84	75	74	83	84	81
Minimum	67	73	76	72	71	68	68	69	64	66	67	68	68	66	64	67	68	66	65	65	68	71	74	70	69	63	67	65	62	66	68	68
September																																
Maximum	83	86	88	91	87	84	86	70	74	76	72	72	74	66	74	78	72	63	73	76	72	65	59	65	66	64	68	65	63	60	--	73
Minimum	69	73	72	75	74	71	70	65	61	61	64	58	61	62	--	63	62	59	56	62	64	57	55	56	52	57	56	56	54	49	--	62

JAMES RIVER BASIN

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.--1,870 square miles, approximately, of which about 460 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: October 1959 to September 1960.
REMARKS.--Records of discharge for water year October 1959 to September 1960 given in WSP 1709.

Chemical analyses, in parts per million, water year October 1959 to September 1960

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. 12, 1959	18,670	3.6		0.05	0.37	46	36	108	19	423	0	118	31	0.3	0.3	0.23	611	264	0	2.9	933	7.8	24
Nov. 23.....	18,400	2.6		.13	.98	55	36	108	20	470	0	119	34	.3	.4	.23	640	284	0	2.8	978	7.9	31
Dec. 7.....	18,400	2.7		.10	.95	56	39	112	20	484	0	130	35	.3	.7	.23	672	300	0	2.8	1,020	8.0	24
Jan. 11, 1960	18,320	4.4		.04	.71	58	39	114	20	495	0	134	36	.3	.5	.21	689	304	0	2.8	1,050	7.7	22
Feb. 2.....	18,211	6.8		.11	--	60	41	122	21	516	0	141	38	.3	1.7	.22	725	320	0	3.0	1,100	7.9	23
Mar. 21.....	18,000	6.6		.12	1.7	55	36	111	19	444	0	129	34	.3	1.3	.20	649	287	0	2.9	1,000	7.5	18
Apr. 11.....	20,750	6.7		.07	1.4	45	29	87	15	365	0	103	27	.3	2.3	.16	538	233	0	2.5	817	7.3	18
May 10.....	26,520	7.0		.02	.87	47	31	93	16	383	0	108	29	.3	.6	.17	567	247	0	2.6	859	7.4	19
June 30.....	29,300	1.0		.03	.47	46	27	89	17	353	7	103	31	.2	1.0	.18	519	228	0	2.6	825	8.3	20
July 26.....	28,950	3.1		.02	1.1	46	28	90	16	369	0	101	29	.2	.5	.18	518	230	0	2.6	847	7.8	20
Aug. 22.....	28,130	9.3		.03	1.1	47	28	92	17	380	0	101	31	.2	1.8	.19	535	234	0	2.6	873	7.7	20
Sept. 30.....	26,600	11		.22	1.9	50	29	95	16	387	0	109	29	.2	2.2	.21	561	244	0	2.6	864	7.6	9

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 1960.
EXTREMES, 1959-60.--Water temperatures: Maximum, 86°F July 19; minimum, freezing point on many days during January to March.
EXTREMES, 1953-60.--Water temperatures: Maximum, 91°F July 12, 13, 1957; minimum, freezing point on many days during winter months.
REMARKS.--Records of discharge for water year October 1959 to September 1960 given in WSP 1709.

Chemical analyses, in parts per million, November 1959 to May 1960

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, 1959	7.3	13		0.10		67	42	133	11	468	0	215	61	0.3	0.5	0.24	796	390	6	2.9	1,220	7.6	12
Apr. 6, 1960.	620	7.8		.16		20	5.9	7.9	7.5	79	0	26	.1	.1	5.3	.06	144	74	9	.4	206	6.4	65
Apr. 8.....	1,380	11		.25		23	7.4	11	6.3	97	0	33	1.2	.1	5.6	.07	177	68	6	.5	249	6.6	70
Apr. 13.....	397	13		.17		28	10	17	6.4	124	0	45	2.3	.2	4.3	.09	215	112	10	.7	317	6.8	45
May 11.....	28	14		.03	0.33	58	26	61	8.8	283	0	116	27	.3	.2	.21	468	250	18	1.7	733	7.3	16

JAMES RIVER BASIN--Continued

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

Temperature (°F) of water, water year October 1959 to September 1960
/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	50	49	50	52	53	54	55	54	43	42	39	39	39	40	41	41	42	44	44	43	42	43	43	44	44	44	42	42	41	40	39	44
Minimum	48	47	46	48	50	50	52	43	41	39	36	37	38	39	40	40	38	39	43	42	42	41	43	42	43	42	40	40	40	38	37	42
November																																
Maximum	39	39	39	39	35	36	35	36	36	35	36	36	36	36	35	36	36	34	34	34	34	34	34	34	34	35	34	35	34	34	---	35
Minimum	38	38	38	34	34	35	34	35	35	35	35	36	36	35	35	35	34	34	34	34	34	34	34	34	34	34	34	34	34	33	---	35
December																																
Maximum	34	34	34	34	34	34	34	34	34	34	33	33	33	33	33	33	34	34	34	34	34	34	34	34	34	33	33	33	33	33	33	34
Minimum	33	33	33	33	34	34	33	33	33	33	33	33	33	33	33	33	33	34	34	34	34	34	34	34	33	33	33	33	33	33	33	33
January																																
Maximum	33	33	34	34	34	32	32	33	33	32	32	33	33	33	33	33	33	33	33	33	33	33	33	32	32	32	32	32	32	32	32	33
Minimum	33	33	33	33	32	32	32	32	32	32	32	32	32	33	33	32	32	33	33	32	32	32	32	32	32	32	32	32	32	32	32	32
February																																
Maximum	33	33	32	32	32	32	32	33	33	33	32	32	32	32	32	33	33	33	33	32	32	32	32	32	32	32	32	32	32	---	---	32
Minimum	32	32	32	32	32	32	32	32	33	32	32	32	32	32	32	32	33	33	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	32	32	33	34	34	34	34	34	35	33	33	33	33	33	33	33
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	33	33	34	33	32	32	33	33	33	33	33	33	32
April																																
Maximum	33	33	33	33	33	33	33	33	34	34	34	40	46	50	52	52	51	51	53	55	58	57	56	49	48	47	48	52	51	51	---	44
Minimum	33	33	33	33	33	33	33	33	33	33	33	34	40	46	50	51	49	49	51	53	54	56	49	48	47	46	46	47	48	47	---	42
May																																
Maximum	53	53	51	48	49	52	53	54	57	57	61	62	63	65	65	66	65	64	67	66	67	69	71	73	71	69	69	70	69	72	74	63
Minimum	49	51	48	47	48	48	49	52	53	54	54	57	60	61	61	63	62	62	63	64	63	64	68	70	69	64	63	66	67	66	69	59
June																																
Maximum	73	72	70	68	68	70	71	69	68	67	69	71	78	75	74	72	70	76	74	70	70	71	68	68	73	76	81	79	77	79	---	72
Minimum	70	69	67	66	64	65	67	67	67	65	65	66	69	72	70	68	62	68	70	66	64	65	67	66	68	70	72	73	72	71	---	68
July																																
Maximum	76	75	75	75	76	82	80	80	81	83	80	81	79	80	81	86	85	86	88	83	84	82	79	81	82	82	84	83	80	80	77	81
Minimum	70	71	69	69	68	71	72	75	75	76	77	75	74	73	73	76	79	77	78	78	78	78	76	77	77	76	76	76	74	71	72	74
August																																
Maximum	76	81	78	80	79	77	76	75	72	76	79	77	76	73	71	74	74	74	73	73	74	76	76	73	72	71	72	73	71	71	74	75
Minimum	74	73	75	74	74	75	73	70	68	69	72	72	73	69	68	70	73	71	69	70	70	72	73	70	69	67	68	69	68	68	71	71
September																																
Maximum	76	77	78	78	78	77	75	71	68	68	67	63	63	65	65	66	64	64	63	65	65	63	60	59	59	60	59	58	57	54	---	66
Minimum	69	76	75	76	76	75	71	68	65	64	63	61	60	59	63	62	62	62	60	62	63	60	58	57	57	58	57	57	53	52	---	63

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 1960.
REMARKS.--Records of discharge for water year October 1959 to September 1960 given in WSP 1709. No flow on many days.

Chemical analyses, in parts per million, water year October 1959 to September 1960

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
Apr. 21, 1960	265	--		--		39	23	76	--	207	0	137	43	--	--	--	466	193	23	2.4	728	7.0	--
Apr. 26.....	558	5.4		0.05	0.00	27	14	41	9.2	148	0	75	22	0.2	4.3	0.18	285	127	6	1.6	463	6.8	45
Apr. 28.....	584	--		--		29	17	50	--	166	0	85	27	--	--	--	326	141	5	1.8	522	7.0	--
June 16.....	31	--		--		63	24	58	--	302	0	106	--	.3	--	--	486	257	9	1.6	733	7.6	--
July 7.....	101	--		--		52	25	59	--	296	0	93	--	.3	--	--	458	231	0	1.7	695	7.6	--
July 27.....	25	37		.19		58	30	71	14	381	0	80	33	.3	2.1	.31	523	268	0	1.9	819	8.0	45
Aug. 24.....	3.1	25		.05		70	34	80	16	419	0	104	38	.3	3.6	.35	585	313	0	2.0	916	7.9	45
Sept. 7.....	1.5	--		--		--	--	78	--	406	0	--	--	--	--	--	567	290	0	2.0	867	7.5	--

6-4719. MOCCASIN CREEK NEAR NAHON, S. DAK.

LOCATION.--At bridge on county road 14, 2.5 miles south of Nabon, Brown County.
RECORDS AVAILABLE.--Chemical analyses: March to August 1960 (discontinued).
REMARKS.--Discharge records for miscellaneous sites for water year October 1959 to September 1960 given in WSP 1709.

Chemical analyses, in parts per million, March to August 1960

Date of collection	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				
Mar. 30, 1960..	60.9	4.5	0.24	10	3.9		11	12	55	27	5.8	0.2	0.8	0.07	110	0.15	18.1	41	0	0.7	178	6.9	50
Apr. 2.....	33.9	8.4	.27	2.4	8.0		69	16	67	103	48	.5	30	.23	350	.48	32.0	93	38	3.1	565	7.1	60
Apr. 6.....	52.6	6.8	.26	24	10		50	14	70	104	34	.4	23	.24	322	.44	45.7	101	44	2.2	492	6.4	--
Apr. 14.....	94.8	8.6	.02	28	7.8		48	15	114	93	21	.4	1.6	.15	294	.40	75.3	102	9	2.1	465	7.1	45
Apr. 20.....	a 24	8.6	.08	37	14		68	13	144	138	43	.4	6.9	.23	420	.57	27.2	152	34	2.4	645	7.1	50
Apr. 26.....	a 4	3.9	.08	49	18		89	17	177	190	51	.5	3.5	.30	533	.72	5.76	198	53	2.8	821	7.2	40
May 5.....	3.9	4.7	.02	57	25		111	19	229	220	67	.5	1.4	.33	646	.88	6.81	243	55	3.1	1,000	7.4	29
May 28.....	14.9	3.3	.09	91	42		185	31	358	384	112	.9	2.4	.56	1,060	1.44	42.7	398	104	4.0	1,560	7.6	23
July 7.....	a 3	1.1	.02	70	49		267	37	309	525	155	1.1	.3	.85	1,300	1.77	10.5	377	124	6.0	1,960	7.5	18
July 27.....	a 2	10	.05	60	55		320	46	308	594	196	1.5	1.8	.95	1,490	2.03	8.06	374	121	7.2	2,280	7.7	23
Aug. 23.....	5.9	23	.11	104	74		441	55	437	813	276	2.1	13	1.4	2,090	2.84	33.3	565	207	8.1	3,130	8.0	45

a Estimated.

JAMES RIVER BASIN--Continued

6-4737.55. LAKE LOUISE NEAR MILLER, S. DAK.

LOCATION.--In NE¼SE¼ sec. 4, T. 113 N., R. 69 W., near spillway at east end of lake, 6 miles north and 7 miles west of Miller, Hand County.
RECORDS AVAILABLE.--Chemical analyses: October 1959 to September 1960 (discontinued).
REMARKS.--Lake content not known. Information on lake stage available in district office at Lincoln, Nebr.

Chemical analyses, in parts per million, water year October 1959 to September 1960

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. 13, 1959		7.2		0.05		36.7	15	18	18	161	0	58	9.8	0.2	0.5	0.14	264	150	18	0.6	410	7.3	15
Nov. 19.....		--		--		--	--	--	--	178	0	--	--	--	1.0	.15	278	160	14	--	470	7.5	--
Dec. 17.....		1.5		.04		9.7	3.8	7.7	6.9	49	0	19	4.5	.1	.2	.06	77	40	0	.5	154	7.1	6
Jan. 14, 1960		6.4		.06		38	17	20	18	185	0	63	11	.2	.7	.15	283	164	12	.7	452	7.2	23
Feb. 11.....		--		--		--	--	--	--	206	0	--	--	.3	.5	.16	--	179	10	--	479	7.3	--
Mar. 11.....		8.8		.13		44	21	22	21	220	0	67	13	.3	.9	.18	331	196	16	.7	515	7.5	25
Apr. 7.....		4.7		.22		6.3	2.3	1.7	5.4	30	0	6.0	.0	.1	3.0	.05	60	25	0	.1	78	6.3	60
Apr. 26.....		7.4		.12		8.5	3.6	--	--	46	0	--	--	.0	.9	.05	--	36	0	--	116	6.5	--
June 18.....		14		.41		22	1.5	3.8	8.2	76	0	12	.0	.1	1.6	.07	117	61	0	.2	161	6.9	43
July 8.....		--		--		21	4.3	--	--	88	0	--	--	.1	.4	.09	124	70	0	--	179	7.1	--
Aug. 17.....		2.1		.10		25	6.0	5.7	9.0	113	0	13	3.7	.1	.7	.08	131	87	0	.3	214	7.6	23
Sept. 26.....		--		.04	0.02	--	--	--	--	112	0	--	--	.1	1.1	.06	--	84	0	--	218	7.5	--

6-4743.1. COTTONWOOD LAKE NEAR REDFIELD, S. DAK.

LOCATION.--In NE¼NE¼ sec. 5, T. 115 N., R. 65 W., near bridge on State Highway 26 at outlet of lake, about 5 miles south and 7 miles west of Redfield, Spink County.
RECORDS AVAILABLE.--Chemical analyses: October 1959 to August 1960 (discontinued).
REMARKS.--Lake content not known. Information on lake stage available in district office at Lincoln, Nebr.

Chemical analyses, in parts per million, October 1959 to August 1960

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. 13, 1959...		21	0.75	37	73	470	43	647	0	609	186	0.6	1.9	0.88	1,840	2.50		391	0	10	2,650	8.1	90
Nov. 19.....		23	1.5	45	89	560	50	783	0	748	240	.6	2.4	1.2	2,190	2.98		480	0	11	3,130	8.2	50
Dec. 16.....		--	--	--	--	--	--	598	0	--	--	.6	.3	.82	1,670	2.27		366	0	--	2,490	8.0	--
Jan. 13, 1960...		21	.08	44	80	496	41	729	0	665	213	.7	.9	1.0	1,960	2.67		441	0	10	2,840	8.2	29
Feb. 10.....		--	--	--	--	--	--	707	35	--	--	.7	1.2	1.1	--	--		479	0	--	3,140	8.4	--
Mar. 11.....		30	.17	63	113	669	55	977	0	930	298	.8	1.3	1.4	2,710	3.69		620	0	12	3,790	7.9	40
Apr. 6.....		4.5	.33	12	6.8	30	8.9	78	0	49	14	.1	5.1	.10	183	.25		58	0	1.7	301	6.7	60
May 11.....		6.6	.08	27	34	195	21	318	0	284	88	.3	.5	.31	849	1.15		207	0	5.9	1,280	8.0	--
June 14.....		--	--	38	31	--	--	346	0	--	--	.3	.1	.48	879	1.20		223	0	--	1,360	7.6	--
July 5.....		--	--	--	--	--	--	347	0	--	--	--	--	--	887	1.21		225	0	--	1,390	7.6	--
July 7.....		9.2	.10	40	30	210	23	346	0	295	92	.3	.9	.32	894	1.22		224	0	6.1	1,390	7.8	18
July 26.....		--	--	34	36	--	--	364	0	--	--	.3	1.5	.47	916	1.25		233	0	--	1,480	8.1	--
Aug. 17.....		15	.31	35	37	226	25	384	0	309	100	.3	3.5	.48	962	1.31		241	0	6.3	1,550	7.7	23

JAMES RIVER BASIN--Continued

6-4745. TURTLE CREEK AT REDFIELD, S. DAK.

LOCATION.--At gaging station at bridge on U.S. Highway 281, at north edge of Redfield, Spink County, and 6.8 miles upstream from mouth.
DRAINAGE AREA.--1,540 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: November 1959 to August 1960 (discontinued).
REMARKS.--Records of discharge for water year October 1959 to September 1960 given in WSP 1709.

Chemical analyses, in parts per million, November 1959 to August 1960

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, 1959	0.2	22		0.33		54	20	818	46	501	0	1,270	225	5.5	62	3.6	2,880	215	0	24	3,780	7.7	39
Dec. 15.....	.2	16		.27		44	18	670	42	323	0	1,110	187	4.9	60	3.4	2,310	183	0	22	3,290	7.0	45
Jan. 12, 1960	.3	19		.24		45	19	697	50	399	0	1,120	193	5.4	16	3.3	2,430	190	0	22	3,500	7.0	60
Feh. 9.....	1.2	16		.14		39	17	609	38	372	0	1,010	168	4.4	--	2.8	2,130	168	0	20	3,150	7.2	45
Mar. 11.....	.4	20		.41		42	21	651	42	347	0	1,110	177	3.9	94	3.9	2,320	193	0	20	3,300	7.5	43
Apr. 6.....	1,150	--		--		--	--	14	--	68	0	--	--	--	--	--	133	60	4	.8	215	6.5	--
Apr. 8.....	1,740	6.3		1.8		19	4.8	7.2	7.3	74	0	21	2.3	.1	4.1	.06	127	67	6	.4	194	6.6	65
Apr. 19.....	324	--		--		--	--	38	--	118	0	--	--	--	--	--	269	105	8	1.6	415	6.9	--
Apr. 26.....	212	14		.07	0.00	31	15	59	11	152	0	108	29	.2	3.2	.19	366	138	13	2.2	564	7.0	45
June 14.....	.8	11		.13		51	18	210	17	243	0	354	72	1.3	16	.85	881	201	2	6.5	1,320	7.4	18
July 6.....	1.9	5.6		.08		38	17	131	15	184	0	229	53	.7	8.9	.54	602	163	12	4.5	935	7.2	18
July 26.....	1.3	7.1		.08		42	22	200	17	240	0	342	79	1.3	6.7	.83	960	194	0	6.2	1,390	7.4	22
Aug. 22.....	.6	8.3		.07		48	26	330	22	287	0	554	113	1.8	13	1.5	1,280	228	0	9.5	1,880	7.2	22

JAMES RIVER BASIN--Continued

6-4759. LAKE BYRON NEAR HURON, S. DAK.

LOCATION.--In NE¼NE¼ sec. 25, T. 113 N., R. 61 W., at bridge on county road, about 6 miles east and 14 miles north of Huron, Beadle County.
RECORDS AVAILABLE.--Chemical analyses: September 1959 to September 1960 (discontinued).
REMARKS.--Lake content not known. Information on lake stage available in district office at Lincoln, Nebr.

Chemical analyses, in parts per million, September 1959 to September 1960

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. 26, 1959.....		10		0.15		72	149	700	64	230	0	1,750	247	0.7	2.4	2.3	3,260	792	603	11	4,220	7.2	45
Nov. 17.....		16		.75		236	358	1,250	112	456	0	3,830	486	.7	16	3.0	6,740	2,060	1,690	12	7,630	7.5	
Dec. 14.....		--		--		--	--	--	--	670	0	--	--	--	23	.63	6,400	2,010	1,460	--	7,320	7.5	
Jan. 12, 1960		--		--		--	--	--	--	800	0	--	--	.5	1.1	2.7	--	1,860	1,200	--	6,490	7.6	
Feb. 8.....		20		.25		123	152	480	62	328	0	1,510	181	.6	13	1.5	2,830	932	663	6.8	3,570	7.3	
Mar. 9.....		108		6.9		550	656	2,090	169	2,230	0	5,650	860	.7	3.0	5.7	11,800	4,070	2,240	14	12,900	7.6	
Apr. 25.....		8.6		.07		40	67	--	--	136	0	--	--	.3	7.9	.94	--	376	264	--	1,980	6.8	
June 14.....		--		--		87	78	--	--	266	0	--	110	.4	2.0	1.1	1,660	539	321	--	2,230	7.4	
July 7.....		22		.09		115	74	322	36	284	0	908	122	.4	2.9	1.2	1,810	592	359	5.8	2,410	7.5	
Aug. 17.....		--		--		112	92	--	--	316	0	--	145	.5	5.8	1.4	2,100	658	399	--	2,790	7.6	
Sept. 26.....		22		.18	0.00	52	94	343	40	269	0	922	131	.5	.2	1.3	1,810	518	297	6.5	2,440	7.4	

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

(Formerly published as 6-4760. James River upstream from diversion, 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 1960.
Water temperatures: August 1956 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 1,680 ppm Mar. 1-27; minimum, 147 ppm Apr. 5-7.
Hardness: Maximum, 651 ppm Mar. 28; minimum, 63 ppm Apr. 1-4.
Specific conductance: Maximum daily, 2,460 micromhos Mar. 16-18, 25; minimum daily, 176 micromhos Mar. 30, Apr. 2.
Water temperatures: Maximum, 80°F on several days during July and September; minimum, freezing point on several days during November to February.
EXTREMES, 1956-60.--Dissolved solids (1956-58, 1959-60): Maximum, 1,680 ppm Mar. 1-27, 1960; minimum, 147 ppm Apr. 5-7, 1960.
Hardness: Maximum, 790 ppm Mar. 1-14, 1959; minimum, 63 ppm Apr. 1-4, 1960.
Specific conductance: Maximum daily, 2,640 micromhos Mar. 1, 1959; minimum daily, 176 micromhos Mar. 30, Apr. 2, 1960.
Water temperatures: Maximum, 83°F July 17, 1957; minimum, freesing 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. Records of discharge for water year October 1959 to September 1960 given in WSP 1709.

Chemical analyses, in parts per million, water year October 1959 to September 1960

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, 1959a	--	--	0.06	--	--	210	--	265	0	480	95	--	--	0.72	1,100	1.50	--	344	127	4.9	1,600	7.1	--
Nov. 1-30 a	--	--	.04	--	--	198	--	298	0	494	92	--	--	.71	1,120	1.52	--	401	157	4.3	1,610	7.4	--
Dec. 1-31 a	--	17	.09	84	58	195	17	313	0	483	94	0.4	4.2	.96	1,170	1.59	--	448	191	4.0	1,670	7.1	24
Jan. 1-16, 1960a	--	--	.10	--	--	200	--	307	0	508	95	--	--	.66	1,180	1.60	--	457	205	4.1	1,670	7.1	--
Jan. 17-24 a	--	--	.06	--	--	217	--	321	0	551	103	--	--	.81	1,290	1.75	--	510	247	4.2	1,790	7.1	--
Jan. 25-31 a	--	--	.09	--	--	231	--	345	0	617	114	--	--	.79	1,420	1.93	--	555	272	4.3	1,950	7.0	--
Feb. 1-29 a	--	--	.13	--	--	248	--	371	0	655	125	--	--	.62	1,500	2.04	--	599	295	4.4	2,050	7.2	--
Mar. 1-27 a	--	--	.10	--	--	284	--	420	0	688	151	--	--	.62	1,680	2.28	--	637	293	4.9	2,310	7.3	--
Mar. 28	400	--	--	--	--	260	--	498	0	613	145	--	--	.55	1,560	2.12	1,680	651	243	4.4	2,160	7.6	--
Mar. 29-31	2,983	7.2	--	22	8.5	15	8.9	86	0	44	8.0	.0	7.4	.15	172	.23	1,390	90	19	.7	282	7.2	37
Apr. 1-4	4,455	--	.12	--	--	20	--	68	0	40	11	--	--	.12	161	.22	1,940	63	7	1.1	263	7.1	--
Apr. 5-7	5,790	7.0	--	17	6.2	14	6.7	70	0	36	5.5	.1	6.4	.07	147	.20	2,300	68	11	.7	236	7.0	34
Apr. 8-14	3,676	--	.13	--	--	18	--	78	0	53	7.8	--	--	.13	180	.24	1,790	81	17	.9	282	6.9	--
Apr. 15-18	1,683	--	.12	--	--	30	--	98	0	90	13	--	--	.17	259	.35	1,320	116	36	1.2	403	7.2	--
Apr. 19-20	1,225	--	--	--	--	44	--	115	0	123	20	--	--	.21	333	.45	1,100	137	43	1.6	510	7.4	--
Apr. 21-30	812	10	.07	35	16	50	13	131	0	127	26	.2	1.9	.27	375	.51	822	153	46	1.6	560	7.2	45
May 1-16	548	--	.04	--	--	47	--	159	0	112	26	--	--	.19	369	.50	546	163	33	1.6	565	7.3	--

May 17-31, 1960.	414	--	.03	--	--	59	--	202	0	114	33	--	--	.21	438	.60	490	188	22	1.9	652	7.3	--
June 1-26.....	168	--	.02	--	--	64	--	236	0	116	34	--	--	.24	452	.61	205	208	14	1.9	701	7.4	--
June 27-July 13.	108	--	.00	--	--	75	--	279	0	140	40	--	--	.30	527	.72	154	250	21	2.1	800	7.3	--
July 14-31.....	55.6	--	.03	--	--	95	--	317	0	173	62	--	--	.35	648	.88	97.3	300	40	2.4	994	7.4	--
Aug. 1-15, 17-31	33.8	7.1	.02	66	30	98	18	316	0	173	60	.3	.3	.35	822	.85	56.8	287	26	2.5	979	7.4	22
Sept. 1-19, 21-26, 28-29.....	8.6	--	.01	--	--	96	--	331	0	173	56	--	--	.41	641	.87	14.9	296	25	2.4	988	7.4	--
Weighted average b.....	305	--	0.10	--	--	31	--	111	0	73	16	--	--	0.16	254	0.35	209	112	21	1.3	394	--	--

a Not included in weighted average.
b Includes estimates where data are missing. Represents 100 percent of runoff for water year.

Temperature (°F) of water, water year October 1959 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	
October.....	50	50	51	52	54	55	56	50	44	44	44	43	40	41	45	45	44	44	50	44	46	47	48	44	45	44	40	40	40	38	38	46
November.....	40	40	41	40	32	32	35	37	39	40	38	38	36	35	35	34	34	36	37	39	38	40	40	38	38	37	36	38	36	40	--	37
December.....	40	38	40	40	38	39	40	39	39	39	39	39	38	39	39	39	38	39	39	38	38	38	35	38	40	40	37	38	37	36	36	38
January.....	37	35	34	35	32	35	37	35	35	35	35	38	36	35	34	34	34	33	33	33	33	35	33	33	34	34	34	35	34	35	36	35
February.....	35	35	38	37	35	35	35	36	35	34	33	33	35	35	35	35	34	35	32	34	34	32	33	32	33	33	34	33	33	--	--	34
March.....	33	33	34	33	34	35	35	35	35	36	35	35	35	34	35	35	35	35	35	36	38	36	36	36	37	38	37	37	35	35	35	35
April.....	37	34	34	34	34	36	39	40	39	39	44	47	47	50	51	52	49	51	52	57	55	55	57	55	56	57	50	52	50	47	--	47
May.....	47	52	52	54	55	50	50	52	54	55	55	58	58	61	61	65	63	62	61	61	60	63	64	69	69	64	62	65	65	66	68	59
June	69	69	70	70	69	69	67	68	67	66	65	66	68	68	69	64	65	67	71	71	68	67	67	66	67	70	72	74	75	74	--	69
July.....	70	73	72	71	73	73	72	73	74	76	77	77	76	74	74	75	76	75	79	77	78	79	80	80	80	80	80	79	79	75	76	76
August.....	75	77	77	77	76	77	77	77	74	74	75	75	76	74	71	75	74	73	74	73	73	75	75	75	73	71	71	73	72	72	75	74
September.....	76	76	77	80	79	79	74	64	64	65	67	65	65	65	65	65	64	64	62	62	65	60	62	58	58	62	60	60	59	55	--	66

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 1960.
Water temperatures: January 1953 to September 1960.
EXTREMES, 1959-60.--Water temperatures: Maximum, 89°F July 23, 24, 26; minimum, freezing point on many days during November to March.
EXTREMES, 1953-60.--Water temperatures: Maximum, 90°F Aug. 1, 2, 1957; minimum, freezing point on many days during winter months.
REMARKS.--Records of discharge for water year October 1959 to September 1960 given in WSP 1709.

Chemical analyses, in parts per million, water year October 1959 to September 1960

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. 2, 1959.	12	--		--	--	179	87	156	--	178	0	868	70	--	--	--	1,610	804	658	2.4	1,950	7.2	--
Nov. 24.....	21	--		--	--	--	--	113	--	280	0	--	--	--	--	--	1,470	840	610	1.7	1,800	7.6	--
Dec. 23.....	22	--		--	--	222	93	175	--	283	0	980	72	--	--	--	1,820	936	704	2.5	2,160	7.6	--
Jan. 19, 1960	17	19		0.13	--	253	97	228	21	398	0	1,030	111	1.0	13	0.71	2,110	1,030	704	3.1	2,510	7.4	15
Feb. 15.....	20	--		--	--	265	99	250	--	423	0	1,040	150	--	--	--	2,220	1,070	723	3.3	2,710	7.6	--
Mar. 9.....	17	--		--	--	290	111	300	--	492	0	1,140	180	--	--	--	2,490	1,180	777	3.8	3,010	7.5	--
Apr. 19.....	4,510	9.7		.31	--	31	8.9	16	10	108	0	61	5.4	.1	1.9	.09	213	114	25	.7	339	6.6	45
Apr. 25.....	3,270	--		.09	0.00	38	12	25	--	122	0	90	11	--	--	--	275	143	43	.9	429	6.8	--
May 12.....	719	--		--	--	--	--	70	--	204	0	--	--	--	--	--	645	330	163	1.7	933	7.0	--
May 26.....	712	11		.07	--	92	34	72	14	232	0	286	36	.3	.4	.25	695	370	180	1.6	997	7.0	32
July 22.....	63	6.8		--	--	99	45	110	16	309	0	337	59	.4	.0	.45	861	433	180	2.3	1,240	7.6	--
Aug. 18.....	36	--		--	--	118	49	124	--	330	0	401	69	--	--	--	980	494	223	2.4	1,390	7.6	--
Sept. 18.....	30	--		--	--	--	--	116	--	274	0	--	--	--	--	--	1,000	505	280	2.2	1,380	7.5	--
Sept. 21.....	31	14		.11	.00	159	36	133	18	305	0	481	85	.5	1.3	.53	1,100	544	294	2.5	1,510	7.5	15

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

Temperature (°F) of water, water year October 1959 to September 1960
/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	57	54	53	54	58	58	58	58	51	51	50	48	48	50	51	51	50	49	51	51	51	51	51	50	49	49	47	45	45	45	45	51
Minimum	54	53	51	52	54	56	57	51	48	50	47	47	47	48	50	50	49	47	49	50	50	50	50	48	48	47	45	45	45	45	44	49
November																																
Maximum	46	46	46	46	41	38	38	37	37	37	37	36	36	35	34	34	34	34	33	32	33	35	35	34	34	33	32	32	32	32	--	36
Minimum	44	45	46	41	38	37	37	37	36	37	36	36	35	34	34	34	34	33	32	32	32	33	33	33	33	32	32	32	32	32	--	36
December																																
Maximum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	32
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	33	33	33	33	33	33	33	32
January																																
Maximum	33	33	34	35	34	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
Minimum	33	33	33	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
February																																
Maximum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	33	33	34	34	34	34	33	33	32	32	32	32	32	--	--	32
Minimum	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	33	33	34	34	33	33	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	34	33	34	34	34	34	34	33	33	33	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	34	34	34	32	32	33	33	33	32
April																																
Maximum	34	34	34	35	38	40	43	43	43	43	46	47	49	50	53	53	51	47	49	51	54	56	58	58	58	57	57	54	53	53	--	48
Minimum	34	34	34	34	35	38	40	43	43	43	43	46	47	49	50	51	46	46	46	49	51	54	56	58	57	56	54	53	53	50	--	46
May																																
Maximum	51	53	56	56	56	56	55	56	58	59	60	61	63	64	65	65	65	65	65	65	64	64	64	68	69	69	68	67	67	68	68	62
Minimum	50	51	53	54	55	54	54	55	56	58	59	60	61	63	64	65	65	65	65	64	62	62	62	64	68	68	67	67	67	67	68	61
June																																
Maximum	70	70	71	71	71	71	72	72	72	72	71	70	70	71	74	74	73	72	74	75	75	76	76	76	75	76	78	80	79	78	--	73
Minimum	68	70	70	71	71	71	71	72	72	71	70	70	69	70	71	73	72	72	72	74	75	75	76	75	75	75	76	78	78	78	--	73
July																																
Maximum	78	78	79	80	80	80	80	80	81	83	84	85	85	83	83	83	83	84	85	86	87	88	89	89	88	89	87	84	84	84	82	84
Minimum	77	77	78	79	80	80	80	79	79	81	83	84	83	82	82	83	83	82	84	85	86	86	87	87	87	86	84	84	84	82	79	82
August																																
Maximum	81	82	85	84	84	82	80	79	78	76	76	76	76	77	76	75	75	75	75	74	76	77	78	79	76	76	75	76	73	73	76	77
Minimum	79	81	82	82	82	79	79	78	75	75	75	75	76	76	74	73	75	75	73	73	74	76	77	76	75	75	75	73	71	72	73	76
September																																
Maximum	78	79	79	80	81	80	79	79	73	70	69	69	67	67	66	66	66	66	64	64	65	65	63	60	60	60	60	60	60	60	--	68
Minimum	76	78	79	79	80	79	79	73	70	69	69	67	67	66	65	65	66	64	62	62	64	63	60	60	60	60	60	60	60	59	--	67

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 1960.
Sediment records: May 1950 to September 1960.
EXTREMES, 1959-60.--Water temperatures: Maximum, 83°F July 24; minimum, freezing point on many days during November to March.
Sediment concentrations: Maximum daily, 6,380 ppm May 21; minimum daily, 11 ppm Dec. 19.
Sediment loads: Maximum daily, 69,700 tons May 21; minimum daily, 5 tons Dec. 19, Mar. 25, 26.
EXTREMES, 1950-60.--Water temperatures (1951-60): 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 (1958-60), 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, 11,500 ppm May 21. Records of discharge for water year October 1959 to September 1960 given in WSP 1710. Flow affected by ice Nov. 6 to Dec. 25, Dec. 30 to Mar. 28.

Temperature (°F) of water, water year October 1959 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	
October	50	49	48	49	52	54	56	52	44	48	42	41	--	42	--	51	--	44	--	48	--	51	--	46	--	47	--	41	--	43	--	--
November	42	--	44	40	36	--	34	--	35	--	36	--	32	--	33	--	32	--	33	--	34	--	34	--	33	--	32	--	34	--	--	--
December	34	--	35	--	34	--	32	--	32	--	34	--	33	--	33	--	33	--	33	--	32	--	33	--	34	--	35	36	34	32	32	--
January	34	--	34	--	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	--	--	--	--
March	32	--	32	--	32	--	32	--	32	--	32	--	32	--	32	--	32	--	32	--	32	--	32	--	32	--	36	34	40	45	35	--
April	40	36	38	38	38	40	43	42	40	40	45	46	50	49	54	54	46	47	50	54	54	57	62	63	60	55	54	52	54	46	--	48
May	48	52	56	58	59	53	50	51	55	53	53	54	57	60	61	64	58	62	60	60	54	57	62	64	64	63	62	62	64	64	66	56
June	68	67	68	68	68	66	66	67	67	66	66	64	62	63	67	67	64	69	70	71	68	65	69	70	68	70	72	72	72	70	--	68
July	67	72	69	69	70	70	69	71	72	73	78	76	74	73	73	74	75	74	77	78	79	81	82	83	82	80	76	74	78	72	72	75
August	73	77	80	79	80	72	74	74	72	68	69	71	--	72	--	--	--	--	--	70	72	74	76	76	76	70	71	73	67	72	76	73
September	78	79	78	78	78	78	77	74	67	64	66	62	61	62	59	64	65	64	61	62	66	63	60	59	56	60	59	59	58	56	--	66

LITTLE SIOUX RIVER BASIN--Continued

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

Suspended sediment, water year October 1959 to September 1960
/Where no concentrations are reported, loads are estimated/

Day	OCTOBER			NOVEMBER			OECEMBER		
	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..	103	68	19	108	53	15	185	27	13
2..	111	55	16	103	47	13	190	34	17
3..	115	49	15	100	41	11	185	40	20
4..	114	64	20	110	60	18	180	32	16
5..	114	78	24	155	190	80	160	24	10
6..	110	81	24	85	140	32	150	24	10
7..	106	81	23	90	88	21	160	25	11
8..	223	200 S	129	105	66	19	170	28	13
9..	266	160 A	115	120	43	14	170	31	14
10..	248	90 A	60	140	42	16	170	24	11
11..	196	48	25	155	41	17	170	18	8
12..	172	38	18	100	47	13	170	24	11
13..	154	42	17	80	53	11	170	31	14
14..	148	46	18	85	52	12	170	28	13
15..	140	62	23	100	52	14	170	25	11
16..	130	78	27	150	47	19	170	20	9
17..	120	64	21	140	42	16	170	16	7
18..	113	50	15	130	40	14	170	14	6
19..	108	64	19	130	38	13	170	11	5
20..	106	79	23	135	32	12	170	14	6
21..	101	92	25	150	27	11	170	17	8
22..	106	105	30	160	30	13	170	16	7
23..	108	92	27	170	34	16	170	16	7
24..	107	80	23	180	36	17	170	16	7
25..	104	65	18	190	38	19	170	15	7
26..	104	50	14	180	37	18	248	--	50
27..	100	43	12	175	36	17	380	280	287
28..	100	36	10	175	33	16	685	1320	2440
29..	98	40	11	175	30	14	805	1170	2540
30..	99	45	12	180	28	14	750	440	891
31..	107	49	14	--	--	--	650	300	526
Total	4031	--	847	4056	--	535	7788	--	6995
	JANUARY			FEBRUARY			MARCH		
1..	600	270	437	180	205	100	120	135	44
2..	500	250	338	180	185	90	120	105	34
3..	400	230	248	180	190	92	120	72	23
4..	300	220	178	175	195	92	120	72	23
5..	340	215	197	170	205	94	115	72	22
6..	360	280	272	170	215	99	110	51	15
7..	355	325	312	170	180	83	110	30	9
8..	350	230	217	170	140	64	110	34	10
9..	345	200	186	170	145	67	110	38	11
10..	340	215	197	170	170	78	110	33	10
11..	335	230	208	165	170	76	110	28	8
12..	330	215	192	160	175	76	110	46	14
13..	325	200	176	160	180	78	110	64	19
14..	320	210	181	160	185	80	110	54	16
15..	315	220	187	155	160	67	110	45	13
16..	310	175	146	150	130	53	110	70	21
17..	305	160	132	145	120	47	110	95	28
18..	300	170	138	140	110	42	110	76	23
19..	295	185	147	140	120	45	110	57	17
20..	290	205	161	140	125	47	110	42	12
21..	285	225	173	140	110	42	110	27	8
22..	270	190	139	135	91	33	110	28	8
23..	250	160	108	135	89	32	110	29	9
24..	230	175	109	130	87	31	110	24	7
25..	210	190	108	125	94	32	110	18	5
26..	190	180	92	125	100	34	110	18	5
27..	170	175	80	120	92	30	200	400 A	216
28..	160	195	84	120	83	27	2500	1100 A	7420
29..	165	215	96	120	110	36	14200	950	36400
30..	170	220	101	--	--	--	13500	810	29500
31..	175	225	106	--	--	--	8440	1030	23500
Total	9290	--	5446	4400	--	1767	41745	--	97450

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 1959 to September 1960--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	7660	1510	31200	685	170	314	4800	385	4990
2	8440	1110	25300	685	160	296	4160	445	5000
3	9080	850	20800	670	165	298	3300	515	4590
4	8600	660	15300	670	170	308	2620	555	3780
5	6300	650	11100	685	190	351	2130	550	3160
6	4800	890	11500	700	245	463	1790	565	2730
7	4970	670	8990	685	185	342	1560	545	2300
8	4390	660	7820	670	160	289	1440	470	1830
9	2980	830	6680	685	160	296	1290	435	1520
10	2180	710	4180	685	140	259	1220	490	1610
11	1790	670	3240	657	120	213	1150	470	1460
12	1440	580	2260	631	120	204	1120	485	1470
13	1520	1860 A	7630	592	115	184	1120	460	1390
14	1410	950 A	3620	566	110	168	1120	405	1220
15	1290	630	2190	529	110	157	1050	380	1080
16	1330	530	1900	709	1080 A	2070	1050	425	1200
17	1410	620	2360	821	1280 A	2840	1150	405	1260
18	1330	580	2080	852	520	1200	1330	520	1870
19	1260	460	1560	980	750	1980	1370	610	2260
20	1220	445	1470	1660	2190 S	12100	1330	515	1850
21	1150	420	1300	5670	6380 S	89700	1220	430	1420
22	1050	375	1060	7100	1250	24000	1150	365	1130
23	948	370	947	6200	640	10700	1080	330	962
24	884	350	835	5060	650	8880	1010	335	914
25	820	340	753	6850	3820 S	68400	948	300	768
26	775	275	575	9240	1600	39900	916	285	705
27	730	265	522	9400	680	17300	980	365	966
28	715	250	483	7800	385	8110	916	410	1010
29	700	255	482	6400	335	5790	948	405	1040
30	685	195	361	5500	375	5570	916	375	927
31	--	--	--	5060	400	5460	--	--	--
Total	81857	--	178498	89097	--	308142	46184	--	56412

Day	JULY			AUGUST			SEPTEMBER		
1	852	370	851	330	230	205	657	490	869
2	775	390	816	311	235	197	553	335	500
3	715	290	560	293	225	178	474	260	333
4	657	240	426	275	255	189	420	220	249
5	618	230	384	293	635 S	634	370	175	175
6	579	215	336	653	2300 S	4470	330	150	134
7	540	215	313	400	540	583	302	130	106
8	518	225	315	340	260	239	311	195	164
9	496	205	275	302	215	175	302	120	98
10	474	220	282	284	180	138	275	105	78
11	463	170	213	266	180	129	275	99	74
12	631	1380 S	2470	248	165	110	320	94	81
13	754	1140 S	2340	232	185	116	380	105	108
14	700	460	869	223	210	126	360	140	136
15	805	370	804	204	--	110	350	115	109
16	916	500	1240	200	--	100	330	110	98
17	884	540	1290	200	--	100	330	130	116
18	1010	1290 S	3640	203	--	100	360	140	136
19	1080	1180 S	3480	201	--	100	340	140	129
20	948	820	2100	232	--	120	340	130	119
21	820	560	1240	223	105	63	350	140	132
22	790	455	971	220	78	46	360	99	96
23	745	415	835	200	66	36	441	165	196
24	657	435	772	208	88 S	56	518	265	371
25	579	340	532	420	1110 S	1580	579	270	422
26	518	300	420	533	930 S	1520	670	365	660
27	474	305	390	302	200	163	745	505	1020
28	430	275	319	2220	4880 S	33900	790	470	1000
29	400	275	297	2560	2400	16600	820	485	1070
30	390	275	290	884	900	2150	805	460	1000
31	370	305	305	852	855	1970	--	--	--
Total	20588	--	29375	14312	--	66203	13457	--	9779

Total discharge for year (cfs-days)..... 336805
Total load for year (tons)..... 761449

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

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

Particle-size analyses of suspended sediment, water year October 1959 to September 1960
(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. 29, 1960.....	1800	40		16000	1160		46	58		85		100	--	--	--			SPWC
Mar. 29.....	1800	40		16000	1160		26	37		80		100	--	--	--			SPN
Apr. 7.....	1350	44		4970	595		--	42		60		86	91	98	100			SPWC
May 21.....	1000	54		5800	6800		--	48		74		96	97	98	100			SPWC
May 21.....	1000	54		5800	6800		--	31		70		96	97	98	100			SPN
May 22.....	0700	57		7100	1400		--	59		79		84	87	92	99	100		SPWC
May 25.....	1915	64		8120	2630		--	59		85		94	96	98	100			SPWC
Aug. 28.....	0900	73		916	8420		--	32		50		99	100	--	--			SPWC
Aug. 28.....	1930	73		4460	6110		--	35		60		97	99	100	--			SPWC
Aug. 28.....	1930	73		4460	6110		--	23		56		97	99	100	--			SPN

PLATTE RIVER BASIN

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 to September 1960.
Sediment records: June 1957 to September 1960.
EXTREMES, 1959-60.--Water temperatures: Maximum, 70°F July 18, 25.
Sediment concentrations: Maximum daily, 250 ppm Sept. 16; minimum daily, not determined.
Sediment loads: Maximum daily, 1.3 tons Sept. 16; minimum daily, less than 0.05 ton on many days.
EXTREMES, 1957-60.--Water temperatures: Maximum, 70°F July 23, 1959, July 16, 25, 1960.
Sediment concentrations: Maximum daily, 250 ppm Sept. 18, 1960; minimum daily, not determined.
Sediment loads: Maximum daily, 14 tons May 17, 1958; minimum daily, less than 0.05 ton on many days.
REMARKS.--Records of discharge for water year October 1959 to September 1960 given in WSP 1710. Flow affected by ice Nov. 4, 5, 12, Apr. 1-3.

Temperature (°F) of water, April 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	
October	--	--	40	--	--	--	--	--	--	--	40	--	--	--	--	--	--	43	--	--	--	--	--	--	--	--	--	--	--	--	--	--
November	--	--	--	--	32	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	32	--	--	--
December	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	32	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
January	--	--	--	--	--	--	32	--	--	--	--	--	--	--	--	--	--	--	--	--	--	32	--	--	--	32	--	--	--	--	--	--
February	--	--	--	--	--	--	--	--	--	--	--	--	--	--	32	--	--	--	--	--	--	--	--	--	--	32	--	--	--	--	--	--
March	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	34	--	--
April	--	--	--	--	--	--	--	--	--	--	--	--	--	40	--	--	--	--	46	--	--	49	43	35	38	42	40	37	--	--	--	--
May	42	42	42	44	--	--	50	43	38	45	43	44	43	38	51	41	40	39	35	36	55	46	50	41	41	44	49	45	47	45	51	44
June	49	54	52	51	53	54	55	53	50	49	53	51	58	55	51	49	57	59	59	59	42	49	53	52	59	64	60	62	57	62	--	54
July	56	--	61	60	60	56	63	55	64	60	64	57	63	57	55	--	--	70	--	57	64	57	67	58	70	67	60	68	61	69	62	62
August	69	58	67	60	68	68	67	65	65	54	64	56	67	54	65	59	57	52	51	53	68	57	53	52	47	46	--	57	48	55	57	59
September	57	62	63	59	63	54	63	46	46	58	52	46	45	47	55	41	50	46	43	52	47	42	44	43	54	44	43	46	44	--	--	50

PLATTE RIVER BASIN--Continued

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

Suspended sediment, water year October 1959 to September 1960
(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	4.3	--	0.1	4.3	--	0.2	2.4		T
2	4.6	--	.1	4.6	--	.2	2.3		T
3	4.6	6	.1	4.1	--	.2	2.3		T
4	4.8	--	.1	3.8	--	.2	2.3		T
5	4.8	--	.1	3.5	16	.2	2.4		T
6	5.3	--	.1	3.6	--	.2	2.5		T
7	5.3	--	.1	3.6	--	.2	2.7		0.1
8	5.3	--	.1	3.5	--	.1	2.7		.1
9	5.3	--	.1	3.3	--	.1	2.6		.1
10	5.3	--	.1	3.5	--	.1	2.6		.1
11	5.0	4	.1	3.3	--	.1	2.6		.1
12	5.8	--	.1	2.7	--	.1	2.6		.1
13	6.0	--	.1	2.2	--	T	2.6		.1
14	5.8	--	.1	2.2	--	T	2.5		.1
15	5.5	--	.1	2.5	--	T	2.5		.1
16	5.8	--	.1	2.3	--	T	2.6		.1
17	4.8	--	.1	2.4	--	T	2.7	8	.1
18	4.3	6	.1	2.5	--	T	2.7		.1
19	4.3	--	.1	2.6	--	T	2.7		.1
20	4.1	--	.1	2.7	--	T	2.7		.1
21	3.8	--	.1	2.7	--	T	2.7		.1
22	3.8	--	.1	2.6	--	T	2.7		.1
23	4.1	--	.1	2.7	--	T	2.6		.1
24	3.8	--	.1	2.7	--	T	2.6		.1
25	4.1	--	.1	2.5	--	T	2.7		.1
26	4.1	--	.1	2.4	--	T	2.6		.1
27	3.6	--	.1	2.4	--	T	2.6		.1
28	3.6	--	.1	2.5	--	T	2.5		.1
29	3.6	--	.1	2.5	2	T	2.5		.1
30	3.8	--	.1	2.5	--	T	2.4		.1
31	4.1	--	.1	--	--	--	2.4		.1
Total	143.4	--	3.1	88.7	--	2.3	79.3		2.6

Day	JANUARY			FEBRUARY			MARCH		
1	2.3	--	0.1	2.9	--	0.1	1.9	--	T
2	2.2	--	.1	2.9	--	.1	1.9	--	T
3	2.2	--	.1	2.8	--	.1	1.9	--	T
4	2.2	--	.1	2.7	--	.1	2.0	--	T
5	2.2	--	.1	2.6	--	.1	2.1	--	T
6	2.8	--	.1	2.7	--	.1	2.2	--	T
7	3.0	10	.1	2.8	--	.1	2.3	--	T
8	3.1	--	.1	2.8	--	.1	2.5	--	T
9	3.2	--	.1	2.7	--	.1	2.5	--	T
10	3.2	--	.1	2.7	--	.1	2.4	--	T
11	3.2	--	.1	2.6	--	.1	2.3	--	T
12	3.1	--	.1	2.6	--	.1	2.3	--	T
13	3.0	--	.1	2.6	--	.1	2.2	--	T
14	3.0	--	.1	2.6	--	.1	2.2	--	T
15	2.9	--	.1	2.6	13	.1	2.2	--	T
16	2.9	--	.1	2.6	--	.1	2.2	--	T
17	2.8	--	.1	2.5	--	.1	2.2	--	T
18	2.7	--	.1	2.4	--	.1	2.3	3	T
19	2.6	--	.1	2.4	--	T	2.4	--	T
20	2.5	--	.1	2.4	--	T	2.5	--	T
21	2.6	--	.1	2.4	--	T	3	--	0.1
22	2.7	8	.1	2.3	--	T	4	--	.1
23	2.7	--	.1	2.2	--	T	6	--	.2
24	2.8	--	.1	2.1	--	T	8	--	.2
25	2.8	--	.1	2.0	--	T	10	--	.2
26	2.9	10	.1	2.0	9	T	12	--	.3
27	3.0	--	.1	1.9	--	T	14	--	.3
28	3.0	--	.1	1.9	--	T	16	--	.3
29	3.0	--	.1	1.9	--	T	14	--	.3
30	2.9	--	.1	--	--	--	12	10	.3
31	2.9	--	.1	--	--	--	7.0	--	.2
Total	86.4	--	3.1	71.6	--	2.3	150.5	--	3.0

T Less than 0.05 ton.

PLATTE RIVER BASIN--Continued

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

Suspended sediment, water year October 1959 to September 1960--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..	4.0	C 7	0.1	11	C 7	0.2	17	C 6	0.3
2..	5.5	C 7	.1	12	C 7	.2	17	C 6	.3
3..	6.5	C 7	.1	13	C 7	.2	17	C 6	.3
4..	13	C 7	.2	15	C 7	.3	15	C 6	.2
5..	21	C 7	.4	16	C 7	.3	15	C 6	.2
6..	24	C 7	.5	15	C 7	.3	15	C 6	.2
7..	23	C 7	.4	19	C 7	.4	14	C 6	.2
8..	20	C 7	.4	23	C 7	.4	15	C 6	.2
9..	21	C 7	.4	23	C 7	.4	18	C 6	.3
10..	23	C 7	.4	27	C 7	.5	16	C 6	.3
11..	17	C 7	.3	29	C 7	.5	15	C 6	.2
12..	17	C 7	.3	33	C 7	.6	13	C 6	.2
13..	16	C 7	.3	36	C 7	.7	13	C 6	.2
14..	15	C 7	.3	33	C 7	.6	11	C 6	.2
15..	10	C 7	.2	29	C 7	.5	14	C 6	.2
16..	9.0	C 7	.2	30	C 7	.6	13	C 6	.2
17..	9.0	C 7	.2	28	C 7	.5	9.5	C 6	.2
18..	8.5	C 7	.2	28	C 7	.5	9.0	C 6	.1
19..	11	C 7	.2	26	C 7	.5	9.5	C 6	.2
20..	13	C 7	.2	23	C 7	.4	8.0	C 6	.1
21..	17	C 7	.3	23	C 7	.4	7.0	C 6	.1
22..	18	C 7	.3	24	C 7	.5	6.0	C 6	.1
23..	18	C 7	.3	23	C 7	.4	6.0	C 6	.1
24..	16	C 7	.3	22	C 7	.4	6.0	C 6	.1
25..	12	C 7	.2	20	C 7	.4	5.5	C 6	.1
26..	11	C 7	.2	19	C 7	.4	5.0	C 6	.1
27..	12	C 7	.2	20	C 7	.4	5.0	C 6	.1
28..	13	C 7	.2	19	C 7	.4	5.0	C 6	.1
29..	10	C 7	.2	19	C 7	.4	4.6	C 6	.1
30..	12	C 7	.2	19	C 7	.4	4.6	C 6	.1
31..	--	--	--	17	C 7	.3	--	--	--
Total	425.5	--	7.8	694	--	13.0	328.7	--	5.3

Day	JULY			AUGUST			SEPTEMBER		
1..	4.3	C 4	T	2.6	C 4	T	1.3	C 8	T
2..	4.3	C 4	T	2.0	C 4	T	1.4	C 8	T
3..	4.3	C 4	T	1.8	C 4	T	1.5	C 8	T
4..	5.3	C 4	0.1	1.8	C 4	T	1.4	C 8	T
5..	5.5	C 4	.1	1.6	C 4	T	1.8	C 8	T
6..	6.0	C 4	.1	1.8	C 4	T	1.8	C 8	T
7..	5.5	C 4	.1	1.8	C 4	T	1.7	C 8	T
8..	5.0	C 4	.1	1.8	C 4	T	1.3	C 8	T
9..	4.8	C 4	.1	2.5	C 4	T	1.8	C 8	T
10..	4.3	C 4	T	1.7	C 4	T	1.6	C 8	T
11..	4.1	C 4	T	1.4	C 4	T	1.0	C 8	T
12..	3.8	C 4	T	1.3	C 4	T	1.3	C 8	T
13..	3.6	C 4	T	1.1	C 4	T	1.0	24	0.1
14..	3.8	C 4	T	1.2	C 4	T	1.3	80	.3
15..	3.3	C 4	T	1.3	C 4	T	1.7	158	.7
16..	3.1	C 4	T	1.2	C 4	T	1.9	250	1.3
17..	2.8	C 4	T	1.4	C 4	T	1.9	100	.5
18..	2.7	C 4	T	1.4	C 4	T	2.0	C 16	.1
19..	3.0	C 4	T	1.1	C 4	T	1.7	C 16	.1
20..	2.8	C 4	T	1.0	C 4	T	1.7	C 16	.1
21..	2.8	C 4	T	1.0	C 4	T	1.4	C 16	.1
22..	2.7	C 4	T	1.4	C 4	T	3.5	82	.8
23..	2.8	C 4	T	1.3	C 4	T	3.0	34	.3
24..	2.6	C 4	T	1.2	C 4	T	3.0	69	.6
25..	2.2	C 4	T	1.3	C 4	T	2.1	110	.6
26..	2.1	C 4	T	1.0	C 4	T	2.4	136	.9
27..	2.2	C 4	T	1.0	C 4	T	2.3	180	1.1
28..	2.3	C 4	T	1.1	C 4	T	2.3	80	.5
29..	2.3	C 4	T	1.1	C 4	T	2.0	24	.1
30..	2.3	C 4	T	.9	C 4	T	1.7	--	.1
31..	2.3	C 4	T	1.0	C 4	T	--	--	--
Total	108.9	--	1.4	44.1	--	0.5	54.8	--	8.7

Total discharge for year (cfs-days)..... 2275.9
Total load for year (tons)..... 53.1

T Less than 0.05 ton.
C Composite period.

6-6435. NORTH PLATTE RIVER NEAR GOOSE EGG, WYO.

LOCATION.--At gaging station, 0.3 mile downstream from Cottonwood Creek, 2.5 miles downstream from Poison Spring Creek, 4 miles southwest of Goose Egg, Natrona County, and 13 miles southwest of Casper.
DRAINAGE AREA (revised).--15,398 square miles, of wbicb 4,654 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to August 1951, October 1957 to April 1960 (discontinued).
Water temperatures: June 1950 to September 1952, April to September 1953, August 1956 to April 1960 (discontinued).
Sediment records: June 1950 to September 1953, August 1956 to September 1958.
EXTREMES, October 1959 to April 1960.--Dissolved solids: Maximum, 438 ppm Mar. 1-27; minimum, 353 ppm Oct. 21-31.
Hardness: Maximum, 235 ppm Mar. 1-27; minimum, 200 ppm Oct. 21-31, Mar. 28 to Apr. 15.
Specific conductance: Maximum daily, 667 micromhos Mar. 22; minimum daily, 480 micromhos Oct. 26.
Water temperatures: Maximum, 58°F Oct. 4; minimum, freezing point on many days during November to March.
EXTREMES, 1950-53, 1956-60.--Dissolved solids (1957-60): Maximum, 1,710 ppm Jan. 1, 1958; minimum, 269 ppm June 1-15, 1958.
Hardness (1957-60): Maximum, 740 ppm Jan. 1, 1958; minimum, 156 ppm June 1-15, 1958.
Specific conductance (1957-60): Maximum daily, 2,030 micromhos Nov. 22, 1957; minimum daily, 257 micromhos Apr. 2, 1959.
Water temperatures: Maximum (1953, 1957-60), 77°F June 11, 1953; minimum (1950-52, 1956-60), freezing point on many days during winter months.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples availahle in district office at Worland, Wyo. Records of discharge for water year October 1959 to September 1960 given in WSP 1710.

Chemical analyses, in parts per million, October 1959 to April 1960

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, 1959.	771	11	0.03	58	19	40	3.2	150	0	163	10	0.7	1.2	0.07	394	0.54	820	221	98	1.2	597	7.2	5
Oct. 15-20.....	1,014	12	.02	55	17	35	3.0	148	0	149	9.2	.7	1.2	.07	367	.50	1,000	207	86	1.1	556	7.2	6
Oct. 21-31.....	1,375	12	.01	53	17	34	3.0	145	0	139	9.1	.3	.9	.06	353	.48	1,310	200	81	1.0	537	7.2	8
Nov. 1-10.....	1,407	11	.01	53	17	36	2.9	152	0	141	9.3	.3	.7	.07	359	.49	1,360	201	76	1.1	554	7.7	8
Nov. 11-20.....	1,201	11	.01	54	17	36	3.0	153	0	146	9.8	.3	1.0	.07	363	.49	1,180	203	78	1.1	550	7.7	10
Nov. 21-30.....	1,011	11	.01	54	17	36	2.9	154	0	149	9.4	.3	.5	.08	368	.50	1,000	205	79	1.1	555	7.8	9
Dec. 1-9.....	812	11	.01	56	22	37	3.1	154	0	158	10	.4	.7	.08	374	.51	820	232	106	1.1	572	7.6	7
Dec. 10.....	797	--	--	56	17	--	--	156	0	155	9.0	--	.1	--	--	--	--	210	82	--	560	7.8	--
Dec. 11-22.....	802	11	.01	55	18	36	3.1	156	0	152	11	.3	.6	.06	387	.50	795	212	84	1.1	562	7.6	7
Dec. 23-26.....	798	11	.01	56	17	36	3.9	154	0	153	10	.4	1.0	.06	371	.50	799	210	84	1.1	562	7.7	6
Dec. 27-31.....	787	12	.01	54	18	36	2.7	152	0	149	9.2	.3	1.2	.08	371	.50	788	210	85	1.1	560	7.5	6
Jan. 1-31, 1960.	812	12	.00	54	18	36	3.3	150	0	149	8.8	.4	1.0	.07	368	.50	807	207	84	1.1	552	7.8	6
Feb. 1-10.....	842	12	.00	57	16	38	1.8	151	0	154	10	.3	1.0	.09	379	.52	862	208	84	1.1	573	7.5	8
Feb. 11-20.....	841	12	.00	56	18	38	1.8	153	0	154	10	.4	.6	.07	381	.52	865	213	86	1.1	568	7.4	7
Feb. 21-29.....	541	12	.00	58	17	39	2.1	154	0	163	11	.4	1.0	.06	392	.53	544	216	90	1.2	584	7.6	7
Mar. 1-27.....	550	12	.04	62	20	46	3.4	156	0	183	11	.4	1.1	.07	438	.60	650	235	107	1.3	644	7.4	14
Mar. 28-Apr. 15.	986	11	.04	52	17	34	3.0	147	0	138	9.4	.3	.6	.07	361	.49	961	200	79	1.0	537	7.2	8

PLATTE RIVER BASIN--Continued

6-6435. NORTH PLATTE RIVER NEAR GOOSE EGG, WYO.--Continued

Temperature (°F) of water, October 1959 to April 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	
October	47	50	54	58	51	54	40	48	49	49	51	52	51	54	52	46	47	51	51	50	48	50	49	51	50	46	--	46	43	40	46	49
November	47	48	47	--	--	41	44	44	45	38	40	--	--	37	34	32	38	39	37	38	39	39	39	41	--	34	33	36	38	38	--	39
December	37	37	37	32	32	34	35	33	35	34	35	34	33	32	35	35	32	35	34	34	34	33	33	35	38	33	32	32	32	32	32	34
January	32	32	--	--	--	--	--	--	32	32	32	33	32	33	32	32	--	--	--	--	--	--	--	--	--	--	--	--	--	--	34	--
February	34	35	33	32	32	32	34	36	32	34	34	32	36	34	34	32	32	32	32	32	34	32	32	32	--	--	--	--	--	--	--	33
March	--	--	--	--	--	--	--	--	--	32	34	34	38	34	36	34	38	39	44	46	47	46	44	48	--	--	51	45	43	43	40	--
April	39	--	43	43	44	42	42	43	44	44	44	44	44	44	42	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
May	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
June	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

PLATTE RIVER BASIN--Continued

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 1960.
EXTREMES, 1959-60.--Sediment concentrations: Maximum daily, 4,700 ppm Mar. 24; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 1,400 tons Mar. 24; minimum daily, 0 tons on many days.
EXTREMES, 1956-60.--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.--Maximum observed sediment concentration during water year, 6,860 ppm Mar. 26. Records of discharge for water year October 1959 to September 1960 given in WSP 1710. No flow during periods October to December and July to September; record is omitted.

Suspended sediment, water year October 1959 to September 1960

Day	JANUARY			FEBRUARY			MARCH			
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)		Tons per day
1							0	--		0
2							0	--		0
3							0	--		0
4							0	--		0
5							0	--		0
6							0	--		0
7							0	--		0
8							0	--		0
9							0	--		0
10							0	--		0
11							0	--		0
12							0	--		0
13							0	--		0
14							0	--		0
15							0	--		0
16							0	--		0
17							0	--		0
18							0	--		0
19							0	--		0
20							0	--		0
21							.2	--	E	.4
22							2.9	--	E	18
23							78	3900	S	1100
24							114	4700		1400
25							77	3900		810
26							54	4460	S	710
27							36	2500		240
28							22	1450		86
29							8.2	757	S	18
30							2.8	402		3.0
31							3.0	465	S	5.4
Total	0		0	0		0	398.1	--		4390.8

E Estimated.
S Computed by subdividing day.

PLATTE RIVER BASIN--Continued

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

Suspended sediment, water year October 1959 to September 1960--Continued

Day	APRIL			MAY			JUNE		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	1.2	122	0.4	0.3	53	T	0.2	7	T
2	.8	88	.2	.3	22	T	.2	4	T
3	.5	60	.1	.3	14	T	.2	5	T
4	.4	68	.1	.2	18	T	.2	3	T
5	.4	120	.1	.4	51	0.1	.1	5	T
6	.4	170	.2	.5	53	.1	.2	7	T
7	.4	115	.1	5.0	610	8.2	.2	7	T
8	.4	125	.1	.5	265	.4	.1	3	T
9	.4	82	.1	.4	125	.1	.1	2	T
10	.4	160	.2	.3	50	T	.1	3	T
11	.3	50	T	.2	28	T	.1	3	T
12	.3	45	T	.2	25	T	.1	48	T
13	.4	190	.2	.3	28	T	0	--	0
14	.4	52	.1	.3	18	T	0	--	0
15	.3	74	.1	.4	26	T	0	--	0
16	.3	68	.1	.5	105	.1	0	--	0
17	.3	87	.1	2.2	410	2.4	0	--	0
18	.3	28	T	1.8	110	.5	0	--	0
19	.3	40	T	2.0	-- E	.5	0	--	0
20	.3	30	T	.9	-- E	.2	0	--	0
21	.3	5	T	.8	-- E	.1	0	--	0
22	.3	5	T	.5	-- E	.1	0	--	0
23	.3	7	T	.4	35	T	0	--	0
24	.3	27	T	.3	23	T	0	--	0
25	.3	83	.1	.3	14	T	0	--	0
26	.3	59	.1	.3	10	T	0	--	0
27	.3	41	T	.2	12	T	0	--	0
28	.3	42	T	.2	17	T	0	--	0
29	.3	66	.1	.2	11	T	0	--	0
30	.3	43	T	.2	12	T	0	--	0
31	--	--	--	.2	16	T	--	--	--
Total	11.5	--	2.8	20.6	--	13.1	1.8	--	T

Total discharge for year (cfs days)..... 432.0
Total load for year (tons)..... 4406.7

E Estimated
T Less than 0.05 ton.

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

Particle-size analyses of suspended sediment, water year October 1959 to September 1960
(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
Mar. 23, 1960.....	1605	--		83	3870		56	64	76	90	96	99	100	--	--			VPWC
Mar. 24.....	1700	--		121	5340		49	59	70	86	93	99	100	--	--			VPWC
Mar. 25.....	1450	57		45	2970		55	64	74	84	92	98	99	100	--			VPWC
Mar. 25.....	1615	55		60	4330		47	58	70	80	88	97	98	99	100			VPWC
Mar. 25.....	1615	55		60	4330		18	34	54	73	88	97	98	99	100			VPN
Mar. 26.....	1730	54		64	6860		39	46	56	68	81	92	95	97	98	100		VPWC
Mar. 27.....	0845	39		34	2250		54	59	71	82	91	98	99	100	--			VPWC
Mar. 28.....	1520	54		15	1140		56	69	81	90	96	99	100	--	--			VPWC
Mar. 28.....	1640	57		16	1120		61	69	80	88	95	--	--	--	--			PWC
Mar. 29.....	1345	--		5.8	732		70	81	89	95	98	--	--	--	--			PWC

Particle-size analyses of bed material, water year October 1959 to September 1960
(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: 0.062	0.125	0.250	0.500	1.000	2.000	4.000	8.000	16.00	32.00	64.00	Method of analysis
Mar. 25, 1960.....	1450		8	45			--	0	2	23	61	83	97	100	--			SV
Mar. 25.....	1615		13	60			--	0	3	23	57	78	94	99	100			SV
Mar. 26.....	1730		11	64			0	1	4	24	57	76	93	99	100			SV
Mar. 27.....	1145		9	22			0	1	2	21	58	82	97	100	--			SV
Mar. 28.....	1520		9	15			3	4	5	21	49	67	86	96	100			SV
Mar. 29.....	1345		5	5.8			1	1	2	18	53	76	93	100	--			SV
May 17.....	1135		3	3.2			1	1	3	17	58	78	96	100	--			SV

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 1960.
EXTREMES, 1959-60.--Sediment concentrations: Maximum daily, 11,800 ppm Mar. 23; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 18,500 tons Mar. 24; minimum daily, 0 tons on many days.
EXTREMES, 1956-60.--Sediment concentrations: Maximum daily, 15,000 ppm Aug. 1, 1956; minimum daily, no flow on many days each year.
Sediment loads: Maximum daily, 43,000 tons July 31, 1956; minimum daily, 0 tons on many days each year.
REMARKS.--Maximum observed sediment concentration during water year, 19,800 ppm Mar. 24. Records of discharge for water year October 1959 to September 1960 given in WSP 1710. Flow affected by ice Dec. 16-27, Jan. 1 to Mar. 20. No flow during period July to September; record is omitted.

Suspended sediment, water year October 1959 to September 1960
/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	0.1		T
2				0		0	.1		T
3				0		0	.1		T
4				0		0	.1		T
5				0		0	.1		T
6				0		0	.1		T
7				0		0	.1		T
8				0		0	.1		T
9				0		0	.1		T
10				0		0	.1		T
11				0		0	.1		T
12				0		0	.2		T
13				0		0	.5		T
14				0		0	.2		T
15				0		0	.1		T
16				0		0	C .1		T
17				0		0	C .1		T
18				0		0	C .1		T
19				0		0	C .1		T
20				0		0	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 .2		T
25				0		0	C .2		T
26				0		0	C .2		T
27				0		0	C .2		T
28				0		0	.1		T
29				0		0	.1		T
30				.1		T	.1		T
31				--		--	.3		T
Total	0		0	0.1		T	4.3		2

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 1959 to September 1960--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 0.9		1		C 0.2	--	T	
2	C .2		T		C .9		1		C .2	--	T	
3	C .2		T		C .9		1		C .2	--	T	
4	C .2		T		C .9		1		C .2	--	T	
5	C .2		T		C .9		1		C .2	--	T	
6	C .2		T		C .9		1		1.5	--	6	
7	C .2		T		C .9		1		2.0	--	6	
8	C .2		T		C .9	349	1		4.0	--	6	
9	C .2		T		C .9		1		6.0	--	6	
10	C .2		T		C .9		1		5.5	--	6	
11	C .2		T		C .3		T		5.5	--	6	
12	C .2		T		C .3		T		5.0	--	6	
13	C .2		T		C .3		T		5.0	--	6	
14	C .2		T		C .3		T		5.5	--	6	
15	C .2		T		C .3		T		4.5	--	6	
16	C .5		T		C .3		T		4.5	--	6	
17	C .5		T		C .3		T		5.0	--	6	
18	C .5		T		C .3		T		6.0	--	6	
19	C .5		T		C .3		T		20	--	110	
20	C .5		T		C .3		T		70	--	380	
21	C .5		T		C .3		T		139	3150	1180	
22	C .5		T		C .3		T		182	5800	2850	
23	C .5		T		C .3		T		322	11600	10100	
24	C .5		T		C .3		T		568	10000	S 16500	
25	C .5		T		C .3		T		249	9170	6200	
26	C .8		T		C .3		T		311	8490	S 8000	
27	C .8		T		C .3		T		150	6100	2470	
28	C .8		T		C .3		T		139	4050	1520	
29	C .8		T		C .3		T		67	2600	470	
30	C .8		T		--		--		33	2100	187	
31	C .8		T		--		--		52	--	280	
Total	12.8		4		14.7		12		2363.0	--	50325	

	APRIL			MAY			JUNE		
1	50	--	260	2.6	--	1	0.6	--	T
2	47	--	260	1.8	--	1	.5	--	T
3	28	--	150	2.6	--	1	.4	20	T
4	20	--	80	2.6	--	1	.3	--	T
5	17	--	50	4.2	--	1	.3	--	T
6	13	--	26	11	780	23	.2	--	T
7	13	--	20	17	1070	49	.2	73	T
8	11	--	12	6.6	--	3	.1	--	T
9	11	--	10	7.4	--	3	0	--	0
10	11	--	8	5.0	--	3	0	--	0
11	9.0	--	6	5.0	200	3	.1	--	T
12	6.6	--	4	5.0	--	3	.1	220	T
13	13	335	12	5.8	--	3	.1	--	T
14	7.4	195	4	5.8	--	3	0	--	0
15	7.4	195	4	9.0	--	7	0	--	0
16	6.6	235	4	24	650	42	0	--	0
17	7.4	240	5	26	760	53	0	--	0
18	5.8	280	4	17	180	8	0	--	0
19	6.6	220	4	20	120	6	0	--	0
20	5.0	210	3	13	300	10	0	--	0
21	5.8	--	3	4.2	110	1	0	--	0
22	6.6	--	3	5.0	120	2	0	--	0
23	4.2	--	3	3.4	--	1	0	--	0
24	5.0	--	3	1.8	--	T	0	--	0
25	5.0	--	3	1.0	--	T	0	--	0
26	5.0	--	3	1.0	--	T	0	--	0
27	6.6	--	3	.9	--	T	0	--	0
28	6.6	--	3	.8	--	T	0	--	0
29	6.6	--	3	.8	--	T	0	--	0
30	5.0	--	3	.7	120	T	0	--	0
31	--	--	--	.6	--	T	--	--	--
Total	352.2	--	956	211.6	--	231	2.9	--	1

Total discharge for year (cfs-days)..... 2961.6
Total load for year (tons)..... 51531

S Computed by subdividing day.
T Less than 0.50 ton.
C Composite period.

PLATTE RIVER BASIN--Continued

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

Particle-size analyses of suspended sediment, water year October 1959 to September 1960
(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, 1960.....	1225	32		274	3170		20	23	28	31	34	41	51	73	96	100		VPWC
Mar. 22.....	1025	--		182	3140		29	32	38	44	50	56	64	76	90	100		VPWC
Mar. 23.....	1303	--		215	8840		21	24	29	34	42	51	60	79	95	100		VPWC
Mar. 24.....	1245	--		322	6510		29	33	39	45	54	66	75	86	95	100		VPWC
Mar. 24.....	1735	38		1060	19800		17	21	24	28	34	40	44	58	87	99	100	VPWC
Mar. 25.....	1025	47		50	5680		30	35	41	48	56	65	71	81	95	100		VPWC
Mar. 25.....	1815	--		366	10700		26	30	35	38	50	61	68	84	97	100		VPWC
Mar. 25.....	1815	--		366	10700		13	21	28	37	48	61	68	84	97	100		VPN
Mar. 26.....	2100	--		476	11500		26	30	35	42	51	59	65	76	94	100		VPWC
Mar. 27.....	1515	60		122	3500		37	41	48	55	64	77	84	93	99	100		VPWC
Mar. 28.....	1435	56		79	2660		34	39	45	52	61	72	80	92	99	100		VPWC
Mar. 29.....	1705	47		59	1260		46	50	58	64	73	84	92	99	100	--		VPWC

Particle-size analyses of bed material, water year October 1959 to September 1960
(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	
Mar. 25, 1960.....	1150		12	223				0	7	38	73	89	98	100				SV
Mar. 25.....	1815		8	366				0	2	20	62	85	96	100				SV
Mar. 26.....	2100		7	476				0	2	30	73	92	99	100				SV
Mar. 27.....	1515		7	122				0	5	43	76	90	99	100				SV
Mar. 28.....	1435		21	79				0	6	45	80	92	99	100				SV
Apr. 13.....	1505		13	11				0	9	45	75	89	98	99	100			SV
Apr. 18.....	0855		6	6.6				0	10	44	77	90	98	100				SV
Apr. 20.....	1040		6	3.4				0	9	42	76	90	98	100				SV
May 7.....	0920		5	31			0	2	12	55	84	94	99	100				SV
May 17.....	0925		6	15				0	9	42	74	88	98	100				SV
May 22.....	1225		6	5.0				0	10	46	76	90	98	100				SV

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

LOCATION.--At gaging station at bridge on State Highway 51, 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 (revised).--23,138 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1945 to September 1960.
Water temperatures: October 1945 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 1,620 ppm Jan. 1-22; minimum, 1,140 ppm Mar. 30 to Apr. 8, May 21-29.
Hardness: Maximum, 778 ppm Jan. 1-22; minimum, 543 ppm May 21-29.
Specific conductance: Maximum daily, 2,130 micromhos Jan. 6; minimum daily, 1,290 micromhos Apr. 1, 2.
Water temperatures: Maximum, 86°F Aug. 27; minimum, freezing point on several days during January to March.
EXTREMES, 1945-60.--Dissolved solids: Maximum, 1,860 ppm Apr. 13, 1955; minimum, 429 ppm June 16, 1956.
Hardness: Maximum, 846 ppm Feb. 20, 1955; minimum, 173 ppm Mar. 1-12, 1947.
Specific conductance: Maximum daily, 2,350 micromhos Apr. 13, 1955; minimum daily, 617 micromhos Aug. 19, 1953.
Water temperatures: Maximum (1946-49, 1950-60), 93°F July 28, Aug. 1, 1953; minimum, freezing point on many days during winter montbs.
REMARKS.--Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Records of discharge for water year October 1959 to September 1960 given in WSP 1710.

Chemical analyses, in parts per million, water year October 1959 to September 1960

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, 1959.	149	--	--	--	--	175	--	282	0	--	--	--	--	--	1,520	2.07	611	716	485	2.8	1,910	7.4	--
Nov. 1-13.....	120	--	--	--	--	174	--	298	0	--	--	--	--	--	1,520	2.07	492	725	481	2.8	1,920	7.3	--
Nov. 14-30.....	247	--	--	--	--	186	--	330	0	--	--	--	--	--	1,600	2.18	1,070	764	493	2.9	2,010	7.3	--
Dec. 1-31.....	281	30	0.01	211	60	196	18	344	0	794	68	0.7	2.0	0.28	1,590	2.16	1,210	772	490	3.1	1,990	7.7	4
Jan. 1-22, 1960.	236	--	--	--	--	169	--	374	0	--	--	--	--	--	1,620	2.20	1,030	778	471	2.6	2,010	7.1	--
Jan. 23-Feb. 5..	396	--	--	--	--	169	--	318	0	--	--	--	--	--	1,470	2.00	1,570	712	451	2.8	1,650	7.4	--
Feb. 6-Mar. 5...	408	--	--	--	--	182	--	314	0	--	--	--	--	--	1,560	2.12	1,720	746	489	2.9	1,950	7.5	--
Mar. 6-11.....	963	--	--	--	--	135	--	280	0	--	--	--	--	--	1,170	1.59	3,040	579	349	2.4	1,530	7.5	--
Mar. 12-29.....	816	--	--	--	--	167	--	305	0	--	--	--	--	--	1,410	1.92	3,110	676	426	2.8	1,790	7.7	--
Mar. 30-Apr. 8..	1,024	19	.01	143	47	136	9.6	254	0	549	49	.9	7.7	.21	1,140	1.55	3,150	551	343	2.5	1,490	7.4	7
Apr. 9-30.....	432	--	--	--	--	169	--	291	0	--	--	--	--	--	1,390	1.89	1,620	664	425	2.9	1,770	7.9	--
May 1-20.....	193	--	--	--	--	174	--	263	0	--	--	--	--	--	1,360	1.85	709	634	418	3.0	1,750	7.7	--
May 21-29.....	573	--	--	--	--	140	--	245	0	--	--	--	--	--	1,140	1.55	1,760	543	342	2.6	1,500	7.5	--
May 30-June 16..	325	--	--	--	--	179	--	273	0	--	--	--	--	--	1,450	1.97	1,270	660	436	3.0	1,820	7.6	--
June 17-23.....	320	22	.01	151	49	147	13	255	0	601	52	.8	3.3	.24	1,230	1.67	1,060	578	369	2.7	1,590	7.7	15
June 24-30.....	122	--	.01	--	--	171	--	270	0	--	--	--	--	--	1,410	1.92	464	660	439	2.9	1,800	7.1	--
July 1-31.....	41.9	--	.01	--	--	176	--	252	0	--	--	--	--	--	1,430	1.94	162	667	460	3.0	1,810	7.2	--

PLATTE RIVER BASIN--Continued

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

Chemical analyses, in parts per million, water year October 1959 to September 1960--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 160°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
Aug. 1-31, 1960.	16.5	--	--	--	--	167	--	201	0	--	--	--	--	--	1,410	1.92	62.6	630	465	2.9	1,790	7.3	--
Sept. 1-30.....	16.1	30	0.00	183	55	170	18	241	0	741	69	0.6	1.5	0.23	1,440	1.96	62.6	681	483	2.8	1,820	7.5	3
Weighted average a.....	279	--	--	--	--	167	--	296	0	--	--	--	--	--	1,410	1.92	1,060	675	432	2.8	1,790	--	--

a Represents 100 percent of runoff for water year.

Temperature (°F) of water, water year October 1959 to September 1960

Month	Day 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	Average
October.....	51	49	56	58	61	64	57	55	56	52	54	56	57	61	62	61	59	58	--	56	54	57	55	58	54	56	52	53	46	39	51	55
November.....	42	56	55	45	38	40	42	52	47	51	49	39	35	42	44	34	38	40	44	43	41	40	45	45	42	35	33	36	40	42	--	42
December.....	42	45	48	39	36	43	44	44	42	43	43	42	39	40	42	41	43	43	42	41	40	38	34	38	--	36	35	34	34	34	35	40
January.....	--	33	33	33	33	36	38	39	37	38	38	39	--	33	34	33	33	33	32	32	--	--	--	--	--	33	34	34	34	35	35	--
February.....	34	34	35	37	38	40	--	41	40	36	37	38	41	39	40	37	38	36	33	35	33	32	32	32	--	--	--	--	--	--	--	--
March.....	--	--	--	--	--	--	--	33	33	33	37	32	33	37	41	40	43	45	46	50	56	53	54	54	54	54	49	55	56	55	52	--
April.....	48	47	52	55	58	61	60	58	59	56	61	59	60	61	56	54	48	50	57	63	65	65	68	63	61	58	48	46	44	50	--	56
May.....	58	57	64	59	62	64	50	60	64	70	69	73	71	73	71	73	--	--	54	67	71	74	71	74	69	73	73	--	73	--	73	67
June.....	74	73	72	80	65	61	61	66	75	68	--	69	71	78	66	63	76	73	78	76	75	67	66	73	--	85	--	--	--	--	--	--
July.....	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	71	81	81	--
August.....	--	85	65	85	--	83	84	70	--	84	82	81	82	81	--	74	72	80	78	77	80	--	75	82	80	81	86	85	81	80	83	80
September.....	83	84	84	82	76	80	77	62	74	76	71	74	66	71	67	76	62	73	--	75	68	54	69	67	62	60	69	62	63	66	--	71

6-7857. 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 1960.
Water temperatures: March 1951 to September 1980.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 738 ppm June 22-30; minimum, 432 ppm Oct. 1-31.
Hardness: Maximum, 341 ppm June 1-20; minimum, 189 ppm Sept. 1-30.
Specific conductance: Maximum daily, 1,210 micromhos June 2; minimum daily, 555 micromhos Feb. 14.
Water temperatures: Maximum, 81°F June 20, July 22, Aug. 2, 6; minimum, 33°F on many days during November to March.
EXTREMES, 1951-60.--Dissolved solids: Maximum, 1,010 ppm Mar. 1-4, 1958; minimum, 388 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 1959 to September 1980

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, 1959.	1,173	--	0.01	--	--	62	--	211	0	--	--	--	--	--	432	0.59	1,370	192	19	1.9	654	7.3	--
Nov. 1-30.....	1,108	--	--	--	--	64	--	211	0	--	--	--	--	--	489	.84	1,400	218	43	1.9	704	7.3	--
Dec. 1-21.....	1,051	29	.00	63	15	83	10	214	0	164	20	0.4	1.5	0.12	480	.65	1,360	220	45	1.8	709	7.6	5
Dec. 22-Jan. 1, 1960.....	1,014	--	--	--	--	68	--	224	0	--	--	--	--	--	541	.74	1,480	248	64	1.9	784	7.4	--
Jan. 2-5.....	781	--	--	--	--	66	--	196	0	--	--	--	--	--	523	.71	1,100	238	77	1.9	759	7.7	--
Jan. 6-14.....	1,117	--	--	--	--	72	--	215	0	--	--	--	--	--	562	.76	1,890	254	78	2.0	814	7.5	--
Jan. 15-24.....	1,127	--	--	--	--	84	--	243	0	--	--	--	--	--	845	.88	1,960	294	95	2.1	933	7.5	--
Jan. 25-31.....	1,326	--	--	--	--	80	--	241	0	--	--	--	--	--	812	.83	2,190	283	85	2.1	889	7.6	--
Feb. 1-10.....	1,205	--	--	--	--	59	--	217	0	--	--	--	--	--	489	.87	1,590	231	53	1.7	716	7.6	--
Feb. 11-29.....	1,025	--	--	--	--	73	--	236	0	--	--	--	--	--	597	.81	1,850	278	82	1.9	854	7.6	--
Mar. 1-20.....	1,175	--	--	--	--	79	--	238	0	--	--	--	--	--	638	.87	2,020	304	109	2.0	909	7.6	--
Mar. 21-23.....	1,740	23	.05	83	27	77	11	216	0	275	28	.5	3.0	.18	650	.88	3,050	320	143	1.9	933	7.6	15
Mar. 24-31.....	1,698	--	--	--	--	75	--	230	0	--	--	--	--	--	822	.85	2,850	304	115	1.9	892	7.5	--
Apr. 1-30.....	1,399	--	--	--	--	75	--	219	0	--	--	--	--	--	618	.84	2,330	298	118	1.9	890	7.6	--
May 1-31.....	1,170	--	--	--	--	79	--	203	0	--	--	--	--	--	654	.89	2,070	312	148	2.0	935	7.7	--
June 1-20.....	1,230	--	--	--	--	95	--	195	0	--	--	--	--	--	734	1.00	2,440	341	181	2.2	1,040	7.7	--
June 21.....	1,080	26	1.2	70	21	71	9.6	186	0	225	24	.5	.2	.11	558	.76	1,830	260	107	1.9	806	7.6	20
June 22-30.....	1,071	--	--	--	--	98	--	193	0	--	--	--	--	--	738	1.00	2,130	340	182	2.3	1,040	7.7	--
July 1-19.....	1,287	--	.01	--	--	82	--	199	0	--	--	--	--	--	613	.83	2,130	271	108	2.2	898	7.2	--

PLATTE RIVER BASIN--Continued

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

Chemical analyses, in parts per million, water year October 1959 to September 1960--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 20-31, 1960	2,005	--	0.01	--	--	80	--	210	0	--	--	--	--	--	523	0.71	2,830	218	46	2.3	797	7.2	--
Aug. 1-12.....	2,069	--	--	--	--	75	--	218	0	--	--	--	--	--	472	.64	2,640	198	19	2.3	723	7.1	--
Aug. 13-31.....	2,000	--	--	--	--	73	--	212	0	--	--	--	--	--	454	.62	2,450	197	23	2.3	702	7.3	--
Sept. 1-30.....	1,518	15	.01	50	16	73	10	218	0	157	20	0.4	1.2	0.16	450	.61	1,840	189	10	2.3	692	7.5	4
Weighted average a.....	1,314	--	--	--	--	74	--	215	0	--	--	--	--	--	551	0.75	1,950	251	75	2.0	810	--	--

a Represents 100 percent of runoff for water year.

Temperature (°F) of water, water year October 1959 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	
October.....	50	48	55	50	60	54	61	57	56	53	55	56	56	52	59	53	56	50	57	52	56	51	55	50	57	50	49	47	45	42	46	53
November.....	42	50	47	48	34	36	40	44	43	49	42	37	33	33	33	33	33	34	34	38	40	44	39	42	40	38	33	45	42	46	--	40
December.....	41	44	44	45	40	45	42	44	37	41	38	43	40	41	33	39	37	40	37	39	34	36	33	37	35	38	33	34	33	34	33	38
January.....	34	33	33	33	33	33	34	33	34	33	34	35	35	33	33	33	33	33	33	33	33	33	33	33	33	33	34	33	34	34	34	33
February.....	33	34	34	34	36	34	36	35	35	33	34	34	34	34	35	34	35	33	33	33	33	33	33	33	33	33	33	33	33	--	--	34
March.....	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	34	35	36	36	39	34	42	38	44	42	51	46	45	41	44	37
April.....	42	49	45	48	44	52	48	54	48	55	50	54	49	58	53	55	52	57	54	60	53	67	59	57	52	58	52	53	48	46	--	52
May.....	58	55	56	52	50	48	52	55	56	51	56	54	67	59	65	60	64	58	54	50	56	60	71	63	71	61	72	61	71	62	73	59
June.....	66	72	67	73	66	70	62	64	62	70	63	69	63	74	67	69	66	78	72	81	68	77	68	78	65	78	66	73	70	72	--	70
July.....	68	77	72	74	69	74	68	75	69	76	72	76	71	76	70	79	71	80	71	78	73	81	74	79	74	80	73	79	75	78	72	74
August.....	74	81	74	80	77	81	73	75	71	74	75	70	77	69	71	79	68	69	64	74	70	76	71	74	70	70	68	69	66	76	72	73
September.....	73	71	76	70	77	70	76	70	72	64	71	62	69	65	70	65	64	60	69	57	64	56	64	57	65	60	66	59	62	56	--	66

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 1960.
Water temperatures: March 1951 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 542 ppm May 1-31; minimum, 270 ppm June 21.
Hardness: Maximum, 265 ppm May 1-31; minimum, 133 ppm June 21.
Specific conductance: Maximum daily, 1,030 micromhos June 11 (chan. 1); minimum daily, 327 micromhos June 21 (chan. 4).
Water temperatures: Maximum, 84°F Sept. 3, 4 (chan. 1); minimum, freezing point on many days during November to March.
EXTREMES, 1951-60.--Dissolved solids: Maximum, 696 ppm Feb. 19-22, 1953; minimum, 270 ppm June 21, 1960.
Hardness: Maximum, 404 ppm Mar. 1-4, 1956; 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. Records of discharge for water year October 1959 to September 1960 given in WSP 1710.

Chemical analyses, in parts per million, water year October 1959 to September 1960

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 160°C): Parts per million	Dissolved solids (residue at 160°C): Tons per acre-foot	Dissolved solids (residue at 160°C): 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, 1959.	166	--	0.02	--	--	53	--	219	0	--	--	--	--	--	437	0.59	196	212	32	1.6	650	7.3	--
Nov. 1-30.....	234	--	--	--	--	51	--	220	0	--	--	--	--	--	444	.60	281	214	34	1.5	655	7.6	--
Dec. 1-21.....	226	34	.01	67	13	52	9.2	221	0	141	16	0.4	2.3	0.09	454	.62	277	222	41	1.5	664	7.7	5
Dec. 22-Jan. 1, 1960.....	203	--	--	--	--	48	--	224	0	--	--	--	--	--	448	.61	246	219	35	1.4	653	7.6	--
Jan. 2-5.....	293	--	--	--	--	59	--	240	0	--	--	--	--	--	508	.69	402	245	48	1.6	723	7.6	--
Jan. 6-14.....	271	--	--	--	--	42	--	213	0	--	--	--	--	--	409	.56	299	206	31	1.3	599	7.5	--
Jan. 15-24.....	366	--	--	--	--	55	--	228	0	--	--	--	--	--	480	.65	474	230	43	1.6	689	7.4	--
Jan. 25-31.....	391	--	--	--	--	43	--	210	0	--	--	--	--	--	406	.55	429	201	29	1.3	593	7.6	--
Feb. 1-10.....	429	--	--	--	--	42	--	204	0	--	--	--	--	--	401	.55	464	200	33	1.3	586	7.4	--
Feb. 11-29.....	310	--	--	--	--	46	--	226	0	--	--	--	--	--	439	.60	367	221	36	1.3	638	7.5	--
Mar. 1-20.....	381	--	--	--	--	44	--	209	0	--	--	--	--	--	420	.57	432	207	36	1.3	612	7.6	--
Mar. 21-23.....	1,800	22	.05	51	15	38	9.0	170	0	121	15	.4	2.2	.10	370	.50	1,800	188	49	1.2	552	7.5	22
Mar. 24-31.....	634	--	--	--	--	47	--	211	0	--	--	--	--	--	431	.59	971	218	45	1.4	633	7.1	--
Apr. 1-30.....	292	--	--	--	--	58	--	224	0	--	--	--	--	--	514	.70	405	257	73	1.6	754	7.8	--
May 1-31.....	260	--	--	--	--	62	--	215	0	--	--	--	--	--	542	.74	380	265	89	1.7	786	7.8	--
June 1-20.....	195	--	--	--	--	56	--	208	0	--	--	--	--	--	506	.69	266	250	79	1.5	735	7.7	--
June 21.....	498	27	.03	38	9.2	25	9.8	144	0	68	6.6	.4	2.0	.10	270	.37	363	133	15	.9	401	7.7	43

PLATTE RIVER BASIN--Continued

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

Chemical analyses, in parts per million, water year October 1959 to September 1960--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 22-30, 1960	219	--	--	--	--	59	--	218	0	--	--	--	--	--	520	0.71	307	256	77	1.6	752	7.7	--
July 1-19.....	151	--	0.01	--	--	50	--	209	0	--	--	--	--	--	483	.66	197	236	65	1.4	697	7.2	--
July 20-31.....	905	--	.01	--	--	69	--	234	0	--	--	--	--	--	479	.85	1,170	209	17	2.1	713	7.1	--
Aug. 1-12.....	1,262	--	--	--	--	69	--	238	0	--	--	--	--	--	455	.62	1,550	195	0	2.1	885	7.4	--
Aug. 13-31.....	497	--	--	--	--	64	--	228	0	--	--	--	--	--	446	.61	598	195	8	2.0	671	7.1	--
Sept. 1-30.....	106	30	.01	58	14	60	11	224	0	144	18	0.5	0.9	0.12	451	.61	129	204	20	1.8	689	7.7	4
Weighted average a.....	338	--	--	--	--	56	--	220	0	--	--	--	--	--	457	0.62	417	217	37	1.7	673	--	--

Analyses of additional samples

Oct. 23, 1959:																							
Chan. 1.....	88		0.06			54		211	0	120	14							190	17	1.7	608	7.5	
Chan. 4.....	67		.04			50		240	0	137	18							246	49	1.4	897	7.5	

a Represents 100 percent of runoff for water year.

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

CHANNEL 1

Temperature (°F) of water, water year October 1959 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	
October	44	46	43	48	50	48	48	44	58	48	45	48	47	64	67	50	42	60	64	--	--	--	54	--	46	45	39	41	46	39	34	48
November	39	42	43	45	32	32	34	34	37	43	38	38	32	32	32	32	32	33	34	35	35	34	35	35	37	33	33	32	33	35	--	35
December	33	33	34	36	32	35	33	33	33	33	35	35	34	33	32	33	34	36	35	33	32	33	32	33	36	40	34	33	33	33	32	34
January	33	--	32	32	32	32	33	32	33	33	32	34	34	--	33	32	--	32	32	32	32	32	32	33	34	33	33	35	34	39	37	33
February	34	34	35	34	33	33	33	34	34	32	32	32	32	33	35	33	33	33	32	32	32	32	32	32	32	33	33	32	32	--	--	33
March	32	32	32	32	33	33	32	--	33	35	33	33	34	34	35	33	35	35	34	36	35	34	35	37	50	44	49	48	46	50	45	37
April	44	36	41	46	45	49	51	49	46	45	49	51	49	49	52	48	45	45	51	53	53	57	59	56	50	48	46	44	45	39	--	48
May	48	50	53	53	50	43	51	55	56	52	51	54	56	59	56	56	58	59	54	54	53	60	63	64	61	74	59	61	58	60	62	56
June	64	64	64	69	64	58	59	60	62	65	64	61	61	64	66	58	64	70	71	70	63	64	70	62	62	68	68	68	70	68	--	65
July	64	70	70	70	68	65	66	66	70	75	74	72	69	68	68	68	71	68	71	69	70	72	73	74	76	75	74	75	76	71	71	71
August	71	77	77	73	75	75	71	69	67	66	67	68	70	79	69	70	66	64	74	66	76	72	72	69	70	62	70	69	63	71	73	70
September	73	70	84	84	74	68	68	63	60	58	60	54	59	61	62	61	59	60	59	62	60	55	54	56	52	57	56	58	56	49	--	62

CHANNEL 4

Temperature (°F) of water, water year October 1959 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	
October	46	48	45	50	53	51	51	48	58	51	47	49	49	61	64	52	46	58	59	--	--	--	56	--	48	48	40	44	48	41	38	50
November	42	44	46	47	34	32	39	41	41	44	42	41	34	34	34	33	32	35	38	39	39	38	39	41	41	36	36	34	36	39	--	38
December	37	35	38	41	35	39	38	37	37	35	39	39	38	36	34	37	38	40	39	36	34	34	33	36	40	44	37	36	35	36	35	37
January	38	--	32	32	32	32	35	34	36	37	35	39	37	--	34	32	--	32	32	32	32	32	33	35	37	35	36	41	41	43	41	35
February	38	38	40	38	36	38	38	42	40	35	35	34	36	37	46	37	37	36	34	35	33	33	32	32	33	34	35	32	33	--	--	36
March	34	32	32	33	35	35	34	36	36	40	44	38	39	36	38	37	43	42	39	41	38	38	40	41	52	45	50	49	48	52	48	40
April	47	39	42	47	47	51	52	49	46	47	51	52	51	49	54	50	48	47	51	52	53	58	59	56	51	49	48	45	47	41	--	49
May	48	51	54	55	52	47	52	54	57	54	53	54	56	58	56	56	58	58	55	55	52	59	62	64	62	72	59	62	57	59	62	57
June	63	63	63	67	62	58	59	59	60	64	63	60	60	61	65	60	63	69	70	68	65	64	68	62	62	66	68	66	68	66	--	64
July	64	64	70	69	70	64	64	64	69	70	72	70	69	67	67	68	69	66	69	69	69	70	70	72	72	72	70	72	74	66	66	69
August	67	75	74	70	73	72	68	67	66	64	65	66	68	80	68	68	65	63	79	64	75	70	72	67	68	62	68	68	62	69	72	69
September	71	68	82	82	72	67	67	62	60	59	60	56	58	62	62	60	61	59	58	62	62	57	55	57	54	58	56	59	58	51	--	62

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 1960.
Water temperatures: November 1958 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 617 ppm July 1-31; minimum, 366 ppm Mar. 22-25.
Hardness: Maximum, 294 ppm July 1-31; minimum, 175 ppm Mar. 22-25.
Specific conductance: Maximum daily, 982 micromhos Aug. 7 (south chan.); minimum daily, 392 micromhos Mar. 22 (south chan.).
Water temperatures: Maximum, 98°F July 9 (north chan.); minimum, freezing point on many days during November to March.
EXTREMES, 1958-60.--Dissolved solids: Maximum, 650 ppm June 1-30, 1959; minimum, 366 ppm Mar. 22-25, 1960.
Hardness: Maximum, 304 ppm June 1-30, 1959; minimum, 175 ppm Mar. 22-25, 1960.
Specific conductance: Maximum daily, 1,070 micromhos July 9, 1959 (south chan.); minimum daily, 392 micromhos Mar. 22, 1960 (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 each year.
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. Records of discharge for water year October 1959 to September 1960 given in WSP 1710.

Chemical analyses, in parts per million, water year October 1959 to September 1960

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
															Parts per million	Tons per acre-foot	Tons per day	Calcium, Magnesium	Noncarbonate			
Oct. 1-31, 1959...	1193	22	0.01	57	18	67	12	220	0	164	20	0.6	1.4	0.12	473	0.64	1520	216	36	2.0	718	7.3
Nov. 1-30.....	1264	27	.01	63	17	62	12	226	0	161	20	.6	1.6	.11	483	.66	1650	227	42	1.8	718	7.5
Dec. 1-31.....	1188	28	.01	64	17	62	11	228	0	163	20	.6	1.5	.11	481	.65	1540	231	44	1.8	726	7.5
Jan. 1-31, 1960...	1204	30	.02	69	19	63	11	238	0	175	21	.6	1.8	.17	515	.70	1670	249	54	1.7	762	7.3
Feb. 1-29.....	1532	30	.02	72	20	66	11	231	0	186	21	.5	2.3	.17	531	.72	2200	260	71	1.8	779	7.3
Mar. 1-21.....	1339	30	.04	73	21	65	11	236	0	188	23	.4	2.1	.25	542	.74	1960	267	73	1.7	796	7.5
Mar. 22-25.....	5485	18	.10	48	13	38	10	155	0	123	15	.3	2.6	.05	366	.50	5420	175	48	1.2	545	7.1
Mar. 26-31.....	3768	27	.05	71	19	61	11	217	0	190	23	.3	1.7	.09	521	.71	5300	255	77	1.7	766	7.5
Apr. 1-30.....	1626	27	.00	75	20	64	11	220	0	204	23	.4	2.1	.12	548	.75	2410	270	90	1.7	804	7.3
May 1-31.....	1011	26	.00	74	21	67	12	216	0	208	23	.5	2.1	.12	554	.75	1510	270	93	1.8	813	7.3
June 1-15.....	457	24	.01	74	22	66	13	214	0	215	24	.5	2.0	.12	566	.77	698	274	99	1.7	827	7.7
June 16.....	2020	23	.07	53	15	38	24	168	0	127	15	.7	5.6	.11	396	.54	2160	192	54	1.2	584	7.7
June 17-30.....	1114	23	.00	76	24	71	13	213	0	232	25	.5	2.2	.12	589	.80	1770	287	112	1.8	860	7.8
July 1-31.....	371	23	.00	77	25	76	13	211	0	248	27	.5	2.2	.12	617	.84	618	294	121	1.9	893	7.5
Aug. 1-31.....	129	29	.00	77	19	74	14	229	0	221	25	.6	.8	.14	593	.81	207	271	83	2.0	861	7.5
Sept. 1-30.....	225	20	.08	56	20	72	15	211	0	187	23	.5	1.5	.15	509	.69	309	220	47	2.1	757	7.1
Weighted average a	1074	26	0.02	68	19	63	12	220	0	183	21	0.5	1.9	0.13	515	0.70	1490	248	68	1.7	761	--

a Represents 100 percent of runoff for water year.

6-7660. PLATTE RIVER NEAR OVERTON, NEBR.--Continued

NORTH CHANNEL

Temperature (°F) of water, water year October 1959 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	
October	53	51	62	56	60	56	63	50	61	51	60	52	59	55	63	53	52	55	61	51	61	54	53	50	57	48	52	44	51	43	48	54
November	42	53	49	45	34	37	38	43	40	47	41	37	32	34	33	--	34	36	35	41	36	43	39	40	39	33	34	34	32	41	--	39
December	35	40	37	38	34	38	36	40	35	39	37	43	34	37	34	40	38	36	34	40	34	34	34	34	38	48	34	35	34	41	36	37
January	34	33	33	34	33	34	34	35	35	34	35	36	36	34	33	34	--	34	32	33	34	34	34	34	34	34	34	34	34	34	34	34
February	34	35	35	33	34	37	35	45	39	33	34	38	34	34	33	42	35	36	33	32	33	32	33	34	33	34	34	34	33	--	--	35
March	33	34	32	32	33	32	34	34	34	33	34	33	34	34	33	33	34	35	38	42	40	37	39	38	38	41	42	40	40	42	48	36
April	40	43	40	53	43	56	41	57	41	48	53	58	53	62	56	54	49	60	58	--	61	69	67	71	59	67	51	46	48	56	--	54
May	68	59	66	57	59	51	63	61	69	61	--	63	70	63	66	60	66	64	58	58	75	76	81	75	76	67	80	63	76	76	71	67
June	80	76	79	77	68	71	64	62	84	73	70	73	75	74	79	76	80	78	86	78	82	72	78	76	83	73	72	75	76	73	--	75
July	83	79	79	70	87	75	79	71	98	92	92	78	89	82	84	80	81	77	96	80	90	83	93	85	89	86	89	79	94	72	86	84
August	72	93	77	86	80	72	70	84	69	87	73	88	71	85	73	81	69	81	69	88	75	85	74	85	68	80	77	70	66	90	79	78
September	87	76	85	77	87	80	80	67	72	67	68	60	78	62	73	73	67	70	82	65	71	58	65	--	71	60	70	62	69	62	--	71

SOUTH CHANNEL

Temperature (°F) of water, water year October 1959 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	
October	54	51	61	56	59	54	62	48	60	49	59	51	59	53	61	53	51	55	59	50	59	53	53	47	55	47	54	45	42	44	48	53
November	42	52	47	45	32	40	38	44	40	45	43	32	32	35	34	--	32	33	33	44	35	40	36	37	38	32	32	35	39	40	--	38
December	32	41	36	36	33	37	35	39	34	39	36	43	34	37	33	40	35	36	34	39	33	34	33	36	37	45	33	35	33	39	34	36
January	36	33	33	32	32	33	32	33	37	33	36	34	40	33	33	33	--	33	32	32	32	33	33	33	34	33	34	33	32	36	35	34
February	32	35	34	35	33	36	35	41	38	32	33	36	32	33	32	39	33	36	32	32	32	32	32	--	--	32	32	32	32	--	--	34
March	33	32	32	32	32	32	33	33	33	32	39	33	36	32	39	32	40	37	42	41	38	35	35	34	38	39	41	40	39	41	42	36
April	38	40	37	42	43	48	39	51	39	46	50	54	51	58	54	53	48	56	56	--	59	66	64	67	57	65	49	47	48	55	--	51
May	66	57	64	56	59	50	62	59	66	59	--	61	70	61	64	59	66	63	59	57	70	74	79	78	73	66	79	62	75	74	69	65
June	79	73	75	74	67	67	65	62	81	71	70	71	73	71	77	75	77	76	84	76	80	71	73	73	83	77	71	73	76	71	--	74
July	83	75	80	69	87	73	79	70	90	89	92	75	87	79	80	76	76	74	94	76	90	78	92	80	88	82	89	76	90	72	85	81
August	76	92	80	85	85	74	71	81	72	89	77	90	74	85	75	82	72	82	73	92	79	85	76	85	72	81	81	72	69	91	84	80
September	86	74	86	77	87	85	83	67	77	66	68	58	80	61	72	71	63	67	83	63	71	59	68	65	72	59	72	60	69	61	--	71

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 1960.
Water temperatures: May 1951 to September 1960.
EXTREMES, 1959-60.--Dissolved solids: Maximum, 557 ppm Nov. 27; minimum, 217 ppm Mar. 31.
Hardness: Maximum, 294 ppm Nov. 27; minimum, 126 ppm Mar. 31.
Specific conductance: Maximum daily, 859 micromhos Nov. 27; minimum daily, 327 micromhos Apr. 4.
Water temperatures: Maximum, 82°F July 26; minimum, freezing point on many days during January to March.
EXTREMES, 1951-60.--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 available in district office at Lincoln, Nebr. Records of discharge for water year October 1959 to Septemher 1960 given in WSP 1710.

Chemical analyses, in parts per million, water year October 1959 to September 1960

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, 1959.	33,010	--	--	--	--	64	--	198	0	--	--	--	--	--	476	0.65	42,420	232	70	1.8	724	7.2	--
Nov. 1-6.....	33,250	--	--	--	--	62	--	202	0	--	--	--	--	--	469	.64	42,100	236	70	1.8	718	7.4	--
Nov. 7-8.....	22,150	--	--	--	--	53	--	188	0	--	--	--	--	--	423	.58	25,300	216	62	1.6	651	7.5	--
Nov. 9-16.....	15,160	--	0.01	--	--	55	--	209	0	--	--	--	--	--	444	.60	18,170	232	61	1.6	687	7.3	--
Nov. 17-20.....	7,640	--	--	--	--	62	--	237	0	--	--	--	--	--	490	.67	10,110	262	68	1.7	756	7.5	--
Nov. 21-25.....	18,660	--	.01	--	--	62	--	228	0	--	--	--	--	--	487	.66	24,540	252	65	1.7	754	7.3	--
Nov. 26.....	21,000	--	--	--	--	29	--	188	0	--	--	--	--	--	321	.44	18,200	194	40	.9	499	7.4	--
Nov. 27.....	20,000	--	.01	--	--	73	--	292	0	--	--	--	--	--	557	.76	30,080	294	55	1.9	859	7.6	--
Nov. 28-30.....	15,600	--	.01	--	--	52	--	212	0	--	--	--	--	--	430	.58	18,110	226	52	1.5	660	7.7	--
Dec. 1-2.....	12,700	--	.00	--	--	61	--	234	0	--	--	--	--	--	488	.66	15,360	250	58	1.7	747	7.6	--
Dec. 3-31.....	14,650	19	.01	63	19	56	5.7	220	0	144	25	0.5	2.3	0.10	450	.61	17,800	234	54	1.6	710	7.3	7
Jan. 1-4, 1960..	12,000	--	.00	--	--	47	--	218	0	--	--	--	--	--	434	.59	14,060	236	57	1.3	665	7.3	--
Jan. 5-9.....	6,058	--	.01	--	--	59	--	258	0	--	--	--	--	--	506	.69	8,280	272	60	1.6	767	7.5	--
Jan. 10-11.....	10,500	--	.01	--	--	66	--	268	0	--	--	--	--	--	530	.72	15,030	278	58	1.7	816	7.6	--
Jan. 12-15.....	15,850	--	.01	--	--	59	--	233	0	--	--	--	--	--	489	.67	20,930	259	68	1.6	745	7.4	--
Jan. 16.....	14,500	--	.01	--	--	36	--	178	0	--	--	--	--	--	348	.47	13,620	188	42	1.1	513	7.2	--
Jan. 17-29.....	11,880	--	.01	--	--	59	--	227	0	--	--	--	--	--	488	.66	15,650	253	67	1.6	741	7.3	--
Jan. 30-Feb. 5..	14,930	--	.00	--	--	60	--	225	0	--	--	--	--	--	485	.66	19,550	248	63	1.7	740	7.5	--
Feb. 6-15.....	17,230	--	.00	--	--	55	--	208	0	--	--	--	--	--	445	.61	20,700	224	53	1.6	680	7.6	--
Feb. 16.....	17,000	--	--	--	--	34	--	164	0	--	--	--	--	--	326	.44	14,960	182	48	1.1	505	7.4	--

Feb. 17-22, 1960	16,820	--	.00	--	--	53	--	202	0	--	--	--	--	--	436	.59	19,600	223	57	1.5	670	7.4	--
Feb. 23-27.....	14,460	--	.00	--	--	56	--	228	0	--	--	--	--	--	476	.65	18,660	241	54	1.6	717	7.7	--
Feb. 28.....	13,700	--	.02	--	--	50	--	200	0	--	--	--	--	--	418	.57	15,460	214	50	1.5	630	7.5	--
Feb. 29-Mar. 28.	15,720	--	.00	--	--	55	--	207	0	--	--	--	--	--	439	.60	18,630	226	56	1.6	668	7.4	--
Mar. 29.....	62,500	--	.09	--	--	30	--	164	0	--	--	--	--	--	280	.38	47,250	150	16	1.1	449	7.8	--
Mar. 30.....	104,000	--	.01	--	--	20	--	152	0	--	--	--	--	--	246	.33	69,080	144	19	.7	383	7.8	--
Mar. 31.....	134,000	13	.12	37	8.1	16	6.5	132	0	46	6.1	.3	2.4	.06	217	.30	78,510	126	18	.6	336	6.8	23
Apr. 1-7.....	164,300	11	.03	43	8.9	16	7.3	141	0	50	5.4	.2	9.4	.07	229	.31	101,600	144	28	.6	366	7.1	9
Apr. 6-10.....	115,900	--	.02	--	--	14	--	152	0	--	--	--	--	--	240	.33	75,100	154	29	.5	375	7.5	--
Apr. 11-15.....	69,240	--	.02	--	--	15	--	161	0	--	--	--	--	--	259	.35	48,420	167	35	.5	407	7.5	--
Apr. 16-21.....	48,370	--	.02	--	--	19	--	177	0	--	--	--	--	--	294	.40	38,400	187	42	.6	459	7.6	--
Apr. 22-30.....	35,060	--	.01	--	--	24	--	187	0	--	--	--	--	--	333	.45	31,520	204	51	.7	515	7.6	--
May 1-21.....	44,700	--	.07	--	--	36	--	194	0	--	--	--	--	--	391	.53	47,190	223	64	1.0	594	7.5	--
May 22.....	70,500	--	.01	--	--	26	--	197	0	--	--	--	--	--	336	.46	63,960	208	46	.6	515	7.6	--
May 23-31.....	48,510	--	.02	--	--	30	--	203	0	--	--	--	--	--	370	.50	48,460	228	62	.9	568	7.3	--
June 1-11.....	33,400	--	.01	--	--	41	--	219	0	--	--	--	--	--	451	.61	40,670	263	83	1.1	677	7.5	--
June 12-13.....	51,350	--	.01	--	--	33	--	177	0	--	--	--	--	--	364	.50	50,470	204	59	1.0	552	7.2	--
June 14-20.....	43,860	--	.01	--	--	37	--	189	0	--	--	--	--	--	393	.53	46,540	219	64	1.1	596	7.0	--
June 21-23.....	75,600	12	.01	45	10	26	7.2	147	0	69	10	.4	6.0	.07	269	.37	54,910	154	33	.9	426	7.5	20
June 24-30.....	40,860	--	.01	--	--	37	--	194	0	--	--	--	--	--	398	.54	43,910	220	61	1.1	606	7.0	--
July 1-31.....	35,150	--	.02	--	--	48	--	188	0	--	--	--	--	--	417	.57	39,580	223	69	1.4	632	7.0	--
Aug. 1-25.....	35,690	--	.00	--	--	52	--	173	0	--	--	--	--	--	422	.57	40,670	213	71	1.5	645	7.2	--
Aug. 26-Sept. 1.	44,890	--	.00	--	--	41	--	167	0	--	--	--	--	--	368	.50	44,600	193	56	1.3	567	6.8	--
Sept. 2-30.....	34,100	11	.01	60	16	53	6.0	180	0	165	17	.4	1.3	.10	435	.59	40,050	217	69	1.6	655	7.1	3
Weighted average a.....	33,030	--	0.02	--	--	41	--	185	0	--	--	--	--	--	385	0.52	34,330	209	57	1.2	590	--	--

a Includes estimates where data are missing. Represents 100 percent of runoff for water year.

MISSOURI RIVER MAIN STEM--Continued

6-8070. MISSOURI RIVER AT NEBRASKA CITY, NEBR.--Continued

Temperature (°F) of water, water year October 1959 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	
October	61	59	58	57	56	56	58	56	54	54	52	51	50	50	50	50	50	50	50	50	50	50	52	52	52	52	49	47	47	47	47	52
November	47	46	48	48	44	41	39	39	38	38	37	37	36	34	33	33	33	33	33	33	33	34	34	34	34	33	33	33	33	33	--	37
December	33	33	33	33	33	33	33	33	33	33	33	33	33	34	34	34	34	34	34	34	34	34	34	34	35	35	35	35	35	35	34	34
January	34	34	34	33	32	32	32	32	32	33	34	34	35	35	35	33	33	33	33	33	32	32	32	32	32	32	32	32	32	32	32	33
February	33	33	34	34	34	34	34	34	35	34	33	33	33	33	33	33	33	33	32	33	32	32	32	32	32	32	32	32	32	--	--	33
March	32	32	32	32	32	32	32	32	32	33	33	33	33	33	33	33	33	33	33	34	34	34	33	33	33	33	34	35	36	35	35	33
April	36	36	36	36	36	36	36	37	37	38	40	41	43	49	51	52	52	51	51	53	54	56	59	61	61	60	60	59	58	58	--	48
May	54	53	54	56	56	56	55	55	55	55	56	56	57	60	63	64	64	64	64	64	61	59	59	61	68	67	69	68	67	67	68	60
June	69	69	70	71	71	70	70	70	69	69	68	66	65	64	68	69	68	69	72	74	71	70	71	71	69	72	73	75	75	74	--	70
July	72	73	76	75	74	75	75	76	75	76	77	79	78	78	77	76	77	77	77	79	79	80	81	81	81	82	81	79	78	76	75	77
August	75	77	78	78	81	79	78	75	75	75	74	74	74	74	73	76	73	73	73	73	74	75	76	76	77	77	76	77	74	74	75	75
September	77	79	79	80	80	80	80	79	76	72	71	68	67	68	68	68	68	70	68	68	68	68	68	67	65	64	65	64	64	61	--	71

NISHNABOTNA RIVER BASIN

6-8080. MULE CREEK NEAR MALVERN, IOWA

LOCATION.--At gaging station at county highway bridge, 1.6 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 1960.
Sediment records: July 1954 to September 1960.
EXTREMES, 1959-60.--Water temperatures: Maximum, 86°F July 12; minimum, freezing point on many days during November, January to March.
Sediment concentrations: Maximum daily, 7,040 ppm June 20; minimum daily, 6 ppm Nov. 1, Sept. 16.
Sediment loads: Maximum daily, 4,200 tons Aug. 28; minimum daily, less than 0.05 ton Oct. 27.
EXTREMES, 1954-60.--Water temperatures (1958-60): Maximum, 86°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, 21,900 ppm June 20. Records of discharge for water year October 1959 to September 1960 given in WSP 1710. Flow affected by ice Nov. 5, 6, 13-18, Nov. 26 to Dec. 1, Dec. 5-9, 13, 14, 18, Dec. 30 to Jan. 11, Jan. 14-29, Feb. 10 to Mar. 26.

Temperature (°F) of water, water year October 1959 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	
October	56	55	--	54	55	58	--	52	--	44	46	--	44	--	55	--	52	44	--	54	--	55	--	50	48	--	40	--	52	--	48	--
November	52	--	46	--	36	34	--	36	--	48	--	38	--	32	32	--	32	--	32	--	36	42	--	50	--	--	48	48	--	42	--	--
December	--	40	34	--	40	35	--	35	--	44	--	36	38	--	42	--	40	--	38	38	--	38	--	38	--	54	--	48	--	36	--	--
January	34	34	--	32	32	32	--	32	34	34	--	34	--	34	--	--	34	--	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	--	--	--
March	--	32	32	--	32	32	--	32	--	32	--	32	32	--	32	--	32	--	32	32	--	32	--	32	--	32	32	--	32	--	42	--
April	--	38	46	--	48	42	52	52	50	52	58	60	62	66	66	55	46	60	54	64	58	63	74	72	62	62	60	56	56	60	--	57
May	64	64	57	58	68	54	60	66	58	68	60	60	64	70	68	66	62	65	60	60	56	58	74	70	70	60	68	71	72	70	68	64
June	70	79	78	78	74	75	72	70	64	70	68	65	64	72	68	66	76	82	82	70	68	64	70	74	78	70	79	82	85	72	--	73
July	68	76	70	82	62	66	74	67	68	72	72	86	74	74	80	80	70	70	72	70	72	82	72	72	76	74	78	84	74	76	62	73
August	78	80	85	82	78	72	72	78	76	78	78	78	80	68	66	70	70	78	74	76	68	80	78	76	78	73	80	72	75	82	84	76
September	74	64	72	72	82	82	82	74	--	72	62	56	57	64	69	71	70	69	60	72	73	64	62	64	58	68	66	66	64	67	--	68

NISHNABOTNA RIVER BASIN--Continued

6-6080. MULE CREEK NEAR MALVERN, IOWA--Continued

Suspended sediment, water year October 1959 to September 1960

Day	OCTOBER			NOVEMBER			DECEMBER		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	2.6	44	0.3	3.1	6	0.1	2.3	48	0.3
2	6.2	95 S	1.9	2.9	9	.1	2.4	58	.4
3	4.0	50	.5	2.9	12	.1	2.4	55	.4
4	3.7	80 A	.8	3.4	16	.1	2.4	52	.3
5	5.2	160	2.2	3.6	20	.2	2.4	48	.3
6	6.0	200 A	3.2	3.1	23	.2	2.2	33	.2
7	4.0	140	1.5	2.9	20	.2	2.1	28	.2
8	9.8	340 S	10	3.1	17	.1	1.9	23	.1
9	4.3	110 A	1.3	3.1	19	.2	2.1	28	.2
10	3.7	55	.6	3.1	21	.2	2.4	32	.2
11	3.4	44	.4	2.9	18	.1	2.9	30	.2
12	3.1	36	.3	2.9	14	.1	2.6	28	.2
13	3.1	28	.2	2.9	13	.1	2.5	47	.3
14	3.1	39	.3	2.7	12	.1	2.4	43	.3
15	3.1	50	.4	2.4	15	.1	2.4	39	.3
16	2.9	42	.3	2.2	18	.1	2.4	45	.3
17	2.9	33	.3	2.7	22	.2	2.4	51	.3
18	2.9	51	.4	3.0	20	.2	2.3	56	.3
19	2.6	44	.3	3.1	19	.2	2.2	61	.4
20	2.6	38	.3	2.9	30	.2	2.4	67	.4
21	2.6	24	.2	2.9	42	.3	2.4	54	.3
22	2.6	9	.1	2.9	15	.1	2.6	42	.3
23	3.4	11	.1	2.9	18	.1	2.6	31	.2
24	3.1	13	.1	2.9	21	.2	2.4	20	.1
25	2.4	13	.1	2.9	21	.2	2.9	21	.2
26	2.9	10	.1	2.8	21	.2	2.9	22	.2
27	2.6	7	T	2.5	21	.1	4.9	32	.4
28	2.6	8	.1	2.2	54	.3	6.0	42	.7
29	2.4	9	.1	2.0	46	.2	3.1	49	.4
30	2.9	8	.1	2.2	37	.2	2.3	56	.3
31	3.7	8	.1	--	--	--	2.0	58	.3
Total	110.4	--	26.6	85.1	--	4.8	81.2	--	9.0

Day	JANUARY			FEBRUARY			MARCH		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	1.9	61	0.3	3.7	70	0.7	3.3	145	1.3
2	2.1	56	.3	3.7	58	.6	3.2	120	1.0
3	1.9	59	.3	4.0	58	.6	3.1	125	1.0
4	1.8	62	.3	4.3	59	.7	3.1	110	.9
5	1.6	93	.4	4.3	62	.7	3.0	100	.8
6	1.9	50	.3	3.7	65	.6	3.0	105	.8
7	2.4	30	.2	3.7	80	.8	2.9	125	1.0
8	2.2	10	.1	5.6	-- E	4.0	2.8	145	1.1
9	2.0	27	.1	6.8	-- E	15	2.8	140	1.1
10	1.9	22	.1	4.3	-- E	3.0	2.8	135	1.0
11	2.3	30	.2	4.0	140	1.5	2.7	160	1.2
12	5.2	230	3.2	3.6	180	1.7	2.7	185	1.3
13	4.3	100	1.2	3.4	200	1.8	2.7	120	.9
14	7.8	1700 A	36	3.1	245	2.1	2.7	110	.8
15	5.0	350 A	4.7	3.0	240	1.9	2.7	105	.8
16	4.0	120	1.3	2.9	235	1.8	2.7	120	.9
17	3.5	105	1.0	3.4	270	2.5	2.8	140	1.1
18	4.5	120	1.5	3.8	300	3.1	2.9	160	1.3
19	3.8	140	1.4	3.6	240	2.3	2.9	175	1.4
20	3.4	140	1.3	3.5	180	1.7	3.0	230	1.9
21	3.1	140	1.2	3.5	190	1.8	3.0	220	1.8
22	2.9	120	.9	3.5	145	1.4	3.1	215	1.8
23	2.7	99	.7	3.4	100	.9	3.2	235	2.0
24	2.6	77	.5	3.4	110	1.0	3.3	255	2.3
25	2.5	88	.6	3.4	125	1.1	3.5	255	2.4
26	2.6	100	.7	3.3	140	1.2	3.5	255	2.4
27	2.8	92	.7	3.3	160	1.4	16	1530 S	142
28	3.0	85	.7	3.3	165	1.5	31	1630 S	206
29	3.1	74	.6	3.3	170	1.5	52	4860 S	758
30	3.4	64	.6	--	--	--	39	1500 A	158
31	3.7	80	.8	--	--	--	34	2710 S	269
Total	95.9	--	62.2	108.8	--	58.9	249.4	--	1567.3

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

NISHNABOTNA RIVER BASIN--Continued

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

Suspended sediment, water year October 1959 to September 1960--Continued

Day	APRIL			MAY			JUNE		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	30	2000	A 162	8.4	315	7.1	5.2	140	2.0
2	26	3300	232	7.6	205	4.2	5.2	155	2.2
3	23	2300	143	6.8	190	3.5	4.9	115	1.5
4	21	2000	113	6.0	145	2.4	5.2	140	2.0
5	19	1640	84	8.4	400	9.0	4.9	105	1.4
6	17	1390	64	15	660	S 31	4.9	130	1.7
7	15	1440	58	10	505	14	4.9	94	1.2
8	14	1070	40	7.6	310	6.4	4.6	100	1.2
9	13	975	34	7.2	265	5.2	4.6	125	1.6
10	12	835	27	6.4	215	3.7	5.6	120	1.8
11	11	850	25	5.6	210	3.2	7.2	600	A 12
12	10	765	21	5.6	170	2.6	10	1080	A 29
13	9.2	1060	26	5.6	115	1.7	8.9	650	A 16
14	8.6	830	19	5.6	190	2.9	7.2	295	5.7
15	8.2	710	16	5.6	170	2.6	5.6	190	2.9
16	7.8	470	9.9	10	820	S 25	14	1690	S 87
17	17	1200	A 55	6.4	235	4.1	6.8	380	7.0
18	13	1200	A 42	7.6	380	7.8	6.0	335	5.4
19	10	740	20	6.8	320	5.9	5.6	230	3.5
20	9.3	570	14	6.8	320	5.9	48	7040	S 1680
21	9.0	450	11	35	6480	S 912	12	1500	49
22	8.6	420	9.8	11	980	29	8.0	650	14
23	8.4	320	7.3	8.9	800	19	8.4	460	A 10
24	8.4	310	7.0	8.4	620	14	7.6	225	4.6
25	8.0	330	7.1	8.0	470	A 10	8.0	215	4.6
26	7.6	240	4.9	7.6	400	8.2	7.6	230	4.7
27	7.2	200	3.9	6.4	270	4.7	7.6	165	3.4
28	7.6	220	4.5	6.4	240	4.1	7.6	135	2.8
29	10	280	7.6	6.4	245	4.2	7.6	125	2.6
30	13	550	19	6.0	230	3.7	26	4060	S 450
31	--	--	--	5.6	160	2.4	--	--	--
Total	381.9	--	1287.0	258.7	--	1159.5	269.7	--	2410.8

Day	JULY			AUGUST			SEPTEMBER		
1	6.4	600	10	3.4	27	0.2	6.0	120	1.9
2	6.4	470	8.1	3.4	68	.6	5.6	90	1.4
3	5.6	270	4.1	3.4	94	.9	5.2	71	1.0
4	5.6	175	2.6	3.1	71	.6	4.9	56	.7
5	6.0	96	1.6	3.5	220	S 6.4	4.6	38	.5
6	6.0	100	1.6	10	1410	S 52	4.3	31	.5
7	4.9	105	1.4	4.6	290	3.6	4.0	56	.6
8	4.9	125	1.7	3.7	91	.9	4.6	110	1.4
9	6.4	240	4.1	3.4	51	.5	4.3	--	E .4
10	5.2	205	2.9	3.1	75	.6	3.7	13	.1
11	4.6	195	2.4	3.1	44	.4	3.7	15	.1
12	7.1	280	A 5.4	3.1	110	.9	3.1	20	.2
13	5.6	190	2.9	2.9	130	1.0	3.1	20	.2
14	4.3	99	1.1	2.9	105	.8	3.4	11	.1
15	4.0	96	1.0	2.9	54	.4	3.4	7	.1
16	4.0	92	1.0	3.1	87	.7	3.7	6	.1
17	4.0	72	.8	18	1940	S 285	3.7	9	.1
18	6.4	--	E 5.0	70	4910	S 1600	54	5160	S 1300
19	4.3	80	.9	6.8	300	5.5	6.4	265	4.6
20	3.7	93	.9	4.9	110	1.5	4.3	85	1.0
21	3.7	120	1.2	4.3	76	.9	4.0	60	.6
22	3.7	70	.7	4.0	37	.4	3.7	42	.4
23	3.7	52	.5	3.7	43	.4	14	845	S 43
24	3.7	70	.7	9.6	1500	S 80	100	6740	S 3780
25	3.7	50	.5	12	1680	S 70	12	700	23
26	3.7	64	.6	6.4	170	3.0	7.6	210	4.3
27	3.4	36	.3	4.9	56	.7	6.8	125	2.3
28	3.7	63	.6	108	4070	S 4200	6.4	120	2.1
29	4.3	59	.7	51	3260	S 721	6.8	115	2.1
30	4.0	39	.4	9.8	320	8.5	6.0	63	1.0
31	3.4	57	.5	6.8	145	2.7	--	--	--
Total	146.4	--	66.2	379.8	--	7050.1	303.3	--	5173.8

Total discharge for year (cfs-days)..... 2470.6
Total load for year (tons)..... 18876.2

E Estimated.
S Computed hy subdividing day.
A Computed from partly estimated concentration graph.

NISHNABOTNA RIVER BASIN--Continued

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

Particle-size analyses of suspended sediment, water year October 1959 to September 1960
(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. 29, 1960.....	1050	32		59	9300		--	30		47		96	99	100				SPWC
May 21.....	1755	56		74	9890		27	31		49		98	99	100				SPWC
May 21.....	1755	56		74	9890		10	15		37		98	99	100				SPN
June 16.....	0600	66		25	3420		24	31		53		100	--	--				SPWC
June 16.....	0600	66		25	3420		6	16		46		100	--	--				SPN
June 20.....	0610	70		111	19900		34	42		65		100	--	--				SPWC
June 30.....	0530	72		51	7700		25	28		46		99	100	--				SPWC
Aug. 17.....	1010	70		10	1720		--	42		68		100	--	--				SPWC
Aug. 18.....	0540	72		126	7230		--	36		62		97	99	100				SPWC

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 1960.
EXTREMES, 1959-60.--Sediment concentrations: Maximum daily, 10,600 ppm May 25; minimum daily, 60 ppm June 10.
Sediment loads: Maximum daily, 5,830 tons May 25; minimum daily, 0.5 ton Oct. 28, Dec. 22-25.
EXTREMES, 1952-60.--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, 32,000 ppm May 25. Records of discharge for water year October 1959 to September 1960 given in WSP 1710. Flow affected by ice Nov. 6-6, Nov. 13 to Dec. 13, Dec. 16-25, Dec. 30 to Mar. 30.

Suspended sediment, water year October 1959 to September 1960
/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	2.2	275	1.6	1.3	210	0.7	2.3	150	0.9
2	3.9	--	6.0	1.0	250 S	.7	2.5	230	1.6
3	3.7	570	5.7	.8	--	.7	2.5	--	1.7
4	3.0	320	2.6	4.0	550	5.9	2.2	290	1.7
5	4.5	355	4.3	4.4	--	6.0	1.9	190	1.0
6	3.5	250	2.4	5.1	420	5.8	1.7	--	.9
7	3.0	155	1.3	5.0	345	4.7	1.6	190	.8
8	5.2	380 S	5.9	4.5	--	4.2	1.6	--	.9
9	3.9	300	3.2	4.2	330	3.7	1.7	--	.9
10	3.2	255	2.2	4.0	310	3.3	1.9	180	.9
11	2.8	220	1.7	3.0	--	2.8	2.1	200	1.1
12	2.7	180	1.3	2.8	295	2.2	2.4	440	2.9
13	2.3	--	1.4	2.6	--	1.8	2.0	--	1.0
14	2.3	260	1.6	2.4	--	1.4	1.6	185	.8
15	2.2	--	1.4	2.2	--	1.1	1.5	--	.8
16	1.8	--	1.2	2.0	--	1.1	1.4	210	.8
17	1.8	230	1.1	1.8	--	1.1	1.3	--	.7
18	1.8	--	1.0	2.3	190	1.2	1.2	--	.6
19	1.6	205	.9	2.8	--	1.6	1.1	215	.6
20	1.5	--	.8	3.0	255	2.1	1.0	--	.6
21	1.5	180	.7	3.2	300	2.6	1.0	215	.6
22	1.5	--	.7	3.1	310	2.6	1.0	--	.5
23	1.6	--	.7	2.9	--	2.4	1.0	180	.5
24	1.1	200	.6	2.7	335	2.4	1.0	--	.5
25	1.1	--	.6	2.5	--	2.1	1.0	--	.5
26	1.5	145	.6	2.3	--	1.8	2.5	170	1.1
27	1.1	--	.6	2.1	--	1.5	5.0	--	5.0
28	.7	--	.5	1.9	225	1.2	12	1020	33
29	1.4	--	.6	1.8	--	1.1	8.2	--	15
30	1.7	370 S	1.9	2.0	--	1.0	5.8	590	9.2
31	1.8	270	1.3	--	--	--	6.6	--	13
Total	71.9	--	56.4	83.7	--	70.8	80.6	--	100.1

S Computed by subdividing day.

NISHNABOTNA RIVER BASIN--Continued

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

Suspended sediment, water year October 1959 to September 1960--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	5.0	--	7.0	3.7	--	2.6	2.2	220	1.3
2	4.0	330	3.6	3.7	260	2.6	2.2	--	1.3
3	3.0	--	2.6	3.6	--	2.5	2.2	--	1.3
4	2.3	--	1.5	3.6	--	2.4	2.1	--	1.2
5	1.9	--	1.0	3.7	--	2.4	2.1	--	1.2
6	3.0	--	1.0	4.0	220	2.4	2.1	--	1.2
7	4.0	105	1.1	4.5	--	2.5	2.1	--	1.2
8	3.5	--	1.0	6.0	--	2.6	2.0	--	1.2
9	3.0	120	1.0	7.6	--	3.4	2.0	--	1.2
10	2.8	--	1.0	9.2	--	4.6	2.0	220	1.2
11	4.5	155	1.9	11	--	6.0	2.0	--	1.2
12	7.0	--	3.0	12	--	9.5	2.0	--	1.2
13	10	180	4.9	11	225	6.7	2.0	--	1.2
14	8.4	--	3.0	8.0	--	4.6	2.0	--	1.2
15	7.6	--	2.6	6.0	190	3.1	2.1	--	1.1
16	6.6	120	2.1	4.8	--	2.9	2.1	--	1.1
17	5.4	--	1.9	4.6	--	2.7	2.2	--	1.0
18	4.5	--	1.7	4.5	--	2.4	2.3	--	1.0
19	4.0	--	1.4	4.5	--	2.2	2.3	--	.9
20	3.7	--	1.2	4.4	--	2.0	2.3	--	.9
21	3.6	--	1.2	4.3	--	1.9	2.3	--	.8
22	3.5	--	1.3	4.1	--	1.8	2.3	125	.8
23	4.3	115	1.3	3.7	160	1.6	2.4	--	.8
24	5.0	--	3.0	3.3	--	1.5	2.4	--	.9
25	4.7	190	2.4	3.0	--	1.4	2.7	--	1.0
26	4.5	--	2.4	2.7	--	1.3	6.0	105	1.7
27	4.3	--	2.4	2.5	--	1.3	20	89	4.8
28	4.2	--	2.4	2.3	--	1.3	60	150	24
29	4.0	--	2.4	2.3	--	1.3	250	810	547
30	3.9	--	2.5	--	--	--	300	1150	932
31	3.8	--	2.5	--	--	--	250	2250	S 1580
Total	140.0	--	68.3	148.6	--	83.5	940.4	--	3116.9
	APRIL			MAY			JUNE		
1	329	3970	3530	17	135	6.2	22	215	13
2	176	2020	960	16	--	4.8	20	195	11
3	114	1890	582	13	95	3.3	18	155	7.5
4	99	1460	390	12	90	2.9	18	135	6.6
5	85	1160	266	36	1030	S 254	17	115	5.3
6	75	1000	203	158	2780	S 1260	16	125	5.4
7	56	710	107	74	1350	270	15	110	4.5
8	44	810	96	51	680	94	14	110	4.2
9	37	890	89	40	295	32	14	90	3.4
10	37	790	79	35	215	20	14	80	3.0
11	34	400	37	31	205	17	19	440	S 26
12	31	290	24	29	200	16	28	595	S 65
13	33	525	47	27	170	12	22	300	18
14	28	350	26	25	145	9.8	18	235	11
15	26	295	21	23	135	8.4	16	250	11
16	35	1110	S 142	43	1230	S 190	36	1380	S 149
17	156	3380	S 1630	27	240	17	21	275	16
18	78	1200	253	28	210	16	21	370	S 24
19	53	600	86	28	340	26	27	605	S 55
20	40	375	41	26	280	20	60	1210	S 285
21	31	330	28	28	285	22	32	415	36
22	25	305	21	23	220	14	25	340	23
23	21	255	14	21	185	10	22	325	19
24	19	230	12	67	5630	S 2210	19	280	14
25	19	200	10	141	10600	S 5830	18	280	14
26	17	135	6.2	53	1090	S 167	17	260	12
27	16	105	4.5	36	750	73	16	235	10
28	16	110	4.8	31	330	28	16	260	11
29	19	155	S 10	27	280	20	15	210	8.5
30	26	550	S 48	24	220	14	47	1760	S 455
31	--	--	--	23	200	12	--	--	--
Total	1775	--	8767.5	1213	--	10679.4	663	--	1326.4

S Computed by subdividing day.

NISHNABOTNA RIVER BASIN--Continued

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

Suspended sediment, water year October 1959 to September 1960--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	25	375	25	7.3	155	3.1	12	290	9.4
2	19	240	12	6.4	160	2.8	11	285	8.5
3	16	--	10	6.0	165	2.7	10	280	7.6
4	14	--	9.5	5.6	190	2.9	9.3	315	7.9
5	14	240	9.1	34	2790	S 896	9.0	370	9.0
6	13	180	6.3	104	4570	S 2110	8.6	335	7.8
7	12	--	5.6	153	2650	S 2180	8.1	230	5.0
8	12	150	4.9	29	450	35	8.8	215	5.1
9	22	1460	S 101	21	250	14	8.8	235	5.6
10	14	375	14	17	210	9.6	8.4	180	4.1
11	30	1300	S 737	15	190	7.7	7.9	180	3.8
12	111	4070	S 1580	14	210	7.9	7.4	155	3.1
13	40	1100	S 163	13	160	5.6	7.4	200	4.0
14	23	310	19	12	125	4.1	7.7	310	6.4
15	20	230	12	11	130	3.9	7.4	330	6.6
16	18	200	9.7	11	155	4.6	7.4	345	6.9
17	16	155	6.7	64	2550	S 1360	7.2	330	6.4
18	20	330	S 19	99	1450	S 698	7.9	420	9.0
19	15	225	9.1	31	485	S 42	7.0	375	7.1
20	14	210	7.9	24	220	14	6.8	335	6.2
21	13	210	7.4	20	210	11	6.5	375	6.6
22	12	290	9.4	18	295	14	6.5	330	6.0
23	12	245	7.9	16	235	10	10	650	S 19
24	12	225	7.3	15	185	7.5	22	1970	S 181
25	11	210	6.2	14	230	8.7	7.9	375	8.0
26	10	215	5.8	13	205	7.2	5.7	335	5.2
27	10	215	5.8	12	185	6.0	4.6	440	5.5
28	9.5	230	5.9	16	535	S 45	3.7	445	4.4
29	8.8	245	5.8	25	770	S 72	3.7	385	3.8
30	8.4	220	5.0	15	265	11	2.3	400	2.4
31	7.5	180	3.6	13	280	9.8	--	--	--
Total	582.2	--	2830.9	854.3	--	7606.1	241.0	--	371.4

Total discharge for year (cfs-days)..... 6793.71
Total load for year (tons)..... 35077.7

S Computed by subdividing day.

NISHNABOTNA RIVER BASIN--Continued

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

Particle-size analyses of suspended sediment, water year October 1959 to September 1960
(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. 29, 1960.....	1630	35		d 250	3790		22	27		46		84	91	98	99	100		SPWC
Mar. 29.....	1630	35		d 250	3790		12	13		36		84	91	98	99	100		SPN
May 25.....	0830	60		329	31900		34	44		69		96	97	99	100	--		SPWC
May 25.....	0830	60		329	31900		15	28		57		96	97	99	100	--		SPN
June 20.....	2215	63		122	4290		45	49		61		98	99	100	--	--		SPWC
June 30.....	1545	65		114	10400		32	41		65		98	99	100	--	--		SPWC

d Daily mean discharge.

6-6566. 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 1960.
Sediment records: October 1957 to September 1960.
EXTREMES, 1959-60.--Water temperatures: Maximum, 65°F Aug. 26; minimum, freezing point Nov. 6.
Sediment concentrations: Maximum daily, 6,060 ppm June 17; minimum daily, 10 ppm on several days during January.
Sediment loads: Maximum daily, 209,000 tons Mar. 26; minimum daily, 3 tons Jan. 2, 3, 6.
EXTREMES, 1957-60.--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.--Records of discharge for water year October 1959 to September 1960 given in WSP 1710. Flow affected by ice Nov. 5, 14, 15, 17, 30, Dec. 31 to Jan. 6, Jan. 16-31, Feb. 19 to Mar. 24.

Temperature (°F) of water, water year October 1959 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	
October	54	54	54	55	56	56	61	56	53	56	52	51	--	50	52	57	50	49	51	53	54	59	58	49	50	50	43	43	44	52	50	52
November	47	49	52	56	37	32	35	40	--	45	45	43	35	33	35	34	33	33	35	33	34	39	37	40	38	35	33	33	33	33	--	39
December	33	36	34	35	34	34	35	35	34	39	41	34	36	43	43	39	39	37	35	34	33	37	36	38	--	50	40	33	34	33	33	37
January	36	33	33	33	33	33	35	35	37	37	34	40	37	37	--	33	--	33	33	33	33	33	33	33	33	33	33	34	34	34	34	34
February	35	34	35	35	34	34	34	36	36	--	35	33	35	33	35	35	33	34	33	34	33	33	33	33	33	33	33	33	33	--	--	34
March	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	34	33	34	33	33	33	35	35	40	47	46	47	35
April	52	45	42	45	49	50	52	53	51	49	55	57	58	57	60	60	55	54	55	59	57	61	65	67	68	64	63	60	57	51	--	56
May	60	55	57	60	61	60	56	57	60	60	59	59	61	63	65	65	64	67	67	64	60	61	66	70	71	70	69	70	69	68	69	63
June	71	72	73	74	74	70	66	64	67	70	71	70	67	66	70	70	66	70	73	75	77	72	71	70	69	71	73	76	78	79	--	71
July	--	77	79	76	74	75	75	74	--	75	79	80	78	76	74	74	78	74	74	76	76	79	76	78	77	82	77	78	81	74	--	77
August	76	78	78	73	79	74	74	74	--	71	72	72	72	76	75	76	75	76	70	72	77	77	77	77	77	77	77	85	74	78	83	76
September	78	77	77	79	77	76	74	74	71	64	64	63	63	64	67	67	68	71	66	67	68	68	64	65	60	60	64	64	65	60	--	68

KANSAS RIVER BASIN--Continued

6-8566. REPUBLICAN RIVER AT CLAY CENTER, KANS.--Continued

Suspended sediment, water year October 1959 to September 1960
/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	336	465	422	883	1540	3670	170	25	11
2	957	1130	S 4830	514	1140	1580	192	35	18
3	2410	3630	S 25200	388	640	670	197	30	16
4	790	2810	5990	331	370	331	214	35	20
5	724	2010	3930	270	210	153	219	30	18
6	3580	3250	31400	296	190	152	214	30	17
7	2630	2890	20500	236	70	45	202	35	19
8	2050	3010	16700	214	80	46	202	50	27
9	1180	1720	5480	214	60	35	197	45	24
10	820	1490	3300	224	90	54	192	45	23
11	772	990	2060	208	85	48	192	50	26
12	592	1100	1760	202	95	52	202	40	22
13	460	1180	1460	208	100	56	202	--	16
14	388	655	686	120	50	16	186	20	10
15	342	410	378	140	60	23	192	20	10
16	314	290	246	131	50	18	192	15	8
17	291	205	161	110	50	15	192	15	8
18	268	160	116	180	80	39	186	15	8
19	252	150	102	175	75	35	192	15	8
20	241	150	98	214	45	26	192	25	13
21	236	135	86	219	45	27	186	30	15
22	230	95	59	192	45	23	180	20	10
23	236	110	70	192	50	26	186	20	10
24	325	450	395	241	95	62	186	15	8
25	274	660	488	246	70	46	180	15	7
26	230	470	292	236	70	45	180	20	10
27	219	340	201	230	40	25	202	25	14
28	208	210	118	219	50	30	219	30	18
29	202	125	68	197	15	8	219	15	9
30	268	175	127	180	25	12	192	15	8
31	1210	2660	S 9520	--	--	--	180	30	14
Total	23035	--	136243	7410	--	7368	6037	--	445

Day	JANUARY			FEBRUARY			MARCH		
1	130	15	5	658	670	1190	160	90	39
2	95	10	3	932	1510	3800	160	75	32
3	75	15	3	1020	1480	4080	150	75	30
4	70	45	8	932	1610	4050	150	75	30
5	75	20	4	1120	2090	6320	160	60	26
6	100	10	3	883	785	1870	160	50	22
7	170	10	5	730	860	1700	160	75	32
8	160	10	4	724	860	1680	170	120	55
9	186	10	5	778	780	1640	170	95	44
10	197	10	5	796	750	1610	170	100	46
11	224	10	6	670	535	968	180	90	44
12	467	595	S 1620	448	210	254	180	75	36
13	1690	5960	27200	400	175	189	170	65	30
14	886	3060	S 7820	371	120	120	170	70	32
15	1700	3280	S 16400	336	120	109	190	60	31
16	500	920	1240	406	165	181	200	75	40
17	320	235	203	532	335	481	220	60	36
18	270	160	117	610	470	774	250	70	47
19	210	140	79	420	310	352	280	85	64
20	170	145	66	350	195	184	310	70	58
21	140	210	79	280	130	98	350	85	80
22	110	140	42	260	115	81	400	55	59
23	110	180	53	220	95	56	550	90	134
24	120	190	62	200	90	49	680	235	431
25	140	130	49	190	115	59	841	530	1200
26	160	140	60	180	130	63	1080	705	S 2260
27	180	120	58	170	115	53	8530	3720	S 98200
28	200	135	73	160	95	41	22200	3490	209000
29	250	145	98	160	95	41	16800	4150	188000
30	310	135	113	--	--	--	14100	2720	104000
31	420	115	130	--	--	--	7490	2450	49500
Total	9835	--	55613	14936	--	32093	76781	--	653638

S Computed by subdividing day.

KANSAS RIVER BASIN--Continued

6-8566. REPUBLICAN RIVER AT CLAY CENTER, KANS.--Continued

Suspended sediment, water year October 1959 to September 1960--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	5280	3030	43200	4080	635	7000	1790	355	1720
2	5760	3280	51000	3730	550	5540	1770	335	1600
3	4700	3330	S 50000	2800	435	3290	1730	330	1540
4	4800	3330	43200	3050	665	5480	1690	330	1510
5	2950	1860	14800	5090	2410	33100	1340	285	1030
6	2320	1120	7020	5220	1640	23100	1130	255	778
7	1880	790	4010	5460	1250	18400	1060	260	744
8	1620	570	2490	4690	770	9750	1020	240	661
9	1680	610	2770	3650	565	5580	1040	245	688
10	2170	1110	6500	2620	430	3040	967	235	614
11	2470	1310	8740	2700	485	3540	2400	3880	S 29400
12	2830	1190	9090	2890	625	4880	2190	3300	S 24600
13	3260	1110	9770	2850	470	3620	3580	4170	40300
14	3630	1040	10200	3440	480	4460	3900	4250	44800
15	3800	980	10000	3810	485	S 5220	2540	3260	22400
16	3750	880	8910	7740	3950	82500	6170	5700	95000
17	3270	690	6090	4410	1600	19000	5920	6060	96900
18	3210	700	6070	4400	1610	19100	4300	5120	59400
19	2490	485	3260	5250	2210	31300	3540	3900	37300
20	2550	540	3720	2990	1230	9930	2040	2350	12900
21	3070	615	5100	2880	1660	12900	2110	1640	9340
22	3190	580	5000	3740	2820	28500	2660	1860	13400
23	3190	645	5560	3210	3170	27500	4010	2510	27200
24	3440	600	5570	2000	1390	7510	4550	2460	30200
25	3520	665	6320	1970	985	5240	6370	3710	63800
26	3510	610	5780	2080	755	4240	5360	3110	45000
27	3510	575	5450	1970	545	2900	3740	1310	13200
28	3670	705	6980	1940	470	2460	3310	915	8180
29	3900	1210	12700	1920	430	2230	3160	785	6700
30	4540	1220	15000	1880	380	1930	3120	780	6570
31	--	--	--	1820	390	1920	--	--	--
Total	99960	--	374300	106280	--	395160	88507	--	697475

Day	JULY			AUGUST			SEPTEMBER		
1	3080	635	5280	493	145	193	988	2980	7950
2	3070	655	5430	475	170	218	722	1510	2940
3	3060	640	5290	451	180	219	710	910	1740
4	3000	500	4050	457	185	228	827	950	2120
5	2970	505	4050	457	175	216	855	885	2040
6	2970	505	4050	729	420	827	619	585	978
7	3000	520	4210	535	350	506	423	320	365
8	3120	520	4380	487	225	296	346	205	192
9	3300	745	6640	481	180	234	308	155	129
10	3040	730	5990	475	205	263	280	120	91
11	2530	450	3070	434	195	228	269	110	80
12	2370	570	3650	396	170	182	242	100	65
13	1890	770	3930	379	185	189	231	--	60
14	1770	985	4710	340	190	174	226	--	55
15	1440	850	3300	308	150	125	221	--	55
16	1290	760	2650	318	155	133	215	--	55
17	1260	585	1990	346	165	154	210	--	50
18	1350	1340	4880	423	220	251	205	90	50
19	1480	1810	7230	517	495	691	194	70	37
20	960	1380	3580	729	1170	2300	178	55	26
21	820	480	1060	499	1040	1400	173	60	28
22	755	320	652	434	445	521	158	60	26
23	696	240	451	401	375	406	194	90	47
24	632	200	341	457	340	420	1990	4710	25300
25	577	175	273	475	380	487	1510	2660	S 12100
26	529	170	243	553	670	1000	559	900	1360
27	511	190	262	625	1680	2830	396	645	690
28	523	195	275	440	1310	1560	330	330	294
29	511	210	290	1120	4290	S 14100	286	285	220
30	505	205	280	1880	5070	25700	264	--	190
31	487	175	230	1310	4570	16200	--	--	--
Total	53496	--	92717	17424	--	72251	14129	--	59333

Total discharge for year (cfs-days)..... 517830
Total load for year (tons)..... 2576636

S Computed by subdividing day.

KANSAS RIVER BASIN--Continued

6-8566. REPUBLICAN RIVER AT CLAY CENTER, KANS.--Continued

Periodic determinations of suspended-sediment discharge and particle size, water year October 1959 to September 1960
(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, 1959.....	1245	52		2460	3350	22200	69	75	--	S6	--	98	99	100	--			VPWC
Oct. 14.....	1230	63		3SS	591	619	84	91	--	97	--	9S	99	99	100			VPWC
Jan. 13, 1960.....	1200	37		2220	6060	36300	50	64	--	85	--	98	--	--	--			SPWC
Mar. 28.....	1720	46		19600	3660	194000	43	52	59	--	74	S1	85	90	96	100		VPWC
June 13.....	0700	67		3880	4420	46300	35	50	--	77	--	97	--	--	--			SPWC
June 13.....	1325	70		3880	4750	49800	64	72	S0	85	91	98	99	100	--			VPWC
June 16.....	0700	70		5250	4820	68300	43	58	--	80	--	97	--	--	--			SPWC
June 17.....	0700	66		6480	6220	109000	50	74	--	S7	--	96	--	--	--			SPWC
June 17.....	1200	73		5870	6310	100000	51	71	--	90	--	96	--	--	--			SPWC
June 25.....	0700	69		7180	4400	85300	54	70	--	86	--	94	--	--	--			SPWC
June 25.....	1700	74		5840	3060	4S200	56	70	--	84	--	93	--	--	--			SPWC
Aug. 21.....	0900	77		499	1110	1500	70	76	--	90	--	99	--	--	--			SPWC
Aug. 27.....	0700	77		696	1920	3610	60	73	--	88	--	99	--	--	--			SPWC
Aug. 29.....	0700	74		981	3840	10200	47	62	--	90	--	100	--	--	--			PWC
Aug. 30.....	1200	78		2070	5380	30100	48	65	--	S9	--	99	--	--	--			SPWC
Sept. 24.....	1200	65		2270	5450	33400	43	63	--	81	--	98	--	--	--			SPWC

Particle-size analyses of bed material, water year October 1959 to September 1960
(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. 6, 1959.....	1650		14	4600			--	0	2	32	72	S2	89	96	100			SV
Oct. 14.....	1230		11	388			1	5	10	44	79	92	98	100	--			SV
Mar. 28, 1960.....	1720		10	19600			21	22	34	72	90	95	99	99	100			SV
May 31.....	1130		12	1780			--	0	5	38	70	84	95	99	100			SV
June 13.....	1400		7	3880			0	1	9	54	80	90	96	99	100			SV
July 6.....	1220		9	3000			0	1	14	45	67	81	94	99	100			SV
Aug. 11.....	1320		3	42S			--	0	4	57	8S	96	99	100	--			SV
Sept. 14.....	1240		6	226			--	0	6	45	76	88	98	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.--2,820 square miles.
RECORDS AVAILABLE.--Chemical analyses: December 1949 to September 1953.
Water temperatures: April 1950 to September 1953, August 1959 to September 1960.
Sediment records: August 1959 to September 1960.
EXTREMES, August 1959 to September 1960.--Water temperatures: Maximum, 85°F Aug. 1, 1959; minimum, freezing point on many days during November 1959 to March 1960.
Sediment concentrations: Maximum daily, 8,670 ppm Sept. 26, 1959; minimum daily, 10 ppm Dec. 6, 31, 1959.
Sediment loads: Maximum daily, 69,000 tons Mar. 25, 1960; minimum daily, 2 tons Dec. 6, 31, 1959.
EXTREMES, 1950-53, 1959-60.--Water temperatures: Maximum, 85°F Aug. 1, 1959; minimum, freezing point on many days during winter months.
REMARKS.--Records of discharge for water year October 1959 to September 1960 given in WSP 1710. Flow affected by ice Jan. 3-7, Jan. 15 to Feb. 3, Feb. 14 to Mar. 21.

Temperature (°F) of water, August to September 1959

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	85	81	81	82	83	82	78	75	72	76	76	72	72	74	78	75	78	80	80	79	80	80	80	80	79	78	76	78	80	74	75	78
September	75	72	70	78	75	75	76	76	75	69	63	63	63	63	64	65	62	60	64	62	65	68	68	69	62	65	65	64	61	57		67

Temperature (°F) of water, water year October 1959 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	
October	55	54	51	52	54	53	52	55	55	52	52	53	53	53	54	52	55	53	53	55	55	52	52	53	53	53	48	48	49	52	49	53
November	42	50	52	52	--	40	39	40	41	45	44	43	--	--	--	--	--	32	32	32	32	32	36	39	39	32	--	35	35	36	--	--
December	38	33	36	32	35	34	34	35	32	32	33	32	35	40	40	32	42	32	35	35	35	38	32	35	40	42	--	--	--	39	36	35
January	36	33	--	--	--	32	32	32	32	32	34	40	33	34	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
February	--	--	--	--	--	32	33	32	31	--	--	--	--	--	--	33	33	34	32	--	--	--	--	--	--	--	--	--	--	--	--	--
March	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	34	32	32	42	42	52	49	50	--
April	48	46	47	46	46	51	52	53	50	50	51	59	63	60	62	63	51	55	56	59	53	63	65	62	65	62	63	--	56	55	--	56
May	57	51	52	59	64	--	57	57	58	59	58	60	61	64	66	67	65	69	67	67	64	65	67	71	71	71	70	76	70	68	70	64
June	73	74	76	75	79	--	67	68	74	70	71	70	--	70	72	72	77	73	74	80	78	74	72	71	72	74	75	78	80	80	--	74
July	79	80	80	76	71	78	74	73	75	77	78	--	79	76	75	75	78	77	76	78	80	79	76	77	77	80	81	78	80	71	72	77
August	74	78	80	75	79	79	78	80	79	79	72	74	75	75	76	78	--	73	72	75	75	76	79	82	79	78	78	71	75	75	78	77
September	78	79	79	80	79	78	77	77	72	68	69	66	66	66	69	68	70	72	69	70	72	70	69	65	62	62	68	63	66	64	--	70

KANSAS RIVER BASIN--Continued

6-8895. SALINE RIVER AT TESCOTT, KANS.--Continued

Suspended sediment, August to September 1959

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..				72	240	47	57	205	32
2..				70	270	51	64	250	43
3..				74	270	54	88	310	74
4..				70	260	49	274	2110	1560
5..				64	230	40	130	2180	765
6..				60	265	43	79	1710	365
7..				60	200	32	64	665	115
8..				58	180	28	54	415	61
9..				58	230	36	49	340	45
10..				56	250	38	46	290	36
11..				55	235	35	44	225	27
12..				54	200	29	43	230	27
13..				52	200	28	42	240	27
14..				51	180	25	42	260	29
15..				52	190	27	42	315	36
16..				51	210	29	42	315	36
17..				51	270	37	42	240	27
18..				53	205	29	53	520	74
19..				60	320	52	359	3880 S	4860
20..				60	325	53	678	6220 S	12600
21..				57	260	40	972	7740	20300
22..				55	300	45	716	7800	15100
23..				92	485	120	260	5030	3530
24..				105	580	164	237	3880	2480
25..				94	510	129	192	2820	1460
26..				79	415	89	508	8670	11900
27..				70	420	79	261	6710	4730
28..				64	380	66	177	3260	1560
29..				60	390	63	126	1400	476
30..				60	320	52	96	780	202
31..				58	260	41	--	--	--
Total				1975	--	1650	5837	--	82577

Total discharge for period Aug. 1 to Sept. 30, 1959 (cfs-days)..... 7812
Total load for period Aug. 1 to Sept. 30, 1959 (tons)..... 84227

S Computed by subdividing day.

KANSAS RIVER BASIN--Continued

6-8695. SALINE RIVER AT TESCOTT, KANS.--Continued

Suspended sediment, water year October 1959 to September 1960
/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..	83	685	153	143	290	112	68	30	6
2..	149	1520	S 821	232	580	363	72	20	4
3..	963	7100	18500	176	1060	504	88	35	8
4..	1300	7410	26000	130	600	211	87	55	13
5..	850	5100	11700	114	305	94	83	35	8
6..	806	3820	8310	107	280	81	82	10	2
7..	1070	3910	11300	100	125	34	80	25	5
8..	1210	3770	12300	94	95	24	78	25	5
9..	720	3400	6610	91	70	17	76	25	5
10..	793	4150	8880	96	60	16	77	15	3
11..	841	5760	13100	98	60	16	77	35	7
12..	466	4800	6040	94	60	16	76	20	4
13..	303	3380	2760	92	55	14	76	20	4
14..	244	2460	1620	91	75	18	76	40	8
15..	201	1710	928	87	45	10	77	35	7
16..	174	1160	545	69	40	8	77	25	5
17..	152	770	316	60	55	9	77	30	6
18..	137	525	191	64	50	9	77	20	4
19..	126	400	136	74	35	7	77	20	4
20..	119	335	108	74	50	10	76	15	3
21..	115	305	95	80	40	9	76	20	4
22..	110	305	90	88	70	17	76	20	4
23..	108	275	80	98	105	28	75	15	3
24..	107	240	69	107	105	30	75	15	3
25..	157	340	144	102	100	28	76	20	4
26..	120	310	100	98	85	22	77	50	10
27..	106	365	104	95	60	15	80	--	11
28..	100	205	55	89	40	10	85	--	11
29..	96	150	39	85	25	6	87	--	10
30..	100	205	55	78	45	10	89	20	5
31..	103	220	61	--	--	--	92	10	2
Total	11929	--	131210	3006	--	1748	2445	--	178

	JANUARY			FEBRUARY			MARCH		
1..	89	20	5	160	--	22	135	--	16
2..	83	30	7	220	--	30	130	--	13
3..	70	--	6	280	--	340	130	--	13
4..	55	--	4	681	--	4800	125	--	13
5..	57	--	6	1470	--	26000	120	--	13
6..	64	50	9	1250	3950	13300	120	--	13
7..	66	35	6	766	2390	4940	115	--	13
8..	68	75	14	616	2110	3510	120	--	13
9..	68	90	16	515	1310	1820	130	--	13
10..	72	45	9	454	--	1200	140	--	13
11..	74	75	15	370	--	500	145	--	15
12..	96	650	S 169	285	--	300	150	--	16
13..	194	5960	3120	212	--	170	155	--	18
14..	310	5340	4470	165	--	90	165	--	20
15..	480	--	3900	170	--	140	180	--	24
16..	210	--	550	180	410	199	195	--	26
17..	120	--	160	160	465	201	190	--	22
18..	75	--	40	190	445	228	185	--	20
19..	95	--	26	200	545	294	190	--	20
20..	110	--	120	165	--	150	205	--	24
21..	95	--	20	90	--	40	215	--	28
22..	80	--	16	85	--	26	292	--	800
23..	75	--	14	105	--	30	559	--	2300
24..	72	--	14	135	--	50	1580	5200	S 25600
25..	70	--	12	150	--	60	3240	7890	69000
26..	73	--	12	145	--	40	4660	4610	58000
27..	75	--	10	140	--	30	6100	3160	52000
28..	80	--	12	145	--	30	8810	2790	66400
29..	85	--	12	140	--	24	11500	2200	68300
30..	90	--	16	--	--	--	8480	1980	45300
31..	100	--	18	--	--	--	4190	3000	S 30500
Total	3351	--	12808	9644	--	58564	52651	--	418566

S Computed by subdividing day.

KANSAS RIVER BASIN--Continued

6-6695. SALINE RIVER AT TESCOTT, KANS.--Continued

Suspended sediment, water year October 1959 to September 1960--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	2050	6340	35100	771	1660	S 3800	385	720	748
2	1440	3300	12800	782	2880	6080	344	660	613
3	1180	1910	6080	557	1180	1770	316	1030	879
4	1120	1560	4720	479	885	1140	300	880	713
5	1250	1820	6140	435	700	822	284	685	525
6	995	2160	5800	409	515	569	274	520	385
7	825	1610	3590	399	470	506	271	420	307
8	743	1230	2470	608	555	911	272	370	272
9	691	1020	1900	884	3210	7660	280	440	333
10	644	925	1610	681	3350	6160	303	535	438
11	608	810	1330	565	1710	2610	344	660	613
12	580	800	1250	489	1200	1580	400	1210	1310
13	562	805	1220	441	890	1060	392	1430	1510
14	565	775	1180	405	835	913	377	1190	1210
15	552	775	1160	379	600	614	532	1170	1680
16	538	690	1000	471	2380	3030	650	2540	4460
17	508	650	892	746	3350	S 9430	597	2720	4380
18	477	570	734	664	3250	5830	472	2210	2820
19	455	555	682	428	2320	2680	391	1570	1660
20	434	520	609	925	3070	S 9180	393	1960	2080
21	416	485	545	1660	7540	33800	493	1880	2500
22	399	460	496	1030	4830	13400	666	1740	3130
23	389	460	483	754	3590	7310	1080	5010	14600
24	378	450	459	623	2410	4050	912	6750	16600
25	364	450	442	530	1870	2680	589	4090	6500
26	351	435	412	469	1610	2040	458	2830	3500
27	339	405	371	427	1160	1340	396	1810	1940
28	340	395	363	395	940	1000	343	1280	1180
29	374	480	485	370	800	799	310	1070	896
30	409	540	596	354	705	674	286	945	730
31	--	--	--	353	660	629	--	--	--
Total	19976	--	94919	18483	--	134067	13110	--	78512
	JULY			AUGUST			SEPTEMBER		
1	262	860	608	104	460	129	436	3110	3660
2	247	825	550	99	475	127	338	2380	2170
3	229	780	482	96	455	118	292	1230	970
4	217	745	436	95	460	118	259	885	619
5	206	680	378	94	480	122	232	695	435
6	195	620	326	93	525	132	218	570	336
7	189	625	318	90	585	142	190	470	241
8	184	625	310	104	665	187	174	425	200
9	182	650	319	160	1620	700	162	365	160
10	182	650	319	216	2290	1340	154	295	123
11	181	670	327	177	1380	659	146	255	100
12	178	675	324	139	715	268	140	250	94
13	172	660	306	344	3610	S 3730	134	235	85
14	172	640	297	288	6510	5060	130	225	79
15	158	640	273	211	2060	1170	127	220	75
16	152	650	267	206	1490	829	124	235	79
17	145	650	254	189	1220	622	121	235	77
18	142	655	251	186	1110	557	118	235	75
19	138	660	246	325	2830	2480	115	255	79
20	136	650	239	205	2580	1430	113	245	75
21	143	655	253	142	1720	659	112	230	70
22	130	610	214	120	685	222	108	225	66
23	124	630	211	111	450	135	126	425	144
24	121	570	186	108	520	152	1300	5800	S 26400
25	118	540	172	135	535	195	2960	5760	46000
26	117	560	177	147	790	314	1350	7160	26100
27	115	540	168	694	4360	S 13800	586	4680	S 7860
28	114	525	162	2160	7020	40900	279	2610	1970
29	113	515	157	2170	4050	23700	149	2220	893
30	117	485	153	1700	5630	25800	94	960	244
31	110	445	132	850	4960	11400	--	--	--
Total	4989	--	8815	11758	--	137197	10787	--	119479

Total discharge for year (cfs-days)..... 162129
Total load for year (tons)..... 1196063

S Computed by subdividing day.

KANSAS RIVER BASIN--Continued

6-8695. SALINE RIVER AT TESCOTT, KANS.--Continued

Periodic determinations of suspended-sediment discharge and particle size, water year October 1959 to September 1960
(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. 26, 1960.....	0810	32		4470	4980	60100	48	66		87		99						SPWC
Mar. 27.....	1215	48		5990	3040	49200	53	66		89		99						SPWC
Mar. 28.....	1205	52		8420	2790	63400	57	71		92		100						SPWC
Mar. 29.....	1200	53		11900	2220	71300	56	74		92		100						SPWC
Mar. 30.....	1210	56		8300	1950	43700	57	73		94		99						SPWC
Mar. 31.....	1210	51		4080	2860	31500	43	60		89		100						SPWC
Apr. 1.....	1540	49		1950	4360	23000	36	48		71		99						SPWC
May 21.....	0810	64		1830	8970	44300	48	64		86		99						SPWC
Aug. 30.....	1015	--		1780	6490	31200	42	58		85		100						SPWC

KANSAS RIVER BASIN--Continued

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 1960.
Water temperatures: February 1949 to September 1952, September 1957 to September 1958.
Sediment records: May 1948 to September 1952.
REMARKS.--Records of discharge for water year October 1959 to September 1960 given in WSP 1710.

Chemical analyses, in parts per million, water year October 1959 to September 1960

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
															Parts per million	Tons per acre-foot	Tons per day	Calcium, Magnesium	Noncarbonate			
Oct. 7, 1959.....	3,740	12	0.10	33	3.3	3.6	8.2	122	0	16	0.1	0.5	1.6	0.05	136	0.16	1,370	96	0	0.2	220	7.6
Nov. 19.....	62	17	.18	122	25	150	11	362	0	205	159	.2	2.9	.12	869	1.16	145	406	109	3.2	1,360	7.6
Dec. 4.....	84	13	.13	90	29	91	11	296	0	168	96	.3	4.2	.16	670	.91	152	342	99	2.1	1,040	7.9
Jan. 2, 1960.....	a 70	8.9	.15	104	17	100	10	274	0	176	93	.2	3.8	.10	648	.88	122	331	106	2.4	1,020	7.6
Feb. 12.....	235	13	.18	79	13	39	9.8	170	0	134	47	.3	8.8	.12	446	.61	263	252	113	1.1	693	7.0
Mar. 11.....	a 60	17	.03	142	23	87	9.8	320	0	233	98	.3	7.4	.14	799	1.09	129	450	186	1.6	1,210	7.6
Apr. 15.....	1,250	11	.36	84	12	33	11	186	0	129	37	.4	6.6	.08	441	.60	1,490	260	107	.9	680	7.4
May 8.....	1,290	12	.54	85	16	36	12	160	0	145	45	.4	5.9	.07	471	.64	1,640	276	126	.9	711	7.3
June 4.....	1,000	8.5	.55	71	11	25	12	180	0	99	27	.4	1.4	.07	360	.49	972	223	75	.7	567	7.4
July 13.....	268	17	.29	102	15	62	12	236	0	157	71	.4	7.1	.09	583	.79	422	315	121	1.5	693	7.4
Aug. 20.....	153	16	.11	67	15	69	11	213	0	160	71	.4	4.3	.15	552	.75	228	280	105	1.8	849	7.3
Sept. 11.....	78	16	.22	86	19	106	11	232	0	172	128	.4	.1	.13	671	.91	141	294	104	2.7	1,070	7.2

a 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 1960.
REMARKS.--Records of discharge for water year October 1959 to September 1960 given in WSP 1710.

Chemical analyses, in parts per million, water year October 1959 to September 1960

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. 6, 1959.	876	10		0.27		40	4.9	29	7.2	131	0	30	34	0.4	6.1	0.06	234	120	13	1.2	395	7.5	
Nov. 18.....	101	20		.20		126	24	220	10	399	0	192	248	.3	2.6	.14	1,070	412	85	4.7	1,660	7.7	
Dec. 2.....	112	18		.06		125	28	248	10	398	0	228	269	.3	2.8	.13	1,160	428	102	5.2	1,780	7.9	
Jan. 4, 1960.	a 90	8.9		.19		105	25	199	9.4	327	0	197	221	.2	.7	.14	938	363	95	4.5	1,530	7.6	
Mar. 7.....	a 180	20		.04		155	28	180	8.7	381	0	263	217	.2	10	.15	1,110	502	190	3.5	1,730	7.4	
Mar. 25.....	1,170	13		.62		85	17	118	7.0	196	0	157	155	.2	7.1	.06	684	280	119	3.1	1,110	7.1	
Apr. 20.....	1,230	12		.11		93	14	56	10	218	0	139	62	.4	6.6	.08	522	289	110	1.4	823	7.4	
May 10.....	1,520	15		.35		97	16	50	10	220	0	158	51	.4	9.7	.08	542	307	127	1.2	816	7.3	
May 31.....	1,110	11		.42		78	13	46	11	197	0	118	53	.4	3.1	.07	448	249	87	1.3	706	7.5	
July 18.....	379	17		.76	0.07	90	13	81	10	250	0	125	99	.3	5.1	.08	582	280	75	2.1	934	7.4	
Aug. 10.....	444	12		.46		59	10	88	7.7	181	0	84	114	.2	4.3	.08	477	188	40	2.8	809	7.3	
Sept. 9.....	166	20		.20		95	16	124	11	286	0	136	150	.4	3.8	.13	710	303	68	3.1	1,150	7.4	

a Daily mean discharge.

6-8769. SOLOMON RIVER AT NILES, KANS.--Continued

Periodic determinations of suspended-sediment discharge and particle size, water year October 1959 to September 1960
(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, 1959	1910	60		676	2740	5000	--	--		--		--						
Oct. 14	2120	53		284	2970	2280	--	--		--		--						
Oct. 16	1030	56		212	786	450	--	--		--		--						
Nov. 18	1240	32		101	78	21	--	--		--		--						
Dec. 2	1410	--		113	104	32	--	--		--		--						
Jan. 4, 1960	1515	32		d 90	88	21	--	--		--		--						
Mar. 7	1615	32		d 180	200	97	--	--		--		--						
Mar. 25	1115	--		1140	1440	4430	--	--		--		--						
Mar. 28	1930	--		10000	2720	73400	46	60		76		99						SPWC
Mar. 30	1530	--		11500	2120	65800	50	78		90		97						SPWC
Apr. 20	1350	--		1230	1050	3490	33	33		62		86						SPWC
May 10	1310	--		1520	1550	6360	--	--		--		--						
May 31	1500	--		1110	821	2460	--	--		--		--						
June 21	0905	76		1130	4840	14800	44	63		83		100						SPWC
June 24	1600	76		2530	6970	47600	45	66		90		99						SPWC
July 18	1600	--		379	577	590	--	--		--		--						
Aug. 8	1440	--		186	453	227	--	--		--		--						
Sept. 9	1510	77		161	180	78	--	--		--		--						

d Daily mean discharge.

Particle-size analyses of bed material, water year October 1959 to September 1960
(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. 16, 1959	1030		4	212				0	4	26	84	100						SV
Aug. 10, 1960	1550		2	444			8	12	26	36	58	72	86	95	100			SV

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 1956.
Water temperatures: October 1955 to September 1960.
Sediment records: October 1957 to September 1960.
EXTREMES, 1959-60.--Water temperatures: Maximum, 80°F Aug. 3, 5-7.
Sediment concentrations: Maximum daily, 7,520 ppm Sept. 26; minimum daily, not determined.
Sediment loads: Maximum daily, 254,000 tons Mar. 27; minimum daily, 12 tons (estimated) Dec. 14.
EXTREMES, 1955-60.--Water temperatures: Maximum, 88°F June 21, 1956; minimum, freezing point on many days during winter months.
Sediment concentrations (1957-60): Maximum daily, 7,520 ppm Sept. 26, 1960; minimum daily, 4 ppm Dec. 6, 22, 1958.
Sediment loads (1957-60): Maximum daily, 254,000 tons Mar. 27, 1960; minimum daily, 5 tons Dec. 6, 22, 1958.
REMARKS.--Records of discharge for water year October 1959 to September 1960 given in WSP 1710.

Temperature (°F) of water, water year October 1959 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	
October	58	58	55	55	55	55	56	55	55	55	59	55	54	54	54	54	54	54	55	54	54	54	56	54	54	54	48	48	48	50	52	54
November	50	51	53	53	50	48	48	42	44	45	--	--	--	--	--	--	--	--	--	46	45	45	45	47	48	--	46	46	43	--	--	--
December	39	--	39	--	40	--	41	--	39	--	42	--	39	--	43	--	41	--	39	--	38	--	39	--	42	--	41	--	38	--	39	--
January	40	--	37	--	37	--	38	--	41	--	41	--	45	--	38	37	37	36	36	--	36	--	35	--	37	--	38	--	37	--	40	--
February	42	--	43	42	39	39	40	39	40	38	38	39	39	38	39	39	39	39	38	39	37	37	37	37	36	36	36	37	36	--	--	38
March	36	38	37	36	37	37	38	39	39	39	39	38	--	39	39	39	39	38	38	39	39	38	39	40	40	42	44	45	46	46	46	40
April	47	48	47	47	48	49	49	49	48	49	53	50	--	55	56	56	54	54	55	56	56	59	61	62	62	62	59	59	57	52	--	54
May	52	53	55	57	59	57	56	57	58	59	56	57	59	60	61	62	63	63	63	63	61	63	64	66	66	68	69	69	68	68	68	61
June	71	72	73	73	73	72	66	65	67	70	69	71	67	66	68	69	68	70	72	74	74	73	73	70	71	73	75	76	76	77	--	71
July	77	78	78	75	75	75	76	74	74	75	79	78	--	76	75	76	77	76	74	75	79	79	76	76	77	76	77	77	78	78	74	76
August	--	78	80	77	80	80	80	78	77	74	74	73	75	75	78	77	75	77	70	72	75	77	78	78	78	78	78	78	77	78	78	77
September	78	78	78	78	78	78	78	78	74	70	70	66	67	67	68	68	68	69	69	68	73	70	65	68	64	60	63	61	65	63	--	70

KANSAS RIVER BASIN--Continued

6-8776. SMOKY HILL RIVER AT ENTERPRISE, KANS.--Continued

Suspended sediment, water year October 1959 to September 1960
(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	882	1760	4190	1250	634	2140	563	92	140
2	4290	5430	S 76200	1050	582	1650	528	--	100
3	6780	5180	94800	1020	369	1020	514	--	90
4	5500	5190	77100	970	431	1130	500	--	70
5	5470	3840	56700	910	608	1490	488	39	51
6	4530	3840	47000	819	600	1330	458	--	50
7	3630	4000	39200	774	234	489	458	43	53
8	3370	3120	28400	756	206	420	452	--	30
9	3760	3090	31400	738	276	550	446	17	20
10	5160	4580	63800	837	220	497	446	--	18
11	5920	4880	78000	855	179	413	434	12	14
12	5130	3170	43900	837	152	343	428	--	14
13	3930	2380	25200	828	164	367	416	12	13
14	3320	2520	22600	810	149	326	416	--	12
15	2910	2090	16400	801	130	281	422	--	16
16	2670	1620	11700	792	113	242	422	--	24
17	2570	1070	7420	584	102	161	422	22	25
18	2460	858	5700	656	98	174	410	--	20
19	2350	760	4820	828	131	293	410	25	28
20	2280	755	4650	828	130	291	404	--	20
21	2320	629	3940	656	86	152	404	--	20
22	2240	638	3860	570	91	140	404	--	18
23	2200	628	3730	521	72	101	404	16	17
24	2160	737	4300	500	63	85	404	--	16
25	2040	636	3500	500	58	78	392	13	14
26	1630	519	2280	494	49	65	410	--	30
27	1100	382	1130	500	174	235	542	48	70
28	765	288	595	507	492	673	549	--	50
29	672	231	419	549	170	252	535	22	32
30	900	240	583	570	52	80	521	--	28
31	1520	466	1910	--	--	--	476	--	24
Total	94459	--	765427	22310	--	15468	14078	--	1127

Day	JANUARY			FEBRUARY			MARCH		
1	458	16	20	1080	366	1070	950	135	346
2	452	--	20	1320	545	1940	950	141	362
3	345	44	41	1460	921	3630	896	164	397
4	300	--	30	1640	1890	8370	923	171	426
5	350	57	54	2990	1620	13100	887	163	390
6	392	--	120	4290	3470	40200	812	152	333
7	470	128	162	5630	4870	74000	869	148	347
8	464	--	140	5050	3440	46900	977	191	504
9	428	98	113	3850	3370	35000	977	198	522
10	434	--	120	2940	1820	14400	986	212	564
11	440	130	154	2410	1080	7030	1010	239	652
12	458	56	69	2030	1040	5700	1080	124	362
13	488	113	149	1730	974	4550	1100	181	538
14	934	--	900	1400	768	2900	1090	161	474
15	3570	3000	28900	1310	742	2620	1070	176	508
16	3640	3910	38400	1270	521	1790	1070	138	399
17	2570	3250	22600	1240	482	1610	1180	178	567
18	1040	3090	8680	1260	503	1710	1180	159	506
19	458	1010	1250	1280	422	1460	1320	241	859
20	500	445	601	1260	158	538	1450	447	1750
21	656	224	397	1070	158	456	1600	326	1410
22	765	--	500	950	139	356	2400	785	5090
23	696	260	489	692	162	303	4440	3090	S 39200
24	619	--	420	520	133	187	7270	5010	98300
25	549	270	400	828	154	344	9500	4310	110000
26	514	--	380	941	97	246	12600	4080	139000
27	507	301	412	959	102	264	18800	5000	254000
28	535	--	420	1040	111	312	18000	3990	194000
29	563	201	306	995	108	290	17100	4380	202000
30	598	--	500	--	--	--	17700	3720	178000
31	828	428	957	--	--	--	20800	3270	184000
Total	25021	--	107704	53435	--	271276	150987	--	1415806

S Computed by subdividing day.

KANSAS RIVER BASIN--Continued

6-8776. SMOKY HILL RIVER AT ENTERPRISE, KANS.--Continued

Suspended sediment, water year October 1959 to September 1960--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	23800	3370	216000	6420	1960	34000	2120	767	4390
2	26000	2850	200000	5690	1520	23400	2160	758	4420
3	21100	2980	170000	6040	1170	19100	2140	679	3920
4	12100	4000	131000	5970	1560	25100	2080	622	3490
5	9020	4660	113000	5260	1510	21400	2000	625	3380
6	7950	3190	68500	4840	1470	19200	1970	598	3180
7	6260	3080	52100	4520	2470	30100	1980	595	3180
8	5270	3060	43500	3800	2150	22000	2200	595	3530
9	4660	1660	20900	3420	1090	10100	3570	1880	18100
10	4340	1270	14900	3690	848	8450	2840	1180	9050
11	4520	1280	15600	3760	1000	10200	2680	798	5770
12	5310	1590	22800	3540	1310	12500	2440	735	4840
13	5910	2110	33700	3650	1760	17300	2360	638	4060
14	8490	4670	S 118000	3560	1740	16700	2620	718	5080
15	8220	3860	85700	3450	1210	11300	3420	1170	10800
16	6840	2390	44100	3450	782	7280	3750	1880	19000
17	5500	2240	33300	4000	851	9190	3620	2610	25500
18	5190	1240	17400	4400	2870	34100	4000	2720	29400
19	5600	1210	18300	3700	2610	26100	4120	2870	31900
20	5500	1410	20900	3750	2580	26100	4220	3270	37200
21	5330	1400	20100	5010	2580	34900	3880	2920	30600
22	5100	1190	16400	4480	3110	37600	3660	3180	31400
23	5080	1100	15100	4260	2610	30000	3260	3310	29100
24	4940	1060	14100	3410	3710	34200	3750	2760	27900
25	4850	1120	14700	2620	2610	18500	5120	3060	42300
26	4790	1090	14100	2380	1960	12600	4660	3950	49700
27	4800	1070	13900	2320	2070	13000	4000	3670	39600
28	4820	1080	14000	2240	1770	10700	3680	3790	37600
29	5840	1470	23200	2200	1420	8430	2760	3640	27100
30	6480	2270	39700	2190	1050	6210	2330	3160	19900
31	--	--	--	2110	888	5060	--	--	--
Total	233610	--	1625000	120130	--	594820	93390	--	565390

	JULY			AUGUST			SEPTEMBER		
1	2140	2790	16100	592	202	323	3400	4130	37900
2	1950	1960	10300	571	201	310	3420	4700	43400
3	1840	1570	7800	571	188	290	3570	3490	33600
4	1770	982	4690	578	146	228	3460	3820	35700
5	1760	812	3860	564	81	123	3320	1670	15000
6	1690	761	3470	538	172	250	3300	1300	11600
7	1560	695	2930	520	103	144	3230	1310	11400
8	1460	628	2480	526	162	230	2940	1150	9130
9	1280	552	1910	860	350	813	1870	887	4480
10	1230	525	1740	1100	435	1290	1240	646	2160
11	1160	551	1720	1220	939	3090	932	482	1210
12	1500	1060	4290	932	600	1510	804	353	766
13	1620	1200	5250	905	448	1090	772	371	773
14	1500	1120	4540	914	442	1090	740	249	497
15	1590	1230	5280	923	403	1000	732	214	423
16	1260	912	3100	968	578	1510	724	186	364
17	1160	683	2140	860	777	1800	724	211	412
18	1660	862	3860	1440	1920	7460	716	208	402
19	1440	1270	4940	2320	2400	15000	668	171	308
20	1050	505	1430	1330	1960	7040	620	147	246
21	860	378	878	1130	875	2670	620	191	320
22	804	367	797	1000	600	1620	592	136	217
23	780	322	678	804	315	684	708	1010	1930
24	772	301	627	764	295	608	3360	3250	S 36800
25	764	289	596	708	262	501	5760	5340	83000
26	740	488	975	668	205	370	7390	7520	150000
27	748	342	691	869	345	809	5280	4850	69100
28	756	231	471	1180	508	1620	3150	3770	32100
29	716	258	499	1940	1310	6860	1840	2650	13200
30	636	223	383	3840	4320	44800	1320	1780	6340
31	620	215	360	4550	7160	88000	--	--	--
Total	38816	--	98785	35685	--	193133	67202	--	602778

Total discharge for year (cfs-days)..... 949123
Total load for year (tons)..... 6256714

S Computed by subdividing day.

KANSAS RIVER BASIN--Continued

6-8776. SMOKY HILL RIVER AT ENTERPRISE, KANS.--Continued

Periodic determinations of suspended-sediment discharge and particle size, water year October 1959 to September 1960
(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	
Oct. 3, 1959	1440	55		6350	4130	70800	61	66		80		97	98	100	--			VPWC
Jan. 15, 1960	1300	38		3750	5120	51800	36	49		67		--	--	--	--			PWC
Mar. 25	1300	42		9540	3980	102000	26	35		51		92	97	99	100			VPWC
Mar. 25	1300	42		9540	3980	102000	14	27		53		92	97	99	100			VPN
Apr. 26	1540	65		4830	997	13000	34	41		61		--	--	--	--			PWC
May 24	1500	77		3270	3520	31100	49	66		88		--	--	--	--			PWC
June 20	1410	79		4370	2930	34600	24	53		79		--	--	--	--			PWC

6-8830. LITTLE BLUE RIVER NEAR DEWEESE, NEBR.

LOCATION.--At bridge on State Highway 14, 0.2 mile downstream from gaging station, 0.6 mile upstream from Walnut Creek, 4 miles southeast of Deweese, Clay County, and 5.6 miles northwest of Angus.
DRAINAGE AREA.--1,140 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: August 1956 to September 1956, October 1959 to June 1960.
Water temperatures: August 1956 to September 1960.
Sediment records: August 1956 to September 1960.
EXTREMES, 1959-60.--Water temperatures: Maximum, 80°F Sept. 7; minimum, freezing point Feb. 26, 27.
Sediment concentrations: Maximum daily, 13,800 ppm May 16; minimum daily, 6 ppm Sept. 16.
Sediment loads: Maximum daily, 101,000 tons May 19; minimum daily, 1 ton Sept. 16.
EXTREMES, 1956-60.--Water temperatures: Maximum, 63°F Aug. 10, 1959; minimum, freezing point Feb. 26, 27, 1960.
Sediment concentrations: Maximum daily, 13,800 ppm May 16, 1960; minimum daily, 6 ppm Sept. 16, 1960.
Sediment loads: Maximum daily, 129,000 tons June 16, 1957; minimum daily, 1 ton Oct. 1, 1958, Sept. 16, 1960.
REMARKS.--Records of discharge for water year October 1959 to September 1960 given in WSP 1710. Flow affected by ice Nov. 6, 14-19, 27-29, Dec. 28, 29, Jan. 2-8, 14-31, Feb. 10-12, Feb. 20 to Mar. 8.

Chemical analyses, in parts per million, October 1959 to June 1960

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, 1959.	95	26		1.6	--	41	6.2	10	6.1	158	0	22	6.1	0.3	2.4	0.04	204	128	0	0.4	313	7.5	
Nov. 12.....	71	31		.05	--	60	9.6	15	7.8	221	0	32	6.5	.3	1.0	.05	273	189	6	.5	427	8.0	
Dec. 21.....	73	28		.06	--	61	8.5	15	6.3	224	0	33	8.8	.2	.9	.05	273	187	3	.5	426	7.7	
Mar. 2, 1960.	a 78	32		.06	--	59	6.0	15	5.6	212	0	31	7.3	.4	1.6	.13	271	160	6	.5	415	7.5	
Mar. 28.....	7,660	9.9		.29	--	6.7	1.0	1.8	6.9	27	0	5.6	.0	.3	2.2	.04	78	21	0	.2	63	6.3	40
May 20.....	4,350	21		.32	0.28	6.3	3.2	1.9	10	40	0	13	.0	.3	1.0	.10	61	34	1	.1	83	6.5	
June 21.....	4,960	20		.21	.09	7.2	2.4	1.6	8.0	35	0	14	.0	.3	2.0	.02	108	28	0	.1	110	6.5	

a Daily mean discharge.

KANSAS RIVER BASIN--Continued

6-8830. LITTLE BLUE RIVER NEAR DEWEESE, NEBR.--Continued

Temperature (°F) of water, water year October 1959 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	
October	49	47	49	52	54	53	57	49	52	50	48	49	47	48	50	53	49	50	49	50	53	54	50	45	50	48	40	42	41	40	42	49
November	46	48	52	50	42	38	35	43	45	44	38	37	34	34	34	33	40	41	43	44	43	41	42	45	46	38	36	39	36	40	--	41
December	41	43	49	45	43	45	46	44	45	42	44	44	43	41	43	41	42	41	40	39	38	40	39	40	39	46	34	36	34	38	38	41
January	35	34	34	33	34	36	36	35	37	35	35	38	39	37	35	34	34	33	33	33	33	33	35	34	35	35	36	36	37	38	36	35
February	38	37	39	37	35	39	41	49	41	34	35	35	36	36	35	34	34	34	34	34	34	34	34	33	33	32	32	33	33	--	--	36
March	33	33	33	33	33	33	34	34	41	40	37	36	34	35	34	38	42	45	44	45	45	46	43	39	35	39	36	39	43	37	--	38
April	40	37	46	41	45	53	52	50	50	52	54	56	58	58	58	57	56	53	54	54	57	58	60	61	56	54	53	51	53	54	--	53
May	55	60	57	58	52	56	51	54	55	54	52	53	56	56	60	58	61	62	58	--	57	62	65	68	69	68	66	68	69	64	66	60
June	68	65	66	68	60	64	61	62	64	--	67	--	65	68	69	65	65	69	69	71	67	70	68	67	70	70	70	70	70	69	--	67
July	67	75	75	65	72	67	73	69	73	74	75	75	--	70	70	70	70	70	70	70	70	70	70	70	70	70	70	75	65	70	70	71
August	70	70	70	70	70	70	70	70	70	70	65	70	70	70	70	70	68	70	68	70	70	69	70	70	69	69	75	70	70	73	79	70
September	78	72	75	78	79	77	80	70	69	70	64	60	63	62	63	63	62	66	60	65	--	--	--	60	62	65	64	67	65	60	--	67

KANSAS RIVER BASIN--Continued

6-6630. LITTLE BLUE RIVER NEAR DEWEESE, NEBR.--Continued

Suspended sediment, water year October 1959 to September 1960

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	220	47	72	32	6	73	140	28
2	100	2150	580	72	86	17	73	72	14
3	147	1900	754	72	150	29	73	92	18
4	116	940	294	72	76	15	73	92	18
5	95	510	131	71	65	12	72	338	66
6	86	320	74	69	68	13	72	500	97
7	81	650	142	70	84	16	76	400	82
8	228	5760	S 3900	70	62	12	76	340	70
9	105	940	266	70	60	11	74	400	80
10	87	400	94	71	70	13	76	430	88
11	81	260	57	70	60	11	77	420	87
12	79	260	55	71	50	10	78	610	128
13	78	320	67	71	86	16	78	780	164
14	74	180	36	65	100	18	78	540	114
15	73	250	49	70	130	25	77	470	98
16	72	110	21	75	140	28	77	450	94
17	73	100	20	80	92	20	77	370	77
18	72	120	23	70	72	14	76	200	41
19	73	100	20	70	72	14	73	160	32
20	72	150	29	73	72	14	74	110	22
21	72	110	21	73	72	14	73	90	18
22	72	70	14	73	76	15	74	100	20
23	73	64	13	73	76	15	72	90	18
24	71	62	12	71	76	15	73	78	15
25	71	54	10	71	90	17	76	80	16
26	69	58	11	70	60	11	77	84	17
27	69	60	11	69	60	11	79	90	19
28	70	120	23	70	88	17	70	96	18
29	70	58	11	71	140	27	75	90	18
30	73	50	10	73	150	30	76	82	17
31	74	40	8	--	--	--	76	72	15
Total	2655	--	6803	2138	--	486	2324	--	1609
	JANUARY			FEBRUARY			MARCH		
1	80	70	15	68	110	20	78	78	16
2	75	70	14	70	110	21	78	130	27
3	70	72	14	74	110	22	70	96	18
4	65	78	14	76	120	25	70	55	10
5	65	92	16	76	120	25	75	200	40
6	65	94	16	76	120	25	75	210	43
7	70	88	17	76	120	25	80	380	82
8	75	70	14	79	210	45	88	260	62
9	73	60	12	86	180	42	80	100	21
10	73	52	10	70	130	25	79	94	20
11	72	50	10	70	450	85	78	72	15
12	74	110	22	70	340	64	77	150	31
13	73	74	15	78	100	21	78	110	23
14	70	64	12	76	88	18	82	230	51
15	70	62	12	77	220	46	82	120	27
16	64	56	10	77	230	48	81	120	26
17	66	52	9	77	150	31	78	90	19
18	66	50	9	77	190	40	79	86	19
19	68	50	9	77	190	40	80	98	21
20	68	50	9	75	180	36	80	92	20
21	68	48	9	75	160	32	80	96	21
22	70	42	8	65	140	25	82	96	21
23	72	42	8	70	140	26	84	100	23
24	74	40	8	60	150	24	100	620	167
25	71	48	9	75	140	28	187	2220	1120
26	71	62	12	78	150	32	738	6050	12100
27	72	70	14	80	130	28	5970	3060	49300
28	76	78	16	80	100	22	8590	2050	47500
29	74	76	15	80	82	18	4010	1600	17300
30	72	72	14	--	--	--	1120	780	2360
31	70	90	17	--	--	--	534	1000	1440
Total	2192	--	389	2168	--	939	23063	--	131943

S Computed by subdividing day.

KANSAS RIVER BASIN--Continued

6-8830. LITTLE BLUE RIVER NEAR DEWEESE, NEBR.--Continued

Suspended sediment, water year October 1959 to September 1960--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..	1770	8600	S 49300	102	84	23	109	820	241
2..	2230	3130	18800	101	90	25	108	640	187
3..	825	2320	5170	98	170	45	105	700	198
4..	595	2120	3410	100	100	27	105	540	153
5..	439	1680	1990	112	1620	490	146	890	351
6..	312	880	741	165	1980	S 936	111	450	135
7..	230	400	248	164	1360	602	111	200	60
8..	190	980	503	147	1500	595	113	160	49
9..	167	1400	631	118	930	296	681	9690	S 21200
10..	153	230	95	102	260	72	294	3200	2540
11..	148	340	136	97	360	94	1250	8170	S 31500
12..	139	190	71	95	230	59	824	6400	14200
13..	136	160	59	92	280	70	427	4000	4610
14..	128	160	55	91	350	86	297	3900	3130
15..	126	120	41	91	480	118	556	5600	8410
16..	122	120	40	1270	13800	S 53100	1580	12100	51600
17..	122	130	43	298	6560	S 4970	1680	5400	24500
18..	118	110	35	182	13200	6490	992	6000	16100
19..	115	110	34	3370	12600	S 101000	492	8000	10600
20..	112	110	33	4120	5660	63000	757	9140	18700
21..	109	110	32	1640	4600	20400	3090	7050	58800
22..	106	110	31	550	3250	4830	3800	4000	41000
23..	106	94	27	310	1400	1170	3290	3000	26600
24..	106	100	29	228	1000	616	1220	3050	10000
25..	105	100	28	185	500	250	475	2020	2590
26..	102	110	30	157	210	89	300	2150	1740
27..	102	150	41	139	200	75	230	3250	2020
28..	104	160	45	130	200	70	192	4000	2070
29..	106	100	29	122	170	56	171	3900	1800
30..	105	120	34	118	140	45	703	6060	S 10900
31..	--	--	--	113	330	101	--	--	--
Total	9228	--	81761	14607	--	259800	24209	--	365984

Day	JULY			AUGUST			SEPTEMBER		
1..	352	2400	2280	81	170	37	46	170	21
2..	245	2300	1520	76	180	37	44	140	17
3..	172	1100	511	76	120	25	42	110	12
4..	144	500	194	74	110	22	39	100	11
5..	213	750	431	74	85	17	36	120	12
6..	1230	7640	25400	70	95	18	36	120	12
7..	396	2650	2830	72	110	21	38	160	16
8..	198	1200	642	70	120	23	40	130	14
9..	162	478	209	66	120	21	44	120	14
10..	172	860	399	63	120	20	44	120	14
11..	140	860	325	62	130	22	48	87	11
12..	125	560	189	64	230	40	47	110	14
13..	113	500	153	62	240	40	49	150	20
14..	120	310	100	63	120	20	50	70	9
15..	125	480	162	61	120	20	52	17	2
16..	113	460	140	57	150	23	53	6	1
17..	106	410	117	60	180	29	55	28	4
18..	113	290	88	61	90	15	59	95	15
19..	131	820	290	60	95	15	57	150	23
20..	108	850	248	58	120	19	57	98	15
21..	93	320	80	59	140	22	57	95	15
22..	90	210	51	61	110	18	56	100	15
23..	86	180	42	64	92	16	62	160	27
24..	86	160	37	66	270	48	68	250	46
25..	88	170	40	64	280	48	65	320	56
26..	88	180	43	77	320	67	59	72	11
27..	86	200	46	69	280	52	59	190	30
28..	88	320	76	62	300	50	59	240	38
29..	161	1310	S 680	61	380	63	434	9590	S 14400
30..	152	1510	620	58	350	55	508	3250	4460
31..	93	460	116	53	180	26	--	--	--
Total	5589	--	38059	2024	--	949	2363	--	19355

Total discharge for year (cfs-days)..... 92560
Total load for year (tons)..... 908077

S Computed by subdividing day.

6-8830. LITTLE BLUE RIVER NEAR DEWEESE, NEBR.--Continued

Particle-size analyses of suspended sediment, water year October 1959 to September 1960
(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. 5, 1959	1015	54		96	530		82	86	--	89	--	98	99	100	--	--		VPWC
Nov. 12	1120	42		71	47		--	--	--	--	--	77	83	97	100	--		V
Dec. 21	1450	41		73	86		--	--	--	--	--	82	89	97	100	--		V
Mar. 27, 1960	1855	--		9240	3100		42	48	53	61	76	87	89	93	98	100		VPWC
Mar. 28	1400	45		7030	2400		25	44	58	70	81	89	90	93	100	--		VPN
Mar. 28	1400	45		7030	2400		52	58	66	71	82	89	90	93	100	--		VPWC
Apr. 2	1500	42		2200	5040		61	66	70	76	86	95	98	99	100	--		VPWC
May 3	1100	61		97	212		45	47	--	75	--	100	--	--	--	--		VPWC
May 20	1305	55		4300	5500		--	--	--	--	--	95	96	97	100	--		V
June 10	1355	72		276	2660		66	70	76	85	90	99	100	--	--	--		VPWC
June 16	1655	--		1790	9180		59	64	71	77	87	96	98	99	100	--		VPWC
June 21	1650	72		4860	6400		61	67	73	80	87	94	95	98	99	100		VPWC
June 22	1300	68		3720	4210		74	79	81	82	90	93	95	98	100	--		VPWC

Particle-size analyses of bed material, water year October 1959 to September 1960
(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. 12, 1959	1120		6	71			0	1	5	46	79	90	98	100	--	--		SV
Jan. 12, 1960	1030		5	74			--	0	8	52	82	92	97	99	100	--		SV
Mar. 28	1400		5	7030			1	1	5	30	62	80	91	97	100	--		SV
May 20	1305		6	4300			0	1	13	45	71	83	92	98	99	100		SV
June 10	1355		17	276			1	2	6	29	55	70	84	94	98	100		SV
June 16	1655		6	1790			0	1	8	35	61	75	87	96	100	--		SV
June 21	1650		9	4860			0	1	7	41	67	82	92	97	100	--		SV
June 22	1300		8	3720			--	0	12	38	68	80	91	98	100	--		SV
July 13	1130		20	108			2	4	11	42	63	74	86	96	100	--		SV
Aug. 11	1420		16	61			--	2	6	43	81	93	98	100	--	--		SV
Sept. 14	1100		15	49			0	2	8	36	67	83	95	100	--	--		SV
Sept. 26	1145		10	59			0	2	8	28	50	63	77	92	100	--		SV

KANSAS RIVER BASIN--Continued

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 1960.
Sediment records: October 1957 to September 1960.
EXTREMES, 1959-60.--Water temperatures: Maximum, 69°F July 24.
Sediment concentrations: Maximum daily, 8,580 ppm Jan. 14; minimum daily, not determined.
Sediment loads: Maximum daily, 740,000 tons Mar. 28; minimum daily, 400 tons (estimated) Dec. 9.
EXTREMES, 1956-60.--Water temperatures: Maximum, 90°F Aug. 4, 1959; minimum, freezing point on many days during winter months.
Sediment concentrations (1957-60): Maximum daily, 10,000 ppm July 5, 1959; minimum daily, not determined.
Sediment loads (1957-60): Maximum daily, 752,000 tons May 7, 1959; minimum daily, not determined.
REMARKS.--Records of discharge for water year October 1959 to September 1960 given in WSP 1710. Flow affected by ice Nov. 17, 18, 28, 29, Dec. 5-10, Jan. 3-6, Jan. 19 to Feb. 2, Feb. 13, 14, Feb. 20 to Mar. 21.

Temperature (°F) of water, water year October 1959 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	
October	47	45	45	44	57	59	61	59	59	59	56	56	56	54	57	58	59	59	54	56	55	59	58	52	54	56	53	52	54	--	52	55
November	53	52	--	52	--	--	--	45	50	51	48	--	--	36	--	--	--	35	--	36	44	--	45	44	--	--	37	--	--	35	--	--
December	37	--	40	--	42	--	--	41	--	--	43	--	42	--	--	43	--	--	--	42	--	--	40	--	--	--	49	--	--	45	--	--
January	--	--	--	--	--	34	--	--	--	--	37	--	43	40	34	33	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
February	--	--	41	--	35	--	--	38	38	--	--	--	--	33	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
March	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	39	--	39	37	43	45	45	45	47	49	--
April	45	45	47	47	46	50	50	50	43	50	52	57	55	56	61	60	60	58	--	60	58	61	66	--	69	64	64	62	60	56	--	55
May	54	59	57	60	63	61	62	61	59	60	63	58	--	70	67	70	70	68	68	65	69	72	70	69	70	69	69	72	74	74	77	66
June	79	80	82	84	77	71	69	71	71	74	75	73	70	72	71	75	74	75	78	80	77	77	75	75	75	77	77	82	84	84	--	76
July	82	78	84	82	80	80	81	77	85	84	88	--	80	79	80	76	78	80	86	--	83	81	--	89	--	--	83	84	--	80	80	82
August	82	--	80	--	--	--	--	--	81	87	82	81	79	--	80	--	--	79	80	83	85	80	86	87	81	79	80	79	83	85	85	--
September	80	85	80	81	--	84	84	--	77	78	--	--	76	--	73	--	75	--	--	--	--	72	--	67	72	68	70	65	70	70	--	--

KANSAS RIVER BASIN--Continued

6-8875. KANSAS RIVER AT WAMEGO, KANS.--Continued

Suspended sediment, water year October 1959 to September 1960
/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	3260	1710	15000	3800	620	6360	1790	210	1010
2	3090	1290	10800	4620	925	11500	1800	--	1200
3	16100	4440	S 227000	3630	720	7060	1800	315	1530
4	25500	3880	267000	3080	535	4450	1800	--	950
5	22300	2930	176000	2900	--	3400	1730	120	561
6	21000	2440	138000	2700	--	2600	1730	--	500
7	19600	2210	117000	2560	--	1900	1720	100	464
8	20400	2720	150000	2480	225	1510	1660	--	450
9	17400	2150	101000	2640	205	1460	1600	--	400
10	15400	1800	74800	2610	200	1410	1600	--	500
11	11800	1770	56400	2540	160	1100	1670	160	721
12	10100	3010	82100	2560	--	900	1660	--	750
13	8820	2610	62200	2460	--	850	1630	225	990
14	6930	1740	32600	2400	130	842	1610	--	850
15	5670	1420	21700	2290	140	866	1620	--	800
16	4890	1390	18400	2160	--	850	1610	165	717
17	4510	1160	14100	2000	--	900	1580	--	700
18	4260	890	10200	2090	185	1040	1500	--	650
19	4160	680	7640	2090	--	900	1480	160	639
20	4080	525	5780	2120	135	773	1500	--	650
21	3840	455	4720	2210	210	1250	1340	--	600
22	3820	430	4430	2220	--	1250	1450	180	705
23	3780	525	5360	2090	200	1130	1390	--	650
24	4560	680	8370	2040	215	1180	1390	--	650
25	5290	880	12600	1970	--	1150	1410	--	650
26	4300	640	7430	1940	--	1100	1400	--	650
27	3590	485	4700	1810	215	1050	1410	--	700
28	3130	370	3130	1800	--	950	1810	--	5000
29	2710	270	1980	1730	--	750	2300	1250	7760
30	2460	230	1530	1740	135	634	1870	--	1900
31	2530	205	1400	--	--	--	1660	--	800
Total	269280	--	1643370	73280	--	61115	50520	--	35097
	JANUARY			FEBRUARY			MARCH		
1	1610	--	750	4000	--	2200	2500	--	1100
2	1540	--	700	4500	--	6100	2570	--	1100
3	1290	--	550	4810	1310	17000	2640	--	1100
4	1230	--	500	6880	--	36000	2710	--	1200
5	1120	--	450	8010	2020	43700	2750	--	1200
6	1120	--	450	8550	--	47000	2750	--	1200
7	1280	--	550	9480	--	56000	2700	--	1200
8	1440	--	750	10400	2820	79200	2820	--	1200
9	1580	--	1200	10000	2740	74000	2850	--	1200
10	1540	--	1200	9340	--	50000	3000	--	1300
11	1560	--	1500	8380	--	36000	2850	--	1200
12	1560	--	2000	7200	--	25000	2700	--	1200
13	3340	2310	S 31300	5800	--	17000	2850	--	1200
14	9510	8580	220000	4600	1890	23500	2700	--	1200
15	9820	5230	139000	4080	--	7700	2950	--	1300
16	14000	6060	229000	3980	--	7000	2700	--	1200
17	10200	--	83000	4000	--	5900	3400	--	1500
18	4850	--	26000	4640	--	5600	3300	--	1500
19	3350	--	12000	4660	--	3800	3600	--	1500
20	2000	550	2970	4220	--	3000	3550	--	1800
21	1800	--	2700	3600	--	2600	4700	--	9000
22	2000	--	2500	3200	--	2200	3630	580	5680
23	1900	--	2000	2700	--	1800	4580	1300	16100
24	1900	--	1700	2500	--	1500	7630	2210	45500
25	2000	--	1500	2500	--	1200	12500	3410	115000
26	2200	--	1500	2600	--	1200	17000	4230	194000
27	2500	--	1500	2700	--	1200	36800	5370	534000
28	2700	--	1700	2700	--	1200	55800	4910	740000
29	2800	--	1700	2500	--	1200	66500	3920	704000
30	3200	--	1900	--	--	--	67200	3490	633000
31	3500	--	2000	--	--	--	63600	3100	532000
Total	100440	--	774570	152530	--	559800	397830	--	3553680

S Computed by subdividing day.

KANSAS RIVER BASIN--Continued

6-8875. KANSAS RIVER AT WAMEGO, KANS.--Continued

Suspended sediment, water year October 1959 to September 1960--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..	60300	2790	454000	15700	1900	80500	7160	790	15300
2..	58500	2780	439000	15800	2410	103000	6670	800	14400
3..	58800	3220	511000	13600	1210	44400	6410	720	12500
4..	55800	2600	392000	12600	1110	37800	6280	575	9750
5..	50500	2520	344000	12100	1070	35000	6250	615	10400
6..	46000	2510	312000	13400	2320	83900	6150	605	10000
7..	42400	2610	298000	16700	2400	108000	5940	595	9540
8..	40300	1870	203000	17400	1650	77500	5760	535	8320
9..	35200	1690	161000	14400	1390	54000	6540	800	14100
10..	22700	1500	91900	12100	985	32200	7670	1580	32700
11..	14200	1300	49800	11900	820	26300	7190	1780	34600
12..	16500	1390	61900	11600	1120	35100	10100	2850 S	84200
13..	31300	1920	162000	9070	865	21200	15700	4770	202000
14..	33000	1850	165000	9040	915	22300	17200	4710	219000
15..	33100	2490	222000	9520	950	24400	16900	4260	194000
16..	29600	1890	151000	11100	1000	30000	14900	3790	152000
17..	23000	1350	83800	21000	4510	256000	19700	5220	278000
18..	15700	1510	64000	17300	4180	195000	21200	4600	263000
19..	12400	1410	47200	16400	4720	209000	18200	4210	207000
20..	12000	1400	45400	15800	3020	129000	15800	4000	171000
21..	11500	1110	34500	12400	2540	85000	13200	3500	125000
22..	11300	910	27800	12800	3100	107000	15100	3880	158000
23..	11300	805	24600	17800	3160	152000	19300	5500	287000
24..	11200	775	23400	19600	3780	200000	21200	4190	240000
25..	11000	790	23500	15800	3410	145000	22600	3480	212000
26..	11000	800	23800	13200	2920	104000	26300	3790	269000
27..	10900	725	21300	11200	2280	68900	24800	3310	222000
28..	10900	800	23500	9520	1880	48300	21100	2440	139000
29..	11400	920	28300	8230	1670	37100	17400	2190	103000
30..	13900	1490	55900	7640	1310	27000	12500	1990	67200
31..	--	--	--	7220	960	18700	--	--	--
Total	805700	--	4544600	411940	--	2597600	415220	--	3764010

Day	JULY			AUGUST			SEPTEMBER		
1..	9640	1580	41100	3100	255	2130	9610	3970	103000
2..	8890	1480	35500	3280	250	2210	8290	3400	76100
3..	8380	1320	29900	3200	245	2120	6460	2510	43800
4..	8230	1480	32900	3160	--	2100	5810	2300	36100
5..	7640	1120	23100	3040	--	2000	5450	--	29000
6..	7220	755	14700	2860	--	2000	5140	1420	19700
7..	6910	695	13000	2770	--	1800	4820	1130	14700
8..	6750	615	11200	2800	--	1700	4660	--	11000
9..	7080	800	15300	2730	220	1620	4510	820	9980
10..	7330	720	14200	2750	225	1670	4120	665	7400
11..	7640	805	16600	3100	285	2380	3420	--	5500
12..	7920	1120	24000	3340	305	2750	2800	--	3600
13..	11700	4660 S	165000	3180	360	3090	2590	--	3100
14..	15900	4730	203000	2820	--	2700	2390	--	2800
15..	14900	3590	144000	2680	335	2420	2240	--	2600
16..	11800	2970	94600	2620	310	2190	2240	--	2500
17..	9430	2680	68200	2900	--	2300	2010	--	2000
18..	7980	2160	46500	5350	1870	27000	2040	--	2000
19..	6280	1360	23100	4060	1000	11000	1980	--	1800
20..	6200	1010	16900	5040	1210	16500	1980	--	1700
21..	6380	980	16900	4820	1230	16000	1930	--	1600
22..	4920	850	11300	3880	1070	11200	1880	--	1400
23..	4680	660	8340	3280	735	6510	1980	--	1700
24..	4400	470	5580	2820	495	3770	2700	775	5650
25..	3990	--	3800	2980	1480 S	15700	4680	2320	29300
26..	3500	--	2900	8530	4460	103000	10400	4160	117000
27..	3060	295	2440	4460	1400	16800	10500	3740	106000
28..	2840	380	2910	3120	825	6950	8230	3570	79300
29..	3040	575	4720	3340	645	5820	5660	3110	47500
30..	3840	575	5960	4080	815	8980	4080	2170	23900
31..	3220	380	3300	8680	2800	65600	--	--	--
Total	221690	--	1100950	114770	--	352010	134600	--	791730

Total discharge for year (cfs-days)..... 3147800
Total load for year (tons)..... 19778532

S Computed by subdividing day.

6-8875. KANSAS RIVER AT WAMEGO, KANS.--Continued

Periodic determinations of suspended-sediment discharge and particle size, water year October 1959 to September 1960
(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. 13, 1969	1500	56		8680	2700	63300	64	72	--	85	--	96	97	100	--	--		VPWC
Mar. 30, 1960	1145	45		67900	3350	614000	40	51	--	67	--	93	--	--	--	--		SPWC
Mar. 31	1600	49		63400	3200	546000	52	56	60	65	72	80	84	93	99	100		VPWC
Apr. 4	1400	48		55400	2520	377000	49	53	56	61	67	60	85	93	99	100		VPWC
Apr. 14	2030	56		33800	2570	235000	31	40	--	67	--	92	--	--	--	--		SPWC
May 6	0630	63		12300	1710	56800	34	35	--	43	--	92	--	--	--	--		SPWC
May 23	0615	69		16800	3720	169000	41	54	--	78	--	98	--	--	--	--		SPWC
June 8	1430	70		5660	564	8620	54	56	65	74	85	94	96	97	100	--		VPWC
June 12	1800	73		11000	4770	142000	33	64	--	71	--	97	--	--	--	--		SPWC
June 26	0710	74		25800	3950	275000	45	57	--	71	--	84	--	--	--	--		SPWC
June 26	1920	77		27200	3710	272000	51	63	--	75	--	95	--	--	--	--		SPWC
June 27	0625	74		25200	3520	240000	54	66	--	77	--	94	--	--	--	--		SPWC
Aug. 25	1550	82		2660	436	3130	58	67	76	84	90	96	99	100	--	--		VPWC
Sept. 7	1115	82		4800	1220	15600	58	66	76	83	93	98	99	100	--	--		VPWC

Particle-size analyses of bed material, water year October 1959 to September 1960
(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	6.000	16.00	32.00	64.00	
Oct. 13, 1959	1500		15	8680			0	2	16	46	66	94	99	100	--			SV
Mar. 31, 1960	1600		12	63400			0	1	17	61	61	67	93	97	100			SV
Apr. 4	1400		11	55400			--	0	9	61	82	90	96	99	100			SV
June 8	1430		11	5660			--	0	7	41	77	91	98	99	100			SV
June 22	1425		11	15800			--	0	10	43	77	89	97	99	100			SV
Aug. 16	0905		11	2610			--	0	1	32	63	86	96	100	--			SV
Aug. 25	1550		11	2660			--	0	6	41	74	86	94	100	--			SV
Sept. 7	1115		15	4600			2	4	10	48	74	64	93	96	100			SV

KANSAS RIVER BASIN--Continued

6-SS80. 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 1960.
EXTREMES, 1959-60.--Sediment concentrations: Maximum daily, 11,400 ppm June 2; minimum daily, not determined.
Sediment loads: Maximum daily, 69,100 tons Mar. 28; minimum daily, 1 ton on many days during January, August, and September.
EXTREMES, 1958-60.--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.
REMARKS.--Maximum observed sediment concentration during water year, 22,100 ppm June 1. Records of discharge for water year October 1959 to September 1960 given in WSP 1710. Flow affected by ice Jan. 19-22, Feb. 11-15, Feb. 18 to Mar. 20.

Suspended sediment, water year October 1959 to September 1960
/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	90	3	49	200	26	27	95	7
2..	149	1650 S	1240	45	170	21	30	--	8
3..	736	--	9200	44	--	20	30	--	8
4..	126	1390	473	44	--	20	30	--	8
5..	510	1970 S	2480	45	--	20	31	--	9
6..	382	1280 S	1410	42	--	18	26	--	7
7..	143	775	299	38	--	16	23	80	5
8..	452	3620 S	4710	41	--	18	26	--	5
9..	202	1740 S	1030	48	--	20	24	--	5
10..	76	460	94	48	155	20	25	--	5
11..	58	260	41	46	--	18	27	--	6
12..	50	--	30	42	--	15	29	--	8
13..	48	175	23	40	--	10	28	--	8
14..	44	--	19	34	--	8	25	100	7
15..	42	185	21	31	75	6	25	--	7
16..	39	200	21	34	--	6	25	--	7
17..	36	--	19	32	--	6	24	--	6
18..	34	--	16	32	--	6	23	--	5
19..	32	155	13	31	--	6	22	--	4
20..	32	--	13	35	--	6	21	75	4
21..	31	185	15	40	--	6	21	--	4
22..	30	--	14	42	--	6	22	--	4
23..	1040	3780 S	12800	42	55	6	23	--	4
24..	191	--	1400	38	--	6	25	--	4
25..	70	660	125	35	--	6	24	--	4
26..	60	400	65	33	--	6	23	--	4
27..	50	--	34	29	--	6	28	--	7
28..	44	--	24	24	--	5	40	115	12
29..	44	--	18	23	--	5	42	--	14
30..	44	--	12	26	--	6	31	--	7
31..	48	230	30	--	--	--	22	--	4
Total	4855	--	35692	1133	--	344	822	--	197

S Computed by subdividing day.

KANSAS RIVER BASIN--Continued

6-8380. VERMILLION CREEK NEAR WAMEGO, KANS.--Continued

Suspended sediment, water year October 1959 to September 1960--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	24		1	185	--	320	55	--	3
2	24		1	287	--	440	55	--	3
3	26		1	328	--	650	55	--	3
4	25		1	226	810	494	55	--	3
5	19		1	169	385	176	50	--	2
6	16		1	190	365	187	50	--	2
7	16		1	150	330	134	50	--	2
8	18		1	128	260	90	50	--	2
9	21		1	142	260	100	52	--	2
10	26		3	136	--	75	55	--	2
11	30		16	110	--	60	55	--	2
12	37		80	100	--	55	50	--	2
13	190		2100	90	--	50	50	--	2
14	100		800	85	180	41	58	--	3
15	721	5780	S 12000	83	--	40	60	--	4
16	126		950	98	200	53	60	--	4
17	92		400	111	--	60	60	--	4
18	70		90	90	--	50	60	--	4
19	65		80	80	--	38	60	--	5
20	65		75	80	155	33	70	--	10
21	60		60	80	--	30	101	--	38
22	55		50	77	--	20	132	155	55
23	50		40	77	--	16	148	180	72
24	49		38	70	--	12	229	--	300
25	56		55	65	--	10	211	450	256
26	68		60	60	--	10	432	720	840
27	78		75	60	--	8	4300	5280	61300
28	84		80	60	--	6	6450	3700	S 69100
29	82		80	60	--	5	1310	3030	10700
30	77		75	--	--	--	562	1950	2960
31	93		100	--	--	--	368	1570	1560
Total	2463		17316	3477	--	3263	15353	--	147245

Day	APRIL			MAY			JUNE		
1	517	2460	3430	188	--	1000	321	4720	S 14000
2	603	--	3300	112	1150	348	1030	11400	S 34100
3	467	1080	1360	97	--	200	119	--	1300
4	291	735	577	89	--	160	72	--	240
5	240	--	420	90	--	120	56	--	46
6	223	--	240	99	505	135	53	285	41
7	197	355	189	158	--	220	54	--	42
8	180	--	170	126	445	151	56	--	38
9	164	--	130	106	305	87	61	610	100
10	156	--	100	102	--	85	63	250	42
11	152	225	92	89	--	60	554	4020	S 12300
12	141	--	85	81	--	50	1580	5420	23100
13	138	--	75	81	--	42	174	2900	1470
14	136	--	70	79	--	30	120	715	232
15	132	--	60	74	--	24	101	510	139
16	128	--	55	80	135	29	1540	5570	S 25900
17	120	145	47	80	--	28	273	3660	S 2950
18	106	--	42	70	--	30	130	--	800
19	101	--	40	229	2640	S 2250	112	--	380
20	97	--	36	263	3440	S 2710	109	735	216
21	92	--	34	108	--	320	562	--	6300
22	88	135	32	79	--	120	196	1700	S 1070
23	85	--	30	71	380	73	100	710	192
24	81	--	30	67	--	65	80	--	110
25	79	135	28	64	--	60	70	--	70
26	73	--	24	62	315	53	65	280	49
27	69	--	20	54	--	50	87	--	140
28	85	--	90	49	--	42	72	--	110
29	161	--	800	54	--	42	52	--	55
30	256	--	1600	54	245	36	46	--	38
31	--	--	--	46	--	32	--	--	--
Total	5358	--	13206	3001	--	8652	7908	--	125570

S Computed by subdividing day.

KANSAS RIVER BASIN--Continued

6-8880. VERMILLION CREEK NEAR WAMEGO, KANS.--Continued

Suspended sediment, water year October 1959 to September 1960--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..	44	--	30	19	--	5	6.2	--	1
2..	40	--	24	14	--	4	5.3	--	1
3..	34	--	18	12	--	3	4.7	--	1
4..	31	--	16	12	--	3	4.3	110	1
5..	32	--	16	9.9	--	2	4.1	--	1
6..	30	--	14	9.1	--	1	4.0	--	1
7..	29	--	10	9.9	40	1	3.8	--	1
8..	27	--	8	9.1	--	1	48	--	500
9..	33	275	S 27	9.0	--	1	136	3780	S 2310
10..	93	625	S 170	9.7	--	1	34	455	S 45
11..	82	280	S 69	7.4	--	1	12	--	9
12..	40	185	20	6.8	--	1	8.3	--	5
13..	38	--	18	6.1	--	1	6.8	--	4
14..	31	--	16	5.7	--	1	6.2	--	3
15..	26	--	12	5.3	105	2	6.0	--	2
16..	24	--	10	4.9	--	2	5.7	--	2
17..	24	140	9	12	--	22	5.6	--	1
18..	28	--	10	159	3320	S 1510	5.6	50	1
19..	38	--	20	41	605	S 81	5.4	--	1
20..	26	--	12	14	--	6	5.4	--	1
21..	20	--	10	8.8	85	2	5.3	--	1
22..	17	--	9	7.3	--	1	4.9	--	1
23..	17	--	8	6.4	--	1	5.8	--	1
24..	16	130	6	28	225	S 27	153	2130	S 2390
25..	16	--	6	27	380	28	164	1740	S 943
26..	15	--	5	13	145	5	32	510	44
27..	15	--	5	8.8	--	3	17	--	19
28..	19	--	7	7.0	--	3	13	--	13
29..	21	--	8	6.6	140	2	13	340	12
30..	40	--	12	13	--	5	12	--	10
31..	35	80	8	8.8	--	3	--	--	--
Total	981	--	613	510.6	--	1729	737.4	--	6325
Total discharge for year (cfs-days)									46599.0
Total load for year (tons)									360152

S Computed by subdividing day.

6-8880. VERMILLION CREEK NEAR WAMEGO, KANS.--Continued

Particle-size analyses of suspended sediment, water year October 1959 to September 1960
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accnmulation 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. 23, 1959.....	0810	58		1180	7640		18	41		76		99						SPWC
Oct. 23.....	1400	64		1760	5890		38	55		87		100						SPWC
Jan. 15, 1960.....	1555	34		704	5630		42	55		84		100						SPWC
Mar. 27.....	0950	60		3000	4660		27	37		64		98						SPWC
Mar. 28.....	0635	50		8800	4550		35	54		88		99						SPWC
Mar. 28.....	1130	65		7780	3670		45	59		83		100						SPWC
May 21.....	0830	--		284	4050		39	52		87		100						SPWC
June 1.....	1825	--		439	22100		21	31		63		99						SPWC
June 2.....	0925	--		1300	9250		39	52		83		100						SPWC
June 2.....	1830	--		417	11000		38	55		66		100						SPWC
June 12.....	0850	--		1630	4250		48	62		88		96						SPWC
June 12.....	1845	--		910	5120		48	64		87		100						SPWC
June 16.....	1305	--		2160	6910		32	47		79		99						SPWC
Aug. 18.....	0700	--		172	5010		41	57		89		100						SPWC
Aug. 18.....	1140	76		180	2350		38	52		79		99						SPWC

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 1960.
EXTREMES, 1959-60.--Sediment concentrations: Maximum daily, 1,460 ppm May 16; minimum daily, no flow on many days during August and September.
Sediment loads: Maximum daily, 2,480 tons May 16; minimum daily, 0 tons on many days during August and September.
EXTREMES, 1952-60.--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, 8,360 ppm Apr. 16. Records of discharge for water year October 1959 to September 1960 given in WSP 1710. Flow affected by ice Nov. 13-20, Nov. 26 to Dec. 6, Jan. 2-11, Jan. 19 to Mar. 27.

Suspended sediment, water year October 1959 to September 1960
/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	1.7	--	0.1	2.5	--	0.2	1.1	--	0.1
2	1.7	--	.1	1.8	--	.2	1.3	--	.1
3	1.6	30	.1	1.6	--	.2	1.2	19	.1
4	11	--	6.5	2.0	--	.2	1.2	--	.1
5	80	220	A 48	5.3	--	.5	1.2	32	.1
6	90	190	A 46	3.4	--	.4	1.2	--	.1
7	20	50	2.7	2.3	--	.3	1.2	--	.1
8	6.0	--	1.0	2.2	--	.2	1.2	25	.1
9	4.1	--	.5	2.5	12	.1	1.1	--	.1
10	3.0	27	.2	3.0	--	.3	1.3	23	.1
11	2.3	--	.2	2.3	--	.2	5.2	--	.5
12	1.7	30	.1	2.0	--	.1	18	--	3.0
13	1.7	--	.1	1.7	--	.1	5.3	--	.4
14	1.6	17	.1	1.5	--	.1	4.0	18	.2
15	1.6	--	.1	1.3	--	.1	3.8	--	.2
16	1.6	10	T	1.2	--	.1	3.5	14	.1
17	1.4	--	T	1.1	--	T	3.1	--	.1
18	1.2	--	T	1.1	12	T	2.7	--	.1
19	1.2	9	T	1.2	--	T	2.3	15	.1
20	1.2	--	T	1.5	18	.1	2.3	--	.1
21	1.2	--	T	2.2	--	.1	2.6	--	.1
22	2.1	--	1.0	2.5	--	.2	3.0	15	.1
23	10	--	5.0	2.7	22	.2	16	--	3.0
24	4.0	64	.7	2.8	--	.2	7.6	--	1.0
25	2.5	--	.2	2.3	12	.1	5.2	--	.6
26	1.5	19	.1	1.7	--	.1	5.8	50	.8
27	1.4	--	.1	1.3	--	T	100	400	A 108
28	1.3	18	.1	1.1	14	T	45	280	34
29	1.3	--	.1	.94	--	T	10	--	8.0
30	1.3	--	.1	1.0	16	T	6.0	--	2.0
31	2.0	--	.2	--	--	--	5.0	46	.6
Total	263.2	--	113.6	60.04	--	4.6	268.4	--	164.0

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 1959 to September 1960--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	4.0	--	0.5	2.8	44	0.3	1.8	--	0.1
2	3.1	31	.3	2.7	--	.3	1.8	21	.1
3	2.5	--	.3	2.7	--	.3	1.7	--	.1
4	2.0	30	.2	2.7	47	.3	1.7	--	.1
5	1.6	--	.2	2.6	--	.3	1.7	--	.1
6	1.8	--	.2	2.6	42	.3	1.7	23	.1
7	1.9	--	.2	2.6	--	.3	1.7	--	.1
8	2.1	--	.2	4.0	120 A	1.3	1.7	--	.1
9	2.3	29	.2	6.0	--	1.9	1.7	--	.1
10	2.5	--	.3	10	--	2.4	1.7	--	.1
11	30	240 A	19	5.0	--	1.0	1.7	--	.1
12	250	850 A	574	4.5	--	.8	1.7	--	.1
13	15	600 A	24	4.0	--	.5	1.7	--	.1
14	10	850 A	23	3.5	--	.3	1.7	--	.1
15	20	280 A	15	3.3	29	.3	1.7	--	.1
16	35	--	5.0	3.1	--	.3	1.7	--	.1
17	7.0	--	2.6	2.9	--	.2	1.7	--	.1
18	5.0	--	1.5	2.7	30	.2	1.7	--	.1
19	4.3	--	.9	2.6	--	.2	1.7	--	.1
20	4.0	--	.6	2.4	23	.1	1.7	--	.1
21	3.7	--	.5	2.3	--	.2	1.7	--	.1
22	3.6	--	.5	2.2	27	.2	1.7	--	.1
23	3.4	--	.4	2.1	--	.2	1.7	--	.1
24	3.3	--	.4	2.0	--	.2	1.7	27	.1
25	3.2	--	.4	1.9	23	.1	1.7	--	.1
26	3.1	--	.4	1.9	--	.1	1.7	19	.1
27	3.1	--	.4	1.9	22	.1	170	130 A	60
28	3.1	--	.4	1.8	--	.1	920	240 A	596
29	3.0	46	.4	1.8	83	.4	500	280 A	378
30	3.0	--	.4	--	--	--	200	280 A	151
31	2.9	--	.4	--	--	--	42	180 A	20
Total	439.5	--	672.8	90.6	--	13.2	1876.4	--	1207.6

Day	APRIL			MAY			JUNE		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	32	140	12	26	200	14	2.8	66	0.5
2	26	98	6.9	6.3	86	1.5	2.1	--	.4
3	22	--	3.4	4.4	51	.6	1.6	--	.3
4	18	49	2.4	3.4	--	.5	1.4	--	.2
5	14	85	3.2	8.7	95 S	2.6	1.1	66	.2
6	9.0	60	1.5	444	980 S	1170	1.0	70	.2
7	5.8	--	1.2	60	300	49	1.1	--	.2
8	4.8	--	1.0	9.0	--	6.0	1.1	--	.2
9	3.8	79	.8	6.0	84	1.4	.70	--	.2
10	3.2	--	.7	4.7	--	1.0	.70	81	.2
11	3.5	--	.6	4.0	59	.6	2.2	180 S	1.6
12	3.0	--	.6	3.1	--	.4	36	315 S	34
13	3.4	--	.6	3.0	53	.4	32	--	15
14	74	305 S	78	2.5	38	.3	4.0	110	1.2
15	28	105	7.9	2.1	--	.3	1.9	90	.5
16	187	1100 S	1280	380	1460 S	2480	1.8	--	.4
17	150	1050	425	35	400	38	1.6	--	.3
18	9.0	220	5.3	18	150	7.3	1.1	67	.2
19	7.0	120	2.3	10	150	4.0	1.0	--	.2
20	5.4	90	1.3	138	830 S	415	36	240 S	31
21	4.6	--	1.0	63	280 S	47	26	155	11
22	4.1	--	.5	38	140	14	4.8	120	1.6
23	3.4	53	.5	6.2	85	1.4	64	455 S	97
24	3.0	--	.5	104	395 S	202	21	180	10
25	25	250 S	46	170	410 A	188	2.3	--	2.0
26	20	200	11	20	--	10	1.4	--	.6
27	4.0	100	1.1	10	--	3.6	1.0	--	.3
28	3.2	71	.6	8.0	86	1.9	1.5	200 S	1.3
29	22	340 S	70	6.0	--	1.2	1.4	160 A	.6
30	152	505	220	4.5	62	.8	32	420 S	49
31	--	--	--	3.5	--	.6	--	--	--
Total	850.2	--	2185.9	1601.4	--	4663.4	286.60	--	260.4

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

CHARITON RIVER BASIN--Continued

6-9035. HONEY CREEK NEAR RUSSELL, IOWA--Continued

Suspended sediment, water year October 1959 to September 1960--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	57	--		26	0	--		0	0.19	97		T
2	7.7	--		2.0	0	--		0	.10	--		T
3	1.9	--		.5	0	--		0	.03	--		T
4	1.0	--		.3	0	--		0	0	--		0
5	.70	68		.1	0	--		0	0	--		0
6	.62	--		.1	0	--		0	0	--		0
7	.54	86		.1	3.7	330	S	3.7	0	--		0
8	.42	110		.1	1.2	--		.2	0	--		0
9	.62	400		.7	.32	--		.1	0	--		0
10	44	895		113	.10	--		T	0	--		0
11	3.8	210		2.2	.05	--		T	0	--		0
12	1.6	110		.5	.01	--		T	0	--		0
13	1.3	--		.2	0	--		0	0	--		0
14	.70	--		.1	0	--		0	0	--		0
15	.47	83		.1	0	--		0	0	--		0
16	.37	56		.1	0	--		0	0	--		0
17	.37	--		.1	.03	40		T	0	--		0
18	.32	72		.1	1.3	650	S	2.3	0	--		0
19	.28	--		T	.78	140	A	.3	.54	--		2.0
20	.22	--		T	.32	65	A	.1	.32	--		.2
21	.14	--		T	.65	220	A	.4	.07	--		T
22	.12	--		T	.32	65		.1	.01	--		T
23	.06	--		T	.12	--		T	.04	85		T
24	.04	--		T	.07	--		T	.70	320		.6
25	.06	--		T	.04	--		T	.47	160		.2
26	1.9	250	S	2.0	0	--		0	.28	--		.1
27	.37	--		.1	0	--		0	.12	--		.1
28	.16	--		T	.05	--		.1	.05	--		T
29	.10	--		T	4.8	595	S	9.1	.01	--		T
30	.05	--		T	1.4	200	A	.8	0	--		0
31	.02	--		T	.37	99		.1	--	--		--
Total	126.95	--		148.7	15.63	--		17.4	2.93	--		3.4

Total discharge for year (cfs-days)..... 5681.85
Total load for year (tons)..... 9455.0

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

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN MISSOURI RIVER BASIN

Chemical analyses, in parts per million, water year October 1959 to September 1960

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																							
6-1745. MILK RIVER AT NASHUA, MONT.																							
Aug. 6, 1959.	98	5.1		0.01		61	29	156	7.6	275	0	339	29	0.5	2.5	0.25	787	273	47	4.1	1180	7.6	14
June 2, 1960.	599	8.3		.02		53	22	94	4.9	240	0	213	13	.3	.9	.16	531	224	27	2.7	831	7.4	16
July 6.....	485	7.1		.01		44	22	79	5.0	241	0	166	10	.3	1.9	.16	458	200	2	2.4	718	7.4	8
Aug. 2.....	208	7.9		.00		65	28	129	6.8	304	0	276	24	.3	1.4	.22	698	279	30	3.4	1050	7.8	8
Sept. 1.....	265	7.4		.01		60	23	107	5.3	275	0	241	17	.3	1.1	.23	600	246	20	3.0	919	7.4	9
LITTLE PORCUPINE CREEK BASIN																							
6-1754. FRAZER RESERVOIR OUTLET AT FRAZER, MONT.																							
Aug. 6, 1959 [a].....		5.8		0.13		40	24	193	13	246	0	414	20	0.5	0.3	0.4	846	200	0	5.9	1290	7.5	28
July 6, 1960.	8.5	4.6		.02		34	7.5	45	7.6	155	0	87	3.5	.1	1.8	.13	279	166	0	1.8	444	7.0	13
TURTLE CREEK BASIN																							
6-3413.9. LAKE ORDWAY NEAR TURTLE LAKE, N. DAK.																							
Apr. 27, 1960	(b)	5.6		0.08	0.00	3.9	14	1270	30	1380	333	1030	28	0.4	1.4	2.0	3450	68	0	67	4750	9.2	70
Sept. 27.....	(b)	9.6		.05	.00	6.0	31	2490	60	2670	773	2080	59	.3	2.5	5.1	7090	143	0	91	9300	9.3	75
PAINTED WOODS CREEK BASIN																							
6-3418. PAINTED WOODS CREEK NEAR WILTON, N. DAK.																							
Nov. 23, 1959	0.1	14		0.09		57	82	578	15	925	0	898	23	0.6	0.9	0.67	2140	478	0	11	2860	8.1	32
Jan. 15, 1960	.1	37		.14		121	76	452	10	1090	0	702	17	.2	1.2	.60	1950	616	0	7.9	2660	8.0	21

a Analysis of reservoir water; no outflow at time of sampling.
b 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 1959 to September 1960--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--Continued																							
6-3418. PAINTED WOODS CREEK NEAR WILTON, N. DAK.--Continued																							
Mar. 27, 1960	600	4.3		0.06		13	4.0	6.4	5.8	59	0	16	0.0	0.1	6.1	0.05	108	49	1	0.4	145	6.5	60
Mar. 31.....	189	7.6		.20		14	6.3	17	7.0	87	0	28	.0	.1	3.6	.10	146	61	0	.9	215	6.6	60
Apr. 27.....	1.4	15		.06	0.02	48	30	120	8.7	353	0	205	3.7	.2	.7	.26	719	243	0	3.3	918	7.5	41
CHEYENNE RIVER BASIN																							
6-4000. HAT CREEK NEAR EDGEMONT, S. DAK.																							
Dec. 1, 1959.	0.3	13		0.26		426	111	338	17	338	0	1960	16	0.3	0.8	0.36	3250	1520	1240	3.8	3480	7.9	9
Apr. 21, 1960	3.5	14		.10		173	48	200	14	230	0	830	12	.5	2.2	.29	1480	630	441	3.5	1920	7.2	25
6-4285. BELLE FOURCHE RIVER AT WYOMING-SOUTH DAKOTA STATE LINE																							
Dec. 16, 1959	0.6	5.6		0.09	--	331	79	142	15	214	0	1150	70	0.4	0.3	0.20	1990	1150	975	1.8	2210	7.7	4
Apr. 13, 1960	134	7.3		.03	0.01	126	29	46	7.1	144	0	393	2.2	.4	1.4	.12	734	432	314	1.0	963	7.4	22
May 16.....	191	5.9		.09	--	67	17	39	6.4	121	0	215	.0	.4	.8	.09	432	235	136	1.1	629	7.3	28
June 14.....	26	8.9		.03	.00	193	52	108	11	111	0	790	3.5	.6	1.0	.22	1330	694	603	1.8	1550	7.5	--
6-4330. REDWATER CREEK ABOVE BELLE FOURCHE, S. DAK.																							
Sept. 3, 1959	3.2	14		0.18		317	80	31	5.0	200	0	966	3.4	0.7	0.5	0.22	1670	1120	956	0.4	1820	7.5	5
Dec. 16.....	102	9.4		.02		210	50	7.5	2.6	238	0	521	1.4	.3	1.6	.08	990	730	535	.1	1210	7.5	3
May 17, 1960.	10	9.8		.07		267	69	26	3.7	237	0	766	2.4	.5	.0	.14	1380	950	756	.4	1580	7.5	6
Aug. 18.....	66	14		.02	0.05	236	47	11	6.2	226	0	606	2.3	.5	2.6	.12	1120	783	598	.2	1320	7.2	13

JAMES RIVER BASIN

6-4676. JAMES RIVER NEAR MANFRED, N. DAK.

Mar. 27, 1960	423	3.0		0.36		6.6	1.6	4.1	5.4	31	0	8.3	0.0	0.1	4.8	0.03	55	23	0	0.4	82	6.4	34
Apr. 8.....	19.0	11		.22		19	7.2	18	7.9	116	0	29	.0	.2	1.5	.10	164	77	0	.9	245	6.8	47
Apr. 27.....	.5	15		.13	0.00	45	20	79	8.6	315	0	106	7.3	.3	.6	.23	461	196	0	2.5	697	7.5	45

6-4679. BIG SLOUGH AT HAMBERG, N. DAK.

Apr. 4, 1960.	26	7.0		0.07		17	11	21	6.2	79	0	64	2.7	0.2	2.8	0.05	193	88	23	1.0	288	6.7	50
Apr. 13.....	12	11		.05		27	18	47	7.8	143	0	126	7.5	.2	1.0	.06	326	143	26	1.7	504	7.1	60

6-4660. JAMES RIVER AT NEW ROCKFORD, N. DAK.

Apr. 3, 1960.	375	7.6		0.22		16	5.1	12	6.2	76	0	27	0.0	0.2	3.5	0.05	127	61	0	0.7	192	6.8	44
Apr. 28.....	14					33	18	30		174	0						305	156	15	1.0	453	7.1	

6-4682. LAKE JUANITA NEAR GRACE CITY, N. DAK.

Oct. 7, 1959.	(b)	43		0.07		22	33	72	13	354	0	67	2.8	0.2	0.5	0.17	478	190	0	2.3	672	7.4	31
May 10, 1960.	(b)	24		.04	0.00	24	29	51	10	254	0	63	17	.2	3.1	.12	380	180	0	1.7	568	7.0	30

6-4683. NICCUM RESERVOIR ON KELLY CREEK, NEAR BORDULAC, N. DAK.

Oct. 7, 1959.	(b)	18		0.06		28	38	84	13	349	0	99	29	0.2	6.7	0.19	520	228	0	2.4	793	7.4	44
May 10, 1960.	(b)	3.7		.05	0.00	22	15	23	6.9	149	0	40	6.5	.2	1.3	.07	265	116	0	.9	336	7.1	25

b 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 1959 to September 1960--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--Continued																							
6-4695. PIPESTEM CREEK NEAR BUCHANAN, N. DAK.																							
Nov. 23, 1959	0.4	19		0.10		90	56	194	9.6	572	0	281	71	0.3	1.5	0.37	1000	453	0	4.0	1500	7.9	20
Mar. 27, 1960	510	4.2		.20		8.3	4.2	3.0	6.8	41	0	13	.0	.1	5.6	.03	82	36	4	.2	118	6.5	43
Apr. 2.....	366	7.3		.17		17	6.2	7.5	7.0	72	0	28	.1	.1	4.7	.05	133	68	9	.4	192	6.6	65
Apr. 13.....	109	14		.10		27	12	17	8.1	131	0	47	.2	.2	2.0	.07	216	115	8	.7	318	7.0	65
May 11.....	7.1	--		--		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	667	--	--
6-4700. JAMES RIVER AT JAMESTOWN, N. DAK.																							
Nov. 23, 1959	4.0	24		0.30		99	39	176	9.0	460	0	267	92	0.2	2.2	0.54	1020	408	14	3.8	1440	7.7	7
Mar. 21, 1960	25	--		--		69	6.3	19	--	207	0	--	--	--	--	--	311	206	36	.6	501	7.1	--
Mar. 28.....	900	3.5		.11		9.5	3.0	2.7	7.2	38	0	13	.0	.1	6.6	.04	82	36	5	.2	111	6.1	55
Apr. 1.....	550	6.2		.28		16	4.6	5.5	7.4	63	0	20	.0	.1	6.2	.05	116	59	7	.3	166	6.4	60
Apr. 11.....	229	13		.20		25	11	15	8.2	121	0	45	.1	.2	3.3	.08	205	109	10	.6	300	6.9	55
May 10.....	20	15		.13		59	29	68	8.4	315	0	128	21	.3	.2	.21	497	265	7	1.8	772	7.5	19
6-4735. WEST BRANCH SNAKE CREEK NEAR ATHOL, S. DAK.																							
July 30, 1957	0.1									308	0							196	0		756	8.0	
July 6, 1960.	.2	2.8		0.05		41	42	110	16	82	0	371	65	0.2	0.0	0.36	726	277	210	2.9	1060	7.2	12
PLATTE RIVER BASIN																							
6-6930. NORTH PLATTE RIVER AT NORTH PLATTE, NEBR.																							
Mar. 30, 1957	386	43						40		182	0	80	10	0.6	0.2			160	11	1.4	471	7.7	
Oct. 23, 1959	806							62		210	0	127	14					179	7	2.0	627	7.4	

6-7655. SOUTH PLATTE RIVER AT NORTH PLATTE, NEBR.

Mar. 30, 1957	126	44						63		240	0	163	22	0.6	2.2			264	67	1.7	741	7.8		
Oct. 23, 1959	121							62		227	0	206	24					292	106	1.6	818	7.6		

6-7702. PLATTE RIVER NEAR KEARNEY, NEBR.

Mar. 21, 1947		42		0.02		62	22	41		202	12	118	17	0.4	0.0	0.16	418	245	60	1.1	57	8.5		
Nov. 6, 1958.		--		--		68	22	75		225	0	212	24	--	--	.16	556	262	77	2.0	829	7.9		
Oct. 25, 1959		22		.00		56	18	71	12	216	0	165	20	.5	.5	.13	477	214	37	2.1	724	7.5		

6-7725. WOOD RIVER NEAR CHAPMAN, NEBR.

Nov. 12, 1959	18	31		0.36		69	13	31	25	227	0	76	20	0.4	31	0.12	405	226	40	0.9	654	7.7	--	
Mar. 30, 1960	580	12		.96		19	2.1	3.3	13	72	0	13	.1	.2	1.7	.06	131	56	0	.2	167	6.5	55	
Apr. 13.....	50	25		.58	0.03	77	16	32	11	224	0	114	19	.4	16	.07	432	258	74	.9	649	7.0	3	
June 14.....	760	20		.52		38	7.8	11	13	116	0	58	4.5	.3	5.6	.06	239	127	32	.4	339	7.0	27	
Sept. 14.....	10	31		.08		71	13	34	10	208	0	88	24	.4	30	.23	450	232	61	1.0	621	7.1	6	

6-7915. CEDAR RIVER NEAR SPALDING, NEBR.

Oct. 6, 1959.	90	41		0.05		23	3.3	6.2	5.7	105	0	2.0	0.2	0.2	0.5	0.02	136	71	0	0.3	175	7.5	9	
Oct. 27.....	54	--		--		--	--	5.8	--	109	0	--	--	--	--	--	138	74	0	.3	183	7.3	--	
Mar. 28, 1960	421	26		.46		18	2.9	5.2	5.2	80	0	5.5	.1	.3	2.1	.05	120	57	0	.3	147	6.8	45	
Apr. 14.....	214	--		.07	0.01	--	--	7.9	--	103	0	--	--	--	--	--	147	71	0	.4	184	7.1	--	
June 14.....	144	--		--		--	--	6.8	--	107	0	--	--	--	--	--	147	73	0	.3	181	7.2	--	

6-7920. CEDAR RIVER NEAR FULLERTON, NEBR.

Oct. 5, 1959.	174	41		0.12		35	5.2	6.8	6.7	156	0	4.0	0.1	0.2	0.9	0.03	177	109	0	0.3	251	7.6	8	
Oct. 26.....	159	--		--		--	--	6.8	--	159	0	--	--	--	--	--	183	116	0	.3	264	7.5	--	

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN MISSOURI RIVER BASIN--Continued

Chemical analyses, in parts per million, water year October 1959 to September 1960--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--Continued																							
6-7920. CEDAR RIVER NEAR FULLERTON, NEBR.--Continued																							
Feb. 9, 1960.	c 235	--		--		--	--	7.1	--	150	0	--	--	--	--	--	181	112	0	0.3	280	8.9	--
Mar. 28.....	c 3300	17		1.1		28	3.9	3.8	9.4	110	0	7.0	0.1	0.2	1.5	0.05	138	81	0	.2	195	8.7	42
June 15.....	255	--		--		--	--	8.4	--	184	0	--	--	--	--	.05	218	137	0	.3	318	7.0	--
6-7990. ELKHORN RIVER NEAR NORFOLK, NEBR.																							
Aug. 12, 1948	c 1700	38		0.00		34	3.0	3.6		114	0	8.0	0.0	0.3	3.1	0.08	178	97	4	0.2	182	8.1	
Sept. 28, 1960.....	245	41		0.10	0.00	46	7.1	9.1	6.5	193	0	6.8	.9	.3	1.5	.03	221	144	0	.3	321	7.4	5
8-8005. ELKHORN RIVER AT WATERLOO, NEBR.																							
Mar. 31, 1980	21400	10		0.03		31	5.0	4.6	7.6	112	0	15	0.1	0.2	6.3	0.08	152	98	6	0.2	234	7.0	48
Apr. 4.....	31800	11		.04		31	6.0	5.9	8.6	114	0	19	.1	.3	9.0	.08	168	102	9	.3	253	6.9	28
Apr. 8.....	10000	15		.03		48	9.2	12	9.2	172	0	38	1.5	.4	9.4	.20	246	158	17	.4	375	7.3	21
8-8035. SALT CREEK AT LINCOLN, NEBR.																							
July 10, 1958	18500							21		106	0	6.8	23		0.8		187	74	0	1.1	259	8.9	
June 21, 1960	1480	19		0.12	0.00	42	9.0	63	6.5	160	0	24	85	0.4	.4	0.09	348	142	11	2.3	608	7.1	
6-8055. PLATTE RIVER AT LOUISVILLE, NEBR.																							
Mar. 31, 1960	92000	16		0.03		33	6.7	18	7.8	115	0	44	10	0.3	4.2	0.10	210	110	18	0.7	323	7.0	22
Apr. 4.....	59300	11		.03		35	5.0	8.1	8.5	123	0	19	.8	.3	8.4	.16	172	108	7	.3	262	7.0	22

6-8650. KANOPOLIS RESERVOIR NEAR KANOPOLIS, KANS.

Nov. 19, 1959	d 48300	9.2		0.10		58	8.6	61	7.6	132	0	67	106	0.3	2.0	0.07	404	160	72	2.0	660	7.6	7
Mar. 8, 1960.	d 56635	10		.07		96	17	110	7.7	179	0	116	207	.3	1.7	.09	721	308	161	2.7	1150	7.1	13
May 10.....	d 54390	6.6		.21		91	14	55	9.6	153	0	149	88	.4	3.0	.06	684	283	158	1.4	817	7.4	6
Aug. 16.....	d 57163	7.5		.25		92	16	93	11	145	0	169	159	.4	1.3	.08	649	296	177	2.4	1060	7.0	6

6-8810. BIG BLUE RIVER NEAR CRETE, NEBR.

June 3, 1951.	18600	14		0.10		5.0	1.1	4.1		28	0	1.0	0.5	0.3	0.7	0.04	54	17	0	0.4	65	6.6	
Mar. 31, 1960	19900	7.7		.25		8.5	1.4	2.2	8.6	33	0	8.8	.1	.2	3.0	.03	80	27	0	.2	90	6.2	110

c Daily mean discharge.
d Lake content, in acre-feet.

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN MISSOURI RIVER BASIN

Periodic determinations of suspended-sediment discharge and particle size, water year October 1959 to September 1960
(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																		
BUTCHER CREEK NEAR LUTHER, MONT.																		
May 5, 1960		44		8.4	78	1.8												
May 9		47		4.0	208	2.2												
May 13		54		2.5	27	.2												
May 16		44		1.8	26	.1												
May 21		54		1.6	30	.1												
May 24		54		1.9	130	.7												
May 27		53		1.5	60	.2												
May 31		58		1.4	25	.1												
June 1		49		1.8	88	.4												
June 6		60		2.3	36	.2												
June 10		59		.9	23	.1												
June 13		64		.4	102	.1												
June 16		59		.4	72	.1												
June 20		60		.4	108	.1												
June 24		66		.3	118	.1												
June 27		61		.3	59	.05												
July 1		56		.2	90	.05												
July 6		58		.3	47	.05												
July 6		65		.3	22	.02												
July 15		58		.2	201	.1												
July 19		55		.2	28	.02												
July 22		62		.2	187	.1												
July 29		64		.2	95	.05												
Aug. 1		69		.3	33	.03												
Aug. 5		56		.3	23	.02												
Aug. 8		58		.3	97	.1												
Aug. 12		59		.3	39	.03												
Aug. 15		65		.3	19	.02												
Aug. 18		58		.4	102	.1												
Aug. 26		56		.2	52	.03												

BUTCHER CREEK NEAR LUTHER, MONT.--Continued

Aug. 29, 1960.....		55		0.2	30	0.02										
Sept. 1.....		55		.2	11	.01										
Sept. 6.....		54		.3	14	.01										
Sept. 9.....		49		.3	80	.1										
Sept. 12.....		52		.3	50	.04										
Sept. 16.....		51		.4	72	.1										
Sept. 19.....		56		.4	366	.4										
Sept. 23.....		49		.3	19	.02										
Sept. 26.....		56		.3	14	.01										
Sept. 30.....		46		1.8	10	.05										

BUTCHER CREEK NEAR ROSCOE, MONT.

May 5, 1960.....		44		12	281	9.1										
May 9.....		42		6.5	87	1.5										
May 13.....		62		4.0	91	1.0										
May 16.....		57		3.3	77	.7										
May 21.....		58		2.6	64	.4										
May 24.....		55		2.7	92	.7										
May 27.....		55		2.3	82	.5										
May 31.....		62		2.1	66	.4										
June 1.....		52		2.3	85	.5										
June 6.....		67		5.0	180	2.4										
June 10.....		58		11	284	8.4										
June 13.....		64		11	213	6.3										
June 16.....		61		13	355	12										
June 20.....		62		14	220	8.3										
June 24.....		67		14	466	18										
June 27.....		63		16	222	9.6										
July 1.....		57		14	174	6.6										

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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 1959 to September 1960--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																		
BUTCHER CREEK NEAR ROSCOE, MONT.--Continued																		
July 6, 1960		61		20	312	17												
July 8		67		13	145	5.1												
July 11		64		13	129	4.5												
July 15		62		18	266	13												
July 19		59		19	381	20												
July 22		70		20	233	12												
July 25		64		25	232	16												
July 29		66		19	130	6.7												
Aug. 1		67		18	164	8.0												
Aug. 5		59		20	122	6.6												
Aug. 8		59		20	154	8.3												
Aug. 12		59		14	60	2.3												
Aug. 15		66		12	38	1.2												
Aug. 16		61		12	37	1.2												
Aug. 26		56		12	41	1.3												
Aug. 29		57		14	54	2.0												
Sept. 1		54		13	26	1.0												
Sept. 6		55		9.3	22	.6												
Sept. 9		50		13	378	13												
Sept. 12		53		16	69	3.0												
Sept. 16		51		14	89	3.4												
Sept. 19		57		13	62	2.2												
Sept. 23		50		11	20	.6												
Sept. 26		57		11	13	.4												
Sept. 30		47		11	17	.5												
BUTCHER CREEK NEAR FISHTAIL, MONT.																		
May 5, 1960		42		12	72	2.3												
May 9		42		8.5	53	1.2												

May 13, 1960.....		62			3.2		56		0.5										
May 16.....		62			3.9		55		.6										
May 24.....		54			3.7		53		.5										
May 27.....		56			5.1		99		1.4										
May 31.....		61			3.4		36		.3										
June 1.....		54			3.2		78		.7										
June 6.....		64			10		90		2.4										
June 10.....		58			7.9		114		2.4										
June 13.....		62			13		195		6.8										
June 16.....		57			19		216		11										
June 20.....		61			21		158		9.0										
June 24.....		66			15		85		3.4										
June 27.....		63			4.1		56		.6										
July 1.....		60			26		185		13										
July 6.....		63			37		284		28										
July 8.....		65			19		217		11										
July 11.....		--		e	25		167		11										
July 15.....		66			25		163		11										
July 19.....		63			22		203		12										
July 22.....		72			17		164		7.5										
July 25.....		64			27		206		15										
July 29.....		67			22		131		7.8										
Aug. 1.....		68			13		143		5.0										
Aug. 5.....		60			24		183		12										
Aug. 8.....		60			38		254		26										
Aug. 12.....		60			42		118		13										
Aug. 15.....		65			39		128		13										
Aug. 18.....		62			30		115		9.3										

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 1959 to September 1960--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																		
BUTCHER CREEK NEAR FISHTAIL, MONT.--Continued																		
Aug. 26, 1960		58		40	87	9.4												
Aug. 29		56		31	69	5.8												
Sept. 1		55		28	67	5.1												
Sept. 6		55		18	53	2.6												
Sept. 9		52		25	57	3.8												
Sept. 12		54		19	66	3.4												
Sept. 16		53		23	99	6.1												
Sept. 19		58		27	86	6.3												
Sept. 23		50		19	38	1.9												
Sept. 26		57		17	40	1.8												
Sept. 30		47		17	17	.8												
NORTH FORK BLUEWATER CREEK NEAR BRIDGER, MONT.																		
Mar. 30, 1960		55		11	25	0.7												
Apr. 1		53		11	24	.7												
Apr. 5		56		11	28	.8												
Apr. 7		52		11	16	.5												
Apr. 11		54		11	32	1.0												
Apr. 14		52		11	37	1.1												
Apr. 18		56		11	40	1.2												
Apr. 21		54		11	42	1.2												
Apr. 22		54		11	76	2.2												
Apr. 25		56		11	61	1.8												
Apr. 28		52		12	26	.8												
May 2		57		11	23	.7												
May 6		54		11	36	1.1												
May 9		58		12	25	.8												
May 13		56		11	24	.7												
May 17		55		11	38	1.1												
May 21		58		12	23	.7												

May 24, 1960.......		56		12	30	1.0											
May 27.............		56		12	28	.9											
May 31.............		59		11	20	.6											
June 2.............		55		12	30	1.0											
June 6.............		58		11	16	.5											
June 10............		57		12	105	3.4											
June 13............		57		12	25	.8											
June 17............		53		11	19	.6											
June 20............		58		11	17	.5											
June 24............		58		11	33	1.0											
June 27............		58		12	19	.6											
July 1.............		55		12	21	.7											
July 5.............		58		11	15	.4											
July 8.............		57		11	13	.4											
July 11............		58		11	18	.5											
July 15............		56		12	12	.4											
July 18............		60		11	24	.7											
July 22............		56		12	11	.4											
July 25............		--		e 12	16	.5											
July 29............		56		12	18	.6											
Aug. 1.............		58		11	19	.6											
Aug. 4.............		55		11	15	.4											
Aug. 8.............		58		12	11	.4											
Aug. 12............		60		12	12	.4											
Aug. 15............		57		12	16	.5											
Aug. 19............		55		12	20	.6											
Aug. 22............		60		12	7	.2											
Aug. 26............		59		12	5	.2											
Aug. 29............		58		11	7	.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 1959 to September 1960--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																		
Sept. 2, 1960		55		12	7	0.2												
Sept. 6		58		12	11	.4												
Sept. 9		58		12	23	.7												
Sept. 12		58		12	33	1.1												
8ept. 16		55		12	25	.8												
Sept. 20		54		12	12	.4												
Sept. 23		54		12	8	.2												
Sept. 26		56		12	11	.4												
Sept. 30		56		12	14	.4												
BLUEWATER CREEK AT SANFORD RANCH, NEAR BRIDGER, MONT.																		
Mar. 30, 1960		54		28	79	6.0												
Apr. 1		51		29	92	7.2												
Apr. 5		54		30	165	13												
Apr. 7		53		30	188	15												
Apr. 11		52		31	211	18												
Apr. 14		51		29	172	13												
Apr. 18		60		30	187	15												
Apr. 21		54		30	160	13												
Apr. 22		50		29	196	15												
Apr. 25		52		30	272	22												
Apr. 28		47		29	274	21												
May 2		61		29	217	17												
May 6		55		28	318	24												
May 9		64		27	276	20												
May 13		61		16	172	7.4												
May 17		61		9.9	70	1.9												
May 21		58		3.8	63	.6												
May 24		61		7.2	53	1.0												
May 27		54		6.5	101	1.8												

May 31, 1960.....	65	7.5	53	1.1
June 2.....	60	6.6	102	1.8
June 6.....	66	8.0	86	1.8
June 10.....	63	10	110	3.0
June 13.....	60	13	230	8.1
June 20.....	64	9.6	102	2.6
June 24.....	65	9.0	139	3.4
June 27.....	64	10	65	1.8
July 1.....	--	e 10	138	3.7
July 5.....	66	15	132	5.3
July 8.....	60	10	102	2.8
July 11.....	67	9	61	1.5
July 15.....	--	e 5	52	.7
July 18.....	77	6.8	214	3.9
July 22.....	68	7.5	62	1.2
July 25.....	64	8.5	71	1.6
July 29.....	65	10	105	2.8
Aug. 1.....	64	9.3	112	2.8
Aug. 4.....	67	13	117	4.1
Aug. 8.....	64	11	138	4.1
Aug. 12.....	65	16	224	9.7
Aug. 15.....	62	13	113	4.0
Aug. 19.....	64	23	402	25
Aug. 22.....	69	22	210	12
Aug. 26.....	64	22	203	12
Aug. 29.....	65	19	170	8.7
Sept. 2.....	58	19	169	8.7
Sept. 6.....	62	16	83	3.6
Sept. 9.....	62	11	195	5.8

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 1959 to September 1960--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	0.006	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																		
Sept. 12, 1960		63		18	75	3.6												
Sept. 16		56		18	40	1.9												
Sept. 20		54		19	77	3.9												
Sept. 23		56		21	61	3.4												
Sept. 26		57		21	35	2.0												
Sept. 30		58		23	32	2.0												
BLUEWATER CREEK NEAR FROMBERG, MONT.																		
Mar. 31, 1960		50		28	80	6.0												
Apr. 1		49		29	103	8.1												
Apr. 5		52		30	64	5.2												
Apr. 7		56		30	94	7.6												
Apr. 11		50		31	119	10												
Apr. 14		49		29	122	9.6												
Apr. 18		54		30	127	10												
Apr. 21		55		29	102	8.0												
Apr. 22		47		29	166	13												
Apr. 25		50		29	180	14												
Apr. 28		44		29	149	12												
May 2		60		29	164	13												
May 6		55		29	181	14												
May 9		62		28	259	20												
May 13		61		13	158	5.5												
May 17		62		1.4	67	.2												
May 21		65		.6	39	.1												
May 24		64		.4	90	.1												
May 27		54		.8	79	.2												
May 31		66		1.2	212	.7												
June 2		65		1.2	126	.4												
June 6		69		1.9	153	.8												

June 10, 1960.....	66		1.6	114	0.5
June 13.....	64		3.1	60	.5
June 17.....	60		2.3	47	.3
June 20.....	68		3.5	40	.4
June 24.....	--	e	3.5	90	.8
June 27.....	71		2.9	51	.4
July 1.....	59		2.9	170	1.3
July 6.....	56		7.0	246	4.6
July 6.....	65		3.1	151	1.3
July 11.....	73		2.5	68	.4
July 15.....	64		2.5	85	.6
July 18.....	83		1.6	38	.2
July 22.....	74		1.9	95	.5
July 25.....	72		1.4	62	.3
July 29.....	72		1.6	98	.4
Aug. 1.....	73		3.1	133	1.1
Aug. 4.....	73		3.0	148	1.2
Aug. 12.....	66		13	320	11
Aug. 15.....	--		7.2	106	2.1
Aug. 19.....	65		21	387	22
Aug. 22.....	71		22	322	19
Aug. 26.....	65		15	226	9.2
Aug. 29.....	66		10	193	5.2
Sept. 2.....	61		9.9	96	2.6
Sept. 6.....	64		9.4	69	1.6
Sept. 12.....	65		9.4	99	2.5
Sept. 16.....	56		12	44	1.4
Sept. 20.....	54		14	64	2.4

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 1959 to September 1960--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																	
Sept. 23, 1960.....		56		15	110	4.4											
Sept. 26.....		57		16	52	2.2											
Sept. 30.....		58		17	49	2.2											
6-2079. BLUEWATER CREEK AT FROMBERG, MONT.																	
Apr. 1, 1960.....	--	43		28	208	16	--	--	--	--	--	--	--	--			
Apr. 5.....	--	54		28	147	11	--	--	--	--	--	--	--	--			
Apr. 7.....	1540	54		28	211	16	46	56	68	78	88	100	--	--			BWC
Apr. 11.....	--	49		30	120	9.7	--	--	--	--	--	--	--	--			
Apr. 14.....	--	47		57	524	81	--	--	--	--	--	--	--	--			
Apr. 18.....	1545	54		45	345	42	18	23	28	39	51	86	98	100			VBWC
Apr. 21.....	--	57		29	199	16	--	--	--	--	--	--	--	--			
Apr. 22.....	--	47		34	331	30	--	--	--	--	--	--	--	--			
Apr. 25.....	1225	46		54	556	81	19	24	29	36	46	77	94	100			VBWC
Apr. 28.....	--	41		55	592	86	--	--	--	--	--	--	--	--			
May 2.....	--	56		58	663	104	--	--	--	--	--	--	--	--			
May 6.....	--	53		62	737	123	--	--	--	--	--	--	--	--			
May 9.....	--	59		57	549	84	--	--	--	--	--	--	--	--			
May 13.....	--	61		66	384	68	--	--	--	--	--	--	--	--			
May 17.....	--	60		5.6	92	1.4	--	--	--	--	--	--	--	--			
May 21.....	--	64		2.8	64	.5	--	--	--	--	--	--	--	--			
May 24.....	--	62		3.1	109	.9	--	--	--	--	--	--	--	--			
May 27.....	--	--		e 2	87	.5	--	--	--	--	--	--	--	--			
May 31.....	--	68		e 15	102	4.1	--	--	--	--	--	--	--	--			
June 2.....	--	64		19	279	14	--	--	--	--	--	--	--	--			
June 6.....	--	--		e 23	96	6	--	--	--	--	--	--	--	--			
June 10.....	--	57		e 30	124	10	--	--	--	--	--	--	--	--			

e Estimated.

June 13, 1960.....	--	60	e	40	702	76	--	--	--	--	--	--	--	--			
June 17.....	--	59		38	632	65	--	--	--	--	--	--	--	--			
June 20.....	--	62	e	35	431	41	--	--	--	--	--	--	--	--			
June 24.....	--	66		58	816	126	--	--	--	--	--	--	--	--			
June 27.....	--	69		49	82	11	--	--	--	--	--	--	--	--			
July 1.....	--	62		32	252	22	--	--	--	--	--	--	--	--			
July 6.....	--	60		20	167	9.0	--	--	--	--	--	--	--	--			
July 8.....	--	57		12	125	4.0	--	--	--	--	--	--	--	--			
July 11.....	--	71		16	248	11	--	--	--	--	--	--	--	--			
July 15.....	--	65		9.1	119	2.9	--	--	--	--	--	--	--	--			
July 18.....	--	79		8.0	49	1.0	--	--	--	--	--	--	--	--			
July 22.....	--	73		11	76	2.3	--	--	--	--	--	--	--	--			
July 25.....	1145	68		22	407	24	27	36	51	62	74	92	98	100			VBWC
July 29.....	--	70		26	251	18	--	--	--	--	--	--	--	--			
Aug. 1.....	--	70		22	443	26	--	--	--	--	--	--	--	--			
Aug. 4.....	--	75		13	238	6.4	--	--	--	--	--	--	--	--			
Aug. 8.....	--	65		47	1040	132	--	--	--	--	--	--	--	--			
Aug. 12.....	--	65		48	916	119	--	--	--	--	--	--	--	--			
Aug. 15.....	--	65		13	180	6.3	--	--	--	--	--	--	--	--			
Aug. 19.....	--	67		43	941	109	--	--	--	--	--	--	--	--			
Aug. 22.....	--	70		46	646	80	--	--	--	--	--	--	--	--			
Aug. 26.....	--	62		36	384	37	--	--	--	--	--	--	--	--			
Aug. 29.....	--	64		23	403	25	--	--	--	--	--	--	--	--			
Sept. 2.....	--	64		16	159	6.9	--	--	--	--	--	--	--	--			
Sept. 6.....	--	65		14	97	3.7	--	--	--	--	--	--	--	--			
Sept. 9.....	--	63		8.7	301	7.1	--	--	--	--	--	--	--	--			
Sept. 12.....	--	64		19	149	7.6	--	--	--	--	--	--	--	--			
Sept. 16.....	--	56		21	208	12	--	--	--	--	--	--	--	--			
Sept. 20.....	--	59		26	347	24	--	--	--	--	--	--	--	--			

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 1959 to September 1960--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	0.006	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																		
Sept. 23, 1960.....	--	56		36	372	36	--	--	--	--	--	--	--	--				
Sept. 26.....	--	68		38	379	39	--	--	--	--	--	--	--	--				
Sept. 30.....	--	57		24	168	11	--	--	--	--	--	--	--	--				
6-2280. WIND RIVER AT RIVERTON, WYO.																		
Oct. 22, 1959.....	--	45		554	123	184		--		--		--	--					
Nov. 20.....	--	33		d 260	208	146		--		--		--	--					
Dec. 17.....	--	33		d 300	67	54		--		--		--	--					
Jan. 18, 1960.....	--	32		d 220	45	27		--		--		--	--					
Feb. 29.....	--	32		d 160	22	10		--		--		--	--					
Mar. 28.....	1430	49		460	452	561	37	43		60		66	71	84	100			VBWC
Apr. 23.....	--	--		157	72	30		--		--		--	--					
May 5.....	--	--		36	60	5.8		--		--		--	--					
May 25.....	--	62		24	66	4.4		--		--		--	--					
June 3.....	--	72		74	44	8.8		--		--		--	--					
June 11.....	1650	70		169	823	376		87		98		99	100					PWC
June 17.....	--	66		172	96	46		--		--		--	--					
July 1.....	--	77		50	33	4.4		--		--		--	--					
July 11.....	--	67		32	49	4.2		--		--		--	--					
Aug. 2.....	--	79		52	36	5.0		--		--		--	--					
Aug. 16.....	--	65		42	42	4.8		--		--		--	--					
Aug. 31.....	--	63		22	12	.7		--		--		--	--					
6-2355. LITTLE WIND RIVER NEAR RIVERTON, WYO.																		
Oct. 22, 1959.....	--	45		251	18	12	--	--		--		--	--	--				
Nov. 20.....	--	34		d 160	51	22	--	--		--		--	--	--				

Dec. 17, 1959.....	--	32		d 200	94	51	--	--		--		--	--	--				
Feb. 29, 1960.....	--	32		d 120	145	47	--	--		--		--	--	--				
Mar. 28.....	1345	49		d 520	1580	2220	--	64		92		99	100	--				VPWC
Apr. 23.....	1330	--		185	214	107	43	51		67		100	--	--				VBWC
May 5.....	--	--		210	124	70	--	--		--		--	--	--				
May 25.....	--	66		164	80	35	--	--		--		--	--	--				
June 3.....	1640	72		750	346	701	20	24		47		96	99	100				VBWC
June 11.....	1555	65		1160	588	1840	--	24		44		82	97	99	100			VPWC
June 17.....	--	62		832	315	708	--	--		--		--	--	--				
July 1.....	--	77		116	68	21	--	--		--		--	--	--				
July 11.....	--	68		205	132	73	--	--		--		--	--	--				
Aug. 2.....	1320	77		68	98	17	7	20		50		84	98	100				VBWC
Aug. 18.....	--	65		59	86	14	--	--		--		--	--	--				
Aug. 31.....	--	68		58	57	8.9	--	--		--		--	--	--				

6-2803. SOUTH FORK SHOSHONE RIVER NEAR VALLEY, WYO.

Oct. 3, 1958.....	--	--		108	9	2.6	--	--		--		--	--	--	--	--		
July 30, 1959.....	--	58		540	8	12	--	--		--		--	--	--	--	--		
Oct. 2.....	--	40		133	1	.4	--	--		--		--	--	--	--	--		
Nov. 8.....	--	34		129	56	20	--	--		--		--	--	--	--	--		
May 12, 1960.....	--	--		808	50	109	--	--		--		--	--	--	--	--		
May 31.....	1130	53		872	95	224	3	4		15		33	46	76	94	100		VBWC
June 15.....	1030	49		1500	290	1170	5	8		17		35	48	69	90	98	100	VBWC
July 8.....	--	59		602	23	37	--	--		--		--	--	--	--	--		
July 19.....	--	64		408	5	5.5	--	--		--		--	--	--	--	--		
Aug. 5.....	--	66		200	6	3.2	--	--		--		--	--	--	--	--		
Aug. 29.....	--	56		164	2	.9	--	--		--		--	--	--	--	--		

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 1959 to September 1960--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	
CHEYENNE RIVER BASIN																	
6-4285. BELLE FOURCHE RIVER AT WYOMING-SOUTH DAKOTA STATE LINE																	
Apr. 13, 1960.....	1855	55		134	510	185	1	4		92		99	99	100				VPN
Apr. 13.....	1855	55		134	510	185	74	83		97		99	99	100				VPWC
June 14.....	1615	69		26	218	15	72	85	94	98	99	100	--	--				PWC
WHITEWOOD CREEK NEAR VALE, S. DAK.																	
Apr. 13, 1960.....	0930	48		32.6	21200	1870	6	11	21	38	64	87	97	100				VPWC
June 13.....	1120	72		28.0	41200	3110	7	10	17	30	59	96	100					VPWC
Aug. 18.....	1410	62		13.0	20900	734	9	16	29	45	66	97	100					VPWC
INDIAN CREEK NEAR NEWELL, S. DAK.																	
Apr. 13, 1960.....	1240	56		0.5	853	1.2	--	--	--	--	--	--						
June 13.....	1610	70		81	5300	1160	69	83	93	96	99	100						VPWC
Aug. 18.....	1030	64		36	596	56	63	78	92	97	99	100						VPWC
6-4370. BELLE FOURCHE RIVER NEAR STURGIS, S. DAK.																	
Apr. 14, 1960.....	1445	60		47	217	28	26	43	--	--	--	100						PWC
June 14.....	1055	69		235	20200	12600	15	23	34	56	87	100						VPWC
Aug. 20.....	1025	69		177	4540	2170	31	41	52	62	78	98	100					VPWC
BELLE FOURCHE RIVER NEAR HEREFORD, S. DAK.																	
Apr. 15, 1960.....	1345	63		50	47	6.3	--	--	--	--	--	--						
June 15.....	1230	65		186	6940	3490	27	42	66	92	98	100						VPWC
Aug. 20.....	1730	82		154	3420	1420	25	37	56	79	95	100						VPWC

JAMES RIVER BASIN

6-4735. WEST BRANCH SNAKE CREEK NEAR ATHOL, S. DAK.

Apr. 1, 1960.....	1500	--		450	79	96											
Apr. 3.....	1715	--		510	91	125											
Apr. 5.....	1845	36		242	45	29											
Apr. 12.....	1110	--		232	81	51											
Apr. 20.....	1515	--		23	32	2.0											
Apr. 26.....	1215	44		20	75	4.0											
May 3.....	1700	--		10	20	.5											
May 5.....	2310	52		9	12	.3											
May 26.....	1400	--		.4	19	.02											

PLATTE RIVER BASIN

6-7755. MIDDLE LOUP RIVER AT DUNNING, NEBR.

Dec. 5, 1959.....	1630	36		395	1540	1640						7	30	74	89	97	99	
Dec. 5 (sec. C-2)..	1710	35		398	968	1040						11	46	96	100	--	--	V
Dec. 6.....	1020	35		453	2200	2690						4	17	60	84	96	98	SV
Dec. 6 (sec. C-2)..	1040	35		465	1060	1330						6	34	93	100	--	--	V
Dec. 6.....	1510	39		469	1840	2330						5	21	66	88	97	100	SV
Dec. 6 (sec. C-2)..	1535	35		469	698	1140						9	38	93	100	--	--	V
Apr. 12, 1960.....	1500	--		406	1750	1920						5	28	74	94	100	--	V
Apr. 12.....	1515	--		406	2050	2250						--	--	--	--	--	--	
Apr. 12.....	1530	--		391	2110	2230						--	--	--	--	--	--	
Apr. 12.....	1545	--		381	2000	2060						--	--	--	--	--	--	
Apr. 12.....	1600	--		361	2210	2270						--	--	--	--	--	--	
Apr. 12.....	1615	--		388	2240	2350						--	--	--	--	--	--	
Apr. 12.....	1630	--		410	1700	1680						5	26	72	93	100	--	V
Apr. 12.....	1705	57		417	2130	2400						--	--	--	--	--	--	
Apr. 13.....	1135	--		440	1680	2000						7	29	68	89	100	--	V

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN MISSOURI RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge and particle size, water year October 1959 to September 1960--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																		
6-7755. MIDDLE LOUP RIVER AT DUNNING, NEBR.--Continued																		
Apr. 13, 1960.....	1200	--		440	1540	1830						--	--	--	--	--	--	
Apr. 13.....	1435	--		440	1440	1710						7	28	70	91	100	--	V
Apr. 13.....	1445	--		440	1730	2060						--	--	--	--	--	--	
Apr. 13.....	1500	--		444	1660	1990						--	--	--	--	--	--	
Apr. 13.....	1515	--		436	1650	1940						--	--	--	--	--	--	
Apr. 13.....	1530	--		428	1350	1560						--	--	--	--	--	--	
Apr. 13.....	1545	--		421	1400	1590						--	--	--	--	--	--	
Apr. 13.....	1710	--		402	1510	1640						7	28	72	91	100	--	V
Apr. 13.....	1730	--		432	2210	2580						--	--	--	--	--	--	
Apr. 13.....	1745	--		436	1920	2260						--	--	--	--	--	--	
Apr. 13.....	1800	--		428	1880	2170						--	--	--	--	--	--	
Apr. 14 (sec. C-2).	1000	53		428	866	1000						10	49	94	100	--	--	V
Apr. 14.....	1045	--		424	1800	2060						5	24	70	95	100	--	V
Apr. 14.....	1330	--		413	1890	2110						--	--	--	--	--	--	
6-7915. CEDAR RIVER NEAR SPALDING, NEBR.																		
Oct. 6, 1959.....	0950	52		72	52	10	--	--	--	--	--	57	71	98	100	--		V
Oct. 27.....	1030	38		60	31	5.0	--	--	--	--	--	83	92	100	--	--		V
Nov. 13.....	0910	32		d 90	36	8.7	--	--	--	--	--	84	87	93	100	--		V
Dec. 1.....	1220	36		60	34	5.5	--	--	--	--	--	93	98	100	--	--		V
Dec. 22.....	0930	34		126	94	32	--	--	--	--	--	38	50	82	100	--		V
Jan. 13, 1960.....	0920	32		d 140	81	31	--	--	--	--	--	60	75	98	100	--		V
Mar. 2.....	1010	32		d 122	368	121	--	--	--	--	--	10	16	30	78	94	94	SV
Mar. 28.....	1710	44		346	1120	1050	--	--	--	--	--	27	53	90	100	--		V
Apr. 5.....	0935	43		272	424	311	--	--	--	--	--	26	44	97	100	--		V
Apr. 14.....	1535	61		202	256	140	16	16	16	19	20	37	56	97	100	--		VPWC
May 3.....	1635	62		224	247	149	6	6	7	11	--	30	50	97	100	--		VPWC
May 23.....	1620	73		377	342	348	--	--	--	--	--	33	53	97	100	--		V

June 14, 1960.....	1540	78		146	171	67	13	14	14	19	23	71	85	99	100	--		VPWC
June 28.....	1130	74		321	382	331	8	9	11	12	14	32	53	94	99	100		VPWC
July 12.....	1010	76		200	292	158	13	13	16	20	25	51	71	96	100	--		VPWC
July 27.....	0905	74		123	238	79	--	--	--	--	--	63	82	99	100	--		V
Aug. 10.....	1000	70		54	46	6.7	--	--	--	--	--	--	--	--	--	--		
Aug. 23.....	0935	73		53	46	6.6	--	--	--	--	--	--	--	--	--	--		
Sept. 13.....	0900	60		64	42	7.2	--	--	--	--	--	--	--	--	--	--		
Sept. 27.....	1310	66		51	34	4.7	--	--	--	--	--	--	--	--	--	--		

6-7918. CEDAR RIVER AT BELGRADE, NEBR.

Oct. 5, 1959.....	1635	63		204	545	300	--	--	--	--	--	61	71	92	100			V
Oct. 26.....	1620	45		184	618	307	--	--	--	--	--	59	71	97	100			V
Nov. 12.....	1630	32		160	518	223	--	--	--	--	--	70	79	97	100			V
Nov. 30.....	1650	32	d	221	910	543	12	12	--	18	--	54	71	98	100			VPWC
Dec. 22.....	1240	32		212	786	450	--	--	--	--	--	54	68	94	100			V
Jan. 13, 1960.....	1510	32	d	175	411	194	--	--	--	--	--	40	47	87	100			V
Feb. 9.....	1620	32	d	195	214	113	--	--	--	--	--	59	68	86	98	100		V
Mar. 1.....	1820	32	d	177	190	91	--	--	--	--	--	61	72	99	100			V
Mar. 29.....	1820	39		1730	7450	34800	13	15	18	21	34	69	85	97	100			VPWC
Mar. 29.....	1820	39		1730	7450	34800	5	8	11	16	29	69	85	97	100			VPN
Apr. 5.....	1330	51		268	1420	1030	10	12	--	19	--	60	79	98	100			VPWC
Apr. 14.....	1210	60		326	832	732	--	--	--	--	--	59	80	99	100			V
May 4.....	0910	57		313	810	685	--	--	--	--	--	62	78	97	100			V
May 6.....	1050	49		880	4660	11100	23	27	32	--	47	74	86	96	100			VPWC
May 10.....	1445	63		764	2220	4700	12	12	14	--	27	57	75	95	100			VPWC
May 24.....	0930	69		432	1260	1470	--	--	--	--	--	--	--	--	--			
June 15.....	0905	71		281	664	504	--	--	--	--	--	--	--	--	--			

d Daily mean discharge.

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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 1959 to September 1980--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	0.018	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
PLATTE RIVER BASIN--Continued																		
6-7918. CEDAR RIVER AT BELGRADE, NEBR.--Continued																		
June 29, 1960.....	0820	73		428	1780	2060	23	26	29	--	43	73	86	98	100			VPWC
July 12.....	1200	83		236	401	256	38	42	48	--	68	88	95	100	--			VPWC
July 26.....	1510	92		150	356	144	--	--	--	--	--	--	--	--	--			
Aug. 10.....	1440	82		158	454	194	29	32	--	--	83	76	88	99	100			VPWC
Aug. 22.....	1810	89		168	440	200	29	30	--	--	55	74	82	98	100			VPWC
Sept. 13.....	1145	71		168	517	232	--	--	--	--	--	--	--	--	--			
Sept. 27.....	1000	88		179	447	218	--	--	--	--	--	--	--	--	--			
6-7920. CEDAR RIVER NEAR FULLERTON, NEBR.																		
Oct. 5, 1959.....	1340	61		174	392	164	--	--	--	--	--	83	89	98	100	--		V
Oct. 26.....	1400	44		159	398	171	--	--	--	--	--	75	84	99	100	--		V
Nov. 13.....	1245	32	d	190	665	341	--	--	--	--	--	56	74	96	100	--		V
Nov. 30.....	1120	32	d	190	140	72	--	--	--	--	--	87	94	100	--	--		V
Dec. 21.....	1720	33		194	756	396	--	--	--	--	--	71	80	98	100	--		V
Jan. 12, 1960.....	1600	32		198	222	119	--	--	--	--	--	82	87	99	100	--		V
Feb. 9.....	1115	32	d	235	265	168	--	--	--	--	--	85	92	99	100	--		V
Mar. 1.....	1240	32	d	161	117	51	--	--	--	--	--	79	87	94	100	--		V
Mar. 28.....	1320	--	d	3300	2690	24000	29	32	36	41	55	86	95	99	100	--		VPWC
Mar. 29.....	1200	39	d	2000	1980	10700	39	44	50	58	74	94	97	100	--	--		VPWC
Mar. 30.....	1700	43		1640	5840	25900	13	15	17	21	32	69	82	98	100	--		VPWC
Apr. 1.....	1420	33		1480	8790	35100	15	17	20	24	30	55	71	91	98	99		VPWC
Apr. 1.....	1420	33		1480	8790	35100	6	9	13	20	31	55	71	91	98	99		VPN
Apr. 4.....	1350	48		551	1250	1860	19	22	--	31	--	76	86	99	100	--		VPWC
Apr. 4.....	1430	48		551	3010	4480	7	8	--	12	--	31	64	93	100	--		VPWC
Apr. 14.....	0915	52		356	189	182	--	--	--	--	--	21	59	97	100	--		V
May 4.....	1525	63		308	800	685	--	--	--	--	--	42	69	90	96	98		V
May 10.....	1200	59		595	2320	3730	13	18	--	22	--	88	81	98	100	--		VPWC

May 23, 1960.....	1200	68		388	1360	1420	--	--	--	--	--	37	88	95	100	--		V
June 15.....	1315	77		268	622	447	--	--	--	--	--	59	77	99	100	--		V
June 29.....	1250	78		360	2080	2020	38	44	--	52	--	90	98	100	--	--		VPWC
July 12.....	1525	84		232	494	309	--	--	--	--	--	--	--	--	--	--		
July 28.....	1200	86		122	276	91	--	--	--	--	--	90	95	100	--	--		V
July 26.....	1535	70		132	416	148	--	--	--	--	--	--	--	--	--	--		
Aug. 11.....	1000	70		118	230	73	--	--	--	--	--	83	90	99	100	--		V
Aug. 22.....	1210	84		128	287	92	--	--	--	--	--	81	88	100	--	--		V
Sept. 13.....	1625	--		159	344	148	--	--	--	--	--	--	--	--	--	--		

6-7975. ELKHORN RIVER AT EWING, NEBR.

May 19, 1960.....	1500	--		1940	1600	8380						2	7	66	97	100		V
July 11.....	1510	85		451	98	119						50	66	98	100			V
July 27.....	1250	81		104	72	20						--	--	--	--			
Aug. 9.....	1425	77		71	39	7.5						90	94	97	100			V
Aug. 23.....	1415	84		48	37	4.8						--	--	--	--			
Sept. 12.....	1345	74		71	20	3.8						--	--	--	--			
Sept. 27.....	1645	71		68	18	3.3						--	--	--	--			

6-8005. ELKHORN RIVER AT WATERLOO, NEBR.

Mar. 31, 1960.....	1045	36		21800	6540	385000	33	38	42	51	81	90	98	100	--	--		VPWC
Mar. 31.....	1540	36		21400	5180	299000	32	37	42	48	59	78	90	99	100	--		VPWC
Apr. 1.....	1020	--		24400	5200	343000	27	30	34	41	54	89	77	97	100	--		VPWC
Apr. 1.....	1450	--		25600	4100	283000	34	39	44	51	61	76	86	98	100	--		VPWC
Apr. 4.....	1145	40		31800	2910	250000	42	48	54	59	85	89	76	96	100	--		VPWC
Apr. 8.....	1145	--		14450	5500	215000	29	33	38	45	59	77	88	98	98	100		VPWC
Apr. 6.....	1145	--		14450	5500	215000	10	18	27	39	57	77	88	98	98	100		VPN
Apr. 8.....	1205	--		10000	5540	150000	29	33	37	44	59	79	89	98	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 1959 to September 1960--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	0.018	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
PLATTE RIVER BASIN--Continued																		
6-8055. PLATTE RIVER AT LOUISVILLE, NEBR.																		
Mar. 31, 1960	0830			90000	4600	1120000	--	--	--	--	--	--	--	--	--	--		
Mar. 31	0930			88400	5350	1260000	17	19	21	24	31	42	54	91	99	100		VPWC
Mar. 31	1300			85800	6100	1410000	--	--	--	--	--	--	--	--	--	--		
Apr. 1	1135			59700	5230	843000	22	24	27	33	43	60	71	93	99	100		VPWC
Apr. 4	1000			59300	5460	874000	23	26	28	32	39	49	59	85	96	100		VPWC
Apr. 8	1010			59100	2660	424000	34	34	39	46	63	79	85	95	100	--		VPWC
LITTLE NEMAHA RIVER BASIN																		
6-S110.4. EAST FORK BROWNELL CREEK NEAR SYRACUSE, NEBR.																		
Mar. 27, 1960	1230			e 80	10900	2350												
Mar. 28	1315			e 140	8620	3260												
KANSAS RIVER BASIN																		
6-8640. SMOKY HILL RIVER NEAR RUSSELL, KANS.																		
Mar. 30, 1958	1640	39		3350	2110	19100		55		68		95	97	98	99	100		VPWC
Mar. 30	1940	--		2920	1980	15600		--		--		--	--	--	--			
May 16	1800	68		960	1610	4170	65	73		88		98	98	99	100			VPWC
6-8645. SMOKY HILL RIVER AT ELLSWORTH, KANS.																		
Mar. 29, 1958	1830			8720	3840	90400	50	55		70		95	97	96	96	100		VPWC
Aug. 29, 1960	2130	73		17800	5700	274000	61	69	76	82	68	95	96	97	99	100		VPWC
Aug. 30	0005			17600	4050	192000	49	70		92		--	--	--	--	--		PWC

e Estimated.

6-8665. SMOKY HILL RIVER NEAR MENTOR, KANS.

Mar. 10, 1958.....	2150	35		527	629	895												
July 28.....	1345	75		3790	2080	21300												
June 27, 1960.....	1425	81		832	520	1170												

6-8670. SALINE RIVER NEAR RUSSELL, KANS.

Mar. 30, 1958.....	1715	40		e 2000	2310	12500		56		72		89	91	97	100			VPWC
May 3.....	1725	60		e 400	511	552		--		--		--	--	--	--			
May 17.....	1300	67		e 5000	6090	82200	54	67		83		92	94	96	100			VPWC
Sept. 1, 1960.....	1050	--		172	178	83		--		--		--	--	--	--			

6-8775. TURKEY CREEK NEAR ABILENE, KANS.

Oct. 5, 1959.....	0830	51		1460	1800	7100												
Nov. 20.....	1130	37		31	59	4.9												
Dec. 1.....	1120	--		29	72	5.6												
Jan. 5, 1960.....	1315	--		d 24	63	4.1												
Mar. 29.....	1030	54		124	394	132												
Apr. 21.....	1330	65		54	110	16												
May 26.....	1330	72		36	231	22												
June 21.....	0930	72		43	2640	306												
July 12.....	1630	86		50	132	18												
Aug. 18.....	1040	75		210	2610	1480												
Sept. 15.....	0850	67		10	1560	42												

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 1959 to September 1960--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.																	
Oct. 3, 1959	1345	56		724	2560	5000											
Nov. 23	1510	43		17	102	4.7											
Jan. 12, 1960	1210	32		18	10	.5											
Mar. 28	1850	48		5700	3080	47400											
May 31	1420	75		39	180	19											
June 21	0940	76		47	355	45											
Aug. 11	1115	80		26	427	30											
Sept. 14	1010	66		11	177	5.2											
6-8785. LYON CREEK NEAR WOODBINE, KANS.																	
Oct. 5, 1959	0940	57		4110	1280	14200											
Nov. 20	1050	40		69	72	13											
Dec. 1	1315	--		65	39	6.8											
Jan. 5, 1960	1415	32		50	18	2.4											
Mar. 29	1145	54		249	350	235											
Apr. 21	1445	66		107	100	29											
May 26	1405	--		80	279	60											
June 21	1015	72		132	622	222											
July 12	1600	84		51	150	21											
Aug. 11	2130	76		32	198	17											
Aug. 18	1105	76		58	177	28											
Sept. 15	1045	72		18	145	7.0											
6-8792. CLARK CREEK NEAR JUNCTION CITY, KANS.																	
Oct. 5, 1959	1030	57		1690	1300	5930											
Nov. 23	0950	41		44	71	8.4											
Dec. 1	1350	34		36	19	1.8											
Jan. 5, 1960	1450	--		32	7	.6											

Mar. 29, 1960.....	1245	55		343	298	276												
Apr. 21.....	1530	64		104	39	11												
May 26.....	1440	73		56	148	22												
June 21.....	1100	73		69	221	41												
July 12.....	1520	82		31	106	8.9												
Aug. 11.....	1000	76		19	124	8.4												
Sept. 15.....	1130	73		13	98	3.4												

6-8810. BIG BLUE RIVER NEAR CRETE, NEBR.

Mar. 31, 1960.....	1720	--		19900	1550	83300	68	70	81	87	--	100	--					VPWC
Apr. 1.....	0920	--		14800	1640	64600	--	--	--	--	--	--	--					
Apr. 1.....	1750	41		12700	1280	43900	62	69	75	83	91	99	99	100				VPWC
Apr. 2.....	1310	42		9800	1240	32800	30	50	65	77	89	99	100					VPWC

6-8840. LITTLE BLUE RIVER NEAR FAIRBURY, NEBR.

Mar. 31, 1960.....	1610	--		4130	3520	39300	21	31	42	55	77	94	97	100				VPWC
Apr. 2.....	1630	41		5230	5820	82200	53	57	66	78	89	98	99	100				VPWC
May 20.....	1620	55		3050	13200	109000	54	61	69	78	90	98	98	99	100			VPWC

6-8905. DELAWARE RIVER AT VALLEY FALLS, KANS.

Oct. 5, 1959.....	1530	59		4260	1740	20000	--	--		--		--						
Dec. 1.....	1945	--		87	34	8.0	--	--		--		--						
Jan. 6, 1960.....	1630	32		d 95	47	12	--	--		--		--						
Apr. 22.....	1300	68		224	119	72	--	--		--		--						
May 28.....	2005	75		115	182	56	--	--		--		--						

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 1959 to September 1960--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																	
6-6905. DELAWARE RIVER AT VALLEY FALLS, KANS.--Continued																	
June 22, 1960	1830	72		768	4860	10100	45	63		92		100					SPWC
July 11	1715	81		420	2720	3080	58	73		97		100					SPWC
Aug. 15	1145	82		16	106	4.6	--	--		--		--					
Aug. 18	1530	74		7800	2500	52600	49	66		86		97					SPWC
Sept. 22	1815	--		15	37	1.5	--	--		--		--					
6-8915. WAKARUSA RIVER NEAR LAWRENCE, KANS.																	
Nov. 19, 1958	1415	50		680	620	1140	67	71		--		--					PWC
Oct. 5, 1959	1245	60		3530	1280	12200	--	--		--		--					
Dec. 1	1730	34		20	67	3.6	--	--		--		--					
Jan. 6, 1960	1430	32		44	44	5.2	--	--		--		--					
Apr. 21	1845	64		192	151	78	--	--		--		--					
May 27	1005	72		42	197	22	--	--		--		--					
June 22	2100	--		76	295	80	--	--		--		--					
July 12	1150	81		84	535	121	74	74		91		99					SPWC
Aug. 15	1300	85		3.4	109	1.0	--	--		--		--					
Aug. 26	1405	78		128	1440	498	--	--		--		--					
Aug. 26	1600	--		110	1020	303	--	--		--		--					
Aug. 26	1820	--		144	782	304	--	--		--		--					
Aug. 26	2355	--		568	4000	6130	31	45		69		99					SPWC
Aug. 27	0830	76		892	3410	8210	45	62		90		100					SPWC
Aug. 27	1100	78		820	3620	8010	48	67		93		100					SPWC
Sept. 23	1050	--		1.6	57	.2	--	--		--		--					

Particle-size analyses of bed material, water year October 1959 to September 1960
(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																		
6-7755. MIDDLE LOUP RIVER AT DUNNING, NEBR.																		
Nov. 25, 1959.....	--		2	d 402			0	1	10	52	78	88	96	99	100			SV
Dec. 6.....	1040		14	465			0	2	41	84	94	97	99	100				SV
Dec. 6.....	1535		14	469			0	2	36	86	97	98	100	--				SV
Apr. 13, 1960.....	--		18	440			0	3	43	88	97	98	99	100				SV
6-7915. CEDAR RIVER NEAR SPALDING, NEBR.																		
Oct. 6, 1959.....	0950		10	72			2	10	48	97	100	--	--	--				V
Oct. 27.....	1030		10	60			2	9	42	93	99	100	--	--				SV
Nov. 13.....	0910		11	d 90			0	3	44	92	99	100	--	--				SV
Dec. 1.....	1220		10	60			1	10	60	94	98	99	100	--				SV
Dec. 22.....	0930		8	126			0	2	91	99	99	99	99	100				SV
Jan. 13, 1960.....	0920		10	d 140			2	16	44	90	99	100	--	--				SV
Apr. 14.....	1535		10	202			3	12	61	96	99	100	--	--				V
May 3.....	1635		10	224			--	0	45	98	100	--	--	--				V
May 23.....	1620		19	377			1	6	53	92	95	96	97	97	99	100		V
June 14.....	1540		19	146			1	14	59	97	100	--	--	--				V
June 28.....	1130		14	321			1	8	57	97	99	100	--	--				SV
July 12.....	1010		12	200			1	10	52	97	100	--	--	--				V
Aug. 10.....	1000		17	54			0	10	56	97	99	100	--	--				SV
Aug. 23.....	0935		17	53			1	10	62	97	100	--	--	--				V
Sept. 13.....	0900		18	64			3	15	60	97	100	--	--	--				V
Sept. 27.....	1310		9	51			1	9	52	96	100	--	--	--				V
6-7918. CEDAR RIVER AT BELGRADE, NEBR.																		
Oct. 5, 1959.....	1635		18	204			0	2	39	97	100	--	--					SV
Oct. 26.....	1620		17	184			0	2	45	94	100	--	--					SV

d Daily mean discharge.

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN MISSOURI RIVER BASIN--Continued

Particle-size analyses of bed material, water year October 1959 to September 1980--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)	Bed material: Percent finer than size indicated, in millimeters										Method of analysis
							0.082	0.125	0.250	0.500	1.000	2.000	4.000	8.000	16.00	32.00	64.00	
PLATTE RIVER BASIN--Continued																	
6-7918. CEDAR RIVER AT BELGRADE, NEBR.--Continued																	
Nov. 12, 1959	1830		18	160			0	2	60	97	100	--	--					SV
Nov. 30	1650		10	d 221			2	11	64	97	99	99	100					SV
Dec. 22	1240		19	212			1	8	59	97	99	99	100					SV
Jan. 13, 1960	1510		15	d 175			0	7	64	97	100	--	--					SV
Feb. 9	1620		12	d 195			3	14	70	98	100	--	--					SV
Mar. 29	1820		9	1730			2	7	71	98	99	100	--					SV
Apr. 14	1210		10	326			4	12	66	98	100	--	--					SV
May 4	0910		18	313			0	4	50	99	100	--	--					SV
May 6	1050		3	880			0	9	74	99	100	--	--					SV
May 24	0930		19	432			2	13	67	98	100	--	--					SV
June 15	0905		19	281			3	20	88	98	100	--	--					SV
June 29	0820		19	428			2	2	7	45	92	100	--					SV
Aug. 10	1440		18	158			3	12	62	96	100	--	--					SV
Aug. 22	1610		18	188			0	4	59	97	100	--	--					SV
Sept. 13	1145		14	166			0	4	52	93	98	98	99	100				SV
Sept. 27	1000		10	179			0	9	67	96	100	--	--					SV
6-7920. CEDAR RIVER NEAR FULLERTON, NEBR.																	
Oct. 5, 1959	1340		10	174			1	3	58	92	95	96	98	100				SV
Nov. 13	1245		17	d 190			0	3	40	89	95	97	100	--				SV
Nov. 30	1120		11	d 190			18	28	73	92	98	97	98	100				SV
Dec. 21	1720		18	194			1	11	60	94	98	99	100	--				SV
Jan. 12, 1980	1600		18	198			0	5	58	94	98	97	99	100				SV
Mar. 30	1700		7	1840			0	5	87	97	98	99	99	100				SV
Apr. 1	1420		10	1480			5	14	86	93	98	97	99	100				SV
Apr. 4	1430		14	551			2	16	81	98	98	98	99	100				SV
Apr. 14	0915		7	358			3	11	88	96	98	99	99	99	100			SV
May 4	1525		18	308			1	5	53	84	89	92	98	100				SV

June 15, 1960.....	1315		21	266			3	10	58	96	98	99	100	--				SV
July 12.....	1525		19	232			1	4	64	97	99	99	100	--				SV
Aug. 11.....	1000		19	118			0	5	64	92	95	97	99	100				SV
Aug. 22.....	1210		19	128			0	2	62	97	98	99	100	--				SV
Sept. 13.....	1625		18	159			1	14	75	96	97	99	99	100				SV
Sept. 26.....	--		19	d 179			0	3	65	98	99	100	--	--				SV
6-7975. ELKHORN RIVER AT EWING, NEBR.																		
July 11, 1960.....	1510		18	451			0	2	29	75	98	100						SV
Aug. 9.....	1425		18	71			0	1	39	91	99	100						SV
Aug. 23.....	1415		18	48			0	1	31	86	99	100						SV
Sept. 12.....	1345		18	71			0	3	32	82	97	100						SV
Sept. 27.....	1645		15	88			0	10	49	88	95	98	100					SV
6-8005. ELKHORN RIVER AT WATERLOO, NEBR.																		
Apr. 1, 1960.....	1020		3	24400				1	49	87	95	98	100					SV
Apr. 4.....	1115		4	31800				0	12	56	89	97	100					SV
Apr. 6.....	1145		7	14450			2	9	61	84	95	98	100					SV
6-8055. PLATTE RIVER AT LOUISVILLE, NEBR.																		
Mar. 31, 1980.....	1300		8	85800				0	26	61	82	90	97	100				SV
Apr. 4.....	1000		8	59300				0	14	73	97	99	100					SV

d Daily mean discharge.

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