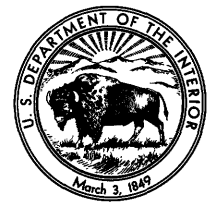
Quality of Surface Waters of the United States 1959

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

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

GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1643

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



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PREFACE

This report was prepared by the Geological Survey in cooperation with the States of Iowa, Kansas, Minnesota, 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 hydraulic engineer, and S. K. Love, chief, Quality of Water Branch. The data were collected and computed under the supervision of the following engineers or district chemists:

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QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1959

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 other Federal agencies deal with the amounts of matter in solution and in suspension in streams.

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

Publication of annual records of chemical analyses, suspended sediment, and water temperature was begun by the Geological Survey in 1941. The records prior to 1948 were published each year in a single volume for the entire country. Beginning in 1948, the records were published in two volumes, and beginning in 1950, in four volumes, covering the drainage basins shown in Figure 1. The samples for which data are given in this volume were collected from October 1, 1958, to September 30, 1959. The records are arranged by drainage basins according to Geological Survey practice in reporting records of streamflow: Stations on tributary streams are listed between stations on the main stem in the order

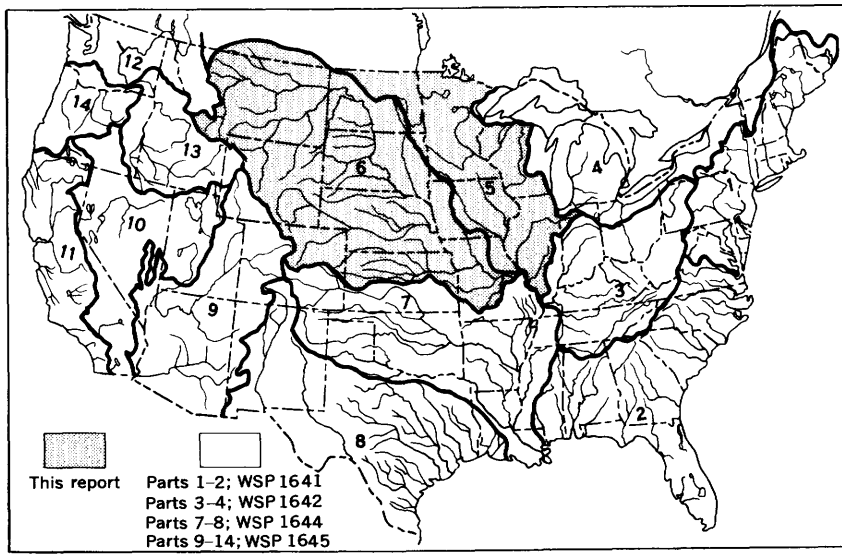

Figure 1. --Map of the United States showing basins covered by the four water-supply papers on quality of surface waters in 1959. The shaded portion represents the section of the country covered by this volume; the unshaded portion represents the section of the country covered by other water-supply papers.

in which those tributaries enter the main stem.

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

Descriptive statements are given for each sampling station for which regular series of 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, 1959, the Geological Survey maintained 76 stations on 58 streams for the study of chemical and physical characteristics of surface water. Samples were collected daily or monthly at 37 of these locations for chemical-quality studies. Samples were also collected less frequently at many other points. Water temperatures were measured daily at 53 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 28.

Quantities of suspended sediment are reported for 30 stations during the year ending September 30, 1959. Sediment samples were collected one or more times daily during periods of significant flow at most of the continuous-record stations. Particle-size distributions of sediments were determined for 23 of the stations.

COLLECTION AND EXAMINATION OF SAMPLES

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

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

The nearly uniform dispersed ions of the solute move with the velocity of the transporting media. The mean section concentration of solutes determined from samples is a precise measure of the solute. The mean section concentration obtained from suspended-sediment samples is a less precise measure of the total sediment load, because sediment samplers did not traverse the bottom 0.4 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 suspended sediment loads presented in this report are usually less than the total sediment loads. For most streams the difference between the suspended 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, 1948, p. 70-76 and U. S. Interagency, 1952, p. 86-90) from a fixed sampling point at one vertical in the cross section. The US DH-48 hand sampler was used at many stations during periods of low flow. Depth-integrated samples were collected periodically at three or more verticals in the cross section to determine the cross-sectional distribution of the concentration of suspended sediment with respect to that at the daily sampling vertical. In streams where transverse distribution of sediment concentration ranges widely, samples were taken 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-evapororation 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 about weekly, monthly, or less frequently, and only rates of sediment discharge at the time of sampling are shown.

In addition to the records of quantities of suspended sediment transported, records of the particle sizes of sediment are included. The particle sizes of the suspended sediments for many of the stations, and the particle sizes of the bed material for some of the stations were determined periodically.

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 accomodate 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 obtained in the laboratory by use of volumetric glassware. The analytical results thus obtained 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 equivalent to parts per million.

Chemical equivalence in equivalents per million (epm) 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 terms "equivalents per million" is a contraction which has been generally adopted for convenience. In more exact language, these units are "milligram equivalents per kilogram" if derived from part-per million data, or "milligram equivalents per

liter" if derived from data expressed in milligrams per liter. Equivalent weights may be computed for use with any of the systems of expression of data (Hem, 1959, p. 30-34).

In an analysis expressed in equivalents per million, unit concentrations of all ions are chemically equivalent.

Conversion factors: Parts per million to equivalents per million

Ion	Multiply by	Ion	Multiply by
Aluminum (Al^{+3})	0.11119	Iron (Fe^{+3})	0.05372
Barium (Ba^{+2})	.01456	Lead (Pb^{+2})	.00965
Bicarbonate (HCO_3^{-1})	.01639	Lithium (Li^{+1})	.14409
Bromide (Br^{-1})	.01251	Magnesium (Mg^{+2})	.08224
Calcium (Ca^{+2})	.04990	Manganese (Mn^{+2})	.03640
Carbonate (CO_3^{-2})	.03333	Nitrate (NO_3^{-1})	.01613
Chloride (Cl^{-1})	.02820	Phosphate (PO_4^{-3})	.03159
Chromium (Cr^{+6})	.11536	Potassium (K^{+1})	.02558
Copper (Cu^{+2})	.03148	Sodium (Na^{+1})	.04350
Fluoride (F^{-1})	.05263	Strontium (Sr^{+2})	.02282
Hydrogen (H^{+1})	.99206	Sulfate (SO_4^{-2})	.02082
Hydroxide (OH^{-1})	.05880	Zinc (Zn^{+2})	.03059
Iodide (I^{-1})	.00788		

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

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

The value usually reported as dissolved solids is the residue on evaporation after drying at 180°C for 1 hour. For some waters, particularly those containing moderately large quantities of soluble salts, the value reported is calculated from the quantities of the various determined constituents using the carbonate equivalent of the reported bicarbonate. The calculated sum of the constituents may be given instead of or in addition to the residue. In the

analyses of most waters used for irrigation, the quantity of dissolved solids is given in tons per acre-foot as well as in parts per million.

Specific conductance is given for most analyses and was determined by means of a conductance bridge and using a standard potassium chloride solution as reference. Specific conductance values are expressed in micromhos per centimeter at 25°C. Specific conductance in micromhos is 1 million times the reciprocal of specific resistance at 25°C. Specific resistance is the resistance in ohms of a column of water 1 centimeter long and 1 square centimeter in cross section.

The discharge of the streams is reported in cubic feet per second (see Streamflow, p. 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 or time-weighted; when analyses during a year are all on 10-day composites of daily samples with no missing days, the arithmetical and time-weighted averages are equivalent. A time-weighted average represents the composition of water that would be contained in a vessel or reservoir that had received equal quantities of water from the river each day for the water year. A discharge-weighted average approximates the composition of water that would be found in a reservoir containing all of the water passing a given station during the year after thorough mixing in the reservoir. A discharge-weighted average is computed by multiplying the discharge for the sampling period by the concentrations of the individual constituents for the corresponding period and dividing the sum of the products by the sum of the discharges. Discharge-weighted averages are usually lower than arithmetical averages for most streams because at times of high discharge the rivers generally have lower concentrations of dissolved solids.

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

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

COMPOSITION OF SURFACE WATERS

All natural waters contain dissolved mineral matter. Water in contact with soils or rock, even for only a few hours, will dissolve some 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.

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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.

In this report, the potassium values not shown are usually calculated in with the sodium and reported as sodium.

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, agriculture, and industrial user is usually dependent upon the nature of the cations (Ca, Mg, Na, K) associated with it. However, moderate amounts of alkalinity does not adversely affect most users.

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

Sulfate (SO_4)

Sulfate is dissolved from many rocks and soils--in especially large quantities from gypsum and from beds of shale. It is formed also by the oxidation of sulfides of iron and is therefore present

in considerable quantities in waters from mines. Sulfate in waters that contain much calcium and magnesium causes the formation of hard scale in steam boilers and may increase the cost of softening the water.

Chloride (Cl)

Chloride is dissolved from rock materials in all parts of the country. Surface waters in the humid regions are usually low in chloride, whereas streams in arid or semiarid regions may contain several hundred parts per million of chloride leached from soils and rocks, especially where the streams receive return drainage from irrigated lands or are affected by ground-water-in-flow carrying appreciable quantities of chloride. Large quantities of 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. Recent investigations indicate that the incidence of dental caries is less when there are small amounts of fluoride present in the water supply than when there is none. However, fluoride in excessive concentrations is undesirable in waters used for drinking. It is stated in a comprehensive report by the California State Water Pollution Control Board (1952, p. 257) on water-quality standards"... that water containing less than 0.9 to 1.0 ppm of fluoride will seldom cause mottled enamel in children, and for adults concentrations less than 3 or 4 ppm are not likely to cause 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 methe-

moglobinemia ("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 or more (as NO_3) may cause methemoglobinemia (Waring, 1949). In a report published by the National Research Council, Maxcy (1950, p. 271) concludes that a nitrate content in excess of 44 parts per million (as NO_3) should be regarded as unsafe for infant feeding.

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 Cr in the hexavalent form constitutes ground for rejection of a water for domestic use on the basis of the standards of the U.S. Public Health Service (1946).

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 (1946) recommends that copper should not exceed 3.0 ppm

in drinking and culinary water on carriers subject to Federal quarantine regulations.

Lead (Pb)

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

Traces of lead in water usually are the result of solution of lead pipe through which the water has passed. Amounts of lead of the order of 0.1 ppm are significant, as this concentration is the upper limit for drinking water in the standards adopted by the U.S. Public Health Service (1946). 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 moderate concentrations is not known to have adverse physiological effects on man or stock, but zinc salts give water an unpleasant astringent taste and form a greasy film on boiling water (Howard, 1923, p. 411). The U.S. Public Health Service (1946, p. 13) recommends that the zinc content not exceed 15 ppm in drinking and culinary water on carriers subject to Federal quarantine regulations.

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 (1946) states that salts of barium, which have a deleterious physiological effect, must not be added to drinking and culinary water on carriers subject to Federal quarantine regulations.

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. Probably trace amounts of bromide are of frequent occurrence in surface water since compounds containing bromine are generally readily soluble. It resembles chloride in that it tends to be concentrated in sea water.

Iodide (I)

Iodine, like bromine, is a minor element and is normally present in natural 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 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 be found to 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. Water that has less than 60 parts per million of hardness is usually rated as soft and suitable for many purposes without further softening. Waters with hardness ranging from 61 to 120 parts per million may be considered moderately hard, but this degree of hardness does not seriously interfere with the use of water for many purposes except for use in high-pressure steam boilers and in some industrial processes. Waters with hardness ranging from 121 to 200 parts per million are considered hard, and laundries and industries may profitably soften such supplies. Water with hardness above 200 parts per million generally required some softening before being used for most purposes.

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 milliequiv-

alents 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 19, 18, and 26, but at 5,000 micromhos the corresponding dividing points are SAR values of approximately 2.5, 6.5 and 11. Waters range in respect to sodium hazard from those which can be used for irrigation on almost all soils to those which are generally unsatisfactory for irrigation.

Specific conductance (micromhos per centimeter at 25°C)

The specific conductance of a water is a measure of its capacity to conduct a current of electricity (see p. 8). The conductance varies with the concentration and degree of ionization of the different minerals in solution and with the temperature of the water. When considered in conjunction with results of determinations for other constituents, specific conductance is a useful determination and plays an important part in indicating changes in concentration of the total quantity of dissolved minerals in surface waters.

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 10 units generally passes unnoticed. Some swamp waters have natural color of 200 to 300 units or more.

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 impart 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 pres-

ence 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 it is highly improbable that harmful amounts could be consumed unknowingly. Reported thresholds of detection of taste and odor range from 0.01 to 0.1 ppm.

Detergents (ABS). --The major type of detergents is the alkylbenzene-sulfonate group, which are highly resistant to biological degradation so that the effect of ABS in water persists over a long period of time. Waste water may carry these detergents to surface water supplies with resulting deterioration of water quality which includes unpleasant taste, odor, and foaming. Very little is known concerning the nature and the extent of occurrence and movement of detergents in waters or of the chemical and physical change that they may undergo after being added to surface waters (U.S. Geological Survey-Federal Housing, 1959).

Temperature

Temperature is an important factor in property determining the quality of water. This is very evident for such a direct use as an industrial coolant. Temperature is also important, but perhaps not so evident, for its indirect influence upon aquatic biota, concentrations of dissolved gases, and distribution of chemical solutes in lakes and reservoirs as a consequence of thermal stratification and variation.

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

Temperature variations which commonly occur during summer in lakes and reservoirs of temperate regions results in a separation of the water volume into a circulating upper portion and a non-circulating lower portion. Separating the two is a stratum of water of variable vertical thickness in which the temperature

decreases rapidly with increasing depth. This physical division of the water mass into a circulating and a stagnant portion is the result of density differences in the water column associated with the temperature distribution. Knowledge of the stratification in a body of water may result in increased utility by locating strata of more suitable characteristics. For example, the elevation of an intake pipe may be changed to obtain water of lower temperature, higher pH, less dissolved iron, or other desirable properties.

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

Turbidity

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

Turbid water is abrasive in pipes, pumps, and turbine blades. In process water, turbidities much more than 1 ppm are not tolerated by several industries, but others permit up to 50 ppm higher (Rainwater, Thatcher, 1960, p. 289).

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 soil mantle, plant cover, topography, and land use. The mode and rate of sediment erosion, transport, and deposition is determined largely by the size distribution of the particles or more precisely by the fall velocities of the particles in water. Sediment particles in the sandsize (larger than 0.062 mm) range do not appear to be affected by flocculation or dispersion resulting from the mineral constituents in solution. In contrast, the sedimentation diameter of clay and silt particles in suspension may vary considerably from point to point in a stream or reservoir, depending on the mineral matter in solution and in suspension and the degree of turbulence present. The size of sediment particles in transport at any point depends on the type of erodible and soluble material in the drainage area, the degree of flocculation present, time in transport, and characteristics of the transporting flow. The flow characteristics include velocity of water, turbulence, and the depth, width, and roughness of the channel. As a result of these variable characteristics, the size of particles transported, as well as the total sediment load, is in constant adjustment with the characteristics and physical features of the stream and drainage area.

STREAMFLOW

Most of the records of stream discharge, used in conjunction with the chemical analyses and in the computation of sediment loads in this volume, are published in Geological Survey 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 1941-59, are listed below:

Numbers of water-supply papers containing records for Parts 5-6, 1941-59

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

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

PROFESSIONAL PAPER

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

BULLETINS

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

WATER-SUPPLY PAPERS

*108. Quality of water in the Susquehanna River drainage basin, with an introductory chapter on physiographic features, 1904.
*161. Quality of water in the upper Ohio River basin and at Erie, Pa., 1906.
*193. The quality of surface waters in Minnesota, 1907.
*236. The quality of surface waters in the United States, Part 1, Analyses of waters east of the one hundredth meridian, 1909.

*237. The quality of the surface waters of California, 1910.
*239. The quality of the surface waters of Illinois, 1910.
*273. Quality of the water supplies of Kansas, with a preliminary report on stream pollution by mine waters in southeastern Kansas, 1911.
*274. Some stream waters of the western United States, with chapters on sediment carried by the Rio Grande and the industrial application of water analyses, 1911.
*339. Quality of the surface waters of Washington, 1914.
*363. Quality of the surface waters of Oregon, 1914.
*418. Mineral springs of Alaska, with a chapter on the chemical character of some surface waters of Alaska, 1917.
*596-B. Quality of water of Colorado River in 1925-26, 1928.
*596-D. Quality of water of Pecos River in Texas, 1928.
*596-E. Quality of the surface waters of New Jersey, 1928.
*636-A. Quality of water of the Colorado River in 1926-28, 1930.
*636-B. Suspended matter in the Colorado River in 1925-28, 1930.
*638-D. Quality of water of the Colorado River in 1928-30, 1932.
*839. Quality of water of the Rio Grande basin above Fort Quitman, Tex., 1938.
*889-E. Chemical character of surface water of Georgia, 1944.
*998. Suspended sediment in the Colorado River, 1925-41, 1947.
1048. Discharge and sediment loads in the Boise River drainage basin, Idaho, 1939-40, 1948.
1110-C. Quality of water of Conchas Reservoir, New Mexico, 1939-49, 1952.

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

COOPERATION

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

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State	Cooperating agency	Drainage basin	District office
Iowa	Iowa Geological Survey H. G. Hershey, director and State Geologist.	Hudson Bay and upper Mississippi River basins Missouri River basin	132 Nebraska Hall 901 North 17th Street, Lincoln 8, Nebr. (Chemical-quality data) 508 Hydraulic Laboratory University of Iowa Iowa City, Iowa (Sediment data)
Kansas	Kansas Water Resources Board, Robert L. Smith, executive secretary. City of Wichita, Robert H. Hess, director of water.	Missouri River basin	132 Nebraska Hall 901 North 17th Street Lincoln 8, Nebr.
Minnesota	Minnesota Iron Range Resources and Rehabilitation, Kaarlo J. Otava, commissioner.	Hudson Bay and upper Mississippi River basins	
Nebraska	Nebraska Mid-State Reclamation District, J. R. McKinney, secretary.		

State	Cooperating agency	Drainage basin	District office
South Dakota	South Dakota Water Resources Commission, J. W. Grimes, chief engineer.	Missouri River basin	132 Nebraska Hall 901 North 17th Street Lincoln 8, Nebr.
Wisconsin	Wisconsin Conservation Department, L. P. Voigt, director, through the Committee on Water Pollution, George P. Steinmetz, chairman, Thedore F. Wisniewski, director.	Missouri River basin	2822 E. Main Street Columbus 9, Ohio (Sediment data)
Wyoming	Wyoming Natural Resources Board, Edwin R. Lang, chief of Water Development. Office of State Engineer Earl Lloyd, State Engineer.		1214 Big Horn Avenue Worland, Wyo.

Conservation Service of the Department of Agriculture for some of the investigations in Colorado and Nebraska; and by the Corps of Engineers of the Department of the Army for some of the investigations in North Dakota and South Dakota.

The investigations in Minnesota and Wisconsin and some of the investigations in Iowa were made in cooperation with these States. In addition to the continued cooperating programs with the states of Kansas, South Dakota, and Wyoming; Nebraska became a cooperating state in 1959.

The table on page 26 lists State and local agencies that cooperated in quality-of-water investigations in the drainage basins included in this volume, and the locations of quality-of-water district offices responsible for the data collected.

DIVISION OF WORK

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

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

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

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

LOCATION.--At intake of Fargo Water Works, about 2.3 miles downstream from gaging station at Fargo, Cass County, and about 24.7 (revised) miles upstream from Sheyenne River. Prior to April 13, 1959, gaging station 3 miles downstream.
DRAINAGE AREA.--6,800 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1955 to September 1959.
Water temperatures: October 1955 to September 1959.
EXTREMES, 1958-59.--Hardness: Maximum, 294 ppm Dec. 1-31; minimum, 155 ppm May 31.
Specific conductance: Maximum daily, 646 micromhos Dec. 9; minimum daily, 347 micromhos May 31.
Water temperatures: Maximum, 80°F July 28-30, Aug. 1; minimum, 33°F Feb. 1.
EXTREMES, 1955-59.--Dissolved solids (1955-58): Maximum, 650 ppm May 6-9, 1958; minimum, 174 ppm Dec. 1-2, 1955.
Hardness: Maximum, 420 ppm May 6-9, 1958; minimum, 154 ppm Dec. 1-2, 18-19, 1955.
Specific conductance: Maximum daily, 960 micromhos May 6, 1958; minimum daily, 275 micromhos Dec. 1, 1955.
Water temperatures: Maximum, 82°F July 15, 16, 18, 1957; minimum, 33°F on many days during winter months.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Records of discharge for water year October 1958 to September 1959 given in WSP 1628.

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Oct. 1-31, 1958....	148	--	--	--	--	11	--	259	--	--	--	--	--	--	--	--	230	18	9	0.3	459	7.2	--
Nov. 1-30.....	152	--	--	--	--	12	--	262	--	--	--	--	--	--	--	--	237	22	10	.3	478	7.4	--
Dec. 1-31.....	161	--	--	--	--	13	--	326	--	--	--	--	--	--	--	--	294	27	9	.3	576	7.6	--
Jan. 1-31, 1959....	245	--	--	--	--	11	--	326	--	--	--	--	--	--	--	--	284	17	8	.3	559	7.5	--
Feb. 1-28.....	243	--	--	--	--	11	--	333	--	--	--	--	--	--	--	--	286	13	8	.3	557	7.6	--
Mar. 1-31.....	364	16	0.01	44	32	12	4.6	267	41	5.3	0.3	2.1	0.07	301	0.41	296	241	22	10	.3	506	7.5	8
Apr. 1-11.....	566	--	--	--	--	11	--	222	--	--	--	--	--	--	--	--	202	20	11	.3	426	7.6	--
Apr. 12-30.....	316	--	--	--	--	9.7	--	238	--	--	--	--	--	--	--	--	216	21	9	.3	435	7.8	--
May 1-25.....	361	--	--	--	--	9.5	--	251	--	--	--	--	--	--	--	--	227	21	8	.3	452	7.7	--
May 26-30.....	718	--	--	--	--	9.3	--	240	--	--	--	--	--	--	--	--	220	23	8	.3	449	7.7	--
May 31.....	653	--	--	--	--	9.2	--	147	--	--	--	--	--	--	--	--	155	34	11	.3	347	7.2	--
June 1-10	621	--	--	--	--	13	--	213	--	--	--	--	--	--	--	--	236	61	11	.4	501	7.7	--
June 11-20	823	9.1	.01	44	26	12	4.9	224	54	3.7	.1	.9	.09	273	.37	607	215	31	11	.4	456	7.7	31
June 21-July 1.....	630	--	--	--	--	9.7	--	222	--	--	--	--	--	--	--	--	210	28	9	.3	434	7.6	--
July 2-11.....	914	--	--	--	--	9.1	--	202	--	--	--	--	--	--	--	--	192	26	9	.3	405	7.6	--
July 12-31.....	463	--	--	--	--	8.9	--	233	--	--	--	--	--	--	--	--	208	71	9	.3	424	7.6	--
Aug. 1-31.....	216	--	--	--	--	8.5	--	245	--	--	--	--	--	--	--	--	211	10	8	.3	417	7.7	--
Sept. 1-30.....	165	6.2	.01	39	29	9.7	4.7	251	29	3.5	.3	.5	.07	249	.34	111	217	11	9	.3	437	7.3	8
Weighted average a.	320	--	--	--	--	11	--	252	--	--	--	--	--	--	--	--	229	22	9	0.3	467	--	--

a Represents 100 percent of runoff for water year October 1958 to September 1959.

RED RIVER OF THE NORTH BASIN--Continued

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

Temperature (° F) of water, water year October 1958 to September 1959
/Once-daily measurement between 7 a.m. and 11 a.m./

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

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

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 1959.
Water temperatures: January 1951 to September 1959.
EXTREMES, 1958-59.--Dissolved solids: Maximum, 853 ppm Mar. 20; minimum, 275 ppm Aug. 15-31.
Hardness: Maximum, 572 ppm Mar. 20; minimum, 154 ppm Mar. 27 to Apr. 5.
Specific conductance: Maximum daily, 1,350 micromhos Mar. 14; minimum daily, 429 micromhos Aug. 4.
Water temperatures: Maximum, 74°F June 18, Aug. 3, 4.
EXTREMES, 1951-59.--Dissolved solids: Maximum, 1,230 ppm Mar. 21-23, 1955; minimum, 174 ppm Apr. 17-22, 1956.
Hardness: Maximum, 572 ppm Mar. 20, 1959; minimum, 76 ppm Mar. 30 to Apr. 2, 1955..
Specific conductance: Maximum daily, 1,940 micromhos Feb. 1, 1955; minimum daily, 240 micromhos Apr. 4, 1955.
Water temperatures: Maximum (1951-55, 1956-59), 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 1958 to September 1959 given in WSP 1628.

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Oct. 1-19, 1958....	3.57	--	--	--	--	22	--	249	--	--	--	--	--	294	0.40	2.83	211	7	19	0.7	479	7.4	--
Oct. 20-Nov. 15 ...	2.27	--	--	--	--	45	--	291	--	--	--	--	--	365	.50	2.24	220	0	31	1.3	597	7.4	--
Nov. 16-Dec. 31...	5.79	16	0.01	62	34	78	7.3	417	102	19	0.3	9.6	0.19	540	.73	8.44	295	0	36	2.0	851	7.7	22
Jan. 1-19, 1959....	3.58	--	--	--	--	53	--	392	--	--	--	--	--	479	.65	4.63	303	0	28	1.3	752	7.7	--
Jan. 20-Feb. 27 ...	2.54	--	--	--	--	27	--	316	--	--	--	--	--	370	.50	2.54	264	5	18	.7	590	7.6	--
Feb. 28-Mar. 8....	3.30	--	--	--	--	30	--	342	--	--	--	--	--	392	.53	3.49	277	0	19	.8	616	7.9	--
Mar. 9-15.....	6.03	--	--	--	--	77	--	591	--	--	--	--	--	698	.95	11.4	452	0	27	1.6	1,060	8.0	--
Mar. 16-19.....	22.5	35	.01	110	54	72	9.1	619	113	21	.6	1.8	.16	728	.99	44.2	496	0	24	1.4	1,090	8.1	--
Mar. 20.....	123	--	--	--	--	82	--	730	--	--	--	--	--	853	1.16	283	572	0	24	1.5	1,270	8.2	--
Mar. 21-26.....	119	--	--	--	--	58	--	264	--	--	--	--	--	423	.58	136	205	0	38	1.8	649	7.2	--
Mar. 27-Apr. 5....	91.0	--	--	--	--	42	--	198	--	--	--	--	--	309	.42	75.9	154	0	37	1.5	482	7.3	--
Apr. 6-17.....	36.7	--	--	--	--	47	--	220	--	--	--	--	--	329	.45	32.6	166	0	38	1.6	519	7.7	--
Apr. 18-May 6.....	16.3	--	--	--	--	60	--	304	--	--	--	--	--	423	.58	18.6	226	0	37	1.7	672	7.9	--
May 7-June 7.....	24.2	11	.01	60	30	71	6.6	366	106	16	.2	1.0	.16	495	.67	32.3	273	0	35	1.9	805	7.7	15
June 8-27	5.33	--	--	--	--	68	--	365	--	--	--	--	--	485	.66	6.98	269	0	35	1.8	765	8.0	--
June 28-July 7.....	7.58	--	--	--	--	78	--	366	--	--	--	--	--	502	.68	10.3	265	0	39	2.1	795	8.0	--
July 8-22.....	1.99	--	--	--	--	46	--	302	--	--	--	--	--	380	.52	2.04	229	0	30	1.3	616	7.9	--
July 23-Aug. 14....	1.36	--	--	--	--	18	--	252	--	--	--	--	--	291	.40	1.07	209	2	16	.5	461	7.8	--
Aug. 15-31.....	.66	30	.00	50	22	11	2.3	249	33	2.5	.2	.2	.05	275	.37	.49	215	11	10	.3	438	7.4	5
Sept. 1-30.....	.80	--	--	--	--	13	--	242	--	--	--	--	--	276	.38	.60	209	11	12	.4	440	7.3	--
Weighted average a	11.7	--	--	--	--	56	--	309	--	--	--	--	--	428	0.58	13.5	235	0	34	1.6	673	--	--

a Represents 100 percent of runoff for water year October 1958 to September 1959.

RED RIVER OF THE NORTH BASIN--Continued

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

Temperature (° F) of water, water year October 1958 to September 1959
/Once-daily measurement between 1 p.m. and 5 p.m./

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

a Measurement between 6 p.m. and 9 p.m.

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.
RECORDS AVAILABLE.--Chemical analyses: June 1954 to September 1959.
REMARKS.--No flow on many days. Records of discharge for water year October 1958 to September 1959 given in WSP 1628.

Chemical analyses, in parts per million, March to May 1959

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
Mar. 23, 1959.....	2.1			56	15	30		114	0	165	13				378	0.51	2.14	200	107	23	0.9	558	7.2
Mar. 27.....	1.8			--	--	35		105	0	--	--				--	--	--	206	120	27	1.1	587	7.3
Apr. 7.....	.1			--	--	103		226	0	--	--				--	--	--	561	376	29	1.9	1,410	7.2
May 28	.02			288	161	407		277	0	1,780	170				3,220	4.38	.17	1,380	1,150	38	4.8	3,660	7.5

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 (includes 3,940 square miles in closed Devils Lake basin).
RECORDS AVAILABLE.--Chemical analyses: August 1956 to September 1959.
Water temperatures: August 1956 to September 1959.
EXTREMES, 1958-59.--Hardness: Maximum, 380 ppm Nov. 28 to Dec. 31; minimum, 180 ppm Mar. 28 to Apr. 12.
Specific conductance: Maximum daily, 1,270 micromhos Dec. 17; minimum daily, 522 micromhos Apr. 5, 7.
Water temperatures: Maximum, 90°F Aug. 23; minimum, freezing point on many days during November to April.
EXTREMES, 1956-59.--Dissolved solids (1956-58): Maximum, 671 ppm May 2-31, 1958; minimum, 269 ppm Nov. 7-8, 1957.
Hardness: Maximum, 380 ppm Nov. 28 to Dec. 31, 1958; minimum, 146 ppm Nov. 7-8, 1957.
Specific conductance: Maximum daily, 1,270 micromhos Dec. 17, 1958; minimum daily, 349 micromhos Nov. 8, 1957.
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 1958 to September 1959 given in WSP 1628.

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Oct. 1-31, 1958....	21.1	--	--	--	--	93	--	332	--	--	--	--	--	--	--	--	300	28	40	2.3	972	7.4	--
Nov. 1-27.....	31.4	--	--	--	--	91	--	342	--	--	--	--	--	--	--	--	299	19	40	2.3	957	7.2	--
Nov. 28-Dec. 31...	36.1	--	--	--	--	116	--	449	--	--	--	--	--	--	--	--	380	12	40	2.6	1,160	7.5	--
Jan. 1-31, 1959....	36.0	20	0.01	75	41	108	12	425	190	35	0.5	3.8	0.29	716	0.97	69.6	356	7	39	2.5	1,080	7.6	17
Feb. 1-28.....	33.5	--	--	--	--	105	--	415	--	--	--	--	--	--	--	--	338	0	40	2.5	1,060	7.8	--
Mar. 1-19.....	46.5	--	--	--	--	84	--	320	--	--	--	--	--	--	--	--	279	17	40	2.2	887	7.7	--
Mar. 20-27.....	48.0	--	--	--	--	69	--	260	--	--	--	--	--	--	--	--	235	22	39	2.0	747	7.7	--
Mar. 28-Apr. 12...	58.9	7.5	.01	40	19	51	6.4	199	104	21	.5	.9	.13	355	.48	56.5	180	17	37	1.7	579	7.6	8
Apr. 13-30.....	16.0	--	--	--	--	52	--	201	--	--	--	--	--	--	--	--	182	17	38	1.7	589	7.6	--
May 1-12.....	14.7	--	--	--	--	65	--	236	--	--	--	--	--	--	--	--	228	34	38	1.9	723	7.8	--
May 13-28.....	16.3	--	--	--	--	78	--	261	--	--	--	--	--	--	--	--	271	57	38	2.1	846	7.8	--
May 29-June 17....	18.2	--	--	--	--	81	--	266	--	--	--	--	--	--	--	--	292	74	38	2.1	897	7.8	--
June 18-28	33.5	--	--	--	--	106	--	304	--	--	--	--	--	--	--	--	307	58	43	2.6	1,020	7.9	--
June 29-30	290	19	.01	59	27	78	12	263	167	42	.4	2.2	.26	552	.75	432	256	40	38	2.1	836	8.2	25
July 1-8.....	43.1	--	--	--	--	94	--	300	--	--	--	--	--	--	--	--	270	24	43	2.5	924	7.9	--
July 9-27.....	26.3	--	--	--	--	64	--	211	--	--	--	--	--	--	--	--	211	38	40	1.9	708	7.4	--
July 28-Aug. 31....	9.92	--	--	--	--	75	--	252	--	--	--	--	--	--	--	--	248	41	40	2.1	805	7.7	--
Sept. 1-30.....	5.25	16	.02	44	21	60	11	197	132	34	.3	1.3	.20	425	.58	6.02	196	34	38	1.9	688	7.6	17
Weighted average a	28.4	--	--	--	--	88	--	323	--	--	--	--	--	--	--	--	287	22	40	2.3	911	--	--

a Represents 100 percent of runoff for water year October 1958 to September 1959.

RED RIVER OF THE NORTH BASIN--Continued

5-587. SHEYENNE RIVER AT LISBON, N. DAK.--Continued

Temperature (° F) of water, water year October 1958 to September 1959
/Once-daily measurement between 2 p.m. and 6 p.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	a 56	a 52	32	b 32	32	32	32	46	--	66	a 89	70
2	b 55	51	b 32	32	32	32	32	a 46	--	65	a 78	a 65
3	54	51	32	b 32	32	32	32	a 49	--	76	a 75	70
4	54	51	32	32	32	32	32	48	--	a 70	--	a 70
5	53	50	32	32	32	32	32	49	--	a 70	84	a 69
6	53	b 51	a 32	32	32	32	32	52	--	70	a 80	74
7	53	b 51	32	32	32	32	32	54	--	75	a 79	75
8	53	a 51	32	32	--	32	32	55	a 74	70	--	a 86
9	54	a 50	32	32	--	32	32	a 57	a 77	72	a 80	a 64
10	54	a 49	--	a 32	--	32	32	a 57	b 75	73	a 75	74
11	54	a 47	--	32	--	32	32	57	a 78	a 72	75	a 75
12	53	b 45	--	32	--	32	32	59	79	75	a 70	a 79
13	b 54	42	32	32	--	b 32	32	59	a 68	a 77	a 79	74
14	b 54	40	b 32	32	--	b 32	32	59	a 74	79	a 81	a 70
15	--	a 40	32	32	32	b 32	32	60	73	82	a 76	a 69
16	54	a 39	32	b 32	32	b 32	32	61	72	75	a 75	--
17	53	39	b 32	b 32	32	b 32	32	a 61	72	a 74	a 70	60
18	a 53	b 39	b 32	32	--	32	32	61	74	--	a 80	a 55
19	--	37	32	b 32	--	32	34	61	74	77	a 80	a 55
20	53	b 37	32	32	--	32	34	62	73	b 77	a 81	55
21	53	37	32	32	--	32	38	62	72	a 76	a 79	a 55
22	53	36	b 32	32	--	b 32	36	62	71	a 76	a 80	a 69
23	--	b 35	32	b 32	--	32	36	63	70	a 80	90	a 69
24	53	34	32	b 32	32	32	36	63	b 68	a 79	a 80	a 60
25	a 53	32	32	32	32	32	37	63	70	b 77	a 70	--
26	52	32	32	b 32	32	32	a 37	b 62	70	a 76	a 70	a 59
27	52	32	a 32	32	32	32	40	b 62	a 70	a 80	a 76	a 60
28	52	32	32	32	32	b 32	41	b 62	70	a 83	a 72	a 55
29	52	32	32	32	--	32	43	a 62	70	a 87	75	a 55
30	52	32	32	32	--	32	46	a 62	66	a 88	b 68	--
31	52	--	32	32	--	32	--	b 62	--	a 89	a 75	--
Average	53	42	32	32	--	32	34	58	--	76	77	66

a Measurement between 9 a.m. and 1 p.m.
b Measurement between 7 p.m. and 11 p.m.

RED RIVER OF THE NORTH BASIN--Continued

5-825. RED RIVER OF THE NORTH AT GRAND FORKS, N. DAK.

LOCATION.--At gaging station, 500 feet downstream from dam at Riverside Park in Grand Forks, Grand Forks County, and 2 miles downstream from Red Lake River.
DRAINAGE AREA.--30,100 square miles, approximately (includes 3,940 square miles in closed Devils Lake basin).
RECORDS AVAILABLE.--Chemical analyses: September 1956 to September 1959.
Water temperatures: October 1956 to September 1959.
EXTREMES, 1958-59.--Hardness: Maximum, 468 ppm Dec. 29-31; minimum, 170 ppm Apr. 1-4.
Specific conductance: Maximum daily, 976 micromhos Dec. 29-31; minimum daily, 353 micromhos Apr. 4.
Water temperatures: *Maximum*, 81°F Aug. 3, 4; *minimum*, 33°F Jan. 29-31, Feb. 1.
EXTREMES, 1956-59.--Dissolved solids (1956-58): Maximum, 1,490 ppm Dec. 1-31, 1956; minimum, 246 ppm Mar. 27-31, 1957.
Hardness: Maximum, 468 ppm Dec. 29-31, 1958; minimum, 170 ppm Apr. 1-4, 1959.
Specific conductance: Maximum daily, 976 micromhos Dec. 29-31, 1958; minimum daily, 353 micromhos Apr. 4, 1959.
Water temperatures: Maximum, 81°F Aug. 3, 4, 1959; minimum, 33°F 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 1958 to September 1959 given in WSP 1628.

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Oct. 1-31, 1958....	398	--	--	--	--	22	--	294	--	--	--	--	--	--	--	--	276	35	15	0.6	599	7.3	--
Nov. 1-21.....	399	--	--	--	--	26	--	303	--	--	--	--	--	--	--	--	286	38	16	.7	625	7.4	--
Nov. 22-Dec. 6....	587	--	--	--	--	26	--	330	--	--	--	--	--	--	--	--	328	57	15	.6	696	7.3	--
Dec. 7-28.....	269	--	--	--	--	37	--	421	--	--	--	--	--	--	--	--	429	84	16	.8	903	7.2	--
Dec. 29-31.....	290	--	--	--	--	43	--	480	--	--	--	--	--	--	--	--	468	74	17	.9	976	7.6	--
Jan. 1-31, 1959....	376	--	--	--	--	34	--	394	--	--	--	--	--	--	--	--	356	33	17	.8	775	7.4	--
Feb. 1-28.....	375	--	--	--	--	28	--	366	--	--	--	--	--	--	--	--	322	22	16	.7	691	7.5	--
Mar. 1-10.....	389	20	0.01	64	40	28	5.9	363	61	16	0.4	8.4	0.27	439	0.60	461	323	25	16	.7	693	7.5	8
Mar. 11-26.....	768	--	--	--	--	23	--	274	--	--	--	--	--	--	--	--	266	41	16	.6	587	7.3	--
Mar. 27-31.....	2,490	--	--	--	--	15	--	208	--	--	--	--	--	--	--	--	199	28	14	.5	448	7.4	--
Apr. 1-4.....	4,600	--	--	--	--	8.5	--	168	--	--	--	--	--	--	--	--	170	32	10	.3	367	7.5	--
Apr. 5-10.....	5,452	12	.02	50	22	11	5.2	201	69	3.9	.2	1.7	.07	289	.39	4,250	217	52	10	.3	472	7.6	22
Apr. 11-14.....	2,900	--	--	--	--	14	--	235	--	--	--	--	--	--	--	--	254	61	11	.4	530	7.7	--
Apr. 15-30.....	1,696	--	--	--	--	14	--	239	--	--	--	--	--	--	--	--	262	66	10	.4	538	7.4	--
May 1-31	1,605	--	--	--	--	15	--	276	--	--	--	--	--	--	--	--	295	69	10	.4	599	7.6	--
June 1-12	2,048	--	--	--	--	17	--	275	--	--	--	--	--	--	--	--	300	74	11	.4	622	7.7	--
June 13-18	3,343	--	--	--	--	16	--	196	--	--	--	--	--	--	--	--	208	47	14	.5	468	7.6	--
June 19-30	2,360	--	--	--	--	15	--	248	--	--	--	--	--	--	--	--	255	52	11	.4	535	7.8	--
July 1-10.....	1,788	--	--	--	--	16	--	275	--	--	--	--	--	--	--	--	278	52	11	.4	571	8.0	--
July 11-23.....	2,208	--	--	--	--	15	--	230	--	--	--	--	--	--	--	--	233	44	12	.4	498	7.9	--

July 24-Aug. 10 ...	1,000	--	--	--	--	14	--	266	--	--	--	--	--	--	--	--	282	64	10	.4	572	7.9	--
Aug. 11-28	599	--	--	--	--	16	--	258	--	--	--	--	--	--	--	--	253	41	12	.4	529	8.0	--
Aug. 29-Sept. 5 ...	720	--	--	--	--	15	--	221	--	--	--	--	--	--	--	--	220	39	13	.4	466	7.3	--
Sept. 6-30	420	9.0	.01	49	33	19	5.2	258	76	9.1	.3	.5	.11	342	.47	388	257	45	14	.5	550	7.2	4
Weighted average a	1,072	--	--	--	--	17	--	259	--	--	--	--	--	--	--	--	264	52	12	0.5	558	--	--

a Represents 100 percent of runoff for water year October 1958 to September 1959.

RED RIVER OF THE NORTH BASIN--Continued

5-825. RED RIVER OF THE NORTH AT GRAND FORKS, N. DAK.--Continued

Temperature (° F) of water, water year October 1958 to September 1959
(Once-daily measurement between 10 a.m. and 2 p.m.)

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	a 60	51	42	39	33	36	39	42	56	72	--	b 73
2	60	50	40	39	35	36	39	43	56	72	--	b 73
3	b 60	b 50	40	39	35	36	39	43	58	73	b 81	b 73
4	a 60	50	38	39	35	36	b 39	43	60	73	b 81	b 73
5	60	50	37	38	35	36	39	43	62	b 73	b 80	73
6	59	49	36	38	35	36	a 39	44	62	73	--	72
7	58	b 49	38	38	36	36	39	44	65	73	79	72
8	58	48	38	38	36	37	39	44	a 68	73	--	b 71
9	58	48	39	38	37	37	39	44	a 69	73	--	b 71
10	b 57	48	39	38	37	37	39	44	a 70	72	b 79	b 71
11	58	48	40	38	37	37	39	44	70	73	79	b 70
12	56	46	40	38	37	37	39	44	70	b 72	77	70
13	b 56	46	41	b 38	37	37	b 39	45	--	a 72	--	b 70
14	56	46	41	38	37	37	39	45	b 72	73	b 74	70
15	56	46	40	38	39	37	39	b 45	72	a 72	74	b 69
16	55	45	42	38	39	38	40	45	72	a 72	b 74	b 69
17	55	44	42	38	39	38	40	45	72	a 72	b 74	69
18	55	44	41	37	39	38	40	45	73	b 72	b 74	68
19	55	44	41	37	39	38	40	46	73	b 72	b 74	65
20	55	43	42	37	40	38	40	46	b 73	72	b 74	62
21	55	42	42	36	40	38	a 40	b 46	73	72	b 74	61
22	55	42	42	36	42	b 38	41	47	a 73	72	74	60
23	55	40	41	35	42	38	41	47	b 73	a 72	74	b 60
24	55	40	42	35	44	b 38	41	47	a 73	72	b 74	b 60
25	51	38	41	34	45	38	41	47	70	72	b 74	60
26	51	38	42	34	47	38	41	49	a 72	b 72	b 74	b 60
27	51	37	41	34	48	39	41	51	b 72	a 72	b 74	b 60
28	51	37	41	34	49	b 39	a 42	51	72	a 75	74	b 59
29	b 51	36	41	33	--	39	42	53	72	75	b 74	b 58
30	b 51	36	42	33	--	b 39	a 42	a 55	72	76	b 74	b 58
31	51	--	41	33	--	b 39	--	55	--	--	b 74	--
Average	56	44	40	37	39	37	40	46	69	73	76	67

a Measurement between 7 a.m. and 9 a.m.
b Measurement between 3 p.m. and 7 p.m.

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

LOCATION.--Temperature recorder at gaging station at interstate highway bridge, 1½ miles northeast of Drayton, Pembina County.
DRAINAGE AREA.--34,800 square miles, approximately (includes 3,940 square miles in closed Devils Lake basin).
RECORDS AVAILABLE.--Chemical analyses: June 1954 to September 1955.
Water temperatures: December 1956 to September 1959.
EXTREMES, 1958-59.--Water temperatures: Minimum, 33°F Mar. 1.
EXTREMES, 1956-59.--Water temperatures: Maximum (1956-58), 80°F on several days during July and August 1957; minimum, freezing point on many days during winter months.
REMARKS.--Records of discharge for water year October 1958 to September 1959 given in WSP 1628.

Temperature (° F) of water, water year October 1958 to September 1958
/Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph/

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

5-1200. SOURIS RIVER NEAR VERENDRYE, N. DAK.

LOCATION.--At gaging station, 2.7 miles north of Verendrye, McHenry County, and 7½ miles southwest of (19 miles upstream from) mouth of Wintering River.
DRAINAGE AREA.--12,200 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1949 to August 1951, August 1952 to September 1959.
REMARKS.--Records of discharge for water year October 1958 to September 1959 given in WSP 1628.

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Oct. 6, 1958	18	4.1	0.02	56	40	112	15	367	187	45	0.5	4.3	0.19	672	0.91	32.7	305	4	43	2.8	1,030	7.5	27
Oct. 30	30	--	--	--	--	103		367	--	--	--	--	--	--	--	--	323	22	41	2.5	1,030	7.1	--
Nov. 18	40	--	--	--	--	93	--	388	--	--	--	--	--	--	--	--	314	0	39	2.3	967	7.7	--
Jan. 15, 1959	29	--	--	--	--	122	--	463	--	--	--	--	--	--	--	--	412	32	39	2.6	1,260	7.7	--
Mar. 12	70	--	--	--	--	94	--	288	--	--	--	--	--	--	--	--	267	31	43	2.5	882	7.0	--
Mar. 24	150	--	--	--	--	58	--	207	--	--	--	--	--	--	--	--	191	21	40	1.8	640	7.1	--
Apr. 7	76	--	--	43	22	100	--	273	177	22	--	--	--	533	.72	109	200	0	50	3.1	829	7.1	--
Apr. 22	105	--	--	--	--	90	--	254	--	--	--	--	--	--	--	--	192	0	51	2.8	759	7.1	--
May 28	24	--	--	--	--	108	--	416	--	--	--	--	--	--	--	--	318	0	42	2.6	1,010	7.9	--
June 9	11	7.8	.03	67	38	130	12	452	190	35	.4	4.2	.39	718	.98	21.3	325	0	45	3.1	1,110	7.4	22
June 18	12	--	--	--	--	141	--	475	--	--	--	--	--	--	--	--	314	0	49	3.5	1,130	7.3	--
July 29	12	--	--	60	37	125	--	418	178	36	--	--	--	694	.94	22.5	300	0	48	3.1	1,050	7.3	--
Aug. 14	11	--	--	--	--	122	--	392	--	--	--	--	--	--	--	--	278	0	49	3.2	1,030	7.5	--
Aug. 25	8.8	13	.20	54	38	117	14	444	166	15	.2	.4	.23	659	.90	15.7	292	0	45	3.0	1,010	7.6	--
Sept. 22	25	--	--	--	--	103	--	384	--	--	--	--	--	--	--	--	290	0	44	2.6	969	7.4	--

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 1959.
Water temperatures: October 1954 to September 1955, October 1956 to September 1959.
EXTREMES, 1958-59.--Hardness: Maximum, 1,050 ppm Mar. 17-31; minimum, 249 ppm Sept. 25-30.
Specific conductance: Maximum daily, 3,910 micromhos Mar. 22; minimum daily, 1,100 micromhos June 1.
Water temperatures: Minimum, freezing point Nov. 8, 12, and on several days during November to March.
EXTREMES, 1954-55, 1956-59.--Dissolved solids (1954-55, 1956-58): Maximum, 1,280 ppm Feb. 10 to Mar. 5, 1958; 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 (1956-59), 3,910 micromhos Mar. 22, 1959; minimum daily, 232 micromhos Apr. 18, 1957.
Water temperatures: 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 1958 to September 1959 given in WSP 1628.

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids: Parts per million: Residue at 180°C	Dissolved solids: Parts per million: Sum	Dissolved solids: Tons per acre-foot	Dissolved solids: Tons per day	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Per cent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 1-31, 1958.	14.7	--	--	--	--	148	--	453	--	--	--	--	--	--		--	--	344	0	48	3.5	1,220	7.2	--
Nov. 1-19.....	1.42	20	0.03	58	53	147	15	467	247	39	0.5	22	0.23	897		1.22	3.44	364	0	45	3.3	1,280	7.5	--
Mar. 17-31,1959	1.79	33	.05	169	153	366	32	1,260	671	105	.8	15	.45	2,310	2,170	3.14	11.2	1,050	20	42	4.9	2,970	7.8	85
Apr. 1-12.....	.45	--	--	--	--	190	--	649	--	--	--	--	--	--		--	--	554	22	43	3.5	1,680	7.7	--
Apr. 13-30.....	.17	--	--	--	--	161	--	524	--	--	--	--	--	--		--	--	424	0	45	3.4	1,410	7.6	--
May 1-31.....	.74	--	--	--	--	164	--	423	--	--	--	--	--	--		--	--	355	8	50	3.8	1,320	7.7	--
June 1-10	43.1	5.3	.02	52	50	121	15	352	285	35	.4	2.4	.20	770		1.05	89.6	334	45	43	2.9	1,130	8.1	24
June 11-30	15.8	--	--	--	--	138	--	382	--	--	--	--	--	--		--	--	384	71	44	3.1	1,260	7.6	--
July 1-31.....	24.0	--	--	--	--	150	--	361	--	--	--	--	--	--		--	--	354	58	48	3.5	1,260	7.8	--
Aug. 1-31.....	19.2	--	--	--	--	164	--	302	--	--	--	--	--	--		--	--	306	58	54	4.1	1,280	7.3	--
Sept. 1-24.....	17.4	8.6	.03	46	36	158	16	281	324	45	.5	13	.22	835		1.14	39.2	262	32	55	4.3	1,190	7.2	45
Sept. 25-30.....	12.7	--	.34	--	--	149	--	284	--	--	--	--	--	--		--	--	249	16	57	4.1	1,130	7.5	--
Weighted average a	12.6	--	--	--	--	150	--	361	--	--	--	--	--	--		--	--	335	39	49	3.6	1,240	--	--

a Represents 99.6 percent of runoff for water year October 1958 to September 1959.

RED RIVER OF THE NORTH BASIN--Continued

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

Temperature (° F) of water, water year October 1958 to September 1959
/Once-daily measurement between 4 p.m. and 8 p.m./

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

a Measurement between 8 a.m. and 12 m.
b Measurement between 1 p.m. and 3 p.m.

Periodic determinations of suspended-sediment discharge, October 1958 to August 1959

Date	Discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Discharge (tons per day)
Oct. 2, 1958	21	59	3.3
Oct. 5	20	46	2.5
Oct. 28	6.3	67	1.1
Apr. 20, 1959	.2	80	.04
May 26	2.8	26	.2
June 8	16	20	.9
June 17	10	81	2.2
June 30	20	58	3.1
July 15	27	41	3.0
July 23	23	37	2.3
July 28	26	11	.8
Aug. 12	18	19	.9
Aug. 27	18	9.0	.4

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN RED RIVER OF THE NORTH BASIN

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of collection	Lake content (acre-feet)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids: Parts per million, Residue at 180°C	Dissolved solids: Parts per million, Sum	Dissolved solids: Tons per acre-foot	Dissolved solids: Tons per day	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Per cent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
5-495. LAKE TRAVERSE NEAR WHEATON, MINN.																								
Sept. 30, 1958..	a 974.72	34	0.05	135	100	99	19	216	723	20	0.3	7.7	0.42	1,320	1,240	1.80		749	572	22	1.6	1,610	6.9	
May 25, 1959...	a 974.39	14	.02	151	102	100	18	224	765	21	.4	.4	.38	1,390	1,280	1.89		794	610	21	1.5	1,690	7.6	12
Sept. 8	a 974.78	21	.17	129	99	100	20	184	750	21	.2	8.5	.45	1,330	1,240	1.81		731	580	22	1.6	1,610	7.4	
BUFFALO LAKE NEAR ESMOND, N. DAK.																								
Oct. 4, 1958 ...	b 9.05	--	0.06	--	--	565		c 1,310	231	7.8	--	--	--	1,610	--	2.19		97	0	93	25	2,340	8.7	
June 7, 1959 ...	b 9.2	26	.09	12	22	600	29	d 1,320	306	45	0.7	9.1	1.2	1,780	1,700	2.42		122	0	89	24	2,520	8.8	
Sept. 30	b 10.80	23	.07	18	32	890	42	e 1,920	486	95	.8	8.6	1.7	2,730	2,540	3.71		176	0	89	29	3,690	8.8	
5-565. DEVILS LAKE NEAR DEVILS LAKE, N. DAK.																								
Oct. 3, 1958 ...	192,000	3.0	0.02	66	296	1,530	169	637	3,380	741	0.2	7.4	1.3	6,650	6,510	9.04		1,380	858	68	18	8,410	8.2	15
Jan. 12, 1959 ..	190,000	--	--	68	338	1,730	--	717	3,810	849	--	--	--	7,530	--	10.2		1,560	972	65	19	9,340	7.7	--
Sept. 30 f.....	167,500	19	.10	71	336	1,750	194	719	3,840	835	.2	.5	1.3	7,620	7,400	10.4		1,560	970	68	19	9,300	8.1	42
5-575. LAKE ASHTABULA AT BALDHILL DAM, N. DAK.																								
Oct. 1, 1958 ...	65,500	15	0.04	48	29	69	10	311	122	16	0.2	1.1	0.19	476		0.65		241	0	37	1.9	744	7.8	
June 5, 1959 ...	67,200	15	.01	51	32	77	9.8	327	139	19	.2	.3	.18	524		.71		258	0	38	2.1	804	8.0	31
Sept. 8	60,490	21	.03	51	30	79	10	333	134	18	.3	2.2	.18	525		.71		252	0	39	2.2	797	8.2	
5-580. SHEYENNE RIVER BELOW BALDHILL DAM, N. DAK.																								
June 5, 1959 ...	g 7.6	19	0.03	40	31	77	9.6	296	136	18	0.3	1.1	0.20	488		0.66	10.0	226	0	41	2.2	766	7.8	
Sept. 8	g 8.8					89		317	136	19								234	0	45	2.5	774	7.9	
5-885. HOMME RESERVOIR NEAR PARK RIVER, N. DAK.																								
Oct. 4, 1958 ...	2,938	21	0.02	82	30	39	8.4	238	193	14	0.2	2.2	0.12	525		0.71		329	134	20	0.9	771	7.3	
Feb. 13, 1959..	2,240	23	.00	108	40	44	9.6	310	247	16	.3	2.4	.14	666		.91		434	180	18	.9	946	7.3	
May 26	3,679	18	.01	72	25	39	6.7	201	182	14	.2	1.2	.12	475		.65		281	116	23	1.0	724	7.7	7
Sept. 7	3,284	22	.02	72	27	43	7.7	200	190	14	.2	8.4	.13	507		.69		290	126	24	1.1	726	7.4	
BUFFALO LODGE LAKE NEAR GRANVILLE, N. DAK.																								
Oct. 4, 1958 ...	h 87.85		0.10			196		544	327	9.2				1,020		1.39		373	0	53	4.4	1,450	7.3	
June 9, 1959 ...	h 87.69	24	.07	27	76	203	25	542	352	35	0.3	7.1	0.23	1,080	1,020	1.47		380	0	52	4.5	1,530	8.0	

a Pool elevation, in feet.
b Water level, in feet below temporary reference mark.
c Includes equivalent of 84 ppm of carbonate (CO_3).
d Includes equivalent of 98 ppm of carbonate (CO_3).
e Includes equivalent of 132 ppm of carbonate (CO_3).
f Also copper (Cu), 0.08 ppm; lead (Pb), 0.01 ppm; zinc (Zn), 0.16 ppm; arsenic (As), 0.04 ppm; phosphorus as PO_4, 0.90 ppm.
g Discharge (cfs).
h Pool elevation, in feet, based on assumed datum.

LAKE OF THE WOODS BASIN

5-1305. STURGEON RIVER NEAR CHISHOLM, MINN.

LOCATION.--At highway bridge, 1,000 feet downstream from gaging station, about 0.8 mile downstream from East Branch Sturgeon River, and about 11¾ miles north of Chisholm, St. Louis County.
DRAINAGE AREA.--187 square miles.
RECORDS AVAILABLE.--Chemical analyses: July 1958 to September 1959.
REMARKS.--Records of discharge for water year October 1958 to September 1958 given in WSP 1628.

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Oct. 2, 1958 a	62	9.3	0.79	13	3.1	2.3	1.2	45	14	0.2	0.2	1.9		91	0.12	15.2	45	8	10	0.1	89	6.5	120
Oct. 24	47	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	89	--	50
Nov. 22	179	11	.15	10	3.2	2.3	1.2	36	9.5	.1	.2	1.5		94	.13	45.4	38	8	11	.2	84	6.7	100
Dec. 19	26	12	.08	13	4.0	3.1	1.5	48	9.8	.1	.2	7.3		112	.15	7.86	49	10	12	.2	108	7.5	90
Jan. 22, 1959	18	13	.05	16	4.4	3.1	1.5	69	7.0	.3	.1	.5		105	.14	5.10	58	1	10	.2	122	7.1	50
Feb. 25	11	17	.44	18	6.6	3.7	1.7	83	20	.4	.1	.8		128	.17	3.80	72	4	10	.2	154	6.5	80
Mar. 26	19	16	.19	19	5.0	4.0	1.6	84	3.0	1.7	.1	.8		109	.15	5.59	68	0	11	.2	150	7.4	36
Apr. 29	93	6.9	.10	9.2	2.9	1.9	1.0	39	8.0	.0	.1	.9		75	.10	18.8	35	3	10	.1	78	6.9	65
May 27	313	5.3	.16	8.0	2.7	1.6	.8	31	9.5	.0	.2	1.8		86	.12	72.7	31	6	10	.1	65	6.6	60
June 4 a	186	6.9	.52	9.0	2.8	1.9	.7	35	8.3	.1	.2	1.2		81	.11	40.7	34	5	11	.1	71	6.7	140
Aug. 2	43	7.8	.28	13	3.3	2.1	.6	50	7.3	.1	.3	1.0		97	.13	11.3	46	5	9	.1	88	7.0	140
Aug. 27	93	10	.09	12	3.4	2.5	1.0	48	5.8	.1	.2	2.6		87	.12	21.8	44	5	11	.2	96	6.4	80
Sept. 5 a	274	9.0	.74	11	2.6	1.7	.6	37	9.5	.0	.3	2.3		105	.14	77.7	38	8	9	.1	72	6.8	180

a Also manganese (Mn), 0.00 ppm.

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

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chlorids (Cl)	Fluorids (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25° C)	pH	Color
																Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
5-1250. SOUTH KAWISHIWI RIVER NEAR ELY																									
Apr. 18, 1958.	324	9.8	0.58	0.23	6.5	2.9	2.0	0.8	30	0	4.8	0.8	0.1	1.0	0.05	60	0.08	52.5	28	3	13	0.2	56	7.0	60
Oct. 3	446	7.8	.49	.00	6.6	2.6	1.7	.2	29	0	7.8	.2	.2	.5		70	.10	84.3	27	3	12	.1	62	6.2	100
June 2, 1959.	955	7.0	.28	.00	4.7	2.2	1.5	.2	22	0	5.5	.1	.1	.9		53	.07	137	21	3	13	.1	46	6.7	55
Sept. 2.	892	5.7	.38	.00	4.3	2.2	1.3	.2	22	0	5.3	.1	.2	.8		53	.07	128	20	2	12	.1	45	6.8	75
5-1255. STONY RIVER NEAR ISABELLA																									
Apr. 18, 1958.	186	8.8	0.24	0.23	6.5	3.4	1.6	0.5	32	0	6.3	1.2	0.1	0.9	0.05	67	0.09	33.6	30	4	10	0.1	58	6.6	70
Oct. 3	131	8.9	.73	.00	6.0	3.2	1.3	.2	24	0	9.5	.4	.2	.5		94	.13	33.2	28	8	9	.1	55	5.9	220
June 2, 1959.	348	4.7	.34	.00	4.2	2.6	1.3	.1	19	0	8.3	.2	.2	.4		66	.09	62.0	21	5	12	.1	44	6.5	150
Sept. 1.	194	7.8	.57	.00	7.5	4.0	1.8	.3	38	0	8.5	.2	.2	1.3		76	.10	39.8	35	4	10	.1	72	7.0	110
5-1260. DUNKA RIVER NEAR BABBITT																									
Apr. 18, 1958.	70	9.6	0.67	0.28	6.5	2.4	2.0	1.0	22	0	6.3	2.6	0.1	2.0	0.09	77	0.10	14.5	26	8	14	0.2	58	6.5	98
Oct. 2	71	12	1.2	.00	5.0	4.0	2.0	.0	21	0	10	2.1	.2	1.0		101	.14	19.4	29	12	13	.2	61	5.8	250
June 3, 1959.	70	4.5	.49	.00	4.2	3.0	1.5	.2	17	0	8.3	.1	.2	1.8		73	.10	13.8	23	9	12	.1	49	6.3	140
Sept. 2.	116	12	.94	.00	8.6	5.2	3.1	.9	15	0	15	2.8	.3	22		149	.20	46.7	43	31	13	.2	101	6.0	230
5-1265. BEAR ISLAND RIVER NEAR ELY																									
Apr. 18, 1958.	40	4.8	0.45	0.00	3.7	1.6	1.2	0.6	14	0	6.3	0.2	0.2	0.8		47	0.06	5.08	16	5	13	0.1	38	6.0	90
Oct. 3	13	3.2	.42	.00	5.0	1.3	1.4	.0	18	0	6.8	.5	.1	.4		54	.07	1.90	18	3	14	.1	44	6.0	90
June 2, 1959.	103	2.5	.30	.00	4.3	1.8	1.6	.1	17	0	7.3	.1	.1	.5		52	.07	14.5	18	4	16	.2	40	6.5	90
Sept. 2.	26	3.0	.31	.00	4.8	2.2	1.4	.0	19	0	5.0	.0	.2	1.6		61	.08	4.28	21	5	13	.1	47	6.4	65
5-1270. KAWISHIWI RIVER NEAR WINTON																									
June 2, 1959.	2,430	7.5	0.34	0.00	5.0	2.8	1.4	0.2	24	0	5.5	0.1	0.2	0.8		54	0.07	354	24	4	11	0.1	51	6.7	70
Sept. 2.	553	5.1	.25	.00	4.4	2.7	1.4	.3	23	0	6.5	.1	.2	1.0		53	.07	79.1	22	3	12	.1	49	6.7	60
5-1284. SAND RIVER NEAR BRITT																									
June 4, 1959.	--	1.6	0.78	0.00	3.7	1.9	1.4	0.1	13	0	8.3	0.1	0.2	1.0		71	0.10	--	17	6	15	0.1	37	5.9	170
Aug. 4	3.13	7.6	.92	--	6.0	2.7	1.5	.2	24	0	9.5	.1	.2	1.6		94	.13	0.79	26	6	11	.1	51	6.6	280
Aug. 26	18.5	11	.49	--	6.4	2.4	1.4	.4	20	0	10	.1	.3	.8		89	.12	4.45	26	10	10	.1	57	6.4	160
Sept. 4.	313	9.4	1.4	.00	5.5	2.0	1.7	.4	14	0	12	.0	.2	3.8		115	.16	97.2	22	11	14	.2	41	6.0	300

LAKE OF THE WOODS BASIN--Continued

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

Chemical analyses, in parts per million, water year October 1958 to September 1959--Continued

Date of collection	Discharge (cfs)	Silica (SiO_2)	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) 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	Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25° C)	pH	Color
5-1285. PIKE RIVER NEAR EMBARRASS																									
Apr. 18, 1958.	87	7.1	0.69	0.00	7.0	1.6	2.0	0.9	20	0	11	0.8	0.1	1.5		66	0.09	15.5	24	8	15	0.2	56	6.6	80
Oct. 1.....	60	8.0	.96	.00	7.4	3.1	1.7	.0	26	0	11	.8	.2	.5		105	.14	17.0	31	10	11	.1	65	6.1	220
June 3, 1959..	258	3.1	.73	.00	5.4	2.1	1.6	.2	18	0	10	.5	.2	.8		78	.11	54.3	22	7	14	.1	47	6.1	180
Sept. 3.....	258	9.9	1.3	.00	6.3	3.0	1.6	.4	17	0	16	.1	.4	.8		120	.16	83.6	28	14	11	.1	57	6.1	280
5-1296.5. LITTLE FORK RIVER AT COOK																									
June 4, 1959..	--	2.1	0.51	0.00	7.3	2.9	2.3	0.3	24	0	12	0.1	0.3	1.3		113	0.15	--	30	10	14	0.2	59	6.3	240
Aug. 4.....	2.75	9.5	.47	--	18	5.9	5.8	.9	68	0	15	1.7	.4	1.2		168	.23	1.25	69	13	15	.3	144	6.7	280
Aug. 26.....	18.7	10	.67	--	19	5.5	4.9	2.7	67	0	18	.5	.3	5.1		168	.23	8.48	70	15	13	.3	147	6.8	280
Sept. 4.....	--	9.2	.82	.01	7.7	4.1	2.0	.8	20	0	21	.3	.4	5.1		169	.23	--	36	20	11	.1	59	6.2	460
5-1298. RICE RIVER NEAR ANGORA																									
June 4, 1959..	--	2.1	0.42	0.00	4.8	1.9	1.3	0.4	15	0	8.3	0.1	0.2	0.8		75	0.10	--	20	8	12	0.1	42	6.1	150
Aug. 4.....	8.57	8.8	.23	--	7.1	3.0	1.8	.6	32	0	8.5	.1	.2	.4		78	.11	1.81	30	4	11	.1	64	6.7	110
Aug. 26.....	26.9	9.8	.27	--	7.2	2.9	1.7	.8	29	0	11	.1	.2	1.1		88	.12	6.39	30	6	11	.1	64	6.7	140
Sept. 4.....	--	8.8	.75	.00	6.5	2.6	1.6	.4	18	0	14	.0	.3	3.1		116	.16	--	27	12	11	.1	49	6.3	230
5-1299. SOUTH BRANCH LITTLE FORK RIVER NEAR COOK																									
Oct. 2, 1958..	--	9.6	0.59	0.00	9.5	2.5	1.9	1.0	27	0	13	0.5	0.3	1.1		100	0.14	--	34	12	11	0.1	66	6.1	200
Oct. 23.....	30.2	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--	--	--	68	--	120
Nov. 21.....	166	12	.16	--	7.0	3.1	2.0	1.4	19	0	15	.4	.3	1.0		108	.15	48.4	30	14	12	.2	64	6.6	200
May 1, 1959..	59.7	6.8	.13	--	7.2	2.4	2.0	.9	27	0	11	.1	.2	.4		74	.10	11.9	28	6	13	.2	64	6.9	100
May 28.....	202	4.8	.34	--	6.9	2.6	1.7	.8	24	0	11	.1	.3	.4		92	.13	50.2	28	8	11	.1	57	6.4	180
June 4.....	--	4.0	.40	.00	6.5	2.6	1.7	.4	24	0	9.3	.1	.2	.9		88	.12	--	27	7	12	.1	56	6.3	170
Aug. 4.....	14.0	6.4	.32	--	11	3.8	2.1	.8	46	0	7.8	.1	.2	.8		96	.13	3.63	43	5	9	.1	86	6.8	160
Aug. 26.....	31.1	7.4	.24	--	12	3.4	2.3	1.3	48	0	8.0	.1	.2	1.6		90	.12	7.56	44	5	10	.2	94	6.9	110
Sept. 4.....	--	10	.66	.00	6.6	4.3	2.4	.6	24	0	15	.0	.3	3.3		126	.17	--	34	14	13	.2	61	6.6	220
5-1310. DARK RIVER NEAR CHISHOLM																									
Apr. 18, 1958.	24	10	0.98	0.21	10	2.9	2.2	1.3	41	0	9.3	0.7	0.1	1.1	0.06	77	0.10	5.00	37	3	11	0.2	78	7.2	70
Oct. 2.....	28	8.9	.95	.00	8.6	3.1	2.1	.4	34	0	7.3	.5	.2	1.5		83	.11	6.27	34	6	12	.2	70	6.2	260
June 4, 1959..	53	5.1	.51	.00	6.6	2.3	1.8	.6	27	0	7.8	.3	.2	.9		72	.10	10.3	26	4	13	.2	57	6.5	120
Sept. 5.....	95	8.3	.83	.00	6.9	2.6	1.6	.6	26	0	8.5	.0	.2	2.4		104	.14	26.7	28	7	11	.1	55	6.7	170

MISCELLANEOUS ANALYSES OF STREAMS IN SWAN RIVER BASIN IN MINNESOTA

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
5-2170. SWAN RIVER NEAR WARBA																							
June 5, 1959 a....	355	4.9	0.20	25	7.4	3.9	1.3	99	18	0.3	0.2	1.2		137	0.19	131	93	12	8	0.2	191	7.1	75
Sept. 5 a.....	199	10	.32	24	7.6	3.4	1.0	100	18	.0	.3	1.3		144	.20	77.4	91	9	7	.2	185	7.3	90

a Also manganese (Mn), 0.00 ppm.

MISSISSIPPI RIVER MAIN STEM

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 1959.
EXTREMES, 1958-59.--Water temperatures: Maximum, 84°F Aug. 1-6; minimum, freezing point on several days during December to February.
EXTREMES, 1956-59.--Water temperatures: Maximum, 85°F Aug. 13-18, 1958; minimum, freezing point on many days during winter months.
REMARKS.--Records of discharge for water year October 1958 to September 1959 given in WSP 1628.

Temperature (° F) of water, water year October 1958 to September 1959
/Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph/

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

a Includes estimated temperature of 35° F on days of no record.

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS ON THE MISSISSIPPI RIVER MAIN STEM IN MINNESOTA

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
5-2105. POKEGAMA LAKE NEAR GRAND RAPIDS																							
June 5, 1959 a.....	b 65,030	4.7	0.10	39	12	3.9	1.3	173	11	0.1	0.2	1.3		182	0.25		146	4	5	0.1	284	7.4	44
Sept. 6 a.....	b 66,540	7.7	.08	31	13	3.9	1.7	164	7.5	.0	.2	1.0		163	.22		129	0	6	.1	255	7.6	25
5-2110. MISSISSIPPI RIVER AT GRAND RAPIDS																							
June 5, 1959 a.....	649	4.8	0.09	39	12	4.1	1.6	175	12	0.1	0.2	1.2		184	0.25	320	145	1	6	0.1	288	7.4	43
Sept. 6 a.....	864	6.7	.15	33	13	4.1	1.4	166	12	.0	.2	.7		174	.24	406	136	0	6	.2	261	7.5	32

a Also manganese (Mn), 0.00 ppm.
b Lake content, in acre-feet.

WISCONSIN RIVER BASIN

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

LOCATION.--At gaging station at Butterfield Bridge on Town Road, 6 miles southwest of Lake Delton, Sauk County, 7 miles east of Reedsburg, and 7 miles upstream from mouth.
DRAINAGE AREA.--44.9 square miles.
RECORDS AVAILABLE.--Water temperatures: October 1957 to September 1959.
Sediment records: October 1957 to September 1959.
EXTREMES, 1958-59.--Water temperatures: Maximum, 69°F Aug. 22; minimum, freezing point on many days during November to March.
Sediment concentrations: Maximum daily, 438 ppm May 11; minimum daily, 1 ppm Mar. 14.
Sediment loads: Maximum daily, 512 tons May 11; minimum daily, less than 0.05 ton Mar. 14.
EXTREMES, 1957-59.--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 May 1, 1958, Mar. 14, 1959.
Sediment loads: Maximum daily, 512 tons May 11, 1959; minimum daily, less than 0.05 ton May 1, 1958, Mar.14, 1959.
REMARKS.--Flow affected by ice Nov. 23 to Feb. 23, Mar. 5-8, 14-18. Records of discharge for water year October 1958 to September 1959 given in WSP 1628.

Temperature (° F) of water, water year October 1958 to September 1959
/Once-daily measurement between 8 a.m. and 10 a.m./

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

WISCONSIN RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959

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	14.0	2	0.1	14.0	2	0.1	14	8	0.3
2	14.0	2	.1	14.0	2	.1	14	8	.3
3	14.0	3	.1	14.0	3	.1	14	9	.3
4	13.8	2	.1	13.8	4	.1	14	13	.5
5	13.5	2	.1	13.8	5	.2	13	6	.2
6	13.8	2	.1	13.8	5	.2	12	8	.2
7	14.0	3	.1	13.8	4	.1	11	7	.2
8	17.4	4	.2	13.8	3	.1	11	5	.1
9	18.5	4	.2	14.0	4	.2	11	6	.2
10	16.0	3	.1	13.8	2	.1	11	3	.1
11	15.4	2	.1	13.5	3	.1	11	4	.1
12	15.4	2	.1	13.2	3	.1	11	8	.2
13	15.4	3	.1	13.5	3	.1	11	4	.1
14	15.4	4	.2	13.5	3	.1	11	4	.1
15	15.4	3	.1	13.5	3	.1	11	8	.2
16	15.4	2	.1	13.5	3	.1	11	6	.2
17	15.4	2	.1	15.7	8	.3	11	5	.1
18	15.4	2	.1	23	12	.7	11	5	.1
19	15.4	2	.1	18.0	2	.1	12	5	.2
20	15.4	2	.1	17.1	4	.2	12	5	.2
21	15.4	2	.1	16.6	5	.2	12	5	.2
22	16.8	2	.1	16.3	6	.3	12	4	.1
23	15.4	2	.1	16	6	.2	12	4	.1
24	15.4	2	.1	16	5	.2	12	4	.1
25	14.9	3	.1	15	6	.2	13	3	.1
26	15.2	3	.1	15	6	.2	13	4	.1
27	15.2	3	.1	15	6	.2	13	4	.1
28	14.6	3	.1	15	6	.2	13	7	.2
29	14.3	2	.1	14	7	.3	13	6	.2
30	14.3	3	.1	14	8	.3	13	5	.2
31	14.0	3	.1	--	--	--	13	4	.1
Total	468.5	--	3.4	446.2	--	5.5	376	--	5.4

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	13	4	0.1	12			15.4	4	0.2
2	13	5	.2	11			15.7	2	.1
3	12	6	.2	11			15.7	3	.1
4	11	3	.1	11			15.7	3	.1
5	11	3	.1	11	--	e 0.1	15	2	.1
6	11	3	.1	11			15	2	a .1
7	12	3	.1	11			15	3	a .1
8	12	2	.1	11	2	.1	15	3	a .1
9	12	2	.1	11	3	.1	16.6	4	.2
10	12	2	.1	11	3	.1	17.1	3	.1
11	13	3	.1	12	4	.1	16.8	3	.1
12	13	3	.1	13	4	.1	16.8	3	.1
13	13	3	.1	13	4	.1	16.8	2	.1
14	13	4	.1	14	6	.2	16	1	(t)
15	13	6	.2	15	4	.2	16	2	.1
16	12	7	.2	14	5	.2	16	3	a .1
17	12	3	.1	14	5	.2	16	3	.1
18	12	3	.1	14	6	.2	16	4	.2
19	12	--		13	8	.3	19.1	4	.2
20	12	--		13	6	.2	24	11	.7
21	12	--		14	5	.2	26	10	.7
22	12	--		15	5	.2	24	9	.6
23	12	--		16	5	.2	23	12	.7
24	12	--		16	5	.2	33	35	b 3
25	12	--	e .1	16	6	.2	61	78	13
26	12	--		16.3	6	.2	75	70	sb 15
27	13	--		16.3	7	.3	45	30	3.6
28	13	--		15.4	6	.2	46	23	2.8
29	13	--		--	--	--	50	39	5.3
30	13	3		--	--	--	56	35	5.3
31	13	--		--	--	--	93	70	s 19
Total	381	--	3.5	371.0	--	4.5	861.7	--	71.9

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

WISCONSIN RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959--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.....	184	52	26	27	3	0.2	44	310	sb 40
2.....	188	38	19	25	4	.3	25	32	2.2
3.....	232	33	21	23	4	.2	22	16	1.0
4.....	264	20	14	23	4	.2	20	12	.6
5.....	236	20	13	22	3	.2	19.4	11	.6
6.....	171	24	11	32	--	e 2	17.7	13	.6
7.....	111	28	8.4	30	8	.6	16.8	13	.6
8.....	81	38	8.3	24	4	.2	16.3	10	.4
9.....	48	25	3.2	22	3	.2	15.7	9	.4
10.....	39	18	1.9	27	10	.7	15.7	16	.7
11.....	35	14	1.3	345	438	s 512	23	32	s 2.1
12.....	33	10	.9	103	82	s 26	17.7	14	.7
13.....	32	9	.8	33	18	1.6	15.7	17	.7
14.....	31	9	.8	27	6	.4	15.4	12	.5
15.....	30	10	.8	24	5	.3	18.8	12	.6
16.....	30	10	.8	22	5	.3	16.8	13	.6
17.....	31	16	1.3	20	6	.3	15.4	11	.4
18.....	35	15	1.4	19.7	13	.7	15.4	8	.3
19.....	29	9	.7	20	6	.3	15.4	7	.3
20.....	27	6	.4	42	--	e 45	14.9	6	.2
21.....	26	2	.1	59	320	sb 60	14.3	6	.2
22.....	25	3	.2	27	30	2.2	14.0	8	.3
23.....	24	3	.2	26	13	.9	13.5	8	.3
24.....	24	2	.1	24	9	.6	14.0	9	.3
25.....	24	2	.1	21	7	.4	15.7	12	.5
26.....	23	3	.2	20	7	.4	21	15	.8
27.....	23	2	.1	22	9	.5	16.8	8	.4
28.....	77	32	s 7.1	20	11	.6	16.8	9	.4
29.....	41	10	s 1.2	21	7	.4	18.8	18	.9
30.....	31	3	.2	19.4	5	.3	21	20	1.1
31.....	--	--	--	43	--	e 45	--	--	--
Total.	2,185	--	144.5	1,213.1	--	703.0	547.0	--	58.7

	July			August			September		
1.....	24	19	1.2	11.1	11	0.3	15.2	9	0.4
2.....	19.7	10	.5	11.1	12	.4	15.7	14	.6
3.....	17.1	10	.5	17.7	33	s 1.7	14.6	6	.2
4.....	15.7	9	.4	16.3	14	.6	13.5	9	.3
5.....	16.0	7	.3	14.0	10	.4	13.2	12	.4
6.....	14.9	6	.2	14.0	13	.5	12.9	10	.3
7.....	14.3	7	.3	15.7	15	.6	12.4	8	.3
8.....	17.4	25	b 1	13.5	13	.5	12.2	8	.3
9.....	33	73	6.5	12.9	12	.4	12.2	8	.3
10.....	30	--	e 12	12.7	10	.3	12.4	15	.5
11.....	51	--	e 30	17.1	21	1.0	12.4	16	.5
12.....	21	19	1.1	14.9	13	.5	12.4	10	.3
13.....	18.0	6	.3	13.8	10	.4	12.4	8	.3
14.....	16.8	11	.5	12.7	11	.4	12.4	7	.2
15.....	16.0	8	.3	22	24	1.4	12.4	7	.2
16.....	15.4	8	.3	21	17	1.0	12.4	7	.2
17.....	15.4	8	.3	23	15	.9	12.4	10	.3
18.....	14.3	7	.3	16.8	10	.4	12.4	8	.3
19.....	13.8	6	.2	15.7	6	.2	12.9	9	.3
20.....	13.2	6	.2	15.2	4	.2	19.1	32	s 1.8
21.....	12.9	7	.2	14.9	3	.1	17.1	18	.8
22.....	12.7	8	.3	14.6	4	.2	22	--	e 2
23.....	12.7	6	.2	14.3	4	.2	26	25	b 2
24.....	12.4	5	.2	13.8	6	.2	18.0	11	.5
25.....	12.2	5	.2	13.2	8	.3	28	--	e 14
26.....	11.9	12	.4	12.9	12	.4	46	150	sb 20
27.....	11.6	11	.3	45	--	e 13	67	65	12
28.....	11.6	14	.4	39	30	s 3.6	40	31	3.3
29.....	12.2	16	.5	18.0	15	.7	25	15	1.0
30.....	12.7	14	.5	16.3	8	.4	21	12	.7
31.....	12.4	14	.5	16.3	8	.4	--	--	--
Total.	532.3	--	60.1	529.5	--	31.6	575.6	--	64.3

Total discharge for year (cfs-days)..... 8,486.9
Total load for year (tons)..... 1,156.4

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

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

Particle-size analyses of suspended sediment, water year October 1958 to September 1959
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
May 11, 1959.....	8:55 a.m.	723		810	887	85	92	97	98	99	99	100					BSWCM
May 11.....	8:55 a.m.	723		810	852	75	91	97	98	98	99	100					BSNM
May 21.....	8:20 a.m.	74		441	674	83	90	95	96	97	98	100					BSWCM
June 1.....	7:10 a.m.	54		480	883	94	95	96	97	98	98	100					BSWCM

WISCONSIN RIVER BASIN--Continued

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

LOCATION.--At gaging station, 0.7 mile east of Black Earth, Dane County, 2.1 miles upstream from Vermont Creek, and 150 feet south of U.S. Highway 14.
DRAINAGE AREA.--45.9 square miles.
RECORDS AVAILABLE.--Water temperatures: February 1954 to September 1959.
Sediment records: February 1954 to September 1959.
EXTREMES, 1958-59.--Water temperatures: Maximum, 76°F May 5, June 26, July 8; minimum, freezing point on many days during November to February.
Sediment concentrations: Maximum daily, 550 ppm Aug. 22; minimum daily, 1 ppm Oct. 19-21.
Sediment loads: Maximum daily, 701 tons Apr. 1; minimum daily, less than 0.05 ton Oct. 19-21.
EXTREMES, 1954-59.--Water temperatures: Maximum, 78°F July 7, 1955, June 10, 1956, July 20, 1957; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 2,010 ppm May 13, 1956; minimum daily, 1 ppm Dec. 31, 1955, Oct. 19-21, 1958.
Sediment loads: Maximum daily, 3,960 tons July 3, 1954; minimum daily, less than 0.05 ton Oct. 19-21, 1958.
REMARKS.--Flow affected by ice Nov. 30, Dec. 6-15, Jan. 3 to Feb. 12, Feb. 19-20, 23, Mar. 6-7, 15-17, 20-21. Records of discharge for water year October 1958 to September 1959 given in WSP 1628.

Temperature (° F) of water, water year October 1958 to September 1959
/Once-daily measurement at varying hours/

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

WISCONSIN RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959

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	16	2	0.1	16	13	0.6	17		
2	16	3	.1	16	13	.6	17		
3	16	6	.2	16	5	.2	17		
4	16	7	.3	16	3	.1	16		
5	15	6	.2	16			15		
6	16	5	a .2	16			16		
7	18	3	.1	16			16		
8	20	3	.2	16			16		
9	26	12	.8	16			16		
10	18	3	a .1	16			16		
11	17	3	.1	16	--	e .4	16		
12	16	2	.1	16			15		
13	16	2	.1	16			15		
14	16	2	.1	16			15		
15	16	2	.1	16			15		
16	16	4	a .2	16			16		e 0.4
17	16	5	.2	20			16		
18	16	4	.2	27	--	e .7	16		
19	16	1	(t)	19			16		
20	16	1	(t)	18			16		
21	16	1	(t)	18			16		
22	16	4	.2	16			16		
23	16	3	.1	16			16		
24	16	3	.1	17			16		
25	16	8	.3	18	--	e .4	16		
26	16	10	.4	18			16		
27	16	6	.2	16			16		
28	16	3	.1	16			16		
29	16	6	.2	14			16		
30	16	6	.2	15			16		
31	16	5	.2	--	--	--	16		
Total	514	--	5.5	504	--	12.2	494		12.4

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	16	16	a 0.7	14	28	1.0	18	12	0.6
2	16	18	.8	15	25	1.0	19	17	.9
3	15	17	a .7	15	18	.7	19	13	.7
4	15	15	.6	15	10	.4	18	13	.6
5	15	13	.5	14	6	.2	17		
6	15	12	.5	15	13	.5	17	--	e .9
7	15	12	.5	15	15	.6	17		
8	15	14	.6	15	16	.6	18		
9	15	13	.5	15	21	.8	18	18	.9
10	15	14	.6	15	25	a 1	18	13	.6
11	15	14	.6	15	26	1.0	18	15	.7
12	16	12	.5	15	25	1.0	18	19	.9
13	16	9	.4	16	26	1.1	18	20	1.0
14	16	8	.3	16	32	1.4	18	20	a 1
15	16	15	.6	16	17	.7	17	20	a .9
16	15	21	.8	16	20	.9	17	20	a .9
17	15	19	.8	16			17	21	1.0
18	15	16	.6	15	--	e .7	17	20	.9
19	15	24	1.0	15			26	30	b 2
20	15	20	.8	17			40	28	3.0
21	15	18	.7	18	18	.9	58	43	6.7
22	15	17	a .7	18	17	a .8	69	38	7.1
23	15	15	a .6	18	15	a .7	106	110	sb 45
24	15	13	.5	18	13	.6	247	401	s 360
25	15	15	.6	17	16	.7	284	289	s 233
26	15	22	.9	17	17	.8	174	83	39
27	15	17	.7	18	17	.8	118	--	e 25
28	15	20	.8	18	17	.8	118	59	s 21
29	15	19	.8	--	--	--	129	80	sb 35
30	14	17	.6	--	--	--	167	--	e 110
31	14	24	.9	--	--	--	360	450	sb 500
Total	469	--	20.2	447	--	21.8	2,215	--	1,402.0

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

WISCONSIN RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959--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	702	370	701	23	40	2.5	19	35	1.8
2	271	164	123	23	21	1.3	19	35	a 2
3	154	120	s 53	22	17	a 1	19	31	1.6
4	86	68	16	21	25	1.4	18	30	1.4
5	65	76	13	21	15	.8	18	35	a 2
6	52	61	8.6	21	11	a .6	25	--	e 19
7	52	92	13	20	15	.8	32	300	sb 35
8	46	57	7.1	20	32	1.7	20	38	2.0
9	41	36	4.0	20	25	1.4	19	28	1.4
10	36	36	3.5	24	16	1.0	19	33	1.7
11	33	35	3.1	26	26	1.8	19	21	1.1
12	32	35	3.0	22	20	1.2	18	13	a .6
13	30	48	3.9	20	24	1.3	18	27	1.3
14	29	42	3.3	20	28	1.5	17	17	.8
15	28	37	2.8	19	27	1.4	18	12	.6
16	27	36	2.6	19	24	1.2	17	12	.6
17	28	27	2.0	19	17	.9	17	28	1.3
18	29	23	1.8	19	11	.6	18	38	1.8
19	26	23	1.6	20	13	.7	18	30	1.4
20	26	24	1.7	25	--	e 8	17	39	1.8
21	24	25	1.6	23	20	b 1	17	30	1.4
22	24	27	1.7	20	16	.9	17	35	1.6
23	23	30	1.9	22	20	1.2	17	45	2.1
24	24	36	2.3	20	23	1.2	17	25	1.1
25	23	40	2.5	19	23	1.2	18	22	1.1
26	23	37	2.3	22	37	s 2.8	20	21	1.1
27	22	49	2.9	29	--	e 11	19	20	1.0
28	34	45	s 3.9	22	40	2.4	29	--	e 5
29	27	23	1.7	21	37	2.1	34	44	4.0
30	25	38	2.6	20	42	2.3	30	27	2.2
31	--	--	--	19	35	1.8	--	--	--
Total	2,042	--	991.4	661	--	59.0	603	--	99.8

Day	July			August			September		
1	26	41	2.9	22	7	a 0.4	29	37	2.9
2	23	39	2.4	21	7	.4	28	40	a 3
3	20	40	a 2	29	23	1.8	26	40	2.8
4	20	42	2.3	26	11	.8	25	40	a 3
5	20	43	2.3	23	8	.5	24	43	2.8
6	20	30	1.6	22	11	a .6	23	38	2.4
7	19	20	1.0	22	13	.8	23	30	a 2
8	18	24	1.2	21			22	20	a 1
9	19	21	1.1	20			22	13	.8
10	19	19	1.0	20			21	6	.3
11	19	18	.9	23	--	.7	21	5	.3
12	18	17	.8	22			21	7	.4
13	18	17	.8	20			20	3	.2
14	18	16	.8	23	--	e 3	20	6	.3
15	17	16	.7	36	85	sb 9	20	7	.4
16	17	26	1.2	25	35	2.4	20	3	.2
17	17	15	.7	32	--	e 15	20	3	a .2
18	50	--	e 50	23	65	a 4	20	5	a .3
19	23	28	1.7	21	57	3.2	20	7	.4
20	20	12	.6	20	62	3.3	20	10	.5
21	20	10	.5	30	--	e 25	20	10	.5
22	19	8	.4	154	550	sb 270	20	10	.5
23	20	11	.6	52	174	s 26	20	10	.5
24	20	18	1.0	30	65	a 5	20	10	.5
25	19	13	a .7	23	44	2.7	21	9	.5
26	19	10	.5	21	32	1.8	25	--	e .8
27	18	11	.5	152	--	e 90	33	--	e 2
28	18	35	1.7	70	80	sb 17	28	--	e .6
29	26	--	e 13	40	39	4.2	25	--	e .5
30	42	--	e 15	33	37	3.3	24	8	.5
31	25	10	.7	32	27	2.3	--	--	--
Total	667	--	110.6	1,108	--	496.7	681	--	31.1

Total discharge for year (cfs-days) 10,405
Total load for year (tons) 3,262.7

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

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

Particle-size analyses of suspended sediment, water year October 1958 to September 1959
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Mar. 24, 1959....	4:50 p.m.	346		626	884	40	45	49	70	91	97	99	100				BSWCM
Apr. 1.....	12:55 p.m.	1,010		567	846	55	66	72	82	93	97	99	100				BSWCM
June 7.....	11:45 p.m.	27		294	444	84	91	95	97	98	99	100	--				BSWCM
Aug. 22.....	6:45 a.m.	280		1,040	939	91	92	94	96	98	99	100	--				BSWM
Aug. 22.....	6:45 a.m.	280		1,040	827	66	77	84	92	98	99	100	--				BSNM

TURKEY RIVER BASIN

5-4125. TURKEY RIVER AT GARBER, IOWA

LOCATION.--At gaging station on downstream side of 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 1959.
Sediment records: October 1957 to September 1959.
EXTREMES, 1958-59.--Water temperatures: Maximum, 80°F Aug. 12; minimum, freezing point on many days during November to March.
Sediment concentrations: Maximum daily, 19,300 ppm May 20; minimum daily, not determined.
Sediment loads: Maximum daily, 294,000 tons June 26; minimum daily, not determined.
EXTREMES, 1957-59.--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, not determined.
Sediment loads: Maximum daily, 294,000 tons June 26,1959; minimum daily, not determined.
REMARKS.--Maximum observed sediment concentration during water year, 31,600 ppm May 26. Flow affected by ice Nov. 26 to Mar. 23. Records of discharge for water year October 1958 to September 1959 given in WSP 1628.

Temperature (° F) of water, water year October 1958 to September 1959
(Once-daily measurement at varying hours)

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

a Includes estimated temperature, 32° F, on missing days.

TURKEY RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959

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	82			90	12		140	34	
2	82			97	--		130	--	
3	90			98	14		100	42	
4	92			111	--		90	--	
5	82	19	4	88	23		100	27	a 10
6	82			93	--		110	--	
7	83			113	10		100	34	
8	115	440	sb 460	88	--		90	--	
9	373	2,100	sb 3,100	95	12	a 4	80	40	
10	111	1,300	390	95	--		72	--	
11	93	48	12	97	12		68	15	
12	90	27	7	97	--		64	--	
13	88	38	9	100	11		62	14	
14	100	54	15	113	--		60	--	
15	82			88	15		60	20	
16	82			97	--		60	37	
17	83	28	6	130	300	sb 160	60	8	
18	83			624	2,700	sb 5,400	60	--	
19	85			776	1,200	sb 2,600	62	8	
20	85			435	500	587	64	--	a 3
21	97	35	9	274	255	189	66	8	
22	100	31	8	252	190	129	68	--	
23	86	--		208	95	53	70	7	
24	88	15		220	--	e 60	72	--	
25	106	--		180	100	49	72	10	
26	90	38		140	--		74	--	
27	102	--	a 6	120	33		74	13	
28	110	26		105	--	e 10	76	--	
29	95	--		100	--		76	13	
30	100	15		120	--		76	--	
31	110	--		--	--	--	76	12	
Total	3,147	--	4,128	5,244	--	9,341	2,432	--	149

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	74	--		58	12		90	52	13
2	74	9		56	--		120	35	11
3	70	--		56	12		160	--	e 17
4	70	8		56	--		140	39	15
5	68	--		56	11		120	--	e 13
6	66	10		56	--		110	--	e 12
7	64	--		56	12		100	--	e 11
8	64	8		58	--		94	44	11
9	66	--		58	13		90	34	
10	66	6		58	--		84	--	
11	66	--		60	14		80	25	
12	68	7		60	--		76	--	
13	70	--		60	13		76	38	a 6
14	72	7		62	--		80	--	
15	74	--		62	16	a 2	90	14	
16	76	21	a 2	62	--		100	--	
17	76	--		62	12		110	17	
18	76	13		60	--		150	44	18
19	76	--		58	13		400	885	956
20	74	8		58	--		5,600	1,860	28,100
21	72	--		60	14		3,200	1,100	9,500
22	72	17		64	--		2,700	500	3,650
23	70	--		66	19		3,100	1,760	14,700
24	70	11		70	--		7,970	3,410	s 80,500
25	68	--		68	12		11,100	2,820	s 86,600
26	66	13		68	--		13,000	2,550	s 90,300
27	64	--		68	10		10,600	2,010	s 58,100
28	62	7		68	--		10,800	2,170	s 63,900
29	60	--		--	--	--	11,000	2,270	s 67,500
30	60	10		--	--	--	12,100	2,420	s 79,400
31	58	--		--	--	--	13,200	2,160	77,000
Total	2,132	--	62	1,704	--	56	106,640	--	660,381

e Estimated.
s Computed by subdividing day.
a Computed from samples obtained three or four times a week.
b Computed from partly estimated concentration graph.

TURKEY RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959--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	14,000	2,050	s 77,600	435	47	55	4,070	7,450	87,500
2	11,800	2,000	63,700	403	41	45	2,330	1,800	11,300
3	9,740	1,890	s 50,600	367	42	42	1,650	930	4,140
4	5,960	1,340	s 21,800	376	39	40	1,320	630	2,250
5	4,700	1,190	15,100	334	41	37	1,070	405	1,170
6	3,280	620	5,490	376	66	67	960	320	829
7	2,400	395	2,560	390	37	39	800	265	572
8	1,980	275	1,470	359	35	34	725	210	411
9	1,650	195	869	342	32	30	650	188	330
10	1,380	145	529	431	1,400	sb 2,500	605	160	261
11	1,240	120	402	1,040	6,000	sb 19,000	562	130	197
12	1,100	73	217	620	610	1,020	510	100	138
13	1,020	100	275	500	220	297	449	100	121
14	932	96	242	421	120	136	417	93	105
15	850	100	230	376	95	96	390	93	98
16	800	53	114	334	110	99	334	105	95
17	775	100	209	281	92	70	351	100	95
18	775	100	209	299	83	67	307	78	65
19	750	76	154	1,780	9,660	s 59,900	307	110	91
20	700	60	113	3,670	19,300	s 204,000	296	105	84
21	675	65	118	2,050	9,000	49,800	281	105	80
22	630	66	112	1,530	2,000	8,260	266	98	70
23	590	71	113	1,210	750	2,450	242	75	49
24	557	61	92	1,040	470	1,320	804	3,800	sb 34,000
25	533	64	92	960	370	959	3,120	15,000	sb 150,000
26	496	50	67	1,550	6,730	s 75,900	8,950	12,000	s 294,000
27	482	47	61	1,560	13,000	sb 62,000	4,600	3,700	46,000
28	514	93	129	988	4,400	11,700	3,810	7,530	s 88,700
29	514	62	86	1,800	6,550	s 32,800	3,440	3,500	33,000
30	435	51	60	1,710	5,400	24,900	3,840	2,900	sb 35,000
31	--	--	--	3,220	9,540	s 106,000	--	--	--
Total	71,258	--	242,813	30,752	--	663,663	47,456	--	790,751

	July			August			September		
1	6,050	2,870	46,900	242	100	65	562	200	303
2	3,980	1,240	13,300	233	100	c 65	514	130	180
3	2,640	640	4,560	2,110	3,860	s 30,100	640	170	c 300
4	2,120	900	sb 5,400	970	1,680	s 4,730	635	255	437
5	1,710	450	2,080	581	340	533	571	140	c 220
6	1,380	290	1,080	467	220	c 280	547	130	192
7	1,150	240	745	430	120	139	463	110	c 140
8	1,040	230	646	376	--		408	105	116
9	1,240	550	sb 1,900	351	81		338	90	c 80
10	988	380	1,010	342	--	a 75	342	81	75
11	1,070	500	1,440	326	82		318	--	
12	960	410	1,060	330	80		299	45	
13	780	700	sb 1,800	322	105	91	274	--	a 34
14	760	420	sb 900	318	150	sc 140	277	53	
15	650	180	316	403	295	321	270	31	
16	605	150	245	385	120	125	259	24	
17	566	140	214	376	90	c 90	252	--	
18	605	125	204	326	78	69	246	37	
19	581	110	173	296	70	c 55	246	--	
20	524	--	e 140	281	71	54	246	32	a 22
21	463	--	e 130	430	480	sb 2,700	236	--	
22	426	92	106	3,570	6,800	sb 70,000	236	37	
23	408	--	e 90	1,440	2,420	s 10,200	236	--	
24	376	77	78	960	650	1,680	307	27	22
25	322	--	e 60	800	500	1,080	538	50	c 75
26	296	72	58	700	420	c 800	1,310	2,600	sb 19,000
27	277	--	e 55	1,120	2,000	sb 6,300	3,260	3,800	sb 42,000
28	277	74	55	960	750	c 1,900	1,710	1,000	4,620
29	342	220	203	800	320	691	1,530	360	1,490
30	326	120	106	800	420	c 900	1,120	270	816
31	274	--	e 80	725	490	959	--	--	--
Total	33,186	--	85,134	21,770	--	134,442	18,190	--	70,412

Total discharge for year (cfs-days) 343,911
Total load for year (tons) 2,661,332

e Estimated.
s Computed by subdividing day.
a Computed from samples obtained three or four times a week.
b Computed from partly estimated concentration graph.
c Computed from estimated concentration graph.

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

Particle-size analyses of suspended sediment, water year October 1958 to September 1959
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Oct. 9, 1958.....	6:45 a.m.	645	60	2,910	3,920	--	51		81		99	99	100		--		SPWCM
Oct. 9	6:45 a.m.	645	60	2,910	3,470	--	40		77		99	99	100		--		SPNM
Nov. 18.....	9:45 a.m.	850	46	3,880	3,410	--	54		80		99	99	100		--		SPWCM
Mar. 20, 1959...	4:30 p.m.	5,600	33	3,370	3,220	--	36		39		88	93	96		100		SPWCM
Mar. 20.....	4:30 p.m.	5,600	33	3,370	2,880	--	16		34		88	93	96		100		SPNM
Mar. 24.....	7:45 a.m.	6,460	34	2,230	3,390	--	25		41		90	94	98		100		SPWCM
Mar. 24.....	8:00 p.m.	11,800	34	4,500	3,630	--	22		39		96	98	99		100		SPWCM
Mar. 25.....	6:00 a.m.	12,600	35	3,020	4,660	--	23		45		92	95	99		100		SPWCM
Mar. 25.....	3:50 p.m.	9,580	34	2,160	3,950	--	22		42		92	96	99		100		SPWCM
Mar. 25.....	3:50 p.m.	9,580	34	2,160	3,590	--	16		35		92	96	99		100		SPNM
Mar. 29.....	9:00 a.m.	10,900	33	2,480	3,430	--	36		40		90	93	98		100		SPWCM
Apr. 1.....	10:30 a.m.	14,900	37	2,180	3,050	--	25		42		88	92	96		100		SPWCM
May 11.....	7:00 a.m.	1,290	60	7,340	2,950	--	52		78		100	--	--		--		SPWCM
May 19.....	7:00 a.m.	3,980	60	24,400	5,770	--	43		63		99	100	--		--		SPWCM
June 1	2:45 p.m.	4,070	66	5,620	3,040	--	34		55		94	96	98		100		SPWCM
June 1	2:45 p.m.	4,070	66	5,620	2,670	--	26		53		94	96	98		100		SPNM
June 25	6:50 a.m.	2,260	68	15,200	2,920	--	44		73		98	99	100		--		SPWCM
Aug. 3.....	3:55 p.m.	3,800	71	4,520	3,130	27	35		64		90	92	98		100		SPWCM
Aug. 22.....	8:10 a.m.	4,430	74	7,760	2,760	21	29		44		88	91	96		100		SPWCM
Sept. 27.....	6:00 a.m.	4,250	60	5,400	4,000	30	40		70		90	91	96		99	100	SPWCM
Sept. 27.....	5:00 p.m.	2,480	60	2,380	3,930	34	47		74		100	--	--		--		SPWCM

ROCK RIVER BASIN

5-4305. ROCK RIVER AT AFTON, WIS.

LOCATION.--Temperature recorder at gaging station, 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 1959.
EXTREMES, 1958-59.--Water temperatures: Maximum, 83°F Aug. 25; minimum, freezing point on many days during December to March.
EXTREMES, 1954-59.--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 1958 to September 1959 given in WSP 1628.

Temperature (° F) of water, water year October 1958 to September 1959
/Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph/

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

ROCK RIVER BASIN--Continued

5-4335. YELLOWSTONE RIVER NEAR BLANCHARDVILLE, WIS.

LOCATION.--At gaging station, 0.6 mile upstream from bridge on County Road F, 2.7 miles upstream from Yellowstone Lake dam, 7 miles southwest of Blanchardville, Lafayette County, and about 9 miles upstream from East Branch Pecatonica River.
DRAINAGE AREA.--29.1 square miles.
RECORDS AVAILABLE.--Water temperatures: August 1954 to September 1959.
Sediment records: August 1954 to September 1959.
EXTREMES, 1958-59.--Water temperatures: Maximum, 84°F Aug. 24; minimum, freezing point on many days during November to March.
Sediment concentrations: Maximum daily, not determined; minimum daily, 2 ppm Apr. 17-18.
Sediment loads: Maximum daily, 3,750 tons Apr. 1; minimum daily, 0.1 ton on many days during October, December to April.
EXTREMES, 1954-59.--Water temperatures: Maximum, 89°F July 27, 1955; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, not determined; minimum daily, 1 ppm on many days.
Sediment loads: Maximum daily, 3,750 tons Apr. 1, 1959; minimum daily, less than 0.05 ton on many days.
REMARKS.--Flow affected by ice Dec. 5, Dec. 7 to Mar. 14, Mar. 16-24. Records of discharge for water year October 1958 to September 1959 given in WSP 1628.

Temperature (° F) of water, water year October 1958 to September 1959
/Once-daily measurement between 4 p.m. and 9 p.m./

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

ROCK RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959

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.....	4.2	12	0.1	5.0	24	0.3	4.2	24	0.3
2.....	4.4	14	.2	5.0	40	.5	4.4	35	.4
3.....	4.2	14	.2	4.8	28	.4	5.0	36	.5
4.....	4.2	22	.2	4.6	14	.2	4.8	34	.4
5.....	4.2	26	.3	4.8	12	.2	4	47	.5
6.....	4.4	23	.3	5.3	22	.3	3.6	45	.4
7.....	7.5	97	s 2.7	5.6	20	.3	3.5	28	.3
8.....	9.7	142	s 5.5	6.1	15	.2	3.5	20	.2
9.....	37	350	sa 55	6.4	14	.2	3		
10.....	7.5	44	.9	6.1	12	.2	3		
11.....	5.6	20	.3	6.1	28	.5	3		
12.....	5.0	24	.3	6.4	49	.8	3		
13.....	4.8	27	.3	6.7	59	1.1	3		
14.....	4.6	34	.4	7.0	57	1.1	3		
15.....	4.6	21	.3	8.4	49	1.1	3.5		
16.....	4.6	10	.1	7.2	48	.9	3.5		
17.....	4.4	14	.2	11.4	66	s 2.1	3.5		
18.....	4.4	24	.3	11.0	80	2.4	4		
19.....	4.4	19	.2	6.7	69	1.2	4		
20.....	4.4	10	.1	5.8	81	1.3	4	--	e .1
21.....	4.6	24	.3	5.3	80	1.1	3.5		
22.....	6.4	124	2.1	5.3	75	1.1	3.5		
23.....	5.0	66	.9	5.3	105	1.5	3.5		
24.....	4.8	24	.3	5.6	86	1.3	3.5		
25.....	4.8	33	.4	6.1	65	1.1	3.5		
26.....	6.1	38	.6	5.6	63	1.0	3.5		
27.....	5.8	43	.7	5.0	66	.9	3.5		
28.....	5.3	41	.6	4.8	90	1.2	3.5		
29.....	5.0	33	.4	4.4	96	1.1	3.5		
30.....	5.0	25	.3	4.0	61	.6	3.5		
31.....	5.0	24	.3	--	--	--	3.5		
Total.	191.9	--	74.8	181.8	--	26.2	112.0	--	5.3

Day	January			February			March		
1.....	3.5			2.5	10	0.1	5	18	0.2
2.....	3.5			3	13	.1	5.5	18	.3
3.....	3.5			3	10	.1	6	16	.2
4.....	3.5			3	10	.1	5.5	13	.2
5.....	3	--	e 0.1	3	13	.1	5	18	.2
6.....	3			3	14	.1	4.5	19	.2
7.....	3			3	15	.1	5	15	.2
8.....	3			3.5	15	.1	5.5	26	.4
9.....	3	19	.2	3.5	15	.1	5.5	23	.3
10.....	3	18	.1	3.5	14	.1	5.5	16	.2
11.....	3	18	.1	3.5	14	.1	5	15	.2
12.....	3	15	.1	3.5	14	.1	5	11	.1
13.....	3.5	13	.1	3.5	21	.2	4.5	7	.1
14.....	3.5	14	.1	3	18	.1	4.5	15	.2
15.....	3.5	11	.1	3	16	.1	4.0	42	.4
16.....	3.5	10	.1	3	18	.1	4.5	58	.7
17.....	3.5	18	.2	3.5			5	27	.4
18.....	3	14	.1	3.5			5	10	.1
19.....	3	14	.1	4.5	--	e .2	11	122	s 12
20.....	3	16	.1	5.5			110	791	s 253
21.....	3	17	.1	6			200	365	197
22.....	3	18	.1	6	17	.3	150	350	142
23.....	3	19	.2	6	15	.2	150	1,090	589
24.....	3	20	.2	5.5	17	.2	450	2,120	s 3,200
25.....	3	14	.1	5	14	.2	267	998	719
26.....	3	14	.1	5	14	.2	394	952	s 1,280
27.....	3	16	.1	5	15	.2	185	379	s 266
28.....	3	10	.1	5	14	.2	204	995	s 731
29.....	3	7	.1	--	--	--	236	971	s 832
30.....	3	7	.1	--	--	--	314	904	s 1,190
31.....	2.5	11	.1	--	--	--	427	1,300	s 2,190
Total.	97.0	--	3.5	111.0	--	4.2	3,188.5	--	11,605.6

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

ROCK RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959--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	861	1,210	s 3,750	12.1	15	0.5	8.1	46	1.0
2	114	404	s 141	11.4	24	.7	7.5	47	1.0
3	61	205	34	11.0	18	.5	7.2	40	.8
4	43	--	e 14	10.7	12	.3	7.0	51	1.0
5	36	92	8.9	10.4	16	.4	6.7	57	1.0
6	30	35	2.8	10.4	17	a .5	6.7	40	.7
7	28	5	.4	9.4	17	.4	6.7	30	.5
8	24	5	.3	8.8	18	.4	6.4	29	.5
9	23	10	.6	9.1	20	.5	6.4	28	.5
10	19.9	14	.8	11.0	22	.6	7.5	40	b .8
11	17.8	15	.7	14.2	20	.8	8.1	47	1.0
12	16.6	10	.4	10.0	27	.7	6.7	25	.4
13	15.4	4	.2	9.7	37	1.0	6.4	29	.5
14	14.6	6	.2	9.4	32	.8	6.4	28	.5
15	13.9	5	.2	9.1	34	.8	6.4	25	.4
16	13.2	3	.1	8.8	36	.8	6.1	26	.4
17	15.0	2	.1	8.4	33	.7	5.8	21	.3
18	15.8	2	a .1	8.8	30	.7	6.4	19	.3
19	13.5	3	a .1	11.4	29	.9	6.4	17	.3
20	12.8	3	.1	9.7	25	.6	6.1	18	.3
21	12.1	6	.2	9.4	28	.7	5.8	17	.3
22	11.7	8	.2	8.4	37	.8	5.8	20	.3
23	11.0	5	.1	9.4	36	.9	5.8	17	.3
24	12.1	6	.2	8.4	34	.8	64	1,660	s 1,050
25	11.0	10	.3	8.1	31	.7	27	1,600	sb 250
26	10.4	15	.4	11.0	--	e 5	175	--	e 3,200
27	10.7	19	.5	11.7	--	e 6	18.2	115	5.6
28	21	--	e 4	9.1	68	1.7	34	480	s 64
29	14.6	22	.9	10.0	53	1.4	22	280	17
30	13.5	18	.6	8.4	54	1.2	31	138	12
31	--	--	--	8.4	37	.8	--	--	--
Total	1,516.6	--	3,962.4	306.1	--	32.6	523.6	--	4,611.7

	July			August			September		
1	28	87	6.5	7.8	16	0.3	12.4	--	e 1
2	21	74	4.2	7.8	20	.4	12.1	--	e 1
3	17.4	72	3.4	161	658	s 707	11.0	--	e 1
4	22	92	s 6.5	23	53	3.3	10.4	42	1.2
5	22	84	5.0	17.4			9.7	37	1.0
6	16.2	63	2.8	15.4			9.4	34	.9
7	14.6	59	2.3	14.2			9.4	33	.8
8	13.9	65	2.4	13.2			9.1	30	.7
9	13.9	57	2.1	12.4	--	e .5	9.1	34	.8
10	14.6	67	s 3.2	11.7			8.8	34	.8
11	17.0	75	s 3.8	11.0			8.4	36	.8
12	12.4	45	1.5	10.7			8.4	33	.7
13	11.7	49	1.5	10.4			8.1	35	.8
14	10.7	43	1.2	15.4	--	e 17	8.1	33	.7
15	10.0	42	1.1	23	--	e 14	8.4	40	.9
16	10.0	41	1.1	14.2	44	1.7	8.4	45	1.0
17	9.7	31	.8	13.5	43	1.6	8.1	44	1.0
18	12.4	30	1.0	11.7	54	1.7	8.1	50	1.1
19	10.4	25	.7	10.7	57	1.6	8.4	37	.8
20	9.7	23	.6	10.4	53	1.5	8.4	20	.4
21	9.1	30	.7	10.0	48	1.3	8.1	18	.4
22	8.8	29	.7	15.4	--	e 4	8.1	26	.6
23	10.0	27	.7	10.7	46	1.3	14.2	--	e 6
24	9.4	26	.6	9.7	44	1.2	8.8	30	.7
25	8.8	25	.6	9.4	33	.8	12.4	25	.8
26	8.4	16	.4	9.4	24	.6	19.5	90	sb 9
27	8.1	20	.4	21	200	sb 20	21	110	sb 7
28	8.4	17	.4	17.0	150	sa 16	13.9	30	1.1
29	10.0	17	.4	12.8	45	a 2	12.4	25	.8
30	10.7	19	.5	14.2	41	1.6	11.4	32	1.0
31	8.1	17	.4	13.9	--	e 2	--	--	--
Total	397.4	--	57.5	558.4	--	805.4	314.0	--	44.8

Total discharge for year (cfs-days) 7,498.3
Total load for year (tons) 21,234.0

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

ROCK RIVER BASIN--Continued

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

Particle-size analyses of suspended sediment, water year October 1958 to September 1959
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Mar. 20, 1959...	5:00 p.m.	965		1,740	2,690	24	31	45	62	87	97	100	--				BSWCM
Mar. 24	5:30 p.m.	883		4,710	2,570	20	24	34	47	73	94	98	100				BSWCM
Mar. 24	5:30 p.m.	883		4,710	3,490	6	11	20	31	72	92	98	100				BSNM
Mar. 31	4:30 p.m.	1,310		3,970	2,200	28	35	40	56	83	95	98	99		100		BSWCM
Mar. 31	4:30 p.m.	1,310		3,970	2,580	19	22	33	49	85	94	98	100				BSNM
June 24	7:00 p.m.	526		9,040	2,950	30	40	53	73	94	99	100	--				BSWCM
June 24	7:00 p.m.	526		9,040	3,080	18	22	47	60	94	99	100	--				BSNM
June 24	8:10 p.m.	434		4,690	4,070	40	54	72	90	99	100	--	--				BSWCM

ROCK RIVER BASIN--Continued

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

LOCATION.--At gaging station at bridge on State Highway 92, 0.9 mile upstream from West Branch Sugar River, and 2.5 miles southeast of Mount Vernon, Dane County.
DRAINAGE AREA.--16.1 square miles.
RECORDS AVAILABLE.--Water temperatures: January 1954 to September 1959.
Sediment records: January 1954 to September 1959.
EXTREMES, 1958-59.--Water temperatures: Maximum, 76°F Aug. 21; minimum, freezing point on many days during November to March.
Sediment concentrations: Maximum daily, 761 ppm Apr. 1; minimum daily, 2 ppm Feb. 17.
Sediment loads: Maximum daily, 1,120 tons Apr. 1, 1959; minimum daily, 0.1 ton on several days during February and March.
EXTREMES, 1954-59.--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. 29 to Dec. 1, Dec. 5-18, Jan. 3-10, Jan. 15 to Feb. 7, Feb. 10-11, 13-21, Mar. 5-8, 15-22. Records of discharge for water year October 1958 to September 1959 given in WSP 1628.

Temperature (° F) of water, water year October 1958 to September 1959
/Once-daily measurement between 3 p.m. and 6 p.m./

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

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

Suspended sediment, water year October 1958 to September 1959

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	9.9	60	1.6	9.9	17	0.4	11		
2	9.9	41	1.1	9.9	21	.6	11		
3	9.9	42	1.1	10	25	.7	11		
4	9.9	45	1.2	10	27	.7	11		
5	9.9	23	.6	10	27	.7	10		
6	9.9	23	.6	9.9	23	.6	10		
7	9.9	30	a .8	10	20	.5	10		
8	11	36	1.1	10	19	.5	10		
9	32	250	sb 30	10	23	.6	10		
10	12	55	a 2	10	29	.8	10		
11	11	34	1.0	9.9	43	1.1	9.5		
12	11	27	.8	9.9	36	1.0	9.5		
13	11	30	.9	10	40	1.1	9.5		
14	11	31	.9	10	54	1.4	9.5		
15	11	30	.9	11	31	.9	9.5		
16	10	43	1.2	10	18	.5	10		e 0.4
17	10	29	.8	14	58	s 2.8	10		
18	10	15	.4	16	58	2.5	10		
19	10	21	.6	12	35	1.1	10		
20	10	22	.6	12	24	.8	10		
21	10	20	.5	11	19	.6	10		
22	10	13	.4	11	16	.5	10		
23	10	11	.3	11	16	.5	10		
24	10	12	.3	12	16	.5	10		
25	10	13	.4	12	17	.6	10		
26	11	14	.4	12	18	.6	10		
27	11	15	.4	11	14	.4	10		
28	10	17	.4	11	12	.4	10		
29	10	13	.4	10	--	e .4	10		
30	10	16	.4	10	--	e .4	10		
31	9.9	20	.5	--	--	--	10		
Total	341.2	--	52.6	325.5	--	24.2	311.5		12.4

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	11			8.5			11	5	0.1
2	10			8.5			12	8	.2
3	9.5			9.0	--	e 0.2	12	8	.2
4	9.5			8.5			12	10	.3
5	9.5			8.5			11	11	.3
6	9.5			8.5	4	.1	10	14	.4
7	9.5			8.8	3	.1	10	19	.5
8	9.5			8.8	5	.1	11	14	.4
9	9.5			9.0	6	.1	12	11	.4
10	9.5		e 0.4	9.0	9	.2	12	24	.8
11	10			9.0	16	.4	12	35	1.1
12	10			9.3	10	.2	12	29	.9
13	10			9.5	4	.1	11	23	.7
14	10			9.5	15	.4	11	22	.6
15	10			9.5	27	.7	10	20	.5
16	9.5			9.5	10	.2	10	16	.4
17	9.5			9.5	2	.1	10	48	1.3
18	9.5			9.0	4	.1	10	44	1.2
19	11			9.0	5	.1	12	35	1.1
20	10			10	5	.1	25	118	s 10
21	9.5			10	6	.2	50	184	25
22	9.5			11	4	.1	45	110	13
23	9.5			11	5	.1	40	109	12
24	9.5			10	7	.2	128	330	s 145
25	9.5			10	14	.4	188	260	s 153
26	9.5		e .2	10	15	.4	89	70	s 18
27	9.5			10	6	.2	65	66	12
28	9.5			10	6	.2	38	102	10
29	9.5			--	--	--	41	140	15
30	9.5			--	--	--	65	266	s 58
31	9.0			--	--	--	249	600	s 510
Total	300.5		10.2	262.9	--	5.8	1,234	--	992.4

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

ROCK RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959--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	464	761	s 1,120	14	31	1.2	12	47	1.5
2	102	319	88	13	32	1.1	12	43	1.4
3	62	152	s 28	13	33	1.2	11	47	1.4
4	35	118	s 13	12	29	.9	11	33	1.0
5	28	114	8.6	12	36	1.2	12	26	.8
6	21	79	4.5	12	43	1.4	12	25	.8
7	21			12	43	1.4	12	25	.8
8	20			12	38	1.2	11	26	.8
9	18			12	33	1.1	11	28	.8
10	17	--	e 2	14	38	1.4	11	28	.8
11	16			16	--	e 3	11	28	.8
12	15			12	28	.9	11	21	.6
13	15			12	38	1.2	11	28	.8
14	14	52	2.0	12	44	1.4	11	33	1.0
15	14	44	1.7	12	32	1.0	11	27	.8
16	14	48	1.8	12	24	.8	11	23	.7
17	16	88	s 4.5	12	48	1.6	11	30	.9
18	17	58	2.7	12	39	1.3	12	29	.9
19	15	26	1.0	14	49	1.8	12	21	.7
20	14	27	1.0	14	44	1.7	12	25	.8
21	14	40	1.5	13	45	1.6	12	35	1.1
22	14	41	1.5	12	36	1.2	12	20	.6
23	14	36	1.4	12	31	1.0	12	28	.9
24	14	33	1.2	12	40	1.3	12	29	.9
25	14	30	1.1	12	44	1.4	14	40	sb 2
26	14	28	1.0	12	50	1.6	50	--	e 75
27	14	21	.8	11	53	1.6	15	49	2.0
28	21	--	e 5	11	54	1.6	38	266	s 38
29	16	30	1.3	12	56	1.8	21	135	7.6
30	14	30	1.1	12	55	1.8	25	87	5.9
31	--	--	--	12	65	2.1	--	--	--
Total	1,087	--	1,306.7	385	--	43.8	439	--	152.1

Day	July			August			September		
1	19	50	2.6	14	15	0.6	13	25	0.9
2	16	27	1.2	14	12	.4	13	29	1.0
3	14	28	1.0	19	34	1.7	12	29	.9
4	15	33	1.3	16	22	1.0	12	26	.8
5	15	29	1.2	15	11	.4	12	32	1.0
6	14	23	.9	15	12	.5	12	44	1.4
7	14	24	.9	14	20	.8	12	30	1.0
8	14	25	.9	14	23	.9	11	--	
9	14	23	.9	14	25	.9	11	--	
10	14	15	.6	14	27	1.0	11	23	
11	16	--	e 2	14	30	a 1	11	--	
12	14	12	.4	14	30	a 1	11	--	
13	14	16	.6	14	31	1.2	11	--	
14	14	24	.9	14	30	a 1	11	--	
15	14	13	.5	18	60	b 3	11	--	e .6
16	14	13	.5	14	40	1.5	11	--	
17	14	18	.7	20	50	b 3	11	--	
18	14	12	.4	15	26	1.0	11	--	
19	14	20	.8	14	21	.8	11	14	
20	14	16	.6	14	15	.6	11	--	
21	14	15	.6	15	50	sb 2	11	--	
22	14	20	.8	23	--	e 13	11	--	
23	15	28	1.1	14	13	.5	22	206	s 16
24	15	18	.7	14	40	1.5	12	10	.3
25	14	13	.5	13	36	1.3	15	20	.8
26	14	18	.7	13	27	.9	20	--	e 20
27	14	16	.6	20	47	s 3.0	27	120	sb 14
28	14	14	.5	18	37	s 2.0	16	24	1.0
29	14	10	.4	14	21	.8	15	15	.6
30	15	18	.7	14	40	1.5	14	19	.7
31	14	22	.8	14	31	1.2	--	--	--
Total	448	--	26.3	472	--	50.0	392	--	69.4

Total discharge for year (cfs-days) 5,998.6
Total load for year (tons) 2,745.9

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

ROCK RIVER BASIN--Continued

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

Particle-size analyses of suspended sediment, water year October 1958 to September 1959
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Apr. 1, 1959.....	8:30 a.m.	88		1,630	2,090	42	44	53	67	74	76	77	85		98	100	BSWCM
Apr. 1.....	3:30 p.m.	114		474	719	47	57	66	80	84	85	87	97		100		BSWCM

IOWA RIVER BASIN

5-4495. IOWA RIVER NEAR ROWAN, IOWA

LOCATION.--At gaging station on downstream side of highway bridge, 3.8 miles northwest of Rowan, Wright County, and 9.4 miles downstream from confluence of East and West Branches.
DRAINAGE AREA.--429 square miles.
RECORDS AVAILABLE.--Water temperatures: October 1957 to September 1959.
Sediment records: October 1957 to September 1959.
EXTREMES, 1958-59.--Water temperatures: Maximum, 86°F Aug. 21; minimum, freezing point on several days during November to January.
Sediment concentrations: Maximum daily, 600 ppm May 22; minimum daily, not determined.
Sediment loads: Maximum daily, 1,100 tons May 31; minimum daily, not determined.
EXTREMES, 1957-59.--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, not determined.
Sediment loads: Maximum daily, 1,100 tons May 31, 1959; minimum daily, not determined.
REMARKS.--Flow affected by ice Nov. 25 to Mar. 27. Records of discharge for water year October 1958 to September 1959 given in WSP 1628.

Temperature (° F) of water, water year October 1958 to September 1959
/Once-daily measurement between 3 p.m. and 7 p.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	54	--	32	--	33	34	38	70	64	62	78	74
2	56	48	--	34	--	34	42	72	66	68	72	68
3	60	--	36	--	33	--	42	74	a 68	72	80	72
4	64	50	--	33	--	--	42	76	66	74	80	74
5	56	--	33	--	33	--	41	72	69	74	75	76
6	62	43	--	34	--	--	44	58	72	74	a 78	80
7	62	a 40	32	--	33	34	50	56	76	--	a 74	80
8	--	--	--	33	--	--	42	59	74	74	72	78
9	60	44	32	a 33	33	34	50	58	a 74	72	72	75
10	--	--	--	--	--	--	48	60	76	74	74	64
11	a 56	43	32	34	a 33	34	46	64	74	74	78	68
12	--	--	--	36	--	--	44	68	72	74	80	70
13	64	50	a 33	--	33	34	54	58	72	77	80	70
14	--	--	--	36	--	--	54	52	71	75	72	70
15	66	46	33	--	33	33	60	58	72	73	72	a 58
16	--	--	--	33	--	--	61	62	80	76	75	54
17	61	54	33	--	33	34	54	64	78	74	81	58
18	--	--	--	33	--	--	50	62	76	a 76	82	53
19	60	42	35	--	33	34	46	70	74	75	82	64
20	--	--	--	33	--	--	48	70	74	76	84	70
21	58	42	33	--	33	33	54	64	76	74	86	a 70
22	--	--	--	32	--	--	56	58	74	76	80	72
23	51	38	40	--	33	35	60	58	72	76	81	64
24	--	--	--	32	--	34	62	60	73	74	80	65
25	46	38	36	--	33	33	58	64	75	78	82	64
26	--	--	--	32	--	33	50	60	78	76	78	62
27	45	36	a 38	--	34	34	50	58	78	78	80	60
28	--	--	--	32	--	36	50	70	77	80	80	58
29	52	32	33	--	--	42	58	66	60	82	78	55
30	--	--	--	32	--	38	66	64	60	80	76	52
31	a 50	--	34	--	--	37	--	58	--	78	--	--
Average	--	--	--	--	--	--	51	63	72	75	78	67

a Measurement before 3 p.m.

IOWA RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959

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	8.8	42		10	--		7.6	--	
2	8.5	54		10	34		8.0	--	
3	8.2	--		10	--		8.4	6	
4	7.9	--	a 1.2	10	35		8.8	--	
5	8.5	54		10	--		9.0	--	
6	9.3	64		12	14		8.8	--	
7	11	76	2.3	18	19		8.4	20	
8	12	--	e 3.0	14	--		7.6	--	
9	11	91	2.7	12	13		7.2	7	
10	9.3	--	e 1.3	13	--		6.4	--	
11	9.0	26		12	8		6.0	4	
12	9.3	--	a .6	12	--		5.2	--	
13	8.8	--		12	28	a 0.6	4.9	5	
14	8.2	--		11	--		4.6	--	
15	10	12		11	--		4.5	19	
16	8.8	--	e .3	12	--		4.5	--	a 0.2
17	8.8	11		14	--		4.5	19	
18	9.0	--		15	--		4.6	--	
19	9.3	63		14	12		4.8	4	
20	9.6	--	a 1.5	14	--		5.2	--	
21	9.3	--		14	9		5.4	10	
22	8.5	--		14	--		5.8	--	
23	7.1	26		14	3		6.2	6	
24	7.6	--		14	--		6.4	--	
25	8.5	23		13	12		6.4	2	
26	9.0	--		9.0	--		6.4	--	
27	9.0	--	a .7	9.1	2		6.4	--	
28	9.6	--		9.2	--	a .1	6.4	--	
29	10	29		9.0	7		6.0	7	
30	9.9	--		8.6	--		5.6	--	
31	11	38		--	--	--	5.2	4	
Total	284.8	--	33.6	359.9	--	15.5	195.2	--	6.2

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	4.9	--		3.1	7		5.4	9	
2	4.5	6		3.0	--		5.6	19	
3	4.2	--		3.0	6		5.8	--	
4	3.9	5		3.0	--		6.2	--	
5	3.7	--		3.0	6		6.6	--	
6	3.7	6		3.1	--		7.2	--	a 0.3
7	3.7	--		3.1	14		7.9	17	
8	3.9	7		3.0	--		8.8	--	
9	4.0	4		3.0	11		9.5	17	
10	4.1	--		3.0	--		10	--	
11	4.2	17		3.0	11		11	12	
12	4.2	9		3.1	--		12	--	
13	4.3	--		3.2	7		13	20	
14	4.2	8		3.3	--		15	--	
15	4.0	--		3.4	7	a 0.1	14	7	a .4
16	3.8	8	a 0.1	3.5	--		13	--	
17	3.6	--		3.5	--		12	6	
18	3.4	24		3.5	--		15	--	
19	3.2	--		3.5	7		20	6	
20	3.0	9		3.5	--		25	--	a .3
21	2.9	--		3.6	4		30	4	
22	2.9	17		3.8	--		26	--	
23	2.9	--		4.0	4		100	15	4.0
24	3.0	12		4.2	--		300	18	15
25	3.1	--		4.5	7		500	21	28
26	3.2	5		4.8	--		450	26	32
27	3.2	--		5.0	6		400	30	32
28	3.2	--		5.3	--		492	58	77
29	3.2	--		--	--	--	381	50	51
30	3.2	7		--	--	--	362	21	21
31	3.1	--		--	--	--	301	27	22
Total	112.4	--	3.1	99.0	--	2.8	3,565.0	--	289.4

e Estimated.

a Computed from samples obtained about three times a week.

IOWA RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959--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	254	17	12	37			1,360	200	734
2	238	14	9.0	39			1,480	80	320
3	224	16	9.7	31	14	1.4	1,300	43	151
4	209	12	6.8	32			900	51	124
5	175	33	16	41			511	49	68
6	163	15	6.6	54	29	4.2	318	48	41
7	120	10	3.2	70	18	3.4	254	50	34
8	111	8	2.4	62	19	3.2	209	46	26
9	89	10	2.4	50			174	32	15
10	66	5	.9	45			147	28	11
11	59	9	1.4	48	15	1.9	133	29	10
12	54			46			116	35	11
13	50			41			103	34	9.5
14	45			37			87	36	8.5
15	44			34			76		
16	43	5	.7	32	23	1.9	71		
17	47			32			68	20	3.6
18	54			27			61		
19	55			26			61		
20	52			32			57		
21	50			94	140	sb 95	52		
22	44			698	600	sb 1,000	47		
23	42			1,200	230	745	44		
24	39			1,420	120	460	45		
25	40			1,020	81	223	43	29	3.4
26	39	7	.7	900	90	219	39		
27	37			532	80	115	41		
28	36			370	74	74	65	65	b 11
29	36			597	380	sb 600	58	60	sb 18
30	35			780	170	358	173	100	47
31	--	--	--	990	400	b 1,100	--	--	--
Total	2,550	--	83.7	9,417	--	5,029.6	8,093	--	1,684.4

Day	July			August			September		
1	224	40	24	20			28	44	3.3
2	209	26	15	23			71	65	12
3	184	39	19	26			86	49	11
4	140	29	11	25			48	48	6.2
5	115	33	10	25			42	50	5.7
6	109	43	13	22			35	44	4.2
7	88	53	13	21	37	2.1	28	32	2.4
8	68			19			24	41	2.7
9	63			19			20	44	2.4
10	66			19			18		
11	69	40	6.7	19			17		
12	59			19			16	48	2.1
13	50			19			15		
14	43			19	51	2.6	15		
15	38			20	53	2.9	15		
16	38			22	42	2.5	15		
17	36	27	2.7	23	72	4.5	15	35	1.5
18	35			20	71	3.8	16		
19	33			18	67	3.3	18		
20	33			16	61	2.6	19	27	1.4
21	26			15	57	2.3	19	26	1.3
22	19			47	91	12	26	59	4.1
23	19			54	69	10	40	50	5.4
24	19			52	69	9.7	35	61	5.8
25	19			109	55	16	29	46	3.6
26	22	32	1.8	98	52	14	30	50	4.0
27	22			70	45	8.5	56	74	11
28	21			54	47	6.9	104	67	19
29	22			40	47	5.1	97	40	10
30	21			33	52	4.6	74	33	6.6
31	20			27	36	2.6	--	--	--
Total	1,930	--	183.9	1,013	--	141.2	1,071	--	140.1

Total discharge for year (cfs-days) 28,690.3
Total load for year (tons) 7,613.5

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

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.
RECORDS AVAILABLE.--Chemical analyses: September 1906 to September 1907, January 1944 to September 1954.
Water temperatures: January 1944 to September 1959.
Sediment records: October 1943 to September 1959.
EXTREMES, 1958-59.--Water temperatures: Maximum, 90°F Aug. 24, 25; minimum, freezing point on many days during November to March.
Sediment concentrations: Maximum daily, 1,920 ppm Apr. 28; minimum daily, 4 ppm Feb. 12.
Sediment loads: Maximum daily, 19,000 tons Apr. 28; minimum daily, 3 tons Feb. 12.
EXTREMES, 1943-59.--Water temperatures (1944-59): Maximum, 90°F July 19, 1957, Aug. 24, 25, 1959; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 7,800 ppm June 13, 1953; minimum daily, 3 ppm Jan. 29, 31, Feb. 6, 8, 1958.
Sediment loads: Maximum daily, 177,000 tons May 23, 1944; minimum daily, 2 tons on several days during 1951 and 1958.
REMARKS.--Flow affected by ice Dec. 3-7, 11, 14-17, Dec. 29 to Jan. 4, Feb. 23-25. Diurnal fluctuation at low stages caused by powerplants upstream from station. High flow regulated by Coralville Reservoir upstream from Iowa City beginning Sept. 17, 1958 (total capacity, 475,000 acre-feet). Records of discharge for water year October 1958 to September 1959 given in WSP 1628.

Temperature (° F) of water, water year October 1958 to September 1959
/Once-daily measurement between 12 m. and 6 p.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	60	51	32	32	32	32	42	a 56	68	a 68	84	80
2	60	49	32	32	32	33	--	64	72	68	78	80
3	61	50	34	32	32	32	43	68	72	70	78	78
4	63	51	36	32	32	33	45	68	72	--	86	80
5	60	49	33	32	32	33	46	72	--	74	78	80
6	62	46	32	32	32	34	44	68	76	76	a 80	82
7	61	46	32	32	32	34	45	70	78	76	82	82
8	61	47	32	32	32	35	43	80	78	80	76	84
9	61	46	32	32	32	35	46	66	80	74	--	84
10	58	46	32	32	32	35	45	70	80	78	80	76
11	58	46	32	32	32	35	46	68	82	78	80	76
12	59	46	32	32	32	35	45	64	80	--	82	74
13	62	49	32	32	32	34	45	62	76	78	86	76
14	62	51	32	32	32	34	46	58	76	80	84	76
15	63	50	32	32	32	34	46	56	76	80	82	72
16	63	52	32	32	32	34	46	60	78	80	78	66
17	62	54	32	32	32	35	46	60	78	80	86	64
18	62	46	32	32	32	35	47	64	76	a 76	84	64
19	a 58	47	32	32	32	36	47	66	78	82	84	66
20	62	44	32	32	32	36	42	66	78	82	86	72
21	58	48	32	32	32	37	42	68	80	82	89	72
22	52	43	32	32	32	37	44	64	74	80	--	76
23	57	46	32	32	32	35	48	64	78	a 78	--	76
24	56	42	32	32	32	36	48	66	80	84	90	74
25	a 54	32	33	32	32	36	47	66	82	82	90	72
26	a 52	32	34	32	32	36	47	68	82	82	84	70
27	53	32	34	32	32	37	47	74	80	82	86	70
28	53	32	36	32	32	37	51	--	82	82	88	70
29	51	32	34	32	--	38	48	72	78	86	86	66
30	52	32	32	32	--	37	49	a 70	72	84	84	64
31	51	--	32	32	--	42	--	72	--	84	84	--
Average	58	45	33	32	32	34	46	66	77	79	83	74

a Measurement before 12 m.

IOWA RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959

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	585			424			455	13	16
2	565			362			368	18	18
3	452			493			330	15	13
4	522	100	141	335			330	80	71
5	495			364			350	80	76
6	490			442			360		
7	479			314			380		
8	622	110	a 180	340			385		
9	2,120	900	a 5,200	336	81	80	355	49	47
10	2,340	400	2,530	417			340		
11	1,720	140	650	366			330		
12	756			244			316		
13	642			344			316		
14	640	120	221	406			310		
15	621			360			305		
16	746			283			300	34	26
17	699			526	94	133	300		
18	663			756	155	316	276		
19	639			1,730	175	817	252		
20	603	105	180	2,130	160	920	202		
21	592			1,360	180	661	237		
22	618			1,190	250	803	294		
23	466			940	220	558	242		
24	532			420	140	159	213		
25	480			535	100	144	252		
26	374	78	100	453	87	106	259	9	7
27	540			432	71	83	268		
28	480			455	50	61	412		
29	444			466	36	45	370		
30	470			471	25	32	310		
31	478	103	133	--	--	--	285		
Total	21,873	--	12,665	17,694	--	6,118	9,702	--	787

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	260			287			3,820	470	4,850
2	260			292			4,200	485	5,550
3	260			289			5,000	510	6,890
4	250			252			5,000	420	5,670
5	204			223			4,800	265	3,430
6	257			197	14	9	3,460	340	3,180
7	257			197			2,770	300	2,240
8	251			228			2,530	240	1,640
9	258			174			2,290	215	1,330
10	252			223			1,970	175	931
11	280	19	12	273			2,050	190	1,050
12	221			305	4	3	1,970	205	1,090
13	213			308	9	7	2,290	320	sa 2,100
14	265			527	19	27	3,640	365	3,590
15	169			507	20	27	4,000	350	3,780
16	212			428			4,400	355	4,220
17	202			507			4,600	330	4,100
18	205			540			4,600	335	4,160
19	202			527			5,970	500	sa 9,100
20	205			424	8	10	7,300	660	13,000
21	245			428			3,310	380	3,400
22	292			475			1,340	275	995
23	319			1,000	74	200	2,360	550	sa 4,400
24	319			1,800	155	753	4,780	700	a 9,000
25	316			2,900	165	1,280	5,770	645	10,000
26	316	13	11	4,000	145	1,570	6,820	550	10,100
27	312			5,140	330	4,580	8,080	420	9,160
28	312			4,400	375	4,460	7,560	370	7,550
29	316			--	--	--	7,430	360	7,220
30	318			--	--	--	6,820	270	4,970
31	311			--	--	--	3,820	260	b 2,700
Total	8,059	--	362	26,851	--	13,076	134,750	--	151,396

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

IOWA RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1.....	4,000	320	3,460	3,820	230	2,370	4,300		
2.....	4,990	650	sb 9,000	3,730	200	2,010	4,300		
3.....	7,950	605	13,000	3,640	200	1,970	4,200		
4.....	9,120	510	12,600	3,640	120	1,180	4,200		
5.....	9,120	440	10,800	3,640	110	1,080	4,200	171	1,930
6.....	9,120	460	11,300	3,640	99	973	4,200		
7.....	9,120	400	9,850	3,640	115	1,130	4,100		
8.....	9,120	400	9,850	3,550	135	1,290	4,000		
9.....	9,120	315	7,760	3,640	155	1,520	3,820	160	1,650
10.....	9,120	270	6,650	3,280	360	sa 3,600	3,640	170	1,670
11.....	9,120	250	6,160	3,730	1,300	a 13,000	3,280	190	1,680
12.....	9,250	160	4,000	4,400	480	s 5,730	2,630	205	1,460
13.....	9,250	175	4,370	3,910	255	2,690	1,780	175	841
14.....	8,990	120	2,910	3,550	200	1,920	1,790	235	1,140
15.....	8,080	90	1,960	3,010	215	1,750	1,600	170	734
16.....	7,060	105	2,000	2,290	220	1,360	1,450	150	587
17.....	6,700	80	1,450	1,930	220	1,150	1,200	130	421
18.....	6,700	650	a 12,000	1,810	160	782	1,230	125	415
19.....	6,150	200	3,320	2,530	1,420	s 10,400	1,120	115	348
20.....	4,950	95	1,270	2,610	815	5,740	1,020	96	264
21.....	2,990	50	404	3,460	1,520	14,200	1,010	120	327
22.....	2,290	75	464	3,640	670	6,580	1,260	400	1,360
23.....	2,210	85	507	3,910	790	8,340	988	200	534
24.....	2,210	85	b 500	4,100	480	5,310	955	150	387
25.....	2,210	120	b 700	4,400	300	3,560	825	120	267
26.....	2,210	160	955	4,600	180	2,240	621	110	184
27.....	2,500	420	sa 3,400	4,500	180	2,190	705	115	219
28.....	3,270	1,920	s 19,000	4,200	340	3,860	795	145	311
29.....	2,390	1,100	sa 7,600	4,100	380	4,210	795	140	301
30.....	3,370	970	8,830	4,800	1,270	s 17,300	988	300	s 811
31.....	--	--	--	4,500	390	4,740	--	--	--
Total.	182,680	--	176,070	112,200	--	134,175	67,002	--	31,351

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.....	2,830	1,300	s 12,800	137	165	61	214		
2.....	4,600	1,160	14,400	170	140	64	114		
3.....	4,100	735	8,140	223	105	63	124		
4.....	4,100	360	3,990	104	55	15	128		
5.....	3,600	220	2,140	109	40	12	180		
6.....	2,930	160	1,270	414	110	123	91		
7.....	2,930	145	1,150	110	120	36	124		
8.....	2,850	165	1,270	107	160	46	206	68	25
9.....	2,370	160	1,020	168	130	59	88		
10.....	1,570	150	636	107	65	19	154		
11.....	1,680	175	794	200	51	28	107		
12.....	1,430	--	e 600	167	50	23	164		
13.....	1,270	135	463	100	43	12	89		
14.....	1,090	115	338	226	57	35	202		
15.....	988	98	261	145	42	16	92		
16.....	988	105	280	347	100	94	104		
17.....	1,030	115	320	195	125	66	122		
18.....	1,220	310	1,020	150	88	36	124		
19.....	1,020	165	454	206	86	48	177		
20.....	1,060	120	343	144	78	30	112		
								71	26
21.....	897	150	363	152			229		
22.....	656	275	487	182			81		
23.....	408	270	297	107			104		
24.....	272	230	169	141			124		
25.....	380	100	103	156			178		
					54	22			
26.....	328	50	44	189			132	110	39
27.....	340	100	92	139			301	110	89
28.....	264	98	70	122			154	72	30
29.....	226	75	46	192			492	100	133
30.....	334	60	54	107			508	82	112
31.....	136	240	88	158			--	--	--
Total.	47,897	--	53,502	5,174	--	1,128	5,019	--	1,038

Total discharge for year (cfs-days)..... 638,901
Total load for year (tons)..... 581,668

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

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

Particle-size analyses of suspended sediment, water year October 1958 to September 1959
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Mar. 20, 1959....	1:45 p.m.	7,060	40	620	3,850		44		65		92	95	100				SPWCM
Apr. 28.....	7:50 a.m.	4,500	46	3,060	4,770		41		66		99	100					SPWCM
May 19	2:00 p.m.	2,850	66	2,000	4,050		56		79		100	--					SPWCM
May 19	2:00 p.m.	2,850	66	2,000	3,430		22		74		100	--					SPNM

IOWA RIVER BASIN--Continued

5-4550. RALSTON CREEK AT IOWA CITY, IOWA

LOCATION.--At gaging station on upstream side of bridge on State Highway 1, at east edge of Iowa City, Johnson County, and 2.2 miles upstream from mouth.
DRAINAGE AREA.--3.01 square miles.
RECORDS AVAILABLE.--Sediment records: April 1952 to September 1959.
EXTREMES, 1958-59.--Sediment concentrations: Maximum daily, 6,280 ppm May 19; minimum daily, no flow Oct. 1-6, Sept. 12-18.
Sediment loads: Maximum daily, 2,110 tons May 19; minimum daily, 0 tons Oct. 1-6, Sept. 12-18.
EXTREMES, 1952-59.--Sediment concentrations: Maximum daily, 8,230 ppm May 21, 1957; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 2,300 tons July 18, 1956; minimum daily, 0 tons on many days.
REMARKS.--Maximum observed sediment concentration during water year, 48,100 ppm May 19. Flow affected by ice Nov. 28 to Dec. 2, Dec. 6 to Mar. 19, Mar. 21-24. Records of discharge for water year October 1958 to September 1959 given in WSP 1628.

Suspended sediment, water year October 1958 to September 1959

Day	October			November			December		
		Suspended sediment			Suspended sediment			Suspended sediment	
	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day
1	0	--	0	0.05	--		0.05	--	
2	0	--	0	.05	--		.07	--	
3	0	--	0	.05	36		.11	--	
4	0	--	0	.05	--		.11	70	
5	0	--	0	.03	--		.05	--	
6	0	--	0	.03	--		.04	--	
7	.06	120	(t)	.03	--	(t)	.02	--	
8	13	825	s 282	.03	--		.02	77	
9	38	815	s 473	.03	--		.01	--	
10	.72	--	e .1	.02	--		.01	--	
11	.41	--		.02	--		.01	--	
12	.29	--		.02	--		.01	--	
13	.23	--		.03	--		.01	--	
14	.18	--		.18	90	sa 0.3	.01	--	
15	.14	--		.40	420	sa .7	.01	--	
16	.13	--	(t)	.09	140	(t)	.01	--	(t)
17	.11	60		3.5	90	s 20	.01	--	
18	.08	--		.61	305	.5	.01	--	
19	.08	--		.31	140	b .1	.01	--	
20	.07	--		.21	96	.1	.01	--	
21	.12	55	(t)	.18			.02	--	
22	.20	60	(t)	.16			.04	--	
23	.09			.15			.04	--	
24	.06			.13			.03	--	
25	.06			.15	--	(t)	.02	--	
26	.06	--	(t)	.10			.03	--	
27	.06			.07			.04	--	
28	.05			.06			.05	--	
29	.05			.05			.04	--	
30	.04			.04			.03	--	
31	.05			--	--	--	.02	--	
Total	54.34	--	755.5	6.83	--	22.0	0.95	--	0.2

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

IOWA RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959--Continued

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	0.02	--		0.01	--		3.0	100	b 0.8
2	.01	--		.01	--		1.3	50	b .2
3	.01	--		.01	--		.60	30	(t)
4	.01	--		.01	--		.30	14	
5	.01	--		.01	--	(t)	.09	--	
6	.01	--		.01	--		.20	--	(t)
7	.01	--	(t)	.01	22		.50	--	
8	.02	--		.02	--		.90	--	
9	.03	--		.15	--		2.0	62	.3
10	.05	--		.60	15	(t)	8.0	120	2.6
11	.02	--		2.0	--	e 0.1	5.0	--	e 1.1
12	.02	34		4.0	--	e .2	2.5	--	e .3
13	.04	--		7.0	15	.3	12	600	a 19
14	.13	120	(t)	13	16	.6	12	360	b 12
15	.35	--	(t)	3.0	--	e .1	6.0	--	e 3.2
16	.07	--		.90	10		2.5	--	e .7
17	.01	--		.50	8		.90	--	e .1
18	.02	--		.32	--		2.5	500	b 3.4
19	.02	35		.25	--	(t)	94	2,300	584
20	.02	--		.20	--		21	800	a 46
21	.01	--		.17	8		5.0	--	e 2.8
22	.01	--		3.0	--	e .2	3.1	--	e 1.3
23	.01	--		100	140	a 38	3.7	92	.9
24	.01	16	(t)	25	40	a 2.8	3.4	--	e .9
25	.01	--		40	130	a 14	2.3	140	.9
26	.02	--		58	420	a 65	8.4	900	b 20
27	.02	--		25	700	a 48	3.8	480	4.9
28	.02	--		10	150	b 4.0	1.9	220	b 1.1
29	.02	25		--	--	--	1.4	140	b .5
30	.02	24		--	--	--	2.3	300	sa 2.6
31	.02	--		--	--	--	1.9	150	b .8
Total	1.05	--	0.1	293.18	--	173.4	212.49	--	710.5

Day	April			May			June		
1	6.4	900	sa 18	1.9	62		3.0	48	
2	3.5	110	sa 1.2	1.6	--	e 0.3	2.1	--	e 0.2
3	2.5	180	sa 1.4	1.2	--		1.5	--	
4	1.6	--	e .6	.93	--		1.0	--	
5	1.2	--	e .4	.84	--		.91		
6	.93	115	.3	.84	40		.70		
7	.93	57	.1	.72	--	e .1	.62	--	e .1
8	.72	--		.57	--		.57		
9	.69	--		.65	--		.55		
10	.63	--		9.1	3,800	sa 300	2.0	--	e 24
11	.57	--		3.6	600	sa 9.5	1.7	--	e 2.0
12	.50	--	(t)	1.4	--	e .2	.55	170	.3
13	.45	--		1.0			.40		
14	.41	29		.88			.31		
15	.38	--		.80	--	e .1	.31		
16	.34	40		.66			.24	--	(t)
17	2.5	360	sa 6.0	.57			.19		
18	1.2	120	b .4	.93	150	sa .6	.19		
19	.84	31	.1	28	6,280	s 2,110	.19		
20	3.7	--	e 9.0	3.8	750	sa 12	.16		
21	2.4	70	.5	19	2,800	sa 460	1.6	750	sa 13
22	1.8	--	e .2	3.0	50	b .4	.45	480	sa .8
23	1.3			2.2	--		.19		
24	1.1			1.5	33	e .2	.16		
25	.80	--	e .1	1.3	--		.13	--	(t)
26	.66			3.7	1,400	sa 46	.11		
27	31	4,710	s1,190	1.2	150	b .5	.10		
28	42	2,800	sa 700	4.3	1,400	sa 44	.90	--	e .2
29	5.8	100	b 1.6	3.6	1,400	sa 24	.86	--	e 5.0
30	3.2	46	.4	35	2,500	sa 950	3.1	--	e 40
31	--	--	--	5.0	130	b 1.8	--	--	--
Total	120.05	--	1,931.0	139.79	--	3,961.7	24.79	--	87.0

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

IOWA RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959--Continued

Day	July			August			September		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	0.57	--	e 0.1	0.13	--	(t)	0.36	--	e 4.0
2	.30			.11			.82	--	e 14
3	.22			.33	--	e 3.0	.09	280	.1
4	.62	--	e 5.0	.15	--	(t)	.06	--	(t)
5	.34	--	e .2	.11			.05	120	(t)
6	.16			12	1,900	sa 220	.03		
7	.13			.66	--	e .2	.02		
8	.12			.41	--		.01		
9	.13			.31	--		.01	--	(t)
10	.09			.21	--		.01		
11	.08	--	(t)	.15	--	(t)	.01		
12	.05			.11	--		0	--	0
13	.06			.08	98		0	--	0
14	.05			.16	--	e 2	0	--	0
15	.05			3.3	--	e 50	0	--	0
16	.04			8.9	--	e 180	0	--	0
17	2.2	1,200	sa 70	1.2	--	e .3	0	--	0
18	16	1,450	s 311	.50			0	--	0
19	.32	200	b .2	.34	--	(t)	.01		
20	.18	60	(t)	.26			.02		
21	.16	42	(t)	.19	--		.01	--	(t)
22	3.8	1,000	sb 44	.16	--		.01		
23	.48	150	b .2	.14	--		.03		
24	.20			.13	--		.02		
25	.12			.09	36		.11	--	e .5
26	.10	--	(t)	.09	--	(t)	1.6	--	e 24
27	.07			.08	--		1.9	--	e 3.0
28	.06			.08	--		.14	240	a .1
29	.05			.07	--		.07	--	(t)
30	4.1	2,100	sa 100	.07	--		.05	--	(t)
31	.27	400	.3	.06	--		--	--	--
Total	31.12	--	531.6	30.58	--	456.2	5.44	--	45.8

Total discharge for year (cfs-days) 920.61
Total load for year (tons) 8,675.0

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

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

Particle-size analyses of suspended sediment, water year October 1958 to September 1959
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Oct. 8, 1958.....	10:30 p.m.	1.8	60	8,040	2,970		46		70		100	--	--		--		SPWCM
Oct. 8	10:30 p.m.	1.8	60	8,040	3,160		37		70		100	--	--		--		SPNM
Oct. 8	11:45 p.m.	725	60	6,670	2,430		35		65		99	99	100		--		SPWCM
Oct. 8	11:45 p.m.	725	60	6,670	2,080		26		59		99	99	100		--		SPNM
Nov. 17.....	5:00 p.m.	4.0	--	1,080	1,050		75		80		99	99	99		100		SPWCM
Mar. 19, 1959 ...	3:45 p.m.	306	--	4,410	3,550		29		44		93	96	98		100		SPWCM
Apr. 27.....	3:45 p.m.	1.1	45	15,200	3,370		52		64		100	--	--		--		SPWCM
Apr. 27.....	5:30 p.m.	60	44	13,000	5,610		37		66		99	100	--		--		SPWCM
Apr. 27.....	5:30 p.m.	60	44	13,000	4,700		22		56		99	100	--		--		SPNM
Apr. 27.....	10:45 p.m.	206	44	13,800	2,840		51		58		99	100	--		--		SPWCM
May 10.....	9:00 p.m.	101	54	10,200	3,570		41		64		97	99	99		100		SPWCM
May 19.....	8:00 a.m.	328	59	33,300	3,820		41		72		99	100	--		--		SPWCM
May 30.....	5:45 p.m.	241	69	19,600	2,700		41		65		98	99	99		100		SPWCM
July 17.....	10:45 p.m.	5.8	72	23,000	4,810		35		61		99	99	100		--		SPWCM
July 18.....	1:15 a.m.	206	70	11,400	3,710		34		64		99	99	100		--		SPWCM
Aug. 6.....	6:15 a.m.	127	70	9,820	3,540	35	45		76		100	--	--		--		SPWCM

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 1959.
EXTREMES, 1958-59.--Water temperatures: Maximum, 78°F Aug. 25-27; minimum, 33°F Mar. 23-31.
EXTREMES, 1953-59.--Water temperatures: Maximum, 88°F June 19, 1953; minimum, freezing point on several days during winter months.
REMARKS.--Records of discharge for water year October 1958 to September 1959 given in WSP 1628.

Temperature (° F) of water, water year October 1958 to September 1959
/Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph/

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

DES MOINES RIVER BASIN

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 1959.
Sediment records: November 1954 to September 1959.
EXTREMES, 1958-59.--Water temperatures: Maximum, 90°F Aug. 29; minimum, freezing point on many days during November to March.
Sediment concentrations: Maximum daily, 3,100 ppm May 21; minimum daily, not determined.
Sediment loads: Maximum daily, 88,000 tons May 31; minimum daily, not determined.
EXTREMES, 1954-59.--Water temperatures: Maximum (1954-57, 1958-59), 95°F July 28, 1955; minimum, freezing point on many days during winter months each year.
Sediment concentrations: Maximum daily, 5,900 ppm June 16, 1957; minimum daily, not determined.
Sediment loads: Maximum daily, 99,000 tons June 16, 1957; minimum daily, not determined.
REMARKS.--Maximum observed sediment concentration during water year, 5,390 ppm May 21. Flow affected by ice Nov. 27 to Mar. 8, Mar. 15-17. No appreciable inflow between sampling site and gaging station except during periods of heavy local runoff. Discharge records at gaging station at Des Moines for water year October 1958 to September 1959 given in WSP 1628.

Temperature (° F) of water, water year October 1958 to September 1959
/Once-daily measurement at varying hours/

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	55	45	32	32	32	32	46	66	64	64	80	78
2	56	47	32	32	32	32	49	72	66	66	76	73
3	63	49	32	32	32	32	48	74	69	69	86	76
4	67	50	32	32	32	32	54	75	69	73	87	79
5	58	48	32	32	32	32	53	73	73	73	81	76
6	64	44	32	32	32	32	54	62	73	76	80	83
7	65	44	32	32	32	32	53	63	73	78	84	83
8	--	45	32	32	32	32	47	63	77	78	78	82
9	65	45	32	32	32	32	47	65	78	77	80	74
10	62	45	32	32	32	32	49	62	77	74	82	67
11	55	45	32	32	32	32	47	66	76	78	81	68
12	59	44	32	32	32	32	46	62	75	78	83	74
13	66	53	32	32	32	39	49	58	75	78	86	74
14	70	54	32	32	32	33	52	56	74	78	89	73
15	68	51	32	32	32	35	60	58	--	76	80	73
16	66	54	32	32	32	32	56	60	78	80	82	51
17	62	54	32	32	32	32	57	62	78	75	82	56
18	58	40	32	32	32	41	52	62	76	81	82	54
19	61	50	32	32	32	43	46	64	80	81	84	68
20	62	42	32	32	32	39	40	67	78	81	89	74
21	60	43	32	32	32	32	48	67	76	82	89	76
22	56	43	32	32	32	32	53	62	74	84	89	69
23	54	44	32	32	32	42	55	63	75	80	82	68
24	52	38	32	32	32	43	59	64	79	79	86	76
25	47	34	32	32	32	38	58	64	82	82	85	67
26	48	32	32	32	32	36	53	67	81	82	88	64
27	47	32	32	32	32	40	50	67	80	81	85	64
28	48	32	32	32	32	39	54	68	78	81	89	64
29	49	32	32	32	--	43	58	69	71	88	90	51
30	50	32	32	32	--	42	63	68	65	81	81	56
31	49	--	32	32	--	44	--	69	--	82	80	--
Average	58	44	32	32	32	36	52	65	75	78	84	70

DES MOINES RIVER BASIN--Continued

5-4820. DES MOINES RIVER AT EUCLID AVENUE BRIDGE AT DES MOINES, IOWA--Continued

Suspended sediment, water year October 1958 to September 1959

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	179			135			117		
2	179			135			130		
3	172			142			140		
4	172			142			150		
5	165	27	13	128			100		
6	172			128			90		
7	165			135			100		
8	172			135			94	36	9.4
9	285	--	e 160	128	44	16	90		
10	210			128			85		
11	210	34	19	122			80		
12	228			128			75		
13	210			128			72		
14	186			142			70		
15	172			142			68		
16	165			150			68		
17	157			297	--	e 260	68		
18	157	57	24	245	86	57	70		
19	157			219			74		
20	150			202			78		
21	157			219	42	24	82		
22	142			219			84		
23	142			219			86		
24	135			194			88	24	5.7
25	135			194			90		
26	135	52	20	128			96		
27	142			113			104		
28	142			133	22	7.1	108		
29	142			130			108		
30	142			95			102		
31	135			--	--	--	95		
Total	5,212	--	727	4,755	--	776.5	2,862	--	232.2

Day	January			February			March		
1	80			47			1,120	445	1,350
2	72			47			1,400	625	2,360
3	69			47			1,340	450	1,630
4	66			46			1,200	375	1,220
5	64			45	26	3.2	500	85	115
6	62			45			230	32	20
7	60			47			300	40	32
8	56	23	3.9	48			370	--	e 50
9	56			50			510	42	58
10	56			50			710	235	450
11	56			50			1,530	530	2,190
12	56			50			2,100	620	3,520
13	60			50			2,160	810	4,720
14	68			50			2,220	880	5,270
15	60			50	18	2.5	1,650	455	2,030
16	55			52			3,700	380	3,800
17	50			54			3,300	220	1,960
18	50			54			2,320	255	1,600
19	47			54			1,950	1,080	5,690
20	45			54			4,060	2,180	23,900
21	46			60			4,930	1,780	23,700
22	47			74	38	7.6	5,040	1,090	14,800
23	48	31	4.1	120	230	75	4,160	720	8,090
24	50			230	88	55	4,160	770	8,650
25	50			210	75	43	4,600	1,000	12,400
26	50			270	60	44	5,150	1,150	16,000
27	50			420	190	215	6,610	1,200	21,400
28	50			700	485	917	6,610	1,020	18,200
29	50			--	--	--	5,590	660	9,960
30	48			--	--	--	4,490	470	5,700
31	47			--	--	--	3,840	400	4,150
Total	1,724	--	124.1	3,074	--	1,414.7	87,850	--	205,015

e Estimated.

DES MOINES RIVER BASIN--Continued

5-4820. DES MOINES RIVER AT EUCLID AVENUE BRIDGE AT DES MOINES, IOWA--Continued

Suspended sediment, water year October 1958 to September 1959--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	3,530	370	3,530	1,390	150	563	14,100	1,300	a 48,000
2	3,320	310	2,780	1,240	170	569	14,900	940	37,800
3	3,110	330	2,770	1,170	170	537	16,100	580	25,200
4	2,700	315	2,300	1,100	150	446	14,900	480	19,300
5	2,260	305	1,860	1,220	190	626	12,600	540	18,400
6	1,990	210	1,130	1,330	200	718	9,920	580	15,500
7	1,800	140	680	1,310	190	672	7,530	570	11,600
8	1,610	130	565	1,370	185	684	6,150	495	8,220
9	1,440	95	369	1,720	250	1,160	5,260	450	6,390
10	1,310	120	424	2,210	950	sa 5,600	4,380	365	4,320
11	1,210	110	359	2,400	600	3,890	3,640	360	3,540
12	1,080	93	271	2,400	580	3,760	3,110	--	e 2,900
13	1,030	87	242	2,200	400	2,380	2,700	290	2,110
14	1,000	91	246	2,000	275	1,490	2,440	265	1,750
15	938	--	e 240	1,850	200	999	2,220	--	e 1,200
16	876	97	229	1,640	160	708	1,990	155	833
17	830	99	222	1,510	140	571	1,850	130	649
18	800	60	173	1,480	190	759	1,780	105	506
19	830	87	195	1,570	250	1,060	1,640	105	465
20	1,050	135	383	1,460	260	1,020	1,510	125	510
21	1,260	150	510	2,800	3,100	sa 28,000	1,390	100	375
22	1,680	135	613	3,640	1,650	16,200	1,260	105	357
23	2,040	295	1,620	4,380	1,600	sa 20,000	1,150	105	326
24	2,060	270	1,500	7,950	1,900	a 41,000	1,140	--	e 320
25	1,910	220	1,130	9,680	1,200	31,400	1,000	--	e 340
26	1,700	180	826	9,920	820	22,000	954	130	335
27	1,910	240	sa 1,500	8,240	730	16,200	938	130	329
28	1,990	395	2,120	6,840	600	11,100	954	135	348
29	1,780	250	1,200	6,610	560	9,990	1,460	600	sa 3,200
30	1,550	180	754	8,240	950	a 21,000	3,740	1,600	sa 17,000
31	--	--	--	10,900	3,000	a 88,000	--	--	--
Total	50,594	--	30,741	111,770	--	333,102	142,706	--	232,123

Day	July			August			September		
1	4,380	1,070	12,700	325			695	90	169
2	5,590	1,000	15,100	315			695	240	450
3	5,150	685	9,520	305	35	30	710	410	786
4	4,270	530	6,110	295			770	335	696
5	3,530	480	4,580	347			725	210	411
6	3,000	305	2,470	448	64	77	560	180	272
7	2,500	310	2,090	460	54	67	472	140	178
8	2,160	280	1,630	402	69	75	380	80	82
9	1,910	255	1,320	380	51	52	358	58	56
10	1,680	260	1,180	315			380	51	52
11	1,570	345	1,460	295			369	42	42
12	1,310	255	902	255			358	47	45
13	1,220	170	560	228	43	32	305	37	30
14	1,080	145	423	228			265		
15	984	135	359	275			265		
16	938	145	367	305			228		
17	1,030	300	sa 950	237			219		
18	938	185	469	237			228		
19	830	150	336	228			255	39	26
20	725	140	274	202	28	17	285		
21	654	65	115	228			255		
22	587	40	63	210			275		
23	522	54	76	210	65	37	245		
24	510	31	43	612	700	a 1,200	228		
25	460	29	36	668	645	1,160	315	45	38
26	424			969	530	1,390	380	68	70
27	413			1,020	310	854	325	45	40
28	391	30	32	954	160	412	574	160	248
29	402			969	295	772	654	100	177
30	391			892	160	385	628	140	237
31	347			770	80	166	--	--	--
Total	49,896	--	63,325	13,584	--	7,123	12,401	--	4,365

Total discharge for year (cfs-days) 486,428
Total load for year (tons) 879,068.5

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

PART 6. MISSOURI RIVER BASIN

BIG HOLE RIVER BASIN

6-260. BIRCH CREEK NEAR GLEN, MONT.

LOCATION.--At gaging station, 2¼ miles downstream from Sheep Creek and 8 miles southwest of Glen, Beaverhead County.
DRAINAGE AREA.--36.0 square miles.
RECORDS AVAILABLE.--Chemical analyses: September 1958 to September 1959 (discontinued).
REMARKS.--Records of discharge for water year October 1958 to September 1959 given in WSP 1629.

Chemical analyses, in parts per million, September 1958 to September 1959

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Sept. 23, 1958.....	10	13	0.02	14	3.2	3.7	1.6	60	5.0	0.9	0.1	0.1	0.06	74	0.10	2.00	48	0	14	0.2	112	7.1	4
Oct. 3.....	9.2	13	.01	15	3.1	2.9	1.1	61	5.3	.0	.1	.1	.01	76	.10	1.89	50	0	11	.2	116	6.8	3
Nov. 5.....	15	11	.02	12	2.4	2.4	.9	49	5.3	.1	.1	.1	.01	58	.08	2.35	40	0	11	.2	95	7.1	2
Dec. 4.....	15	14	.02	15	2.3	2.8	1.2	57	7.5	.2	.1	.2	.01	73	.10	2.96	47	0	11	.2	107	6.9	3
Jan. 7, 1959	7.8	14	.01	16	3.2	3.0	1.0	62	8.0	.2	.1	.2	.01	79	.11	1.66	53	2	11	.2	123	7.1	1
Apr. 2.....	14	12	.02	12	2.4	3.0	1.5	51	6.0	.0	.1	.3	.02	66	.09	2.49	40	0	14	.2	108	6.8	9
May 7	11	13	.01	12	2.0	3.7	1.6	48	5.5	.7	.1	.4	.01	63	.09	1.87	38	0	17	.3	115	7.3	2
June 2.....	32	10	.01	7.8	1.3	1.8	.4	31	4.0	.1	.0	.3	.01	50	.07	4.32	25	0	13	.2	65	7.0	8
July 7	85	8.4	.00	6.3	1.0	1.6	.4	28	1.8	.1	.0	.1	.00	41	.06	9.41	20	0	15	.2	54	7.0	3
Aug. 4.....	62	7.4	.01	6.5	.9	1.5	.4	27	2.5	.1	.0	.0	.00	40	.05	6.70	20	0	14	.1	53	7.1	3
Sept. 3	7.8	12	.01	16	2.0	2.7	1.4	60	6.2	.3	.1	.2	.01	70	.10	1.47	48	0	11	.2	108	7.4	7

BIG HOLE RIVER BASIN--Continued

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

Periodic determinations of suspended-sediment discharge, September 1958 to September 1959

Date	Water discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Discharge (tons per day)
Sept. 23, 1958	10	4	0.1
Oct. 3	9.2	2	.1
Nov. 5	15	4	.2
Dec. 4	15	1	(t)
Jan. 7, 1959	7.8	13	.3
Apr. 2	14	11	.4
May 7	11	4	.1
June 2	32	56	4.8
July 7	85	8	1.8
Aug. 4	62	4	.7
Sept. 3	7.8	4	.1

t Less than 0.050 ton.

MISSOURI RIVER MAIN STEM

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

LOCATION.--At gaging station at private bridge, an eighth of a mile upstream from Hell Canyon Creek, 4 miles downstream from confluence of Beaverhead and Big Hole Rivers, and 5 miles north of Twin Bridges, Madison County.
DRAINAGE AREA.--7,632 square miles.
RECORDS AVAILABLE.--Chemical analyses: September 1957 to September 1959 (discontinued).
Water temperatures: March 1958 to September 1959 (discontinued).
Sediment records: October 1957 to September 1959 (discontinued).
EXTREMES, 1958-59.--Dissolved solids: Maximum, 380 ppm Oct. 1-11; minimum, 93 ppm June 1-14.
Hardness: Maximum, 266 ppm Oct. 1-11; minimum, 53 ppm June 1-14.
Specific conductance: Maximum daily, 602 micromhos Oct. 4; minimum daily, 124 micromhos June 7, 8, 11, 13.
Water temperatures: Maximum, 78°F July 16; minimum, freezing point probably on many days during winter months.
Sediment concentrations: Maximum daily, not determined; minimum daily, not determined.
Sediment loads: Maximum daily, 2,830 tons June 8; minimum daily, not determined.
EXTREMES, 1957-59.--Dissolved solids: Maximum, 390 ppm Sept. 30, 1957; minimum, 93 ppm June 1-14, 1959.
Hardness: Maximum, 272 ppm Aug. 28 to Sept. 30, 1958; minimum, 49 ppm May 11-31, 1958.
Specific conductance: Maximum daily, 640 micromhos Sept. 25, 1958; minimum daily, 102 micromhos May 23, 1958.
Water temperatures (1958-59): Maximum, 78°F July 16, 1959; minimum, freezing point probably on many days during winter months.
Sediment concentrations: Maximum daily, not determined; minimum daily, not determined.
Sediment loads: Maximum daily, 2,830 tons June 8, 1959; minimum daily, not determined.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Worland, Wyo. Flow affected by ice Nov. 16-18, 27, 28, Dec. 5-9, 14, 29, Jan. 3-6, 15, 19-21, Jan. 26 to Feb. 23. Records of discharge for water year October 1958 to September 1959 given in WSP 1629.

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Oct. 1-11, 1958....	1,188	21	0.01	67	24	25	5.0	254	94	13	0.3	1.2	0.11	380	0.52	1,220	266	58	17	0.7	593	7.6	4
Oct. 12-31	1,192	21	.02	63	22	23	4.4	236	86	12	.2	.9	.08	351	.48	1,130	246	52	17	.6	552	7.4	4
Nov. 1-30.....	1,472	21	.01	61	21	22	4.2	226	83	12	.3	1.4	.07	338	.46	1,340	239	54	16	.6	532	7.7	4
Dec. 1-31.....	1,320	21	.01	58	19	19	3.6	214	76	11	.3	1.3	.04	319	.43	1,140	223	48	15	.6	506	7.6	4
Jan. 1-31, 1959....	1,136	21	.01	63	21	21	4.1	233	85	11	.4	1.2	.06	347	.47	1,060	242	51	16	.6	546	7.6	4
Feb. 1-28.....	969	20	.00	60	19	19	3.5	214	79	11	.3	1.1	.06	318	.43	832	228	53	15	.5	507	7.6	2
Mar. 1-31.....	1,126	19	.00	56	18	18	3.7	203	74	10	.3	.9	.06	306	.42	930	212	46	15	.5	485	7.5	4
Apr. 1-30.....	2,188	16	.02	32	9.7	11	3.5	126	38	5.5	.2	.6	.04	188	.26	1,110	120	17	16	.4	300	7.3	17
May 1-31.....	2,392	16	.03	18	5.1	7.0	1.8	73	19	1.9	.2	.3	.02	118	.16	762	66	6	18	.4	172	7.0	11
June 1-14	4,761	15	.03	15	3.8	5.7	1.9	63	11	.1	.2	.4	.03	93	.13	1,200	53	1	18	.3	134	7.2	30
June 15-25	5,891	15	.02	19	4.5	5.7	1.6	78	13	.1	.2	.3	.04	105	.14	1,670	66	2	15	.3	157	7.3	25
June 26-July 5	4,992	19	.02	33	8.9	12	2.8	132	32	3.1	.3	.4	.05	194	.26	2,620	119	11	18	.5	287	7.5	25
July 6-22.....	2,030	18	.01	38	11	13	3.3	150	42	4.8	.2	.4	.06	212	.29	1,160	142	19	16	.5	336	7.6	9
July 23-31.....	909	16	.01	40	13	14	3.3	160	48	5.5	.2	.5	.05	226	.31	555	154	23	16	.5	364	7.5	7

Aug. 1-12.....	745	17	.01	45	14	16	4.7	174	61	7.4	.4	.4	.05	260	.35	523	170	27	17	.5	401	7.6	14
Aug. 13-31.....	649	21	.00	60	22	23	5.4	224	95	11	.5	.3	.06	353	.48	619	241	57	17	.6	543	7.6	13
Sept. 1-20	741	22	.00	56	22	23	5.2	218	93	13	.4	.2	.06	350	.48	700	231	52	17	.7	541	7.8	7
Sept. 21-30	1,344	22	.01	57	19	23	5.3	216	90	13	.4	.2	.06	345	.47	1,250	222	45	18	.7	534	7.6	7
Weighted average a.....	1,733	18	0.02	39	12	14	3.2	151	49	6.2	0.3	0.6	0.05	225	0.31	1,050	147	23	17	0.5	349	--	--

a Represents 100 percent of runoff for water year October 1958 to September 1959.

MISSOURI RIVER MAIN STEM--Continued

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

Temperature (° F) of water, water year October 1958 to September 1959
/Once-daily measurement between 2 p.m. and 8 p.m./

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

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

MISSOURI RIVER MAIN STEM--Continued

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

Suspended sediment, water year October 1958 to September 1959

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	1,220	26	86	1,270			1,340	--	
2	1,200	19	62	1,260			1,390	--	
3	1,180	17	54	1,280	16	57	1,460	26	
4	1,190	34	109	1,360			1,560	--	
5	1,220	43	142	1,390			1,500	--	
6	1,220	48	158	1,470	--		1,460	--	
7	1,180	38	121	1,480	--		1,440	--	
8	1,130	31	95	1,580	--		1,430	--	
9	1,140	31	95	1,590	--		1,430	--	
10	1,190	29	93	1,670	--		1,440	34	
11	1,200	26	84	1,680	--		1,430	--	
12	1,220	19	63	1,610	60		1,440	--	
13	1,200	17	55	1,560	--		1,410	--	
14	1,180	17	54	1,610	--		1,370	--	
15	1,150			1,540	--		1,330	--	
16	1,130			1,420	--		1,250	--	e 90
17	1,130			1,290	--		1,310	30	
18	1,120			1,260	--	e 130	1,340	--	
19	1,110			1,360	25		1,340	26	
20	1,100			1,560	--		1,310	--	
21	1,130			1,650	--		1,330	--	
22	1,160			1,650	--		1,310	--	
23	1,210	13	42	1,640	--		1,240	--	
24	1,220			1,700	--		1,150	21	
25	1,220			1,600	--		1,150	--	
26	1,240			1,550	8		1,120	--	
27	1,250			1,330	--		1,140	--	
28	1,260			1,260	--		1,140	--	
29	1,270			1,250	--		1,120	--	
30	1,270			1,280	--		1,100	--	
31	1,270			--	--	--	1,140	17	
Total	36,910	--	1,985	44,150	--	3,535	40,920	--	2,790

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	1,160	--		1,000	--		1,110	--	
2	1,120	--		950	--		1,160	--	
3	500	--		950	--		1,120	--	
4	500	--		900	34		1,080	--	
5	850	--		880	--		1,080	34	
6	1,150	--		880	--		1,070	--	
7	1,250	20		880	--		1,100	--	
8	1,470	--		860	--		1,080	--	
9	1,420	--		830	--		1,060	--	
10	1,340	--		810	--		1,100	--	
11	1,330	--		810	14		1,050	31	
12	1,260	--		870	--		1,100	--	
13	1,240	--		930	--		1,120	--	
14	1,250	17		960	--		1,060	--	
15	1,200	--		1,000	--	e 70	1,020	--	
16	1,160	--	e 100	1,010	--		1,100	--	e 120
17	1,200	--		1,000	--		1,160	--	
18	1,160	--		990	22		1,210	46	
19	1,120	42		980	--		1,190	--	
20	1,100	--		1,000	--		1,120	--	
21	1,070	25		1,030	--		1,100	--	
22	1,150	--		1,090	--		1,120	--	
23	1,190	--		1,110	27		1,160	42	
24	1,310	--		1,100	--		1,190	--	
25	1,210	--		1,070	28		1,190	47	
26	1,180	--		1,100	--		1,180	--	
27	1,120	--		1,070	--		1,190	--	
28	1,080	--		1,070	--		1,160	--	
29	1,060	--		--	--	--	1,180	--	
30	1,040	--		--	--	--	1,200	--	
31	1,020	--		--	--	--	1,150	--	
Total	35,210	--	3,100	27,130	--	1,960	34,910	--	3,720

e Estimated.

MISSOURI RIVER MAIN STEM--Continued

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

Suspended sediment, water year October 1958 to September 1959--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	1,140	49	151	2,180	--	e 220	2,060	10	56
2	1,280	55	190	2,520	--	e 280	1,950	10	53
3	1,740	96	451	2,640	--	e 320	2,040	13	72
4	2,160	--	e 700	2,430	--	e 220	2,410	21	137
5	2,480	--	e 900	2,200	--	e 140	3,020	32	261
6	3,240	--	e 1,300	2,000	--	e 90	3,800	--	e 550
7	5,220	--	e 2,800	1,850	12	60	5,770	111	1,730
8	4,460	--	e 1,400	1,720	--	e 55	7,540	139	2,830
9	3,180	--	e 500	1,780	12	58	7,560	--	e 2,200
10	2,360	--		1,910	17	88	7,790	78	1,640
11	2,010	--		1,940	21	110	6,410	57	986
12	1,890	--		1,860	13	65	5,280	55	784
13	2,080	--		1,780	11	53	5,190	56	785
14	2,350	--		1,860	21	105	5,830	69	1,090
15	2,410	68		2,160	31	181	6,380	103	1,770
16	2,380	--		2,670	51	368	7,060	113	2,150
17	2,010	--		3,480	59	554	7,080	90	1,720
18	1,780	--		3,690	42	418	7,010	77	1,460
19	1,720	--		3,520	28	266	6,570	62	1,100
20	1,680	--	e 180	3,210	24	208	5,960	48	772
21	1,610	--		2,850	17	131	5,660	59	902
22	1,630	--		2,540	13	89	5,440	62	911
23	1,710	18		2,300	12	74	5,040	42	572
24	1,700	--		2,080	10	56	4,440	41	492
25	1,750	--		2,080	11	62	4,160	38	427
26	1,750	--		2,330	--	e 70	4,770	68	876
27	1,960	24		2,620	13	92	6,070	108	1,770
28	2,070	--		2,680	13	94	5,990	78	1,260
29	1,910	17		2,650	12	86	6,120	74	1,220
30	1,980	--		2,410	10	65	5,740	95	1,470
31	--	--	--	2,200	9	53	--	--	--
Total	65,640	--	12,172	74,140	--	4,731	160,140	--	32,046

Day	July			August			September		
1	5,500	76	1,130	811			643	--	
2	4,960	60	804	860			658	--	
3	3,940	53	564	890			666	23	
4	3,570	59	569	870			690	--	
5	3,260	53	466	830			722	21	
6	2,920	35	276	784			739	--	
7	2,680	28	203	739			757	--	
8	2,730	31	228	690			739	--	
9	2,840	29	222	650			714	11	
10	2,730	22	162	629			714	--	
11	2,460	15	100	615	12	22	730	--	e 34
12	2,200	14	83	574			722	--	
13	2,040	11	61	594			706	--	
14	1,960	--	e 42	580			706	--	
15	1,910	8	41	574			766	19	
16	1,810			538			757	--	
17	1,680			532			802	--	
18	1,560			505			840	--	
19	1,390			526			870	--	
20	1,320			574			880	13	
21	1,200			658			1,130	31	95
22	1,080			757			1,320	63	225
23	1,030			784			1,330	41	147
24	942	10	31	793			1,330	--	
25	931			775			1,340	--	
26	900			757	24	46	1,340	25	e 100
27	890			739			1,360	--	
28	880			690			1,420	--	
29	900			658			1,430	25	
30	890			658			1,440	30	
31	820			636			--	--	--
Total	63,923	--	5,447	21,270	--	946	28,261	--	1,847

Total discharge for year (cfs-days) 632,604
Total load for year (tons) 74,279

e Estimated.

MILK RIVER BASIN

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 1959.
EXTREMES, 1958-59.--Sediment concentrations: Maximum daily, not determined; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 170,000 tons (estimated) Mar. 19; minimum daily, 0 tons on many days.
EXTREMES, 1953-59.--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.--Maximum observed sediment concentration during water year, 27,400 ppm June 17. Flow affected by ice Dec. 3-9, 15-31, Feb. 28, Mar. 7-12. Bureau of Land Management has extensive spreader systems on some of the tributaries upstream from station. Records of discharge for water year October 1958 to September 1959 given in WSP 1629.

Monthly and annual summary of water and suspended-sediment discharge, water year October 1958 to September 1959

Month	Discharge (cfs-days)	Runoff (acre-feet)	Suspended sediment					
			Load (tons)	Daily load (tons)			Concentration (ppm)	
				Mean	Maximum	Minimum	Weighted mean	Maximum observed
October	0	0	0	0	0	0		--
November	4.0	7.9	e 4	.1	e 2	0		--
December	700.5	1,390	a 3,569	115	a 2,300	0		3,900
January	0	0	0	0	0	0		--
February	10	20	e 4	.1	e 4	0		--
March	21,688	43,020	a 863,616	27,900	e 170,000	e 3		22,400
April	430.1	853	a 4,499	150	1,420	1		6,600
May	5.8	12	e 2	.1	--	0		120
June	203.5	404	a 5,965	199	e 2,600	0		27,400
July	4.8	9.5	e 8	.2	e 2	0		--
August	0	0	0	0	0	0		--
September	59.3	118	e 775	26	e 440	0		--
Water year	23,106.0	45,830	878,442	2,410	e 170,000	0		27,400

e Estimated.
a Partly estimated.

MILK RIVER BASIN--Continued

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

Particle-size analyses of suspended sediment, water year October 1958 to September 1959
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, steve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment											Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters									
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Mar. 17, 1959...	11:40 a.m.	1,360		14,800	2,870		59		82		99	100					VPWCM
Mar. 23	1:50 p.m.	1,180		22,400	4,680		61		84		99	100					VPWCM
Apr. 1	12:15 p.m.	a 75	48	6,600	3,290		83		98		100	--					PWCM

a Daily mean discharge.

6-2530. FIVEMILE CREEK NEAR SHOSHONI, WYO.

LOCATION.--At gaging station, 1½ miles upstream from normal high-water line of Boysen Reservoir and 5 miles west of Shoshoni, Fremont County.
DRAINAGE AREA.--397 square miles.
RECORDS AVAILABLE.--Chemical analyses: September 1949 to November 1951.
Water temperatures: December 1948 to September 1959.
Sediment records: August 1948 to September 1959.
EXTREMES, 1958-59.--Water temperatures: Minimum, freezing point on many days during November to March.
Sediment concentrations: Maximum daily, not determined; minimum daily, not determined.
Sediment loads: Maximum daily, 7,200 tons (estimated) June 16; minimum daily, not determined.
EXTREMES, 1948-59.--Water temperatures: Maximum (1948-58), 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.--Maximum observed sediment concentration during water year, 10,900 ppm July 17. Flow affected by ice Nov. 17-23, 26-30, Dec. 6-18, 22-26, Jan. 2 to Mar. 1. Records of discharge for water year October 1958 to September 1959 given in WSP 1629.

Temperature (° F) of water, water year October 1958 to September 1959
/Once-daily measurement between 8 a.m. and 12 m./

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

a Measurement between 1 p.m. and 8 p.m.

YELLOWSTONE RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959

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	305	2,170	1,790	98	--	e 220	96	--	e 300
2	298	2,070	1,670	94	751	191	105	--	e 500
3	288	2,540	1,980	98	971	257	120	2,300	a 750
4	295	2,880	2,290	98	948	251	118	2,300	a 750
5	285	2,790	2,150	94	960	244	94	--	
6	265	2,400	1,720	94	697	177	80	--	
7	262	2,350	1,660	99	1,000	267	85	--	e 190
8	259	2,470	1,730	96			90	780	
9	265	2,240	1,600	92			90	800	
10	295	2,900	2,310	94			90	--	
11	243	2,330	1,530	96	817	207	100	1,600	a 440
12	173	1,220	570	94			90	--	
13	130	980	344	92			80	--	
14	114	690	212	96			70	--	
15	108	590	172	94	394	100	70	400	e 95
16	101	550	150	86	--	e 130	75	--	
17	139	2,600	976	75	706	143	80	490	
18	130	1,960	688	70	950	180	90	--	
19	114	1,050	323	70	1,100	208	118	2,300	sa 700
20	112	1,180	357	75			103	--	e 600
21	114	1,210	372	75	1,430	309	94	--	e 550
22	118	1,090	347	80			80	1,880	406
23	108	896	261	90			80	1,650	356
24	101	742	202	107	1,460	422	75	1,410	
25	98	796	211	96	--	e 260	70	--	
26	101	913	249	85	--	e 180	70	--	
27	101	841	229	75	--	e 150	74	--	e 260
28	99	766	205	70	--	e 150	77	--	
29	98	728	193	70	800	a 150	80	1,100	
30	94	890	226	75	--	e 190	72	--	
31	98	977	258	--	--	--	72	--	
Total	5,311	--	26,975	2,628	--	6,555	2,688	--	9,237

Day	January			February			March		
1	80	--		75			90	--	e 1,800
2	60	--		75			86	--	e 1,200
3	50	--		75			79	--	e 900
4	50	--		75			77	--	e 700
5	60	--		75			74	--	e 600
6	80	156		75	483	98	75	2,930	593
7	80	--		75			79	--	e 700
8	80	143		75			80	--	e 750
9	80	--		75			79	--	e 750
10	80	--		75			71	3,100	594
11	80	--		85	540	124	60	2,800	a 460
12	80	259	e 40	85	680	156	74	3,260	651
13	80	--		85	700	161	84	--	e 700
14	80	--		85	700	161	80	3,680	795
15	80	--		85	900	a 200	84	--	e 800
16	80	--		85	1,280	294	80	3,400	734
17	80	--		80	1,330	287	77	--	e 900
18	80	--		80	1,200	a 260	89	--	e 1,300
19	80	--		80			87	--	e 1,200
20	70	--		80			84	4,900	a 1,100
21	60	244		80	--	e 260	79	--	e 1,000
22	60	--		80			84	--	e 950
23	70	460	a 85	80			86	--	e 900
24	90			80			82	--	e 800
25	85			80	--	e 460	66	4,200	a 750
26	80			80	5,040	1,090	66	5,400	sa 950
27	80	845	180	80	--	e 1,300	63	--	e 850
28	80			85	--	e 1,500	58	--	e 800
29	80			--	--	--	58	--	e 650
30	75			--	--	--	52	--	e 600
31	75			--	--	--	54	--	e 500
Total	2,325	--	2,405	2,225	--	8,533	2,337	--	25,977

e Estimated.
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 1958 to September 1959--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.....	52	3,200	a 440	136	2,770	1,020	237	4,700	3,010
2.....	55	3,400	a 500	134	--	e 1,100	240	--	e 3,100
3.....	52	--	e 420	132	--	e 1,200	194	--	e 2,700
4.....	50	--	e 340	173	3,800	1,770	220	--	e 2,800
5.....	45	--	e 280	159	--	e 1,300	202	2,810	1,530
6.....	43	--	e 220	152	--	e 1,000	178	--	e 1,400
7.....	45	--	e 180	159	--	e 950	181	--	e 1,300
8.....	45	1,200	146	159	2,180	936	214	--	e 1,300
9.....	45	--	e 150	143	--	e 1,100	225	--	e 1,400
10.....	45	1,330	162	164	--	e 1,200	228	2,410	1,480
11.....	45	--	e 160	171	--	e 1,200	208	--	e 1,400
12.....	42	--	e 160	164	--	e 1,000	205	--	e 1,400
13.....	42	--	e 170	134	2,400	a 850	217	--	e 1,400
14.....	43	--	e 300	154	--	e 950	220	--	e 1,400
15.....	63	8,800	a 1,500	168	2,240	1,020	240	--	e 1,500
16.....	95	--	e 1,300	154	--	e 1,000	348	--	e 7,200
17.....	164	5,500	a 2,400	154	--	e 1,000	326	6,800	5,990
18.....	130	--	e 1,200	161	--	e 1,000	308	--	e 4,500
19.....	124	--	e 700	147	--	e 1,000	278	4,620	3,470
20.....	118	1,860	593	216	--	e 1,700	262	--	e 3,400
21.....	110	--	e 600	228	--	e 1,900	298	--	e 3,500
22.....	112	--	e 750	217	2,900	a 1,700	316	4,300	3,670
23.....	118	3,800	a 1,200	214	--	e 1,700	319	--	e 4,300
24.....	143	4,600	a 1,800	217	--	e 1,600	322	5,650	4,910
25.....	139	--	e 2,000	214	--	e 1,600	302	5,190	4,230
26.....	154	--	e 2,600	202	--	e 1,600	295	4,650	3,700
27.....	211	--	e 3,500	194	--	e 1,600	295	--	e 3,800
28.....	176	2,880	1,370	200	2,880	1,560	312	--	e 4,000
29.....	152	2,360	969	202	--	e 1,600	337	4,700	a 4,300
30.....	132	--	e 950	200	--	e 2,100	355	--	e 4,800
31.....	--	--	--	240	--	e 3,100	--	--	--
Total.	2,790	--	27,060	5,462	--	42,356	7,882	--	92,890
	July			August			September		
1.....	337	4,600	4,190	330	3,230	2,880	240	1,620	1,050
2.....	295	4,300	3,420	330	3,820	3,400	246	1,680	1,120
3.....	291	3,300	2,590	337	3,700	3,370	243	1,470	964
4.....	295	3,300	2,630	340	3,380	3,100	246	1,440	956
5.....	298	3,200	2,570	344	3,300	3,060	250	1,650	1,110
6.....	285	3,000	2,310	344	3,150	2,930	246	1,410	937
7.....	272	2,600	1,910	348	2,900	2,720	243	1,300	853
8.....	259	2,500	1,750	344	2,800	2,600	240	1,350	875
9.....	240	2,400	1,560	330	2,600	2,320	225	1,160	705
10.....	253	3,060	2,090	337	2,640	2,400	222	1,200	719
11.....	268	3,140	2,270	322	2,550	2,220	220	1,160	689
12.....	285	2,900	2,230	322	2,510	2,180	225	1,220	741
13.....	275	2,900	2,150	340	2,310	2,120	231	1,300	811
14.....	262	2,900	2,050	363	2,450	2,400	234	1,490	941
15.....	272	2,900	2,130	378	2,480	2,530	225	1,510	917
16.....	302	3,140	2,560	363	2,250	2,210	225	1,390	844
17.....	363	5,100	sa 5,300	363	2,500	2,450	256	2,000	1,380
18.....	398	5,000	sa 5,700	337	2,400	2,180	256	1,890	1,310
19.....	359	4,000	3,880	322	2,320	2,020	259	1,920	1,340
20.....	337	3,200	2,910	298	2,220	1,790	259	1,740	1,220
21.....	302	2,630	2,140	295	1,950	1,550	272	1,850	1,360
22.....	308	2,540	2,110	288	1,820	1,420	272	1,550	1,140
23.....	308	2,900	2,410	282	2,020	1,540	262	1,400	990
24.....	312	2,650	2,230	291	2,100	1,650	272	1,570	1,150
25.....	308	2,600	2,160	278	1,930	1,450	253	1,560	1,070
26.....	308	2,630	2,190	265	1,990	1,420	237	1,510	966
27.....	326	3,040	2,680	259	1,670	1,170	231	1,410	879
28.....	333	3,150	2,830	259	1,600	1,120	240	1,540	998
29.....	312	3,200	2,700	253	1,580	1,080	220	1,230	731
30.....	319	3,400	2,930	246	1,700	1,130	228	1,200	739
31.....	333	3,400	3,060	250	1,820	1,230	--	--	--
Total.	9,415	--	83,640	9,758	--	65,640	7,278	--	29,505
Total discharge for year (cfs-days).....									60,099
Total load for year (tons).....									420,773

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

YELLOWSTONE RIVER BASIN--Continued

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

Particle-size analyses of suspended sediment, water year October 1958 to September 1959
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Oct. 2, 1958.....	1:55 p.m.	302	51	2,140	3,160	16	22	28	33	39	56	69	86		97	100	VBWCM
Oct. 15	12:40 p.m.	108	53	590	1,500	17	25	32	36	38	44	53	76		96	100	VBWCM
Nov. 7.....	12:30 p.m.	101	40	1,200	2,940	--	31	--	46	--	61	75	90		98	100	VPWCM
Nov. 21.....	3:15 p.m.	75	39	1,700	3,090	--	17	--	28	--	55	76	92		99	100	VPWCM
Dec. 8.....	4:20 p.m.	95	32	1,500	2,780	--	15	--	24	--	47	64	90		99	100	VPWCM
Feb. 26, 1959 ...	3:05 p.m.	84	32	10,000	4,430	--	25	--	47	--	80	91	96		99	100	VPWCM
Mar. 10.....	5:55 p.m.	74	39	3,250	3,110	--	19	--	32	--	50	64	89		99	100	VPWCM
Mar. 26.....	1:25 p.m.	61	48	3,550	4,150	--	36	--	57	--	79	87	96		100	--	VPWCM
Apr. 15.....	9:00 a.m.	72	41	8,390	3,610	--	38	--	58	--	85	94	98		100	--	VPWCM
Apr. 24.....	8:40 a.m.	143	50	4,780	3,530	--	28	--	42	--	71	86	95		100	--	VPWCM
Apr. 28.....	4:35 p.m.	164	56	2,600	3,700	--	21	--	32	--	61	78	92		99	100	VPWCM
May 4.....	8:45 a.m.	186	46	4,350	4,260	--	15	--	24	--	51	79	92		99	100	VPWCM
May 13.....	5:05 p.m.	128	65	1,850	2,920	--	22	--	37	--	62	75	91		99	100	VPWCM
May 28.....	5:10 p.m.	197	64	2,680	3,800	--	20	--	33	--	56	77	92		99	100	VPWCM
June 10	3:55 p.m.	228	66	2,400	3,790	--	21	--	34	--	55	71	88		97	100	VPWCM
June 17	2:55 p.m.	340	73	6,270	4,400	--	24	--	39	--	70	87	96		99	100	VPWCM
June 26	5:20 p.m.	291	68	4,390	3,220	--	19	--	28	--	52	73	92		98	100	VPWCM
July 10.....	2:10 p.m.	262	71	3,050	4,360	--	19	--	32	--	52	69	89		97	100	VPWCM
July 17.....	10:30 a.m.	374	68	3,200	3,980	--	18	--	29	--	54	72	90		98	100	VPWCM
Aug. 3.....	5:40 p.m.	322	75	3,440	2,870	--	21	--	36	--	58	74	89		97	100	VPWCM
Aug. 20.....	3:45 p.m.	288	72	2,000	4,220	--	13	--	30	--	45	59	85		97	100	VPWCM
Sept. 14.....	5:05 p.m.	225	68	1,320	3,200	--	11	--	27	--	49	59	80		96	100	VPWCM

YELLOWSTONE RIVER BASIN--Continued

6-2570. BADWATER CREEK AT BONNEVILLE, WYO.

LOCATION.--At gaging station at Bonneville, Fremont County, 3 miles upstream from normal high-water line of Boysen Reservoir.
DRAINAGE AREA.--790 square miles, approximately.
RECORDS AVAILABLE.--Sediment records: October 1947 to February 1954, August 1954 to September 1959.
EXTREMES, 1958-59.--Sediment concentrations: Maximum daily, not determined; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 3,500 tons (estimated) Mar. 19; minimum daily 0 tons on many days.
EXTREMES, 1947-59.--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.--Maximum observed sediment concentration during water year, 19,200 ppm Mar. 16.
Records of discharge for water year October 1958 to September 1959 given in WSP 1629.

Monthly and annual summary of water and suspended-sediment discharge, water year October 1958 to September 1959

Month	Discharge (cfs-days)	Runoff (acre-feet)	Suspended sediment					
			Load (tons)	Daily load (tons)			Concentration (ppm)	
				Mean	Maximum	Minimum	Weighted mean	Maximum observed
October	0	0	0	0	0	0		--
November	0	0	0	0	0	0		--
December	0	0	0	0	0	0		--
January	0	0	0	0	0	0		--
February	0	0	0	0	0	0		--
March	599.4	1,190	a 17,909	578	e 3,500	0		19,200
April	122.6	243	a 1,164	38.8	465	0		8,090
May	314.8	624	a 4,997	161	e 750	0		10,300
June	0	0	0	0	0	0		--
July	0	0	0	0	0	0		--
August	0	0	0	0	0	0		--
September	0	0	0	0	0	0		--
Water year	1,036.8	2,060	24,070	66	e 3,500	0		19,200

e Estimated.
a Partly estimated.

YELLOWSTONE RIVER BASIN--Continued

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

Particle-size analyses of suspended sediment, water year October 1958 to September 1959
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Mar. 16, 1959...	5:10 p.m.	19	47	19,200	5,590		53		88		97	99	100				VPWCM
Mar. 20	3:35 p.m.	110	50	15,400	5,210		36		54		88	97	100				VPWCM
Mar. 26	3:55 p.m.	26	59	9,140	5,480		39		61		92	99	100				VPWCM
May 4	10:00 a.m.	32	54	10,300	5,240		46		72		94	99	100				VPWCM

YELLOWSTONE RIVER BASIN--Continued

6-2580. MUDDY CREEK NEAR SHOSHONI, WYO.

LOCATION.--At gaging station, 2¼ miles upstream from normal high-water line of Boysen Reservoir and 9 miles northwest of Shoshoni, Fremont County.
DRAINAGE AREA.--340 square miles, approximately.
RECORDS AVAILABLE.--Water temperatures: March to July 1949, October 1956 to September 1959.
Sediment records: March 1949 to September 1959.
EXTREMES, 1958-59.--Water temperatures: Minimum, freezing point probably on many days during November to March.
Sediment concentrations: Maximum daily, not determined; minimum daily, not determined.
Sediment loads: Maximum daily, 3,300 tons (estimated) July 5; minimum daily, less than 0.50 ton on several days during February.
EXTREMES, 1949-59.--Water temperatures: Maximum (1956-58), 87°F July 12, 1958; minimum (1949, 1956-59), freezing point on many days during winter months.
Sediment concentrations: Maximum daily (1951-58), 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.--Maximum observed sediment concentration during water year, 20,300 ppm Apr. 29. Flow affected by ice Nov. 17 to Mar. 27. Records of discharge for water year October 1958 to September 1959 given in WSP 1629.

Temperature (° F) of water, water year October 1958 to September 1959
/Once-daily measurement between 1 p.m. and 5 p.m./

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

a Measurement between 9 a.m. and 12 m.

YELLOWSTONE RIVER BASIN--Continued

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

Monthly and annual summary of water and suspended-sediment discharge, water year October 1958 to September 1959

Month	Discharge (cfs-days)	Runoff (acre-feet)	Suspended sediment					
			Load (tons)	Daily load (tons)			Concentration (ppm)	
				Mean	Maximum	Minimum	Weighted mean	Maximum observed
October	550	1,090	a 3,574	115	a 600	--		6,060
November	283.5	562	a 1,035	34	--	--		5,240
December	117	232	e 104	3.4	--	--		404
January	71	141	e 62	2	--	--		312
February	57	113	e 26	.9	--	(t)		198
March	493	978	a 2,654	86	e 400	--		8,260
April	376.6	747	a 3,798	127	a 1,200	--		20,300
May	583.8	1,160	a 5,383	174	1,160	--		15,000
June	1,303	2,580	a 14,423	481	e 1,900	a 80		6,790
July	1,502	2,980	a 21,637	698	e 3,300	17		8,970
August	1,165	2,310	a 7,975	257	e 700	e 17		3,580
September	462.8	918	a 1,063	35	e 90	8		1,500
Water year	6,964.7	13,810	61,734	169	e 3,300	(t)		20,300

e Estimated.
t Less than 0.50 ton.
a Partly estimated.

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

Particle-size analyses of suspended sediment, water year October 1958 to September 1959
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Oct. 1, 1958.....	3:55 p.m.	21	46	2,120	2,060	10	14	17	20	25	37	69	97		100	--	VBWCM
Oct. 15	2:25 p.m.	20	60	1,600	1,410	9	13	14	17	21	35	60	92		100	--	VBWCM
Oct. 17	11:35 a.m.	41	--	6,050	3,720	18	25	28	35	41	55	74	95		100	--	VBWCM
Nov. 7.....	3:05 p.m.	17	42	1,580	2,310	--	28	--	40	--	52	72	96		100	--	VPWCM
Mar. 26, 1959...	5:35 p.m.	25	34	7,800	4,040	--	30	--	49	--	65	79	98		100	--	VPWCM
Apr. 1.....	3:30 p.m.	16	53	3,890	3,440	--	46	--	61	--	79	92	100		--	--	VPWCM
Apr. 29.....	9:05 a.m.	47	47	20,300	3,050	--	42	--	66	--	81	89	98		100	--	VPWCM
Apr. 29.....	2:05 p.m.	23	57	10,200	2,670	--	46	--	74	--	87	94	99		100	--	VPWCM
May 13.....	11:30 a.m.	64	57	15,000	4,120	--	31	--	58	--	82	91	98		100	--	VPWCM
June 10	10:05 a.m.	48	63	4,940	3,600	--	20	--	22	--	53	77	96		100	--	VPWCM
June 24	3:25 p.m.	64	80	5,540	3,900	--	19	--	30	--	54	71	94		99	100	VPWCM
July 1	4:15 p.m.	109	72	7,740	3,880	--	20	--	31	--	52	70	92		99	100	VPWCM
July 8	2:55 p.m.	63	70	5,000	3,220	--	18	--	28	--	51	72	94		99	100	VPWCM
July 10.....	11:05 a.m.	36	69	2,050	2,550	--	21	--	30	--	50	72	95		100	--	VPWCM
July 17.....	11:20 a.m.	35	75	1,570	930	--	12	--	17	--	39	68	95		100	--	VPWCM

Particle-size analyses of bed material, water year October 1958 to September 1959
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Number of sampling points	Bed material												Methods of analysis
				Percent finer than indicated size, in millimeters												
				0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	4.000	8.000	16.000	32.000	
May 9, 1958.....	9:30 a.m.	81	22			5	15	74	96	99	99	99	100			SV
May 13, 1959.....	12:05 p.m.	65	21			1	5	31	72	91	95	98	98	100		SV

YELLOWSTONE RIVER BASIN--Continued

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

LOCATION.--At gaging station, 1¾ miles upstream from mouth and 2¾ miles west of Worland, Washakie County.
DRAINAGE AREA.--594 square miles.
RECORDS AVAILABLE.--Sediment records: March 1951 to September 1959.
EXTREMES, 1958-59.--Sediment concentrations: Maximum daily, 93,400 ppm June 27; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 108,000 tons May 4; minimum daily, 0 tons on many days.
EXTREMES, 1951-59.--Sediment concentrations: Maximum daily, 125,000 ppm Apr. 16, 1952; minimum daily, no flow on many days each year.
Sediment loads: Maximum daily, 418,000 tons May 22, 1952; minimum daily, 0 tons on many days each year.
REMARKS.--Flow affected by ice Mar. 6-22. Bureau of Land Management has extensive spreader systems on some of the tributaries upstream from station. Records of discharge for water year October 1958 to September 1959 given in WSP 1629.

Suspended sediment, water year October 1958 to September 1959

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1.....	0		0						
2.....	0		0						
3.....	0		0						
4.....	0		0						
5.....	0		0						
6.....	0		0						
7.....	0		0						
8.....	0		0						
9.....	0		0						
10.....	3.1	6,500	sa 260						
11.....	0		0						
12.....	0		0						
13.....	0		0						
14.....	0		0						
15.....	0		0						
16.....	0		0						
17.....	0		0						
18.....	0		0						
19.....	0		0						
20.....	0		0						
21.....	0		0						
22.....	0		0						
23.....	0		0						
24.....	0		0						
25.....	0		0						
26.....	0		0						
27.....	0		0						
28.....	0		0						
29.....	0		0						
30.....	0		0						
31.....	0		0						
Total.	3.1		260	0		0	0		0

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

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

Suspended sediment, water year October 1958 to September 1959--Continued

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1.....							0	--	0
2.....							0	--	0
3.....							0	--	0
4.....							0	--	0
5.....							0	--	0
6.....							5	750	a 10
7.....							8	1,640	35
8.....							25	5,090	344
9.....							10	9,330	252
10.....							9	6,970	169
11.....							10	9,780	264
12.....							30	8,700	705
13.....							20	10,900	589
14.....							7	8,400	159
15.....							5	5,790	78
16.....							15	7,740	313
17.....							30	13,400	1,080
18.....							45	21,200	2,580
19.....							25	20,400	1,380
20.....							10	15,500	418
21.....							4	12,500	135
22.....							2	9,600	52
23.....							1.7	8,200	38
24.....							0	--	0
25.....							0	--	0
26.....							0	--	0
27.....							0	--	0
28.....							0	--	0
29.....							0	--	0
30.....							0	--	0
31.....							4.1	7,900	sa 320
Total.	0		0	0		0	265.8	--	8,921

Day	April			May			June		
1.....	6.2	7,000	sa 300	0.6	2,300	a 4	1.0	10,000	a 28
2.....	0	--	0	.3	800	a 1	4.4	31,500	374
3.....	0	--	0	31	20,600	s 6,250	3.7	28,000	280
4.....	0	--	0	401	92,800	108,000	4.7	12,000	152
5.....	0	--	0	55	44,800	6,900	4.0	5,500	59
6.....	0	--	0	21	22,600	1,280	3.5	3,800	36
7.....	0	--	0	15	19,100	774	3.0	3,400	28
8.....	0	--	0	12	15,000	486	3.2	2,900	25
9.....	0	--	0	8.9	11,300	272	3.0	2,800	23
10.....	0	--	0	4.7	9,700	a 120	2.7	3,300	24
11.....	0	--	0	1.9	9,000	46	1.9	3,800	a 19
12.....	0	--	0	.4	8,200	9	.4	3,600	4
13.....	0	--	0	.1	2,300	1	0	--	0
14.....	0	--	0	0	--	0	0	--	0
15.....	0	--	0	0	--	0	0	--	0
16.....	0	--	0	0	--	0	0	--	0
17.....	7.5	9,700	sa 850	0	--	0	119	91,800	s 52,500
18.....	30	34,200	s 3,040	0	--	0	5.4	63,200	s 1,180
19.....	39	29,100	s 3,360	0	--	0	.6	18,000	29
20.....	53	34,900	5,180	0	--	0	.4	9,000	a 10
21.....	52	29,500	s 4,720	0	--	0	.7	6,000	a 11
22.....	84	41,600	s 10,400	0	--	0	6.2	11,000	184
23.....	83	38,600	8,970	0	--	0	.7	5,580	s 13
24.....	43	31,300	3,630	0	--	0	1.9	800	4
25.....	23	23,400	1,450	0	--	0	12	19,200	s 3,680
26.....	12	16,300	528	0	--	0	28	88,600	s 8,440
27.....	7.2	10,400	202	0	--	0	25	93,400	s 8,510
28.....	6.9	6,100	114	38	41,200	s 6,840	5.8	82,100	s 1,480
29.....	4.4	6,200	74	6.9	35,200	680	50	83,500	s 21,800
30.....	.8	4,800	10	1.9	25,500	131	361	90,700	95,000
31.....	--	--	--	.6	13,500	22	--	--	--
Total.	452.0	--	42,828	599.3	--	131,816	652.2	--	193,893

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

YELLOWSTONE RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959--Continued

Day	July			August			September		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1.....	63	43,800	s 9,040	0	--	0	0	--	0
2.....	29	28,000	2,190	0	--	0	0	--	0
3.....	27	24,000	1,750	0	--	0	0	--	0
4.....	29	17,400	1,360	0	--	0	0	--	0
5.....	26	13,800	969	0	--	0	0	--	0
6.....	22	12,200	725	0	--	0	0	--	0
7.....	19	13,200	677	0	--	0	0	--	0
8.....	17	12,200	560	1.2	61,300	s 2,710	0	--	0
9.....	13	12,200	428	.2	21,000	sa 22	0	--	0
10.....	11	15,000	446	0	--	0	0	--	0
11.....	7.6	15,000	a 300	0	--	0	0	--	0
12.....	2.7	14,000	a 100	0	--	0	0	--	0
13.....	.4	15,000	16	0	--	0	0	--	0
14.....	.3	18,000	14	0	--	0	0	--	0
15.....	.3	19,400	16	0	--	0	0	--	0
16.....	44	43,000	s 9,530	0	--	0	.7	12,000	sa 70
17.....	16	63,800	2,860	0	--	0	.2	5,600	sa 6
18.....	7.1	48,000	954	0	--	0	.4	6,530	s 10
19.....	7.5	26,100	529	1.3	11,700	s 161	.2	3,200	a 2
20.....	7.9	16,800	358	48	50,300	s 15,900	.1	400	(t)
21.....	7.1	16,200	311	5.0	40,500	s 649	0	--	0
22.....	6.7	14,000	253	.9	24,000	a 60	0	--	0
23.....	3.0	11,800	96	.3	8,000	a 6	0	--	0
24.....	.5	8,950	12	0	--	0	0	--	0
25.....	18	26,600	s 2,930	0	--	0	0	--	0
26.....	3.5	17,900	s 213	0	--	0	0	--	0
27.....	.5	5,800	8	0	--	0	9.8	11,700	s 971
28.....	0	--	0	0	--	0	54	42,400	s 7,530
29.....	0	--	0	0	--	0	6.7	19,800	s 400
30.....	0	--	0	0	--	0	2.5	11,300	76
31.....	0	--	0	0	--	0	--	--	--
Total.	389.1	--	36,645	56.9	--	19,508	74.6	--	9,065

Total discharge for year (cfs-days)..... 2,493.0
Total load for year (tons)..... 442,936

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

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

Particle-size analyses of suspended sediment, water year October 1958 to September 1959
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment											Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters									
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Mar. 10, 1959...	1:45 p.m.	9.7	32	7,240	4,940		86		100		--	--	--		--		PWCM
Apr. 18.....	10:35 a.m.	50	37	48,000	3,690		77		95		99	99	100		--		VPWCM
Apr. 20.....	3:45 p.m.	43	44	32,500	5,410		73		93		98	99	100		--		VPWCM
Apr. 21.....	10:05 a.m.	80	39	32,200	3,970		64		82		96	99	100		--		VPWCM
Apr. 22.....	8:45 a.m.	139	--	45,000	4,180		59		76		96	99	100		--		VPWCM
May 4	10:15 a.m.	624	45	104,000	2,700		42		56		87	95	99		100		VPWCM
May 4	1:40 p.m.	355	--	103,000	4,650		40		56		85	95	99		100		VPWCM
June 17.....	8:50 a.m.	302	--	100,000	5,400		39		62		90	96	99		100		VPWCM
June 17.....	1:25 p.m.	55	69	102,000	3,490		57		87		98	99	100		--		VPWCM
June 30.....	9:00 a.m.	488	--	69,700	4,710		49		65		90	97	99		100		VPWCM
July 1	9:20 a.m.	59	56	44,400	3,840		75		92		98	100	--		--		VPWCM
Sept. 28	8:30 a.m.	105	43	50,000	4,360		56		83		97	99	100		--		VPWCM

6-2780. DRY CREEK AT GREYBULL, WYO.

LOCATION.--At gaging station, half a mile north of Greybull, Big Horn County, and half a mile upstream from mouth.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1951, August 1957 to September 1959.
Water temperatures: October 1951 to June 1953.
Sediment records: April 1951 to June 1953.
REMARKS.--Records of discharge for water year October 1958 to September 1959 given in WSP 1629.

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids: Parts per million: Residue at 180°C	Dissolved solids: Parts per million: Sum	Dissolved solids: Tons per acre-foot	Dissolved solids: Tons per day	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Per cent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 3, 1958....	42	17	0.01	92	41	172	3.8	297	500	11	0.9	4.2	0.19	1,020	988	1.39	116	399	155	48	3.7	1,400	7.7	8
Nov. 6.....	9.5	18	.02	221	124	641	9.8	391	2,030	50	1.2	19	.49	3,400	3,310	4.62	87.2	1,060	739	57	8.6	4,010	7.6	6
Dec. 5.....	a 10	23	.01	180	85	452	4.4	432	1,330	35	2.0	16	.41	2,410	2,340	3.28	65.1	800	446	55	7.0	2,990	7.9	6
Jan. 7, 1959....	a 5	28	.01	263	127	623	6.0	520	2,000	48	2.0	25	.52	3,480	3,380	4.73	47.0	1,180	754	53	7.9	4,070	7.5	3
Feb. 3.....	a 6	20	.01	191	95	460	3.8	472	1,390	34	1.5	18	.36	2,560	2,450	3.48	41.5	869	482	53	6.8	3,150	7.8	6
Mar. 30.....	10	18	.01	182	98	520	12	420	1,540	58	1.3	11	.37	2,750	2,650	3.74	74.3	859	515	56	7.7	3,440	7.6	8
May 8.....	24	16	.00	145	82	453	14	351	1,330	65	1.1	7.5	.46	2,380	2,290	3.24	154	701	413	58	7.5	3,000	7.9	20
June 5.....	2.8	14	.00	137	70	353	5.0	268	1,140	35	.9	5.5	.33	1,990	1,890	2.71	15.0	630	410	55	6.1	2,540	7.8	14
July 1	67	16	.01	87	29	209	7.2	260	530	20	1.0	7.2	.22	1,060	1,030	1.44	192	337	124	57	5.0	1,490	8.2	14
July 31.....	7.0	14	.01	109	59	286	4.2	240	864	22	1.0	6.9	.30	1,580	1,480	2.15	30.0	514	317	54	5.5	2,060	8.2	9
Sept. 3.....	5.5	15	.00	166	84	400	5.7	325	1,300	33	1.3	5.7	.41	2,250	2,170	3.06	33.4	760	493	53	6.3	2,780	7.7	17

a Daily mean discharge.

Periodic determinations of suspended-sediment discharge, water year October 1958 to September 1959

Date	Water discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Discharge (tons per day)
Oct. 3, 1958.....	42	79	9.0
Nov. 6.....	9.5	15	.4
Dec. 5.....	a 10	92	2.5
Mar. 30, 1959.....	10	350	9.4
May 8.....	24	1,460	95
June 5.....	2.8	118	.9
July 1	67	8,120	1,470
July 31.....	7.0	59	1.1
Sept. 3.....	5.5	74	1.1

a Daily mean discharge.

YELLOWSTONE RIVER BASIN--Continued

6-2795. BIGHORN RIVER AT KANE, WYO.

LOCATION.--At bridge on State Highway 14, half a mile upstream from Shoshone River, 1½ miles northeast of Kane, Big Horn County, and 12½ miles downstream from gaging station.
DRAINAGE AREA.--15,900 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: December 1949 to September 1953, June 1955 to September 1957.
Water temperatures: July to September 1949, October 1950 to September 1959.
Sediment records: March 1946 to September 1959.
EXTREMES, 1958-59.--Water temperatures: Maximum, 78°F July 22, 25; minimum, freezing point Dec. 10 and probably on several other days during winter months.
Sediment concentrations: Maximum daily, 25,200 ppm July 1; minimum daily, not determined.
Sediment loads: Maximum daily, 470,000 tons July 1; minimum daily, not determined.
EXTREMES, 1946-59.--Water temperatures (1950-59): Maximum, 85°F July 14, 30, 1953, July 12, 1954; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 33,000 ppm Apr. 20, Sept. 21, 1948; minimum daily, not determined.
Sediment loads: Maximum daily, 972,000 tons June 25, 1946; minimum daily, not determined.
REMARKS.--Flow affected by ice Dec. 8 to Mar. 5. No appreciable inflow between gaging station and sampling point except during periods of intense local precipitation. Records of discharge for water year October 1958 to September 1959 given in WSP 1629.

Temperature (° F) of water, water year October 1958 to September 1959
(Once-daily measurement between 5 a.m. and 10 a.m.)

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

a Measurement between 11 a.m. and 5 p.m.

YELLOWSTONE RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959

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	2,270	1,160	7,110	2,560	816	5,640	2,660	--	
2	2,320	1,220	7,640	2,560	780	5,390	2,590	--	
3	2,320	1,340	8,390	2,590	888	6,210	2,620	562	
4	2,330	1,360	8,560	2,640	912	6,500	2,690	--	
5	2,350	1,420	9,010	2,640	1,040	7,410	2,670	--	
6	2,410	1,390	9,040	2,600	908	6,370	2,760	--	
7	2,410	1,300	8,460	2,620	--		2,890	--	
8	2,410	1,310	8,520	2,600	--		2,300	--	
9	2,360	1,260	8,030	2,640	--		1,750	--	
10	2,360	1,240	7,900	2,660	--		2,000	26	
11	2,520	2,000	a 14,000	2,640	--		2,300	--	
12	2,480	1,700	11,400	2,660	634		2,400	--	
13	2,490	1,540	10,400	2,620	--		2,400	--	
14	2,490	1,500	10,100	2,660	--		2,300	--	
15	2,510	1,360	9,220	2,710	--		2,400	--	
16	2,510	1,270	8,610	2,670	--		2,500	--	e 1,500
17	2,510	1,360	9,220	2,540	--		2,600	218	
18	2,490	1,270	8,540	2,490	--		2,600	--	
19	2,490	1,020	6,860	2,480	730	e 4,700	2,700	--	
20	2,510	1,210	8,200	2,620	--		2,600	--	
21	2,520	1,370	9,320	2,750	--		2,600	--	
22	2,600	--	e 9,200	2,760	--		2,600	--	
23	2,620	1,280	9,050	2,750	--		2,600	--	
24	2,590	1,400	9,790	2,710	--		2,600	--	
25	2,570	972	6,740	2,640	--		2,500	--	
26	2,570	1,030	7,150	2,560	666		2,250	--	
27	2,590	1,120	7,830	2,780	--		2,400	--	
28	2,590	1,150	8,040	2,620	--		2,500	--	
29	2,570	864	6,000	2,520	--		2,500	--	
30	2,570	924	6,410	2,570	--		2,600	--	
31	2,560	888	6,140	--	--	--	2,500	54	
Total	76,890	--	264,880	78,860	--	150,320	77,180	--	46,500

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	2,400	--		2,000	--		1,300	--	
2	2,000	--		1,600	--		1,300	1,320	
3	1,750	--		1,500	278		1,300	--	
4	1,750	--		1,500	--		1,300	--	
5	1,800	55		1,500	--		1,300	--	
6	2,000	70		1,400	--		1,360	--	
7	2,250	--		1,300	--		1,500	--	
8	2,600	--		1,100	--		1,610	--	
9	2,750	--		1,000	--		1,810	954	
10	2,800	--		1,000	1,190		1,740	--	
11	2,800	--		1,100	--		1,600	--	
12	2,800	121		1,100	--		1,640	--	
13	2,800	--		1,200	--		1,680	--	
14	2,800	--		1,300	--		1,680	--	
15	2,700	--		1,300	--	e 1,500	1,470	--	
16	2,600	--	e 1,500	1,300	--		1,450	3,350	e 6,000
17	2,500	--		1,200	114		1,610	--	
18	2,500	--		1,200	--		2,140	--	
19	2,500	437		1,200	--		2,360	--	
20	2,300	--		1,200	--		2,100	--	
21	2,200	--		1,200	--		1,790	--	
22	2,000	--		1,200	--		1,730	--	
23	2,200	--		1,200	--		1,680	1,760	
24	2,500	--		1,200	122		1,660	--	
25	2,600	--		1,200	--		1,600	--	
26	2,600	813		1,200	--		1,460	--	
27	2,600	--		1,300	--		1,380	--	
28	2,500	--		1,300	--		1,320	--	
29	2,300	--		--	--	--	1,260	--	
30	2,300	--		--	--	--	1,140	410	
31	2,200	--		--	--	--	1,110	--	
Total	74,400	--	46,500	35,800	--	42,000	48,380	--	186,000

e Estimated.
a Computed from partly estimated concentration graph.

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

Suspended sediment, water year October 1958 to September 1959--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	1,040	--		959	--	e 2,000	1,380	768	2,860
2	1,030	--		959	--	e 2,000	1,270	624	2,140
3	1,000	--		1,130	--	e 2,700	1,230	492	1,630
4	1,050	--		1,360	1,090	4,000	1,530	1,080	4,460
5	1,140	--		2,540	--	e 20,000	2,360	3,040	19,400
6	2,150	--		1,840	--	e 14,000	3,290	4,130	36,700
7	2,190	755		1,660	--	e 11,000	4,420	4,730	56,400
8	1,790	--		1,600	2,290	9,890	5,990	4,980	80,500
9	1,790	--		1,460	1,760	6,940	5,240	3,140	44,400
10	1,730	1,030		1,380	1,270	4,730	4,580	2,420	29,900
11	1,680	--		1,320	1,090	3,880	4,470	1,810	21,800
12	1,640	--		1,330	1,020	3,660	3,900	1,460	15,400
13	1,630	--		1,310	696	2,460	4,800	3,360	43,500
14	1,400	384		1,230	636	2,110	4,200	1,520	17,200
15	1,410	--	e 4,500	1,200	684	2,220	4,180	1,420	16,000
16	1,440	--		1,220	888	2,920	4,010	1,320	14,300
17	1,780	--		1,310	1,560	5,520	3,900	1,360	14,300
18	1,780	--		1,460	2,040	8,040	3,500	1,490	14,100
19	1,890	--		1,560	1,660	6,990	2,850	3,000	23,100
20	1,890	--		1,500	1,220	4,940	2,850	1,370	10,500
21	1,730	2,600		1,490	1,090	4,380	2,540	940	6,450
22	1,950	--		1,380	900	3,350	2,820	7,700	a 59,000
23	2,100	--		1,180	864	2,750	3,880	11,000	a 120,000
24	1,740	--		1,070	588	1,700	2,890	4,500	35,100
25	1,530	--		1,060	480	1,370	2,280	3,600	22,200
26	1,440	--		1,160	612	1,920	2,270	2,350	14,400
27	1,290	--		1,290	660	2,300	3,520	11,000	a 100,000
28	1,160	713		1,420	912	3,500	2,480	9,600	64,300
29	1,080	--		1,410	876	3,330	2,120	3,350	19,200
30	995	--		1,380	996	3,710	4,360	9,100	s 149,000
31	--	--	--	1,370	1,260	4,660	--	--	--
Total	46,465	--	135,000	42,538	--	152,970	99,110	--	1,058,240

Day	July			August			September		
1	6,910	25,200	470,000	636	190	326	716	120	232
2	3,920	14,600	154,000	636	140	240	684	110	203
3	3,380	4,800	43,800	642	130	225	684	110	203
4	3,290	2,330	20,700	630	150	255	700	80	151
5	3,290	1,560	13,800	624	120	202	724	110	215
6	3,020	1,030	8,400	590	120	191	748	130	262
7	2,490	860	5,780	580	120	188	804	140	304
8	2,100	740	4,200	585	100	158	829	190	425
9	1,980	640	3,420	618	90	150	812	130	285
10	1,670	640	2,880	624	110	185	812	130	285
11	1,350	450	1,640	624	90	152	856	150	347
12	1,180	390	1,240	630	110	187	856	130	300
13	1,100	400	1,190	642	110	191	788	120	255
14	1,040	310	870	838	800	a 1,800	829	140	313
15	910	260	639	772	2,100	a 4,400	812	120	263
16	847	250	572	724	2,240	4,380	883	350	834
17	838	200	452	676	610	1,110	1,240	1,860	6,230
18	812	200	438	668	280	505	1,260	2,100	a 7,100
19	772	240	500	660	230	410	1,090	2,800	a 8,200
20	950	1,700	a 4,400	660	240	428	1,080	660	1,920
21	920	2,140	5,320	764	160	330	1,060	510	1,460
22	856	500	1,160	788	1,200	a 2,600	1,060	410	1,170
23	796	390	838	676	1,290	2,350	1,070	370	1,070
24	740	260	519	684	820	1,510	1,090	340	1,000
25	692	220	411	748	480	969	1,070	270	780
26	668	170	307	970	1,200	a 3,100	1,120	330	998
27	700	130	246	920	650	1,610	1,210	440	1,440
28	716	140	271	618	330	551	1,310	750	a 2,700
29	676	150	274	624	250	421	1,440	1,400	a 5,400
30	642	120	208	642	140	243	1,300	2,980	10,500
31	642	120	208	692	130	243	--	--	--
Total	49,897	--	748,683	21,185	--	29,610	28,937	--	54,845

Total discharge for year (cfs-days) 679,642
Total load for year (tons) 2,915,548

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

YELLOWSTONE RIVER BASIN--Continued

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

Particle-size analyses of suspended sediment, water year October 1958 to September 1959
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Oct. 3, 1958	10:15 a.m.	2,320	52	1,270	4,830	8	14	17	23	32	57	73	94		100	--	VBWCM
Nov. 6	2:40 p.m.	2,600	43	894	1,780	3	5	7	10	15	33	53	86		99	100	VBWCM
Apr. 10, 1959	5:40 p.m.	2,020	46	1,040	1,260	12	15	20	23	30	46	65	92		100	--	VBWCM
May 8	5:45 p.m.	1,580	62	2,240	4,230	--	29	--	38	--	44	46	67		95	100	VPWCM
June 5	7:20 a.m.	1,980	64	1,870	3,750	--	18	--	38	--	71	78	93		100	--	VPWCM
July 1	1:05 p.m.	8,030	60	26,600	2,680	--	69	--	88	--	96	98	99		100	--	VPWCM
Aug. 12	10:15 a.m.	630	68	123	--	--	--	--	--	--	83	90	100		--	--	VM

6-2844. SHOSHONE RIVER NEAR GARLAND, WYO.

LOCATION.--At gaging station on county road, 300 feet downstream from Penrose Dam, 4½ miles upstream from Whistle Creek, 4 miles southeast of Garland, Park County, and 8 miles east of Powell.
DRAINAGE AREA.--2,040 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: August 1958 to October 1959 (discontinued).
REMARKS.--Records of discharge for water year October 1958 to September 1959 given in WSP 1629.

Chemical analyses, in parts per million, August 1958 to October 1959

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids				Hardness as $CaCO_3$		Per cent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million		Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
														Residue at 180°C	Sum									
Aug. 20, 1958...	2,040	16	0.01	31	11	31	2.0	131	77	2.9	0.4	2.2	0.07	241	--	0.33	1,330	124	17	35	1.2	370	8.2	5
Sept. 9.....	2,250	15	.02	33	11	31	2.2	127	85	3.7	.3	1.4	.08	258	--	.35	1,570	127	23	34	1.2	390	7.3	5
Oct. 3.....	17	14	.01	56	26	97	3.8	214	271	8.6	.6	3.8	.17	600	--	.82	27.5	248	73	45	2.7	884	7.6	5
Nov. 6.....	562	17	.01	92	35	100	5.2	267	343	11	.6	3.5	.28	757	--	1.03	1,150	374	155	36	2.2	1,070	7.6	2
Dec. 5.....	502	21	.01	123	38	108	5.8	346	383	12	.6	6.6	.29	879	--	1.20	1,190	462	178	33	2.2	1,210	7.8	2
Jan. 6, 1959....	333	18	.00	130	45	126	6.3	356	455	16	.6	7.6	.36	1,010	980	1.37	908	510	218	35	2.4	1,360	7.8	2
Feb. 3.....	a 110	16	.01	153	75	185	10	379	697	26	.9	7.8	.54	1,440	1,360	1.96	428	691	380	36	3.1	1,840	7.5	4
Mar. 30.....	a 75	14	.03	134	66	168	9.6	344	640	24	1.1	5.3	.47	1,330	1,230	1.81	269	606	324	37	3.0	1,800	7.6	4
May 8.....	5.0	16	.00	80	28	96	4.5	245	311	11	.6	2.8	.25	690	--	.94	9.32	316	115	39	2.4	997	7.5	3
June 5.....	2.0	16	.00	63	19	77	2.4	225	211	7.5	.5	4.1	.20	527	--	.72	2.85	237	52	41	2.2	790	7.9	5
July 1.....	61	16	.01	51	18	67	2.3	180	183	6.0	.4	3.8	.13	443	--	.60	73.0	203	55	41	2.0	672	7.6	5
July 30.....	57	17	.02	49	16	67	2.4	181	169	5.1	.4	3.7	.13	433	--	.59	66.6	187	39	43	2.1	650	8.0	8
Sept. 3.....	112	14	.00	48	20	72	3.2	178	210	6.7	.3	.4	.16	466	--	.63	141	201	55	43	2.2	700	7.6	18
Oct. 2.....	224	16	.01	59	20	68	2.8	197	199	5.8	.5	2.9	.15	478	--	.65	289	229	67	39	2.0	716	7.4	6

a Daily mean discharge.

YELLOWSTONE RIVER BASIN--Continued

6-2845. BITTER CREEK NEAR GARLAND, WYO.

LOCATION.--At gaging station, three-quarters of a mile upstream from mouth, 4 miles southeast of Garland, Park County, and 5 miles southwest of Byron.
DRAINAGE AREA.--50 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: August 1958 to September 1959.
REMARKS.--Records of discharge for water year October 1958 to September 1959 given in WSP 1629.

Chemical analyses, in parts per million, August 1958 to September 1959

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids				Hardness as $CaCO_3$		Per cent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million		Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
														Residue at 180°C	Sum									
Aug. 20, 1958...	309	18	0.01	48	16	93	3.0	215	198	6.6	0.8	6.6	0.13	508	--	0.69	424	184	8	52	3.0	750	8.1	6
Sept. 9.....	252	17	.01	51	18	100	3.3	208	232	7.4	.7	6.2	.15	555	--	.75	378	202	31	51	3.1	806	7.4	7
Oct. 3	232	18	.01	74	25	121	4.0	269	307	8.3	.8	4.8	.19	711	--	.97	445	286	65	47	3.1	1,030	7.5	5
Nov. 6	74	19	.01	79	33	238	3.5	341	544	15	1.2	14	.25	1,130	1,110	1.54	226	333	53	61	5.7	1,590	7.9	5
Dec. 5	24	21	.00	85	34	275	3.4	390	599	16	1.4	16	.25	1,240	1,240	1.69	80.4	350	30	63	6.4	1,720	7.7	5
Jan. 7, 1959....	32	22	.01	78	32	238	3.3	366	506	14	1.2	19	.27	1,100	1,090	1.50	95.0	328	28	61	5.7	1,550	7.9	3
Feb. 3	a 24	20	.01	85	33	281	3.3	375	609	17	1.1	15	.26	1,270	1,250	1.73	82.3	346	38	64	6.6	1,780	7.7	5
Mar. 30.....	17	7.9	.01	50	36	340	3.8	217	767	19	1.0	2.5	.25	1,380	1,340	1.88	63.3	271	78	73	9.0	2,080	8.5	9
May 8.....	51	16	.00	70	32	182	4.7	250	469	15	.8	5.9	.25	950	--	1.29	131	305	100	56	4.5	1,340	7.5	4
June 5.....	239	18	.00	77	14	116	3.0	255	281	8.9	.7	8.1	.24	662	--	.90	427	249	40	50	3.2	978	7.7	5
July 1.....	228	18	.01	62	19	106	2.8	222	262	7.5	.7	6.0	.18	603	--	.82	371	231	49	50	3.0	885	7.7	4
July 30.....	215	19	.02	61	17	119	3.0	241	256	7.2	.8	9.8	.16	630	--	.86	366	220	22	54	3.5	919	7.7	7
Sept. 3.....	268	17	.00	62	19	105	3.9	229	269	6.6	.7	2.9	.21	601	--	.82	435	232	44	49	3.0	873	7.9	18

a Daily mean discharge.

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 2½ miles east of Deaver, Big Horn County.
DRAINAGE AREA.--340 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: August 1958 to September 1959.
REMARKS.--Records of discharge for period August 1958 to September 1959 given in WSP 1629.

Chemical analyses, in parts per million, August 1958 to September 1959

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids: Parts per million: Residue at 180°C	Dissolved solids: Parts per million: Sum	Dissolved solids: Tons per acre-foot	Dissolved solids: Tons per day	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Per cent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Aug. 20, 1958...	160	15	0.00	86	37	139	4.0	207	487	13	0.5	3.0	0.20	906	--	1.23	391	368	198	45	3.1	1,230	7.9	10
Sept. 9.....	100	14	.00	102	54	207	3.8	232	709	16	.5	3.1	.24	1,260	1,220	1.71	340	477	287	48	4.1	1,630	8.0	7
Oct. 3	138	15	.01	115	56	191	4.8	262	664	14	.5	2.0	.28	1,250	1,190	1.70	466	516	301	44	3.7	1,620	7.4	6
Nov. 6	70	14	.02	194	125	443	6.2	338	1,640	33	.8	9.3	.55	2,770	2,630	3.77	524	996	719	49	6.1	3,240	7.6	4
Dec. 5	a 32	13	.01	245	148	562	6.2	403	2,060	35	.7	16	.53	3,510	3,280	4.77	303	1,220	890	50	7.0	3,950	7.6	6
Jan. 6, 1959....	10	11	.01	280	175	702	6.4	470	2,460	41	.7	21	.60	4,230	3,930	5.75	114	1,420	1,040	52	8.1	4,670	7.9	6
Feb. 3	a 6	11	.01	268	175	690	6.1	436	2,380	44	.7	20	.59	4,090	3,810	5.56	66.2	1,390	1,030	52	8.1	4,580	7.7	7
Mar. 30.....	a 18	9.5	.01	231	176	590	6.2	360	2,190	51	1.0	11	.56	3,700	3,440	5.03	180	1,300	1,010	50	7.1	4,200	7.7	10
May 8.....	a 108	15	.00	121	57	190	6.4	275	689	20	.6	3.8	.32	1,310	1,240	1.78	382	536	310	43	3.6	1,710	7.6	4
June 4.....	59	16	.00	122	52	201	4.5	249	729	17	.5	5.4	.33	1,350	1,270	1.84	215	518	314	45	3.8	1,750	7.8	13
July 1.....	208	16	.01	88	35	127	3.3	191	447	11	.4	3.2	.21	864	--	1.18	485	362	205	43	2.9	1,190	7.9	6
July 30.....	80	14	.01	103	47	188	4.1	223	625	12	.4	4.5	.23	1,170	1,110	1.59	253	450	267	47	3.9	1,540	8.0	9
Sept. 3.....	144	14	.01	100	43	148	4.0	203	544	12	.5	1.9	.27	1,000	968	1.36	389	425	259	43	3.1	1,340	7.5	22

a Daily mean discharge.

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 1½ miles upstream from mouth.
DRAINAGE AREA.--2,990 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to June 1953, August 1958 to September 1959.
REMARKS.--Records of discharge for water year October 1958 to September 1959 given in WSP 1629.

Chemical analyses, in parts per million, August 1958 to September 1959

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids: Parts per million: Residue at 180°C	Dissolved solids: Parts per million: Sum	Dissolved solids: Tons per acre-foot	Dissolved solids: Tons per day	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Per cent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Aug. 20, 1958...	3,300	15	0.00	53	17	64	2.8	176	192	6.5	0.5	3.3	0.11	452	--	0.61	4,030	201	57	40	2.0	673	8.1	7
Sept. 9.....	3,130	15	.00	50	17	63	3.0	166	188	5.5	.5	1.9	.10	438	--	.60	3,700	194	58	41	2.0	640	8.2	5
Oct. 3	792	15	.01	108	42	157	4.6	271	530	12	.5	3.3	.24	1,060	1,010	1.44	2,270	442	220	43	3.3	1,430	7.4	6
Nov. 6	784	16	.02	125	49	164	5.6	300	571	16	.7	5.3	.29	1,160	1,100	1.58	2,450	515	269	41	3.1	1,550	7.4	3
Dec. 5	610	19	.01	138	47	168	5.6	356	572	16	.6	4.8	.32	1,170	1,150	1.59	1,930	538	246	40	3.1	1,560	7.7	1
Jan. 6, 1959....	658	22	.01	175	61	183	8.0	450	658	20	.8	7.5	.45	1,420	1,360	1.93	2,520	686	317	36	3.0	1,810	7.8	3
Feb. 3	a 150	17	.01	185	81	270	8.7	412	920	32	1.0	8.6	.50	1,820	1,730	2.48	737	794	456	42	4.2	2,270	7.6	5
Mar. 30.....	242	13	.00	153	80	288	7.4	328	990	31	1.1	5.6	.43	1,840	1,730	2.51	1,200	712	443	46	4.7	2,540	7.7	4
May 8.....	334	15	.00	111	48	186	5.1	268	643	19	.6	1.6	.29	1,210	1,160	1.65	1,090	474	254	46	3.7	1,610	7.5	5
June 5.....	345	18	.00	123	42	175	4.1	271	622	15	.7	5.6	.37	1,200	1,140	1.63	1,120	479	257	44	3.5	1,590	7.7	6
July 1.....	1,150	16	.02	81	26	120	3.7	209	369	9.5	.5	5.3	.17	760	--	1.03	2,360	310	139	45	3.0	1,070	7.5	4
July 31.....	550	17	.01	101	36	154	3.7	242	499	12	.6	5.2	.21	988	--	1.34	1,470	398	200	45	3.4	1,340	7.6	12
Sept. 3.....	1,190	15	.01	90	31	128	3.9	232	437	10	.6	1.7	.25	850	--	1.16	2,730	354	164	44	3.0	1,170	7.4	18

a Daily mean discharge.

6-2947. BIGHORN RIVER AT BIGHORN, MONT.

LOCATION.--At gaging station at bridge on U.S. Highway 10, three-quarters of a mile upstream from mouth, 1 mile southwest of Bighorn, Treasure County, and 4 miles east of Custer.
RECORDS AVAILABLE.--Chemical analyses: February 1950 to September 1959.
Water temperatures: April 1949 to September 1951, August 1952 to November 1958, June to September 1959.
Sediment records: July 1947 to September 1954, October 1955 to September 1958.
EXTREMES, 1958-59.--Dissolved solids: Maximum, 977 ppm Mar. 20 to Apr. 30; minimum, 377 ppm June 11-20.
Hardness: Maximum, 432 ppm Mar. 20 to Apr. 30; minimum, 211 ppm June 11-20.
Specific conductance: Maximum daily, 1,370 micromhos Apr. 2, 30; minimum daily, 550 micromhos June 13.
Water temperatures: Maximum, 77°F July 15, 26.
EXTREMES, 1949-59.--Dissolved solids (1951-59): Maximum, 1,190 ppm July 28-31, 1955; minimum, 304 ppm June 23, 1951.
Hardness (1951-59): Maximum, 544 ppm July 28-31, 1955; minimum, 151 ppm June 23, 1951.
Specific conductance (1951-59): Maximum daily, 1,640 micromhos Nov. 18, 1955; minimum daily, 384 micromhos June 20, 1951.
Water temperatures (1949-51, 1952-59): Maximum, 89°F Aug. 7, 1953; minimum, freezing point on many days during winter months.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Worland, Wyo. Records of discharge for water year October 1958 to September 1959 given in WSP 1629.

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Oct. 1-17, 1958....	3,623	--	--	--	--	102	--	211	--	--	--	--	--	727	0.99	7,110	333	160	40	2.4	1,030	7.4	--
Oct. 18-31.....	4,251	13	0.01	82	29	98	3.6	209	338	13	0.4	1.2	0.14	697	.95	8,000	324	153	39	2.4	991	7.2	3
Nov. 1-30.....	3,907	--	--	--	--	107	--	228	--	--	--	--	--	767	1.04	8,090	352	165	40	2.5	1,060	7.2	--
Dec. 1-31.....	3,688	--	--	--	--	111	--	252	--	--	--	--	--	816	1.11	8,120	384	177	39	2.5	1,130	7.5	--
Jan. 1-24, 1959 ...	2,881	--	--	--	--	113	--	232	--	--	--	--	--	841	1.14	6,540	392	202	39	2.5	1,160	7.8	--
Jan. 25-Feb. 25 ...	2,294	10	.00	102	37	111	4.0	250	411	17	.5	1.5	.16	864	1.18	5,350	406	201	37	2.4	1,200	7.7	7
Feb. 26-Mar. 19...	2,741	--	--	--	--	85	--	188	--	--	--	--	--	675	.92	4,990	314	160	37	2.1	943	7.5	--
Mar. 20-Apr. 30...	2,578	--	--	--	--	142	--	252	--	--	--	--	--	977	1.33	6,800	432	255	42	3.0	1,340	7.5	--
May 1-18	2,617	--	--	--	--	118	--	230	--	--	--	--	--	805	1.09	5,690	365	176	41	2.7	1,130	7.5	--
May 19-31	2,655	12	.01	76	25	75	3.2	199	266	8.8	.3	1.5	.13	588	.80	4,210	294	131	35	1.9	851	7.7	--
June 1-10	4,017	--	--	--	--	64	--	207	--	--	--	--	--	523	.71	5,670	276	106	33	1.7	768	7.7	--
June 11-20	5,808	9.7	.01	59	16	40	2.1	170	151	4.1	.3	.9	.08	377	.51	5,910	211	72	29	1.2	581	7.5	12
June 21-30	4,234	--	--	--	--	63	--	188	--	--	--	--	--	550	.75	6,290	285	131	32	1.6	793	7.7	--
July 1-12.....	4,284	--	--	--	--	85	--	211	--	--	--	--	--	652	.89	7,540	314	141	37	2.1	945	7.7	--
July 13-31.....	1,149	--	--	--	--	128	--	203	--	--	--	--	--	842	1.15	2,610	366	200	43	2.9	1,160	7.6	--
Aug. 1-15.....	1,187	--	--	--	--	130	--	195	--	--	--	--	--	874	1.19	2,800	366	206	44	3.0	1,200	7.2	--
Aug. 16-31.....	1,571	--	--	--	--	127	--	220	--	--	--	--	--	883	1.20	3,740	377	197	42	2.9	1,230	7.2	--
Sept. 1-9	1,357	--	--	--	--	129	--	186	--	--	--	--	--	875	1.19	3,210	370	217	43	2.9	1,210	7.4	--
Sept. 10-17.....	1,353	--	--	--	--	139	--	206	--	--	--	--	--	914	1.24	3,340	384	215	44	3.1	1,260	7.3	--
Sept. 18-30.....	2,498	12	.00	101	36	121	4.3	233	451	17	.5	1.6	.17	897	1.22	6,050	400	209	39	2.6	1,230	7.6	12
Weighted average a	2,898	--	--	--	--	103	--	221	--	--	--	--	--	757	1.03	5,920	352	171	38	2.4	1,060	--	--

a Represents 100 percent of runoff for water year October 1958 to September 1959.

YELLOWSTONE RIVER BASIN--Continued

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

Temperature (° F) of water, water year October 1958 to September 1959
/Once-daily measurement between 7 a.m. and 11 a.m./

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

a Measurement between 1 p.m. and 5 p.m.

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 1959.
Water temperatures: April 1949 to September 1959.
Sediment records: June 1946 to September 1951.
EXTREMES, 1958-59.--Dissolved solids: Maximum, 750 ppm July 15-21; minimum, 280 ppm Mar. 1-16.
Hardness: Maximum, 440 ppm Jan. 1-31; minimum, 104 ppm Oct. 22-23.
Specific conductance: Maximum daily, 1,320 micromhos July 20; minimum daily, 409 micromhos Mar. 14.
Water temperatures: Maximum, 73°F June 17, 18, July 28, Aug. 1; minimum, freezing point probably on many days during November to March.
EXTREMES, 1949-59.--Dissolved solids (1951-59): Maximum, 1,790 ppm Sept. 11, 1958; minimum, 200 ppm June 23-27, 1953.
Hardness (1951-59): Maximum, 688 ppm Sept. 11, 1958; minimum, 94 ppm May 4, 1955.
Specific conductance (1951-59): 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 1958 to September 1959 given in WSP 1629.

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Oct. 1-21, 1958....	150	--	--	--	--	65	--	273	--	--	--	--	--	551	0.75	223	318	94	31	1.6	835	7.4	--
Oct. 22-23	880	--	--	--	--	66	--	176	--	--	--	--	--	314	.43	746	104	0	58	2.8	493	7.6	--
Oct. 24-31	221	--	--	--	--	56	--	250	--	--	--	--	--	506	.69	302	298	93	29	1.4	769	7.4	--
Nov. 1-30.....	256	--	--	--	--	61	--	298	--	--	--	--	--	611	.83	422	366	122	27	1.4	891	7.2	--
Dec. 1-31.....	243	9.0	0.01	79	57	67	5.0	344	286	4.6	0.4	0.9	0.13	691	.94	453	432	150	25	1.4	1,010	7.7	3
Jan. 1-31, 1959....	197	--	--	--	--	68	--	350	--	--	--	--	--	692	.94	368	440	153	25	1.4	1,020	7.9	--
Feb. 1-28.....	191	--	--	--	--	58	--	350	--	--	--	--	--	649	.88	335	424	137	23	1.2	959	7.7	--
Mar. 1-16.....	1,076	7.0	.07	33	15	34	5.7	154	93	.2	.2	1.8	.08	280	.38	813	146	20	33	1.2	440	7.2	45
Mar. 17-28.....	2,235	--	--	--	--	56	--	253	--	--	--	--	--	502	.68	3,030	290	83	30	1.4	765	7.7	--
Mar. 29-Apr. 30 ...	546	--	--	--	--	59	--	261	--	--	--	--	--	555	.75	818	326	112	28	1.4	834	7.6	--
May 1-31.....	450	5.9	.02	62	40	49	5.3	253	210	3.0	.3	.6	.13	516	.70	627	320	113	25	1.2	779	7.7	6
June 1-12	420	--	--	--	--	39	--	228	--	--	--	--	--	406	.55	460	253	66	25	1.1	632	7.9	--
June 13-22	544	10	.01	42	21	25	2.6	188	91	.1	.2	.2	.07	290	.39	426	192	38	22	.8	475	7.6	7
June 23-July 14....	200	--	--	--	--	48	--	232	--	--	--	--	--	406	.55	219	234	44	31	1.4	640	7.9	--
July 15-21.....	81.7	--	--	--	--	128	--	351	--	--	--	--	--	750	1.02	165	334	46	45	3.0	1,110	8.0	--
July 22-31.....	204	--	--	--	--	46	--	213	--	--	--	--	--	408	.55	225	244	69	29	1.3	640	7.8	--
Aug. 1-31.....	221	--	--	--	--	39	--	221	--	--	--	--	--	393	.53	234	245	64	26	1.1	623	7.1	--
Sept. 1-13.....	222	--	--	--	--	43	--	225	--	--	--	--	--	432	.59	259	261	76	26	1.2	666	7.4	--
Sept. 14-23.....	192	--	--	--	--	49	--	228	--	--	--	--	--	474	.64	246	288	101	27	1.3	716	7.4	--
Sept. 24-30.....	141	9.4	.02	58	39	58	5.3	246	219	4.7	.3	.3	.15	519	.71	198	304	102	29	1.4	786	7.6	18
Weighted average a	382	--	--	--	--	52	--	250	--	--	--	--	--	490	0.67	505	292	87	28	1.3	742	--	--

a Represents 100 percent of runoff for water year October 1958 to September 1959.

YELLOWSTONE RIVER BASIN--Continued

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

Temperature (° F) of water, water year October 1958 to September 1959
/Once-daily measurement at 7 a.m./

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

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 1959.
Water temperatures: February 1951 to May 1954, October 1954 to September 1959.
Sediment records: March 1950 to September 1953.
EXTREMES, 1958-59.--Dissolved solids: Maximum, 2,090 ppm Sept. 15-24; minimum, 490 ppm Mar. 11-31.
Hardness: Maximum, 902 ppm Jan. 1-26; minimum, 168 ppm Oct. 21-24.
Specific conductance: Maximum daily, 2,700 micromhos Oct. 8; minimum daily, 555 micromhos Mar. 17.
Water temperatures: Maximum, 86°F July 26; minimum, freezing point probably on many days during November to March.
EXTREMES, 1951-59.--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, 1954-59), 86°F July 26, 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 Worland, Wyo. Records of discharge for water year October 1958 to September 1959 given in WSP 1629.

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids: Parts per million: Residue at 180°C	Dissolved solids: Parts per million: Sum	Dissolved solids: Tons per acre-foot	Dissolved solids: Tons per day	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Per cent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 1-20, 1958.	17.7	--	--	--	--	317	--	260	--	--	--	--	--	2,060	--	2.80	98.4	772	559	47	5.0	2,530	7.5	--
Oct. 21-24	268	--	--	--	--	154	--	222	--	--	--	--	--	700	--	.95	506	168	0	67	5.2	1,030	7.3	--
Oct. 25-27	103	--	--	--	--	206	--	222	--	--	--	--	--	1,390	--	1.82	387	564	382	44	3.8	1,750	7.5	--
Oct. 28-31	74.5	--	--	--	--	234	--	237	--	--	--	--	--	1,670	--	2.27	336	716	522	42	3.8	2,050	7.4	--
Nov. 1-30	83.8	9.4	0.04	195	85	245	7.7	285	1,070	58	0.4	3.5	0.22	1,910	1,810	2.60	432	836	602	39	3.7	2,320	7.4	13
Dec. 1-31	145	--	--	--	--	217	--	338	--	--	--	--	--	1,750	--	2.38	685	830	553	36	3.3	2,120	7.6	--
Jan. 1-26, 1959..	104	--	--	--	--	232	--	376	--	--	--	--	--	1,870	--	2.54	525	902	594	36	3.4	2,290	7.8	--
Jan. 27-Feb. 15.	132	13	.01	171	74	170	5.4	328	704	54	.4	3.4	.16	1,490	1,360	2.03	531	729	460	33	2.7	1,870	7.8	--
Feb. 16-Mar. 10	138	--	--	--	--	157	--	286	--	--	--	--	--	1,310	--	1.78	488	638	403	35	2.7	1,690	7.7	--
Mar. 11-31.....	3,872	--	--	--	--	68	--	156	--	--	--	--	--	490	--	.67	5,120	226	98	40	2.0	735	7.4	--
Apr. 1-30	495	--	--	--	--	184	--	252	--	--	--	--	--	1,390	--	1.89	1,860	618	411	39	3.2	1,780	7.5	--
May 1-7	466	--	--	--	--	186	--	250	--	--	--	--	--	1,400	--	1.90	1,760	629	424	39	3.2	1,770	7.5	--
May 8-21	670	--	--	--	--	142	--	226	--	--	--	--	--	1,060	--	1.44	1,920	489	304	39	2.8	1,420	7.3	--
May 22-June 5..	748	--	--	--	--	106	--	230	--	--	--	--	--	836	--	1.14	1,690	418	229	36	2.2	1,150	7.3	--
June 6-11	563	--	--	--	--	172	--	254	--	--	--	--	--	1,270	--	1.73	1,930	558	350	40	3.2	1,670	7.5	--
June 12-24	490	13	.01	99	32	99	5.3	208	367	23	.5	2.5	.13	773	--	1.05	1,020	378	207	36	2.2	1,090	7.5	23
June 25-July 12 .	924	--	--	--	--	130	--	225	--	--	--	--	--	1,360	--	1.85	3,390	714	529	28	2.1	1,650	7.6	--
July 13-21	162	--	--	--	--	176	--	212	--	--	--	--	--	1,300	--	1.77	569	574	400	40	3.2	1,670	7.8	--

YELLOWSTONE RIVER BASIN--Continued

6-3265. POWDER RIVER NEAR LOCATE, MONT.--Continued

Chemical analyses, in parts per million, water year October 1958 to September 1959--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids				Hardness as $CaCO_3$		Per cent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million		Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
														Residue at 180°C	Sum									
July 22-31, 1959.	45.6	--	--	--	--	265	--	238	--	--	--	--	--	1,720	--	2.34	212	688	493	46	4.4	2,140	8.0	--
Aug. 1-13.....	13.4	--	--	--	--	295	--	242	--	--	--	--	--	1,890	--	2.57	68.4	716	518	47	4.8	2,360	7.6	--
Aug. 14-23.....	1.43	13	0.00	181	69	328	11	255	1,150	52	0.5	0.1	0.26	2,040	1,930	1.37	7.88	735	526	49	5.3	2,490	7.7	14
Aug. 24.....	44	--	--	--	--	332	--	291	--	--	--	--	--	2,080	--	2.83	247	772	533	48	5.2	2,570	7.6	--
Aug. 25-Sept. 14.	2.01	--	--	--	--	332	--	271	--	--	--	--	--	2,060	--	2.80	11.2	751	529	49	5.3	2,560	7.6	--
Sept. 15-24.....	3.02	--	--	--	--	348	--	277	--	--	--	--	--	2,090	--	2.84	17.0	726	499	51	5.6	2,600	7.6	--
Sept. 25-30.....	48.0	--	--	--	--	264	--	275	--	--	--	--	--	1,210	--	1.65	157	275	49	68	6.9	1,690	7.3	--
Weighted average a	456	--	--	--	--	113	--	204	--	--	--	--	--	890	--	1.21	1,100	418	251	37	2.4	1,190	--	--

a Represents 100 percent of runoff for water year October 1958 to September 1959.

YELLOWSTONE RIVER BASIN--Continued

6A-3265. POWDER RIVER NEAR LOCATE, MONT.--Continued

Temperature (° F) of water, water year October 1958 to September 1959
/Once-daily measurement between 8 a.m. and 11 a.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	42	34	--	--	--	--	--	51	68	64	78	62
2	54	36	--	--	--	--	--	59	65	a 75	78	65
3	60	41	33	--	--	--	--	61	71	71	83	66
4	54	42	--	--	32	32	--	51	69	a 66	82	68
5	59	33	--	--	--	--	--	55	68	a 72	74	67
6	48	--	--	32	--	--	--	47	72	76	65	58
7	60	--	--	--	--	--	--	49	72	a 72	70	63
8	47	--	--	--	--	--	36	57	70	72	a 81	55
9	43	--	--	a 32	--	--	--	58	69	71	a 76	53
10	38	--	32	--	--	--	--	54	66	71	a 75	58
11	42	--	--	--	32	a 33	36	54	66	71	73	57
12	50	42	--	--	--	--	39	53	73	73	a 67	57
13	46	--	--	--	--	--	48	50	65	76	71	61
14	45	--	--	--	--	--	48	56	74	80	73	59
15	48	--	--	--	--	--	42	58	a 83	73	72	54
16	50	--	--	--	--	--	a 38	60	74	75	73	46
17	42	--	34	--	--	a 35	40	60	78	68	75	44
18	42	--	--	--	32	--	a 39	61	78	77	76	39
19	56	34	--	--	--	--	a 43	55	76	77	72	41
20	43	--	--	--	--	--	48	54	80	73	74	43
21	39	--	--	32	--	--	48	57	69	72	78	48
22	39	--	--	--	--	--	47	58	66	76	81	50
23	42	--	--	--	--	--	41	60	77	76	78	49
24	41	--	33	--	--	--	42	63	77	80	60	53
25	37	--	--	--	a 32	42	47	69	74	83	64	45
26	37	--	--	--	--	--	48	57	a 73	86	69	44
27	35	--	--	--	--	--	51	54	68	73	62	45
28	41	--	--	32	--	--	58	58	71	75	68	47
29	34	--	--	--	--	--	59	61	67	78	65	43
30	36	--	--	--	--	--	59	62	65	79	67	41
31	35	--	32	--	--	--	--	62	--	77	a 64	--
Average	45	--	--	--	--	--	--	57	71	74	72	53

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

YELLOWSTONE RIVER BASIN--Continued

6-3295. YELLOWSTONE RIVER NEAR SIDNEY, MONT.

LOCATION.--At bridge on State Highway 23, 2 miles south of Sidney, Richland County, 4½ miles downstream from gaging station, 2 miles downstream from Fox Creek, and 30 miles upstream from mouth.
DRAINAGE AREA.--69,450 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to September 1959.
Water temperatures: January 1951 to September 1959.
EXTREMES, 1958-59.--Dissolved solids: Maximum, 712 ppm Dec. 1 to Jan. 31; minimum, 186 ppm June 14-26.
Hardness: Maximum, 358 ppm Jan. 1-31; minimum, 120 ppm June 14-26.
Specific conductance: Maximum daily, 1,100 micromhos Dec. 19; minimum daily, 265 micromhos June 22.
Water temperatures: Maximum, 81°F July 26; minimum, freezing point probably on many days during November to March.
EXTREMES, 1951-59.--Dissolved solids: Maximum, 1,370 ppm Jan. 2-3, 1954; minimum, 173 ppm June 5-16, 1956.
Hardness: Maximum, 649 ppm Jan. 2-3, 1954; minimum, 102 ppm June 5-16, 1956.
Specific conductance: Maximum daily, 2,780 micromhos Jan. 14, 1951; minimum daily, 257 micromhos June 15, 1956.
Water temperatures: Maximum, 82°F July 14, 15, 1953; minimum, freezing point on many days during winter months.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Worland, Wyo. No appreciable inflow between gaging station and sampling station. Records of discharge for water year October 1958 to September 1959 given in WSP 1629.

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Oct. 1-15, 1958....	6,361	11	0.01	68	29	89	4.1	209	289	12	0.5	1.3	0.19	620	0.84	10,650	288	117	40	2.3	904	7.5	4
Oct. 16-31	8,317	--	--	--	--	84	--	209	--	--	--	--	--	599	.81	13,450	275	104	40	2.2	876	7.2	--
Nov. 1-30.....	7,420	--	--	--	--	86	--	228	--	--	--	--	--	641	.87	12,840	310	123	38	2.1	926	7.3	--
Dec. 1-31.....	6,179	--	--	--	--	96	--	260	--	--	--	--	--	712	.97	11,880	344	131	38	2.3	1,020	7.6	--
Jan. 1-31, 1959 ...	5,132	--	--	--	--	90	--	266	--	--	--	--	--	712	.97	9,870	358	140	35	2.1	1,010	7.7	--
Feb. 1-Mar. 3.....	4,390	--	--	--	--	82	--	248	--	--	--	--	--	678	.92	8,040	338	135	35	1.9	965	7.7	--
Mar. 4-31.....	20,270	9.9	.02	50	17	51	5.0	158	161	7.3	.4	1.3	.31	398	.54	21,780	194	64	35	1.6	606	7.3	--
Apr. 1-30.....	7,411	--	--	--	--	93	--	218	--	--	--	--	--	677	.92	13,550	315	136	39	2.3	973	7.3	--
May 1-18.....	9,252	--	--	--	--	65	--	188	--	--	--	--	--	486	.66	12,140	238	84	37	1.8	727	7.5	--
May 19-31.....	11,960	--	--	--	--	40	--	158	--	--	--	--	--	347	.47	11,200	182	52	32	1.3	532	7.4	--
June 1-13	19,930	--	--	--	--	30	--	167	--	--	--	--	--	302	.41	16,250	172	35	28	1.0	469	7.5	--
June 14-26	45,060	12	.00	36	7.3	15	1.8	128	45	1.2	.1	.2	.06	186	.25	22,630	120	15	21	.6	302	7.4	6
June 27-July 11....	32,720	--	--	--	--	27	--	151	--	--	--	--	--	275	.37	24,290	161	37	27	.9	438	7.5	--
July 12-22.....	14,630	--	--	--	--	29	--	124	--	--	--	--	--	244	.33	9,640	130	28	33	1.1	390	7.5	--
July 23-31.....	9,146	--	--	--	--	37	--	137	--	--	--	--	--	294	.40	7,260	147	35	35	1.3	461	7.7	--
Aug. 1-9.....	6,316	--	--	--	--	47	--	148	--	--	--	--	--	350	.48	5,970	169	48	38	1.6	541	7.1	--
Aug. 10-31.....	4,081	10	.00	51	21	68	4.1	177	205	93	.05	.4	.18	475	.65	5,230	214	69	40	2.0	709	7.5	8
Sept. 1-19.....	3,473	--	--	--	--	84	--	196	--	--	--	--	--	553	.75	5,190	251	90	42	2.3	832	7.3	--
Sept. 20-23.....	5,555	--	--	--	--	88	--	208	--	--	--	--	--	599	.81	8,980	276	105	41	2.3	881	7.5	--
Sept. 24-30.....	7,509	--	--	--	--	88	--	215	--	--	--	--	--	614	.84	12,450	279	103	41	2.3	892	7.4	--
Weighted average a	10,730	--	--	--	--	53	--	177	--	--	--	--	--	425	0.58	12,310	215	70	35	1.6	636	--	--

a Represents 100 percent of runoff for water year October 1958 to September 1959.

YELLOWSTONE RIVER BASIN--Continued

6-3295. YELLOWSTONE RIVER NEAR SIDNEY, MONT.--Continued

Temperature (° F) of water, water year October 1958 to September 1959
(Once-daily measurement between 3 p.m. and 8 p.m.)

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

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

MISSOURI RIVER MAIN STEM--Continued

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 1959.
Water temperatures: May 1951 to September 1959.
EXTREMES, 1958-59.--Dissolved solids: Maximum, 547 ppm Dec. 19 to Jan. 22; minimum, 199 ppm June 21-26.
Hardness: Maximum, 290 ppm Dec. 19 to Jan. 22; minimum, 115 ppm June 21-26.
Specific conductance: Maximum daily, 917 micromhos Dec. 21; minimum daily, 303 micromhos June 22.
Water temperatures: Maximum, 75°F July 26-28; minimum, freezing point on many days during November to March.
EXTREMES, 1950-59.--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, 303 micromhos June 22, 1959.
Water temperatures: Maximum (1951-59), 80°F July 21, 22, 1958; minimum (1954-55, 1956-59), 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 1958 to September 1959 given in WSP 1629.

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Oct. 1-31, 1958....	14,380	--	--	--	--	67	--	205	--	--	--	--	--	506	0.69	19,650	254	86	36	1.8	767	7.3	--
Nov. 1-25.....	14,770	11	0.00	63	27	65	3.7	210	222	10	0.6	1.2	0.17	509	.69	20,300	266	94	34	1.7	778	7.3	4
Dec. 19-Jan. 22, 1959	12,480	--	--	--	--	67	--	230	--	--	--	--	--	547	.74	18,430	290	101	33	1.7	822	7.4	--
Jan. 23-Mar. 7....	11,610	--	--	--	--	64	--	219	--	--	--	--	--	518	.70	16,240	277	97	33	1.7	776	7.6	--
Mar. 8-13.....	20,820	--	--	--	--	52	--	164	--	--	--	--	--	406	.55	22,820	205	71	36	1.6	622	7.5	--
Mar. 14-19.....	32,670	--	--	--	--	45	--	148	--	--	--	--	--	345	.47	30,430	164	43	37	1.5	535	7.3	--
Mar. 20-22.....	49,330	9.2	.02	37	14	44	5.5	142	114	6.0	.3	1.6	.11	323	.44	43,020	149	33	38	1.6	505	7.4	--
Mar. 23.....	110,000	--	--	--	--	43	--	195	--	--	--	--	--	374	.51	111,100	204	44	31	1.3	580	7.7	--
Mar. 24-26.....	55,100	--	--	--	--	42	--	160	--	--	--	--	--	345	.47	51,330	176	45	34	1.4	534	7.6	--
Mar. 27-31.....	31,560	--	--	--	--	44	--	170	--	--	--	--	--	364	.50	31,020	188	49	34	1.4	564	7.5	--
Apr. 1-30.....	17,620	--	--	--	--	65	--	198	--	--	--	--	--	497	.68	23,640	248	86	36	1.8	747	7.6	--
May 1-21.....	17,380	--	--	--	--	59	--	197	--	--	--	--	--	457	.62	21,450	235	73	35	1.7	699	7.7	--
May 22-31.....	19,220	11	.02	50	18	42	3.3	174	137	7.5	.5	1.2	.12	364	.50	18,890	197	54	31	1.3	563	7.6	9
June 1-8	19,090	--	--	--	--	48	--	177	--	--	--	--	--	380	.52	19,590	202	57	34	1.5	596	7.7	--
June 9	29,800	--	--	--	--	48	--	188	--	--	--	--	--	390	.53	31,380	218	64	32	1.4	609	8.0	--
June 10	39,500	--	--	--	--	38	--	190	--	--	--	--	--	342	.47	36,470	196	40	30	1.2	542	8.0	--
June 11-12	43,450	--	--	--	--	28	--	157	--	--	--	--	--	274	.37	32,140	162	33	27	1.0	437	7.6	--
June 13-16	40,650	--	--	--	--	23	--	135	--	--	--	--	--	228	.31	25,020	136	25	27	.9	370	7.9	--
June 17-20	56,800	--	--	--	--	21	--	129	--	--	--	--	--	211	.29	32,360	125	19	27	.8	341	7.9	--
June 21-26	54,630	11	.01	32	8.5	18	2.0	118	54	2.0	.2	.9	.06	199	.27	29,350	115	18	25	.7	314	7.3	8

June 27-July 1	53,900	--	--	--	--	31	--	154	--	--	--	--	--	283	.38	41,190	160	34	30	1.1	449	7.6	--
July 2-5	41,980	--	--	--	--	29	--	144	--	--	--	--	--	274	.37	31,060	158	40	29	1.0	436	7.6	--
July 6-11	35,500	--	--	--	--	41	--	156	--	--	--	--	--	340	.46	32,590	182	54	33	1.3	529	7.5	--
July 12-21	23,760	--	--	--	--	34	--	146	--	--	--	--	--	290	.39	18,600	158	38	32	1.2	463	7.5	--
July 22-31	17,470	--	--	--	--	38	--	154	--	--	--	--	--	320	.44	15,090	164	38	33	1.3	508	7.6	--
Aug. 1-31	12,990	--	--	--	--	52	--	187	--	--	--	--	--	402	.55	14,100	210	57	35	1.6	624	7.6	--
Sept. 1-21	11,790	8.8	.01	57	23	59	4.3	199	194	.7	.7	.3	.14	453	.62	14,420	238	75	35	1.7	696	7.4	5
Sept. 22-30	16,090	--	--	--	--	68	--	201	--	--	--	--	--	502	.68	21,810	248	83	37	1.9	752	7.3	--
Weighted average a	19,400	--	--	--	--	50	--	180	--	--	--	--	--	401	0.55	21,000	211	63	34	1.5	616	--	--
Weighted average b	18,810	--	--	--	--	50	--	182	--	--	--	--	--	406	0.55	20,620	213	64	34	1.5	623	--	--

a Represents 97 percent of runoff for water year October 1958 to September 1959.
b Includes estimated data for missing period. Represents 100 percent of runoff for water year October 1958 to September 1959.

MISSOURI RIVER MAIN STEM--Continued

6-3300. MISSOURI RIVER NEAR WILLISTON, N. DAK.--Continued

Temperature (° F) of water, water year October 1958 to September 1959
/Once-daily measurement between 4 p.m. and 7 p.m./

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

a Measurement between 8 a.m. and 12 m.
b Measurement between 1 p.m. and 3 p.m.

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

LOCATION.--Temperature recorder at gaging station, 4.3 miles north of Stanton, Mercer County, 5 miles upstream from Knife River, and 9 miles downstream from Garrison Dam.
DRAINAGE AREA.--181,400 square miles, approximately.
RECORDS AVAILABLE.--Water temperatures: June 1952 to September 1959.
EXTREMES, 1958-59.--Water temperatures: Maximum, 66°F July 30, Aug. 17; minimum, freezing point on many days during December to March.
EXTREMES, 1952, 1954-59.--Water temperatures: Maximum, 76°F July 27, 28, 1954; minimum (1954-59), freezing point on many days during winter months.
REMARKS.--Records of discharge for water year October 1958 to September 1959 given in WSP 1629.

Temperature (° F) of water, water year October 1958 to September 1959
/Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph/

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

TURTLE CREEK BASIN

MISCELLANEOUS ANALYSES OF LAKES IN TURTLE CREEK BASIN IN NORTH DAKOTA

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of collection	Water level[a]	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C) Parts per million	Dissolved solids Tons per acre-foot	Dissolved solids Tons per day	Hardness as $CaCO_3$ Calcium, magnesium	Hardness as $CaCO_3$ Noncarbonate	Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
LAKE ORDWAY NEAR TURTLE LAKE																							
Oct. 9, 1958.....	9.42	--	--	--	--	2,480		3,030	688	1,790	32	--	--	--	6,640	9.03		140	0	97	91	8,600	9.1
June 9, 1959.....	8.75	9.8	0.18	18	21	2,280	54	2,790	659	1,760	45	0.5	9.4	4.2	b 6,390	8.69		130	0	96	87	8,280	9.3
Sept. 29.....	9.58	19	.06	3.5	61	5,150	137	4,450	2,360	4,110	119	.7	1.8	10	c14,600	19.9		261	0	96	139	17,000	9.5

a In feet below temporary reference mark.
b Sum, 6,230 ppm.
c Sum, 14,200 ppm.

PAINTED WOODS CREEK BASIN

MISCELLANEOUS ANALYSES OF STREAMS IN PAINTED WOODS CREEK BASIN IN NORTH DAKOTA

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids Parts per million Residue at 180°C	Dissolved solids Parts per million Sum	Dissolved solids Tons per acre-foot	Dissolved solids Tons per day	Hardness as $CaCO_3$ Calcium, magnesium	Hardness as $CaCO_3$ Noncarbonate	Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
6-3418. PAINTED WOODS CREEK NEAR WILTON																								
Oct. 27, 1958..	0.1					557		894	814	20				2,030		2.76	0.55	398	0	75	12	2,780	7.9	
June 9, 1959...	.04	14	0.07	38	62	419	12	a 658	676	11	0.3	2.1	0.60	1,600	1,560	2.18	.17	348	0	71	9.7	2,220	8.3	

a Includes equivalent of 8 ppm of carbonate (CO_3).

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

LOCATION.--At spillway and irrigation outlets of Shadehill Reservoir, a quarter of a mile upstream from gaging station, three-quarters of a mile west of Shadehill, Perkins County, and 4 miles downstream from confluence of North and South Forks of Grand River. Prior to Oct. 25, 1958, gaging site three-quarters of a mile downstream.
DRAINAGE AREA.--3,120 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: April to October 1952, March 1953 to September 1959.
Water temperatures: August 1954 to September 1959.
EXTREMES, 1958-59.--Hardness: Maximum, 154 ppm Feb. 28 to Mar. 21 (irrigation outlet); minimum, 100 ppm Mar. 31 to Apr. 3 (spillway outlet).
Specific conductance: Maximum daily, 1,630 micromhos Feb. 27 (irrigation outlet); minimum daily, 985 micromhos Mar. 31 (spillway outlet).
EXTREMES, 1954-59.--Dissolved solids (1954-58): Maximum, 990 ppm Sept. 3-30, 1958 (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. Discharge records for gaging station at Shadehill for water year October 1958 to September 1959 given in WSP 1629.

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids: Parts per million: Residue at 180°C	Dissolved solids: Parts per million: Sum	Dissolved solids: Tons per acre-foot	Dissolved solids: Tons per day	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Per cent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 1-18, 1958..	9.47	--	--	--	--	298	--	424	--	--	--	--	--	--		--	--	140	0	82	11	1,500	7.6	--
Oct. 19-Dec. 4..	8.37	--	--	--	--	300	--	430	--	--	--	--	--	--		--	--	142	0	82	11	1,510	7.7	--
Dec. 5-26.....	9.23	--	--	--	--	309	--	440	--	--	--	--	--	--		--	--	146	0	82	11	1,550	7.7	--
Dec. 27-Jan. 31, 1959	9.56	--	--	--	--	314	--	457	--	--	--	--	--	--		--	--	148	0	82	11	1,600	7.6	--
Feb. 1-27.....	9.58	--	--	--	--	328	--	470	--	--	--	--	--	--		--	--	150	0	83	12	1,630	7.8	--
Feb. 28-Mar. 21	13.5	--	--	--	--	327	--	a 477	--	--	--	--	--	--		--	--	154	0	82	11	1,630	8.3	--
Mar. 22-30.....	310	4.4	0.00	30	18	325	8.5	468	467	6.2	0.6	0.5	0.45	1,100	1,090	1.50	921	150	0	81	12	1,620	7.9	11
Mar. 22-30 b....	310	5.8	.03	20	17	237	7.2	348	335	4.4	.4	.7	.33	814		1.11	681	118	0	80	9.5	1,220	7.8	28
Mar. 31-Apr. 3 .	207	--	--	--	--	294	--	433	--	--	--	--	--	--		--	--	140	0	82	11	1,490	8.0	--
Mar. 31-Apr. 3 b	207	--	--	--	--	197	--	298	--	--	--	--	--	--		--	--	100	0	81	8.6	1,050	7.6	--
Apr. 4-29.....	82.9	--	--	--	--	277	--	410	--	--	--	--	--	--		--	--	133	0	82	10	1,410	8.0	--
Apr. 4-29 b.....	82.9	--	--	--	--	279	--	410	--	--	--	--	--	--		--	--	132	0	82	11	1,410	8.0	--
Apr. 30-May 12..	46.5	--	--	--	--	272	--	407	--	--	--	--	--	--		--	--	134	0	82	10	1,400	8.1	--
Apr. 30-May 12 b	46.5	--	--	--	--	273	--	406	--	--	--	--	--	--		--	--	134	0	82	10	1,410	7.9	--
May 13-31	15.4	--	--	--	--	269	--	407	--	--	--	--	--	--		--	--	134	0	81	10	1,400	8.0	--
June 1-30.....	18.4	--	--	--	--	276	--	412	--	--	--	--	--	--		--	--	132	0	82	10	1,410	8.0	--
July 1-31	15.5	--	--	--	--	286	--	418	--	--	--	--	--	--		--	--	134	0	82	11	1,430	8.2	--
Aug. 1-31.....	13.2	--	--	--	--	300	--	427	--	--	--	--	--	--		--	--	132	0	83	11	1,450	8.2	--
Sept. 1-30	13.1	3.4	.02	27	16	294	8.6	c 439	415	5.7	.5	.5	.35	993		1.35	35.1	134	0	82	11	1,480	8.6	13
Weighted average d.....	27.9	--	--	--	--	299	--	437	--	--	--	--	--	--		--	--	141	0	82	11	1,510	--	--

a Includes equivalent of 3 ppm of carbonate (CO_3).
b Sample collected at spillway outlet. Not included in weighted average.
c Includes equivalent of 14 ppm of carbonate (CO_3).
d Represents 100 percent of runoff for water year October 1958 to September 1959.

GRAND RIVER BASIN--Continued

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

Temperature (° F) of water, water year October 1958 to September 1959
(Once-daily measurement between 8 a.m. and 12 m.)

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

a Measurement between 1 p.m. and 6 p.m.

MISCELLANEOUS ANALYSES OF LAKES IN GRAND RIVER BASIN IN SOUTH DAKOTA

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of collection	Pool elevation (feet)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
6-3570. SHADEHILL RESERVOIR AT SHADEHILL																							
June 18, 1958.....	2,272.55	1.3	0.01	28	18	280	7.8	a 418	390	3.2	0.4	0.3	0.32	960	1.31		144	0	80	10	1,420	8.5	10
Apr. 9, 1959.....	2,272.48	2.8	.02	26	16	276	8.2	402	385	5.1	.4	.6	.35	940	1.28		131	0	81	10	1,410	8.2	23

a Includes equivalent of 14 ppm of carbonate (CO_3).

CHEYENNE RIVER BASIN

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

LOCATION.--At gaging station at bridge on State Highway 87, a quarter of a mile downstream from Cascade Creek and 10 miles southwest of Hot Springs, Fall River County.
DRAINAGE AREA.--8,710 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: April 1947 to September 1951.
Water temperatures: July 1947 to September 1949, April 1951 to September 1959.
Sediment records: April 1946 to September 1959.
EXTREMES, 1958-59.--Sediment concentrations: Maximum daily, 23,400 ppm June 2; minimum daily, not determined.
Sediment loads: Maximum daily, 72,000 tons June 24; minimum daily, less than 0.50 ton on many days.
EXTREMES, 1946-59.--Water temperatures: Maximum (1947-49, 1951-55, 1956-58), 91°F Aug. 9, 1958; minimum (1947-49, 1951-56), freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 55,000 ppm June 19, 1950; minimum daily, not determined.
Sediment loads: Maximum daily, 612,000 tons June 28, 1952; minimum daily, 0.1 ton or less on several days during some years.
REMARKS.--Records of discharge for water year October 1958 to September 1959 given in WSP 1629.

Temperature (° F) of water, water year October 1958 to September 1959
/Once-daily measurement between 2 p.m. and 5 p.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	--	--	--	--	--	--	61	--	--	--	78	--
2	--	58	--	--	--	--	a 60	--	a 65	a 67	--	--
3	68	--	--	--	--	--	--	--	a 70	77	82	--
4	--	--	--	--	51	--	--	--	78	a 65	--	77
5	67	a 51	--	45	--	--	b 68	--	81	b 78	--	--
6	--	--	--	--	--	--	--	--	b 76	b 80	a 77	77
7	a 58	50	--	a 44	--	--	60	--	b 76	79	a 74	--
8	--	--	--	--	--	a 40	--	a 60	--	a 68	--	--
9	58	--	--	--	--	a 39	--	--	b 76	b 70	--	--
10	--	--	--	--	49	44	--	b 62	--	b 77	--	77
11	68	--	--	--	--	a 48	--	--	--	--	78	--
12	--	60	--	--	--	48	--	a 69	b 75	b 74	--	--
13	70	--	--	--	--	a 37	--	--	--	--	70	75
14	a 64	--	--	--	--	--	--	--	b 80	a 66	--	--
15	--	--	--	--	--	a 47	--	b 67	--	79	--	--
16	65	--	--	--	54	b 52	60	--	a 82	82	78	53
17	--	--	a 50	--	--	--	--	--	b 72	a 76	--	--
18	--	--	46	--	--	--	49	b 70	--	80	--	69
19	--	--	--	--	--	--	--	--	--	--	a 72	--
20	--	--	--	38	a 42	--	57	62	b 78	b 75	80	--
21	52	--	--	--	--	--	69	--	77	83	--	70
22	--	--	--	--	--	a 41	60	--	a 64	b 74	--	--
23	--	--	54	--	--	a 47	--	--	76	87	79	--
24	--	--	--	--	53	38	--	b 70	76	--	--	--
25	58	--	--	--	--	a 39	--	--	b 77	80	74	61
26	--	a 45	--	--	--	a 43	--	76	a 73	--	--	--
27	--	--	--	a 48	a 43	a 45	--	a 66	--	--	--	--
28	52	--	--	52	--	b 53	--	--	--	80	--	a 50
29	--	--	a 50	--	--	b 52	--	--	a 58	--	--	a 47
30	57	51	--	--	--	a 46	--	--	a 59	--	--	55
31	--	--	--	48	--	--	--	b 64	--	a 75	a 80	--
Average	--	--	--	--	--	--	--	--	--	--	--	--

a Measurement between 8 a.m. and 1 p.m.
b Measurement between 6 p.m. and 7 p.m.

CHEYENNE RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959

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	18			11			20		
2	17			11			21		
3	18			12			22		
4	18			14			23		
5	17			13			19		
6	19			14	62	3	19		
7	20			17			18		
8	20			17			18		
9	20			19			18		
10	20	65	3	20			18		
11	20			20			18		
12	20			23			19		
13	19			25			19		
14	19			25			19		
15	19			24			19		
16	18			25			18	12	1
17	16			22	40	2	19		
18	12			22			19		
19	10			23			19		
20	10			23			19		
21	12			23			19		
22	12			23			19		
23	12			26	79	6	18		
24	12	73	2	30	--	e 8	18		
25	13			31	--	e 10	18		
26	14			23	44	3	18		
27	14			21			18		
28	12			21	20	1	18		
29	12			21			18		
30	12			20			17		
31	12			--	--	--	18		
Total	487	--	79	619	--	86	583		31

	January			February			March		
1	18			20			26	--	e 1
2	18			19			24	100	a 6
3	17			19			24	110	a 7
4	17			19			34	150	14
5	17			19			50	180	24
6	17			19			57	180	a 28
7	17			19			59	190	a 30
8	17			19			68	225	41
9	17			20			69	255	48
10	17			20			57	190	29
11	17			20			51	98	13
12	17			19			62	135	s 25
13	17			19			65	210	37
14	17			19			57	170	a 26
15	17			19	13	1	46	195	s 27
16	17	10	(t)	19			52	145	s 25
17	17			19			74	400	80
18	18			19			78	540	114
19	18			19			72	450	87
20	19			19			79	480	102
21	19			19			109	1,090	s 377
22	18			19			282	4,750	3,620
23	18			20			329	4,980	4,420
24	18			21			261	3,800	2,680
25	19			21			232	3,050	1,910
26	19			21			217	2,810	1,650
27	19			23			191	2,510	1,290
28	20			23			137	1,340	496
29	20			--		--	100	730	197
30	20			--		--	78	590	124
31	20			--		--	67	300	54
Total	556		16	551		28	3,107	--	17,582

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

CHEYENNE RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	54	245	36	22			158	14,400	s 16,500
2	47	145	18	24			274	23,400	17,300
3	40	130	a 14	22	15	1	159	14,300	6,140
4	36	75	a 7	24			111	6,200	1,860
5	32	42	4	31			72	1,750	340
6	27			32	60	a 5	47	430	55
7	25			42	220	a 25	36	145	14
8	25			32	21	2	27	110	a 8
9	25			30	--	e 2	22	70	4
10	25			28			22	55	a 3
11	24			26			21	42	a 2
12	24			24			17	34	a 2
13	24			24			17	28	a 1
14	23			22	22	1	17	26	1
15	22			17			17	25	a 1
16	21			17			17	41	2
17	21			17			19	32	2
18	22	24	2	17			19	26	a 1
19	23			21			19	28	a 1
20	24			23			243	3,840	s 4,010
21	26			23			116	3,980	s 4,740
22	26			22			85	2,250	516
23	25			21	16	1	694	23,200	s 49,200
24	25			20			1,170	21,400	s 72,000
25	25			20			1,060	19,200	55,000
26	24			21			509	13,800	19,000
27	23			20	52	3	231	6,000	s 3,940
28	23			23	75	a 5	196	5,400	2,860
29	22			22			202	2,820	1,540
30	21			23	50	3	201	2,760	s 1,610
31	--	--	--	23			--	--	--
Total	804	--	129	733	--	73	5,798	--	256,653

	July			August			September		
1	306	6,690	s 5,990	14			10		
2	422	16,200	18,500	12	28	1	10		
3	440	15,700	18,700	12			10		
4	240	9,870	6,400	12			10		
5	137	4,400	1,630	33	1,410	sa 320	10		
6	98	1,920	508	40	1,820	s 246	8		
7	78	990	208	18	94	5	8	32	1
8	72	640	124	12	65	a 2	8		
9	57	295	45	12	55	a 2	9		
10	42	150	17	10	44	a 1	10		
11	35	86	8	9	38	1	9		
12	30	60	5	8			9		
13	93	3,450	sa 2,700	6			10		
14	144	7,180	s 3,080	7			11		
15	132	2,550	909	7			12		
16	242	10,100	s 8,290	7			13		
17	210	7,390	s 4,420	8			13		
18	114	1,500	s 493	8			13	8	(t)
19	91	200	a 49	10			14		
20	71	110	21	10			14		
21	57	72	11	10	26	1	14		
22	47	50	6	10			14		
23	40	38	3	10			15		
24	32	--	e 2	10			20	100	sa 8
25	24			10			38	315	32
26	22			10			30	180	sa 17
27	22			10			33	110	a 10
28	21	16	1	10			33	46	4
29	19			10			26	555	39
30	18			10			21	--	e 6
31	17			10			--	--	--
Total	3,373	--	72,126	365	--	601	455	--	131

Total discharge for year (cfs-days) 17,431
Total load for year (tons) 347,535

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

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

Particle-size analyses of suspended sediment, water year October 1958 to September 1959
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Mar. 22, 1959....	10:00 a.m.	301	41	6,600	3,560	49	62		89		99	100	--				VPWCM
Mar. 23	10:00 a.m.	350	47	6,040	4,080	58	70		91		97	99	100				VPWCM
June 20	8:30 a.m.	630	66	6,870	4,630	51	62		83		95	98	100				VPWCM
June 21	10:30 a.m.	113	75	3,820	2,880	68	84		96		98	98	100				VPWCM
June 23	6:30 a.m.	990	64	31,600	5,360	52	64		88		97	98	100				VPWCM
June 23	2:00 p.m.	701	76	22,000	5,550	60	66		77		98	99	100				VPWCM
June 23	7:55 p.m.	393	75	12,200	4,200	54	67		94		99	100	--				VPWCM
June 24	7:45 a.m.	1,220	68	25,300	7,510	48	59		83		95	98	100				VPWCM
June 24	2:10 p.m.	1,550	76	21,700	6,230	48	58		81		94	98	100				VPWCM
June 24	2:10 p.m.	1,550	76	21,700	6,250	2	3		80		94	98	100				VPN
June 25	6:00 p.m.	1,040	78	19,600	5,770	60	71		90		98	99	100				VPWCM
June 26	9:00 a.m.	556	73	15,200	9,380	68	78		93		98	99	100				VPWCM
June 29	10:30 a.m.	209	58	2,830	2,010	72	85		96		100	--	--				PWCM
July 15	5:00 p.m.	182	79	2,220	1,490	63	73		90		99	100	--				VPWCM
July 16	9:30 a.m.	310	72	18,700	2,830	67	78		88		99	100	--				VPWCM
Aug. 6.....	11:00 a.m.	38	77	1,690	1,450	80	91		98		100	--	--				VPWCM
Sept. 29	8:30 a.m.	26	47	2,220	1,860	52	75		98		100	--	--				SPWCM

CHEYENNE RIVER BASIN--Continued

6-4015. CHEYENNE RIVER AT ANGOSTURA RESERVOIR OUTLET, S. DAK.

LOCATION.--At outlet to powerplant below Angostura Dam, 800 feet upstream from gaging station, 4¾ miles upstream from Fall River, and 6½ miles southeast of Hot Springs, Fall River County.
DRAINAGE AREA.--9,100 square miles, approximately.
RECORDS AVAILABLE.--Sediment records: October 1951 to September 1953, October 1954 to September 1959.
REMARKS.--Discharge records for gaging station below Angostura Dam for water year October 1954 to September 1959 given in WSP 1629.

Monthly and annual summary of water and suspended-sediment discharge, water year October 1958 to September 1959

Month	Discharge (cfs-days)	Runoff (acre-feet)	Suspended sediment					
			Load (tons)[a]	Daily load (tons)			Concentration (ppm)	
				Mean	Maximum	Minimum	Weighted mean	Maximum daily
October	1,904.1	3,780	149.6	4.83			29	
November	1,466.6	2,910	65.8	2.19			17	
December	1,690.2	3,350	28.7	.93			6	
January	1,762.0	3,490	23.9	.77			5	
February	1,790.1	3,550	24.2	.86			5	
March	42.2	84	1.2	.04			11	
April	40.0	79	2.1	.07			19	
May	46.9	93	4.7	.15			37	
June	105.8	210	7.7	.26			27	
July	58.2	115	3.6	.12			23	
August	84.9	168	3.1	.10			14	
September	37.8	75	.6	.02			6	
Water year	9,028.8	17,900	315.2	0.86			13	

a Based on infrequent samples.

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

LOCATION.--At gaging station at highway bridge, 4¼ miles northwest of Elm Springs, Meade County, and 5½ miles downstream from Hay Creek.
DRAINAGE AREA.--7,210 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to September 1951, July 1956 to September 1959.
REMARKS.--Determinations of manganese, copper, lead, zinc, arsenic, selenium, cyanides, and sulfides available in district office at Lincoln, Nebr. Records of discharge for water year October 1958 to September 1959 given in WSP 1629.

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids				Hardness as $CaCO_3$		Per cent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million		Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
														Residue at 180°C	Sum									
Oct. 10, 1958...	56	6.6	0.03	270	130	184	15	184	1,390	20	0.8	6.4	0.43	2,250	2,110	3.06	340	1,210	1,060	25	2.3	2,450	7.4	--
Nov. 6.....	46	8.2	--	268	139	200	14	214	1,410	28	.3	15	.21	2,400	2,190	3.26	298	1,240	1,070	26	2.5	2,620	7.5	5
Dec. 12.....	35	--	--	--	--	332	--	353	--	--	--	--	--	--	--	--	--	1,730	1,440	29	3.5	3,560	7.4	--
Jan. 5, 1959....	10	--	--	--	--	390	--	447	--	--	--	--	--	--	--	--	--	2,110	1,740	29	3.7	4,160	7.0	--
Feb. 3.....	30	--	--	--	--	268	--	397	--	--	--	--	--	--	--	--	--	1,640	1,310	26	2.9	3,220	6.9	--
Mar. 16.....	190	--	--	--	--	236	--	171	--	--	--	--	--	--	--	--	--	774	634	40	3.7	2,160	7.0	--
Mar. 26.....	133	5.1	.13	158	89	179	14	168	947	26	.4	18	.23	1,660	1,520	2.26	596	762	624	33	2.8	1,990	7.1	6
May 11.....	46	--	--	--	--	200	--	176	--	--	--	--	--	--	--	--	--	972	828	31	2.8	2,280	7.7	--
June 15.....	62	--	--	--	--	290	--	150	--	--	--	--	--	--	--	--	--	1,160	1,040	35	3.7	2,850	7.4	--
July 24.....	104	--	--	--	--	148	--	149	--	--	--	--	--	--	--	--	--	968	846	25	2.1	2,080	7.4	--
Aug. 13	64	--	--	--	--	190	--	148	--	--	--	--	--	--	--	--	--	1,130	1,010	27	2.5	2,400	7.6	--
Sept. 14.....	10	--	--	--	--	270	--	138	--	--	--	--	--	--	--	--	--	1,410	1,300	29	3.1	2,990	7.9	--

CHEYENNE RIVER BASIN--Continued

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

Periodic determinations of suspended-sediment discharge, October 1958 to May 1959

Date	Water discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Discharge (tons per day)
Oct. 10, 1958	56	218	33
Nov. 6	46	104	13
Dec. 12	35	99	9.4
Jan. 5, 1959	10	27	.7
Feb. 3	30	4	.3
Mar. 16	190	3,610	1,850
Mar. 26	133	2,560	919
May 11	46	85	11

Particle-size analyses of suspended sediment, October 1958 to May 1959
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Oct. 10, 1958	12:50 p.m.	56	47	218	3,160	35	58	89	97	99	100						VPWCM
Mar. 26, 1959	8:25 p.m.	133	44	2,560	6,140	36	57	86	98	98	100						VPWCM

MISCELLANEOUS ANALYSES OF STREAMS IN CHEYENNE RIVER BASIN

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids: Parts per million: Residue at 180°C	Dissolved solids: Parts per million: Sum	Dissolved solids: Tons per acre-foot	Dissolved solids: Tons per day	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Per cent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
WHITEWOOD CREEK NEAR VALE, S. DAK.																								
Mar. 26, 1959a.	16	9.1	0.03	127	63	34	18	220	457	17	0.5	0.1	0.10	883		1.20	38.1	578	398	11	0.6	1,190	7.3	6
Sept. 3.....	9.0	13	.25	141	69	48	24	214	553	24	.6	.2	.11	1,030	978	1.40	25.0	635	460	14	.8	1,340	7.6	5

a Also copper (Cu), 0.90 ppm; lead (Pb), 0.00 ppm; zinc (Zn), 0.13 ppm; arsenic (As), 0.11 ppm; cyanides as CN, 6.0 ppm; sulfides as H_2S, 0.0 ppm; manganese (Mn), 0.17 ppm; selenium (Se), 0.00 ppm.

CHEYENNE RIVER BASIN--Continued

MISCELLANEOUS ANALYSES OF STREAMS IN CHEYENNE RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge, water year October 1958 to September 1959

Date	Water discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Discharge (tons per day)
6-3860. LANCE CREEK AT SPENCER, WYO.			
Mar. 24, 1959	56	83	12
Mar. 27	8.0	200	4.3
Apr. 6	2.4	172	1.1
Apr. 17	1.5	67	.3
May 8	.6	126	.2
May 11	53	4,490	642
May 25	.2	124	.1
June 18, 7:45 p.m	39	16,800	1,770
June 18, 7:55 p.m	136	6,460	2,370
June 19	7.1	11,600	222
June 22	40	4,200	454
June 23	167	10,600	4,780
June 24	13	2,680	94
July 1	199	26,100	14,000
July 2	54	12,200	1,780
July 7	1.0	271	.7
July 8	1.0	702	1.9
Sept. 24	47	35,700	4,700
Sept. 25	1.2	2,530	8.2

Particle-size analyses of suspended sediment, water year October 1958 to September 1959
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
6-3860. LANCE CREEK AT SPENCER, WYO.																	
June 19, 1959	2:55 a.m.	7.1		11,600	6,230		86		98		100	--	--		--		PWCM
July 1	11:50 a.m.	199		26,100	5,770		68		87		90	91	93		97	100	VPWCM
July 2	11:55 a.m.	54		12,200	4,010		86		97		98	99	99		100		VPWCM

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 1959.
EXTREMES, 1958-59.--Water temperatures: Maximum, 95°F Aug. 23; minimum, freezing point on many days during December to March.
EXTREMES, June 1958 to September 1959.--Water temperatures: Maximum, 95°F Aug. 23, 1959; minimum, freezing point on many days during winter months.
REMARKS.--Records of discharge for water year October 1958 to September 1959 given in WSP 1629.

Temperature (° F) of water, water year October 1958 to September 1959
/Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph/

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

MISSOURI RIVER MAIN STEM

6-4675. MISSOURI RIVER AT YANKTON, S. DAK.

LOCATION.--At gaging station at Meridian Highway Bridge on U.S. Highway 81 in Yankton, Yankton County, 5.8 miles upstream from James River, 6.1 miles downstream from Gavins Point Dam.
DRAINAGE AREA.--279,500 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to September 1951, October 1956 to September 1959 (discontinued).
Water temperatures: October 1956 to September 1959 (discontinued).
EXTREMES, 1958-59.--Hardness: Maximum, 239 ppm Aug. 17 to Sept. 22; minimum, 177 ppm Dec. 1-5.
Specific conductance: Maximum daily, 760 micromhos Sept. 13, 14, 19; minimum daily, 443 micromhos Dec. 24.
Water temperatures: Maximum, 80°F Aug. 27; minimum, 33°F on many days during December to February.
EXTREMES, 1956-59.--Dissolved solids (1956-58): Maximum, 559 ppm Aug. 29 to Sept. 30, 1957; minimum, 327 ppm Mar. 16-31, 1957.
Hardness: Maximum, 250 ppm Aug. 29 to Sept. 30, 1957; minimum, 168 ppm Mar. 16-31, 1957.
Specific conductance: Maximum daily, 839 micromhos Aug. 24-25, Sept. 5-8, 1957; minimum daily, 443 micromhos Dec. 24, 1958.
Water temperatures: Maximum, 81°F Aug. 19, 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 1958 to September 1959 given in WSP 1629.

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Oct. 1-31, 1958....	29,980	--	--	--	--	66	--	190	--	--	--	--	--	--	--	--	238	82	38	1.9	742	7.2	--
Nov. 1-4.....	19,130	--	--	--	--	62	--	190	--	--	--	--	--	--	--	--	234	78	37	1.8	714	7.1	--
Nov. 5-30.....	8,184	--	--	--	--	60	--	189	--	--	--	--	--	--	--	--	233	78	36	1.7	702	7.3	--
Dec. 1-5.....	8,340	--	--	--	--	39	--	145	--	--	--	--	--	--	--	--	177	58	32	1.3	530	7.1	--
Dec. 6-23.....	10,160	--	--	--	--	54	--	186	--	--	--	--	--	--	--	--	231	78	34	1.5	671	7.2	--
Dec. 24-31.....	8,264	--	--	--	--	47	--	170	--	--	--	--	--	--	--	--	206	67	33	1.4	598	7.5	--
Jan. 1-31, 1959....	10,240	--	--	--	--	57	--	194	--	--	--	--	--	--	--	--	236	77	34	1.6	685	7.6	--
Feb. 1-28.....	10,530	--	--	--	--	55	--	190	--	--	--	--	--	--	--	--	231	75	34	1.6	676	7.5	--
Mar. 1-29.....	10,550	12	0.00	57	18	49	4.2	178	164	9.2	0.5	0.9	0.12	416	0.57	11,850	214	68	33	1.5	626	7.4	4
Mar. 30-Apr. 5....	21,140	--	--	--	--	40	--	160	--	--	--	--	--	--	--	--	181	50	32	1.3	533	7.6	--
Apr. 6-30.....	25,410	--	--	--	--	54	--	188	--	--	--	--	--	--	--	--	227	73	34	1.6	665	7.6	--
May 1-29.....	23,130	--	--	--	--	57	--	192	--	--	--	--	--	--	--	--	225	68	36	1.7	674	8.0	--
May 30-June 5.....	14,130	--	--	--	--	54	--	184	--	--	--	--	--	--	--	--	217	66	35	1.6	647	7.9	--
June 6-30.....	26,580	8.3	.01	57	18	56	4.7	183	176	8.8	.5	.3	.12	432	.59	31,000	218	68	35	1.6	659	7.4	7
July 1-24.....	26,260	--	--	--	--	59	--	185	--	--	--	--	--	--	--	--	215	63	37	1.8	669	7.7	--
July 25-Aug. 16....	28,890	--	--	--	--	65	--	195	--	--	--	--	--	--	--	--	232	72	38	1.9	711	7.6	--
Aug. 17-Sept. 22...	31,340	--	--	--	--	67	--	202	--	--	--	--	--	--	--	--	239	73	38	1.9	745	7.8	--
Sept. 23-30.....	28,650	--	--	--	--	67	--	200	--	--	--	--	--	--	--	--	220	56	40	2.0	738	7.7	--
Weighted average a.....	20,080	--	--	--	--	60	--	190	--	--	--	--	--	--	--	--	227	71	37	1.7	692	--	--

a Represents 100 percent of runoff for water year October 1958 to September 1959.

MISSOURI RIVER MAIN STEM--Continued

6-4675. MISSOURI RIVER AT YANKTON, S. DAK.--Continued

Temperature (° F) of water, water year October 1958 to September 1959
/Once-daily measurement between 8 a.m. and 12 m./

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

a Measurement between 6 p.m. and 10 p.m.
b Measurement between 1 p.m. and 5 p.m.

JAMES RIVER BASIN

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

LOCATION.--Temperature recorder at gaging station, downstream from bridge on State Highway 13, half a mile west of La Moure, La Moure County, and 12 miles upstream from Cottonwood Creek.
DRAINAGE AREA.--5,740 square miles, approximately, of which about 2,800 square miles is probably noncontributing.
RECORDS AVAILABLE.--Water temperatures: June 1953 to September 1959.
EXTREMES, 1958-59.--Water temperatures: Maximum, 83°F July 19; minimum, freezing point Dec. 6, 7, Feb. 25, 26, Mar. 21.
EXTREMES, 1953-59.--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 1958 to September 1959 given in WSP 1629.

Chemical analyses, in parts per million, November 1958 to September 1959

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
Nov. 6, 1958.....	12	4.3	0.01	86	38	118	10	445	0	196	49	0.2	0.4	0.33	752	1.02	24.4	371	6	40	2.7	1,150	7.6
June 7, 1959.....	19	--	--	--	--	120		399	0	188	52	--	--	--	697	.95	35.8	335	8	44	2.9	1,090	7.6
Sept. 27.....	7.3	15	.04	63	32	88	12	348	0	131	52	.1	2.6	.42	581	.79	11.5	289	4	39	2.2	916	7.8

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

Temperature (° F) of water, water year October 1958 to September 1959
/Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph/

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

JAMES RIVER BASIN--Continued

6-4710. JAMES RIVER AT COLUMBIA, S. DAK.
(formerly published as James River near Columbia)

LOCATION.--At bridge on county road, 3.5 miles north of Columbia, Brown County, approximately 5 miles upstream from gaging station, and 0.1 mile downstream from Columbia Road Reservoir.
DRAINAGE AREA.--7,050 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1951 to September 1952, November 1954 to September 1959.
REMARKS.--No flow during water year.

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 1959.
Water temperatures: August 1956 to September 1959.
EXTREMES, 1958-59.--Hardness: Maximum, 790 ppm Mar. 1-14; minimum, 299 ppm Oct. 1-31.
Specific conductance: Maximum daily, 2,640 micromhos Mar. 1; minimum daily, 1,050 micromhos Oct. 1.
Water temperatures: Maximum, 80°F Aug. 3, 21; minimum, freezing point on several days during November and December.
EXTREMES, 1956-59.--Dissolved solids (1956-58): Maximum, 1,580 ppm Mar. 6-15, 1957; minimum, 340 ppm Mar. 29 to Apr. 4, 1957.
Hardness: Maximum, 790 ppm Mar. 1-14, 1959; minimum, 166 ppm Mar. 29 to Apr. 5, 1958.
Specific conductance: Maximum daily, 2,640 micromhos Mar. 1, 1959; minimum daily, 483 micromhos Mar. 30, 1957.
Water temperatures: Maximum, 83°F July 17, 1957; minimum, freezing point on many days during winter months.
REMARKS.--Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Discharge records for gaging station at Huron, downstream from diversion, for water year October 1958 to September 1959 given in WSP 1629.

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of collection	Mean discharge (cfs) [a]	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids: Parts per million: Residue at 180°C	Dissolved solids: Parts per million: Sum	Dissolved solids: Tons per acre-foot	Dissolved solids: Tons per day	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Per cent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 1-31, 1958	--	--	--	--	--	128	--	323	--	--	--	--	--	--	--	--		299	34	48	3.2	1,130	7.4	--
Nov. 1-30	--	--	--	--	--	136	--	333	--	--	--	--	--	--	--	--		322	49	48	3.3	1,210	7.5	--
Dec. 1-31	--	19	0.02	70	49	187	15	346	340	110	0.5	7.9	0.57	999	--	1.36		377	93	51	4.2	1,500	7.0	28
Jan. 1-15, 1959	--	--	--	--	--	216	--	397	--	--	--	--	--	--	--	--		479	153	50	4.3	1,790	7.0	--
Jan. 16-31	--	--	--	--	--	257	--	466	--	--	--	--	--	--	--	--		592	210	49	4.6	2,090	7.0	--
Feb. 1-28	--	33	.01	137	105	289	21	588	689	151	.6	1.6	.77	1,900	1,720	2.58		774	292	44	4.5	2,450	7.2	27
Mar. 1-14	--	--	--	--	--	276	--	641	--	--	--	--	--	--	--	--		790	264	43	4.3	2,430	7.8	--
Mar. 15-23	10.4	--	--	--	--	242	--	643	--	--	--	--	--	--	--	--		754	227	41	3.8	2,240	7.8	--
Mar. 24-Apr. 11	4.78	--	--	--	--	133	--	349	--	--	--	--	--	--	--	--		440	154	40	2.8	1,360	7.6	--
Apr. 12-May 31	--	--	--	--	--	136	--	314	--	--	--	--	--	--	--	--		408	151	42	2.9	1,320	8.1	--
June 1-30	--	--	--	--	--	130	--	264	--	--	--	--	--	--	--	--		366	150	44	3.0	1,280	7.7	--
July 1-28	--	13	.02	58	41	145	20	232	358	68	.4	7.1	.51	848	--	1.15		314	124	48	3.6	1,250	7.7	25
July 29-Aug. 25	--	--	--	--	--	189	--	201	--	--	--	--	--	--	--	--		310	145	57	4.7	1,450	7.6	--
Aug. 26-Sept. 8	--	--	--	--	--	230	--	212	--	--	--	--	--	--	--	--		319	145	61	5.6	1,690	7.1	--
Sept. 9-21	--	13	.02	57	49	249	23	232	557	112	.5	11	.88	1,230	1,190	1.67		342	152	59	5.9	1,780	7.2	45
Sept. 22-30	--	--	.08	--	--	246	--	245	--	--	--	--	--	--	--	--		329	128	62	5.9	1,710	7.1	--

a No flow at the gaging station at Huron, downstream from the diversion, except during Mar. 15-28, Mar. 31 to Apr. 3, Apr. 5, 7-8, 11.

JAMES RIVER BASIN--Continued

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

Temperature (° F) of water, water year October 1958 to September 1959
(Once-daily measurement between 8 a.m. and 10 a.m.)

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

a No flow for entire month, at gaging station downstream from diversion.

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 1959.
Water temperatures: January 1953 to September 1959.
EXTREMES, 1958-59.--Water temperatures: Maximum, 88°F June 16-18; minimum, freezing point on many days during January to March.
EXTREMES, 1953-59.--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 1958 to September 1959 given in WSP 1629.

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids				Hardness as $CaCO_3$		Per cent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million		Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
														Residue at 180°C	Sum									
Oct. 28, 1958...	3.8	9.8	0.02	100	64	150	20	252	510	83	0.5	0.0	0.57	1,130	1,060	1.54	11.6	513	306	38	2.9	1,550	7.2	
Dec. 3.....	19	--	--	--	--	142	--	296	--	--	--	--	--	--	--	--	--	984	741	24	2.0	2,100	7.7	
Jan. 6, 1959....	12	--	--	--	--	187	--	417	--	--	--	--	--	--	--	--	--	1,150	808	26	2.4	2,500	7.5	
Mar. 4.....	69	--	--	--	--	200	--	384	--	--	--	--	--	--	--	--	--	1,040	725	29	2.7	2,400	7.2	
Mar. 13.....	43	--	--	193	75	161	--	300	750	80	--	--	.57	1,560	--	2.12	181	789	543	31	2.5	1,950	7.1	
Apr. 2.....	54	--	--	108	57	135	--	134	559	79	--	--	.75	1,110	--	1.51	162	505	395	37	2.6	1,480	7.4	
Apr. 22.....	33	--	--	--	--	164	--	161	--	--	--	--	--	--	--	--	--	532	400	40	3.1	1,670	7.4	
June 4	30	--	--	140	56	122	--	231	562	62	--	--	.53	1,150	--	1.56	93.2	581	392	31	2.2	1,520	7.6	
June 11	10	--	.06	--	--	150	--	274	--	--	--	--	--	--	--	--	--	713	488	31	2.4	1,780	7.5	
July 2	15	--	--	--	--	146	--	226	--	--	--	--	--	--	--	--	--	597	412	35	2.6	1,630	7.4	
Aug. 12.....	.002	--	--	162	89	225	--	180	894	111	--	--	.85	1,770	--	2.41	.01	772	624	39	3.5	2,190	7.0	
Sept. 3.....	.8	--	--	--	--	224	--	146	--	--	--	--	--	--	--	--	--	746	626	39	3.6	2,180	6.9	
Sept. 24.....	10	--	--	86	37	82	--	118	371	42	--	--	.33	754	--	1.03	20.4	365	268	33	1.9	1,050	7.1	
Sept. 25.....	7	7.6	.02	106	52	110	18	136	511	56	.4	3.2	.47	1,020	932	1.39	19.3	480	368	32	2.2	1,350	6.9	15

JAMES RIVER BASIN--Continued

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

Temperature (° F) of water, water year October 1958 to September 1959
/Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph/

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

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN JAMES RIVER BASIN

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids: Parts per million: Residue at 180°C	Dissolved solids: Parts per million: Sum	Dissolved solids: Tons per acre-foot	Dissolved solids: Tons per day	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Per cent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
LAKE JUANITA NEAR GRACE CITY, N. DAK.																								
Oct. 2, 1958....	a 3.30	46	0.03	21	31	62	11	328	53	2.8	0.4	0.5	0.14	399		0.54		178	0	41	2.0	616	7.2	
May 29, 1959...	a 3.15	28	.02	24	32	56	10	284	64	19	.2	.4	.15	415		.56		193	0	37	1.8	617	7.5	
6-4695. PIPESTEM CREEK NEAR BUCHANAN, N. DAK.																								
Oct. 1, 1958....	0.1	20	0.03	67	48	144	11	458	252	42	0.3	1.7	0.31	817		1.11	0.22	364	0	45	3.3	1,240	7.4	
May 29, 1959...	3.4	8.4	.02	54	37	129	8.9	403	166	52	.3	1.9	.23	675		.92	6.20	287	0	48	3.3	1,060	7.7	
NICCUM RESERVOIR ON KELLY CREEK NEAR BORDULAC, N. DAK.																								
Oct. 2, 1958....	a 6.8	12	0.05	35	39	86	12	292	154	30	0.2	1.5	0.14	551		0.75		247	8	42	2.4	846	7.3	31
May 29, 1959...	a 6.02	14	.02	41	38	73	11	339	123	26	.2	3.3	.14	529		.72		260	0	37	2.0	816	7.5	
6-4700. JAMES RIVER AT JAMESTOWN, N. DAK.																								
Oct. 29, 1958...	3.3	25	0.01	80	36	156	9.2	448	229	67	0.2	2.3	0.59	836		1.14	7.45	348	0	49	3.6	1,280	7.2	
June 7, 1959....	5.0	--	--	--	--	118		408	161	36	--	--	--	643		.87	8.68	297	0	46	3.0	1,000	7.7	
Sept. 27.....	2.6	19	.05	71	32	112	12	416	162	32	.3	1.8	.41	666		.91	4.68	309	0	43	2.8	1,020	7.6	15
6-4676. JAMES RIVER NEAR MANFRED, N. DAK.																								
Nov. 21, 1958 ..	(b)					290		799	235	14		0.7		1,090		1.48		290	0	68	7.4	1,620	7.7	
June 7, 1959....	0.2	8.0	0.08	48	36	218	10	564	248	20	0.5	1.5	0.64	908		1.23	0.49	267	0	63	5.8	1,330	7.9	
6-4745. TURTLE CREEK AT REDFIELD, S. DAK.																								
Aug. 10, 1949 ..	0.17	15	0.10	55	19	792		402	1,240	216	1.4	10	0.79	2,640	2,550	3.59	1.21	215	0	89	24	3,510	8.2	
Mar. 30, 1950 ..	1,430	8.3	.30	20	2.6	12		71	18	2.8	.1	8.1	.30	136	--	.19	533	61	3	31	.7	180	7.4	
Sept. 26, 1959..	.2	21	.03	44	21	648	33	386	1,050	175	4.5	16	3.1	2,260	2,210	3.07	1.22	197	0	86	20	3,250	7.2	55

a Water level, in feet below temporary reference mark.
b Practically no flow.

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 1959.
Sediment records: May 1950 to September 1959.
EXTREMES, 1958-59.--Water temperatures: Maximum, 80°F Aug. 5, 20-22; minimum, freezing point on many days during November to March.
Sediment concentrations: Maximum daily, 12,000 ppm May 31; minimum daily, 6 ppm Mar. 11.
Sediment loads: Maximum daily, 220,000 tons May 31; minimum daily, not determined.
EXTREMES, 1950-59.--Water temperatures (1951-59): Maximum, 84°F July 31, 1955; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 13,300 ppm June 22, 1957; minimum daily, not determined.
Sediment loads: Maximum daily, 257,000 tons June 19, 1954; minimum daily, less than 0.50 ton Feb. 18-25, 1957.
REMARKS.--Maximum observed sediment concentration during water year, 33,400 ppm June 11. Flow affected by ice Nov. 26 to Mar. 22. Records of discharge for water year October 1958 to September 1959 given in WSP 1630.

Temperature (° F) of water, water year October 1958 to September 1959
/Once-daily measurement between 7 a.m. and 10 a.m./

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

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

LITTLE SIOUX RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959

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	9.0	21		22	--		21	15	
2	9.0	--	a 1	22	32		22	17	
3	9.0	36		22	--	a 2	23	--	a 1
4	9.0	42		22	41		23	13	
5	10	52		22	--		22	--	
6	11	63	a 2	22			20	49	
7	11	50		23			16	--	
8	11	--		24			15	54	a 2
9	12	76	2	25			14	--	
10	14	--	e 3	25	24	2	14	34	
11	11	49		24			13	--	
12	11	--		23			13	47	
13	11	64		24			12	--	
14	11	--		25	43	3	12	43	
15	12	84		25	50	3	12	--	
16	11	--		26	63	4	13	48	
17	10	75	a 2	27	73	5	13	--	
18	10	--		28			13	30	
19	12	73		28			14	--	
20	12	--		33			14	33	
21	13	85		33			14	--	a 1
22	13	--		32			14	32	
23	14	83		31			14	--	
24	13	--		31	16	1	14	29	
25	14	49	2	32			14	--	
26	25	--	e 5	24			14	27	
27	17	42		23			14	--	
28	17	--	a 2	21			14	44	
29	17	42		20			13	--	
30	25	--	e 5	20			12	29	
31	22	42	2	--	--	--	12	--	
Total	406.0	--	65	759	--	54	468	--	36

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	11	25		6.8	--		50	--	e 1
2	11	--	a 1	6.8	12		90	77	19
3	10	16		6.8	30		100	20	5
4	10	--		6.8	59		110	33	10
5	9.5	17		6.8	--		90	30	7
6	9.5	--		7.0	--		70	41	8
7	9.5	20		7.0	44		60	20	3
8	9.5	15		7.0	46		55	30	4
9	9.5	52		7.0	--		50	19	3
10	9.0	--	a 1	7.0	48		45	13	2
11	9.0	42		7.0	--		40	6	1
12	8.5	--		7.0	--		35	9	1
13	8.5	37		7.0	--		35	53	5
14	8.5	--		7.0	32		70	27	5
15	8.5	41		7.0	--	a 1	55	20	3
16	8.0	--		7.0	68		50	11	1
17	8.0	58		7.0	--		45	12	1
18	8.0	--		6.8	31		45	9	1
19	7.4	37		6.5	--		50	47	6
20	7.4	--		6.5	32		60	20	3
21	7.4	57		6.5	--		50	22	3
22	7.4	--		6.5	38		47	27	3
23	7.4	31		6.5	--		46	88	11
24	7.4	--	a 1	7.0	31		266	160	115
25	6.8	29		8.0	--		257	130	90
26	6.8	--		8.0	26		311	190	160
27	6.8	25		9.0	--		330	160	143
28	6.8	--		9.0	47		311	135	113
29	6.8	18		--	--	--	330	135	120
30	6.8	--		--	--	--	284	130	100
31	6.8	15		--	--	--	257	98	68
Total	257.5	--	31	198.3	--	28	3,694	--	1,015

e Estimated.

a Computed from samples obtained three or four times a week.

LITTLE SIOUX RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959--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.....	240	100	65	72	96	19	4,720	2,750	s 35,600
2.....	232	80	50	66	88	16	2,770	1,700	12,700
3.....	223	83	50	74	82	16	2,280	1,160	7,140
4.....	211	71	40	86	95	22	2,180	1,080	6,360
5.....	196	89	47	121	130	42	2,280	1,060	6,530
6.....	184	84	42	266	250	180	2,790	1,060	7,990
7.....	172	105	49	360	270	262	3,440	1,020	9,470
8.....	164	76	34	380	220	226	3,580	890	8,600
9.....	146	41	16	420	280	318	3,100	805	6,740
10.....	136	47	17	991	4,760	s 13,000	2,390	710	4,580
11.....	130	37	13	829	1,780	s 4,410	2,660	6,250	s 67,100
12.....	122	55	18	631	685	1,170	1,560	840	3,540
13.....	114	35	11	518	580	811	1,220	560	1,840
14.....	106	54	15	430	405	470	1,050	510	1,450
15.....	103	86	24	370	310	310	916	425	1,050
16.....	98	90	24	320	275	238	805	370	804
17.....	104	87	24	293	260	206	730	315	621
18.....	113	65	20	266	245	176	670	290	525
19.....	107	40	12	248	270	181	670	310	561
20.....	134	37	13	330	1,800	sb 1,800	631	350	596
21.....	158	61	26	546	3,810	s 5,920	592	340	543
22.....	144	93	36	775	2,850	5,960	579	205	320
23.....	131	96	34	860	1,700	3,950	529	230	329
24.....	118	77	25	1,290	2,100	7,310	496	185	248
25.....	106	75	21	1,650	1,560	6,950	463	185	231
26.....	95	66	17	1,650	1,050	4,680	430	190	221
27.....	92	70	17	1,010	950	2,590	418	270	305
28.....	87	64	15	1,730	8,100	sb110,000	860	3,100	8,800
29.....	82	69	15	3,300	9,700	sb110,000	1,520	3,900	16,000
30.....	76	79	16	1,550	4,000	sb 23,000	1,560	4,010	16,900
31.....	--	--	--	6,580	12,000	sb220,000	--	--	--
Total.	4,124	--	806	28,012	--	524,233	47,889	--	227,694

	July			August			September		
1.....	1,440	1,830	7,120	110	145	43	90	77	19
2.....	1,220	1,050	3,460	160	1,100	sb 650	90	115	28
3.....	1,080	760	2,220	1,400	3,800	b 14,000	84	73	17
4.....	916	575	1,420	869	1,370	s 3,270	78	83	17
5.....	760	470	964	553	1,230	1,840	76	87	18
6.....	644	400	696	471	800	1,020	76	93	19
7.....	566	350	535	693	2,150	4,020	74	79	16
8.....	496	315	422	380	680	698	66	73	13
9.....	452	270	329	302	305	249	60	78	13
10.....	400	215	232	240	140	91	56		
11.....	360	175	170	206	180	100	53		
12.....	330	145	129	180	150	73	51	58	8
13.....	330	165	147	160	135	58	50		
14.....	320	260	225	172	175	81	48		
15.....	311	185	155	205	140	77	46		
16.....	284	190	146	214	130	75	47		
17.....	276	240	sb 190	201	125	68	54	40	6
18.....	351	700	sb 750	180	82	40	57		
19.....	302	545	444	161	75	33	58		
20.....	257	260	180	140	67	25	75	360	sb 220
21.....	232	185	116	125	75	25	376	2,000	sb 2,900
22.....	209	145	82	115	83	26	141	300	114
23.....	192	150	78	107	78	23	96	210	54
24.....	177	145	69	103	80	22	96	180	45
25.....	164	155	69	98	82	22	95	145	37
26.....	152	155	64	112	98	30	107	135	39
27.....	142	145	56	100	94	25	117	205	65
28.....	134	155	56	108	86	25	142	115	44
29.....	125	150	51	108	86	25	121	62	20
30.....	121	155	51	106	83	24	106	40	11
31.....	114	145	45	94	78	20	--	--	--
Total.	12,857	--	20,671	8,173	--	26,778	2,686	--	3,781

Total discharge for year (cfs-days)..... 109,523.8
Total load for year (tons)..... 805,192

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

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

Particle-size analyses of suspended sediment, water year October 1958 to September 1959
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
May 10, 1959.....	7:00 a.m.	715	57	14,600	3,470		43		69		99	100	--		--		SPWCM
May 29	6:50 a.m.	3,780	64	7,320	3,510		53		80		98	99	100		--		SPWCM
May 31	7:00 a.m.	6,960	62	11,200	4,980		52		78		96	98	99		100		SPWCM
May 31	7:00 a.m.	6,960	62	11,200	5,070		35		75		96	98	99		100		SPNM
June 3	5:30 p.m.	2,230	67	1,030	3,830		38		65		95	98	100		--		SPWCM
June 11	9:50 a.m.	3,930	77	33,400	3,890		32		56		97	99	100		--		SPWCM
Aug. 3	1:00 p.m.	1,790	75	3,770	2,850		75		82		99	100	--		--		SPWCM
Aug. 5	12:40 p.m.	605	80	2,620	4,010	28	37		67		100	--	--		--		SPWCM

PLATTE RIVER BASIN

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

LOCATION.--At gaging station, 500 feet below Slate Creek and 1.4 miles northwest of Atlantic City, Fremont County.
DRAINAGE AREA.--21.3 square miles.
RECORDS AVAILABLE.--Chemical analyses: April to June 1957, November 1957 to September 1958.
Water temperatures: June to September 1957, May to September 1958, May to September 1959.
Sediment records: June 1957 to September 1959.
EXTREMES, 1958-59.--Water temperatures: Maximum, 70°F July 23.
Sediment concentrations: Maximum daily, 11 ppm May 15; minimum daily, not determined.
Sediment loads: Maximum daily, 0.7 ton May 15; minimum daily, less than 0.05 ton on many days.
EXTREMES, 1957-59.--Water temperatures: Maximum, 70°F July 23, 1959.
Sediment concentrations: Maximum daily, 99 ppm May 17, 1958; minimum daily, not determined.
Sediment loads: Maximum daily, 14 tons May 17, 1958; minimum daily, less than 0.05 ton on many days.
REMARKS.--Flow affected by ice Nov. 14-19, 26-30, Dec. 14, 15, 26-29. Records of discharge for water year October 1958 to September 1959 given in WSP 1630.

Chemical analyses, in parts per million, January to June 1959

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Jan. 26, 1959.....	2.54	16	0.02	18	2.7	4.4	0.8	75	4.3	0.1	0.1	0.2	0.00	88	0.12	0.60	56	0	14	0.3	131	7.1	5
June 7	28	10	.07	5.8	1.6	2.3	.6	29	1.0	.1	.1	.3	.01	48	.07	3.63	21	0	19	.2	62	7.1	23

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

Temperature (° F) of water, water year October 1958 to September 1959
/Once-daily measurement between 7 a.m. and 9 a.m./

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

a Measurement between 10 a.m. and 7 p.m.

PLATTE RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959

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	2.7	--		2.3	--		3.0		
2	2.9	2		2.3	--		2.9		
3	2.8	--		2.6	--		2.9		
4	2.7	--		2.7	--		2.9		
5	2.7	--		2.4	--		2.9		
6	2.6	--		2.4	8		2.9		
7	2.3	--		2.8	--		2.9		
8	2.3	--		2.8	--		2.9		
9	2.3	--		2.9	--		2.8		
10	2.4	--		3.0	--		2.8		
11	2.4	--		2.9	--		2.8		
12	2.4	--		2.8	--		2.9		
13	2.4	--		2.8	--		2.9		
14	2.4	--		2.8	--		2.8		
15	2.3	--		2.8	--	e 0.1	2.8		
16	2.4	--	(t)	2.5	--		2.8		(t)
17	2.2	--		2.5	--		2.6		
18	2.2	2		2.5	--		2.4		
19	2.4	--		3.0	--		2.3		
20	2.3	--		3.4	--		2.3		
21	2.3	--		3.4	--		2.2		
22	2.3	--		3.4	8		2.2		
23	2.4	--		3.4	--		2.2		
24	2.4	--		3.3	--		2.2		
25	2.4	--		3.3	--		2.2		
26	2.4	--		3.0	--		2.5	6	
27	2.6	--		3.0	--		2.5		
28	2.6	--		3.0	--		2.5		
29	2.6	--		3.0	--		2.5		
30	2.2	--		3.0	--		2.5		
31	2.3	--		--	--	--	2.5		
Total	75.6	--	0.3	86.0	--	3.0	81.5		1.2

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1								--	
2								--	
3	2			2				--	
4								--	
5								--	
6								--	
7								--	
8	2.5							--	
9								--	
10				2.5				--	
11								--	
12								--	
13								--	
14								--	
15	3.5					(t)		--	
16			(t)				3	--	(t)
17								--	
18								--	
19					6			2	
20				2				--	
21								--	
22								--	
23	3							--	
24								--	
25								--	
26		3						--	
27				2.5				--	
28	2.5							--	
29				--		--		--	
30				--		--		--	
31				--		--		4	
Total	87.5		0.6	62.5		1.1	93	--	0.6

e Estimated.
t Less than 0.050 ton.

PLATTE RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	2.5			24			27		
2	1.8			26	10	0.6	27		
3	2.2	--	(t)	23			28		
4	2.6			20			29		
5	3.2			16			28		
								4	0.3
6	4.2			14			30		
7	4.4			13			31		
8	3.2			13	5	.2	30		
9	3.3			17			28		
10	3.5	--	e 0.1	19			26		
11	4			17			23		
12	4.5			20			21		
13	7	--		24	5	.3	20		
14	8	10		24	7	.5	20		
15	8.5	--		22	11	.7	19		
16	8.5	--		28	7	.5	19		
17	8.5	--		24	7	.5	17		
18	8.5	--	e .2	22			16		
19	8	--		21			16		
20	8	--		19	2	.1	15		
								3	.1
21	8.5	--		18			18		
22	9	6		20			16		
23	10	--		24	4	.3	14		
24	17			33	7	.6	11		
25	17			33	5	.4	10		
26	19			28			10		
27	14	--	e .3	30			10		
28	11			28			10		
29	13			24	3	.2	15		
30	18			28			14		
31	--	--	--	29			--	--	--
Total	240.9	--	5.1	701	--	9.1	598	--	5.0

Day	July			August			September		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	10			2.8			1.7		
2	8.5			2.8			1.8		
3	8.0			2.6			1.8		
4	9.0			2.8			1.6		
5	7.0	4	0.1	2.9			1.5		
6	5.7			2.9			1.5		
7	5.5			2.8			1.4		
8	5.0			2.4			1.4		
9	5.0			2.3			1.4		
10	4.7			2.3			1.2		
11	4.4			2.3			1.2		
12	4.4			2.3			1.1		
13	4.4			2.7			1.1		
14	4.4			2.3			1.3		
15	4.2			2.2			1.4		
								2	(t)
16	4.7			2.3	3	(t)	1.8		
17	4.4			2.1			2.8		
18	3.9			2.1			2.7		
19	4.2			2.2			2.2		
20	4.4	3	(t)	2.8			2.2		
21	3.9			2.7			3.2		
22	3.7			2.2			2.8		
23	3.3			2.1			2.8		
24	3.2			2.0			3.7		
25	3.0			2.0			3.4		
26	3.0			2.0			3.0		
27	3.0			2.0			3.2		
28	2.9			1.8			4.2		
29	2.7			1.7			3.7		
30	2.7			1.7			3.3		
31	2.8			1.7			--		--
Total	146.0	--	1.4	71.8		0.6	66.4		0.3

Total discharge for year (cfs-days) 2,310.2

Total load for year (tons) 28.3

e Estimated.

t Less than 0.050 ton.

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

LOCATION.--At gaging station, 0.3 mile downstream from Cottonwood Creek, 2½ miles downstream from Poison Spring Creek, 4 miles southwest of Goose Egg, Natrona County, and 13 miles southwest of Casper.
DRAINAGE AREA.--11,500 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to August 1951, October 1957 to September 1959.
Water temperatures: June 1950 to September 1952, April to September 1953, August 1956 to September 1959.
Sediment records: June 1950 to September 1953, August 1956 to September 1958.
EXTREMES, 1958-59.--Dissolved solids: Maximum, 433 ppm Oct. 17-31; minimum, 298 ppm Mar. 29 to Apr. 30.
Hardness: Maximum, 239 ppm Dec. 1-27; minimum, 174 ppm Mar. 29 to Apr. 30.
Specific conductance: Maximum daily, 716 micromhos Sept. 24; minimum daily, 257 micromhos Apr. 2.
Water temperatures: Maximum, 68°F July 26; minimum, freezing point Nov. 16, Dec. 14, 28, Feb. 8, 22, and probably on many other days during November to February.
EXTREMES, 1950-53, 1956-59.--Dissolved solids (1957-59): Maximum, 1,710 ppm Jan. 1, 1958; minimum, 269 ppm June 1-15, 1958.
Hardness (1957-59): Maximum, 740 ppm Jan. 1, 1958; minimum, 156 ppm June 1-15, 1958.
Specific conductance (1957-59): Maximum daily, 2,030 micromhos Nov. 22, 1957; minimum daily, 257 micromhos Apr. 2, 1959.
Water temperatures: Maximum(1953,1957-59),77°F June 11, 1953; minimum (1950-52, 1956-59), 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 1958 to September 1959 given in WSP 1630.

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Oct. 1-16, 1958....	1,351	14	0.01	55	17	36	3.5	157	142	9.6	0.4	2.0	0.08	363	0.49	1,320	207	78	27	1.1	550	7.2	7
Oct. 17-31	644	12	.01	64	19	46	3.8	164	180	13	.4	3.1	.11	433	.59	753	238	104	29	1.3	648	7.0	6
Nov. 1-30	592	12	.01	63	18	45	3.6	158	181	13	.4	2.2	.10	426	.58	681	233	103	29	1.3	642	7.5	6
Dec. 1-27	561	13	.01	65	19	44	3.9	165	179	13	.4	1.8	.07	430	.58	651	239	104	28	1.2	642	7.2	3
Dec. 28-Jan. 18, 1959	505	14	.01	63	18	42	3.6	161	170	12	.4	1.8	.10	423	.58	577	232	100	28	1.2	628	7.6	5
Jan. 19-Feb. 28 ...	496	12	.01	64	19	43	3.4	160	175	12	.3	1.8	.07	430	.58	576	238	107	28	1.2	638	7.3	6
Mar. 1-28.....	538	11	.01	61	19	42	3.3	158	172	11	.3	1.6	.08	414	.56	601	231	101	28	1.2	621	7.5	6
Mar. 29-Apr. 30...	1,937	12	.03	48	13	28	2.3	139	107	7.4	.3	.3	.06	298	.41	1,560	174	60	26	.9	466	7.3	13
May 1-31.....	1,342	12	.01	49	14	31	2.4	143	122	8.2	.4	.3	.07	325	.44	1,180	182	65	27	1.0	495	7.4	7
June 1-30	1,294	12	.01	49	15	30	2.8	146	120	8.1	.4	.4	.11	318	.43	1,110	183	63	26	1.0	495	7.5	6
July 1-17.....	1,765	12	.00	48	17	30	2.8	145	119	7.9	.4	.4	.06	323	.44	1,540	188	69	25	1.0	490	7.5	7
July 18-31.....	1,284	10	.00	51	17	33	2.8	147	130	7.9	.4	.1	.06	340	.46	1,180	195	74	27	1.0	519	7.5	6
Aug. 1-15.....	1,720	12	.00	51	16	32	2.9	147	136	9.1	.4	.1	.06	345	.47	1,600	194	73	26	1.0	520	7.4	14
Aug. 16-31.....	2,033	12	.00	52	17	33	2.8	145	142	9.5	.4	.2	.07	347	.47	1,900	199	80	26	1.0	524	7.4	9
Sept. 1-15.....	1,879	12	.00	53	16	33	3.2	147	140	11	.4	.2	.06	363	.49	1,840	198	77	26	1.0	535	7.4	8
Sept. 16-18.....	1,793	12	.00	53	17	35	3.1	147	141	9.5	.3	1.2	.06	355	..48	1,720	203	82	27	1.1	545	7.4	9
Sept. 19-24.....	1,453	12	.01	61	18	37	3.7	159	162	11	.4	.4	.08	403	.55	1,580	224	94	26	1.1	589	7.4	9
Sept. 25-30.....	1,323	13	.02	59	18	36	3.3	159	156	11	.4	.8	.06	392	.53	1,400	219	89	26	1.1	590	7.5	9
Weighted average a.	1,128	12	0.01	53	16	34	3.0	149	138	9.5	0.4	0.8	0.07	353	0.48	1,080	198	76	27	1.0	536	--	--

a Represents 100 percent of runoff for water year October 1958 to September 1959.

PLATTE RIVER BASIN--Continued

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

Temperature (° F) of water, water year October 1958 to September 1959
/Once-daily measurement between 4 p.m. and 8 p.m./

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

a Measurement between 9 p.m. and 12 m.

PLATTE RIVER BASIN--Continued

6-6450. NORTH PLATTE RIVER BELOW CASPER, WYO.

LOCATION.--At gaging station, 0.3 mile upstream from Claude Creek, half a mile north of U.S. Highways 20 and 87, 5½ miles east of city hall in Casper, Natrona County, and 9½ miles downstream from Casper Creek.
DRAINAGE AREA.--12,600 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to August 1952, August 1957 to September 1959 (discontinued).
Water temperatures: June 1949 to September 1952, August 1957 to September 1959 (discontinued).
Sediment records: April 1947 to September 1952.
EXTREMES, 1958-59.--Dissolved solids: Maximum, 603 ppm Oct. 19-30; minimum, 330 ppm Apr. 1-30.
Hardness: Maximum, 320 ppm Oct. 19-30; minimum, 186 ppm Apr. 1-30.
Specific conductance: Maximum daily, 1,170 micromhos Oct. 24; minimum daily, 471 micromhos Apr. 19.
Water temperatures: Maximum, 79°F Aug. 25, 30, 31.
EXTREMES, 1949-52, 1957-59.--Dissolved solids (1957-59): Maximum, 1,700 ppm Apr. 1-2, 1958; minimum, 282 ppm June 2-5, 1958.
Hardness (1957-59): Maximum, 720 ppm Jan. 1-2, 1958; minimum, 162 ppm June 2-5, 1958.
Specific conductance (1957-59): Maximum daily, 2,360 micromhos Nov. 29, 1957; minimum daily, 434 micromhos May 24, 1958.
Water temperatures: Maximum, 79°F Aug. 25, 30, 31, 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 Worland, Wyo. Records of discharge for water year October 1958 to September 1959 given in WSP 1630.

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Oct. 1-18, 1958....	1,351	13	0.01	56	19	40	3.6	163	152	12	0.3	2.3	0.08	391	0.53	1,430	216	82	28	1.2	587	7.1	5
Oct. 19-30.....	646	11	.01	81	29	69	4.0	196	269	20	.4	3.4	.13	603	.82	1,050	320	159	32	1.7	863	7.0	5
Oct. 31-Nov. 30 ...	597	10	.01	74	25	65	4.0	177	244	18	.4	4.6	.11	556	.76	896	289	144	32	1.7	804	7.4	5
Dec. 1-24.....	582	11	.01	73	24	62	3.6	178	237	20	.4	4.0	.10	545	.74	856	282	136	32	1.6	789	7.1	4
Dec. 25-Jan. 31, 1959.....	503	13	.01	73	23	60	3.9	176	224	17	.4	4.6	.10	530	.72	720	276	132	32	1.6	773	7.2	7
Feb. 1-28.....	528	11	.01	75	23	61	3.6	180	235	21	.4	2.7	.09	542	.74	773	283	135	32	1.6	794	7.4	8
Mar. 1-23.....	598	9.9	.01	67	24	59	3.5	172	222	16	.5	3.5	.12	516	.70	833	265	124	32	1.6	774	7.6	7
Mar. 24-31.....	790	12	.00	66	22	57	3.9	169	214	15	.4	2.6	.11	496	.67	1,060	256	117	32	1.6	744	7.8	18
Apr. 1-30.....	2,080	11	.00	49	15	33	2.8	144	124	9.2	.4	.8	.09	330	.45	1,850	186	68	28	1.1	514	7.4	8
May 1-31.....	1,365	11	.02	54	17	39	2.8	151	151	11	.4	.7	.08	378	.51	1,390	203	79	29	1.2	572	7.3	7
June 1-17	1,332	11	.00	52	17	37	2.8	150	140	10	.4	.2	.08	353	.48	1,270	199	76	28	1.1	563	7.4	6
June 18-30	1,217	11	.01	55	18	42	3.1	154	157	11	.4	.3	.09	384	.52	1,260	213	87	30	1.2	593	7.4	4
July 1-15.....	1,717	11	.01	53	17	37	3.0	152	143	9.8	.4	.2	.07	363	.49	1,680	202	77	28	1.1	558	7.5	9
July 16-31.....	1,380	9.0	.00	54	18	41	3.3	154	157	12	.4	.1	.08	388	.53	1,450	210	84	29	1.2	588	7.3	4
Aug. 1-31.....	1,827	11	.00	55	18	38	3.0	154	156	11	.4	.0	.07	378	.51	1,860	210	84	28	1.1	564	7.2	9
Sept. 1-15.....	1,903	12	.01	56	19	42	3.3	156	166	16	.4	.7	.06	410	.56	2,110	218	90	29	1.2	605	7.5	8
Sept. 16-18.....	1,987	13	.01	58	20	46	3.3	158	174	12	.4	2.5	.08	420	.57	2,250	226	96	30	1.3	635	7.0	12
Sept. 19-24.....	1,548	11	.01	64	20	45	3.3	171	181	14	.4	1.1	.07	447	.61	1,870	243	103	28	1.3	651	7.3	9
Sept. 25-30.....	1,368	13	.00	72	22	55	3.8	182	218	15	.5	2.1	.06	516	.70	1,910	268	119	30	1.5	739	7.3	8
Weighted average[a]	1,146	11	0.01	58	19	44	3.2	159	169	13	0.4	1.4	0.08	414	0.56	1,280	222	92	30	1.3	621	--	--

a Represents 100 percent of runoff for water year October 1958 to September 1959.

PLATTE RIVER BASIN--Continued

6-6450. NORTH PLATTE RIVER BELOW CASPER, WYO.--Continued

Temperature (° F) of water, water year October 1958 to September 1959
/Once-daily measurement between 1 p.m. and 7 p.m./

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

a Measurement between 6 a.m. and 12 m.

PLATTE RIVER BASIN--Continued

6-6698.5. CHUGWATER CREEK NEAR UVA, WYO.

LOCATION.--Lat 42°07'12", long 104°51'5", in SE¼SE¼ sec. 23, T. 25 N., R. 67 W., at bridge on county road, half a mile above mouth and 3½ miles east of Uva, Platte County.
RECORDS AVAILABLE.--Chemical analyses: May 1958 to September 1959 (discontinued).
REMARKS.--No discharge records available for this station.

Chemical analyses, in parts per million, November 1958 to September 1959

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Nov. 4, 1958	28.8	33	0.02	107	27	59	6.5	319	196	20	0.6	6.9	0.11	626	0.85	48.7	376	114	25	1.3	899	7.6	4
Dec. 1	21.3	35	.02	105	26	55	6.3	314	193	20	.6	6.9	.11	618	.84	35.5	370	113	24	1.2	881	7.8	3
Jan. 15, 1959	40.4	31	.01	63	27	62	6.8	223	190	18	.6	2.7	.14	527	.72	57.5	267	84	33	1.7	764	7.4	4
Feb. 17	41.5	38	.01	100	26	63	6.4	315	189	18	.6	5.3	.09	624	.85	69.9	357	99	22	1.5	891	7.5	3
Mar. 19	41.9	37	.01	77	39	62	6.3	308	194	17	.6	4.6	.10	611	.83	69.1	351	98	27	1.4	877	7.6	5
May 6	39.0	36	.00	100	24	62	6.7	311	199	20	.7	6.1	.18	620	.84	65.3	350	95	27	1.4	891	7.7	3
June 18	5.28	40	.00	97	23	61	6.5	325	187	18	.7	3.3	.13	611	.83	8.71	335	68	28	1.4	875	8.1	4
Sept. 25	15.1	38	.01	104	27	61	6.5	323	202	19	.7	5.4	.11	639	.87	26.0	369	104	26	1.4	909	7.9	6

6-6700. LARAMIE RIVER NEAR UVA, WYO.

LOCATION.--At gaging station at private bridge, 7¼ miles east of Uva, Platte County, and 9½ miles downstream from Chugwater Creek.
DRAINAGE AREA.--4,440 square miles, of which 623 square miles is probably noncontributing.
RECORDS AVAILABLE.--Chemical analyses: October 1956 to June 1957, September 1957, May 1958 to September 1959 (discontinued).
Water temperatures: October 1952 to September 1957.
Sediment records: October 1952 to September 1957.
REMARKS.--Records of discharge for water year October 1958 to September 1959 given in WSP 1630.

Chemical analyses, in parts per million, November 1958 to September 1959

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Nov. 4, 1958.....	54	32	0.02	96	29	56	5.3	307	192	19	0.7	3.9	0.11	601	0.82	87.6	360	108	25	1.3	867	7.6	5
Dec. 1.....	74	30	.02	91	29	51	4.9	303	173	18	.7	4.2	.11	570	.78	114	347	99	24	1.2	820	7.9	3
Jan. 15, 1959.....	88	21	.01	56	31	53	4.3	219	172	17	.6	1.1	.16	475	.65	113	265	85	30	1.4	720	7.5	3
Feb. 17.....	96	32	.01	96	25	55	5.0	305	177	18	.6	4.2	.10	577	.78	150	343	93	25	1.3	848	7.6	4
Mar. 19.....	106	28	.01	90	28	55	4.4	297	182	18	.6	1.1	.11	581	.79	166	341	97	26	1.3	839	7.8	4
May 6.....	213	25	.02	66	21	39	4.4	223	132	14	.5	3.5	.09	421	.57	242	249	66	25	1.1	637	7.3	17
June 18.....	3.5	38	.02	76	22	53	6.5	281	143	16	.8	2.0	.16	501	.68	4.73	278	48	29	1.4	739	7.8	5
Sept. 25.....	20	37	.00	86	26	56	7.2	285	194	19	.7	.3	.11	575	.78	31.0	322	88	27	1.4	818	7.9	15

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.--111 square miles.
RECORDS AVAILABLE.--Sediment records: April 1956 to September 1959.
EXTREMES, 1958-59.--Sediment concentrations: Maximum daily, not determined; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 44 tons (estimated) May 22; minimum daily, 0 tons on many days.
EXTREMES, 1956-59.--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, 10,200 ppm July 16. Flow affected by ice during most of period Oct. 27 to Mar. 24. Records of discharge for water year October 1958 to September 1959 given in WSP 1630.

Suspended sediment, water year October 1958 to September 1959

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									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13	0		0						
14									
15									
16				0.1		(t)	0.2		(t)
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29	.1		(t)						
30									
31				--		--			
Total	0.6		(t)	3.0		1	6.2		2

t Less than 0.50 ton.

PLATTE RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959--Continued

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1									
2									
3									
4									
5									
6									
7									
8				0.3		(t)			
9									
10									
11							1		e 2
12									
13									
14									
15									
16	0.3		(t)						
17									
18				4		e 3			
19									
20									
21									
22							7		e 16
23							7		e 14
24							7		e 14
25				1		e 1	1.8		e 4
26							.8		e 1
27							1.8		e 2
28							.8		e 1
29				--		--	2.6		e 3
30				--		--	2.0		e 2
31				--		--	5.0		e 8
Total	9.3		3	32.5		24	56.8		107

Day	April			May			June		
	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day
1	13		e 30	1.0			8.2	420	9
2	11	1,000	20	1.0		e 3	3.4		e 5
3	17		e 38	1.8			.9		e 2
4	15		e 34	5.0			.7		
5	17		e 36	4.2		e 7	.5		e 1
6	6.6			.8			.3		
7	7.4			.8			.2		(t)
8	5.8		e 10	.9		e 1	0		0
9	5.0			3.4			0		0
10	3.4		e 7	3.4		e 6	0		0
11	5.0			3.4			0		0
12	5.8			1.8		e 2	0		0
13	5.8			4.2		e 7	0		0
14	4.2		e 10	5.0			0		0
15	5.8			7.4			.1		e 1
16	5.8			7.4		e 12	0		0
17	3.4			8.2			0		0
18	2.6		e 8	7.4			.1		e 1
19	4.2			6.6			0		0
20	5.0			15		e 40	0		0
21	1.0		e 2	11		e 30	0		0
22	2.6			18		e 44	0		0
23	2.6		e 5	11		e 22	0		0
24	2.6			5.8			0		0
25	1.0			4.2		e 8	0		0
26	1.0			2.6			0		0
27	1.0		e 3	2.6			0		0
28	1.0			2.6		e 6	0		0
29	1.8			2.6			0		0
30	1.0			3.4			0		0
31	--		--	5.8		e 7	--		--
Total	164.4		332	158.3		314	14.4		21

e Estimated.
t Less than 0.50 ton.

PLATTE RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959--Continued

Day	July			August			September		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1									
2									
3									
4									
5									
6									
7									
8	0	--	0						
9									
10									
11									
12									
13									
14									
15									
16	.2	1,280	s 6						
17	.3	1,140	s 9						
18									
19									
20									
21									
22									
23									
24	0	--	0						
25									
26									
27									
28									
29									
30									
31									
Total	0.5	--	15	0		0	0		0

Total discharge for year (cfs-days) 446.0
Total load for year (tons) 819

s Computed by subdividing day.

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

Particle-size analyses of bed material, water year October 1958 to September 1959
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Number of sampling points	Bed material: Percent finer than indicated size, in millimeters												Methods of analysis
				0.031	0.062	0.125	0.250	0.500	1.000	2.000	4.000	8.000	16.000	32.000	64.000	
Apr. 2, 1959.....		a 11	2		1	2	9	40	78	93	99	100				SV
June 2.....		a 3.4	1		1	1	9	40	77	91	98	100				SV
July 15.....		0	8		--	0	8	38	70	87	97	100				SV
July 16.....		1.8	1		0	1	7	38	73	88	98	100				SV

a Daily mean discharge.

PLATTE RIVER BASIN--Continued

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.--22,800 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1945 to September 1959.
Water temperatures: October 1945 to September 1959.
EXTREMES, 1958-59.--Dissolved solids: Maximum, 1,520 ppm Nov. 1 to Dec. 31; minimum, 912 ppm May 27-30.
Hardness: Maximum, 729 ppm Dec. 1-31; minimum, 458 ppm May 27-30.
Specific conductance: Maximum daily, 1,980 micromhos Jan. 6, 7; minimum daily, 1,250 micromhos May 28-30.
Water temperatures: Maximum, 85°F July 16; minimum, freezing point on several days during December to February.
EXTREMES, 1945-59.--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, 1950-59), 93°F July 28, Aug. 1, 1953; minimum, freezing point on many days during winter months.
REMARKS.--Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Records of discharge for water year October 1958 to September 1959 given in WSP 1630.

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids: Parts per million: Residue at 180°C	Dissolved solids: Parts per million: Sum	Dissolved solids: Tons per acre-foot	Dissolved solids: Tons per day	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 1-31, 1958.	202	--	--	--	--	170	--	291	--	--	--	--	--	1,440	--	1.96	785	674	435	35	2.8	1,830	7.4	--
Nov. 1-30	318	--	--	--	--	180	--	324	--	--	--	--	--	1,520	--	2.07	1,310	726	460	35	2.9	1,930	7.2	--
Dec. 1-31	327	31	0.00	204	54	174	16	340	735	64	0.7	2.9	0.28	1,520	1,450	2.07	1,340	729	450	34	2.8	1,930	7.4	4
Jan. 1-31, 1959.	280	--	--	--	--	174	--	312	--	--	--	--	--	1,490	--	2.03	1,130	716	460	35	2.8	1,900	7.3	--
Feb. 1-28	310	--	--	--	--	176	--	300	--	--	--	--	--	1,470	--	2.00	1,230	707	461	35	2.9	1,870	7.4	--
Mar. 1-31	437	27	.00	179	58	175	13	293	726	60	.8	3.3	.28	1,440	1,390	1.96	1,700	685	445	35	2.9	1,820	7.4	5
Apr. 1-19	1,030	--	--	--	--	168	--	300	--	--	--	--	--	1,430	--	1.94	3,980	684	438	35	2.8	1,820	7.7	--
Apr. 20-May 2 ..	1,040	--	--	--	--	149	--	272	--	--	--	--	--	1,270	--	1.73	3,570	610	387	35	2.6	1,640	7.6	--
May 3-24	714	--	--	--	--	157	--	275	--	--	--	--	--	1,330	--	1.81	2,560	625	399	35	2.7	1,720	7.9	--
May 25-26	779	--	--	--	--	124	--	240	--	--	--	--	--	1,020	--	1.39	2,150	494	297	35	2.4	1,360	8.1	--
May 27-30	1,730	18	.01	118	40	108	9.4	226	447	35	.8	5.6	.19	912	--	1.24	4,260	458	273	33	2.2	1,250	7.7	15
May 31-June 1 ..	1,560	--	--	--	--	127	--	244	--	--	--	--	--	1,050	--	1.43	4,420	522	322	35	2.4	1,400	8.2	--
June 2-30.....	215	--	--	--	--	166	--	260	--	--	--	--	--	1,320	--	1.80	766	620	407	37	2.9	1,700	7.6	--
July 1-31.....	29.9	--	--	--	--	176	--	235	--	--	--	--	--	1,350	--	1.84	108	617	424	38	3.1	1,740	7.7	--
Aug. 1-31	20.5	--	--	--	--	178	--	215	--	--	--	--	--	1,330	--	1.81	73.6	604	428	39	3.1	1,720	7.7	--
Sept. 1-21.....	17.6	--	--	--	--	170	--	226	--	--	--	--	--	1,360	--	1.85	64.6	620	435	37	3.0	1,740	7.5	--
Sept. 22-30.....	31.2	31	.02	189	53	176	18	264	731	70	.8	2.7	.22	1,450	1,400	1.97	122	688	472	35	2.9	1,860	7.9	4
Weighted average a	344	--	--	--	--	163	--	289	--	--	--	--	--	1,370	--	1.86	1,270	656	419	35	2.8	1,760	--	--

a Represents 100 percent of runoff for water year October 1958 to September 1959.

PLATTE RIVER BASIN--Continued

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

Temperature (° F) of water, water year October 1958 to September 1959
(Once-daily measurement between 4 p.m. and 8 p.m.)

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	58	52	41	41	a 33	40	51	63	71	76	76	76
2	62	54	43	32	33	41	53	a 65	72	78	a 78	78
3	65	54	44	a 32	37	39	51	60	76	80	a 84	77
4	67	50	37	32	36	40	50	63	76	84	77	79
5	a 65	53	38	36	35	38	a 55	60	78	76	77	80
6	67	51	a 33	38	37	42	60	61	78	77	79	78
7	72	53	34	39	36	42	50	53	78	78	73	82
8	66	a 54	33	39	a 32	43	48	52	80	80	--	74
9	63	53	33	38	33	43	43	51	82	80	--	69
10	64	53	37	38	33	43	48	--	81	81	78	75
11	64	52	33	39	36	45	a 43	--	83	80	82	76
12	a 67	--	33	39	37	49	49	68	81	77	a 81	a 76
13	68	50	32	40	39	50	54	69	a 82	82	78	a 74
14	--	a 50	33	38	40	44	57	--	a 83	83	a 70	67
15	66	a 45	36	33	a 41	40	60	68	84	84	78	64
16	59	40	38	36	42	50	63	65	81	85	81	58
17	62	37	38	37	35	46	61	72	79	77	78	53
18	66	35	38	39	36	45	48	70	80	76	78	68
19	a 58	37	40	--	34	46	44	63	80	78	78	73
20	53	39	40	--	36	44	47	61	81	73	77	76
21	55	47	40	33	36	48	49	59	78	--	79	72
22	52	48	40	33	34	50	59	56	74	72	79	67
23	53	38	40	34	38	a 56	61	67	78	76	78	62
24	53	43	40	38	42	53	58	71	80	78	79	61
25	a 53	39	38	36	45	--	57	69	82	80	78	63
26	55	35	39	33	43	41	61	a 71	73	76	79	60
27	54	33	40	32	42	43	62	--	73	81	78	--
28	46	33	a 40	32	42	48	64	70	a 71	78	80	59
29	48	36	39	32	--	a 50	65	63	70	75	78	56
30	50	a 40	40	33	--	50	68	a 68	72	77	a 79	53
31	52	--	40	32	--	50	--	67	--	76	77	--
Average	59	45	38	36	37	45	55	64	78	78	78	69

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

PLATTE RIVER BASIN--Continued

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

LOCATION.--At gaging station at Parshall Flume in sec. 28, T. 13 N., R. 29 W., near Maxwell, Lincoln County.
RECORDS AVAILABLE.--Chemical analyses: March 1951 to September 1959.
Water temperatures: March 1951 to September 1959.
EXTREMES, 1958-59.--Dissolved solids: Maximum, 938 ppm June 9-21; minimum, 453 ppm Sept. 1-30.
Hardness: Maximum, 438 ppm June 9-21; minimum, 190 ppm Sept. 1-30.
Specific conductance: Maximum daily, 1,410 micromhos June 17; minimum daily, 596 micromhos Mar. 26.
Water temperatures: Maximum, 84°F June 15, 17, 25: minimum, 33°F on many days during November to March.
EXTREMES, 1951-59.--Dissolved solids: Maximum, 1,010 ppm Mar. 1-4, 1958; minimum, 368 ppm May 15, 1951.
Hardness: Maximum, 492 ppm Mar. 1-4, 1958; minimum, 171 ppm May 15, 1951.
Specific conductance: Maximum daily, 1,440 micromhos Mar. 1, 1958; minimum daily, 403 micromhos Jan. 9, 1957.
Water temperatures: Maximum, 85°F June 13, 15, 1952, July 27, 31, 1957; minimum, freezing point on several days during winter months.
REMARKS.--Daily samples for chemical analysis composited by discharge. Composite periods normally identical to those of Platte River at Brady, Nebr.
Records of specific conductance of daily samples available in district office in Lincoln, Nebr. Records of discharge for water year October 1958 to September 1959 given in reports of State Engineer.

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Oct. 1-31, 1958....	1,069	--	--	--	--	67	--	221	--	--	--	--	--	490	0.67	1,410	222	41	40	2.0	729	7.3	--
Nov. 1-16.....	923	--	--	--	--	62	--	216	--	--	--	--	--	483	.66	1,200	222	45	38	1.8	711	7.3	--
Nov. 17-Dec. 5....	1,125	--	--	--	--	69	--	222	--	--	--	--	--	528	.72	1,600	247	65	38	1.9	780	7.1	--
Dec. 6-31.....	1,085	29	0.00	77	20	77	10	233	221	24	0.6	1.1	0.17	592	.81	1,730	276	85	37	2.0	865	7.2	3
Jan. 1-31, 1959....	1,017	--	--	--	--	81	--	238	--	--	--	--	--	635	.86	1,740	306	111	37	2.0	930	7.6	--
Feb. 1-28.....	1,172	--	--	--	--	82	--	238	--	--	--	--	--	653	.89	2,070	309	114	37	2.0	942	7.3	--
Mar. 1-31.....	1,232	32	.00	76	20	70	9.2	213	218	23	.6	1.9	.13	572	.78	1,900	270	95	35	1.9	827	7.3	6
Apr. 1-30.....	1,493	--	--	--	--	87	--	207	--	--	--	--	--	693	.94	2,790	321	151	37	2.1	991	7.6	--
May 1-31.....	1,325	--	--	--	--	94	--	197	--	--	--	--	--	730	.99	2,610	340	178	38	2.2	1,030	7.6	--
June 1-8	1,264	--	--	--	--	106	--	201	--	--	--	--	--	806	1.10	2,750	376	211	38	2.4	1,130	7.7	--
June 9-21	1,571	15	.01	107	42	125	12	200	465	41	.7	.8	.20	938	1.28	3,980	438	274	37	2.6	1,280	7.5	6
June 22-July 2.....	1,905	--	--	--	--	87	--	214	--	--	--	--	--	645	.88	3,320	294	119	39	2.2	934	7.7	--
July 3-13.....	1,428	--	--	--	--	86	--	218	--	--	--	--	--	622	.85	2,400	281	102	40	2.2	908	7.7	--
July 14-16.....	2,043	--	--	--	--	81	--	222	--	--	--	--	--	548	.75	3,020	239	57	42	2.3	824	7.9	--
July 17-31.....	2,055	--	--	--	--	76	--	223	--	--	--	--	--	496	.67	2,750	210	27	44	2.3	757	7.8	--
Aug. 1-8.....	2,138	18	.01	51	17	75	11	224	161	19	.5	.6	.14	471	.64	2,720	198	14	43	2.3	729	7.7	5
Aug. 9-19.....	2,093	--	--	--	--	76	--	224	--	--	--	--	--	466	.63	2,630	193	9	46	2.4	711	7.7	--
Aug. 20-31.....	1,891	--	--	--	--	72	--	224	--	--	--	--	--	463	.63	2,360	196	12	44	2.2	700	7.7	--
Sept. 1-30.....	1,537	--	--	--	--	70	--	214	--	--	--	--	--	453	.62	1,880	190	15	45	2.2	684	7.3	--
Weighted average a	1,367	--	--	--	--	80	--	218	--	--	--	--	--	591	0.80	2,180	269	90	39	2.1	862	--	--

a Represents 100 percent of runoff for water year October 1958 to September 1959.

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

Temperature (° F) of water, water year October 1958 to September 1959
/Once-daily measurement between 8 a.m. and 9 a.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	48	a 46	a 35	34	a 33	a 36	35	55	a 67	a 70	73	a 72
2	a 61	40	36	a 33	33	34	a 38	a 63	61	65	a 78	66
3	53	a 48	a 38	33	a 33	a 35	36	57	a 73	a 76	74	a 71
4	a 63	40	36	a 33	33	34	a 40	a 60	67	69	a 79	66
5	54	a 46	a 35	33	a 34	a 33	36	55	a 76	a 75	74	a 79
6	a 61	39	33	a 34	33	33	a 42	a 57	68	70	a 80	70
7	52	a 45	a 33	33	a 34	a 35	37	55	a 76	a 81	73	a 74
8	a 63	40	33	a 34	33	34	a 38	a 56	68	69	a 78	69
9	55	a 47	a 33	33	a 33	a 37	36	53	a 77	a 75	74	a 67
10	a 58	39	33	a 35	33	34	a 37	a 68	67	69	a 79	60
11	51	a 45	a 33	34	a 33	a 36	36	55	a 78	a 78	72	a 69
12	a 57	39	33	a 36	33	34	a 38	a 64	69	69	a 81	60
13	52	a 46	a 33	34	a 34	a 37	35	57	a 79	a 77	71	a 68
14	a 58	38	33	a 36	33	33	a 39	a 64	70	70	a 78	60
15	55	a 39	a 33	33	a 33	a 35	36	55	a 84	a 78	67	a 69
16	a 58	37	33	a 33	33	34	a 42	a 61	76	71	a 78	58
17	54	a 36	a 34	33	a 34	a 37	39	57	a 84	a 75	70	a 55
18	a 61	35	34	a 35	33	35	a 48	a 69	78	70	a 78	56
19	53	a 38	a 35	34	a 33	a 37	45	58	a 82	a 80	73	a 64
20	a 57	37	34	a 33	33	34	a 47	a 61	76	72	a 80	62
21	51	a 35	a 35	33	a 34	a 37	44	56	a 80	a 77	78	a 70
22	a 56	34	35	a 33	33	34	a 55	a 58	75	71	a 80	62
23	49	a 37	a 38	33	a 34	a 37	52	54	a 76	a 75	75	a 63
24	a 56	36	33	a 36	33	35	a 54	a 60	73	74	a 79	57
25	48	a 38	a 38	35	a 34	a 36	50	57	a 84	a 80	72	a 62
26	a 54	33	36	a 34	33	33	a 56	a 62	74	73	a 77	58
27	45	a 35	a 39	33	a 34	a 34	51	62	a 77	a 81	71	a 64
28	a 50	33	35	a 36	33	35	a 61	a 68	73	74	a 78	58
29	44	a 36	a 33	33	--	a 37	54	62	a 62	a 76	74	a 55
30	a 51	34	33	a 33	--	37	a 64	a 70	57	72	a 74	52
31	42	--	a 34	33	--	a 38	--	61	--	a 77	68	--
Average	54	39	34	34	33	35	44	60	74	74	75	64

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

PLATTE RIVER BASIN--Continued

6-7660. PLATTE RIVER AT BRADY, NEBR.

LOCATION.--At gaging station at highway bridges, half a mile and 2½ miles south of Brady, Lincoln County, and 18 miles downstream from confluence of North Platte and South Platte Rivers.
DRAINAGE AREA.--56,900 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: November 1950 to September 1959.
Water temperatures: March 1951 to September 1959.
EXTREMES, 1958-59.--Dissolved solids: Maximum, 742 ppm June 9-21; minimum, 410 ppm Jan. 1-31.
Hardness: Maximum, 351 ppm June 9-21; minimum, 190 ppm Aug. 1-8.
Specific conductance: Maximum daily, 1,250 micromhos June 17 (chan. 1); minimum daily, 397 micromhos Feb. 20 (chan. 1).
Water temperatures: Maximum, 81°F Sept. 7 (chan. 1); minimum, freezing point on many days during November to February.
EXTREMES, 1951-59.--Dissolved solids: Maximum, 896 ppm Feb. 19-22, 1953; minimum, 278 ppm Nov. 26, 1952.
Hardness: Maximum, 404 ppm Mar. 1-4, 1958; minimum, 151 ppm June 8, 1951.
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 1958 to September 1959 given in WSP 1630.

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Oct. 1-31, 1958....	172	--	--	--	--	58	--	224	--	--	--	--	--	475	0.65	221	225	41	36	1.7	691	7.5	--
Nov. 1-16.....	160	--	--	--	--	54	--	224	--	--	--	--	--	468	.64	202	233	49	34	1.5	685	7.2	--
Nov. 17-Dec. 5....	184	--	--	--	--	50	--	220	--	--	--	--	--	459	.62	228	225	45	33	1.5	659	7.1	--
Dec. 6-31.....	222	41	0.00	64	15	48	8.5	220	129	16	0.6	2.2	0.11	443	.60	266	223	43	31	1.4	647	7.3	2
Jan. 1-31, 1959....	221	--	--	--	--	43	--	216	--	--	--	--	--	410	.56	245	214	37	30	1.3	609	7.6	--
Feb. 1-28.....	217	--	--	--	--	43	--	206	--	--	--	--	--	417	.57	244	215	46	30	1.3	612	7.3	--
Mar. 1-31.....	274	38	.01	64	15	45	9.2	218	127	15	.6	2.1	.11	437	.59	323	220	41	30	1.3	638	7.4	8
Apr. 1-30.....	256	--	--	--	--	54	--	218	--	--	--	--	--	489	.67	338	242	63	33	1.5	709	7.7	--
May 1-31.....	227	--	--	--	--	58	--	221	--	--	--	--	--	520	.71	319	259	78	33	1.6	753	7.6	--
June 1-8	178	--	--	--	--	63	--	219	--	--	--	--	--	542	.74	260	270	90	34	1.7	781	7.9	--
June 9-21	180	28	.01	94	28	93	12	209	329	31	.6	1.2	.16	742	1.01	361	351	180	36	2.2	1,050	7.8	5
June 22-July 2.....	324	--	--	--	--	76	--	216	--	--	--	--	--	587	.80	514	272	95	38	2.0	853	7.8	--
July 3-13.....	166	--	--	--	--	70	--	220	--	--	--	--	--	565	.77	253	262	82	37	1.9	823	7.8	--
July 14-16.....	504	--	--	--	--	68	--	224	--	--	--	--	--	482	.66	656	215	31	41	2.0	718	7.9	--
July 17-31.....	887	--	--	--	--	66	--	233	--	--	--	--	--	456	.62	1,090	199	8	42	2.0	686	7.9	--
Aug. 1-8.....	1,130	27	.01	52	15	68	11	234	135	17	.6	.3	.14	443	.60	1,350	190	0	42	2.1	676	7.9	9
Aug. 9-19.....	608	--	--	--	--	65	--	232	--	--	--	--	--	442	.60	726	192	2	42	2.0	660	7.8	--
Aug. 20-31.....	137	--	--	--	--	59	--	224	--	--	--	--	--	454	.62	168	204	20	39	1.8	662	7.8	--
Sept. 1-30.....	125	--	--	--	--	56	--	215	--	--	--	--	--	443	.60	150	210	34	37	1.7	656	7.1	--
Weighted average a.	270	--	--	--	--	58	--	222	--	--	--	--	--	469	0.64	342	223	41	36	1.7	690	--	--

a Represents 100 percent of runoff for water year October 1958 to September 1959.

PLATTE RIVER BASIN--Continued

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

CHANNEL 1

Temperature (° F) of water, water year October 1958 to September 1959
/Once-daily measurement between 7 a.m. and 11 a.m./

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

a Measurement between 12 m. and 2 p.m.

PLATTE RIVER BASIN--Continued

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

CHANNEL 4

Temperature (° F) of water, water year October 1958 to September 1959
/Once-daily measurement between 7 a.m. and 11 a.m./

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

a Measurement between 12 m. and 2 p.m.

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 1959.
Water temperatures: November 1958 to September 1959.
EXTREMES, November 1958 to September 1959.--Dissolved solids: Maximum, 650 ppm June 1-30; minimum, 508 ppm Sept. 1-30.
Hardness: Maximum, 304 ppm June 1-30; minimum, 220 ppm Sept. 1-30.
Specific conductance: Maximum daily, 1,070 micromhos July 9 (south channel); minimum daily, 711 micromhos Jan. 14 (north channel).
Water temperatures: Maximum, 98°F June 13 (south channel); minimum, freezing point on many days during November to March.
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 1958 to September 1959 given in WSP 1630.

Chemical analyses, in parts per million, March 1957 to September 1959

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Mar. 30, 1957 a...	771	32	--	--	--	64		207	145	17	0.6	1.2	--	--	--	--	208	38	40	1.9	655	7.6	--
Nov. 6-30, 1958...	1,071	26	0.01	64	19	65	11	218	184	22	.6	1.9	0.19	509	0.69	1,470	239	60	36	1.8	769	7.1	3
Dec. 1-31.....	1,088	30	.01	70	21	66	11	231	186	22	.5	2.1	.13	530	.72	1,560	259	70	34	1.8	788	7.2	4
Jan. 1-31, 1959...	1,100	31	.01	76	21	69	11	237	203	26	.6	2.4	.20	575	.78	1,710	274	80	34	1.8	839	7.4	4
Feb. 1-28	1,396	32	.01	79	21	70	11	239	211	24	.5	2.9	.13	587	.80	2,210	283	87	34	1.8	855	7.1	4
Mar. 1-31.....	1,696	32	.01	76	21	65	11	230	196	23	.6	3.4	.13	554	.75	2,540	275	86	33	1.7	813	7.3	4
Apr. 1-30	1,769	30	.00	71	22	66	11	219	201	23	.6	1.3	.12	548	.75	2,620	267	87	34	1.8	810	7.6	4
May 1-31	813	26	.01	77	24	72	12	222	228	25	.6	1.9	.12	592	.81	1,300	289	107	34	1.8	862	7.8	4
June 1-30.....	232	25	.01	79	26	81	14	214	269	29	.6	1.3	.14	650	.88	407	304	129	35	2.0	936	7.7	3
July 1-16.....	282	27	.01	80	24	80	14	220	261	27	.6	1.7	.13	638	.87	486	299	119	35	2.0	920	7.8	6
July 17-Aug. 10...	171	29	.01	71	22	72	15	228	216	25	.6	1.0	.12	578	.79	267	269	82	35	1.9	847	7.8	7
Aug. 11-31	157	26	.01	66	22	76	14	220	210	25	.6	.8	.12	559	.76	237	255	75	38	2.1	829	7.8	6
Sept. 1-30.....	492	21	.01	56	20	73	12	217	190	22	.6	1.2	.13	508	.69	675	220	42	40	2.1	757	7.3	3
Weighted average b	907	29	0.01	73	21	68	11	227	203	24	0.6	2.2	0.14	558	0.76	1,370	269	83	34	1.8	821	--	--
Weighted average c	896	28	0.01	71	21	68	11	227	199	23	0.6	2.1	0.14	551	0.75	1,330	264	78	35	1.8	813	--	--

a Not included in weighted average.
b Represents 91 percent of runoff for water year October 1958 to September 1959.
c Includes estimates where data are missing. Represents 100 percent of runoff for water year October 1958 to September 1959.

PLATTE RIVER BASIN--Continued

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

NORTH CHANNEL

Temperature (° F) of water, November 1958 to September 1959
(Once-daily measurement between 9 a.m. and 12 m.)

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1		--	34	a 34	32	a 46	50	64	b 67	a 82	75	a 77
2		--	a 47	32	32	40	a 58	a 65	72	72	a 94	76
3		--	36	a 33	a 32	a 46	49	71	b 83	b 87	84	a 84
4		--	a 40	31	32	37	a 60	a 65	62	74	a 92	73
5		--	34	b 32	a 38	a 42	55	57	a 89	a 81	83	b 90
6		b 52	a 33	32	32	35	a 63	a 70	77	76	a 84	90
7		45	33	a 32	a 32	a 46	50	59	b 84	a 83	76	a 87
8		a 51	a 33	32	32	41	a 53	a 58	73	74	a 89	74
9		44	33	a 33	a 32	a 48	44	56	a 85	a 89	73	a 76
10		a 55	a 32	32	32	40	a 51	a 68	74	75	a 69	75
11		45	33	b 33	a 33	a 42	48	60	a 87	a 80	78	a 79
12		a 50	b 33	33	33	38	a 55	a 59	76	68	a 82	65
13		44	32	a 39	a 32	b 53	47	59	a 94	a 81	73	b 80
14		a 55	a 33	33	34	39	a 59	a 73	80	73	b 76	75
15		45	33	a 34	a 37	a 37	48	60	a 88	a 83	74	a 78
16		a 50	a 34	32	34	38	a 67	a 60	79	75	a 84	55
17		35	33	a 34	a 35	a 52	55	60	a 97	a 84	73	b 53
18		a 42	a 37	32	32	47	a 49	a 80	81	78	a 83	58
19		33	34	a 34	a 33	a 51	46	70	a 89	b 92	79	a 73
20		a 44	a 39	32	33	39	a 45	a 67	80	78	a 87	69
21		38	36	a 33	a 39	--	47	59	a 82	a 89	78	a 79
22		a 48	a 40	33	35	--	a 58	a 58	71	79	a 89	78
23		39	36	a 33	a 40	--	55	60	a 86	a 93	91	a 64
24		a 39	a 38	32	34	41	a 67	a 68	79	82	b 89	59
25		37	32	a 33	a 43	a 41	53	68	a 87	b 92	76	a 66
26		b 47	a 39	32	36	--	a 52	a 74	81	75	b 83	64
27		32	32	a 32	a 43	a 48	55	67	a 97	a 88	77	a 67
28		a 38	b 37	31	37	43	a 64	a 80	75	82	a 90	60
29		33	31	a 32	--	b 44	60	65	a 61	a 78	77	a 53
30		a 38	a 33	31	--	49	a 71	a 78	61	79	a 78	55
31		--	32	a 32	--	a 52	--	65	--	a 88	74	--
Average		43	35	33	35	44	54	65	80	81	81	71

a Measurement between 4 p.m. and 7 p.m.
b Measurement between 1 p.m. and 3 p.m.

PLATTE RIVER BASIN--Continued

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

SOUTH CHANNEL

Temperature (° F) of water, November 1958 to September 1959
/Once-daily measurement between 9 a.m. and 12 m./

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

a Measurement between 4 p.m. and 7 p.m.
b Measurement between 1 p.m. and 3 p.m.

PLATTE RIVER BASIN--Continued

MISCELLANEOUS ANALYSES OF STREAMS IN PLATTE RIVER BASIN

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
6-6655. WHEATLAND CANAL NO. 1 NEAR WHEATLAND, WYO.																							
June 17, 1959.....	386	15	0.01	63	20	32	1.8	176	147	8.4	0.4	1.7	0.09	391	0.53	407	240	96	22	0.9	594	7.5	17
Sept. 25.....	24	8.9	.00	72	30	45	3.4	186	217	16	.4	.7	.11	515	.70	33.4	302	149	24	1.1	756	7.7	4
6-6658. WHEATLAND CANAL NO. 3 NEAR WHEATLAND, WYO.																							
Sept. 30, 1958....	15.0	14	0.02	79	27	41	3.2	242	168	25	0.6	0.9	0.12	483	0.66	19.6	308	110	22	1.0	722	7.7	2
Nov. 4.....	9.51	14	.02	93	29	44	3.6	264	196	16	.6	2.1	.11	549	.75	14.1	352	136	21	1.0	811	7.5	3
Dec. 2.....	21.6	14	.02	76	26	34	2.4	266	124	15	.6	.8	.10	436	.59	25.4	298	80	20	.9	674	7.7	3
Feb. 16, 1959	26	14	.00	64	28	28	1.9	252	108	11	.5	1.6	.07	397	.54	27.9	274	67	18	.7	619	7.8	3
Mar. 19.....	29	13	.01	70	20	26	1.6	240	95	11	.5	.2	.08	372	.51	29.1	257	60	18	.7	581	7.8	3
6-6660. WHEATLAND CANAL NO. 2 NEAR WHEATLAND, WYO.																							
June 18, 1959.....	171	13	0.00	67	25	37	2.1	213	157	12	0.6	1.0	0.09	437	0.59	202	269	94	23	1.0	658	7.6	9
Sept. 25.....	9.8	17	.37	100	36	56	3.0	294	243	18	.8	1.2	.12	648	.88	17.1	398	157	23	1.2	926	8.0	7
6-6666. SYBILLE CREEK AT MULESHOE RANCH, NEAR WHEATLAND, WYO.																							
June 17, 1959.....	3.7	19	0.01	108	31	52	2.2	328	202	17	0.1	1.0	0.11	608	0.83	6.07	397	128	22	1.1	897	7.7	4
Sept. 25.....	8.3	19	.00	106	35	57	3.1	321	247	18	.7	.2	.13	653	.89	14.6	408	145	23	1.2	935	7.8	17
6-7705. PLATTE RIVER NEAR GRAND ISLAND, NEBR.																							
Mar. 30, 1957....	985	23				69		214	160	20	0.6	0.1					222	47	40	2.0	707	7.8	
June 23, 1959.....	a 2					25		244	105								262	62	17	.7	613	7.9	
6-7725. WOOD RIVER NEAR CHAPMAN, NEBR.																							
Nov. 10, 1958	21	29	0.15	70	12	28	22	308	41	19	0.4	0.2	0.10	370	0.50	21.0	225	0	19	0.8	647	7.2	
June 26, 1959 b...	a 2	--	--	--	--	30	--	220	79	--	--	--	--	--	--	--	230	50	22	.9	594	7.3	
Sept. 22.....	13	28	.02	77	13	41	14	226	93	30	.4	30	.15	458	.62	16.1	244	59	25	1.1	688	7.1	
PLATTE RIVER NEAR SILVER CREEK, NEBR.																							
Nov. 6, 1958	a 830			76	23	81		231	241	26			0.15	615	0.84	1,380	283	94	37	2.1	904	7.4	
June 27, 1959.....	a 40					77		225	240								284	99	37	2.0	895	7.8	

Oct. 6, 1958	49.4					5.7		117						147	0.20	19.6	83	0	13	0.3	199	7.1	
Aug. 25, 1959	79.2	38	0.01	23	3.3	6.1	5.5	104	3.8	0.1	0.2	0.2	0.02	131	.18	28.0	71	0	15	.3	173	7.2	14

a Estimated.
b Sample 2.4 miles downstream from staff gage.

Particle-size analyses of suspended sediment, water year October 1958 to September 1959
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Suspended sediment discharge (tons per day)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
6-6655. WHEATLAND CANAL NO. 1 NEAR WHEATLAND, WYO.																	
June 11, 1958....	10:00 a.m.	408	--	98	108						55	74	97		100		VM
Aug. 5	10:00 a.m.	245	--	25	17						76	94	98		100		VM
June 17, 1959....	12:55 p.m.	386	71	218	227	7	15		32		70	88	100		--		VBWCM
																	--
June 25	--	371	--	137	137						--	--	--		--		--
Aug. 17.....	--	a 291	--	155	122						--	--	--		--		
Sept. 25.....	12:10 p.m.	24	53	8	.5						75	91	100		--		VM
6-6660. WHEATLAND CANAL NO. 2 NEAR WHEATLAND, WYO.																	
June 12, 1958....	9:50 a.m.	122		350	115						50	85	91		98	100	VM
Aug. 5	12:00 m.	118		140	45						50	88	100				VM
June 18, 1959....	3:45 p.m.	171	73	209	96	12	19		36		75	90	100				VBWCM
June 24	--	155		240	100						--	--	--				--
Sept. 25.....	--	9.8		8	.2						--	--	--				--

a Daily mean discharge.

PLATTE RIVER BASIN--Continued

MISCELLANEOUS ANALYSES OF STREAMS IN PLATTE RIVER BASIN--Continued

Particle-size analyses of suspended sediment, water year October 1958 to September 1959--Continued
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Suspended-sediment discharge (tons per day)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
6-7915. CEDAR RIVER NEAR SPALDING, NEBR.																	
Oct. 6, 1958....	3:00 a.m.	47	66	34	4.3						100	--	--		--		V
Nov. 10.....	10:45 a.m.	102	49	69	19						--	--	--		--		--
Dec. 13.....	9:30 a.m.	a 85	32	47	11						69	80	96		100		V
Jan. 12, 1959...	2:10 p.m.	a 123	32	83	28						--	--	--		--		--
Feb. 11.....	12:20 p.m.	a 118	33	93	30						65	82	100		--		V
Mar. 16.....	11:30 a.m.	138	38	146	55						63	77	99		100		V
Apr. 13.....	11:20 a.m.	94	46	50	13						61	78	100		--		V
May 5.....	2:10 p.m.	93	57	84	21						76	89	100		--		V
May 20.....	12:20 p.m.	117	68	114	36						79	88	100		--		V
June 2	4:35 p.m.	76	76	64	13						92	100	--		--		V
June 16	12:15 p.m.	61	82	72	12						91	100	--		--		V
July 8	12:05 p.m.	68	74	86	16						89	99	100		--		V
July 23.....	11:40 a.m.	66	78	62	11						84	100	--		--		V
Aug. 5.....	10:55 a.m.	79	78	121	26						86	96	100		--		V
Aug. 25.....	10:15 a.m.	73	75	84	17						78	92	100		--		V
Sept. 9.....	10:20 a.m.	56	63	66	10						85	95	100		--		V
Sept. 22.....	9:50 a.m.	85	62	96	22						48	76	99		100		V
Sept. 22.....	2:40 p.m.	58	70	42	6.6						81	97	100		--		V
6-7918. CEDAR RIVER AT BELGRADE, NEBR.																	
Aug. 25, 1959 ..	1:30 p.m.	e 140	83	498	190						81	90	100		--		V
Sept. 8	3:50 p.m.	135	82	494	180						77	84	99		100		V
Sept. 21.....	2:20 p.m.	204	73	583	321						77	88	99		100		V
Sept. 21.....	6:15 p.m.	e 200	73	512	280						82	90	100		--		V

6-7920. CEDAR RIVER NEAR FULLERTON, NEBR.

Aug. 25, 1959...	2:50 p.m.	96	89	331	86						97	99	100				V
Sept. 8.....	5:15 p.m.	118	82	404	129						91	95	100				V
Sept. 21.....	10:35 a.m.	162	69	499	218						87	92	100				V

ELKHORN RIVER NEAR WATERLOO, NEBR.

June 20, 1958 b .	10:35 a.m.	582	--	278	437	31	37		49		74	82	99		100		VPWCM
July 2, 1959 b...	1:40 p.m.	3,100	68	3,700	31,000	48	59		81		92	97	100				VPWCM
July 2 c	2:05 p.m.	3,000	70	3,420	27,700	50	58		70		93	98	100				VPWCM
July 2 b	4:20 p.m.	2,620	69	3,300	23,300	54	59		70		93	98	100				VPWCM
July 2 c	4:20 p.m.	2,620	70	3,280	23,200	52	59		71		93	98	100				VPWCM
July 2 c	5:45 p.m.	2,540	70	3,080	21,100	56	62		73		94	98	100				VPWCM
July 2 b	6:15 p.m.	2,400	69	3,140	20,300	56	60		71		93	98	100				VPWCM

e Estimated.
a Daily mean discharge.
b At upper cableway.
c At lower cableway.

PLATTE RIVER BASIN--Continued

MISCELLANEOUS ANALYSES OF STREAMS IN PLATTE RIVER BASIN--Continued

Particle-size analyses of bed material, water year October 1958 to September 1959
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Number of sampling points	Bed material: Percent finer than indicated size, in millimeters												Methods of analysis
				0.031	0.062	0.125	0.250	0.500	1.000	2.000	4.000	8.000	16.000	32.000	64.000	
6-7915. CEDAR RIVER NEAR SPALDING, NEBR.																
Oct. 6, 1958	3:00 a.m.	47	7		0	3	46	94	98	99	100					SV
Nov. 10	10:45 a.m.	102	13		2	8	46	93	99	100	--					SV
Dec. 13	9:30 a.m.	a 85	7		--	0	23	89	98	98	99	100				SV
Jan. 12, 1959	2:10 p.m.	a 123	7		2	8	46	94	99	100	--					SV
Mar. 16	11:30 a.m.	138	6		1	5	43	93	99	99	100					SV
Apr. 13	11:20 a.m.	94	5		0	7	49	94	99	99	100					SV
May 5	2:10 p.m.	93	5		0	4	51	97	99	99	100					SV
May 20	12:20 p.m.	117	10		0	6	45	94	98	99	100					SV
June 2	4:35 p.m.	76	9		0	3	43	93	98	100	--					SV
June 16	12:15 p.m.	61	10		2	10	50	93	99	100	--					SV
July 8	12:05 p.m.	68	10		1	8	51	97	100	--	--					V
July 23	11:40 a.m.	66	10		6	17	52	95	99	99	100					SV
Aug. 5	10:55 a.m.	79	10		6	18	64	98	100	--	--					V
Aug. 25	10:15 a.m.	73	10		3	8	48	95	99	100	--					SV
Sept. 9	10:20 a.m.	56	9		1	4	42	94	99	100	--					SV
Sept. 22	2:40 p.m.	58	10		1	9	51	96	100	--	--					V
6-7918. CEDAR RIVER AT BELGRADE, NEBR.																
Aug. 25, 1959	1:30 p.m.	e 140	9		6	12	66	98	100							V
Sept. 8	3:50 p.m.	135	12		0	1	51	98	100							V
Sept. 21	2:20 p.m.	204	18		1	5	56	97	100							V
6-7920. CEDAR RIVER NEAR FULLERTON, NEBR.																
Aug. 25, 1959	2:50 p.m.	96	10		7	12	65	95	98	99	100					SV
Sept. 8	5:15 p.m.	118	9		8	15	61	95	97	98	99	100				SV
Sept. 21	10:35 a.m.	162	16		2	7	67	97	100	--	--					V

June 20, 1958 b....	10:35 a.m.	582	32		2	6	52	80	92	97	99	100				S
June 20 b	10:35 a.m.	582	32		0	7	53	84	94	97	99	100				SV
July 2, 1959 b	1:40 p.m.	3,100	9		1	16	82	99	100	--	--	--				V
July 2 c	2:05 p.m.	3,000	6		3	14	34	51	64	71	89	100				SV
July 2 b	4:20 p.m.	2,620	9		1	16	82	99	100	--	--	--				V

e Estimated.
a Daily mean discharge.
b At upper cableway.
c At lower cableway.

MISSOURI RIVER MAIN STEM

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

LOCATION.--At gaging station at Waubonsie Highway Bridge at Nebraska City, Otoe County.
DRAINAGE AREA.--414,400 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: January 1951 to September 1959.
Water temperatures: May 1951 to September 1959.
EXTREMES, 1958-59.--Dissolved solids: Maximum, 504 ppm Jan. 1-11; minimum, 316 ppm June 4-5.
Hardness: Maximum, 254 ppm Jan. 1-11; minimum, 179 ppm Aug. 1-7.
Specific conductance: Maximum daily, 860 micromhos Dec. 13; minimum daily, 435 micromhos Aug. 4.
Water temperatures: Maximum, 82°F Aug. 22, 23, 26; minimum, freezing point on many days during January and February.
EXTREMES, 1951-59.--Dissolved solids: Maximum, 600 ppm Jan. 1-10, 1952; minimum, 252 ppm June 18-19, 1957.
Hardness: Maximum, 344 ppm Jan. 1-10, 1952; minimum, 141 ppm Aug. 6-11, 1958.
Specific conductance: Maximum daily, 936 micromhos Jan. 6, 1953; minimum daily, 361 micromhos Mar. 29, 1951.
Water temperatures: Maximum, 85°F July 25, 1952; minimum, freezing point on many days during winter months.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in district office at Lincoln, Nebr. Records of discharge for water year October 1958 to September 1959 given in WSP 1630.

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Oct. 1-31, 1958....	32,280	--	--	--	--	68	--	195	--	--	--	--	--	493	0.67	42,970	234	74	39	1.9	747	6.9	--
Nov. 1-30.....	17,640	--	--	--	--	64	--	207	--	--	--	--	--	478	.65	22,770	235	65	37	1.8	734	7.3	--
Dec. 1-31.....	12,050	20	0.00	65	21	64	5.8	224	162	29	0.5	2.2	0.15	488	.66	15,880	247	63	35	1.8	754	7.3	4
Jan. 1-11, 1959....	10,770	--	--	--	--	63	--	223	--	--	--	--	--	504	.69	14,660	254	71	35	1.7	768	7.3	--
Jan. 12	17,000	--	--	--	--	41	--	184	--	--	--	--	--	382	.52	17,530	208	57	30	1.2	580	7.6	--
Jan. 13-19	17,130	--	--	--	--	63	--	215	--	--	--	--	--	493	.67	22,800	248	72	36	1.7	754	7.3	--
Jan. 20	16,400	--	--	--	--	46	--	168	--	--	--	--	--	361	.49	15,990	182	44	35	1.5	564	7.5	--
Jan. 21-Feb. 27....	15,830	--	--	--	--	57	--	191	--	--	--	--	--	442	.60	18,890	221	64	36	1.7	679	7.3	--
Feb. 28	21,000	--	--	--	--	45	--	184	--	--	--	--	--	386	.52	21,890	197	46	33	1.4	594	7.4	--
Mar. 1-31.....	23,070	21	.00	53	16	44	6.0	180	117	21	.4	4.1	.09	378	.51	23,550	196	48	32	1.4	588	7.3	7
Apr. 1-30.....	33,040	--	--	--	--	48	--	193	--	--	--	--	--	413	.56	36,840	211	53	33	1.4	625	7.6	--
May 1-5.....	41,340	--	--	--	--	53	--	202	--	--	--	--	--	429	.58	47,880	222	56	34	1.6	666	7.6	--
May 6-7.....	61,750	14	.01	54	14	39	7.2	186	103	14	.4	4.9	.11	352	.48	58,690	194	41	30	1.2	546	7.9	8
May 8-22.....	39,680	--	--	--	--	47	--	203	--	--	--	--	--	404	.55	43,280	214	48	32	1.4	626	7.6	--
May 23-29.....	43,170	--	--	--	--	42	--	199	--	--	--	--	--	376	.51	43,830	210	47	30	1.3	592	7.9	--
May 30-June 3.....	67,680	--	--	--	--	34	--	202	--	--	--	--	--	348	.47	63,590	210	44	26	1.0	559	7.8	--
June 4-5	37,600	--	--	--	--	28	--	186	--	--	--	--	--	316	.43	32,080	193	40	24	.9	506	8.0	--
June 6-28	33,510	--	--	--	--	48	--	199	--	--	--	--	--	409	.56	37,010	221	58	32	1.4	641	7.9	--
June 29-July 5.....	42,070	--	--	--	--	40	--	a 189	--	--	--	--	--	371	.50	42,140	203	48	30	1.2	576	8.3	--
July 6-31.....	31,800	--	--	--	--	58	--	194	--	--	--	--	--	433	.59	37,180	221	62	36	1.7	675	7.7	--

Aug. 1-7.....	49,130	--	--	--	--	43	--	170	--	--	--	--	--	349	.47	46,290	179	40	34	1.4	547	7.4	--
Aug. 8-31.....	33,960	--	--	--	--	62	--	201	--	--	--	--	--	466	.63	42,730	225	60	38	1.8	712	7.6	--
Sept. 1-30	33,930	10	.01	63	20	66	8.5	200	199	18	.6	.8	.15	490	.67	44,890	241	77	36	1.9	743	7.2	6
Weighted average b.....	27,980	--	--	--	--	54	--	197	--	--	--	--	--	433	0.59	32,710	221	59	35	1.6	667	--	--

a Includes equivalent of 2 ppm of carbonate (CO_3).
b Represents 100 percent of runoff for water year October 1958 to September 1959.

MISSOURI RIVER MAIN STEM--Continued

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

Temperature (° F) of water, water year October 1958 to September 1959
/Once-daily measurement between 4 a.m. and 8 a.m./

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

NISHNABOTNA RIVER BASIN

6-8080. MULE CREEK NEAR MALVERN, IOWA

LOCATION.--At gaging station at highway bridge, 1.8 miles upstream from mouth and 4.4 miles south of Malvern, Mills County.
DRAINAGE AREA.--10.6 square miles.
RECORDS AVAILABLE.--Water temperatures: October 1958 to September 1959.
Sediment records: July 1954 to September 1959.
EXTREMES, 1958-59.--Water temperatures: Maximum, 88°F Aug. 3; minimum, freezing point on many days during November to March.
Sediment concentrations: Maximum daily, 10,000 ppm May 29; minimum daily, not determined.
Sediment loads: Maximum daily, 13,000 tons May 18; minimum daily, less than 0.05 ton on many days.
EXTREMES, 1954-59.--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, 65,000 ppm May 18. Flow affected by ice Nov. 25 to Dec. 1, Dec. 4-24, Dec. 28 to Jan. 11, Jan. 13 to Feb. 2, Feb. 10-26, Mar. 4-9, 14-16, 19-21. Records of discharge for water year October 1958 to September 1959 given in WSP 1630.

Temperature (° F) of water, water year October 1958 to September 1959
/Once-daily measurement at varying hours/

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

NISHNABOTNA RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	1.4	--		1.4	9		1.1	27	
2	1.4	--		1.4	--		1.2	--	a 0.1
3	1.6	10	a 0.1	1.2	9		1.6	34	
4	1.8	--		1.0	--		1.7	--	
5	1.6	26		1.4	20		1.5	63	a .3
6	2.2	320	sb 3.6	.91	--		1.3	--	
7	2.2	75	.4	1.0	--	(t)	1.1	--	
8	1.8	--		1.4	10		.96	24	
9	1.8	32		1.4	--		.86	--	
10	1.4	--		.91	14		.80	25	
11	1.2	15		.91	--		.80	--	
12	1.2	--		1.0	2		.80	30	
13	1.4	5		1.2	--		.80	--	
14	1.4	--		1.6	--		.80	--	
15	1.4	12		1.8	47	a 0.2	.80	43	
16	1.4	--		1.6	--		.80	--	
17	1.2	--		2.9	51	.4	.80	31	
18	1.2	9		2.0	--	e .3	.84	--	
19	1.0	--		1.2	49	.2	.88	--	a .1
20	1.6	7	(t)	1.0	--		.92	42	
21	1.6	--		1.0	--		.94	--	
22	1.6	7		1.0	8		1.0	37	
23	1.6	--		1.0	--		1.0	--	
24	1.4	--		1.0	34		1.0	60	
25	1.6	8		1.1	--	(t)	1.0	--	
26	1.6	--		1.0	14		1.0	--	
27	1.2	5		1.0	--		1.0	28	
28	1.2	--		.90	--		1.0	--	
29	1.2	--		.84	18		1.0	34	
30	1.2	--		.96	--		.92	--	
31	1.2	--		--	--	--	.84	--	
Total	45.6	--	5.5	37.03	--	2.5	31.06	--	3.7

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	0.96	--		0.80	--		4.3	440	c 5.0
2	1.0	--		.84	16		4.0	310	3.3
3	1.0	35		1.0	--		3.1	100	.8
4	1.0	--		1.0	34		2.9	110	.9
5	1.0	46		.91	5		2.7		
6	1.0	--		.91	--		2.6		
7	1.0	48		1.0	--		3.1		
8	1.0	--		1.2	--		3.8		
9	1.0	--	a 0.1	1.2	76		4.8	--	e .8
10	1.0	18		1.0	--		4.6		
11	1.0	--		.90	79	a 0.1	4.0		
12	1.0	25		.90	--		4.0		
13	1.0	--		1.0	--		4.3		
14	1.0	30		1.0	49		5.2		
15	1.0	--		1.1	--		6.0		
16	1.0	--		1.1	26		4.0		
17	.96	12		.90	--		2.9		
18	.94	--		.80	37		3.7		
19	.90	24		1.0	--		5.8	--	e 1.0
20	.85	--		1.1	53		5.2		
21	.82	18		1.0	--		4.2		
22	.80	--		1.5	320	c 1.3	4.0		
23	.80	--		15	1,500	b 60	3.4		
24	.80	12	(t)	25	1,200	b 80	3.4		
25	.80	--		32	3,800	b 320	7.7	1,800	sb 120
26	.80	11		25	1,900	b 130	38	8,400	sb 1,200
27	.80	--		13	1,100	b 38	12	1,300	c 42
28	.80	16		6.0	690	11	8.0	750	b 16
29	.80	--		--	--	--	7.2	480	c 9.5
30	.80	--		--	--	--	8.4	800	b 18
31	.80	13		--	--	--	7.6	380	c 8.0
Total	28.43	--	2.1	138.16	--	642.4	184.9	--	1,441.9

e Estimated.
s Computed by subdividing day.
t Less than 0.050 ton.
a Computed from samples obtained three or four times a week.
b Computed from partly estimated concentration graph.
c Computed from estimated concentration graph.

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

Suspended sediment, water year October 1958 to September 1959--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	6.4	185	a 2.8	2.2	215	1.3	8.2	1,300	sb 38
2	5.2	--		16	2,000	sb 900	7.6	770	16
3	4.9	--		62	7,380	s 2,350	6.8	620	11
4	3.4	--		7.2	1,610	564	7.2	800	b 16
5	3.4	--		21	3,400	193	6.8	735	13
6	3.1	175		71	7,110	s 2,420	6.0	445	7.2
7	4.0	--		11	1,080	32	5.6	310	4.7
8	2.2	--	a 1.3	9.3	800	20	4.9	230	3.0
9	2.6	145		44	5,900	sb 1,100	4.3	190	2.2
10	3.1	155		22	3,100	184	4.3	190	2.2
11	3.1	165		11	1,320	39	4.6	200	2.5
12	3.4	130		10	1,290	35	4.3	230	2.7
13	2.9	105	.8	10	--	e 26	4.0	140	1.5
14	2.9	87	.7	5.6	855	13	3.7	110	1.1
15	3.1	68	.6	6.8	460	8.4	3.7	110	1.1
16	3.1	70	.6	6.8	375	6.9	3.4	91	.8
17	5.6	650	b 10	6.8	360	6.6	3.4	130	1.2
18	6.0	460	b 7.5	188	8,500	sb13,000	5.2	360	b 5.0
19	4.3	750	b 8.5	26	1,700	sb 160	4.9	240	b 3.2
20	6.0	1,000	b 16	9.8	1,050	28	4.6	145	1.8
21	4.3	230	2.7	12	1,380	45	4.3	150	1.7
22	3.4	180	c 1.7	7.6	645	13	3.7	105	1.0
23	3.1	125	1.0	7.6	765	16	3.4	110	1.0
24	2.9	115	.9	7.2	455	8.8	3.4	99	.9
25	2.6	115	.8	6.4	365	6.3	3.1	82	.7
26	2.2	44	.3	8.4	700	16	2.9	60	.5
27	2.6	200	1.4	44	8,500	sb 1,700	2.9	67	.5
28	3.7	240	2.4	26	4,310	sb 1,500	2.6	60	.4
29	2.6	65	.5	56	10,000	sb 2,800	2.9	49	.4
30	2.2	54	.3	112	8,500	sb 4,100	7.6	550	b 11
31	--	--	--	13	1,600	56	--	--	--
Total	108.3	--	76.8	846.7	--	30,848.3	140.3	--	152.3

Day	July			August			September		
1	4.6	220	b 2.8	3.4	36	0.3	4.6	230	2.9
2	3.4	115	1.1	4.0	275	3.0	2.9	52	.4
3	2.9	135	1.1	3.1	235	2.0	2.2	45	.3
4	4.0	135	1.5	2.6	110	.8	2.0	19	.1
5	3.1	135	1.1	13	2,000	sb 130	2.0	47	.3
6	2.9	74	.6	22	3,700	sb 380	2.0	29	.2
7	2.6	125	.9	3.4	83	.8	1.8	19	
8	2.4	92	.6	2.2	53	.3	1.8	--	
9	2.2			2.0	79	.4	1.6	10	
10	2.2			18	1,780	s 182	1.4	9	
11	2.2			4.9	270	3.6	1.4	--	
12	2.4			2.4	76	.5	1.2	19	(t)
13	2.6	46	.3	2.0	62	.3	1.4	--	
14	2.6			2.2	105	.6	1.6	4	
15	2.4			6.6	480	sb 12	1.6	--	
16	2.6			3.4	66	.6	1.6	5	
17	2.9	270	2.1	2.4	37	.2	4.7	1,500	sc 22
18	4.0	83	.9	2.2	--		44	3,400	sb 1,200
19	2.6	48	.3	2.0	29		37	1,800	sb 260
20	2.2	42		1.8	67		4.9	400	c 5.5
21	2.2	--		1.8	93		3.7	120	1.2
22	2.2	29		1.8	--		2.6	--	
23	2.2	56		2.6	54	a .3	2.2	79	
24	2.0	24		2.2	26		2.9	--	
25	1.8	27	a .2	2.0	22		2.9	51	
26	1.6	--		1.8	47		3.4	72	a .5
27	1.8	33		1.8	--		2.9	--	
28	2.2	30		5.2	1,300	sc 200	2.4	110	
29	2.0	33		32	7,900	sb 1,100	2.0	24	
30	1.6	16		3.7	1,000	10	2.0	--	
31	2.2	--		13	1,100	sc 60	--	--	--
Total	78.6	--	17.8	171.5	--	2,090.4	148.7	--	1,497.9

Total discharge for year (cfs-days) 1,959.28
Total load for year (tons) 36,781.6

e Estimated.
s Computed by subdividing day.
t Less than 0.050 ton.
a Computed from samples obtained three or four times a week.
b Computed from partly estimated concentration graph.
c Computed from estimated concentration graph.

NISHNABOTNA RIVER BASIN--Continued

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

Particle-size analyses of suspended sediment, water year October 1958 to September 1959
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment											Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters									
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Oct. 6, 1958	6:00 p.m.	4.9	60	2,430	1,650	--	61		86		100	--	--				SPWCM
Feb. 25, 1959	5:30 p.m.	100	34	11,500	4,220	--	22		39		99	100	--				SPWCM
May 2	12:00 p.m.	293	45	21,100	4,930	--	30		50		99	100	--				SPWCM
May 2	12:00 p.m.	293	45	21,100	4,300	--	20		46		99	100	--				SPNM
May 3	12:35 a.m.	332	45	23,200	4,500	--	31		52		99	100	--				SPWCM
May 3	5:45 a.m.	71	66	10,400	3,840	--	26		44		99	100	--				SPWCM
May 4	11:00 p.m.	18	63	13,800	2,880	--	43		66		100	--	--				SPWCM
May 6	5:20 a.m.	126	66	11,200	4,100	--	23		41		92	98	100				SPWCM
May 9	5:45 p.m.	122	62	26,200	5,500	--	25		42		99	100	--				SPWCM
May 18	2:50 p.m.	1,160	60	40,200	4,550	--	32		47		96	98	100				SPWCM
May 18	2:50 p.m.	1,160	60	40,200	3,890	--	19		41		96	98	100				SPNM
May 28	11:15 p.m.	268	60	24,300	2,850	--	60		64		99	100	--				SPWCM
May 30	5:45 a.m.	244	60	15,500	3,370	--	35		52		97	99	100				SPWCM
Aug. 5	6:15 p.m.	40	78	7,560	2,980	35	43		68		97	99	100				SPWCM
Aug. 6	7:20 a.m.	57	80	6,110	2,300	--	35		56		98	99	100				SPWCM
Aug. 10	6:45 a.m.	6.0	66	3,400	5,130	--	41		72		100	--	--				SPWCM
Aug. 10	9:15 a.m.	74	66	13,200	5,600	28	34		56		99	100	--				SPWCM

NISHNABOTNA RIVER BASIN--Continued

6-8090. DAVIDS CREEK NEAR HAMLIN, IOWA

LOCATION.--At gaging station on downstream side of bridge on State Highway 64, 5.2 miles east of Hamlin, Audubon County, and 8 miles upstream from mouth and East Nishnabotna River.
DRAINAGE AREA.--26.0 square miles.
RECORDS AVAILABLE.--Water temperatures: July 1952 to September 1953.
Sediment records: July 1952 to September 1959.
EXTREMES, 1958-59.--Sediment concentrations: Maximum daily, 4,600 ppm May 28; minimum daily, not determined.
Sediment loads: Maximum daily, 1,560 tons Mar. 19; minimum daily, not determined.
EXTREMES, 1952-59.--Sediment concentrations: Maximum daily, 10,700 ppm Apr. 23, 1955; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 99,000 tons July 2, 1958; minimum daily, 0 tons on many days.
REMARKS.--Maximum observed sediment concentration during water year, 16,600 ppm May 28. Flow affected by ice Nov. 26 to Mar. 19. Records of discharge for water year October 1958 to September 1959 given in WSP 1630.

Suspended sediment, water year October 1958 to September 1959

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	7.2	72		3.9	--		3.1	--	
2	7.2	--		3.9	--		3.6	--	
3	7.0	--		3.9	--		3.9	56	
4	6.8	75		3.7	80		4.5	--	
5	6.4	26	a 1.2	3.7	62		3.6	--	
6	6.7	--		3.5	--		3.0	46	
7	8.4	70		3.5	--		2.6	--	
8	7.7	66		3.5	40		2.2	40	
9	7.0	--		3.5	--	a 0.6	2.0	--	
10	6.2	--		3.5	--		1.9	--	
11	5.4	43		3.5	--		1.8	--	
12	5.0	--		3.5	29		1.8	--	
13	4.5	--		3.5	--		1.8	--	
14	4.2	--		3.5	--		1.8	--	
15	4.0	80		3.5	--		1.8	--	
16	3.9	--		4.5	73		1.8	--	a 0.4
17	3.9	--		9.4	240	sb 8.5	1.8	78	
18	3.9	40		11	240	b 7.0	1.8	--	
19	3.9	--		9.5	140	b 3.6	1.8	--	
20	3.9	--		8.2	110		1.9	63	
21	3.9	--	a .6	7.6	--		2.0	--	
22	3.9	83		6.8	95	a 1.9	2.0	60	
23	3.9	--		6.4	--		2.1	--	
24	3.9	--		6.2	--		2.2	65	
25	3.9	42		5.8	--		2.3	--	
26	3.9	--		3.9	--		2.3	59	
27	3.9	--		4.5	--		2.3	68	
28	4.0	--		5.0	--	a .7	2.3	--	
29	3.9	--		3.6	64		2.0	--	
30	3.9	--		2.8	--		1.7	54	
31	3.9	--		--	--	--	1.4	--	
Total	156.2	--	24.6	149.3	--	43.6	71.1	--	12.4

s Computed by subdividing day.
a Computed from samples obtained two or three times a week.
b Computed from estimated concentration graph.

NISHNABOTNA RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959--Continued

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	1.3	42		1.0	--		40	1,400	sc 260
2	1.2	--		1.0	--		30	1,300	c 110
3	1.1	--		1.0	26		18	260	13
4	1.1	--		1.0	30		6.7	210	3.8
5	1.1	58		1.0	--		8.0	140	b 3.0
6	1.0	--		1.0	--		9.0	100	b 2.4
7	1.0	42		1.0	32		7.0	76	1.4
8	1.0	--		1.0	--		9.0	50	b 1.2
9	1.0	--		1.0	51		14	36	1.4
10	1.0	45		1.0	--		20	--	e 100
11	1.0	--		1.0	44		45	900	sc 260
12	1.0	--		1.0	--		60	1,200	sc 200
13	1.1	48		1.0	--	a 0.1	80	2,230	s 715
14	1.2	--		1.0	33		64	1,100	s 237
15	1.2	--		1.0	--		50	200	b 28
16	1.2	--	a 0.2	1.0	27		38	120	12
17	1.2	58		1.0	--		25	270	18
18	1.1	--		1.0	46		50	700	sc 150
19	1.1	46		1.0	--		120	3,830	s 1,560
20	1.1	--		1.0	--		33	2,200	sc 220
21	1.1	--		1.0	55		13	550	19
22	1.1	98		1.0	--		18	750	sc 50
23	1.1	--		1.0	--		15	800	32
24	1.1	--		1.0	57		10	500	14
25	1.1	31		1.0	--		11	585	17
26	1.1	--		10	500	sc 18	33	2,900	sc 380
27	1.0	--		50	675	s 171	18	850	41
28	1.0	52		45	975	s 236	14	600	23
29	1.0	--		--	--	--	14	550	21
30	1.0	60		--	--	--	14	--	e 20
31	1.0	--		--	--	--	14	475	18
Total	33.6	--	6.2	130.0	--	427.5	900.7	--	4,531.2

Day	April			May			June		
1	20	1,000	c 55	16	--	e 5.0	45	860	104
2	16	690	30	16	440	sc 24	35	645	61
3	14	500	b 19	51	3,100	sc 520	31	550	46
4	12	420	14	27	850	sc 65	28	505	38
5	11	340	b 10	62	3,200	sc 600	26	700	49
6	11	285	8.5	43	1,600	c 190	23	725	45
7	13	280	9.8	34	1,000	92	22	510	30
8	11	265	7.9	32	885	76	21	400	23
9	9.5	--	e 7.0	42	1,600	sc 200	20	265	14
10	9.0	--	e 6.0	42	1,800	sc 220	18	160	b 8.0
11	8.0	210	4.5	31	1,100	sc 100	17	220	c 10
12	7.3	185	3.6	30	520	42	16	240	10
13	7.0	--	e 3.0	28	515	39	15	215	8.7
14	6.4	950	sc 26	26	--	e 20	14	190	7.2
15	6.0	750	b 12	25	265	18	13	125	4.4
16	7.2	1,100	sc 32	24	250	16	12	150	4.9
17	9.2	1,300	c 32	23	250	16	11	150	4.3
18	8.0	300	6.5	40	2,810	s 569	10	210	5.7
19	11	2,100	sb 140	25	900	c 60	9.5	185	4.7
20	30	2,000	sc 170	22	570	34	9.2	190	4.7
21	36	1,500	sc 170	19	400	21	8.9	400	sb 22
22	29	1,100	86	18	350	17	8.5	440	sc 11
23	21	960	54	17	290	13	8.2	185	4.1
24	20	815	44	16	260	b 11	7.7	170	3.5
25	17	820	38	15	350	14	7.5	160	b 3.2
26	16	--	e 32	14	430	16	7.3	150	3.0
27	22	1,300	sc 150	13	145	5.1	10	195	5.3
28	32	1,400	sc 150	64	4,600	sc1,400	24	850	sc 75
29	20	550	30	84	4,000	sc1,400	29	700	sc 130
30	17	170	7.8	76	4,200	sc1,100	72	2,000	sc 420
31	--	--	--	58	2,700	sc 480	--	--	--
Total	456.6	--	1,358.6	1,033	--	7,383.1	578.8	--	1,159.7

e Estimated.
s Computed by subdividing day.
a Computed from samples obtained two or three times a week.
b Computed from estimated concentration graph.
c Computed from partly estimated concentration graph.

NISHNABOTNA RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959--Continued

Day	July			August			September		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	37	650	sc 70	3.0	80	0.6	14	500	sb 55
2	24	320	21	5.8	--	e 5.5	6.8	600	sc 14
3	21	375	21	5.2	230	3.2	4.4	160	1.9
4	18	265	13	4.8	78		3.9	105	1.1
5	16	345	15	4.3	--		2.3	60	.4
6	14	350	13	3.8	--		1.9		
7	12	215	7.0	3.5	--		1.5		
8	11	410	12	3.2	--		1.4		
9	10	270	7.3	2.9	--	e .5	1.2		
10	9.5	255	6.5	2.7	--		1.1		
11	9.0	260	6.3	2.5	54		1.2	65	.2
12	8.1	170		2.3	56		1.3		
13	7.5	--		2.0	31		1.3		
14	7.2	--		1.8	92		1.5		
15	7.0	--		5.0	125	1.7	1.1		
16	6.4	130	a 2.8	2.7	130	1.0	1.1		
17	6.0	180		2.5	25	.2	2.3	97	
18	5.7	190		2.2			3.5	93	
19	5.4	--		1.8			3.2	--	
20	5.2	145		1.6	14	.1	3.0	92	
21	5.0	100		1.5			1.8	--	a .6
22	4.8	--		1.1			1.6	93	
23	4.5	185		4.0	105	1.1	1.4	87	
24	4.3	--		2.7	36	.3	1.3	--	
25	4.1	95		1.3	23	.1	5.3	--	e 5.0
26	4.0	120	a 1.5	.98	22	.1	5.4	--	e 4.0
27	3.8	125		.79	33	.1	3.9	275	2.9
28	3.6	--		.79	32	.1	2.7	190	1.4
29	3.5	150		1.5	110	.4	2.5	225	1.5
30	3.3	--		1.1	29	.1	2.3	255	1.6
31	3.1	210		2.7	--	e 10	--	--	--
Total	284.0	--	234.6	82.06	--	30.5	86.2	--	95.8

Total discharge for year (cfs-days) 3,961.56
Total load for year (tons) 15,307.8

e Estimated.
s Computed by subdividing day.
a Computed from samples obtained two or three times a week.
b Computed from estimated concentration graph.
c Computed from partly estimated concentration graph.

NISHNABOTNA RIVER BASIN--Continued

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

Particle-size analyses of suspended sediment, water year October 1958 to September 1959
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Feb. 27, 1959....	3:00 p.m.	50	34	1,830	4,680		33		44		90	95	98		99	100	SPWCM
Feb. 28	3:45 p.m.	45	34	3,120	6,590		26		49		95	98	99		99	100	SPWCM
Mar. 13	4:30 p.m.	80	34	6,880	4,800		23		45		91	96	100		--	--	SPWCM
Mar. 19	2:00 p.m.	180	36	9,520	3,390		22		46		83	90	98		100	--	SPWCM
Apr. 16	6:00 p.m.	20	52	7,170	3,030		50		67		99	100	--		--	--	SPWCM
May 3	10:30 a.m.	44	62	2,620	3,060		41		67		95	97	99		100	--	SPWCM
May 28	2:45 p.m.	116	60	14,600	2,680		37		59		93	96	99		100	--	SPWCM
May 29	9:45 a.m.	68	59	3,060	2,910		33		53		83	86	92		98	100	SPWCM
May 29	9:45 a.m.	68	59	3,060	2,450		22		47		83	86	92		98	100	SPNM
May 30	8:30 a.m.	89	60	5,020	2,830		38		52		78	84	95		99	100	SPWCM
June 30.....	10:15 a.m.	53	56	1,680	2,580		42		64		93	96	99		100	--	SPWCM
June 30.....	5:15 p.m.	82	59	3,060	3,530		38		66		94	97	100		--	--	SPWCM
June 30.....	5:15 p.m.	82	59	3,060	2,980		25		56		94	97	100		--	--	SPNM

KANSAS RIVER BASIN

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

LOCATION.--At gaging station at bridge on State Highway 15, 1 mile south of Clay Center, Clay County, and 4 miles downstream from Five Creeks.
DRAINAGE AREA.--24,570 square miles, approximately, of which a large area is non-contributing.
RECORDS AVAILABLE.--Water temperatures: October 1957 to September 1959.
Sediment records: October 1957 to September 1959.
EXTREMES, 1958-59.--Water temperatures: Maximum, 85°F July 4, 5, 9, 10; minimum, freezing point on several days during December and January.
Sediment concentrations: Maximum daily, 5,940 ppm May 6; minimum daily, 23 ppm Jan. 1.
Sediment loads: Maximum daily, 134,000 tons May 6; minimum daily, 22 tons Jan. 1.
EXTREMES, 1957-59.--Water temperatures: Maximum, 94°F Aug. 12, 1958; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 5,940 ppm May 6, 1959; minimum daily, 23 ppm Jan. 1, 1959.
Sediment loads: Maximum daily, 277,000 tons Sept. 6, 1958; minimum daily, not determined.
REMARKS.--Maximum observed sediment concentration during water year, 9,460 ppm May 6. Flow affected by ice Nov. 28-30, Dec. 4 to Feb. 23. Records of discharge for water year October 1958 to September 1959 given in WSP 1630.

Temperature (° F) of water, water year October 1958 to September 1959
/Once-daily measurement between 6 a.m. and 8 a.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	55	49	a 39	b 32	a 33	b 38	51	67	61	a 72	75	74
2	a 62	b 52	b 40	a 32	a 33	42	53	69	67	a 77	79	67
3	55	47	38	b 32	a 35	34	53	70	69	a 82	78	67
4	58	47	a 42	b 32	a 33	43	51	72	70	a 84	81	70
5	b 62	48	a 37	a 32	a 35	a 37	57	68	69	a 85	80	72
6	62	46	b 33	a 33	a 34	34	56	63	a 82	a 85	80	76
7	65	46	b 35	a 33	a 35	36	59	66	73	a 81	75	75
8	63	a 52	33	a 35	a 33	b 42	45	57	73	a 83	73	73
9	62	a 52	32	a 34	a 34	42	46	60	75	a 85	75	71
10	57	45	33	33	a 33	44	47	60	76	a 85	73	59
11	a 65	46	34	34	a 35	45	44	60	76	b 83	73	59
12	a 66	48	a 33	a 34	--	42	b 45	63	77	b 78	72	60
13	60	b 49	33	a 35	--	44	42	65	76	72	73	63
14	63	56	a 32	34	b 34	47	42	64	74	70	73	61
15	63	57	a 33	33	b 34	a 45	50	61	73	71	74	63
16	64	58	33	a 33	35	39	55	64	75	71	73	63
17	62	54	33	33	34	39	60	62	77	75	76	59
18	b 66	39	33	32	a 33	45	54	64	79	73	78	56
19	b 62	40	33	a 34	a 33	49	51	67	78	77	76	61
20	61	42	a 33	33	a 34	52	47	71	77	73	77	67
21	59	43	a 36	a 32	b 36	39	46	70	76	75	77	67
22	54	b 49	33	a 32	b 34	b 42	47	63	77	74	77	71
23	54	b 46	33	a 33	a 35	42	52	60	73	75	b 79	72
24	53	43	33	a 34	33	50	57	62	76	72	80	65
25	52	a 43	a 38	a 35	35	54	60	64	78	77	76	64
26	b 51	a 34	a 36	a 33	34	47	58	68	77	--	76	65
27	50	a 33	b 37	a 34	36	43	59	70	72	77	74	61
28	48	a 33	a 40	a 35	36	45	54	72	a 83	76	75	62
29	48	a 37	a 33	a 33	--	b 47	60	73	a 76	77	71	58
30	47	a 37	a 32	a 34	--	48	62	73	a 72	79	74	55
31	48	--	32	b 33	--	51	--	71	--	80	74	--
Average	58	46	35	33	34	43	52	66	75	77	76	65

a Measurement between 4 p.m. and 6 p.m.
b Measurement between 9 a.m. and 3 p.m.

706-462

KANSAS RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959

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	779	230	484	405	115	126	314	76	65
2	720	223	434	393	--	e 130	336	78	71
3	694	200	375	387	108	113	364	104	102
4	682	202	372	375	108	110	390	213	225
5	663	196	351	364	131	129	390	263	277
6	645	172	300	353	94	90	380	286	294
7	633	165	282	348	83	78	350	163	154
8	627	141	239	348	74	70	330	100	89
9	615	124	206	342	54	50	300	84	68
10	567	123	189	336	81	74	260	50	35
11	573	213	330	331	62	56	250	51	35
12	786	562	1,190	326	75	66	350	42	40
13	1,150	1,040	3,230	331	67	60	350	--	e 46
14	1,200	784	2,540	331	68	61	340	--	e 65
15	996	460	1,240	331	65	58	320	83	72
16	831	331	743	320	66	57	330	66	59
17	714	276	533	342	55	51	320	--	e 44
18	645	239	417	364	74	73	330	50	45
19	603	213	347	387	70	74	370	54	54
20	567	204	313	387	61	64	420	--	e 110
21	537	212	307	393	53	57	430	203	236
22	513	190	264	393	58	62	430	111	129
23	495	177	237	393	60	64	400	181	196
24	477	165	213	387	--	e 70	400	158	171
25	465	175	220	361	62	64	410	228	253
26	465	155	195	375	60	61	430	224	260
27	453	150	184	381	61	63	440	228	271
28	447	131	158	400	84	91	410	230	255
29	435	141	166	400	88	95	380	245	252
30	417	126	142	350	86	82	350	169	160
31	411	99	110	--	--	--	310	62	52
Total	19,805	--	16,311	10,954	--	2,299	11,184	--	4,185

Day	January			February			March		
1	350	23	22	500	58	79	1,230	840	2,790
2	400	60	65	480	66	86	1,060	732	2,100
3	300	43	35	490	70	93	911	542	1,330
4	290	--	e 34	510	70	97	862	404	941
5	290	70	55	520	70	99	855	439	1,010
6	300	66	54	540	76	111	834	349	787
7	320	68	59	570	96	148	807	294	641
8	350	71	67	590	94	150	788	276	588
9	360	65	64	600	94	153	774	279	584
10	370	61	61	620	90	151	762	286	588
11	370	68	68	630	85	145	765	239	488
12	390	79	84	640	168	291	755	250	510
13	390	80	85	800	--	e 1,000	755	246	501
14	390	64	68	950	270	694	748	256	518
15	370	--	e 70	850	118	272	742	271	544
16	410	--	e 90	840	363	824	742	263	528
17	400	73	79	800	430	930	729	258	508
18	370	64	64	750	270	548	729	260	512
19	350	70	66	720	238	463	690	268	500
20	340	64	59	720	418	813	670	238	431
21	430	52	61	720	285	555	644	224	390
22	460	52	65	720	139	271	619	164	308
23	500	68	92	800	322	696	601	160	260
24	520	95	134	911	168	414	589	160	287
25	520	78	110	1,010	595	1,620	619	200	335
26	500	53	72	1,090	874	2,570	710	464	s 960
27	520	68	96	1,200	879	2,850	946	1,780	4,550
28	540	72	106	1,180	920	2,930	1,400	2,280	8,620
29	560	78	118	--	--	--	1,230	2,210	7,340
30	560	74	112	--	--	--	932	1,590	4,000
31	540	68	100	--	--	--	762	1,020	2,100
Total	12,760	--	2,315	20,751	--	19,053	25,250	--	45,549

e Estimated.
s Computed by subdividing day.

KANSAS RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959--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	658	531	944	981	442	1,170	1,840	2,730	13,600
2	607	308	505	967	456	1,190	1,580	2,200	9,390
3	565	287	438	960	431	1,120	1,320	890	3,170
4	535	250	362	1,000	460	1,240	1,300	670	2,350
5	535	238	344	3,810	4,560	s 55,700	1,370	680	2,520
6	517	253	354	8,370	5,940	134,000	1,310	790	2,800
7	487	390	513	5,300	4,250	60,800	1,320	520	1,850
8	463	335	419	4,530	3,620	44,300	1,270	590	2,020
9	445	258	310	5,600	3,680	55,600	1,220	510	1,680
10	434	228	268	5,690	3,000	46,100	1,170	490	1,550
11	428	200	232	4,780	2,540	32,800	1,090	430	1,270
12	445	208	250	3,330	2,050	18,400	1,050	420	1,190
13	535	324	468	2,340	1,410	8,910	995	450	1,210
14	632	504	861	1,930	1,030	5,370	967	370	967
15	677	479	876	1,700	720	3,300	953	380	979
16	696	403	758	1,520	630	2,590	925	370	925
17	722	384	749	1,350	580	2,120	876	340	805
18	742	339	680	1,170	550	1,740	814	340	748
19	807	382	833	1,140	530	1,630	781	320	676
20	1,240	816	2,730	1,090	400	1,180	729	300	591
21	981	692	1,830	1,170	510	1,610	820	--	e 4,000
22	897	510	1,240	1,220	805	2,650	781	1,860	3,920
23	939	512	1,300	1,870	1,240	6,260	535	670	968
24	897	520	1,260	3,270	3,560	31,400	595	480	772
25	862	640	1,490	2,740	2,780	20,600	742	1,000	2,000
26	855	484	1,120	1,760	1,940	9,220	638	2,090	3,600
27	862	430	1,000	1,340	1,200	4,340	505	1,980	2,700
28	862	386	898	1,170	690	2,180	440	1,040	1,240
29	939	430	1,090	1,110	530	1,590	396	700	749
30	974	472	1,240	1,090	620	1,830	390	550	580
31	--	--	--	1,970	2,280	s 13,600	--	--	--
Total	21,238	--	25,362	76,268	--	574,540	28,722	--	70,820
	July			August			September		
1	650	964	s 2,770	291	600	471	231	360	224
2	1,490	--	e 21,000	237	250	160	221	290	173
3	876	2,680	6,340	226	180	110	226	330	201
4	703	1,400	2,660	215	140	81	215	240	139
5	729	2,030	4,000	237	240	154	210	210	119
6	890	1,950	4,690	379	1,360	1,390	200	180	97
7	3,160	4,900	s 45,500	296	1,510	1,210	189	220	112
8	1,710	4,300	s 21,400	248	860	576	168	160	73
9	939	2,380	6,030	226	1,020	622	163	150	66
10	690	1,600	2,980	215	710	412	148	110	44
11	577	980	1,530	194	260	136	138	160	60
12	481	620	805	178	440	211	133	140	50
13	418	410	463	178	370	178	128	90	31
14	379	300	307	178	500	240	128	130	45
15	374	220	222	200	210	113	123	95	32
16	379	225	230	242	160	105	118	100	32
17	324	225	197	258	320	223	114	130	40
18	330	240	214	231	--	e 140	143	430	166
19	302	210	171	237	160	102	302	600	489
20	296	220	176	269	250	182	280	630	476
21	401	430	466	286	260	201	324	572	s 553
22	463	670	838	286	250	193	774	3,660	7,650
23	457	720	888	286	320	247	638	3,040	5,240
24	368	520	517	248	250	167	946	3,940	10,100
25	335	450	407	221	300	179	781	2,860	s 6,600
26	308	320	266	205	200	111	469	1,310	1,660
27	313	270	228	189	200	102	677	2,910	5,320
28	280	230	174	173	170	79	374	1,040	1,050
29	269	360	261	379	--	e 2,100	335	640	579
30	253	420	287	440	2,160	2,570	296	680	543
31	242	260	170	264	680	485	--	--	--
Total	19,386	--	126,187	7,712	--	13,250	9,192	--	41,964
Total discharge for year (cfs-days)									263,222
Total load for year (tons)									941,835

e Estimated.
s Computed by subdividing day.

KANSAS RIVER BASIN--Continued

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

Particle-size analyses of suspended sediment, water year October 1958 to September 1959
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Oct. 21, 1958....	1:20 p.m.	537	62	238	--	--	--		--		95	97	100	--	--	--	V
Dec. 2.....	12:30 p.m.	320	40	74	--	--	--		--		96	100	--	--	--	--	V
Apr. 14, 1959 ...	11:10 a.m.	644	48	526	1,620	48	54		--		94	96	97	100	--	--	VPWCM
May 6.....	2:00 p.m.	9,840	--	6,020	6,840	60	66		80		94	97	99	100	--	--	VPWCM
May 9.....	4:20 p.m.	7,200	63	4,090	6,260	48	56		73		93	97	99	100	--	--	VPWCM
May 9.....	4:20 p.m.	7,200	63	4,090	6,490	32	47		72		93	97	99	100	--	--	VNP
May 12.....	1:40 p.m.	3,340	68	2,470	2,670	53	57		67		74	77	79	84	96	100	VPWCM
May 12.....	1:40 p.m.	3,340	68	2,470	2,740	22	44		63		74	77	79	84	96	100	VNP
May 14.....	11:40 a.m.	1,910	66	1,030	2,580	50	55		71		89	93	96	100	--	--	VPWCM
May 14.....	11:40 a.m.	1,910	66	1,030	2,480	13	28		71		89	93	96	100	--	--	VNP
June 22	9:20 a.m.	841	43	2,320	5,060	64	72		84		90	90	90	95	100	--	VPWCM
Aug. 1.....	2:15 p.m.	258	88	353	--	--	--		--		82	85	85	85	100	--	V
Sept. 16.....	9:55 a.m.	118	60	103	--	--	--		--		98	100	--	--	--	--	V

Particle-size analyses of bed material, water year October 1958 to September 1959
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Number of sampling points	Bed material												Methods of analysis
				Percent finer than indicated size, in millimeters												
				0.031	0.062	0.125	0.250	0.500	1.000	2.000	4.000	8.000	16.000	32.000	64.000	
May 9, 1959.....	4:20 p.m.	7,200	12		0	1	14	60	83	91	96	100				SV
May 12	1:40 p.m.	3,340	12		4	7	22	67	89	95	98	99	100			SV
May 14	11:40 a.m.	1,910	12		4	6	18	68	89	95	99	100				SV
Aug. 1.....	2:15 p.m.	258	37		1	2	10	48	75	86	96	100				SV

KANSAS RIVER BASIN--Continued

6-8633. BIG CREEK NEAR OGALLAH, KANS.

LOCATION.--At gaging station at bridge on State Highway 147, 5 miles south of Ogallah, Trego County, 9.0 miles upstream from Ogallah Creek, and 10 miles west of Ellis.
DRAINAGE AREA.--347 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1955 to September 1958.
Water temperatures: October 1955 to September 1959 (discontinued).
Sediment records: October 1955 to September 1959 (discontinued).
EXTREMES, 1958-59.--Water temperatures: Maximum, 83°F Aug. 24; minimum, freezing point on many days during November to February
Sediment concentrations: Maximum daily, 1,580 ppm June 23; minimum daily, no flow Aug. 11-13.
Sediment loads: Maximum daily, 678 tons Aug. 17; minimum daily, 0 tons Aug. 11-13.
EXTREMES, 1955-59.--Water temperatures: Maximum, 83°F Aug. 24, 1959; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 9,630 ppm June 30, 1957; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 139,000 tons June 17, 1957; minimum daily, 0 tons on many days.
REMARKS.--Flow affected by ice Nov. 26, 28, Dec. 5, 8, 10, 12, 15, 31, Jan. 2, 5, 7-9, 16, 21, Jan. 23 to Feb. 13, Feb. 19-22. Records of discharge for water year October 1958 to September 1959 given in WSP 1630.

Chemical analyses, in parts per million, November 1958 to August 1959

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
Nov. 5, 1958.....	2.5					14		260	0									219	6	12	0.4	473	7.5
Feb. 11, 1959.....	5.2					13		282	0									238	7	11	.4	509	7.8
June 7.....	3.5					8.0		207	0									173	3	9	.3	383	7.3
Aug. 17	170					2.8		152	0									109	0	5	.1	263	7.4

KANSAS RIVER BASIN--Continued

6-8633. BIG CREEK NEAR OGALLAH, KANS.--Continued

Temperature (° F) of water, water year October 1958 to September 1959
/Once-daily measurement between 6 a.m. and 10 a.m./

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

a Measurement between 1 p.m. and 5 p.m.

KANSAS RIVER BASIN--Continued

6-8633. BIG CREEK NEAR OGALLAH, KANS.--Continued

Suspended sediment, water year October 1958 to September 1959

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	2.0	95	0.5	3.0	55	0.4	1.3		
2	2.3	104	.6	2.8	56	.4	2.0		
3	2.2	101	.6	2.5	71	.5	3.0		
4	2.3	74	.5	2.5	63	.4	3.4		
5	2.2	53	.3	2.5	64	.4	3.2		
6	2.3	98	.6	2.7	50	.4	2.8		
7	2.2	126	.8	3.0	102	.8	2.7		
8	2.3	125	.8	2.2	38	.2	2.9		
9	2.3	119	.7	3.2	47	.4	2.5		
10	2.3	89	.6	2.5	51	.3	2.3		
11	2.3	97	.6	2.5	90	.6	2.7		
12	2.7	163	1.2	2.5	43	.3	1.5		
13	2.7	150	1.1	2.7	80	.6	1.0		
14	2.5	126	.8	2.5	58	.4	1.2		
15	2.7	130	1.0	2.5	80	.5	2.0		
16	2.7	138	1.0	2.3			2.9	35	0.2
17	2.3	126	.8	2.2			3.4		
18	2.3	123	.8	2.1			3.6		
19	2.2	79	.5	2.3			2.5		
20	2.2	79	.5	2.4			2.6		
21	2.5	61	.4	2.5			2.7		
22	2.3	57	.4	2.7			2.7		
23	2.3	71	.4	2.9	50	.3	2.4		
24	2.5	46	.3	2.8			2.0		
25	2.3	55	.3	2.8			2.4		
26	2.5	76	.5	2.6			2.8		
27	2.5	92	.6	2.4			2.7		
28	2.7	73	.5	2.0			2.6		
29	2.7	67	.5	2.1			2.5		
30	2.8	65	.5	2.3			2.0		
31	3.0	61	.5	--	--	--	2.1		
Total	75.1	--	19.2	76.0	--	11.1	76.4		6.2

Day	January			February			March		
1	2.3			2.3			3.9	10	0.1
2	1.7			2.0			3.0	12	.1
3	1.2			3.0			2.7	7	.1
4	.8			3.3			2.7	9	.1
5	.9			3.5			2.8	13	.1
6	1.4			4.0	20	0.2	3.5	11	.1
7	1.9			4.8			3.6	7	.1
8	1.8			4.6			4.0	9	.1
9	2.0			3.5			3.8	9	.1
10	2.3			3.0			4.0	7	.1
11	2.9			4.0	14	.2	3.8	8	.1
12	3.4			5.8	20	.3	3.8	6	.1
13	3.9			6.0	14	.2	3.8	10	.1
14	3.0			5.4	7	.1	3.8	29	.3
15	3.0			3.4	7	.1	4.0	9	.1
16	2.5	25	0.2	4.8	11	.1	3.8	9	.1
17	2.8			8.5	6	.1	3.6	11	.1
18	3.2			5.2	5	.1	3.8	28	.3
19	4.1			4.5	6	.1	4.0	75	.8
20	3.5			3.5	5	(t)	3.6	62	.6
21	2.5			4.0	6	.1	2.6	16	.1
22	1.5			3.7	8	.1	4.2	17	.2
23	3.2			3.4	31	.3	4.2	31	.4
24	3.7			3.0	7	.1	4.2	34	.4
25	4.5			3.0	6	(t)	3.5	40	.4
26	3.5			3.0	6	(t)	3.6	24	.2
27	3.0			3.2	6	.1	4.6	17	.2
28	3.2			5.2	8	.1	4.2	31	.4
29	3.7			--	--	--	4.4	12	.1
30	2.9			--	--	--	4.0	38	.4
31	2.6			--	--	--	3.8	37	.4
Total	82.9		6.2	113.6	--	4.2	115.3	--	6.8

t Less than 0.050 ton.

6-8633. BIG CREEK NEAR OGALLAH, KANS.--Continued

Suspended sediment, water year October 1958 to September 1959--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	3.6	34	0.3	2.6	175	1.2	1.7	155	0.7
2	4.2	51	.6	1.9	206	1.1	1.9	177	.9
3	4.2	44	.5	1.9	206	1.1	2.6	190	1.3
4	3.6	49	.5	1.7	168	.8	14	1,100	42
5	3.5	46	.4	3.3	139	1.2	8.4	580	s 15
6	4.2	40	.4	2.1	188	1.1	5.9	355	5.7
7	4.2	68	.8	2.1	190	1.1	3.3	360	3.2
8	3.3	123	1.1	2.1	234	1.3	4.2	305	3.5
9	3.3	26	.2	5.1	196	2.7	11	324	9.6
10	3.8	14	.1	4.0	177	1.9	5.9	322	5.1
11	3.6	20	.2	3.6	215	2.1	2.4	328	2.1
12	3.1	20	.2	2.3	232	1.4	2.3	335	2.1
13	3.6	42	.4	2.0	275	1.5	2.6	271	1.9
14	3.5	71	.7	2.0	205	1.1	1.9	275	1.4
15	3.5	55	.5	2.0	175	.9	1.6	229	1.0
16	3.5	47	.4	2.1	127	.7	1.3	225	.8
17	3.5	124	1.2	2.4	152	1.0	1.3	138	.5
18	4.6	100	1.2	2.1	221	1.3	.8	188	.4
19	4.4	67	.8	2.0	202	1.1	.8	162	.3
20	3.3	85	.8	2.0	224	1.2	.8	164	.4
21	3.6	86	.8	2.0	192	1.0	1.0	213	.6
22	3.1	120	1.0	2.4	176	1.1	4.2	1,090	12
23	3.3	132	1.2	2.3	139	.9	3.6	1,580	15
24	3.0	172	1.4	2.3	218	1.4	1.5	415	1.7
25	3.0	165	1.3	2.3	188	1.2	1.5	405	1.6
26	3.0	168	1.4	2.3	157	1.0	1.0	388	1.0
27	3.0	158	1.3	2.1	166	.9	.8	273	.6
28	3.0	217	1.8	2.0	193	1.0	.7	201	.4
29	2.8	206	1.6	2.8	319	2.4	.6	232	.4
30	2.6	188	1.3	2.4	240	1.6	1.0	164	.4
31	--	--	--	1.7	198	.9	--	--	--
Total	104.9	--	24.4	73.9	--	39.2	90.6	--	131.6

Day	July			August			September		
1	1.0	170	0.5	0.6	112	0.2	2.8	220	1.7
2	.8	193	.4	.3	85	.1	3.1	314	2.6
3	.5	159	.2	.3	60	(t)	3.8	262	2.7
4	.3	176	.1	.2	62	(t)	2.3	199	1.2
5	.3	171	.1	.2	75	(t)	5.7	371	s 9.7
6	.3	158	.1	1.4	496	1.9	11	398	12
7	.4	155	.2	6.7	1,550	28	6.1	649	11
8	.2	118	.1	.9	650	1.6	4.0	492	5.3
9	.1	86	(t)	.5	240	.3	3.1	364	3.0
10	.1	78	(t)	.2	185	.1	2.1	202	2.1
11	.1	82	(t)	0	--	0	1.9	175	.9
12	.1	77	(t)	0	--	0	1.5	140	.6
13	.4	785	.2	0	--	0	1.5	98	.4
14	7.1	926	s 20	14	202	s 14	1.4	117	.4
15	2.3	752	s 9.5	8.8	1,240	s 32	1.0	92	.2
16	2.6	259	s 1.9	6.1	710	s 12	.8	100	.2
17	44	1,210	s 153	194	1,110	s 678	1.0	53	.1
18	22	1,080	64	194	939	492	5.7	524	s 8.9
19	10	862	23	52	944	133	3.1	380	3.2
20	8.2	800	18	24	787	51	2.8	218	1.6
21	5.9	850	14	15	638	26	1.6	196	.8
22	21	751	s 45	10	532	14	1.4	169	.6
23	11	1,110	33	7.1	451	8.6	1.0	143	.4
24	5.1	766	12	5.3	358	5.1	4.4	337	s 6.0
25	3.3	400	.4	4.2	336	3.8	16	720	31
26	2.1	304	.2	3.6	266	2.6	38	1,400	144
27	2.0	306	.2	3.6	227	2.2	18	1,180	57
28	1.6	254	.1	2.6	205	1.4	14	1,040	39
29	1.3	279	1.0	2.1	214	1.2	12	901	29
30	.8	235	.5	2.0	198	1.1	8.4	836	19
31	.7	149	.3	2.0	190	1.0	--	--	--
Total	155.6	--	398.1	561.7	--	1,511.3	179.5	--	394.6

Total discharge for year (cfs-days) 1,705.5

Total load for year (tons) 2,552.9

s Computed by subdividing day.

t Less than 0.050 ton.

KANSAS RIVER BASIN--Continued

6-8645. SMOKY HILL RIVER AT ELLSWORTH, KANS.

LOCATION.--At gaging station at bridge on State Highway 14, in Ellsworth, Ellsworth County, and 2 miles downstream from Turkey Creek.
DRAINAGE AREA.--7,580 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: September 1957 to September 1959 (discontinued).
REMARKS.--Records of discharge for water year October 1958 to September 1959 given in WSP 1630.

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids				Hardness as $CaCO_3$		Per cent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million		Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
														Residue at 180°C	Sum									
Oct. 14, 1958...	163	16	0.00	124	13	200	11	223	160	340	0.4	1.9	0.16	1,050	976	1.43	462	361	178	54	4.6	1,700	7.5	
Nov. 5.....	87	15	.00	164	38	286	9.8	284	242	501	.5	1.3	.16	1,520	1,400	2.07	357	565	332	52	5.2	2,380	7.7	
Dec. 11.....	72	15	.00	177	26	270	8.0	319	249	452	.5	3.5	.16	1,470	1,360	2.00	286	550	288	51	5.0	2,300	7.6	
Jan. 19, 1959...	116	14	.00	133	28	240	8.1	184	215	435	.4	2.7	.13	1,250	1,170	1.70	392	446	295	53	4.9	2,040	7.8	
Feb. 11.....	152	15	.00	187	27	257	8.4	318	230	468	.4	6.7	.17	1,490	1,360	2.03	612	576	315	49	4.7	2,320	7.7	
Mar. 11.....	67	14	.00	168	29	274	8.0	269	244	486	.5	2.1	.27	1,490	1,360	2.03	270	540	319	52	5.1	2,330	7.9	
Apr. 17.....	56	9.3	.01	152	29	272	9.2	231	241	495	.5	.9	.19	1,500	1,320	2.04	227	497	308	54	5.3	2,330	7.5	
May 26.....	264	14	.02	83	10	64	9.4	159	88	122	.3	1.7	.07	525	--	.71	374	248	118	35	1.8	827	7.3	
June 7.....	280	18	.01	113	15	97	11	219	130	178	.4	2.6	.09	731	--	.99	553	344	164	37	2.3	1,100	7.6	
July 14.....	72	16	.01	116	22	233	12	202	179	391	.5	1.2	.21	1,160	1,070	1.58	226	380	214	56	5.2	1,900	7.4	
Aug. 11.....	39	19	.01	138	31	376	12	201	240	630	.5	.7	.27	1,670	1,550	2.27	176	471	306	63	7.5	2,720	7.4	
Sept. 15.....	23	17	.20	147	33	384	10	230	246	656	.5	1.5	.19	1,690	1,610	2.30	105	502	313	62	7.5	2,790	7.3	

6-8650. KANOPOLIS RESERVOIR NEAR KANOPOLIS, KANS.

LOCATION.--At gaging station at dam on Smoky Hill River, 12 miles southeast of Kanopolis, Ellsworth County, 25 miles southwest of Salina, and 207.8 miles upstream from mouth of Smoky Hill River.
DRAINAGE AREA.--7,857 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1958 to September 1959 (discontinued).
REMARKS.--Records of discharge for water year October 1958 to September 1959 given in WSP 1630.

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of collection	Lake content (acre-feet)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
Oct. 14, 1958	69,208	11	0.01	77	12	65	11	156	0	109	108	0.3	3.2	0.21	506	0.69		240	112	36	1.8	819	7.4
Nov. 5	59,536	11	.00	77	11	67	11	156	0	102	114	.3	3.0	.10	509	.69		236	108	37	1.9	826	7.0
Dec. 11	59,162	10	.00	85	13	89	10	167	0	113	153	.4	2.3	.10	588	.80		266	129	41	2.4	985	7.4
Jan. 19, 1959	58,226	9.7	.00	97	16	108	11	187	0	132	190	.4	2.5	.10	702	.95		306	153	42	2.7	1,150	7.1
Feb. 19	59,018	8.7	.00	100	17	119	11	193	0	138	206	.4	2.1	.10	735	1.00		318	160	44	2.9	1,220	7.6
Mar. 11	59,346	8.7	.01	100	16	121	10	195	0	140	207	.4	.9	.10	760	1.03		316	156	44	3.0	1,220	7.4
Apr. 17	52,280	7.5	.01	103	17	128	10	192	0	144	218	.4	1.6	.10	795	1.08		326	169	45	3.1	1,270	7.5
May 26	71,557	6.8	.01	94	12	110	8.8	170	0	123	184	.4	1.8	.11	703	.96		284	145	45	2.8	1,130	7.7
June 7	79,470	5.6	.01	82	12	93	9.0	157	0	108	160	.5	1.6	.08	622	.85		255	126	43	2.5	997	7.6
July 14	60,484	8.1	.00	78	11	81	9.6	156	0	95	148	.4	1.9	.09	551	.75		238	110	41	2.3	948	7.5
Aug. 11	57,830	8.3	.01	71	12	87	11	138	0	98	156	.4	1.2	.09	558	.76		225	112	44	2.5	981	7.6
Sept. 15	53,212	6.9	.19	78	13	102	10	145	0	108	178	.4	1.7	.11	607	.83		247	128	46	2.8	1,010	7.4

6-8669. SALINE RIVER NEAR WAKEENEY, KANS.

LOCATION.--At gaging station at bridge on U.S. Highway 283, 1 mile upstream from Trego Creek and 5 miles north of Wakeeney, Trego County.
DRAINAGE AREA.--696 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1955 to September 1958.
Water temperatures: October 1955 to September 1959 (discontinued)
Sediment records: October 1955 to September 1959 (discontinued).
EXTREMES, 1958-59.--Water temperatures: Maximum, 94°F July 29; minimum, freezing point Dec. 11, Jan. 3, 31, Feb. 2.
Sediment concentrations: Maximum daily, not determined; minimum daily, no flow on several days during July and August.
Sediment loads: Maximum daily, 9,700 tons (estimated) Aug. 16; minimum daily, 0 tons on several days during July and August.
EXTREMES, 1955-59.--Water temperatures: Maximum, 94°F July 29, 1959; minimum, freezing point on several days during winter months.
Sediment concentrations: Maximum daily, 8,400 ppm May 30, 1956; minimum daily, no flow on many days
Sediment loads: Maximum daily, 140,000 tons June 17, 1957; minimum daily, 0 tons on many days.
REMARKS.--Flow affected by ice Nov. 26-29, Dec. 7-22, Dec. 27 to Feb. 24, Mar. 6, 7. Records of discharge for water year October 1958 to September 1959 given in WSP 1630.

Chemical analyses, in parts per million, November 1958 to August 1959

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
Nov. 5, 1958.....	6.0					23		333	0									321	48	13	0.6	703	7.7
Feb. 11, 1959.....	28					22		296	0									276	33	15	.6	623	7.7
June 7.....	32					8.6		186	0									155	2	11	.3	371	7.4
Aug. 17	75					4.4		146	0									124	4	7	.2	293	7.5

KANSAS RIVER BASIN--Continued

6-8669. SALINE RIVER NEAR WAKEENEY, KANS.--Continued

Temperature (° F) of water, water year October 1958 to September 1959
/Once-daily measurement between 8 a.m. and 11 a.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	52	40	a 43	--	--	a 40	50	66	a 75	68	a 91	--
2	57	46	--	--	32	a 42	51	67	a 76	a 78	80	--
3	a 67	50	38	a 32	--	a 44	52	68	75	a 81	a 96	68
4	60	51	--	--	a 33	a 45	54	a 63	65	a 80	--	73
5	60	49	--	a 33	--	a 47	54	60	65	--	--	74
6	a 75	48	35	--	--	a 48	55	53	a 78	--	--	a 79
7	a 75	50	--	a 33	a 34	a 50	a 53	a 65	72	--	--	a 78
8	a 67	52	a 37	--	--	49	48	a 59	a 82	--	71	a 77
9	60	49	--	a 35	a 35	50	45	61	a 79	--	79	a 75
10	a 58	48	a 36	a 36	--	51	46	59	a 82	--	--	a 74
11	a 68	48	a 32	--	a 33	53	45	a 74	a 82	--	81	a 74
12	--	50	--	33	--	54	40	a 77	a 83	--	--	a 72
13	--	52	34	33	--	a 54	47	a 73	a 84	--	--	60
14	a 74	51	--	--	34	52	50	a 74	70	70	69	a 73
15	a 70	53	35	34	--	a 45	52	a 68	82	70	68	a 77
16	a 70	--	--	--	35	a 47	57	a 67	81	71	--	a 60
17	a 68	36	37	34	--	a 48	59	a 70	80	a 80	a 79	a 55
18	59	--	--	--	35	a 51	49	72	82	75	74	55
19	62	38	36	a 33	--	a 53	47	a 73	81	73	75	59
20	59	--	--	--	--	a 46	47	a 68	82	a 82	77	a 80
21	57	--	a 37	a 34	34	a 47	a 59	a 65	78	a 76	76	a 79
22	53	42	--	--	--	a 48	59	a 60	80	a 87	74	a 75
23	49	--	39	--	35	a 48	61	67	a 79	77	a 83	a 63
24	51	43	--	a 33	--	a 63	62	67	82	a 72	a 85	62
25	50	--	40	--	36	a 40	55	73	80	83	a 83	a 65
26	a 59	41	--	33	--	40	59	72	79	84	a 85	a 67
27	a 57	--	38	--	--	41	a 60	a 80	76	91	a 87	59
28	a 58	--	--	33	38	40	63	a 79	78	93	a 86	a 63
29	a 47	38	36	--	--	42	65	a 73	75	a 94	78	a 53
30	41	--	--	--	--	45	66	a 75	70	a 93	68	a 50
31	39	--	a 39	a 32	--	46	--	a 76	--	a 89	--	--
Average	59	--	--	--	--	47	54	69	78	80	79	68

a Measurement between 12 m. and 6 p.m.

KANSAS RIVER BASIN--Continued

6-8669. SALINE RIVER NEAR WAKEENEY, KANS.--Continued

Suspended sediment, water year October 1958 to September 1959

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.....	1.9	53	0.3	4.0	86	0.9	8.0	90	1.9
2.....	1.9	104	.5	3.8	123	1.3	8.0	80	1.7
3.....	2.0	118	.6	3.8	92	.9	8.0	50	1.1
4.....	2.1	99	.6	4.0	100	1.1	7.8	34	.7
5.....	2.2	65	.4	3.6	75	.7	7.2	42	.8
6.....	2.4	66	.4	4.2	82	.9	7.0	54	1.0
7.....	3.3	110	s 1.1	4.6	56	.7	6.0	50	.8
8.....	2.1	128	.7	4.6	56	.7	4.0	38	.4
9.....	2.4	140	.9	4.2	47	.5	3.5	32	.3
10.....	2.2	129	.8	4.6	28	.3	3.0	43	.3
11.....	2.2	81	.5	4.2	41	.5	2.8	47	.4
12.....	2.4	50	.3	4.6	91	1.1	2.6	50	.4
13.....	2.6	44	.3	4.8	91	1.2	3.2	75	.6
14.....	2.7	77	.6	5.0	55	.7	4.3	80	.9
15.....	2.7	106	.8	5.0	33	.4	5.5	71	1.1
16.....	2.7	118	.9	5.2	32	.4	7.0	70	1.3
17.....	3.3	109	1.0	6.0	37	.6	9.0	79	1.9
18.....	3.6	127	1.2	7.2	38	.7	11	80	2.4
19.....	2.7	123	.9	6.2	36	.6	13	70	2.5
20.....	2.4	112	.7	6.2	36	.6	14	65	2.5
21.....	2.4	131	.8	6.2	46	.8	12	72	2.3
22.....	2.2	138	.8	7.0	67	1.3	11	65	1.9
23.....	2.2	140	.8	7.8	80	1.7	12	38	1.2
24.....	2.6	113	.8	8.0	68	1.5	11	30	.9
25.....	2.6	152	1.1	7.5	65	1.3	11	44	1.3
26.....	2.9	135	1.1	7.0	92	1.7	10	50	1.4
27.....	3.1	109	.9	6.5	100	1.8	11	44	1.3
28.....	3.3	122	1.1	6.0	95	1.5	9.5	34	.9
29.....	3.6	61	.6	6.8	91	1.7	10	33	.9
30.....	4.0	78	.8	8.0	90	1.9	10	30	.8
31.....	4.6	54	.7	--	--	--	6.0	22	.4
Total.	83.3	--	23.0	166.6	--	30.0	248.4	--	36.3

Day	January			February			March		
1.....	6.1	20	0.3	4.5	--	e 0.2	14	78	2.9
2.....	6.4	30	.5	3.5	23	.2	13	72	2.5
3.....	3.0	61	.5	4.0	38	.4	12	80	2.6
4.....	2.0	75	.4	5.0	25	.3	12	86	2.8
5.....	1.7	75	.3	6.0	--	e .2	11	87	2.6
6.....	2.2	65	.4	8.0	--	e .2	11	94	2.8
7.....	2.7	38	.3	9.5	16	.4	11	83	2.5
8.....	3.5	30	.3	12	20	.6	12	51	1.7
9.....	4.5	50	.6	10	19	.5	12	101	3.3
10.....	5.4	22	.3	9.0	24	.6	11	107	3.2
11.....	7.0	13	.2	8.5	64	1.5	11	120	3.6
12.....	10	22	.6	11	75	2.2	11	108	3.2
13.....	15	14	.6	15	70	2.8	11	115	3.4
14.....	17	5	.2	17	54	2.5	12	51	1.7
15.....	20	6	.3	20	46	2.5	12	72	2.3
16.....	13	15	.5	21	62	3.5	11	52	1.5
17.....	12	27	.9	21	65	3.7	12	33	1.1
18.....	14	28	1.1	19	46	2.4	12	40	1.3
19.....	17	29	1.3	17	38	1.7	12	39	1.3
20.....	13	24	.8	15	38	1.5	12	25	.8
21.....	8.0	14	.3	16	41	1.8	14	20	.8
22.....	3.5	10	.1	20	46	2.5	15	24	1.0
23.....	4.0	12	.1	18	49	2.4	15	25	1.0
24.....	6.0	14	.2	17	50	2.3	15	42	1.7
25.....	9.0	10	.2	17	55	2.5	14	51	1.9
26.....	10	5	.1	17	60	2.8	15	43	1.7
27.....	9.0	--	e .1	17	60	2.8	18	45	2.2
28.....	9.5	--	e .2	15	59	2.4	18	49	2.4
29.....	12	--	e .2	--	--	--	17	50	2.3
30.....	11	--	e .2	--	--	--	16	55	2.4
31.....	8.0	--	e .2	--	--	--	15	68	2.8
Total.	265.5	--	12.3	373.0	--	47.4	407	--	67.3

e Estimated.
s Computed by subdividing day.

KANSAS RIVER BASIN--Continued

6-8669. SALINE RIVER NEAR WAKEENEY, KANS.--Continued

Suspended sediment, water year October 1958 to September 1959--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	54	2.2	11	102	3.0	4.8	123	1.6
2.....	14	65	2.5	11	104	3.1	5.0	73	1.0
3.....	14	65	2.5	10	106	2.9	6.0	233	3.8
4.....	13	55	1.9	11	178	5.3	9.8	132	3.5
5.....	12	38	1.2	34	654	60	8.9	155	3.7
6.....	12	35	1.1	20	250	14	47	854	s 127
7.....	11	32	1.0	13	169	5.9	30	1,030	83
8.....	11	23	.7	12	160	5.2	16	441	19
9.....	11	16	.5	14	229	8.7	11	214	6.4
10.....	11	19	.6	15	228	9.2	8.1	208	4.5
11.....	11	11	.3	13	210	7.4	6.7	210	3.8
12.....	11	14	.4	11	190	5.6	5.4	203	3.0
13.....	11	14	.4	9.5	192	4.9	4.6	205	2.5
14.....	12	18	.6	8.6	204	4.7	3.6	173	1.7
15.....	11	82	2.4	8.4	180	4.1	2.8	137	1.0
16.....	11	93	2.8	8.4	190	4.3	2.2	136	.8
17.....	11	80	2.4	8.6	188	4.4	2.0	141	.8
18.....	11	88	2.6	8.6	172	4.0	1.5	141	.6
19.....	11	68	2.0	8.6	160	3.7	1.1	128	.4
20.....	12	75	2.4	8.1	139	3.0	1.6	115	.5
21.....	12	87	2.8	7.4	114	2.3	1.3	52	.2
22.....	12	82	2.7	7.9	121	2.6	1.2	52	.2
23.....	12	76	2.5	8.1	119	2.6	1.1	63	.2
24.....	12	100	3.2	7.9	114	2.4	1.0	65	.2
25.....	11	92	2.7	7.4	152	3.0	.8	86	.2
26.....	12	106	3.4	7.2	141	2.7	.6	74	.1
27.....	12	126	4.1	13	166	5.8	.4	76	.1
28.....	10	132	3.6	8.4	137	3.1	.4	88	.1
29.....	11	119	3.5	6.7	111	2.0	.4	79	.1
30.....	11	130	3.9	6.0	135	2.2	.4	62	.1
31.....	--	--	--	5.0	93	1.3	--	--	--
Total.	351	--	62.9	328.8	--	193.4	185.7	--	270.1

	July			August			September		
1.....	0.2	47	(t)	0.4	77	0.1	5.2	--	e 2.9
2.....	.2	82	(t)	.2	83	(t)	4.6	--	e 1.6
3.....	.2	112	0.1	.1	55	(t)	8.6	181	s 4.5
4.....	.1	153	(t)	0	--	0	5.6	107	1.6
5.....	0	--	0	0	--	0	4.2	105	1.2
6.....	0	--	0	0	--	0	3.8	67	.7
7.....	0	--	0	0	--	0	3.3	56	.5
8.....	0	--	0	.1	30	(t)	3.0	60	.5
9.....	0	--	0	.1	45	(t)	2.4	46	.3
10.....	0	--	0	0	--	0	2.1	54	.3
11.....	0	--	0	.1	40	(t)	2.0	40	.2
12.....	0	--	0	0	--	0	1.9	46	.2
13.....	0	--	0	0	--	0	1.8	40	.2
14.....	1.1	196	.6	2.9	790	s 14	1.8	41	.2
15.....	39	1,130	119	173	--	e 2,500	1.7	46	.2
16.....	54	2,210	322	419	--	e 9,700	1.8	68	.3
17.....	22	830	49	81	1,070	s 262	2.4	63	s .6
18.....	31	1,070	90	39	445	47	4.2	235	s 2.9
19.....	21	1,010	57	26	210	15	40	5,090	s 611
20.....	9.8	608	16	17	180	8.3	11	1,370	s 48
21.....	9.2	314	7.8	14	142	5.4	6.2	250	4.2
22.....	8.6	233	5.4	10	141	3.8	4.6	236	2.9
23.....	6.9	264	4.9	8.9	118	2.8	3.9	442	s 6.7
24.....	4.2	193	2.2	8.1	121	2.6	5.6	274	4.1
25.....	3.8	111	1.1	7.4	107	2.1	10	667	s 19
26.....	3.0	110	.9	6.7	91	1.6	45	1,860	s 278
27.....	2.6	85	.6	6.4	93	1.6	30	2,320	s 235
28.....	2.0	30	.2	6.4	86	1.5	15	654	26
29.....	1.4	66	.2	5.0	120	1.6	8.6	334	7.8
30.....	1.0	84	.2	4.4	171	2.0	8.1	249	5.4
31.....	.7	74	.1	4.2	140	1.6	--	--	--
Total.	222.0	--	677.4	840.4	--	12,573.1	248.4	--	1,267.0

Total discharge for year (cfs-days)..... 3,720.1
Total load for year (tons)..... 15,260.2

e Estimated.
s Computed by subdividing day.
t Less than 0.050 ton.

6-8769. SOLOMON RIVER AT NILES, KANS.

LOCATION.--At gaging station at county highway bridge, three-quarters of a mile west of Niles, Ottawa County.
DRAINAGE AREA.--6,770 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1958 to September 1959.
REMARKS.--Records of discharge for water year October 1958 to September 1959 given in WSP 1630.

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids				Hardness as $CaCO_3$		Per cent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million		Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
														Residue at 180°C	Sum									
Oct. 7, 1958....	1,070	15	0.01	87	14	103	10	260	108	128	0.3	0.4	0.11	627	--	0.85	1,810	275	62	44	2.7	1,010	6.7	
Dec. 2.....	143	13	.00	112	23	174	9.2	334	185	210	.3	1.9	.17	913	--	1.24	352	376	102	49	3.9	1,500	7.5	
Jan. 24, 1959...	180	17	.00	151	31	234	9.2	447	243	282	.4	3.3	.18	1,220	1,190	1.66	593	503	136	50	4.5	1,950	7.5	
Feb. 12.....	197	17	.00	134	28	219	9.2	384	223	262	.4	7.6	.15	1,120	1,090	1.52	596	451	136	51	4.5	1,800	7.3	
Mar. 10.....	191	18	.01	118	21	148	9.8	328	182	180	.4	5.6	.13	864	--	1.18	446	379	110	45	3.3	1,390	7.4	
May 5.....	652	14	1.2	74	20	120	11	226	154	141	.4	1.2	.13	660	--	.90	1,160	268	83	48	3.2	1,080	7.4	
May 9.....	2,780	16	1.5	44	9.0	24	8.8	153	58	22	.3	1.2	.07	266	--	.36	2,000	147	22	25	.9	421	7.3	
June 2	3,360	16	.19	50	7.1	18	11	162	44	17	.4	.7	.05	254	--	.35	2,300	154	21	19	.6	400	7.2	
July 23.....	233	13	.02	129	22	195	12	297	182	304	.5	.9	.18	1,070	1,000	1.46	673	413	169	50	4.2	1,860	7.5	
Aug. 20.....	37	19	.01	116	27	310	11	391	209	403	.4	1.2	.23	1,310	1,290	1.78	131	400	79	62	6.7	2,430	8.0	
Sept. 15.....	46	16	.12	73	18	157	10	286	115	187	.4	.4	.16	724	--	.98	90.0	255	20	56	4.3	1,240	7.6	

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

Periodic determinations of suspended-sediment discharge, water year October 1958 to September 1959

Date	Water discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Discharge (tons per day)
Oct. 7, 1958	1,070	2,880	8,320
Oct. 21	153	311	128
Dec. 2	143	124	48
Jan. 24, 1959	180	113	55
Feb. 12	197	90	48
Mar. 10	191	279	144
Mar. 27	1,390	6,620	24,800
Apr. 14	448	543	657
May 5	652	1,880	3,310
May 9	2,780	3,770	28,300
May 14	824	2,180	4,850
June 2	3,360	9,170	83,200
July 23	233	545	343
Aug. 20	37	314	31
Sept. 15	46	138	17

Particle-size analyses of suspended sediment, water year October 1958 to September 1959
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Oct. 7, 1958	3:00 p.m.	1,070	66	2,880	5,050	46	52		69		99	100					VPWCM
Mar. 27, 1959	2:00 p.m.	1,390	47	6,620	4,620	57	66		83		100						VPWCM

KANSAS RIVER BASIN--Continued

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

LOCATION.--At gaging station at bridge on State Highway 43, in Enterprise, Dickinson County, and 18.6 miles upstream from Chapman Creek. Prior to May 4, 1959, gaging station at site 0.2 mile downstream.
DRAINAGE AREA.--19,200 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1955 to September 1958.
Water temperatures: October 1955 to September 1959.
Sediment records: October 1957 to September 1959.
EXTREMES, 1958-59.--Water temperatures: Maximum, 85°F Aug. 6, 7.
Sediment concentrations: Maximum daily, 7,280 ppm July 2; minimum daily, 4 ppm Dec. 6, 22.
Sediment loads: Maximum daily, 129,000 tons May 6; minimum daily, 5 tons Dec. 6, 22.
EXTREMES, 1955-59.--Water temperatures: Maximum, 88°F June 21, 1956; minimum, freezing point on many days during winter months.
Sediment concentrations (1957-59): Maximum daily, 7,280 ppm July 2, 1959; minimum daily, 4 ppm Dec. 6, 22, 1958.
Sediment loads (1957-59): Maximum daily, 133,000 tons Oct. 24, 1957; minimum daily, 5 tons Dec. 6, 22, 1958.
REMARKS.--Maximum observed sediment concentration during water year, 12,100 ppm May 5. Flow affected by ice Jan. 3-10, 20-24, Feb. 1-2. Records of discharge for water year October 1958 to September 1959 given in WSP 1630.

Temperature (° F) of water, water year October 1958 to September 1959
/Once-daily measurement at 7 a.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	56	52	37	36	36	39	52	65	73	75	79	83
2	57	46	--	--	--	44	54	68	68	72	79	73
3	56	46	43	--	35	41	54	68	68	73	83	72
4	58	46	--	--	--	43	53	71	68	75	84	72
5	60	46	38	--	37	39	56	69	72	76	84	75
6	64	49	--	--	--	36	56	64	72	77	85	78
7	67	48	37	--	36	35	58	60	73	78	85	80
8	66	74	--	--	--	44	55	64	74	78	80	80
9	66	48	36	36	35	43	50	63	74	73	77	80
10	59	76	--	--	--	43	49	62	75	75	77	79
11	58	51	37	36	35	43	47	63	75	76	78	69
12	62	49	--	--	--	43	48	63	76	76	79	--
13	62	58	35	38	38	44	45	62	75	76	79	64
14	65	58	--	--	--	46	46	60	75	75	79	63
15	64	57	34	40	37	43	49	63	75	75	79	64
16	--	--	--	--	--	43	53	63	75	72	78	63
17	62	56	36	38	39	41	59	64	75	73	78	64
18	59	--	--	--	--	47	55	64	78	73	80	62
19	62	43	37	34	36	48	55	67	78	71	80	65
20	61	--	--	--	--	51	54	72	79	75	81	65
21	62	44	36	--	--	47	50	72	78	75	82	64
22	56	--	--	--	35	43	47	70	78	--	82	64
23	57	46	37	--	36	46	52	62	79	77	82	64
24	54	--	--	--	--	--	55	65	78	77	82	67
25	52	48	35	36	37	55	58	65	79	77	82	65
26	52	--	--	--	38	53	59	66	80	77	83	65
27	51	38	38	36	38	47	60	68	81	77	83	64
28	48	--	--	--	43	50	60	70	81	77	83	65
29	48	36	37	36	--	48	60	72	81	78	83	63
30	48	--	--	--	--	49	62	73	81	79	83	60
31	49	--	36	36	--	53	--	72	--	79	83	--
Average	58	--	--	--	--	45	54	66	76	76	81	69

KANSAS RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959

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	878	428	1,010	545	138	203	540	120	175
2	835	370	834	542	121	177	510	96	132
3	815	297	654	534	140	202	478	80	103
4	803	303	657	531	174	249	468	47	59
5	711	259	497	517	198	276	489	10	13
6	639	300	518	503	160	217	506	4	5
7	1,610	3,930	s 18,000	496	202	271	531	9	13
8	3,670	4,920	48,800	496	194	260	528	34	48
9	3,550	4,870	46,700	500	198	267	444	194	233
10	2,260	3,460	21,100	496	160	214	461	42	52
11	1,420	3,050	11,700	496	208	279	482	25	33
12	1,710	2,900	13,400	500	260	351	362	22	22
13	1,500	1,700	6,880	496	216	289	332	24	22
14	1,300	1,320	4,630	480	230	298	350	20	19
15	1,190	1,150	3,690	500	336	454	404	10	11
16	1,140	762	2,340	490	296	392	434	7	8
17	1,110	648	1,940	490	232	307	437	13	15
18	1,080	560	1,630	470	238	302	440	18	21
19	1,060	427	1,220	500	229	309	472	19	24
20	1,030	418	1,160	480	208	270	478	14	18
21	1,010	314	856	440	182	216	492	8	11
22	990	310	829	460	158	196	500	4	5
23	981	296	784	530	134	192	500	10	14
24	968	285	745	510	174	240	486	9	12
25	936	285	720	550	192	285	496	9	12
26	795	282	605	540	190	277	503	10	14
27	707	204	389	520	178	250	514	8	11
28	647	229	400	530	220	315	506	9	12
29	584	152	240	540	280	408	503	18	24
30	556	167	251	480	165	214	486	27	35
31	548	150	222	--	--	--	431	114	133
Total	37,033	--	193,401	15,162	--	8,160	14,563	--	1,309

Day	January			February			March		
1	395	72	77	350	41	39	620	56	94
2	371	56	56	360	32	31	640	44	76
3	230	178	111	424	59	68	588	62	98
4	240	86	56	394	61	65	576	68	106
5	260	94	66	370	46	46	576	82	128
6	400	100	108	370	41	41	556	74	111
7	430	91	106	391	45	48	540	74	108
8	420	68	77	436	76	89	528	48	68
9	400	38	41	472	140	178	560	44	67
10	370	16	16	480	117	152	620	60	100
11	373	28	28	460	90	112	608	50	82
12	382	130	134	480	80	104	572	34	53
13	397	157	168	830	297	666	552	34	51
14	436	158	186	920	--	e 750	528	52	74
15	468	143	181	1,020	288	793	484	61	80
16	394	62	66	1,140	250	770	476	35	45
17	409	32	35	1,300	390	1,370	468	35	44
18	442	30	36	1,100	382	1,130	442	34	41
19	480	26	34	830	--	e 850	430	61	71
20	390	17	18	528	--	e 420	439	86	102
21	230	15	9	704	--	e 480	524	219	310
22	290	25	20	1,000	235	634	552	160	238
23	370	40	40	815	240	528	584	60	95
24	390	43	45	712	242	465	628	90	153
25	427	38	44	652	218	384	688	138	256
26	412	65	72	600	98	159	858	318	730
27	424	79	90	620	58	97	1,710	5,980	27,600
28	418	61	69	660	62	110	3,240	5,720	50,000
29	412	57	63	--	--	--	3,130	5,450	46,100
30	412	58	65	--	--	--	1,930	4,250	22,100
31	415	123	138	--	--	--	1,450	3,290	12,900
Total	11,887	--	2,255	18,418	--	10,579	26,097	--	162,081

e Estimated.
s Computed by subdividing day.

KANSAS RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959--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	1,280	2,520	8,710	427	192	221	3,880	4,950	51,900
2	1,150	1,810	5,620	412	180	200	5,280	6,860	97,800
3	1,090	1,050	3,090	406	206	226	6,850	6,860	127,000
4	1,060	700	2,000	471	185	235	5,810	4,610	72,300
5	1,220	679	2,240	3,550	6,610	s 87,600	3,270	3,810	33,600
6	1,240	670	2,240	8,210	5,810	129,000	2,760	3,220	24,000
7	1,260	612	2,080	7,410	5,260	105,000	2,690	2,540	18,400
8	1,220	590	1,940	4,430	3,790	45,300	2,620	2,100	14,900
9	1,200	530	1,720	3,150	3,510	29,900	2,590	1,950	13,600
10	1,210	474	1,550	5,890	4,240	67,400	2,620	1,880	13,300
11	1,200	429	1,390	7,450	4,460	89,700	2,770	1,840	13,800
12	1,200	406	1,320	6,120	3,800	62,800	2,840	1,700	13,000
13	1,170	409	1,290	3,170	3,150	27,000	2,480	1,200	8,040
14	1,140	370	1,140	2,130	2,280	13,100	1,660	930	4,170
15	1,020	339	934	1,660	1,830	8,200	1,100	800	2,380
16	805	305	663	1,310	1,280	4,530	960	600	1,560
17	740	206	412	6,660	4,960	s 102,000	1,040	535	1,500
18	760	193	396	3,260	4,270	37,600	1,050	530	1,500
19	880	262	623	1,260	820	2,790	1,020	570	1,570
20	1,230	500	1,660	1,070	440	1,270	980	630	1,670
21	950	780	2,000	1,040	610	1,710	1,020	770	2,120
22	740	555	1,110	1,090	1,190	3,500	860	580	1,350
23	664	300	538	1,200	520	1,680	761	460	945
24	620	258	432	1,780	910	4,370	707	360	687
25	564	251	382	2,470	2,810	18,700	640	360	622
26	528	238	339	2,650	3,420	24,500	593	610	977
27	516	210	293	2,690	3,800	27,600	572	1,200	1,850
28	484	197	257	2,030	3,210	17,600	632	410	700
29	464	198	248	1,680	2,650	12,000	624	450	758
30	445	189	227	2,060	3,050	17,000	1,060	2,960	s 9,930
31	--	--	--	3,210	4,250	36,800	--	--	--
Total	28,050	--	46,844	90,346	--	979,532	61,739	--	535,929

	July			August			September		
1	3,710	6,320	s 66,700	434	264	309	320	284	245
2	5,280	7,280	104,000	410	247	273	374	344	347
3	3,670	4,420	43,800	404	224	244	392	300	318
4	1,940	3,430	18,000	386	180	188	325	242	212
5	1,420	3,260	12,500	368	174	173	315	208	177
6	1,030	920	2,560	350	188	178	428	236	273
7	860	740	1,720	345	166	155	506	264	361
8	752	670	1,360	325	176	154	428	276	319
9	680	500	918	320	192	166	340	256	235
10	648	400	700	320	194	168	275	264	196
11	608	320	525	300	214	173	260	196	138
12	586	380	601	295	224	178	250	171	115
13	624	420	708	290	233	182	241	191	124
14	1,190	1,180	s 4,930	290	222	174	223	175	105
15	2,080	3,670	s 25,200	310	232	194	214	161	93
16	3,810	3,900	40,100	310	229	192	210	155	88
17	1,330	2,710	9,730	310	214	179	197	179	95
18	1,080	1,940	5,660	310	237	198	232	184	115
19	920	678	1,680	305	219	180	500	385	520
20	752	490	995	295	214	170	404	252	275
21	725	372	728	270	220	160	2,230	5,120	s 38,100
22	860	448	1,040	280	218	165	4,150	5,290	59,300
23	851	460	1,060	368	224	223	2,960	5,100	40,800
24	1,160	694	s 2,400	315	251	213	1,960	6,080	32,200
25	1,000	816	2,200	290	223	175	1,060	3,940	11,300
26	824	490	1,090	280	220	166	930	2,100	5,270
27	593	328	525	315	244	208	1,120	2,620	7,920
28	537	259	376	325	244	214	1,130	2,100	6,410
29	494	249	332	315	277	236	1,070	2,100	6,070
30	470	285	362	295	278	221	880	1,400	3,330
31	452	262	320	290	269	211	--	--	--
Total	40,936	--	352,820	10,020	--	6,020	23,924	--	215,051

Total discharge for year (cfs-days) 378,175
Total load for year (tons) 2,514,001

s Computed by subdividing day.

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

Particle-size analyses of suspended sediment, water year October 1958 to September 1959
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Oct. 27, 1958	10:40 a.m.	711	53	184	--	--	--		--		99	100	--				V
Mar. 31, 1959	10:00 a.m.	1,460	51	3,280	5,980	68	79		95		100	--	--				SPWCM
Apr. 21	11:50 a.m.	940	40	842	2,250	71	84		98		100	--	--				SPWCM
May 11	3:20 p.m.	7,840	65	4,780	4,310	46	53		68		95	99	100				VPWCM
June 5	11:20 a.m.	3,240	69	3,660	5,800	60	72		89		100	--	--				VPWCM
Aug. 21	2:30 p.m.	270	85	214	--	--	--		--		83	98	100				V
Sept. 16	11:50 a.m.	210	68	138	--	--	--		--		100	--	--				V

KANSAS RIVER BASIN--Continued

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

LOCATION.--At bridge on State Highway 14, a quarter of a mile downstream from gaging station, three-quarters of a mile upstream from Walnut Creek, 4 miles southeast of Deweese, Clay County, and 5¾ miles northwest of Angus.
DRAINAGE AREA.--1,140 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: August 1956 to September 1958.
Water temperatures: August 1956 to September 1959.
Sediment records: August 1956 to September 1959.
EXTREMES, 1958-59.--Water temperatures: Maximum, 83°F Aug. 10; minimum, 34°F on many days during December to February.
Sediment concentrations: Maximum daily, 9,890 ppm May 5; minimum daily, 8 ppm Oct. 1.
Sediment loads: Maximum daily, 68,600 tons July 4; minimum daily, 1 ton Oct. 1.
EXTREMES, 1956-59.--Water temperatures: Maximum, 83°F Aug. 10, 1959; minimum, 33°F Nov. 22, 1956.
Sediment concentrations: Maximum daily, 11,600 ppm July 11, 1958; minimum daily, not determined.
Sediment loads: Maximum daily, 129,000 tons June 16, 1957; minimum daily, 1 ton Oct. 1, 1958.
REMARKS.--Flow affected by ice Dec. 9-20, Dec. 30 to Jan. 13, Jan. 16-18, Jan. 20 to Feb. 4, Feb. 8-13, 19, 20. Records of discharge for water year October 1958 to September 1959 given in WSP 1630.

Chemical analyses, in parts per million, water year October 1958 to September 1959

Date of collection	Discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180° C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
Oct. 7, 1958.....	65.5					14		208	0									180	9	14	0.5	416	7.2
May 5, 1959.....	706					3.3		62	0									46	0	14	.2	132	7.0
June 16	76.7					15		226	0									189	4	15	.5	432	7.7
Sept. 18.....	2,670					1.8		52	0									37	0	9	.1	98	6.6

KANSAS RIVER BASIN--Continued

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

Temperature (° F) of water, water year October 1958 to September 1959
/Once-daily measurement between 6 a.m. and 8 a.m. Oct. 1-27 and Apr. 1 to Sept. 30 and at 5 p.m. Oct. 28 to Mar. 31/

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	52	56	38	36	34	48	46	65	60	62	76	--
2	54	55	40	34	34	49	48	66	65	64	73	65
3	54	55	40	34	37	48	50	67	60	66	76	64
4	54	55	38	34	36	46	62	64	64	60	72	68
5	58	53	35	35	37	45	60	62	64	69	80	67
6	61	51	35	36	38	43	52	52	69	70	78	70
7	--	50	34	34	38	42	54	56	67	74	76	72
8	62	50	34	34	34	46	46	57	68	64	73	70
9	58	50	34	35	35	42	43	55	71	68	81	66
10	56	52	35	37	34	39	44	57	69	68	83	60
11	54	50	34	38	34	47	45	55	71	69	73	57
12	55	49	34	37	35	46	42	60	70	66	76	55
13	68	52	34	38	34	50	44	54	68	67	73	57
14	67	51	34	36	34	40	45	53	70	66	71	60
15	58	52	35	35	35	46	50	52	68	69	69	58
16	60	51	39	34	36	51	54	57	71	69	73	57
17	59	46	42	34	34	54	55	59	71	71	71	56
18	57	43	42	34	34	58	48	56	73	70	76	53
19	56	44	43	34	34	50	45	63	70	70	75	56
20	55	45	43	34	35	49	42	67	70	71	75	63
21	50	47	41	35	34	47	43	60	68	71	76	65
22	55	46	44	36	36	45	46	55	69	70	75	66
23	56	44	45	34	38	55	52	54	69	70	75	--
24	51	44	47	35	40	54	57	60	72	71	75	59
25	50	43	40	36	41	53	54	65	73	71	75	59
26	50	43	43	35	43	40	51	65	74	70	74	61
27	48	39	45	36	48	46	53	62	73	72	72	60
28	50	37	40	36	41	42	50	69	71	73	74	56
29	52	36	41	35	--	50	56	67	68	73	73	54
30	52	37	39	34	--	58	60	67	60	74	71	52
31	51	--	40	34	--	54	--	64	--	73	70	--
Average	55	48	39	35	37	48	50	60	69	69	75	61

KANSAS RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959

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	62	8	1	68	240	a 44	69	900	168
2	63	25	4	67	120	22	71	220	42
3	64	40	a 7	68	60	11	72	190	37
4	63	55	9	68	50	9	70	270	51
5	62	95	16	67	55	a 10	69	365	68
6	62	100	a 17	67	65	a 12	69	470	88
7	65	110	19	69	70	13	69	205	38
8	64	90	16	70	42	8	69	620	116
9	62	90	a 15	69	45	8	68	430	79
10	62	110	18	67	60	11	66	150	27
11	63	140	24	67	60	a 11	63	360	61
12	64	125	22	68	60	11	64	170	29
13	65	95	17	69	60	a 11	65	150	26
14	66	120	21	70	65	12	67	385	70
15	66	130	23	70	245	46	70	595	112
16	65	105	18	70	160	30	75	610	124
17	65	--	e 18	72	165	32	76	520	107
18	66	--	e 17	71	250	48	70	720	136
19	66	--	e 16	69	635	118	71	625	120
20	65	--	e 15	68	1,200	220	70	410	77
21	64	70	12	68	845	155	71	225	43
22	64	135	23	69	545	102	70	260	49
23	66	400	71	69	150	28	71	355	68
24	66	205	37	67	145	26	70	530	100
25	66	80	14	69	860	160	70	200	38
26	65	85	15	69	500	93	70	50	a 9
27	65	240	42	68	305	56	70	85	16
28	67	350	63	71	810	155	71	430	82
29	67	370	67	69	290	54	70	250	47
30	67	340	62	71	820	157	68	680	125
31	68	360	66	--	--	--	68	295	54
Total	2,005	--	785	2,064	--	1,673	2,152	--	2,207

Day	January			February			March		
1	70	105	20	66	145	26	105	440	a 125
2	66	230	41	69	165	31	95	230	59
3	60	115	19	71	95	18	87	370	87
4	56	120	18	74	200	a 40	85	170	39
5	58	270	a 42	72	315	61	86	265	62
6	64	130	22	71	415	80	80	835	180
7	66	330	59	72	345	67	78	405	85
8	67	220	40	69	350	65	79	200	a 43
9	70	120	23	75	330	67	78	90	19
10	71	95	18	71	115	22	78	740	156
11	72	75	15	68	130	24	77	960	200
12	74	100	20	75	--	e 48	76	570	117
13	75	490	99	73	295	58	78	1,500	316
14	72	550	107	72	--	e 95	88	965	229
15	73	195	38	72	--	e 95	82	1,110	246
16	68	420	77	72	--	e 95	78	510	107
17	70	520	98	73	--	e 100	78	620	131
18	71	605	116	73	330	65	79	235	50
19	72	230	45	70	250	47	78	60	a 13
20	70	115	22	71	360	69	81	75	16
21	66	195	35	72	320	62	80	190	41
22	62	100	17	82	110	24	79	--	e 42
23	64	195	34	148	330	132	78	--	e 32
24	67	235	43	185	740	370	78	--	e 36
25	70	110	21	207	625	349	89	2,500	s 697
26	74	65	13	185	530	265	295	3,030	s 2,220
27	77	80	17	160	275	119	291	2,480	1,950
28	78	170	36	122	320	105	212	2,420	1,390
29	75	110	22	--	--	--	153	1,920	a 793
30	72	95	18	--	--	--	128	935	323
31	70	115	22	--	--	--	307	2,880	s 3,080
Total	2,140	--	1,217	2,590	--	2,599	3,436	--	12,884

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

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

Suspended sediment, water year October 1958 to September 1959--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	600	4,180	6,770	90	170	41	126	250	85
2	301	2,450	1,990	91	365	90	189	2,000	1,020
3	194	1,690	885	92	370	92	308	7,400	6,150
4	155	900	377	229	2,350	1,450	139	1,100	413
5	120	700	a 227	648	9,890	17,300	122	505	166
6	105	510	145	1,880	7,500	38,100	115	355	110
7	101	360	98	824	4,400	9,790	109	210	62
8	97	210	55	408	2,850	3,140	102	200	55
9	95	145	37	507	2,000	2,740	98	175	46
10	91	100	25	936	4,200	10,600	96	165	43
11	87	87	20	492	2,300	3,060	92	135	34
12	85	100	23	288	1,500	1,170	90	100	24
13	84	175	40	233	1,800	1,130	87	115	27
14	81	74	16	187	550	278	84	155	35
15	80	80	17	160	340	147	79	325	69
16	79	115	25	144	340	132	78	130	27
17	84	160	36	134	500	181	76	130	27
18	80	950	205	687	6,880	s 22,200	74	170	34
19	102	5,560	1,530	1,640	6,550	29,000	76	180	37
20	333	6,640	5,970	690	5,000	9,320	78	185	39
21	224	3,000	s 1,920	1,680	9,510	43,100	262	4,080	s 4,080
22	142	1,140	437	1,620	8,100	35,400	298	5,690	4,580
23	116	560	175	992	4,250	11,400	145	2,150	842
24	106	495	142	422	1,550	1,770	105	850	241
25	101	215	59	262	955	676	91	500	123
26	96	255	66	216	570	332	84	350	79
27	95	80	21	185	405	202	80	350	76
28	93	105	26	167	330	149	650	9,380	s 19,500
29	92	145	36	153	345	143	320	6,260	s 5,840
30	91	135	33	147	475	189	264	3,500	2,490
31	--	--	--	136	450	165	--	--	--
Total	4,110	--	21,406	16,340	--	243,487	4,517	--	46,354

Day	July			August			September		
1	209	3,100	1,750	46	4,650	578	76	750	sa 190
2	137	1,550	573	227	9,550	s 5,540	362	6,740	6,590
3	145	2,000	783	93	3,600	904	190	3,630	1,860
4	3,280	8,270	s 68,600	56	700	106	112	3,550	1,070
5	3,300	4,450	39,600	48	275	36	78	940	198
6	3,110	4,150	34,800	41	600	66	70	445	84
7	622	3,700	6,210	42	560	64	63	370	63
8	267	1,040	750	44	180	21	56	245	37
9	192	630	327	41	115	13	53	165	24
10	157	440	186	37	130	13	51	95	13
11	136	490	180	37	140	14	52	90	13
12	122	370	122	34	190	17	52	75	11
13	111	550	165	32	1,300	112	53	75	11
14	101	1,400	382	101	6,100	1,660	53	75	11
15	93	890	223	403	4,440	4,830	54	70	10
16	86	320	74	313	2,800	2,370	55	120	18
17	144	400	156	228	1,500	923	94	1,650	s 485
18	180	2,120	1,030	160	780	337	1,860	8,680	43,600
19	164	1,790	793	97	520	136	1,790	6,000	29,000
20	123	1,550	515	73	265	52	609	4,250	6,990
21	101	810	221	61	215	35	254	2,700	1,850
22	88	460	109	53	200	29	157	1,300	551
23	77	270	56	51	115	16	124	930	311
24	68	230	42	47	155	20	106	995	285
25	63	190	32	40	75	8	102	385	106
26	64	250	43	38	180	18	93	265	67
27	62	180	30	35	90	9	86	210	49
28	58	130	20	36	160	16	82	270	60
29	56	230	35	49	920	122	78	95	20
30	52	140	20	62	1,520	254	78	80	a 17
31	47	470	60	55	510	76	--	--	--
Total	13,415	--	157,887	2,680	--	18,395	6,943	--	93,594

Total discharge for year (cfs-days) 62,392
Total load for year (tons) 602,488

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

KANSAS RIVER BASIN--Continued

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

Particle-size analyses of suspended sediment, water year October 1958 to September 1959
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Dec. 12, 1958....	1:10 p.m.	64	32	120	--	--	--		--		86	91	95		97	100	V
Apr. 13, 1959....	3:50 p.m.	82	65	162	--	--	--		--		87	95	100		--	--	V
May 5	11:25 a.m.	730	63	11,800	6,590	55	61		78		97	99	100		--	--	VPWCM
May 5	4:15 p.m.	669	63	9,940	9,580	54	63		80		98	99	100		--	--	VPWCM
May 20	4:25 p.m.	517	77	4,050	4,870	62	67		79		99	100	--		--	--	VPWCM
May 21	11:40 a.m.	2,500	63	9,140	9,440	41	56		77		95	97	99		100	--	VPWCM
June 2.....	11:00 a.m.	157	66	1,070	3,640	55	59		74		96	98	100		--	--	VPWCM
June 16.....	4:35 p.m.	77	86	116	--	--	--		--		93	97	100		--	--	V
July 8.....	5:10 p.m.	236	79	1,540	3,850	76	79		87		100	--	--		--	--	VPWCM
July 23	4:00 p.m.	72	84	370	1,440	83	86		91		100	--	--		--	--	VPWCM
Aug. 25	5:40 p.m.	38	85	56	--	--	--		--		99	100	--		--	--	V
Sept. 8.....	11:10 a.m.	56	--	240	1,370	74	77		85		98	100	--		--	--	VPWCM
Sept. 18.....	6:00 p.m.	2,870	56	8,070	4,830	49	54		68		89	91	95		98	100	VPWCM
Sept. 23.....	9:50 a.m.	126	62	756	2,420	80	82		87		97	98	99		100	--	VPWCM

Particle-size analyses of bed material, water year October 1958 to September 1959
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Number of sampling points	Bed material												Methods of analysis
				Percent finer than indicated size, in millimeters												
				0.031	0.062	0.125	0.250	0.500	1.000	2.000	4.000	8.000	16.000	32.000	64.000	
Oct. 7, 1958.....	12:40 p.m.	66	8		0	1	12	47	81	92	98	100	--			SV
Apr. 13, 1959	3:50 p.m.	82	11		--	0	14	50	75	88	94	99	100			SV
May 21.....	11:40 a.m.	2,500	7		--	1	6	30	60	74	91	100	--			SV
June 2	11:00 a.m.	157	9		0	1	23	54	74	84	92	100	--			SV
June 16	4:35 p.m.	77	10		4	8	18	47	74	85	92	97	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, and 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 1959.
Sediment records: October 1957 to September 1959.
EXTREMES, 1958-59.--Water temperatures: Maximum, 90°F Aug. 4; minimum, freezing point Feb. 12 and probably on many other days during December to February.
Sediment concentrations: Maximum daily, 10,000 ppm July 5; minimum daily, not determined.
Sediment loads: Maximum daily, 752,000 tons May 7; minimum daily, not determined.
EXTREMES, 1956-59.--Water temperatures: Maximum, 90°F Aug. 4, 1959; minimum, freezing point on many days during winter months.
Sediment concentrations (1957-59): Maximum daily, 10,000 ppm July 5, 1959; minimum daily, not determined.
Sediment loads (1957-59): Maximum daily, 752,000 tons May 7, 1959; minimum daily, not determined.
REMARKS.--Flow affected by ice Dec. 7 to Feb. 14. Records of discharge for water year October 1958 to September 1959 given in WSP 1630.

Temperature (° F) of water, water year October 1958 to September 1959
/Once-daily measurement between 6 a.m. and 8 a.m./

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	a 62	50	--		--	34	50	66	67	68	79	b 67
2	56	45	40		--	39	51	70	68	69	81	61
3	54	48	a 46		--	35	53	69	70	70	--	60
4	57	48	--		--	36	52	73	71	74	b 90	b 62
5	b 60	45	--		--	36	56	69	70	73	82	--
6	62	44	--		--	36	55	64	72	71	81	67
7	69	--	--		--	37	61	62	74	74	79	b 74
8	65	45	--		--	--	50	62	75	75	b 76	66
9	a 69	44	--		--	46	45	61	76	74	75	64
10	a 62	43	--		--	44	47	63	76	74	--	54
11	59	49	--		--	42	47	62	78	75	71	64
12	62	50	--		a 32	50	45	64	79	75	74	b 63
13	60	54	--		--	48	47	65	77	73	--	--
14	64	58	--		--	46	46	62	75	a 74	75	a 76
15	64	--	--		--	46	50	66	76	71	--	b 64
16	65	--	--		--	50	--	62	76	73	70	b 60
17	62	55	--		--	49	--	61	78	73	77	b 49
18	60	--	--		--	50	--	64	80	74	78	b 52
19	62	48	--		--	--	--	66	79	--	--	b 63
20	a 66	--	--		--	--	48	71	80	76	79	64
21	60	--	--		--	--	46	71	76	72	81	b 62
22	56	48	--		--	--	47	65	78	76	80	59
23	55	--	--		36	50	51	63	76	72	--	60
24	54	45	--		34	57	56	62	76	76	b 83	58
25	--	--	--		35	54	60	65	79	78	b 84	56
26	--	40	--		36	50	57	67	78	87	76	b 57
27	50	--	--		38	45	59	67	77	79	b 72	--
28	a 52	--	--		35	43	55	71	78	78	b 88	53
29	a 54	--	--		--	45	59	72	78	73	b 84	50
30	47	--	--		--	46	63	72	71	75	--	50
31	46	--	--		--	48	--	70	--	75	66	--
Average	59	--	--		--	45	52	66	75	74	--	61

a Measurement between 12 m. and 2 p.m.
b Measurement between 5 p.m. and 7 p.m.

KANSAS RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959

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	4,620	455	5,680	2,460	285	1,890	1,930	--	e 850
2	4,430	540	6,460	2,400	245	1,590	2,040	160	881
3	4,160	250	2,810	2,370	270	1,730	2,080	78	438
4	3,900	410	4,320	2,370	335	2,140	1,990	--	e 380
5	3,830	350	3,620	2,380	240	1,540	1,990	--	e 320
6	3,730	330	3,320	2,320	230	1,440	2,110	--	e 280
7	8,020	5,740	s 135,000	2,270	230	1,410	2,000		
8	10,800	4,940	s 160,000	2,210	250	1,490	1,850	--	e 260
9	6,250	2,800	47,200	2,190	300	1,770	1,700		
10	6,040	2,950	48,100	2,140	330	1,910	1,500		
11	5,110	3,390	46,800	2,160	210	1,220	1,450		
12	4,100	1,850	20,500	2,130	220	1,270	1,500		
13	3,720	1,350	13,600	2,160	230	1,340	1,400		
14	4,010	1,220	13,200	2,140	230	1,330	1,300	--	e 200
15	4,220	1,220	13,900	2,180	225	1,320	1,300		
16	3,970	775	8,310	2,240	220	1,330	1,400		
17	3,570	600	5,780	2,210	220	1,310	1,500		
18	3,400	535	4,910	2,300	210	1,300	1,600		
19	3,350	510	4,610	2,210	205	1,220	1,700		
20	3,220	525	4,560	2,370	200	1,280	1,700		
21	3,220	450	3,910	2,300	180	1,120	1,700		
22	3,060	375	3,100	2,240	150	907	1,800		
23	2,880	350	2,720	2,210	240	1,430	1,900		
24	2,900	355	2,780	2,210	135	805	1,900		
25	2,850	360	2,770	2,160	160	933	1,900	--	e 240
26	2,780	415	3,110	2,110	200	1,140	1,900		
27	2,660	280	2,010	2,130	--	e 1,200	2,000		
28	2,610	290	2,040	2,110	--	e 1,100	2,000		
29	2,610	295	2,080	2,050	--	e 1,000	1,900		
30	2,580	265	1,840	2,020	--	e 950	1,700		
31	2,580	270	1,880	--	--	--	1,500	--	e 200
Total	125,180	--	580,920	66,750	--	40,415	54,240	--	8,809

Day	January			February			March		
1	1,500			1,900			5,310	860	12,300
2	1,500			1,800			4,780	710	9,160
3	1,500			1,700			4,420	705	8,410
4	1,300			1,700			3,920	600	6,350
5	1,300			1,800			3,670	300	2,970
6	1,400			1,800	--	e 260	3,460	295	2,760
7	1,400		e 200	1,850			3,260	320	2,820
8	1,400			1,900			2,990	295	2,380
9	1,400			2,100			2,940	240	1,900
10	1,550			2,200			2,850	225	1,730
11	1,600			2,300			3,040	230	1,890
12	1,600			2,400	125	810	3,030	240	1,960
13	1,600			2,500	--	e 3,400	3,060	280	2,310
14	1,700			7,300	--	e 79,000	2,970	195	1,560
15	1,800			10,700	--	e 140,000	2,920	200	1,580
16	1,700			9,010	--	e 97,000	2,830	270	2,060
17	1,650		e 240	6,990	--	e 57,000	2,710	275	2,010
18	1,600			5,920	--	e 26,000	2,750	270	2,000
19	1,600			5,280	--	e 13,000	2,590	260	1,820
20	1,700			4,540	--	e 8,600	2,750	250	1,860
21	1,550			3,920	--	e 6,400	2,990	235	1,900
22	1,300		e 200	3,840	--	e 5,200	2,970	220	1,760
23	1,400			3,920	460	4,870	2,750	200	1,480
24	1,500			3,880	340	3,560	2,610	205	1,440
25	1,700			4,420	520	6,210	2,590	280	1,960
26	1,900			5,220	955	13,400	2,900	290	2,270
27	2,000		e 260	5,970	1,360	21,900	3,240	280	2,450
28	2,000			5,720	1,250	19,300	8,250	4,120	s 103,000
29	1,900			--	--	--	9,540	5,100	131,000
30	1,900			--	--	--	8,280	4,040	90,300
31	2,000			--	--	--	6,380	3,300	56,800
Total	49,950		6,900	112,580	--	508,510	118,750	--	464,190

e Estimated.
s Computed by subdividing day.

KANSAS RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959--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	5,000	2,510	33,900	3,120	425	3,580	20,500	4,600	255,000
2	4,340	1,750	20,500	3,010	375	3,050	12,000	3,420	111,000
3	3,840	1,380	14,300	2,970	475	3,810	10,200	2,980	82,100
4	3,480	1,060	9,960	2,940	585	4,640	10,600	3,680	105,000
5	3,460	940	8,780	16,600	6,960	s 384,000	9,930	3,650	97,900
6	3,460	725	6,770	26,200	7,780	550,000	7,750	2,300	48,100
7	3,460	590	5,510	38,800	7,180	752,000	6,800	1,730	31,800
8	3,390	585	5,350	36,500	5,400	532,000	6,410	1,650	28,600
9	3,010	585	4,750	28,400	4,700	360,000	5,820	1,360	21,400
10	2,970	680	5,450	19,300	4,620	241,000	5,650	1,010	15,400
11	3,040	475	3,900	24,700	4,850	323,000	5,420	900	13,200
12	3,010	395	3,210	25,900	4,400	308,000	5,240	850	12,000
13	3,030	375	3,070	18,900	3,630	185,000	5,260	800	11,400
14	2,920	340	2,680	13,100	2,960	105,000	5,060	790	10,800
15	3,010	380	3,090	10,300	2,320	64,500	4,440	670	8,030
16	2,990	380	3,070	9,230	1,820	45,400	3,860	560	5,840
17	2,950	360	2,870	8,450	1,680	38,300	3,480	500	4,700
18	2,900	335	2,620	15,900	3,580	s 171,000	3,350	460	4,160
19	2,880	315	2,450	13,800	2,830	s 116,000	3,260	430	3,780
20	3,550	395	3,780	7,520	1,560	31,700	3,170	410	3,510
21	5,990	2,040	33,000	9,260	1,840	46,000	4,480	1,140	13,800
22	5,840	2,700	42,600	12,000	3,600	117,000	6,250	2,210	37,300
23	4,300	1,200	13,900	12,200	4,000	132,000	7,270	3,720	73,000
24	3,820	790	8,150	12,200	3,620	119,000	5,870	2,030	32,200
25	3,780	600	6,120	15,000	4,400	178,000	5,330	2,140	30,800
26	3,630	500	4,900	14,200	3,620	139,000	4,120	1,870	20,800
27	3,500	465	4,390	12,500	2,800	94,500	3,690	1,040	10,400
28	3,440	460	4,270	12,000	2,600	84,200	3,300	760	6,770
29	3,350	280	2,530	9,850	2,580	68,800	2,940	650	5,160
30	3,210	350	3,030	11,000	3,570	s 121,000	3,870	1,080	s 14,400
31	--	--	--	29,600	8,000	639,000	--	--	--
Total	107,550	--	268,900	475,450	--	5,960,280	185,320	--	1,118,350

Day	July			August			September		
1	11,100	4,960	149,000	2,400	245	1,590	3,060	1,330	11,000
2	6,880	2,000	37,200	2,270	78	478	2,590	1,420	9,930
3	9,850	4,720	126,000	2,040	95	523	1,760	755	3,590
4	9,310	4,020	101,000	1,820	240	1,180	1,600	500	2,160
5	27,100	10,000	s 732,000	1,720	195	906	1,490	370	1,490
6	32,900	5,820	517,000	1,710	230	1,060	1,470	275	1,090
7	20,500	5,120	283,000	1,790	240	1,160	1,420	240	920
8	14,100	4,700	179,000	1,790	225	1,090	1,470	220	873
9	11,100	4,550	136,000	1,860	320	1,610	1,470	230	913
10	7,750	3,380	70,700	1,990	330	1,770	1,470	220	873
11	6,520	2,580	45,400	1,980	305	1,630	1,340	190	687
12	5,650	2,060	31,400	1,890	280	1,430	1,250	185	624
13	4,660	2,060	25,900	1,760	275	1,310	1,190	165	530
14	4,220	1,320	15,000	1,620	220	962	1,170	140	442
15	11,800	4,460	s 150,000	1,610	210	913	1,180	150	478
16	8,450	2,000	45,600	1,560	260	1,100	1,140	150	462
17	7,890	3,600	76,700	2,110	365	2,080	1,100	150	446
18	5,650	2,100	32,000	1,780	270	1,300	1,120	165	499
19	4,930	1,110	14,800	1,580	235	1,000	1,610	190	s 934
20	4,600	740	9,190	1,560	210	885	6,820	4,840	89,100
21	3,860	680	7,090	1,890	260	1,330	7,800	3,860	81,300
22	4,050	670	7,330	2,190	340	2,010	6,280	3,360	57,000
23	4,460	1,010	12,200	2,000	270	1,460	8,420	4,320	98,200
24	3,950	800	8,530	2,000	250	1,350	9,540	5,080	131,000
25	4,500	1,740	21,100	1,930	270	1,410	8,310	4,020	90,200
26	3,760	1,020	10,400	1,730	225	1,050	5,560	2,990	44,900
27	3,220	680	5,910	1,650	240	1,070	7,330	3,910	s 85,800
28	2,970	420	3,370	1,530	230	950	10,300	4,200	117,000
29	2,800	330	2,490	1,560	220	927	7,240	2,380	46,500
30	2,560	290	2,000	1,830	920	4,540	4,050	1,760	19,200
31	2,380	260	1,670	2,130	1,220	7,020	--	--	--
Total	253,470	--	2,858,980	57,280	--	47,094	110,550	--	898,141

Total discharge for year (cfs-days)	1,717,070
Total load for year (tons)	12,761,489

s Computed by subdividing day.

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

Particle-size analyses of suspended sediment, water year October 1958 to September 1959
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Oct. 27, 1958....	2:40 p.m.	2,630	56	222	1,170	62	64		--		93	96	98		100		VPWCM
Dec. 3.....	1:45 p.m.	2,100	46	75	--	--	--		--		91	96	98		100		V
Apr. 21, 1959 ...	8:45 a.m.	5,680	40	1,140	3,710	32	38		56		96	99	100		--		VPWCM
May 11.....	9:40 p.m.	26,400	64	4,630	6,900	46	50		65		94	97	99		100		VPWCM
July 29.....	2:20 p.m.	2,730	80	321	1,240	60	64		76		90	91	94		100		VPWCM
Aug. 14.....	10:50 a.m.	1,620	77	182	--	--	--		--		81	83	88		100		V
Sept. 14.....	2:20 p.m.	1,150	76	132	--	--	--		--		88	90	95		100		V

Particle-size analyses of bed material, water year October 1958 to September 1959
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Number of sampling points	Bed material												Methods of analysis
				Percent finer than indicated size, in millimeters												
				0.031	0.062	0.125	0.250	0.500	1.000	2.000	4.000	8.000	16.000	32.000	64.000	
May 11, 1959.....	9:40 p.m.	26,400	11		5	8	22	56	75	81	86	88	90	94	100	SV
July 29	2:20 p.m.	2,730	27		0	2	11	39	62	75	88	93	95	100		SV

KANSAS RIVER BASIN--Continued

6-8880. VERMILLION CREEK NEAR WAMEGO, KANS.

LOCATION.--At gaging station at highway bridge, 1 mile upstream from Indian Creek and 14 miles northeast of Wamego, Pottawatomie County.
DRAINAGE AREA.--243 square miles.
RECORDS AVAILABLE.--Water temperatures: April 1958 to September 1959.
Sediment records: April 1958 to September 1959.
EXTREMES, 1958-59.--Water temperatures: Maximum, 87°F Aug. 3, 4; minimum, freezing point Feb. 18 and probably on many other days during November to February.
Sediment concentrations: Maximum daily, 7,500 ppm May 5; minimum daily, not determined.
Sediment loads: Maximum daily, 108,000 tons May 30; minimum daily, less than 0.50 ton Sept. 10, 15-17.
EXTREMES, April 1958 to September 1959.--Water temperatures: Maximum, 87°F Aug. 3, 4, 1959; minimum, freezing point Feb. 18, 1959, and probably on many other days during winter months.
Sediment concentrations: Maximum daily, 7,500 ppm May 5, 1959; 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, 17,200 ppm July 4. Flow affected by ice Nov. 28 to Dec. 2, Dec. 7, Dec. 17 to Jan. 4, Jan. 7 to Feb. 7, Feb. 15, 18-21. Records of discharge for water year October 1958 to September 1959 given in WSP 1630.

Temperature (° F) of water, water year October 1958 to September 1959
/Once-daily measurement between 5 p.m. and 10 p.m./

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

a Measurement between 7 a.m. and 11 a.m.
b Measurement between 1 p.m. and 4 p.m.

KANSAS RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959

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	106	--	e 28	28	--		42		e 16
2	71			32	61		46		e 12
3	63	--	e 22	31	--		64	88	15
4	60			28	220		76		e 16
5	50	135	18	23	--		58		e 9
6	42	130	15	22	--		23		
7	64	145	25	22	--		27		
8	67	125	23	28	--	e 8	27		
9	49	120	16	40	95		22		
10	28	--		45	--		22		
11	23	--		50	--		20		
12	23	--		47	--		19		
13	25	96		51	--		19		
14	25	--		63	--		14		
15	26	--		267	--	e 380	11		
16	26	74		255	250	s 209	12		
17	25	--		197	--	e 75	15		
18	22	--		414	--	e 750	18		
19	22	--		135	--	e 110	20		e 3
20	24	--	e 5	69	150	28	23		
21	25	53		54	100	15	25		
22	22	--		49	91	12	25		
23	21	--		49	--		28		
24	21	--		47	--		25		
25	21	--		43	--		26		
26	21	--		41	320	e 12	27		
27	23	78		33	--		28		
28	24	--		27	--		28		
29	25	--		32	--		28		
30	24	--		34	175		19		
31	25	--		--	--	--	28		
Total	1,093	--	301	2,256	--	1,787	865		146

Day	January			February			March		
1	25			26			49	120	16
2	21			27			47	140	18
3	18			28			43	150	17
4	15			30			40	150	16
5	13			35	--	e 2	52	150	21
6	13			40			61	140	23
7	15			80			51	92	13
8	17			487	--	e 800	120	215	s 82
9	18			357	--	e 480	180	385	187
10	20			167	--	e 110	126	350	119
11	22			143	--	e 55	82	250	55
12	24			299	--	e 340	69	235	44
13	26			1,230	1,420	s 4,720	59	150	24
14	30			711	1,110	2,130	60	140	23
15	40			283	740	565	60	130	21
16	30		e 2	236	--	e 360	52	125	18
17	27			168	520	236	73	130	26
18	20			105	220	62	85	175	40
19	23			72	--	e 22	61	110	18
20	24			60	--	e 19	50	115	16
21	20			48	--	e 16	40	90	10
22	20			68	135	25	34	80	7
23	22			88	260	62	36	91	9
24	24			63	195	33	39	88	9
25	27			84	200	45	53	--	e 85
26	40			73	150	30	842	--	e 18,000
27	35			85	180	41	428	3,100	3,580
28	30			67	140	25	139	1,180	443
29	25			--	--	--	90	445	108
30	25			--	--	--	115	310	96
31	25			--	--	--	186	570	286
Total	734		62	5,160	--	10,190	3,422	--	23,430

e Estimated.
s Computed by subdividing day.

KANSAS RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959--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	118	310	99	86	120	28	849	3,310	s 8,420
2	92	220	55	82	140	31	319	2,700	2,320
3	75	175	35	82	165	37	250	2,610	1,760
4	52	150	21	77	340	71	209	2,360	1,330
5	52	145	20	3,230	7,500	s 61,700	186	960	482
6	46	130	16	1,250	4,050	s 15,500	159	545	234
7	48	125	16	355	1,730	1,660	128	465	161
8	55	115	17	238	1,180	758	111	360	107
9	63	120	20	273	1,160	855	102	305	84
10	50	100	14	297	1,600	s 1,510	98	230	61
11	43	43	5	1,100	6,090	s 20,300	88	180	43
12	47	48	6	249	1,680	s 1,200	78	180	38
13	45	30	4	180	660	321	68	140	26
14	38	22	2	145	460	180	62	115	19
15	33	22	2	126	520	177	57	130	20
16	29	30	2	113	390	119	55	150	22
17	116	120	s 66	121	390	127	52	150	21
18	320	--	e 950	110	200	59	47	125	16
19	311	890	s 1,270	100	180	49	44	115	14
20	1,610	4,860	21,100	78	200	42	44	105	12
21	315	1,630	s 1,530	907	4,280	s 17,400	331	6,370	s 8,430
22	210	705	400	341	3,950	s 4,290	97	3,850	s 1,160
23	175	535	253	152	1,100	451	58	880	138
24	150	400	162	103	495	138	48	225	29
25	133	340	122	90	440	107	42	200	23
26	120	260	84	85	420	96	37	175	17
27	118	245	78	80	300	65	35	145	14
28	115	205	64	63	230	39	34	160	15
29	101	210	57	731	4,720	s 12,700	38	295	30
30	93	195	49	6,340	6,310	108,000	41	375	42
31	--	--	--	2,010	5,730	s 24,400	--	--	--
Total	4,773	--	26,519	19,194	--	272,410	3,767	--	25,088

Day	July			August			September		
1	62	340	57	25	78	5	44	--	e 60
2	40	150	16	20	77	4	16	120	5
3	30	150	12	18	66	3	12	80	2
4	2,900	6,640	s 61,400	16	36	2	9.5	79	2
5	2,220	3,220	s 22,000	16	51	2	8.3	105	2
6	239	1,650	s 1,160	17	80	4	7.4	92	2
7	115	700	217	17	81	4	6.8	54	1
8	90	420	102	15	52	2	6.2	42	1
9	75	345	70	13	84	3	5.6	40	1
10	67	320	58	12	91	3	4.4	42	(t)
11	62	300	50	11	68	2	4.0	61	1
12	60	250	40	10	66	2	3.8	79	1
13	58	175	27	9.5	58	1	3.6	68	1
14	78	290	s 75	8.9	78	2	3.6	72	1
15	158	640	273	10	83	2	3.6	48	(t)
16	88	370	88	11	78	2	3.4	40	(t)
17	62	200	33	12	82	3	4.2	39	(t)
18	64	210	36	12	95	3	6.5	40	1
19	73	250	49	11	110	3	14	100	4
20	55	180	27	9.2	110	3	29	110	9
21	48	150	19	8.3	110	2	33	46	4
22	44	120	14	7.4	110	2	29	54	4
23	42	94	11	6.8	120	2	39	100	10
24	38	105	11	6.2	120	2	64	295	51
25	34	135	12	6.2	125	2	46	210	26
26	30	135	11	5.6	120	2	27	99	7
27	27	79	6	5.6	110	2	90	--	e 140
28	26	42	3	5.3	120	2	49	--	e 50
29	27	50	4	6.5	120	2	21	235	13
30	26	51	4	8.0	110	2	14	130	5
31	22	50	3	20	--	e 22	--	--	--
Total	6,960	--	85,888	359.5	--	97	607.9	--	406

Total discharge for year (cfs-days) 49,191.4
Total load for year (tons) 446,324

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

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

Particle-size analyses of suspended sediment, water year October 1958 to September 1959
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Apr. 20, 1959....	6:10 p.m.	1,310	40	3,780	5,820	54	61		82		99	100					VPWCM
May 29.....	5:00 p.m.	1,460	73	9,340	5,350	41	49		81		99	100					VPWCM
May 30.....	7:00 a.m.	3,920	67	10,600	6,640	24	37		72		100	--					VPWCM
May 30.....	11:30 a.m.	6,300	65	7,600	4,310	32	38		77		100	--					VPWCM
May 30.....	4:30 p.m.	10,200	66	5,310	3,680	61	72		86		100	--					SPWCM
May 31.....	8:00 a.m.	1,820	68	7,320	4,800	41	50		81		100	--					SPWCM
July 4.....	10:45 a.m.	1,860	75	14,100	8,320	37	46		70		100	--					VPWCM
July 4.....	3:00 p.m.	4,290	75	9,780	5,750	44	51		75		99	100					VPWCM
July 4.....	11:00 p.m.	6,860	72	4,900	3,540	66	77		94		100	--					SPWCM
July 5.....	8:00 a.m.	2,300	71	3,500	2,070	55	68		87		100	--					SPWCM

KANSAS RIVER BASIN--Continued

MISCELLANEOUS ANALYSES OF STREAMS IN KANSAS RIVER BASIN IN KANSAS

Periodic determinations of suspended-sediment discharge, water year October 1958 to September 1959

Date	Water discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Discharge (tons per day)
6-8695. SALINE RIVER AT TESCOTT			
Oct. 8, 1958	498	9,940	13,400
Dec. 2	124	193	65
Feb. 27, 1959	162	210	92
Mar. 14	127	78	27
Apr. 14	114	228	70
June 2	3,610	4,200	40,900
July 23	88	446	106
Aug. 20	60	376	61
Sept. 15	42	318	36
6-8775. TURKEY CREEK NEAR ABILENE			
Oct. 27, 1958	19	288	15
Dec. 3	22	214	13
Mar. 9, 1959	48	130	17
July 13	23	391	24
July 14	230	786	488
July 15, 3:30 p.m.	1,720	5,580	25,900
July 15, 4:30 p.m.	1,630	5,480	24,100
July 15, 5:30 p.m.	2,050	6,000	33,200
July 15, 6:30 p.m.	2,320	4,810	30,100
July 15, 7:30 p.m.	2,780	4,060	30,500
July 15, 8:30 p.m.	3,220	3,250	28,300
July 15, 10:00 p.m.	3,730	2,720	27,400
July 16, 1:00 a.m.	3,770	2,200	22,400
July 16, 4:00 a.m.	2,990	1,860	15,000
Aug. 21	12	104	3.4
Sept. 14	9	176	4.3
Sept. 21, 10:40 a.m.	2,090	5,370	30,300
Sept. 21, 4:10 p.m.	1,690	6,120	27,900
Sept. 25	28	272	20
6-8780. CHAPMAN CREEK NEAR CHAPMAN			
Oct. 21, 1958	10	180	4.9
Dec. 2	15	104	4.2
Apr. 14, 1959	12	233	7.5
May 5	1,050	8,020	22,700
Aug. 24	3.8	194	2.0
Sept. 14	3.9	140	1.5
Sept. 21	32	1,770	153
6-8785. LYON CREEK NEAR WOODBINE			
Oct. 27, 1958	40	135	14
Dec. 3	38	89	9.1
Mar. 9, 1959	65	40	7.0
July 13	102	249	68
July 14, 3:40 p.m.	6,070	3,050	50,000
July 14, 6:00 p.m.	6,260	2,960	50,000
July 14, 8:15 p.m.	6,040	2,220	36,200
July 15	1,460	2,320	9,150
Aug. 21	40	226	24
Sept. 14	26	98	6.9
Sept. 21, 11:45 a.m.	1,190	5,610	18,000
Sept. 21, 3:20 p.m.	1,800	5,030	24,400
Sept. 21, 6:30 p.m.	2,500	4,680	31,600
Sept. 25	65	205	36
6-8792. CLARK CREEK NEAR JUNCTION CITY			
Oct. 27, 1958	44	99	12
Dec. 3	27	137	10
July 13, 1959	44	144	17
July 14	51	3,920	540
July 15	1,130	1,830	5,580
Sept. 14	12	54	1.7
Sept. 21, 1:25 p.m.	751	2,240	4,540
Sept. 21, 7:45 p.m.	505	1,970	2,690
Sept. 25	44	95	11

Periodic determinations of suspended-sediment discharge, water year October 1958 to September 1959--Continued

Date	Water discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Discharge (tons per day)
6-8905. DELAWARE RIVER AT VALLEY FALLS			
Nov. 19, 1958	227	186	114
Mar. 30, 1959	550	1,160	1,720
May 7	1,290	2,700	9,400
July 15	565	1,910	2,910
Sept. 25	330	918	818
6-8915. WAKARUSA RIVER NEAR LAWRENCE			
Nov. 19, 1958	680	620	1,140
May 7, 1959	329	1,450	1,290
July 14	594	3,860	6,190
Sept. 25	1.5	49	.2
6-8920. STRANGER CREEK NEAR TONGANOXIE			
Nov. 19, 1958	1,020	932	2,570
Mar. 30, 1959	316	996	850
May 7	410	1,890	2,090
July 15	68	399	73
Sept. 25	858	1,760	4,080

KANSAS RIVER BASIN--Continued

MISCELLANEOUS ANALYSES OF STREAMS IN KANSAS RIVER BASIN IN KANSAS--Continued

Particle-size analyses of suspended sediment, water year October 1958 to September 1959
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
6-8695. SALINE RIVER AT TESCOTT																
Oct. 8, 1958	4:50 p.m.	498	68	9,940	6,600	57	71		94		100						VPWCM
Sept. 19, 1959	5:10 p.m.	542	68	6,880	4,850	56	68		91		100						SPWCM
Sept. 20	8:30 a.m.	504	62	4,780	3,840	60	73		94		100						VPWCM
Sept. 21	8:15 a.m.	1,010	65	8,240	6,220	65	81		97		100						SPWCM
Sept. 22	8:20 a.m.	920	68	6,790	4,840	69	80		95		100						SPWCM
Sept. 23	4:35 p.m.	270	71	3,240	2,510	70	83		97		100						SPWCM
Sept. 26	8:50 a.m.	587	65	13,000	9,210	63	82		97		100						SPWCM
Sept. 27	8:40 a.m.	272	65	7,340	5,900	68	84		100		--						PWCM
6-8775. TURKEY CREEK NEAR ABILENE																
June 9, 1958	10:15 a.m.	--	--	7,440	6,620	65	72		89		100						VPWCM
June 21	2:00 p.m.	--	--	397	1,500	64	70		83		99	100					VPWCM
July 15, 1959	3:30 p.m.	1,720	79	5,580	8,740	58	66		84		100						VPWCM
July 15	4:30 p.m.	1,630	79	5,480	6,750	58	65		82		100						VPWCM
July 15	6:30 p.m.	2,320	79	4,810	5,230	60	66		83		100						VPWCM
July 15	8:30 p.m.	3,220	79	3,250	4,360	68	75		90		100						VPWCM
July 15	10:00 p.m.	3,730	79	2,720	3,570	72	79		91		100						VPWCM
July 16	4:00 a.m.	2,990	79	1,860	2,230	78	83		94		100						VPWCM
6-8785. LYON CREEK NEAR WOODBINE																
July 14, 1959	3:40 p.m.	6,070	68	3,050	5,360	57	64		82		100						VPWCM
July 14	8:15 p.m.	6,040	--	2,220	2,740	64	70		86		100						VPWCM
July 15	2:55 p.m.	1,460	78	2,320	2,690	61	64		76		99	100					VPWCM
6-8792. CLARK CREEK NEAR JUNCTION CITY																
July 14, 1959	4:40 p.m.	51	67	3,920	7,300	49	55		75		99	100					VPWCM
July 15	2:05 p.m.	1,130	69	1,830	2,430	58	64		80		100						VPWCM
6-8920. STRANGER CREEK NEAR TONGANOXIE																
Nov. 19, 1958	3:00 p.m.	1,020	49	932	1,450	71	71		82		100						VPWCM
Mar. 30, 1959	12:30 p.m.	316	51	996	2,180	43	45		72		99	100					VPWCM

CHARITON RIVER BASIN

6-9035. HONEY CREEK NEAR RUSSELL, IOWA

LOCATION.--At gaging station on downstream side of highway bridge, 0.7 mile upstream from Chariton River and 5.5 miles southeast of Russell, Lucas County.
DRAINAGE AREA.--13.2 square miles.
RECORDS AVAILABLE.--Sediment records: June 1952 to September 1959.
EXTREMES, 1958-59.--Sediment concentrations: Maximum daily, 1,100 ppm May 21, June 30; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 6,300 tons May 21; minimum daily, 0 tons on many days.
EXTREMES, 1952-59.--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, 4,150 ppm May 18. Flow affected by ice Nov. 25 to Jan. 7, Jan. 12 to Mar. 1, Mar. 5-18. Backwater from Chariton River Nov. 18, 19, Mar. 19 to Apr. 4, Apr. 20-24, May 6, 7, 11-14, May 19 to June 3, July 1-4, Sept. 27-30. Records of discharge for water year October 1958 to September 1959 given in WSP 1630.

Suspended sediment, water year October 1958 to September 1959

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	0.78	--		0.54	--		0.70	--	
2	.70	--		.62	--		.90	32	
3	.70	--		.62	--		1.3	26	
4	.70	10	(t)	.62	11		1.5	--	
5	.54	--		.70	--		.80	--	
6	.47	--		.42	--		.50	--	
7	6.4	180	sa 3.8	.37	--		.35	--	
8	3.8	65	a .7	.47	--		.33	--	
9	2.6	10	.1	.42	--	(t)	.30	--	
10	1.7	--		.32	--		.28	--	
11	1.2	--		.28	10		.33	--	
12	1.1	--		.28	--		.25	--	
13	1.0	9		.32	--		.17	--	
14	1.0	--		.47	--		.12	--	
15	1.0	--	(t)	.62	--		.10	--	
16	1.0	--		.70	--		.12	22	(t)
17	1.0	--		94	465	s 135	.17	--	
18	1.0	--		55	80	12	.30	--	
19	.95	--		4.5	--	e .5	.58	--	
20	.95	9		3.1	--	e .3	.50	--	
21	.78	--		2.5	--		.46	--	
22	.70	--		2.1	28		.54	16	
23	.70	--		2.0	--		.60	--	
24	.62	--		1.8	--		.70	--	
25	.86	--		1.5	--		.70	--	
26	.78	--	(t)	1.0	--	e .1	.80	--	
27	.62	--		.70	--		.90	--	
28	.62	--		.80	--		1.0	--	
29	.54	--		.70	--		.90	--	
30	.54	--		.60	--		.70	--	
31	.54	10		--	--	--	.50	--	
Total	35.89	--	5.2	178.07	--	149.0	17.40	--	1.1

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

CHARITON RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959--Continued

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	0.70	--		3.0	--	e 0.1	8.8	--	e 1.5
2	.80	--		.90	--		6.6	71	1.3
3	.40	--		.60	--		5.0	31	.4
4	.25	--		.50	--		3.5	41	.4
5	.19	--		.41	13	(t)	1.0	--	e .3
6	.23	22		.35	--		.25	--	e .2
7	.28	--		.50	--		1.0	--	e .4
8	.32	--		19	--	e 2.0	2.4	--	e .5
9	.47	--		15	--	e .8	4.0	55	.6
10	.54	--		20	--	e 2.4	6.0	80	1.3
11	.37	--		15	--	e .9	10	170	4.6
12	.31	22		30	35	2.8	20	335	18
13	.45	--		80	54	12	35	350	33
14	1.3	--		50	47	6.3	60	295	48
15	1.5	--	(t)	35	51	4.8	70	395	75
16	1.8	--		30	22	1.8	25	155	10
17	.40	--		25	--	e 1.1	20	125	6.8
18	.25	--		20	--	e .8	70	550	b 100
19	.16	--		17	--	e .6	350	550	sb 550
20	.13	--		15	--	e .5	100	500	135
21	.12	--		40	150	16	20	75	4.0
22	.11	--		100	140	38	15	--	e 2.0
23	.10	--		30	205	17	11	200	5.9
24	.13	--		10	55	1.5	10	--	e 5.0
25	.17	--		30	90	7.3	9.0	240	b 6.5
26	.15	--		20	230	12	220	700	sb 440
27	.15	--		15	110	4.5	33	170	15
28	.18	--		11	42	1.2	18	65	3.2
29	.90	--		--	--	--	14	--	e 2.0
30	20	30	2.0	--	--	--	12	--	e 4.4
31	9.0	--	e .7	--	--	--	11	110	8.0
Total	41.86	--	3.5	633.26	--	134.5	1,171.55	--	1,483.3

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	250	750	sb 750	3.8	--		45	78	9.5
2	22	170	10	3.4	53	e 0.6	25	60	4.1
3	11	140	4.2	4.6	--		15	--	e 2.4
4	6.0	120	1.9	3.1	66		7.6	65	1.3
5	4.8	--	e 1.0	17	180	sb 15	5.2	--	e .9
6	3.8	69		7.6	100	2.1	3.1	66	.6
7	3.8	67		4.0	85	a .9	1.9	--	
8	4.1	--		2.8	70	a .5	1.5	65	
9	4.0	51		6.0	140	sa 3.0	1.0	--	
10	3.2	--		12	100	3.2	1.2	--	e .2
11	3.2	--	e .5	35	220	sa 32	1.1	--	
12	5.0	57		11	45	1.3	.86	--	
13	3.6	35		4.0	35	a .4	.25	60	
14	3.0	--		3.0	22		.25	--	
15	2.6	--		2.7	--	e .2	.22	--	
16	2.3	--		2.3	--		.22	--	(t)
17	5.0	140	sb 2.6	2.2	--		.22	--	
18	6.0	53	.9	53	700	sb 240	.22	86	
19	141	750	sb 480	110	180	a 55	.16	--	
20	170	480	sb 240	180	750	sb2,500	.69	--	e .5
21	30	200	a 16	1,100	1,100	sb6,300	.25	51	
22	15	85	a 3.4	48	210	27	.28	--	
23	9.0	50	1.2	15	1	4.4	.22	--	
24	6.0	72	1.2	10	75	a 2.0	.14	--	
25	4.4	57	.7	7.6	60	e 1.5	.12	--	(t)
26	3.5	50	a .5	7.6	88		.14	--	
27	50	340	sa 130	7.0	--		.12	--	
28	76	200	sb 55	90	550	sa 320	.12	--	
29	9.0	80	a 1.9	66	930	166	3.1	380	sa 19
30	5.3	53	.8	150	750	sb 320	73	1,100	sb 280
31	--	--	--	80	120	26	--	--	--
Total	862.6	--	1,706.8	2,048.7	--	10,026.5	188.18	--	320.0

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

CHARITON RIVER BASIN--Continued

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

Suspended sediment, water year October 1958 to September 1959--Continued

Day	July			August			September		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	100	500	sb 180	0	--	0	0	--	0
2	5.0	170	a 2.2	0	--	0	0	--	0
3	2.0	125	.7	0	--	0	0	--	0
4	1.6	--	e .5	8.2	700	sb 19	0	--	0
5	1.4	--	e .3	4.9	360	sa 6.5	0	--	0
6	.86	34		4.1	280	b 3.0	0	--	0
7	.54	--		2.5	240	a 1.6	0	--	0
8	.47	76		.62	--	e .5	0	--	0
9	.42	--		.28	--	e .1	0	--	0
10	.32	--		.22			0	--	0
11	.28	--		.19			0	--	0
12	.25	--		.10			0	--	0
13	.19	36		.07	--	(t)	0	--	0
14	.16	--		.04			0	--	0
15	.19	--	(t)	.04			0	--	0
16	.28	--		.04			0	--	0
17	.22	--		2.8	420	7.0	0	--	0
18	.16	--		.37	--	.4	0	--	0
19	.12	--		.22			0	--	0
20	.05	--		.10	--	(t)	0	--	0
21	.03	--		.05			0	--	0
22	.01	--		.01			0	--	0
23	0	--	0	0	--	0	1.6	--	e 4.0
24	0	--	0	0	--	0	1.6	--	e 1.0
25	0	--	0	0	--	0	.98	150	.4
26	0	--	0	0	--	0	82	--	e 200
27	0	--	0	0	--	0	100	--	e 5.0
28	0	--	0	0	--	0	3.0	--	e 1.0
29	0	--	0	0	--	0	2.1	93	.5
30	0	--	0	0	--	0	1.8	--	e .2
31	0	--	0	0	--	0	--	--	--
Total	114.55	--	184.3	24.85	--	38.5	193.08	--	212.1

Total discharge for year (cfs-days) 5,509.99
Total load for year (tons) 14,264.8

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

CHARITON RIVER BASIN--Continued

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

Particle-size analyses of suspended sediment, water year October 1958 to September 1959
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; M, mechanically dispersed; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time	Discharge (cfs)	Water temperature (° F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
May 21, 1959.....	7:30 a.m.	1,480	60	850	3,410		76		95		98	--	--		--		SPWCM
May 28	5:00 p.m.	246	60	1,550	3,490		56		81		97	98	99		100		SPWCM
May 29	5:15 a.m.	598	58	950	3,720		71		92		99	99	99		100		SPWCM
May 30	5:10 a.m.	296	60	915	3,490		66		88		99	99	100		--		SPWCM

MISSOURI RIVER MAIN STEM--Continued

6-9090. MISSOURI RIVER AT BOONVILLE, MO.

LOCATION.--Temperature recorder at gaging station at Missouri-Kansas-Texas Railroad Co. bridge at Boonville, Cooper County.
DRAINAGE AREA.--505,700 square miles, approximately.
RECORDS AVAILABLE.--Water temperatures: May 1953 to February 1959.
EXTREMES, October 1958 to February 1959.--Water temperatures: Minimum daily mean, freezing point on several days during January.
EXTREMES, 1953-59.--Water temperatures: Maximum daily mean (1953-58), 90°F July 31 to Aug. 3, 1955; minimum daily mean, freezing point on many days during winter months.
REMARKS.--No data from March 1959 to October 1960 owing to malfunction of recorder. Records indicate only a few degrees change in temperature from day to day with very little, if any, diurnal change. Records of discharge for water year October 1958 to September 1959 given in WSP 1630.

Daily mean temperature (° F) of water, October 1958 to February 1959
/Recorder with temperature attachment, continuous ethyl alcohol-actuated thermograph/

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

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