Quality of Surface Waters of the United States 1954

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

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GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1351

Prepared in cooperation with the State of Iowa, and with other agencies

Quality of Surface Waters of the United States 1954

Parts 5 and 6

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

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PREFACE

This report was prepared by the Geological Survey in cooperation with the State of Iowa and other agencies by personnel of the Water Resources Division under the direction of:

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INTRODUCTION

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

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

The regular yearly publication of records of chemical analyses, suspended sediment, and water temperature was begun by the Geological Survey in 1941. The annual records prior to 1948 were published 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 were collected from October 1, 1953 , to September 30, 1954 . Descriptive statements are given for each sampling station for which regular series of chemical analyses or sediment determinations have been made. These statements include the location of the stream-sampling station, drainage area, length of time for which records are available, extremes of dissolved solids, hardness, sediment loads, water temperature, and other pertinent data.

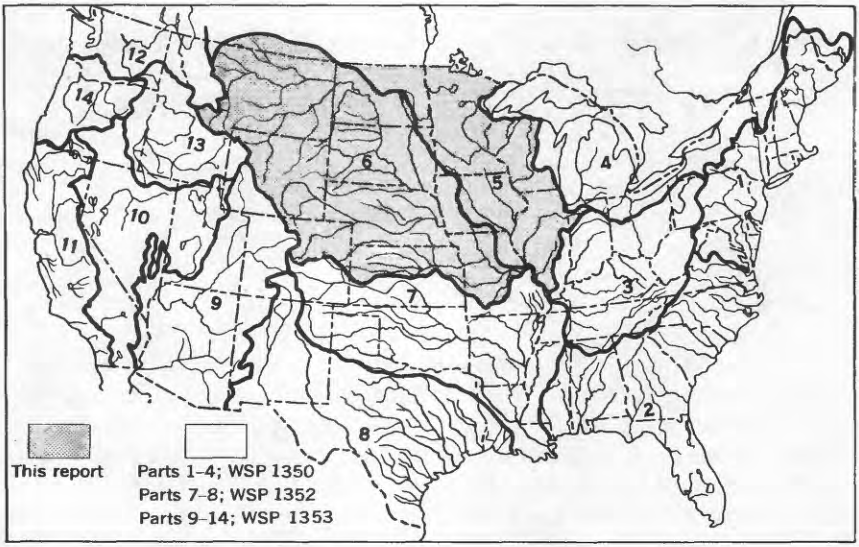

Figure 1. Map of the United States showing basins covered by the four water-supply papers on quality of surface waters in 1954. The shaded portion represents the section of the country covered by this volume; the unshaded portion represents the section of the country covered by other water-supply papers.

Records of water discharge of the streams at, or near, the sampling point for the sampling period are included in most tables of analyses. The records are arranged by drainage basins, according to Geological Survey practice in reporting records of stream flow.

Beginning with the series of reports for the water year ending September 30, 1951, the order of listing station records has been changed. In this report, stations on tributary streams are listed between stations on the main stream in the order in which those tributaries enter the main stem. Stations on tributaries to tributaries are inserted in a similar manner.

During the year ended September 30, 1954, 69 regular sampling stations on 64 streams for the study of the chemical character of surface waters were maintained by the Geological Survey in the area covered by this volume. Samples were collected less frequently during the year at many other points. Water temperatures were measured daily at 54 of the regular sampling 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, determinations made on the

daily samples before compositing have not been reported. Specific conductance was usually determined on each daily sample, and pH, chloride, or other determinations were also made on many of the daily samples. As noted in the table headings these data are available for reference at the district offices listed under Division of Work, on page 19.

Quantities of suspended sediment are reported for 42 stations during the year ended September 30, 1954. The sediment samples were collected one or more times daily at most stations, depending on the rate of flow and changes in stage of the stream. Sediment samples were collected less frequently during the year at many other points. In connection with measurements of sediment discharge, sizes of sediment particles were determined at 38 of the stations. As noted under "Remarks" in the table headings, suspended-sediment concentrations also were determined from the samples collected for chemical analyses in some parts of the country. The data do not provide a reliable basis for computing the loads of suspended sediment carried by the stream but may be of value for design and operation of filtration plants utilizing these stream waters. Records of these infrequent determinations are available for reference in the district offices listed.

Material which is transported essentially in continuous contact with the stream bed is termed bed load and is not considered in this report. All other undissolved material in transport is termed suspended sediment and generally constitutes the major part of the total sediment load. At the present time no reliable method has been developed for determining bed load on a routine basis.

COLLECTION AND EXAMINATION OF SAMPLES

CHEMICAL QUALITY

Samples for chemical analyses were usually collected daily at, or near, points on streams where gaging stations are maintained for measurement of water discharge. Most of the analyses were made on 10-day composites of daily samples collected for a period of a year at each sampling point. Three composite samples were usually prepared each month by mixing together equal volumes of daily samples collected from the 1st to the 10th, from the 11th to the 20th, and during the remainder of the month. For some streams that are subject to sudden and large changes in chemical composition or concentration, samples were composited for shorter periods on the basis of the concentration of dissolved solids indicated by measurements of specific conductance of the daily samples.

The samples were analyzed according to methods regularly used by the Geological Survey. These methods are essentially the same as or are modifications of methods described in recognized

authoritative publications for the mineral analysis of water samples (Collins, 1928; Am. Public Health Assoc., 1946).

For those waters containing moderately large quantities of soluble salts, the value reported for dissolved solids is the sum of the quantities of the various determined constituents using the carbonate equivalent of the reported bicarbonate. In other analyses the value reported as dissolved solids is the residue on evaporation after drying at 180°C for 1 hour. Specific conductance is given for most analyses and was determined by means of a conductance bridge using a standard potassium chloride solution as reference.

SUSPENDED SEDIMENT

In general, samples were collected daily with the US D-43 depth-integrating sampler (U. S. Inter-agency, 1948, p. 70-76) 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. Suspended-sediment samples, consisting of depth-integrated samples at three or more verticals in the cross section were made periodically to determine the cross-sectional distribution of the suspended concentration with respect to that at the daily sampling vertical. In streams where comparatively rapid fluctuations in transverse distribution of water discharge or sediment concentration are encountered at the sampling point, samples were taken regularly at two or more verticals to determine the average concentration across the section. During periods of high flow, samples were taken two or more times throughout the day at many sampling stations, and during periods of rapidly changing flow samples were taken hourly at some stations.

Sediment concentrations were determined by filtration or evaporation of the samples as required. At many stations the mean daily concentration for some days was obtained by plotting the instantaneous concentrations on the original or copies of the original gage-height chart. The plotted concentrations adjusted, if necessary, for cross-sectional distribution with respect to that at the daily sampling vertical, were connected or averaged by continuous curves to obtain a concentration graph. This graph represented the estimated concentration at any time and, for most periods, mean daily concentrations were determined from the graph. When the concentration and water discharge were changing rapidly, the day was often subdivided for this computation. For some periods when the day-to-day variation in the concentration was negligible, the data were not plotted, and the average concentration of the samples was used as the mean concentration for the day. For certain stations, when the discharge and sediment concentrations were relatively low and varied only slightly from day to day, the

samples for a number of days were composited and the mean daily concentrations and mean daily loads are shown.

For some periods when no samples were collected, daily sediment loads were estimated on the basis of water discharge, sediment concentrations observed immediately preceding and following the periods, and 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 sediment loads for individual days are not estimated, as numerous factors influencing the quantities of transported sediment made it very difficult to make accurate estimates of sediment loads for individual days. However, estimated sediment loads for missing days in an otherwise continuous period of sampling have been included in monthly and annual totals for most streams to provide a complete record.

In addition to the records of total quantities of sediment, records of the particle sizes of sediment are included also. The particle sizes of the suspended sediments were determined periodically for many of the stations. As much of the material carried in suspension can pass through the finest sieves, the bottom-withdrawal tube method (U. S. Inter-agency, 1943, p. 82-90) was used in most of the analyses. Generally, sieves were used in the determination of particle sizes for sediments which were predominantly coarser than 0.062 mm. Size distribution for some sediments was determined by a combination of sieves and pipette methods in which the size fraction 0.062 mm and larger was analyzed by sieves and that smaller than 0.062 mm was analyzed by the pipette method (Kilmer and Alexander, 1949). Native or distilled water, as noted in the tables of analyses, was used as the settling medium. In some instances, chemical dispersing agents were added to the settling medium. As settling diameters of the clay and colloidal fractions are often affected by the chemical character of the settling medium, analyses made using native water may more nearly simulate particle sizes existing in the stream. Results of analyses using distilled water or using a settling medium containing dispersing agents approximate ultimate particle sizes of the finer fractions. The concentration of sediment suspension for analysis was reduced to less than 5,000 parts per million, where necessary, by means of a sample splitter, in order to stay within limits recommended for the bottom-withdrawal tube or pipette method. The concentration of suspended sediment used in the bottom-withdrawal tube or pipette cylinder was often different from the concentration in the original suspension. The concentration at which analyses were made is indicated in the appropriate tables.

TEMPERATURE

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

Records of thermograph observations consist of maximum and minimum temperatures for each day, and the monthly averages of the maximum daily and minimum daily temperatures.

EXPRESSION OF RESULTS

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

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

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

tity of sodium and potassium is given in some analyses and is the quantity of sodium needed in addition to the calcium and magnesium to balance the acid constituents.

The hardness, as calcium carbonate ($CaCO_3$), is calculated from the equivalents of calcium and magnesium except for a few samples for which the reported values also include equivalents of free mineral acid, aluminum, iron, and manganese when present in significant quantities. The hardness caused by calcium and magnesium (and other ions if significant) equivalent to the carbonate and bicarbonate is called carbonate hardness; the hardness in excess of this quantity is called noncarbonate hardness.

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

Specific conductance values are expressed in reciprocal ohms times 10^6 (micromhos at 25°C). The discharge of the streams is reported in cubic feet-per second (see Streamflow, p. 19) and the temperature in degrees Fahrenheit. Color is expressed in units of the platinum-cobalt scale proposed by Hazen (1892, p. 427-428). Hydrogen-ion concentration is expressed in terms of pH units. By definition the pH value of a solution is the negative logarithm of the concentration of gram ions of hydrogen. However, the pH meter which is generally used in Survey laboratories, determines the activity of the hydrogen ions as distinguished from concentration.

An average of analyses (arithmetical or weighted) for the water year is given for most daily sampling stations. An arithmetical 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 weighted average represents approximately 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. The weighted average of the analyses is computed by multiplying the discharge for the sampling period by the quantities of the individual constituents for the corresponding period and dividing the sum of the products by the sum of the discharges. Water as represented by the weighted average is less concentrated than that represented by the average of the individual analyses for most streams because at times of high discharge the rivers generally have lower concentrations of dissolved solids.

Mean daily sediment concentrations are expressed in parts per million by weight. A part per million of sediment 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 finer than indicated sizes in millimeters. The size classification used in this report is that recommended by the American Geophysical Union Subcommittee on sediment terminology (Lane, et al; 1947, p. 937). Other data included as pertinent to the size analyses for many streams are the date of collection, the stream discharge and sediment concentration when sample was collected, the concentration of the suspension during analysis, and the method of analysis.

COMPOSITION OF SURFACE WATERS

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

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

MINERAL CONSTITUENTS IN SOLUTION

Silica (SiO_2)

Silica is dissolved from practically all rocks. Some natural surface waters contain less than 5 parts per million of silica and 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.

Manganese (Mn)

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

Iron (Fe)

Iron is dissolved from many rocks and soils. On exposure to the air, normal basic waters that contain more than 1 part per

million of iron soon become turbid with the insoluble reddish ferric oxide produced by oxidation. Surface waters, therefore, seldom contain as much as 1 part per million of dissolved iron, although some acid waters carry large quantities of iron in solution. Iron causes reddish-brown stains on white porcelain or enameled ware and fixtures and on fabrics washed in the water.

Calcium (Ca)

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

Magnesium (Mg)

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

Sodium and potassium (Na and K)

Sodium and potassium are dissolved from 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.

Carbonate and bicarbonate (CO_3 and HCO_3)

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

Sulfate (SO_4)

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

Chloride (Cl)

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

Fluoride (F)

Fluoride has been reported as being present in some rocks to about the same extent as chloride. However, the quantity of fluoride in natural surface waters is ordinarily very small compared to that of chloride. Recent investigations indicate that the incidence of dental caries is less when there are small amounts of

fluoride present in the water supply than when there is none. However, excess fluoride in water is associated with the dental defect known as mottled enamel if the water is used for drinking by young children during calcification or formation of the teeth (Dean, 1936, p. 1269-1272). This defect becomes increasingly noticeable as the quantity of fluoride in water increases above 1.5 to 2.0 parts per million.

Nitrate (NO_3)

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

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

Boron (B)

Boron in small quantities has been found essential for plant growth, but irrigation water containing more than 1 part per million 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 dis-

solved solids are usually satisfactory for domestic and some industrial uses. Waters 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.

PROPERTIES AND CHARACTERISTICS OF WATER

Oxygen consumed

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

Color

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

Hydrogen-ion concentration (pH)

The degree of acidity or alkalinity of water, as indicated by the hydrogen-ion concentration, expressed as pH, 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 value of 7.0 indicates that the water is neither acid nor alkaline. Waters having pH values progressively lower than 7.0 denote increasing acidity, whereas values progressively higher than 7.0 denote increasing alkalinity (see p. 7). The pH of most natural surface waters ranges between 6

and 8. Some alkaline surface waters have pH values greater than 8.0, and waters containing free mineral acid usually have pH values less than 4.5.

Specific conductance (micromhos at 25°C)

The specific conductance of a water is a measure of its capacity to conduct a current of electricity. 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. (See p. 7.)

Hardness

Hardness is the characteristic of water that receives the most attention in industrial and domestic use. It is usually 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 usually requires some softening before being used for most purposes.

Total acidity

The total acidity of a natural water represents the content of free carbon dioxide, mineral acids, and salts--especially sulfates

of iron and aluminum-- that hydrolyze to give hydrogen ions. Acid waters are very corrosive and generally contain excessive amounts of objectionable constituents, such as iron, aluminum, and manganese.

Corrosiveness

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

Percent sodium

Percent sodium is reported in most of the analyses of waters collected from streams in the western part of the country where irrigation is practiced extensively. The proportion of sodium to all the basic constituents in the water has a bearing on the suitability of a water for irrigation. (See p. 7) Waters in which the percent sodium is more than 60 may be injurious when applied to certain types of soils, particularly when adequate drainage is not provided (Magistad and Christiansen, 1944, p. 8-9; Wilcox, 1948, p. 6).

Sodium-adsorption-ratio

Sodium-adsorption-ratio (SAR) is the relative proportion of sodium to other cations in an irrigation water.

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

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

The term is used for soil extracts and irrigation waters to ex-

press the relative activity of sodium ions in exchange reactions with soil. SAR provides an estimate of the sodium or alkali hazard and reportedly is more significant for interpreting water quality than percent sodium because it relates more directly to the exchangeable sodium percentage the soil will attain when it and the water are in equilibrium.

The U. S. Salinity Laboratory diagram for classifying waters for irrigation divides water into four classes with respect to sodium hazard, the dividing points being at SAR values of 10, 18, and 26. They range from low-sodium water that can be used for irrigation on almost all soils to very high-sodium water which is generally unsatisfactory for irrigation.

SEDIMENT

Fluvial sediment is generally regarded as that sediment which is transported by, suspended in, or deposited by water. Suspended sediment is that sediment which remains in suspension in water owing to the upward components of turbulent currents or by colloidal suspension. Most fluvial sediment results from the normal process of erosion, which in turn is part of the geologic cycle of rock transformation. In some instances, this normal process may have been accelerated by agricultural practices. Sediment also results from a number of industrial activities. In certain sections, waste materials from mining, logging, oil-field, and other industrial operations introduce large quantities of suspended as well as dissolved material.

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

teristics, 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.

PUBLICATIONS

Reports giving chemical analyses, suspended sediment loads, and water temperatures of samples of surface water made by the Geological Survey have been published yearly since 1941. Records for many of the stations listed in this report for the water years ending September 30, 1941-1954 are listed below.

Numbers of water-supply papers containing records for Parts 5 and 6, 1941-1954

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

Geological Survey reports containing analyses of surface-water samples collected prior to 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

Records in Iowa were obtained in cooperation with the Iowa Geological Survey, H. G. Hershey, director and State Geologist. Records on file for sediment sampling stations can be obtained by writing to the District Engineer, Surface Water, 508 Hydraulic Laboratory, University of Iowa, Iowa City, Iowa.

Financial assistance was furnished by the Bureau of Reclamation of the United States Department of the Interior in the operation of some stations in the Missouri River basin.

In addition to these cooperative programs, many of the stations were operated from funds appropriated directly to the Geological Survey for quality-of-water investigations.

Assistance in collecting records was given by many municipal, State, and Federal agencies.

DIVISION OF WORK

The quality-of-water program was conducted by the Water Resources Division of the Geological Survey, Carl G. Paulsen, Chief Hydraulic Engineer, and S. K. Love, Chief of the Quality of Water Branch.

The chemical quality and sediment investigations in the Missouri River basin in Colorado, Iowa, Kansas, Montana, Nebraska, North Dakota, South Dakota, and Wyoming were begun in 1945. The studies were made as a part of the program of the Interior Department for development of the Missouri River basin through funds provided directly to the Geological Survey for this purpose. The studies were made under the direction of P. C. Benedict, regional engineer, Lincoln, Nebr. A few chemical analyses of streams in the Hudson Bay basin in North Dakota were made in connection with this program. Any additional data on file for the sampling stations can be obtained by writing or visiting the Quality of Water regional office, 510 Rudge-Guenzel Building, Lincoln, Nebr.

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 the mean daily discharges for the normal composite period. For analyses in which the composite periods differ from the normal 10 or 11-day period, the discharges reported are the averages of the mean daily discharges for the days indicated. 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.

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PART 5. HUDSON BAY AND UPPER MISSISSIPPI RIVER BASINS

RED RIVER OF THE NORTH BASIN

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 1954.
Water temperatures: January 1951 to September 1954.
EXTREMES, 1953-54.-- Dissolved solids: Maximum, 753 ppm Aug. 26-27; minimum, 232 ppm Mar. 1-4.
Hardness: Maximum, 354 ppm Aug. 26-27; minimum, 102 ppm Mar. 1-4
Specific conductance: Maximum daily, 1,220 micromhos Aug. 26-27; minimum daily, 343 micromhos Mar. 2.
Water temperatures: Maximum, 83° F July 4; minimum, freezing point Nov. 27, 28, Jan. 19, Mar. 13.
EXTREMES, 1951-54.--Dissolved solids: Maximum, 753 ppm Aug. 26-27, 1954; minimum, 180 ppm Mar. 29, 1951.
Hardness: Maximum, 363 ppm Mar. 27, 1951; minimum, 86 ppm Mar. 29, 1951.
Specific conductance: Maximum daily, 1,220 micromhos Aug. 26-27, 1954; minimum daily, 244 micromhos Mar. 29, 1951.
Water temperatures: Maximum, 83° F July 4, 1954; minimum, freezing point Dec. 12, 1951, Nov. 27, 28, 1953, Jan. 19, Mar. 13, 1954.
REMARKS.-- Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records for discharge for water year October 1953 to September 1954 given in WSP 1338.

Chemical analyses, in parts per million, water year October 1953 to September 1954

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
Oct. 1-31, 1953.....	1.5	--	--	--	--	25	--	268	0	48	--	--	--	--	305	0.41	1.24	219	0	20	0.7	498	8.0
Nov. 1-30.....	2.8	--	--	--	--	57	--	338	0	67	--	--	--	--	406	.55	3.07	229	0	35	1.6	640	8.1
Dec. 1-28.....	3.4	19	0.00	61	28	85	8.5	428	0	83	12	0.5	1.7	0.26	513	.70	4.71	266	0	40	2.3	802	8.0
Dec. 29-Jan. 16, 1954	3.8	--	--	--	--	66	--	412	0	87	--	--	--	--	491	.67	5.04	286	0	33	1.7	769	8.1
Jan. 17-26	3.2	--	--	--	--	53	--	370	0	73	--	--	--	--	451	.61	3.90	271	0	30	1.4	701	7.8
Jan. 27-Feb. 21	5.3	--	--	--	--	53	--	406	0	75	--	--	--	--	484	.66	6.93	307	0	27	1.3	755	7.8
Feb. 22-28.....	123	--	--	--	--	72	--	309	0	93	--	--	--	--	446	.61	148	202	0	44	2.2	688	7.6
Mar. 1-4	143	--	--	--	--	37	--	153	0	51	--	--	--	--	232	.32	89.6	102	0	44	1.6	373	7.3
Mar. 5-31.....	69.5	15	.06	33	14	61	8.0	223	0	82	8.0	.2	2.3	.15	344	.47	64.6	141	0	47	2.2	530	7.8
Apr. 1-30.....	64.1	--	--	--	--	50	--	210	0	70	--	--	--	--	309	.42	53.5	145	0	43	1.8	491	7.8
May 1-23	30.9	--	--	--	--	66	--	305	0	94	--	--	--	--	440	.60	36.7	215	0	40	2.0	676	8.1
May 24-June 8.....	38.6	16	.01	55	29	84	7.8	366	6	108	16	.7	1.6	.19	524	.71	54.6	257	0	41	2.3	812	8.2
June 9-13	336	--	--	--	--	78	--	312	0	106	13	--	--	--	460	.63	417	213	0	44	2.3	705	7.4
June 14-17	462	--	--	--	--	65	--	253	0	96	8.5	--	--	--	395	.54	493	175	0	44	2.1	596	7.4
June 18-20	792	--	--	--	--	69	--	249	0	94	6.5	--	--	--	389	.53	832	158	0	48	2.4	590	7.3
June 21-23	504	--	--	--	--	70	--	275	0	88	6.0	--	--	--	407	.55	554	167	0	47	2.4	602	7.7
June 24-July 1.....	278	--	--	--	--	92	--	332	0	101	8.5	--	--	--	481	.65	361	184	0	51	2.9	715	7.5
July 2-3	435	--	--	--	--	139	--	433	0	161	17	--	--	--	659	.90	774	232	0	55	4.0	985	7.8

RED RIVER OF THE NORTH BASIN--Continued

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

Chemical analyses, in parts per million, water year October 1953 to September 1954--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
July 4-7, 1954	354	--	--	--	--	91	--	308	0	93	10	--	--	--	440	0.60	421	164	0	54	3.1	674	7.7
July 8-12	183	--	--	--	--	105	--	363	0	97	10	--	--	--	492	.67	243	185	0	55	3.4	756	7.5
July 13-18	148	--	--	--	--	128	--	431	0	113	13	--	--	--	590	.80	236	204	0	57	3.9	882	7.8
July 19-25	86.4	--	--	--	--	111	--	384	0	95	12	--	--	--	512	.70	119	188	0	56	3.5	785	7.8
July 26-Aug. 7	50.3	--	--	--	--	125	--	437	0	91	12	--	--	--	552	.75	75.0	198	0	58	3.9	845	7.7
Aug. 8-25	51.1	--	--	--	--	132	--	481	0	85	13	--	--	--	581	.79	80.2	206	0	57	4.0	883	8.0
Aug. 26-27	40.5	--	--	--	--	135	--	442	0	95	140	--	--	--	753	1.02	82.3	354	0	45	3.1	1,220	7.5
Aug. 28-Sept. 30	39.0	20	0.01	40	31	153	11	545	0	99	17	0.5	0.9	0.46	660	.90	69.5	226	0	58	4.4	994	8.0
Weighted average a	66.7	--	--	--	--	86	--	b 320	--	95	10	--	--	--	453	0.62	81.6	184	0	50	2.8	690	--

a Includes estimates where data are missing. Represents 100 percent of runoff for water year October 1953 to September 1954.
b Includes carbonate as bicarbonate.

RED RIVER OF THE NORTH BASIN--Continued

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

Temperature (°F) of water, water year October 1953 to September 1954
(Once-daily measurement between 1 p.m. and 4 p.m.)

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

a Reading obtained between 11 a.m. and 12 m.

THIEF RIVER NEAR GATZKE, MINN.

LOCATION.--At gaging station at bridge, 3½ miles downstream from dam at outlet of Thief Lake and 7½ miles west of Gatzke, Marshall County.
RECORDS AVAILABLE.-- Chemical analyses: October 1953 to September 1954.
Water temperatures: October 1953 to September 1954.
EXTREMES, 1953-54.--Dissolved solids: Maximum, 616 ppm Apr. 5-6; *minimum*, 260 ppm Apr. 7.
Hardness: Maximum, 476 ppm Apr. 5-6; minimum, 200 ppm Apr. 7.
Specific conductance: Maximum daily, 959 micromhos Apr. 6; minimum daily, 390 micromhos Apr. 7.
REMARKS.-- Daily samples of chemical analysis composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1953 to September 1954 given in WSP 1338.

Chemical analyses, in parts per million, September 1953 to September 1954

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Sept. 17, 1953 a...	--	4.9	0.00	--	--	8.7		164	107	1.0	0.2	2.5	--	--	--	--	231	97	8	0.3	457	7.1	--
Apr. 5-6, 1954....	8.5	15	.03	105	52	9.2		366	171	6.0	.2	11	0.10	616	0.84	14.1	476	176	4	.2	851	7.3	35
Apr. 7.....	29	11	.03	45	21	9.9		156	75	6.0	--	8.7	.08	260	.35	20.4	200	72	10	.3	390	7.1	--
Apr. 8-15	62.9	12	.03	80	38	4.8		269	125	5.0	.3	7.6	.10	459	.62	78.0	354	133	3	.1	662	7.3	28
Apr. 16-May 15 ...	175	12	.02	57	24	4.1		188	85	1.5	.3	4.1	.13	311	.42	147	240	86	4	.1	467	7.2	24
May 16-June 16 ...	141	7.5	.03	65	24	2.5		195	98	1.0	.1	3.2	.05	336	.46	128	261	101	2	.1	494	7.2	25
June 16 a.....	188	--	--	--	--	--		--	--	--	--	--	--	--	--	--	264	--	--	--	503	--	45
June 17-July 10 ...	84.1	6.9	.03	71	26	4.6		208	113	1.0	.1	2.6	.10	364	.50	82.7	282	111	3	.1	530	7.4	25
July 11-24.....	.56	6.3	.02	69	28	5.3		203	126	.5	.1	2.6	.07	374	.51	.57	289	123	4	.1	550	7.4	25
Aug. 8-28	.94	3.1	.02	68	32	7.8		216	122	10	.4	.1	.04	385	.52	.98	302	125	5	.2	579	7.8	22
Sept. 14-19.....	.15	3.0	.01	58	35	7.4		197	133	3.0	.3	.1	.08	380	.52	.15	289	127	5	.2	556	8.0	21
Weighted average b.....	c 89.5	9.5	0.03	63	25	3.7		197	96	1.4	0.2	3.7	0.09	335	0.46	81.0	260	98	3	0.1	496	--	--
Weighted average d.....	34.1	9.5	0.03	64	25	3.7		198	97	1.4	0.2	3.7	0.09	337	0.46	31.0	263	101	3	0.1	498	--	--

a Not included in weighted average.
b Represents 99 percent of runoff for water year October 1953 to September 1954.
c Average for periods of sampling only.
d Includes estimated data for missing periods. Represents 100 percent of runoff for water year October 1953 to September 1954.

RED RIVER OF THE NORTH BASIN--Continued

THIEF RIVER NEAR GATZKE, MINN.--Continued

Temperature (°F) of water, water year October 1953 to September 1954
/Once-daily measurement between 10 a.m. and 11 a.m. Many days of no flow/

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

a Reading obtained between 12 m. and 2 p.m.

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RED RIVER OF THE NORTH BASIN--Continued

SNAKE RIVER AT WARREN, MINN.

LOCATION.--At gaging station at bridge on Minnesota Street in Warren, Marshall County.
RECORDS AVAILABLE.--Chemical analyses: October 1953 to September 1954.
Water temperatures: October 1953 to September 1954.
EXTREMES, 1953-54.--Dissolved solids: Maximum, 684 ppm Apr. 8-10; minimum, 300 ppm Apr. 11-17.
Hardness: Maximum, 442 ppm June 27 to July 13; minimum, 222 ppm Apr. 11-17.
Specific conductance: Maximum daily, 1,120 micromhos July 19; minimum daily, 447 micromhos Apr. 15.
Water temperatures: Maximum, 80°F July 11.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1953 to September 1954 given in WSP 1338.

Chemical analyses, in parts per million, September 1953 to July 1954

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Sept. 16, 1953 a	--	20	0.04	--	--	54		406	123	38	0.4	2.3	--	--	--	--	400	67	23	1.2	890	7.7	--
Apr. 8-10, 1954	8.03	24	.03	81	49	83		362	128	93	.3	27	0.17	684	0.93	14.8	403	106	31	1.8	1,090	7.1	40
Apr. 11-17	20.4	15	.00	50	24	16		192	84	5.5	.1	4.2	.05	300	.41	16.5	222	65	14	.5	472	7.7	30
Apr. 18-May 14	9.10	16	.00	71	35	18		246	142	6.0	.2	1.6	.06	433	.59	10.6	321	119	11	.4	637	7.6	30
May 11 a	9.0	13	.03	84	41	16		267	181	2.0	.4	.9	.09	516	.70	12.5	378	159	8	.3	737	7.8	45
May 15-June 14	2.40	13	.00	91	48	27		320	195	12	.3	1.8	.08	583	.79	3.78	426	164	12	.6	834	7.8	45
June 15-17	4.70	16	.02	90	49	22		365	153	9.0	.2	2.1	.08	546	.74	6.93	426	127	10	.5	812	7.7	45
June 18-20	14.3	12	.02	74	48	19		314	145	4.0	.2	8.4	.08	510	.69	19.7	380	123	10	.4	738	7.5	45
June 21-26	6.52	15	.00	93	49	21		375	155	5.5	.3	1.7	.07	568	.77	10.0	434	126	9	.4	819	7.7	48
June 27-July 13	.88	12	.00	93	51	29		371	169	15	.3	2.7	.11	600	.82	1.43	442	138	12	.6	865	7.6	55
Weighted average b	6.17	15	0.00	72	37	22		266	136	10	0.2	3.8	0.07	451	0.61	7.51	332	114	13	0.5	669	--	--

a Not included in weighted average.
b Represents 100 percent of runoff for water year October 1953 to September 1954.

RED RIVER OF THE NORTH BASIN--Continued

SNAKE RIVER AT WARREN, MINN.--Continued

Temperature (°F) of water, water year October 1953 to September 1954
(Once-daily measurement between 4 p.m. and 6 p.m. Many days of no flow)

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

a Reading obtained between 12 m. and 1 p.m.

RED RIVER OF THE NORTH BASIN--Continued

MIDDLE RIVER AT ARGYLE, MINN.

LOCATION.--At gaging station at bridge on U. S. Highway 75 in Argyle, Marshall County, and 14 miles upstream from mouth.
RECORDS AVAILABLE.--Chemical analyses: October 1953 to September 1954.
Water temperatures: October 1953 to September 1954.
EXTREMES, 1953-54.--Dissolved solids: Maximum, 446 ppm June 16-17; minimum, 184 ppm Apr. 10-15.
Hardness: Maximum, 366 ppm June 16-17; minimum, 136 ppm Apr. 10-15.
Specific conductance: Maximum daily, 728 micromhos June 2; minimum daily, 263 micromhos Apr. 13.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of dishcarge for water year October 1953 to September 1954 given in WSP 1338.

Chemical analyses, in parts per million, April to July 1954

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Apr. 10-15, 1954.	91.3	10	0.00	33	13	6.9		129	0	36	2.0	0.1	5.7	0.03	184	0.25	45.4	136	30	10	0.3	283	7.2	32
Apr. 16-25	62.6	15	.00	52	22	4.4		211	0	48	2.0	.1	2.4	.05	276	.38	46.6	219	46	4	.1	422	7.5	45
Apr. 26-May 15..	66.2	12	.00	70	29	6.0		271	0	77	1.5	.2	1.4	.05	368	.50	65.8	293	71	4	.2	544	7.7	55
May 11 a	56	6.6	.04	72	28	10		267	0	82	9.0	.4	.8	.03	367	.50	55.5	296	77	7	.3	546	8.0	60
May 16-June 15 ..	28.0	14	.00	84	36	7.8		342	0	86	2.0	.2	1.9	.07	440	.60	33.3	358	78	5	.2	650	7.8	55
June 16-17.....	38.0	16	.02	84	38	6.0		344	8	75	2.0	.3	2.1	.07	446	.61	45.8	366	71	3	.1	651	8.2	70
June 18-21.....	115	22	.08	75	32	4.8		299	0	75	1.0	.2	2.9	.10	407	.55	126	317	72	3	.1	580	7.6	90
June 22-28.....	49.4	26	.08	80	31	6.4		331	0	64	1.0	.2	3.0	.10	420	.57	56.0	328	57	4	.2	597	7.5	100
June 29-July 23 ..	9.07	27	.07	85	35	9.4		376	0	60	1.0	.2	2.7	.10	434	.59	10.6	354	46	5	.2	638	7.6	80
Weighted average b.....	c 42.6	16	0.02	68	28	6.3		d 273	--	68	1.6	0.2	2.5	0.06	359	0.49	41.3	285	61	5	0.2	530	--	--
Weighted average e.....	12.4	16	0.02	68	28	6.3		d 273	--	67	1.6	0.2	2.5	0.06	359	0.49	12.0	285	61	5	0.2	530	--	--

a Not included in weighted average.
b Represents 99 percent of runoff for water year October 1953 to September 1954.
c Average for periods of sampling only.
d Includes carbonate as bicarbonate.
e Includes estimated data for missing periods. Represents 100 percent of runoff for water year October 1953 to September 1954.

RED RIVER OF THE NORTH BASIN--Continued

MIDDLE RIVER AT ARGYLE, MINN.--Continued

Temperature (°F) of water, water year October 1953 to September 1954
(Once-daily measurement between 5 p.m. and 7 p.m. Many days of no flow)

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

a Reading obtained between 9 a.m. and 11 a.m.

RED RIVER OF THE NORTH BASIN--Continued

TAMARAC RIVER NEAR STEPHEN, MINN.

LOCATION.--At gaging station at bridge, 4½ miles northwest of Stephen, Marshall County, and 8 miles upstream from mouth.
RECORDS AVAILABLE.--Chemical analyses: October 1953 to September 1954.
Water temperatures: October 1953 to September 1954.
EXTREMES, 1953-54.--Dissolved solids: Maximum 451 ppm June 26 to July 21; minimum, 221 ppm Apr. 16-20.
Hardness: Maximum, 359 ppm June 26 to July 21; minimum, 172 ppm Apr. 16-20.
Specific conductance: Maximum daily, 677 micromhos July 19; minimum daily, 307 micromhos Apr. 16.
Water temperatures: Maximum, 86 °F July 19.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of Discharge for water year October 1953 to September 1954 given in WSP 1338.

Chemical analyses, in parts per million, April to July 1954

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Apr. 16-20, 1954...	64.8	13	0.00	42	16	6.9		171	37	3.0	0.1	4.8	0.04	221	0.30	38.7	172	32	8	0.2	352	7.3	30
Apr. 21-25	39.0	16	.00	54	23	8.7		228	51	4.0	.2	2.6	.02	290	.39	30.5	229	42	8	.3	450	7.4	35
Apr. 26-May 17....	98.8	17	.00	62	25	6.2		244	65	1.0	.2	2.7	.06	332	.45	88.6	258	58	5	.2	489	7.7	55
May 18-June 17	28.7	14	.00	81	32	8.5		343	65	2.0	.4	1.5	.08	408	.55	31.6	335	54	5	.2	607	7.5	60
June 17 a	21	--	--	--	--	--		--	--	--	--	--	--	--	--	--	338	--	--	--	616	--	65
June 18-19.....	115	19	.04	77	33	11		356	51	2.0	.3	2.5	.09	400	.54	124	326	34	7	.3	583	7.8	75
June 20-21.....	203	29	.17	64	27	15		296	52	2.0	.3	1.9	.13	370	.50	203	270	27	11	.4	496	7.7	110
June 22-25.....	99.0	29	.09	74	30	7.8		316	55	2.0	.3	2.9	.12	394	.54	105	306	47	5	.2	547	7.7	110
June 26-July 21	8.50	24	.02	87	35	11		374	60	7.0	.3	2.7	.10	451	.61	10.4	359	52	6	.2	644	7.7	90
Weighted average b.....	c 49.9	19	0.02	67	27	8.1		278	60	1.9	0.3	2.6	0.07	354	0.48	47.7	278	50	6	0.2	517	--	--
Weighted average d.....	13.9	18	0.02	66	26	8.0		273	59	2.0	0.2	2.7	0.07	347	0.47	13.0	272	48	6	0.2	509	--	--

a Not included in weighted average.
b Represents 95 percent of runoff for water year October 1953 to September 1954.
c Average for periods of sampling only.
d Includes estimated data for missing periods. Represents 100 percent of runoff for water year October 1953 to September 1954.

RED RIVER OF THE NORTH BASIN--Continued

TAMARAC RIVER NEAR STEPHEN, MINN.--Continued

Temperature (°F) of water, water year October 1953 to September 1954
/Once-daily measurement between 5 p.m. and 8 p.m. Many days of no flow/

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

RED RIVER OF THE NORTH BASIN --Continued

SOUTH BRANCH TWO RIVERS AT PELAN, MINN.

LOCATION.--At gaging station at bridge on State Highway 11 and a quarter of a mile west of Pelan, Roseau County.
RECORDS AVAILABLE.--Chemical analyses: September 1953 to September 1954.
REMARKS.--Records of discharge for water year October 1953 to September 1954 given in WSP 1338.

Chemical analyses, in parts per million, September 1953 to September 1954

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	Turbidity
														Parts per million	Tons per acre-foot	Calcium, magnesium	Noncarbonate						
Sept. 16, 1953.....	0.01	9.3	0.01	--	--	7.8		209	26	2.0	0.2	1.5	--	--	--	186	15	8	0.2	366	7.4	--	--
Apr. 8, 1954.....	105	4.9	.09	25	7.4	4.1		83	25	.5	.3	8.0	0.04	129	0.18	93	25	9	.2	198	7.0	45	4
May 12	41	4.7	.05	84	31	6.2		251	136	1.0	.4	.2	.08	436	.59	336	130	4	.1	620	8.0	65	1
June 17.....	263	20	.15	73	23	7.6		260	74	2.0	.2	1.5	.02	376	.51	278	65	6	.2	515	7.6	130	4
July 21	2.0	9.5	.03	81	46	11		183	250	1.0	.1	2.5	.15	542	.74	390	240	6	.2	729	7.3	55	1
Sept. 3.....	.4	6.2	.02	97	51	10		191	300	1.0	.1	1.3	.13	621	.84	450	293	5	.2	824	7.5	45	.9

SOUTH BRANCH TWO RIVERS AT LAKE BRONSON, MINN.

LOCATION.--At gaging station at bridge on U. S. Highway 59 at Lake Bronson, Kittson County, and 2 miles downstream from dam at outlet of Lake Bronson.
DRAINAGE AREA.--444 square miles.
RECORDS AVAILABLE.--Chemical analyses: April to September 1954.
Water temperatures: April to September 1954.
EXTREMES, April to September 1954.--Dissolved solids: Maximum, 436 ppm June 30 to July 21; minimum, 275 ppm Apr. 12 to May 10.
Hardness: Maximum, 333 ppm June 30 to July 21; minimum, 206 ppm Apr. 12 to May 10.
Specific conductance: Maximum daily, 647 micromhos June 10; minimum daily, 299 micromhos Apr. 17.
Water temperatures: Maximum, 78°F July 25, 31.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1953 to September 1954 given in WSP 1338.

Chemical analyses, in parts per million, September 1953 to September 1954

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Sept. 16, 1953 a....	--	6.2	0.00	--	--	10		231	85	0.5	0.4	4.7	--	--	--	--	261	72	8	0.3	504	7.3	--
Apr. 6-7, 1954.....	10.0	6.8	.04	70	29	5.5		272	78	.5	.3	1.8	0.05	357	0.49	9.64	295	72	4	.1	555	7.7	18
Apr. 8-11.....	240	12	.03	71	31	7.1		285	76	2.0	.2	3.4	.08	369	.50	239	303	69	5	.2	568	7.5	17
Apr. 12-May 10....	284	12	.06	51	19	5.1		173	67	1.5	.1	3.7	.09	275	.37	211	206	64	5	.2	410	7.2	45
May 11-29.....	44.9	13	.05	67	26	6.2		217	100	1.5	.2	2.3	.07	364	.50	44.1	273	95	5	.2	522	7.7	48
May 30-June 4	202	13	.07	73	30	6.9		232	120	1.5	.2	1.8	.09	407	.55	222	304	114	5	.2	580	7.0	48
June 5-15.....	81.3	13	.05	77	31	9.2		258	119	1.0	.2	3.0	.11	423	.58	92.9	320	108	6	.2	599	7.1	60
June 16-22	413	19	.06	76	31	14		267	118	1.0	.2	1.9	.16	421	.57	469	316	97	9	.3	599	7.5	65
June 23-29	55.3	24	.20	76	29	8.7		277	93	1.0	.2	3.6	.10	416	.57	62.1	310	83	6	.2	578	7.3	90
June 30-July 21	12.2	21	.06	82	31	6.4		298	95	1.0	.2	2.7	.11	436	.59	14.4	333	89	4	.2	611	7.5	85
July 22-Aug. 21....	3.57	13	.03	74	33	8.3		300	86	.5	.6	.7	.10	393	.53	3.79	320	74	5	.2	598	7.8	47
Aug. 22	22	7.9	.00	68	29	1.8		268	68	2.0	--	.4	.07	348	.47	20.7	290	70	1	.0	536	7.9	--
Aug. 23-Sept. 5....	6.91	15	.03	77	33	6.2		295	91	1.0	.6	3.4	.08	413	.56	7.71	328	86	4	.1	609	7.6	55
Sept. 6-30.....	4.08	12	.02	72	33	6.9		305	74	.5	.6	1.1	.09	384	.52	4.23	315	65	5	.2	589	7.7	50
Weighted average b.....	c 90.2	14	0.06	62	24	7.4		215	87	1.4	0.2	3.0	0.10	338	0.46	82.3	253	77	6	0.2	494	--	--
Weighted average d.....	45.6	14	0.06	63	25	7.5		218	87	1.4	0.2	3.0	0.10	342	0.47	42.1	260	81	6	0.2	500	--	--

a Not included in weighted average.
b Represents 96 percent of runoff for water year October 1953 to September 1954.
c Average for periods of sampling only.
d Includes estimated data for missing period. Represents 100 percent of runoff for water year October 1953 to September 1954.

RED RIVER OF THE NORTH BASIN--Continued

SOUTH BRANCH TWO RIVERS AT LAKE BRONSON, MINN.--Continued

Temperature (°F) of water, April to September 1954
(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							--	43	53	62	67	67
2							--	40	--	60	66	64
3							--	40	55	65	69	59
4							--	40	--	60	67	62
5							--	42	58	68	67	60
6							--	40	59	65	67	59
7							--	41	59	71	69	55
8							a 32	43	55	71	67	55
9							a 39	43	56	70	67	58
10							40	46	55	71	62	58
11							a 46	45	58	72	60	58
12							a 58	--	60	73	62	57
13							38	54	60	72	64	54
14							40	57	66	70	66	54
15							40	--	65	71	67	53
16							44	50	66	73	62	54
17							42	50	66	71	62	55
18							40	53	68	70	63	55
19							38	--	68	73	63	53
20							40	a 60	68	73	64	a 53
21							37	--	68	74	68	50
22							38	58	--	74	64	48
23							41	59	a 70	65	67	51
24							41	54	a 74	70	69	54
25							41	54	70	78	68	54
26							41	--	65	74	66	55
27							44	57	65	75	65	56
28							44	53	72	77	64	--
29							41	53	70	72	64	54
30							41	55	65	68	63	50
31							--	54	--	78	64	--
Average							--	49	63	71	65	56

a Reading obtained between 11 a.m. and 2 p.m.

TWO RIVERS BELOW HALLOCK, MINN.

LOCATION.--At gaging station at highway bridge, 4 miles west of Hallock, Kittson County, and 5 miles upstream from North Branch Two Rivers.
DRAINAGE AREA.--644 square miles.
RECORDS AVAILABLE,--Chemical analyses: April to September 1954.
Water temperatures: April to September 1954.
EXTREMES, April to September 1954.--Dissolved solids: Maximum, 525 ppm July 22 to Aug. 9; minimum, 186 ppm Apr. 9-11.
Hardness: Maximum, 364 ppm July 2-21; minimum, 130 ppm Apr. 9-11.
Specific conductance: Maximum daily, 908 micromhos Aug; 5, 8, 9; minimum daily, 260 micromhos Apr. 10.
Water temperatures: Maximum, 78°F July 17.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1953 to September 1954 given in WSP 1338.

Chemical analyses, in parts per million, September 1953 to September 1954

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Sept. 16, 1953 a....	--	4.2	0.01	--	--	20		264	49	19	0.4	1.2	--	--	--	--	254	38	14	0.5	528	7.5	--
Apr. 9-11, 1954....	140	12	.04	30	13	7.8		126	22	9.0	.1	10	0.13	186	0.25	70.3	130	27	12	.3	293	7.6	35
Apr. 12-15	385	12	.00	54	23	7.8		216	60	3.0	.1	4.9	.04	291	.40	302	231	54	7	.2	455	7.4	22
Apr. 16-26	231	11	.01	45	17	8.3		163	55	4.5	.1	4.9	.06	237	.32	148	184	50	9	.3	377	7.4	30
Apr. 27-May 15....	304	15	.02	57	22	12		191	93	3.0	.1	2.7	.05	311	.42	255	233	76	10	.4	459	7.7	48
May 16-June 15	98.9	11	.01	75	29	19		247	126	8.0	.2	1.7	.06	404	.55	108	306	103	12	.5	595	7.4	55
June 16-17.....	336	17	.04	70	27	20		236	108	16	.2	2.5	.09	402	.55	365	286	92	13	.5	583	7.6	55
June 18-24.....	443	18	.03	78	32	13		270	113	10	.3	2.1	.09	430	.60	514	326	105	8	.3	629	7.6	85
June 25-July 1	78.6	24	.03	85	34	31		305	127	23	.1	2.7	.10	481	.65	102	350	100	16	.7	699	7.7	90
July 2-21.....	17.0	16	.02	86	36	27		326	94	39	.1	2.3	.09	501	.68	23.0	364	97	14	.6	759	7.7	65
July 22-Aug. 9.....	3.04	8.4	.01	85	36	46		323	90	73	.4	.2	.12	525	.71	4.31	362	97	22	1.1	851	7.8	55
Aug. 23-Sept. 8....	11.6	12	.01	65	31	20		268	57	36	.6	2.6	.08	399	.54	12.5	290	70	13	.5	626	7.7	40
Sept. 9-30.....	7.31	9.2	.01	62	29	27		244	63	45	.6	2.1	.08	378	.51	7.46	274	74	17	.7	619	7.6	46
Weighted average b.....	c 114	14	0.02	63	25	14		220	93	8.0	0.2	3.1	0.07	346	0.47	106	260	80	10	0.4	517	--	--
Weighted average d.....	51.6	14	0.02	64	25	14		223	93	9.0	0.2	3.1	0.07	351	0.48	48.9	263	80	10	0.4	524	--	--

a Not included in weighted average.
b Represents 98 percent of runoff for water year October 1953 to September 1954.
c Average for periods of sampling only.
d Includes estimated data for missing periods. Represents 100 percent of runoff for water year October 1953 to September 1954.

RED RIVER OF THE NORTH BASIN--Continued

TWO RIVERS BELOW HALLOCK, MINN--Continued

Temperature (°F) of water, April to September 1954
(Once-daily measurement between 6 a.m. and 9 a.m.)

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

RED RIVER OF THE NORTH BASIN--Continued

NORTH BRANCH TWO RIVERS NEAR LANCASTER, MINN.

LOCATION.--At gaging station at highway bridge, half a mile upstream from State ditch 85 and 7 miles northeast of Lancaster, Kittson County.
DRAINAGE AREA.--32 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1953 to September 1954.
REMARKS.--No flow October to April. Records of discharge for water year October 1953 to September 1954 given in WSP 1338.

Chemical analyses, in parts per million, April to September 1954

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	Turbidity
														Parts per million	Tons per acre-foot	Calcium, magnesium	Noncarbonate						
Apr. 9, 1954	4.7	5.4	0.07	26	8.3	3.0		98	21	0.5	0.3	1.8	0.04	139	0.19	99	19	6	0.1	212	7.0	45	2
May 12	4.4	4.7	.08	59	21	7.8		199	78	2.0	.4	1.1	.05	306	.42	232	69	7	.2	441	7.7	90	.9
June 17	22	26	.09	70	27	8.1		279	66	2.0	--	1.9	.13	395	.54	284	55	6	.2	533	8.0	130	1
July 21	.06	9.3	.04	57	34	9.7		300	49	1.0	.2	2.7	.08	340	.46	280	34	7	.3	527	7.6	70	1
Aug. 30	.05	3.9	.03	60	32	12		314	38	6.0	.2	2.0	.06	339	.46	282	25	8	.3	539	7.4	50	4
Sept. 28	.10	4.6	.03	71	35	9.4		343	45	4.0	.1	6.9	.05	377	.51	319	38	6	.2	597	7.3	45	3

RED RIVER OF THE NORTH BASIN--Continued

STATE DITCH 85 NEAR LANCASTER, MINN.

LOCATION.--At gaging station at highway bridge, 1 mile upstream from North Branch Two Rivers and 7 miles northeast of Lancaster, Kittson County.
DRAINAGE AREA.--95 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1953 to September 1954.
REMARKS.--No flow October to April. Records of discharge for water year October 1953 to September 1954 given in WSP 1338.

Chemical analyses, in parts per million, April to September 1954

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	Turbidity
														Parts per million	Tons per acre-foot	Calcium, magnesium	Noncarbonate						
Apr. 9, 1954.....	9	7.3	0.08	58	24	5.5		180	99	0.5	0.4	3.9	0.05	311	0.42	243	95	5	0.2	480	7.2	27	4
May 12.....	36	7.8	.07	65	23	6.7		180	117	1.0	.4	.9	.04	355	.48	258	110	5	.2	498	7.7	80	2
June 17	118	18	.14	76	27	9.7		248	111	2.0	.2	1.5	.01	415	.56	302	99	7	.2	568	7.6	110	4
July 21	.6	8.0	.03	117	46	9.9		345	210	1.0	.1	1.8	.11	615	.84	483	200	4	.2	855	7.5	55	2
Aug. 30	.4	6.4	.02	100	42	7.8		301	184	1.0	.1	1.0	.13	535	.73	424	177	4	.2	762	7.7	43	1
Sept. 28	1.0	5.7	.02	104	44	8.5		322	186	1.5	.1	.5	.07	551	.75	442	178	4	.2	800	7.4	42	.5

NORTH BRANCH TWO RIVERS AT LANCASTER, MINN.

LOCATION.--At gaging station at bridge on U. S. Highway 59 at Lancaster, Kittson County, and 7½ miles downstream from State ditch 85.
DRAINAGE AREA.--209 square miles.
RECORDS AVAILABLE.--Chemical analyses: September 1953 to September 1954.
Water temperatures: April to July 1954.
EXTREMES, April to September 1954.--Dissolved solids: Maximum, 539 ppm July 9-31; minimum, 204 ppm Apr. 11-14.
Hardness: Maximum, 391 ppm July 9-31; minimum, 150 ppm Apr. 11-14.
Specific conductance: Maximum daily, 841 micromhos July 12; minimum daily, 276 micromhos Apr. 14.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1953 to September 1954 given in WSP 1338.

Chemical analyses, in parts per million, September 1953 to September 1954

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
Sept. 17, 1953 a	b 0.1	11	0.01	--	--	130		300	155	211	0.4	0.9	--	--	--	--	423	177	40	2.8	1,360	7.7	--
Apr. 9, 1954 a	4.5	20	.05	75	35	30		398	26	28	.2	3.1	0.08	422	0.57	5.13	331	5	16	.7	709	7.7	15
Apr. 9-10	9.75	21	.04	63	30	19		332	21	18	.2	.8	.08	366	.50	9.63	280	8	13	.5	570	7.8	20
Apr. 11-14	41.3	8.5	.08	37	14	8.3		138	43	6.0	.1	1.2	.03	204	.28	22.7	150	37	11	.3	322	7.3	38
Apr. 15-22	39.8	10	.03	46	16	9.0		154	58	7.5	.3	1.8	.05	245	.33	26.3	180	54	10	.3	380	7.2	45
Apr. 23-May 9	111	13	.07	56	19	7.1		167	87	3.5	.4	1.2	.06	310	.42	92.9	219	82	7	.2	441	7.3	65
May 10-28	37.7	9.1	.05	78	27	12		237	118	9.0	.2	1.5	.08	416	.57	42.3	304	110	8	.3	598	7.5	65
May 29-June 3	122	16	.05	79	28	7.1		240	125	.5	.1	2.2	.10	425	.58	140	314	117	5	.2	594	7.5	85
June 4-23	106	20	.07	81	32	13		286	113	3.5	.3	3.6	.08	444	.60	127	332	97	8	.3	624	7.6	110
June 24-July 8	22.5	17	.04	87	34	18		327	110	7.5	.3	2.9	.09	467	.64	28.4	357	89	10	.4	674	7.8	85
July 9-31	2.57	15	.02	96	37	35		352	118	36	.3	2.8	.11	539	.73	3.74	391	102	16	.8	806	7.7	60
Aug. 29-Sept. 3	2.47	9.5	.01	68	34	24		308	67	27	.1	1.7	.10	414	.56	2.76	310	57	14	.6	658	7.7	33
Weighted average c	d 53.1	15	0.06	71	26	11		233	102	4.7	0.3	2.3	0.07	385	0.52	55.2	284	93	8	0.3	548	--	--
Weighted average e	17.9	15	0.06	71	26	11		236	102	5.6	0.3	2.3	0.08	389	0.53	18.8	284	90	8	0.3	555	--	--

a Not included in weighted average.
b Estimated.
c Represents 97 percent of runoff for water year October 1953 to September 1954.
d Average for periods of sampling only.
e Includes estimated data for missing periods. Represents 100 percent of runoff for water year October 1953 to September 1954.

RED RIVER OF THE NORTH BASIN--Continued

NORTH BRANCH TWO RIVERS NEAR LANCASTER, MINN.--Continued

Temperature (°F) of water, April to July 1954
/Once-daily measurement between 6 p.m. and 8 p.m./

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

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RED RIVER OF THE NORTH BASIN--Continued

SOURIS RIVER NEAR VERENDRYE, N. DAK.

LOCATION.--At gaging station, 2.7 miles north of Verendrye, McHenry County, and 19 miles upstream from Wintering River.
DRAINAGE AREA.--12,200 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1949 to August 1951, August 1952 to September 1954.
REMARKS.--Records of discharge for water year October 1953 to September 1954 given in WSP 1338.

Chemical analyses, in parts per million, water year October 1953 to September 1954

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. 5, 1953	136			56	27	94		335	0	146	19				--	--		249	0	45	2.6	849	7.6
Oct. 27	149			57	27	92		345	0	143	15				--	--		253	0	44	2.5	823	7.4
Dec. 3	149			60	29	101		358	0	162	19				--	--		270	0	45	2.7	904	7.5
Dec. 14	152			62	28	92		350	0	150	19				--	--		271	0	42	2.4	869	7.5
Jan. 6, 1954	96			62	29	85		351	0	142	16				--	--		273	0	40	2.2	837	8.0
Jan. 25	98			65	30	90		349	10	152	16				--	--		287	0	41	2.3	877	8.4
Feb. 3	125			65	30	89		362	0	151	17				--	--		284	0	41	2.3	871	7.5
Mar. 4	190			46	20	69		250	0	122	12				--	--		199	0	43	2.1	662	7.5
Mar. 24	193			45	21	71		258	0	121	11				--	--		199	0	44	2.2	683	7.3
Apr. 11	427			41	18	55		226	0	104	2.0				--	--		176	0	41	1.8	583	7.5
Apr. 29	346			51	26	88		314	0	140	16				--	--		234	0	45	2.5	786	7.6
June 16	258			66	35	147		424	0	238	23				--	--		307	0	51	3.7	1,130	7.9
June 18	155			69	36	132		400	0	243	18				739	1.01		320	0	47	3.2	1,090	7.5
June 28	473			--	--	17	--	321	0	--	--				492	.67		229	0	42	2.2	764	7.6
July 8	540			47	26	74		300	0	120	11				--	--		225	0	42	2.2	710	7.5
July 12	355			--	--	68	--	289	0	--	--				449	.61		219	0	40	2.0	701	7.3
July 21	221			41	26	81		310	0	108	15				--	--		211	0	46	2.4	716	7.5
Aug. 15	76			55	28	95		373	0	121	20				--	--		253	0	45	2.6	838	7.5
Sept. 13	101			49	28	100		360	0	128	19				546	.74		238	0	48	2.8	836	7.5

RED RIVER OF THE NORTH BASIN--Continued

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

Chemical analyses, in parts per million, water year October 1953 to September 1954

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) Parts per million	Dissolved solids (residue at 180°C) Tons per acre-foot	Hardness as $CaCO_3$ Calcium, magnesium	Hardness as $CaCO_3$ Noncarbonate	Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color	Turbidity
MAUVAIS COULEE NEAR CHURCH'S FERRY, N. DAK.																								
June 27, 1954...	175	19	0.20	48	24	61	19	242	0	121	36	0.1	0.5	0.16	469	0.64	220	22	35	1.8	699	7.4		
July 7.....	322	--	--	43	16	37	--	205	0	67	20	--	--	--	329	.45	174	6	30	1.2	512	7.2		
July 20.....	268	--	--	44	18	29	--	213	0	60	16	--	--	--	319	.43	184	9	24	.9	490	7.4		
Aug. 3.....	168	--	--	52	21	31	--	220	20	62	14	--	--	--	366	.50	215	1	23	.9	535	8.7		
Aug. 31.....	88.4	23	.02	53	23	28	16	261	0	65	14	.1	.3	.17	365	.50	226	12	20	.8	558	7.7		
BALDHILL CREEK AT HANNAFORD, N. DAK.																								
July 1, 1954....	a 7			--	--	91		454	0	--	--				756	1.03	417	45	32	1.9	1,080	8.0		
July 16.....	a 2			--	--	71		417	0	--	--				640	.87	368	26	30	1.6	939	7.8		
July 23.....	a 2	29	0.07	75	40	67	8.0	398	0	151	16	0.0	1.0	0.22	608	.83	352	26	29	1.6	897	7.9		
Aug. 5.....	1.0			75	39	60		396	0	135	14				568	.77	346	21	27	1.4	856	7.8		
RED RIVER OF THE NORTH AT OSLO, MINN.																								
Apr 9, 1954 ...	3,670	14	0.03	65	28	31		243	0	100	27	0.2	4.9	0.08	401	0.55	278	79	20	0.8	639	7.6	18	35
May 11.....	4,680	10	.04	67	31	19		246	0	112	11	.2	.4	.06	393	.53	294	92	12	.5	605	7.7	27	10
June 15.....	3,190	7.7	.09	63	31	26		246	0	109	17	.2	1.5	.04	402	.55	283	81	17	.7	625	7.9	18	15
July 20.....	1,780	11	.00	48	26	27		233	0	68	14	.2	2.9	.11	320	.44	226	35	21	.8	515	7.6	20	70
SNAKE RIVER AT ALVARADO, MINN.																								
Apr. 6, 1954 ...	0.1	25	0.01	104	49	141		468	0	69	217	0.4	5.8	0.20	875	1.19	460	76	40	2.9	1,480	7.2	39	6
May 11.....	10	4.7	.05	72	38	30		249	0	156	23	.4	1.4	.09	478	.65	336	132	16	.7	722	8.2	34	4
June 15	1.6	7.1	.05	90	46	80		354	0	182	75	.2	1.1	.15	685	.93	414	124	29	1.7	1,070	7.7	35	2
MIDDLE RIVER NEAR STRANDQUIST, MINN.																								
Apr. 6 1954 ...	0.8	18	0.05	81	35	13		386	0	45	6.5	0.2	1.3	0.06	398	0.54	346	29	7	0.3	655	7.8	22	2
May 11.....	46	4.0	.05	73	30	5.3		276	0	83	1.0	.2	1.0	.05	373	.51	304	78	4	.1	555	8.1	60	1
June 16	146	16	.11	69	27	6.0		262	0	73	1.0	.2	2.8	.01	372	.51	282	67	4	.2	525	7.6	90	4
July 19.....	.3	18	--	72	41	7.8		382	0	47	1.5	--	--	--	428	.58	347	34	5	.2	638	7.8	--	--
Sept. 30.....	.05	16	.00	65	35	9.7		363	0	25	1.0	.1	1.8	.08	360	.49	306	8	6	.2	572	7.5	37	.3
TAMARAC RIVER NEAR STRANDQUIST, MINN.																								
Apr. 6 1954 ...	5.0	15	0.05	57	20	8.5		270	0	15	3.0	0.2	2.9	0.05	258	0.35	225	4	8	0.2	442	7.6	17	4
May 11.....	50	8.0	.07	73	28	5.1		275	0	75	1.0	.4	1.2	.03	373	.51	296	70	4	.1	541	7.9	80	3

June 16	187	17	.15	61	23	6.4	241	0	56	1.0	.2	2.2	.00	329	.45	246	48	5	.2	455	7.6	110	10
July 20	.6	14	.02	72	36	14	387	0	32	2.0	.2	2.3	.09	382	.52	326	9	8	.3	618	7.9	45	1
Sept. 30	.1	14	.02	63	38	19	416	0	4.0	6.0	.1	.9	.11	371	.50	314	0	11	.5	631	7.8	34	.9
				R			RED RIVER OF THE NORTH AT DRAYTON, N. DAK.																
June 17, 1954	4,140	9.2	0.04	64	30	39	242	0	119	30	0.2	0.4	0.10	436	0.59	282	84	23	1.0	675	7.6	23	50
July 20	2,060	11	.00	49	26	38	236	0	77	27	.2	.6	.12	364	.50	229	35	27	1.1	579	8.0	20	85
Sept. 16	768	6.0	.00	47	24	46	230	0	50	55	.0	1.2	.12	362	.49	218	29	32	1.4	620	7.5	7	25
							RED RIVER OF THE NORTH AT EMERSON, MANITOBA																
Apr. 9, 1954	2,970	13	0.04	60	26	65	211	0	107	78	0.2	6.3	0.13	473	0.64	258	85	36	1.8	777	7.6	23	15
May 13	5,240	8.7	.06	69	32	24	244	0	119	21	.2	.6	.06	409	.56	302	102	15	.6	629	7.8	32	20
June 17	4,120	12	.05	70	36	46	242	0	157	42	.4	1.4	.08	519	.71	324	126	23	1.1	789	7.8	23	85
							ROSEAU RIVER AT INTERNATIONAL BOUNDARY, NEAR CARIBOU, MINN.																
Apr. 9, 1954	100	8.5	0.07	33	13	8.3	147	0	26	2.0	0.2	4.9	0.04	179	0.24	137	16	12	0.3	298	7.3	35	10
May 12	1,150	9.3	.06	44	14	5.8	171	0	36	1.0	.4	.8	.04	218	.30	168	28	7	.2	324	7.8	70	5
June 17	b 800	11	.09	55	18	6.0	206	0	49	1.0	.2	1.5	.05	280	.38	210	41	6	.2	399	7.6	85	100
July 21	28	5.1	.03	61	27	3.2	272	0	44	1.0	.2	1.1	.09	328	.45	265	42	3	.1	497	7.7	55	2
Sept. 28	25	2.4	.05	48	22	12	240	0	30	5.0	.2	.5	.07	274	.37	210	13	11	.4	427	7.3	32	.1
							WINTERING RIVER NEAR KARLSRUHE, N. DAK.																
June 28, 1954	131					209		513	0	--	--				807	1.10	173	0	72	6.9	1,150	7.5	
July 12	51					226	9.3	594	0	168	23		4.3		840	1.14	194	0	70	7.1	1,220	7.7	
July 21	31			33	24	233		626	0	136	21				856	1.16	180	0	74	7.6	1,240	7.8	
Aug. 3	18					200		576	14	--	--				761	1.03	201	0	68	6.2	1,120	8.3	
							WILLOW CREEK NEAR UPHAM, N. DAK.																
June 30, 1954	a 2,000			--	--	42		219	22	--	--				415	0.56	231	15	28	1.2	597	8.7	
July 15	400			--	--	48		327	0	--	--				483	.66	289	21	27	1.2	721	7.7	
July 22	a 300	10	0.12	47	44	49	12	354	0	123	9.0	0.0	0.8	0.14	506	.69	298	8	25	1.2	743	7.9	
Aug. 4	58			51	52	63		414	0	131	8.0				575	.78	342	3	28	1.5	852	7.9	
							CUT BANK CREEK AT UPHAM, N. DAK.																
June 29, 1954	a 25			--	--	92		504	0	--	--				675	0.92	365	0	35	2.1	1,010	7.7	
July 13	a 11			--	--	91		429	0	--	--				626	.85	314	0	39	2.2	934	7.8	
July 21	a 10	7.1	0.10	44	53	96	14	447	0	153	20	0.0	1.0	0.13	671	.91	327	0	38	2.3	965	8.0	
Aug. 3	a 5			46	57	100		480	0	156	21				694	.89	348	0	37	2.3	1,020	8.0	

a Estimated.
b Daily mean discharge.

PAINT CREEK BASIN

PAINT CREEK AT WATERVILLE, IOWA

LOCATION.--At gaging station, on downstream side of bridge on State Highway 373 and 0.5 mile northwest of Waterville, Allamakee County.
DRAINAGE AREA.--42.7 square miles.
RECORDS AVAILABLE.--Water temperatures: November 1952 to September 1954.
Sediment records: November 1952 to September 1954.
EXTREMES, 1953-54.--Water temperatures: Maximum, 69°F Oct. 5, 8; minimum, freezing point on several days during January and February.
Sediment concentrations: Maximum daily, 9,290 ppm Apr. 15; minimum daily, not determined.
Sediment loads: Maximum daily, 7,470 tons Apr. 15; minimum daily, less than 1.0 ton on many days.
EXTREMES, 1952-54.--Water temperatures: Maximum, 72°F May 10, 1953; minimum, freezing point on several days during winter months.
Sediment concentrations: Maximum daily, 9,290 ppm Apr. 15, 1954; minimum daily, not determined.
Sediment loads: Maximum daily, 23,000 tons July 26, 1953; minimum daily, less than 1.0 ton on many days each year.
REMARKS.--Flow affected by ice Dec. 15-22, Jan. 10-12, Feb. 11-12, Mar. 3-4. Records of discharge for water year October 1953 to September 1954 given in WSP 1338.

Temperature (°F) of water, water year October 1953 to September 1954

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

PAINT CREEK BASIN--Continued

PAINT CREEK AT WATERVILLE, IOWA--Continued

Suspended sediment, water year October 1953 to September 1954

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	13	--		19	--		18	--	
2	13	--		20	--		18	--	
3	13	--	e 2.0	18	14		22	105	
4	13	--		18	--	e 0.7	27	87	e 4.0
5	12	45		18	--		21	47	
6	11	--		18	14		22	--	
7	11	--		18	--		20		
8	11	45		19	--		19		
9	12	--		18	34		19		
10	12	--		19	--		18	42	1.8
11	12	--	e 1.3	19	--	e 1.7	15		
12	11	--		19	34		10		
13	11	45		18	--		9.8		
14	10	--		19	--		9.8	--	
15	11	--		19	--		9.0	42	
16	10	37		20	59		8.0	--	
17	11	--		19	--		5.2	--	
18	12	--		18	--		5.0	42	e .8
19	13	37		21	59		5.2	--	
20	13	--		26	--		8.0	--	
21	14	--		23	--		8.2	--	
22	14	--		19	--		8.4	42	
23	16	29		18	59	e 3.0	8.6	--	
24	17	--	e 1.0	18	--		8.6	--	
25	18	--		18	--		8.6	32	
26	18	--		17	--		8.6	--	
27	18	20		18	56		8.6	--	e .7
28	18	--		18	--		8.6	32	
29	18	--		18	--		8.6	--	
30	19	19		18	56		8.6	--	
31	20	--		--	--	--	8.6	--	
Total	425	--	39.0	568	--	63.5	383.0	--	50.1

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	8.6	68		6.8	17		8.0	28	
2	8.6	--		6.8	--	e 0.3	7.4	--	
3	8.6	--		6.8	--		6.2	--	
4	8.6	26		11	76	sa 4.8	6.0	--	
5	8.6	--	e 0.6	23	55	b 3.4	6.4	--	e 0.5
6	8.6	--		18	--	e 2.0	6.4	--	
7	8.6	--		9.8	--	e .7	6.8	--	
8	8.6	26		15	44	sa 3.0	6.8	28	
9	8.0	--		39	127	s 19	6.8	--	
10	7.0	--		35	182	17	6.8	21	
11	7.0	--		13	26	.9	6.8	--	e .4
12	7.2	26		10	22	b .6	7.4	21	
13	7.4	--		9.2	19	.5	7.4	--	
14	7.4	--		36	127	s 27	7.4	--	
15	7.4	--	e .5	54	199	29	6.8	21	
16	7.4	--		20	90	4.9	10	28	s .9
17	6.8	--		9.8			13	55	1.9
18	6.8	20		9.8	25	.7	12	70	2.3
19	6.8	--		9.8			16	72	3.1
20	7.4	--		17	74	s 4.9	9.2		
21	6.8	20	e .4	35	275	26	8.6	40	.9
22	6.8	--		12	102	3.3	8.6		
23	6.8	--		11			8.0		
24	6.8	--		9.8			8.8		
25	6.8	13		9.8	28	.7	55	1,140	s 205
26	6.8	--		8.6			14	365	s 15
27	6.8	--		8.6			10	155	4.2
28	6.8	13	e .2	8.0			9.8	110	b 2.9
29	6.8	--		--	--	--	8.6	100	2.3
30	6.8	--		--	--	--	8.0	61	1.3
31	6.8	--		--	--	--	8.0	55	1.2
Total	230.2	--	13.7	462.6	--	154.2	311.0	--	251.4

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

PAINT CREEK BASIN--Continued

PAINT CREEK AT WATERVILLE, IOWA--Continued

Suspended sediment, water year October 1953 to September 1954--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	7.4			229	3,640	s 4,280	18	116	s 6.0
2	7.4	41	0.8	88	1,780	s 476	12	110	3.6
3	6.8			55	690	s 113	77	2,120	s 579
4	6.8			40	144	16	23	375	23
5	8.3	73	s 2.2	34	--	e 10	17	120	5.5
6	29	921	72	27	--	e 7.0	15		
7	30	1,380	112	24			15	94	3.9
8	13	845	s 32	23	74	4.5	16		
9	9.8	260	6.9	21			15		
10	9.2	180	4.5	19			16	146	s 6.8
11	8.6	155	3.6	17			13		
12	7.4	162	3.2	16	48	2.0	13		
13	6.8	132	2.4	15			13		
14	6.8	108	2.0	14			13		
15	115	9,290	s 7,470	13			12	87	3.0
16	30	2,270	s 227	12			12		
17	17	520	24	12			12		
18	13	295	10	11			13		
19	10	222	6.0	11			33	414	s 63
20	9.2	165	4.1	10			129	4,580	s 3,500
21	23	520	s 40	9.8	26	.7	76	2,500	sa 1,100
22	13	1,090	38	9.8			53	1,700	sa 360
23	9.2	310	7.7	9.8			27	246	18
24	9.8	220	5.8	9.2			24	162	10
25	25	369	s 30	9.2			22	130	7.7
26	17	1,130	52	9.2			18		
27	15	395	16	11			18		
28	12	210	6.8	20	310	sa 18	18	111	5.2
29	11	155	4.6	12	27	.9	17		
30	139	1,840	s 2,960	9.8	15	.4	16		
31	--	--	--	15	140	sb 13	--	--	--
Total	625.5	--	11,146.0	815.8	--	4,968.2	777	--	5,748.2

Day	July			August			September		
1	16	70	3.0	11			9.2		
2	56	2,220	s 644	10			6.8		
3	28	900	68	9.0			7.4		
4	22	255	15	8.6			8.0		
5	16	148	6.4	8.6	48	1.2	8.6		
6	14			8.6			9.2	63	1.5
7	13			8.0			9.2		
8	13	149	5.3	8.0			9.2		
9	13			7.4			9.2		
10	13			7.4			9.8		
11	13			7.4			7.4		
12	13			7.4			6.8		
13	12			6.8	46	.9	8.6		
14	12			6.8			10		
15	12			6.8			8.6	51	1.2
16	12	59	1.9	6.8			8.0		
17	11			6.8			9.2		
18	11			25	335	s 25	11		
19	11			8.6	196	4.6	11		
20	11			8.0			10		
21	11			8.0	62	1.3	10	61	1.7
22	11			8.0			10		
23	11			8.0			10		
24	11			17	345	s 17	10		
25	11			30	600	sa 61	10		
26	12	69	2.1	15	426	17	9.8		
27	11			11	124	3.7	8.6		
28	11			11			6.8	56	1.3
29	11			10	66	1.8	7.4		
30	11			10			9.8		
31	30	570	sa 70	10			--	--	--
Total	463	--	872.9	315.0	--	158.4	269.6	--	43.5

Total discharge for year (cfs-days) 5,645.7
Total load for year (tons) 23,509.1

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

IOWA RIVER AT IOWA CITY, IOWA

LOCATION.--At Benton Street Bridge at Iowa City, Johnson County, 0.5 mile downstream from the university dam and gaging station, 1.0 mile upstream from RALSTON CREEK, and 3.8 miles downstream from Clear Creek.
DRAINAGE AREA.--3,230 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: September 1906 to September 1907, January 1944 to September 1954 (discontinued).
Water temperatures: January 1944 to September 1954.
Sediment records: October 1943 to September 1954.
EXTREMES, 1953-54.--Dissolved solids: Maximum, 410 ppm Jan. 1-31; minimum, 180 ppm Aug. 26 to Sept. 3.
Hardness: Maximum, 335 ppm Jan. 1-31; minimum, 130 ppm Aug. 26 to Sept. 3.
Specific conductance: Maximum daily, 756 micromhos Jan. 28; minimum daily, 207 micromhos Aug. 29.
Water temperatures: Maximum, 82°F July 14; minimum, 33°F Mar. 4.
Sediment concentrations: Maximum daily, 3,270 ppm June 14; minimum daily, not determined.
Sediment loads: Maximum daily, 31,700 tons June 4; minimum daily, not determined.
EXTREMES, 1943-54.--Dissolved solids (1944-54): Maximum, 436 ppm Jan. 26 to Feb. 17, 1948; minimum, 96 ppm Jan. 5-10, 1946.
Hardness (1944-54): Maximum, 345 ppm Dec. 21-31, 1944; minimum, 54 ppm Jan. 5-10, 1946.
Specific conductance (1945-54): Maximum daily, 756 micromhos Jan. 28, 1954; minimum daily, 108 micromhos Jan. 9, 1946.
Water temperatures (1944-54): Maximum, 89°F July 4, 1949; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 7,800 ppm June 13, 1953; minimum daily, 4 ppm Feb. 10-12, 1945, Feb. 5, 1947.
Sediment loads: Maximum daily, 177,000 tons May 23, 1944; minimum daily, 2 tons Jan. 28, Feb. 2-8, 10, 1951.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Flow affected by ice Dec. 18-19, 22-23, Jan. 12-13, 16-18, 21-23, Mar. 2-3. Records of discharge for water year October 1953 to September 1954 given in WSP 1338.

Chemical analyses, in parts per million, water year October 1953 to September 1954

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
Oct. 1-31, 1953.....	120							263		68	15				337	0.46	109	270	54			557	7.8
Nov. 1-30.....	127							268		63	17				330	.45	113	268	48			561	8.0
Dec. 1-31.....	122							278		64	18				354	.48	117	284	56			589	7.9
Jan. 1-31, 1954.....	78.8							326		77	18				410	.56	87.2	335	68			671	8.0
Feb. 1-14.....	90.1							306		71	17				391	.53	95.1	313	62			642	7.7
Feb. 15-28.....	250							203		49	16				269	.37	182	209	43			455	7.9
Mar. 1-31	235							226		53	16				291	.40	185	229	44			486	7.8
Apr. 1-8.....	365							203		56	16				287	.39	283	216	50			471	7.4
Apr. 9-17.....	357							154		44	11				230	.31	222	168	42			376	7.7
Apr. 18-26.....	498							193		51	13				268	.36	360	204	46			445	7.6
Apr. 27-30.....	839							158		44	10				230	.31	521	171	41			379	7.3
May 1-7	2,143							133		39	7.5				209	.28	1,210	150	41			333	7.6
May 8-28	815							225		61	11				325	.44	715	255	70			519	7.6
May 29-June 1.....	1,079							190		52	11				254	.35	740	201	45			430	7.5
June 2-6	3,736							149		32	5.5				217	.30	2,190	159	37			339	7.3

IOWA RIVER BASIN--Continued

IOWA RIVER AT IOWA CITY, IOWA--Continued

Chemical analyses, in parts per million, water year October 1953 to September 1954--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
June 7-13, 1954	2,684							213		62	7.0				342	0.47	2,480	240	65			483	7.5
June 14-19	3,778							178		33	5.0				250	.34	2,550	185	39			376	7.2
June 20-July 5	5,119							180		30	3.5				243	.33	3,360	178	30			362	7.5
July 6-17	1,564							270		52	6.5				363	.49	1,530	284	63			545	7.5
July 18-30	654							291		64	9.0				384	.52	678	303	64			581	8.0
July 31-Aug. 25	465							226		60	9.5				322	.44	404	238	53			482	7.8
Aug. 26-Sept. 3	3,999							126		22	3.0				180	.24	1,940	130	27			266	7.3
Sept. 4-14	2,375							248		43	5.5				316	.43	2,030	250	47			482	7.6
Sept. 15-30	780							280		56	8.5				351	.48	739	284	54			546	7.6
Weighted average a	910							199		42	6.8				274	0.37	673	207	43			419	--

a Represents 100 percent of runoff for water year October 1953 to September 1954.

IOWA RIVER BASIN--Continued

IOWA RIVER AT IOWA CITY, IOWA--Continued

Temperature (°F) of water, water year October 1953 to September 1954
/Once-daily measurement between 7 a.m. and 8 a.m./

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

a Reading obtained between 9 a.m. and 11 a.m.

IOWA RIVER BASIN--Continued

IOWA RIVER AT IOWA CITY, IOWA--Continued

Suspended sediment, water year October 1953 to September 1954

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	95	88	23	60			72		
2	118	91	29	179			175		
3	92	64	16	57			182		
4	135	143	52	195			195		
5	94	112	28	59	72	20	165	33	14
6	105			60			172		
7	80			164			162		
8	132			54			190		
9	77	89	26	103			96		
10	173			209			118		
11	74			64			226		
12	151			92			147		
13	73			108			84		
14	119			97	42	14	246		
15	140			183			76	19	6
16	76	77	25	140			65		
17	187			72			67		
18	73			104			71		
19	186			185			75		
20	70			157			81		
21	207			142	64	26	134		
22	71			165			94		
23	70			133			86		
24	258			159			88		
25	74			149			91		
26	70	80	29	163			95	24	7
27	218			123			91		
28	57			146	33	13	94		
29	181			150			90		
30	69			145			173		
31	182			--	--	--	74		
Total	3,707	--	848	3,817	--	565	3,775	--	269

Day	January			February			March		
1	114			65			212		
2	78			65			230		
3	155			66			225		
4	78			69			145	16	8
5	69			71	22	4	132		
6	158			76			126		
7	83	18	5	83			161		
8	81			91			241		
9	84			95			222		
10	91			104			211		
11	84			115			229	35	20
12	80			119	27	9	259		
13	76			115			213		
14	74			127			177		
15	73			188			208		
16	71			244			227		
17	70	33	6	212			231		
18	68			264			222		
19	67			317			229		
20	67			257			217	41	25
21	67			322			223		
22	66			216	15	10	222		
23	65			236			259		
24	65			216			293		
25	64			253			312		
26	66	47	8	217			388		
27	67			273			238	66	55
28	67			279			356		
29	66			--	--	--	254		
30	65			--	--	--	268		
31	65			--	--	--	342		
Total	2,444	--	194	4,755	--	220	7,272	--	868

IOWA RIVER BASIN--Continued

IOWA RIVER AT IOWA CITY, IOWA--Continued

Suspended sediment, water year October 1953 to September 1954--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	198			2,010	1,270	6,890	1,850	365	1,820
2	236			2,200	1,480	8,790	3,100	2,170	18,200
3	265	39	24	2,290	1,610	9,950	3,370	3,200	29,100
4	148			2,290	1,490	9,210	3,910	3,000	31,700
5	275			2,160	1,360	7,930	4,100	2,620	29,000
6	309	78	65	2,200	1,100	6,530	4,200	1,740	19,700
7	789	255	543	1,850	965	4,820	4,100	1,480	16,400
8	702	233	442	1,690	476	2,170	3,190	1,200	10,300
9	562	1,070	1,620	1,490	322	1,300	2,560	920	6,360
10	485	390	511	1,330	244	876	2,200	625	3,710
11	330	372	331	1,210	192	627	1,890	495	2,530
12	330	250	223	1,050	162	459	1,930	460	2,400
13	281			980	150	397	2,920	2,560	20,200
14	275			910	143	351	3,370	3,270	29,800
15	338	187	146	850	157	360	3,820	2,000	20,600
16	259			790	160	341	4,100	1,670	18,500
17	349	298	281	730	158	311	4,100	1,670	18,500
18	482	165	215	675	144	262	3,640	1,220	12,000
19	462	142	177	635	124	213	3,640	2,530	24,900
20	440	204	242	580	117	183	3,910	2,060	21,700
21	427	207	239	514			4,200	1,480	16,800
22	429	202	234	525			4,800	1,640	21,300
23	641	170	294	476			4,900	1,440	19,100
24	570	168	259	548			5,110	2,240	30,900
25	557	197	296	446	118	157	4,600	1,690	21,000
26	473	350	447	495			4,200	1,160	13,200
27	998	388	1,050	445			4,300	1,000	11,600
28	730	560	1,100	753	190	sa 430	4,400	895	10,600
29	730	292	576	665	186	334	4,700	825	10,500
30	896	270	653	800	145	313	5,110	810	11,200
31	--	--	--	1,000	155	419	--	--	--
Total	13,966	--	10,502	34,587	--	64,565	112,220	--	503,620

	July			August			September		
1	5,990	890	14,400	433			4,700	1,030	13,100
2	7,300	1,080	21,300	417			4,900	810	10,700
3	7,560	800	16,300	433	84	101	5,110	726	10,000
4	6,820	575	10,600	429			5,770	610	9,500
5	4,000	590	6,370	512			5,770	575	8,960
6	2,740	530	3,920	384			2,920	350	2,760
7	2,290	428	2,650	485			2,110	235	1,340
8	1,980	405	2,170	539			1,770	173	827
9	1,770	312	1,490	552			1,610	88	383
10	1,610	278	1,210	457	83	107	1,450	117	458
11	1,490	260	1,050	460			1,290	115	401
12	1,410	238	906	465			1,210	--	e 330
13	1,250	205	692	325			1,170	96	303
14	1,170	195	616	483			1,050	--	e 240
15	1,090	182	536	232	68	64	980	--	
16	1,020	175	482	353			910	--	
17	945	172	439	455			910	70	e 190
18	880	192	456	476			850	--	
19	820	168	372	507			820	--	
20	670	159	288	451			799	98	211
21	730	150	296	710	88	125	786	81	172
22	702	140	265	567			756	79	161
23	675	142	259	485			668		
24	655	128	226	546			617		
25	625	119	201	490	100	132	702		
26	582	114	179	2,020	840	a 4,600	675	72	129
27	589	106	169	2,650	940	sa 8,300	655		
28	576	163	253	3,910	2,170	22,900	670		
29	532	95	136	4,000	1,470	15,900	730	80	158
30	460	78	97	4,200	1,250	14,200	945	84	214
31	444	87	104	4,500	1,320	16,000	--	--	--
Total	59,375	--	88,432	32,926	--	84,542	53,303	--	61,942

Total discharge for year (cfs-days) 332,147

Total load for year (tons) 816,567

e Estimated.

s Computed by subdividing day.

a Computed from partly estimated concentration graph.

IOWA RIVER BASIN--Continued

IOWA RIVER AT IOWA CITY, IOWA--Continued

Particle-size analyses of suspended sediment, April to August 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed)

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. 9, 1954	11:35 a.m.	585		1,060	3,940		95		98		100						SPWCM
June 2	7:50 p.m.	3,280	62	3,120	5,060	44	58	78	93	97	100						SPWCM
June 5	11:20 a.m.	4,100		3,120	5,160		49		77		100						SPWCM
June 15	1:35 p.m.	3,820		1,900	3,620		48		73		99						SPWCM
June 23	8:15 a.m.	4,900		1,230	4,310		38		63		96						SPWCM
July 1	2:10 p.m.	5,990		879	3,350		35		56		94						SPWCM
July 2	9:10 a.m.	7,180		1,050	3,150		35		60		94	98	100				SPWCM
Aug. 31	1:40 p.m.	4,500		1,280	4,640		38		61		99						SPWCM

IOWA RIVER BASIN--Continued

RALSTON CREEK AT IOWA CITY, IOWA

LOCATION.--At gaging station on upstream side of bridge on State Highway 1, at east side of Iowa City, Johnson County, and 2.8 miles upstream from mouth.
DRAINAGE AREA.--3.01 square miles.
RECORDS AVAILABLE.--Sediment records: April 1952 to September 1954.
EXTREMES, 1953-54.--Sediment concentrations: Maximum daily, 2,490 ppm May 2; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 226 tons Apr. 30; minimum daily, 0 tons on many days.
EXTREMES, 1952-54.--Sediment concentrations: Maximum daily, 4,970 ppm May 24, 1953; minimum daily, no flow on many days each year.
Sediment loads: Maximum daily, 1,980 tons May 24, 1953; minimum daily, 0 tons on many days each year.
REMARKS.--Flow affected by ice Dec. 21, Feb. 2-5, Feb. 26 to Mar. 1. Records of discharge for water year October 1953 to September 1954 given in WSP 1338.

Suspended sediment, water year October 1953 to September 1954

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1				0		0	0	--	0
2				0		0	.05	12	
3				0		0	.11	5	
4				0		0	.05	--	
5				0		0	.02	--	
6				0		0	.05	--	
7				0		0	.04	--	
8				0		0	.03	--	
9				0		0	.03	--	(t)
10				0		0	.04	--	
11				0		0	.04	--	
12				0		0	.02	--	
13				0		0	.01	--	
14				0		0	.01	--	
15				0		0	.01	--	
16				0		0	0	--	0
17				0		0	0	--	0
18				0		0	0	--	0
19				0		0	0	--	0
20				0		0	.01	--	(t)
21				.01			.10		
22				.01			0	--	0
23				.02			0	--	0
24				.02			0	--	0
25				.01		(t)	0	--	0
26				.01			0	--	0
27				.01			0	--	0
28				.01			0	--	0
29				.01			0	--	0
30				.01	14		0	--	0
31				--		--	0	--	0
Total	0		0	0.12		(t)	0.62	--	(t)

t Less than 0.050 ton.

IOWA RIVER BASIN--Continued

RALSTON CREEK AT IOWA CITY, IOWA--Continued

Suspended sediment, water year October 1953 to September 1954--Continued

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1				0	--	0	0.05	--	(t)
2				.04	22		.02		
3				.10	30		0	--	0
4				.07	32		0	--	0
5				.15	35	(t)	0	--	0
6				.02	--		0	--	0
7				0	--	0	.10		
8				.01	--		.43		
9				.05	--		.23		
10				.05	11		.30	25	(t)
11				.08	--	(t)	.25		
12				.01	--		.19		
13				.04	--		.11		
14				.09	23		.03		
15				.20	--		.05		
16				.18	5		.05		
17				.16	--		.06		
18				.15	--	(t)	.08	14	(t)
19				.16	2		.24		
20				.17	5		.11		
21				.15	--		.05		
22				.12	--		.05		
23				.11	--		.05		
24				.18	10		.87	235	s .7
25				.30	--	(t)	1.2	630	s 2.8
26				.18	--		.20		
27				.13	11		.16		
28				.10	--		.20		
29				--	--	--	.15	37	(t)
30				--	--	--	.19		
31				--	--	--	.15		
Total	0		0	3.00	--	0.1	5.57	--	3.8

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	0.26			1.5	851	s 6.2	1.8	862	s 7.4
2	.31			4.7	2,490	s 52	1.2	573	s 11
3	.11	21	(t)	1.2	303	s 1.3	1.0	426	1.2
4	.13			.60	51	.1	.43	69	
5	.15			.38			.24	101	e .1
6	1.6	493	s 3.0	.27			.21	--	
7	.29			.20	48	(t)	.14	121	
8	.14			.16			.09	--	
9	.11	26	(t)	.14			.11	128	(t)
10	.11			.14			.18	--	
11	.09			.12			.05	--	
12	.05			.10			.03	--	
13	.05	27	(t)	.09			.01	79	
14	.05			.08			.02	--	
15	.47	28	(t)	.09	60	(t)	.01	93	(t)
16	.16			.06			.01	--	
17	.08			.08			.01	40	
18	.06	21	(t)	.07			0	--	0
19	.06			.05	--		.05	103	
20	.63	107	.2	.05	66		.05	--	
21	.27			.05	--		.03	88	
22	.15			.04	--		.08	--	(t)
23	.11	56	(t)	.05	62	(t)	.02	--	
24	.09			.05	--		.01	--	
25	.09			.02	--		.01	--	
26	3.0	1,670	s 83	.03	--		0	--	0
27	.85	974	s 3.3	.08	39		0	--	0
28	.27	98	.1	.22			0	--	0
29	.21	80	(t)	.08			0	--	0
30	5.9	2,210	s 226	.04	80	(t)	0	--	0
31	--	--	--	.08			--	--	--
Total	15.85	--	315.9	10.82	--	60.0	5.79	--	20.1

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

IOWA RIVER BASIN--Continued

RALSTON CREEK AT IOWA CITY, IOWA CITY, IOWA--Continued

Suspended sediment, water year October 1953 to September 1954--Continued

Day	July			August			September		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	0	--	0	0	--	0	0		0
2	0	--	0	0	--	0	0		0
3	0	--	0	0	--	0	0		0
4	0	--	0	0	--	0	0		0
5	0	--	0	0	--	0	0		0
6	0	--	0	0	--	0	0		0
7	0	--	0	0	--	0	0		0
8	0	--	0	0	--	0	0		0
9	0	--	0	0	--	0	0		0
10	0	--	0	0	--	0	0		0
11	0	--	0	0	--	0	0		0
12	0	--	0	0	--	0	0		0
13	0	--	0	0	--	0	0		0
14	0	--	0	0	--	0	0		0
15	0	--	0	0	--	0	0		0
16	0	--	0	0	--	0	0		0
17	0	--	0	0	--	0	0		0
18	0	--	0	0	--	0	0		0
19	0	--	0	0	--	0	0		0
20	0	--	0	0	--	0	0		0
21	0	--	0	0	--	0	0		0
22	0	--	0	0	--	0	0		0
23	0	--	0	0	--	0	0		0
24	0	--	0	0	--	0	0		0
25	0	--	0	7.2	881	s 145	0		0
26	0	--	0	7.5	1,090	s 60	0		0
27	0	--	0	.48	214	s .4	0		0
28	1.4	753	s 15	.05	90	(t)	0		0
29	.07	432	s .2	0	--	0	2.4	952	s 19
30	0	--	0	0	--	0	0		0
31	0	--	0	0	--	0	--		--
Total	1.47	--	15.2	15.23	--	205.4	2.4		19

Total discharge for year (cfs-days) 60.87

Total load for year (tons) 639.5

s Computed by subdividing day.

t Less than 0.050 ton.

IOWA RIVER BASIN--Continued

RALSTON CREEK AT IOWA CITY, IOWA--Continued

Particle-size analyses of suspended sediment, April to August 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed)

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. 6, 1954.....	7:30 a.m.	1.5	50	1,040	2,410		92		98		100						SPWCM
Apr. 26	9:25 p.m.	22	--	11,500	3,580		55		87		100						SPWCM
Apr. 30	8:45 p.m.	78	--	12,600	4,440		46		74		99						SPWCM
June 2.....	7:10 p.m.	7.7	55	1,050	4,020	48	59	76	91		100						SPWCM
Aug. 25	10:35 p.m.	80	70	5,120	7,220		45		78		99						SPWCM

CEDAR RIVER AT CEDAR RAPIDS, IOWA

459649 O-58-5

LOCATION.--At Eighth Avenue Bridge on U. S. Highway 30 in Cedar Rapids, Linn County, 500 feet downstream from gaging station and 2.7 miles upstream from Prairie Creek.
DRAINAGE AREA.--6,640 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: September 1906 to September 1907, January 1944 to September 1954 (discontinued).
Water temperatures: January 1944 to September 1954 (discontinued).
Sediment records: October 1943 to September 1954 (discontinued).
EXTREMES, 1953-54.--Dissolved solids: Maximum, 834 ppm Apr. 8; minimum, 174 ppm Aug. 18-20.
Hardness: Maximum, 287 ppm Jan. 1-22; minimum, 114 ppm Aug. 18-20.
Specific conductance: Maximum daily, 1,520 micromhos Apr. 8; minimum daily, 244 micromhos Aug. 18.
Water temperatures: Maximum, 83°F July 12-14, 29-30; minimum, freezing point on many days during November to April.
Sediment concentrations: Maximum daily, 1,380 ppm June 23; minimum daily, not determined.
Sediment loads: Maximum daily, 87,400 tons June 25; minimum daily, not determined.
EXTREMES, 1943-54.--Dissolved solids (1944-54): Maximum, 834 ppm Apr. 8, 1954; minimum, 98 ppm Mar. 31 to Apr. 3, 1951.
Hardness (1944-54): Maximum, 334 ppm Jan. 17 to Feb. 1, 1948; minimum, 68 ppm Mar. 31 to Apr. 3, 1951.
Specific conductance (1945-54): Maximum daily 1,520 micromhos Apr. 8, 1954; minimum daily, 138 micromhos Jan. 9, 1946, Mar. 31, 1951.
Water temperatures (1944-54): Maximum, 89°F July 4, 1949; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 2,050 ppm June 25, 1950; minimum daily, 1 ppm Jan. 20, 21, 1944, Jan. 31, 1945, Feb. 11, 1947.
Sediment loads: Maximum daily, 245,000 tons June 15, 1947; minimum daily, 1.6 tons Jan. 21, 1944.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Flow affected by ice Dec. 13-17, Jan. 9-13, 15-18, 20-22, 24-26, 28-29, 31, Feb. 1, 12-14, Mar. 7-8. Records of discharge for water year October 1953 to September 1954 given in WSP 1338.

Chemical analyses, in parts per million, water year October 1953 to September 1954

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
Oct. 1-31, 1953	714							180		32	30				243	0.33	468	174	26			436	7.3
Nov. 1-30	753							207		35	35				278	.38	565	200	30			498	7.3
Dec. 1-31	714							265		47	35				357	.49	688	257	40			596	7.6
Jan. 1-22, 1954	531							292		47	43				402	.55	576	287	48			672	7.9
Jan. 23-Feb. 20	564							257		41	45				365	.50	556	253	42			625	7.4
Feb. 21-Mar. 23	839							228		37	32				305	.41	691	218	31			523	7.6
Mar. 24-Apr. 7	970							208		40	29				281	.38	736	203	32			488	7.4
Apr. 8	952							140		54	347				834	1.13	2,140	202	87			1,520	6.7
Apr. 9-30	1,440							180		38	22				255	.35	991	180	32			428	7.4
May 1-10	5,807							182		44	13				267	.36	4,190	196	47			423	7.4
May 11-31	2,118							179		45	18				261	.35	1,490	190	43			428	7.3
June 1-20	4,130							188		41	13				258	.35	2,880	196	42			420	7.8
June 21-24	13,350							153		22	5.5				194	.26	6,990	145	20			304	7.6
June 25-27	35,600							159		22	4.5				206	.28	19,800	156	26			320	7.4
June 28	22,100							186		29	3.0				248	.34	14,800	188	35			379	7.3

IOWA RIVER BASIN--Continued

CEDAR RIVER AT CEDAR RAPIDS, IOWA--Continued

Chemical analyses, in parts per million, water year October 1953 to September 1954--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
June 29-30, 1954	13,050							218		37	8.0				291	0.40	10,250	223	44			445	7.7
July 1-12	5,303							254		43	12				337	.46	4,830	254	46			511	7.4
July 13-26	2,084							214		45	16				299	.41	1,680	217	42			463	7.4
July 27-Aug. 17	1,463							160		41	20				261	.35	1,030	178	47			395	7.2
Aug. 18-20	2,590							119		21	7.5				174	.24	1,220	114	16			253	7.2
Aug. 21-25	1,546							158		39	20				253	.34	1,060	165	35			389	7.2
Aug. 26-Sept. 2	6,653							189		34	9.5				252	.34	4,530	187	32			393	7.5
Sept. 3-30	1,834							189		44	16				272	.37	1,350	194	39			427	7.5
Weighted average a	2,210							193		37	16				266	0.36	1,590	194	36			425	--

a Represents 100 percent of runoff for water year October 1953 to September 1954.

IOWA RIVER BASIN--Continued

CEDAR RIVER AT CEDAR RAPIDS, IOWA--Continued

Temperature (°F) of water, water year October 1953 to September 1954
/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	66	55	35	a 32	31	32	37	a 52	a 59	a 78	a 80	a 72
2	67	55	34	a 32	31	32	39	a 50	a 58	81	78	77
3	a 65	53	37	31	31	32	a 36	a 43	a 55	78	77	72
4	a 65	50	38	32	31	32	a 32	a 38	a 53	a 76	a 76	76
5	63	45	38	32	31	32	40	a 40	a 57	a 77	74	78
6	66	42	36	32	a 31	32	43	a 41	a 61	81	76	76
7	55	a 40	36	32	a 31	a 32	50	a 42	a 61	78	a 74	77
8	55	a 40	37	32	31	a 32	46	a 42	70	80	a 74	72
9	57	40	35	--	31	32	46	a 42	73	a 75	76	67
10	a 58	42	34	a 32	31	33	a 46	a 44	72	77	76	65
11	59	42	32	31	31	a 32	--	a 46	a 71	81	75	66
12	60	44	33	31	31	a 32	49	a 50	a 74	83	74	67
13	59	44	33	31	31	a 32	51	a 53	a 76	83	73	a 64
14	60	46	32	31	31	a 32	53	a 55	a 78	63	a 74	a 64
15	61	48	32	31	31	a 32	50	a 59	a 77	82	a 74	a 65
16	63	51	--	a 31	31	a 32	48	a 58	a 74	81	80	a 62
17	64	52	--	31	31	a 32	a 50	a 58	78	a 78	74	a 64
18	67	53	32	31	31	a 35	a 51	a 59	80	a 78	69	a 68
19	68	54	32	31	31	a 36	52	a 59	80	79	a 68	a 72
20	67	54	33	31	a 32	37	a 50	a 55	80	80	a 71	63
21	66	50	34	31	36	a 37	a 50	a 57	a 78	a 76	a 74	63
22	66	45	--	31	32	36	49	a 58	a 74	77	a 75	60
23	60	43	32	32	32	36	51	a 59	a 73	a 77	80	60
24	58	41	--	32	33	36	a 55	64	a 74	76	81	61
25	56	38	32	32	32	36	a 55	a 63	a 76	a 77	81	a 63
26	54	36	31	31	31	35	a 56	a 63	a 79	80	a 80	a 65
27	52	34	32	31	31	38	a 55	a 57	a 78	80	a 73	67
28	50	33	32	31	32	37	a 53	a 58	a 75	78	a 74	67
29	50	32	--	31	--	36	50	a 56	81	83	a 76	69
30	51	32	--	a 31	--	40	51	a 60	80	83	76	66
31	53	--	32	31	--	41	--	a 63	--	a 80	72	--
Average	60	44	34	31	31	34	48	53	72	79	75	68

a Reading obtained between 8 a.m. and 1 p.m.

IOWA RIVER BASIN--Continued

CEDAR RIVER AT CEDAR RAPIDS, IOWA--Continued

Suspended sediment, water year October 1953 to September 1954

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	718			694			580		
2	802			706			924		
3	736			694			768		
4	706			580			845		
5	706	63	127	670	43	79	871		
6	754			718			938		
7	838			730			938		
8	670			658			980	18	43
9	766			706			1,020		
10	790			682			952		
11	730			718			994		
12	706			694			832		
13	658			730			900		
14	670			718			800		
15	646			694	59	116	480		
16	718	63	117	720			390	26	28
17	694			720			330		
18	670			756			320		
19	694			684			455		
20	682			832			648		
21	706			832			756		
22	670			845			696		
23	766	310	641	845			696		
24	670	66	119	845			525		
25	718			910	21	48	515	19	33
26	754			845			637		
27	754	52	100	924			672		
28	694			819			672		
29	610			910			660		
30	742			708			660		
31	706			-	--	--	672		
Total	22,138	--	4,134	22,587	--	2,430	22,126	--	1,138

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	602			400			952		
2	614			402			938	20	50
3	648			411			897		
4	696			445			428		
5	648	14	23	475	15	20	465	25	35
6	591			495			515		
7	626			535			650		
8	602			545			910		
9	620			525			858	33	76
10	560			602			793		
11	500			626			756		
12	530			640			819	68	147
13	480			550			832		
14	445			500			780		
15	450	37	47	744	15	28	768		
16	480			924			696	26	50
17	500			871			684		
18	440			1,120			637		
19	411			1,060			756		
20	420			910	32	87	793	52	114
21	430			980			884		
22	390			952			980		
23	368			1,020			1,080		
24	400			1,050			1,090		
25	420			966			1,200		
26	390	29	31	1,080	23	65	1,240	59	173
27	377			1,020			1,080		
28	410			1,080			1,040		
29	400			--	--	--	994		
30	402			--	--	--	871	36	86
31	410			--	--	--	897		
Total	15,260	--	1,041	20,928	--	1,243	26,283	--	3,107

IOWA RIVER BASIN--Continued

CEDAR RIVER AT CEDAR RAPIDS, IOWA--Continued

Suspended sediment, water year October 1953 to September 1954--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	806			5,220	954	s 14,300	5,290	1,080	15,400
2	910	57	129	5,040	752	10,200	5,040	680	9,250
3	819			5,760	625	9,720	5,760	505	7,850
4	806			6,120	495	8,180	6,440	542	9,420
5	793	73	sa 190	6,660	472	8,490	5,580	320	4,820
6	980	82	217	7,390	472	9,420	4,830	262	3,420
7	1,020	100	275	6,840	290	5,360	4,340	255	2,990
8	952	84	216	6,120	215	3,550	3,850	205	2,130
9	1,090	76	224	4,860	126	1,650	3,250	146	1,280
10	1,040	60	168	4,060	123	1,350	3,340	216	1,950
11	980			3,570	111	1,070	3,380	404	3,690
12	952	62	158	3,070	107	887	3,190	284	2,450
13	952			2,960	116	927	3,960	478	5,110
14	884			2,720	130	955	4,100	626	6,930
15	1,040	90	253	2,480	128	857	2,960	322	2,570
16	1,190	93	299	2,300	119	739	2,690	190	1,380
17	1,310	67	237	2,110	117	667	2,600	134	941
18	1,260	66	225	1,950	100	527	2,640	136	969
19	1,130	61	186	1,720	93	432	3,960	250	2,670
20	1,180	86	274	1,660	87	390	5,400	382	5,570
21	1,450	108	423	1,610	81	352	7,690	845	17,500
22	1,360	82	301	1,500	72	292	10,300	1,310	36,400
23	1,260	104	354	1,520	69	283	14,000	1,380	52,200
24	1,450	180	sa 820	1,470	52	206	21,400	965	55,800
25	2,410	478	3,110	1,420	67	257	34,900	928	87,400
26	2,130	382	2,200	1,400	69	261	40,000	612	66,100
27	2,070	160	894	1,360	100	367	31,900	352	30,300
28	2,110	148	843	2,050	87	482	22,100	182	10,900
29	2,130	119	684	2,220	120	719	15,100	172	7,010
30	2,300	129	801	2,500	110	743	11,000	210	6,240
31	--	--	--	2,880	122	949	--	--	--
Total	38,764	--	14,342	102,540	--	84,582	290,990	--	460,640

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	8,530	152	3,500	1,440			5,400		
2	7,390	150	2,990	1,610			4,340	127	1,510
3	6,480	193	3,380	1,760			3,510		
4	5,760	94	1,460	1,740	71	317	3,100		
5	5,400	103	1,500	1,720			2,690	114	891
6	5,400	115	1,680	1,660			2,520		
7	5,040	144	1,960	1,520			2,320	68	424
8	4,690	112	1,420	1,470			2,090		
9	4,240	73	836	1,400	44	171	2,010		
10	3,920	77	815	1,370			1,990	72	387
11	3,540	80	765	1,260			1,970		
12	3,250	75	658	1,190			1,790		
13	2,960	72	575	1,280			1,740		
14	2,640	90	642	1,220			1,700	57	264
15	2,570	85	590	1,250	37	126	1,640		
16	2,370	71	454	1,310			1,610		
17	2,110	83	473	1,300			1,630		
18	2,010	94	510	3,640	323	s 4,160	1,590		
19	1,950			2,410	382	2,490	1,550	55	233
20	1,870			1,720	248	1,150	1,500		
		80	408						
21	1,910			1,500			1,520		
22	1,830			1,550	121	498	1,480		
23	1,760			1,500			1,400		
24	1,720			1,500	52	219	1,470		
25	1,740	87	405	1,680			1,420	56	209
26	1,740			6,120	240	sa 4,600	1,340		
27	1,660			7,960	482	10,400	1,260		
28	1,570			7,960	317	6,810	1,300		
29	1,470			7,390	296	5,910	1,590	78	335
30	1,570	84	342	7,390	282	5,630	1,630	68	299
31	1,420			6,660	208	3,740	--	--	--
Total	100,510	--	29,233	83,480	--	50,011	61,100	--	13,296

Total discharge for year (cfs-days) 806,706

Total load for year (tons) 665,197

s Computed by subdividing day.

a Computed from partly estimated concentration graph.

IOWA RIVER BASIN--Continued

CEDAR RIVER AT CEDAR RAPIDS, IOWA--Continued

Particle-size analyses of suspended sediment, June 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed)

Date of collection	Time	Discharge (cfs)	Water temperature (°F)	Suspended sediment											Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters									
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
June 23, 1954	2:40 p.m.	14,400		945	2,890		38		63		91	95		98			SPWCM
June 25	1:35 p.m.	36,900		765	2,150		41		67		89	92		99			SPWCM
June 26	10:30 a.m.	40,900		462	3,270		35		57		85	87		98			SPWCM

DES MOINES RIVER BASIN

EAST FORK HARDIN CREEK NEAR CHURDAN, IOWA

LOCATION.--At gaging station on upstream side of highway bridge, 4.4 miles upstream from mouth and 6.5 miles southeast of Churdan, Greene County.
DRAINAGE AREA.--22.7 square miles.
RECORDS AVAILABLE.--Sediment records: July 1952 to September 1954.
EXTREMES, 1953-54.--Sediment concentrations: Maximum daily, 668 ppm Mar. 17; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 200 tons Aug. 26; minimum daily, 0 tons on many days.
EXTREMES, 1952-54.--Sediment concentrations: Maximum daily, 668 ppm Mar. 17, 1954; minimum daily, no flow on many days each year.
Sediment loads: Maximum daily, 200 tons Aug. 26, 1954; minimum daily, 0 tons on many days each year.
REMARKS.--No flow during period October to December; record is omitted. Records of discharge for water year October 1953 to September 1954 given in WSP 1338.

Suspended sediment, January to September 1954

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1				0	--	0	0.1	272	0.1
2				0	--	0	0	--	0
3				0	--	0	0	--	0
4				0	--	0	0	--	0
5				0	--	0	0	--	0
6				0	--	0	0	--	0
7				0	--	0	0	--	0
8				0	--	0	.1	440	
9				0	--	0	.2	--	
10				0	--	0	.1	--	e .1
11				0	--	0	.1	--	
12				0	--	0	.1	--	
13				0	--	0	0	--	0
14				0	--	0	0	--	0
15				0	--	0	0	--	0
16				0	--	0	.1	--	e .1
17				0	--	0	.3	668	.5
18				0	--	0	.3	--	
19				0	--	0	.6	3	
20				0	--	0	.3	--	
21				.1	240	a .1	.2	--	(t)
22				0	--	0	.2	--	
23				0	--	0	.2	--	
24				0	--	0	.2	12	
25				.1	--		.3	--	
26				.1	220	e .1	.2	--	
27				.1	--		.1	5	
28				.1	--		.1	--	(t)
29				--	--	--	.1	--	
30				--	--	--	.1	--	
31				--	--	--	.1	--	
Total	0		0	0.5	--	0.5	4.1	--	1.3

e Estimated.
t Less than 0.050 ton.
a Computed from estimated concentration graph.

DES MOINES RIVER BASIN--*Continued*

EAST FORK HARDIN CREEK NEAR CHURDAN, IOWA--Continued

Suspended sediment, January to September 1954--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	0.1	1		4.0	29	0.3	121	280	sb 94
2	.1	--		9.7	94	sa 3.5	78	225	47
3	.1	--	(t)	9.6	35	.9	57	100	sb 17
4	.1	--		5.7			32	84	7.3
5	.1	--		4.2			24	70	a 4.5
6	1.3	52	sb 0.3	3.8			18	--	e 2.8
7	.3	--		2.8	5	(t)	14	43	1.6
8	.2	9		2.4			9.6	--	
9	.1	--		2.0			8.3	--	
10	.1	--	(t)	1.8			7.4	40	e .9
11	.1	--		1.7			6.5	--	
12	0	--	0	1.6	--		6.0		
13	0	--	0	1.4	10		5.7		
14	0	--	0	1.3	--		5.2		
15	0	--	0	1.2	25	(t)	5.2		
								46	.7
16	.1	--	(t)	1.0	--		5.7		
17	0	--	0	.9	6		5.7		
18	0	--	0	.9	--		5.0		
19	.1	39	(t)	.8	4		4.7		
20	0	--	0	.7	--		8.4	49	sa 1.7
21	5.6	208	s 4.2	.7	--		111	220	sb 72
22	1.4	27	.1	.6	7	(t)	44	98	12
23	.8	12	(t)	.7	--		24		
24	.6	23		.7	7		18	--	e 4.0
25	.9	41	.1	.6	--		14		
26	.6	17		.6	2		9.6		
27	.5	--	(t)	1.0	10		8.0		
28	.3	--		4.9	100	sa 1.8	7.1	76	1.5
29	.3	--		2.8	20	a .2	6.0		
30	2.9	51	.4	1.9	--	e .1	5.2		
31	--	--	--	31	120	sb 44	--	--	--
Total	16.7	--	5.4	103.0	--	51.4	674.3	--	288.6

Day	July			August			September		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	4.4			0.2	--		64	--	e 9.0
2	3.6			.2	--		44	--	e 8.0
3	3.4	81	0.8	.2	--		26	--	e 7.0
4	3.0			.2	--		20	120	6.5
5	2.6	--		.2	--		14	--	e 4.2
6	2.3	65		.1	--		9.6	--	
7	2.2	--	e .4	.1	--		7.7	141	e 2.9
8	1.8	72		.2	--	(t)	6.5	--	
9	1.6	--		.2	--		6.5	--	
10	1.4	42		.1	--		6.0	--	
									e 1.2
11	1.3	--		.1	--		5.2	85	
12	1.1	--	e .2	.1	81		4.7	--	
13	.9	--		.1	--		4.4		
14	.8	--		.1	--		4.0		
15	.7	--		.1	--		4.0		
								80	.9
16	.6			0	--	0	4.2		
17	.6			1.7	140	sa 1.0	4.2		
18	.6			1.2	95	a .3	4.0		
19	.6			.4	--	e .1	3.4		
20	.6	53	.1	.2	--	e .1	3.4		
21	.6			23	280	sa 32	2.8		
22	.5			67	100	sb 25	2.8		
23	.4			83	130	sb 33	2.8		
24	.4			31	108	9.0	2.8	76	.6
25	.3			18	166	8.1	2.6		
26	.2			306	230	sb 200	2.4		
27	.2	50	(t)	269	96	70	2.4		
28	.2			224	108	65	2.6		
29	.2			175	--	e 35	3.0		
30	.2			123	--	e 20	6.0	84	1.4
31	.2			82	--	e 10	--	--	--
Total	37.5	--	7.4	1,406.7	--	508.9	276.0	--	61.6

Total discharge for year (cfs-days) 2,518.8

Total load for year (tons) 925.1

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.

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

MILK RIVER BASIN

WILLOW CREEK NEAR GLASGOW, MONT.

LOCATION.--At gaging station, about 6 miles south of Glasgow, Valley County, and about 8 miles upstream from mouth.
DRAINAGE AREA.--536 square miles.
RECORDS AVAILABLE.--Sediment records: October 1953 to September 1954.
EXTREMES, 1953-54.--Sediment concentrations: Maximum daily, 58,000 ppm Apr. 5; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 390,000 tons Apr. 6; minimum daily, 0 tons on many days.
REMARKS.--Flow affected by ice Feb. 12 to Apr. 3. Records of discharge for water year October 1953 to September 1954 given in WSP 1339.

Monthly and annual summary of water and suspended-sediment discharge, water year October 1953 to September 1954

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	1,841	3,650	a 15,601	557	3,030	0	3,140	4,120
March	311	617	e 620	20	--	--	738	--
April	6,541.0	12,970	a 728,719	24,300	390,000	(t)	39,200	29,400
May	455.7	904	a 12,968	418	3,500	0	10,500	5,230
June	2,478.8	4,920	b 227,330	7,580	177,000	0	32,800	36,200
July	155.2	308	a 1,648	53	1,080	0	3,930	7,710
August	2,839.1	5,630	b 155,239	5,010	70,400	0	20,300	31,600
September	432.1	857	a 4,923	164	1,900	(t)	4,220	998
Water year 1953-54	15,053.9	29,860	a 1,147,048	3,140	390,000	0	28,200	36,200

e Estimated.
t Less than 0.50 ton.
a Includes loads computed from mostly estimated concentration graph.
b Includes loads estimated on many days of low flow.

MILK RIVER BASIN--Continued

WILLOW CREEK NEAR GLASGOW, MONT.--Continued

Particle-size analyses of suspended sediment, February to August 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; V, visual accumulation tube)

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. 10, 1954	4:30 p.m.	224	--	3,980	1,840		93		96		99						SPWCM
Feb. 16	11:00 a.m.	12	32	1,300	2,260		100		--		--						PWCM
Feb. 24	8:40 a.m.	126	32	4,000	2,400		91		99		100						SPWCM
Apr. 7	8:00 a.m.	1,280	33	29,400	3,120		58		83		98						SPWCM
Apr. 11	3:45 p.m.	103	46	8,360	2,970		84		100		--						PWCM
May 23	8:30 a.m.	8.6	51	5,230	4,160		98		99		100						SPN
May 23	8:30 a.m.	8.6	51	5,230	3,890		98		100		--						PWCM
June 11	6:45 p.m.	2,110	55	36,200	4,530		71		90		99						SPWCM
June 12	11:00 a.m.	355	67	25,700	4,100		74		93		99						SPWCM
Aug. 17	3:30 p.m.	1,300	59	31,600	3,160		63		95		99						SPWCM
Aug. 18	10:50 a.m.	1,490	59	18,400	3,190		81		97		99						SPWCM
Aug. 20	11:00 a.m.	94	63	7,940	3,120		32		100		--						PN
Aug. 20	11:00 a.m.	94	63	7,940	2,860		88		100		--						PWCM

YELLOWSTONE RIVER AT BILLINGS, MONT.

LOCATION.--At gaging station at bridge on U. S. Highway 87, 1 mile northeast of Billings, Yellowstone County, and 12 miles upstream from Pryor Creek.
DRAINAGE AREA.--11,870 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to September 1954.
Water temperatures: December 1950 to September 1954.
EXTREMES, 1953-54.--Dissolved solids: Maximum, 549 ppm Jan. 18-21; minimum, 101 ppm May 21-23, June 23-29.
Hardness: Maximum, 316 ppm Jan. 18-21; minimum, 52 ppm May 21-23.
Specific conductance: Maximum daily, 964 micromhos Jan. 20; minimum daily, 129 micromhos May 22.
Water temperatures: Maximum, 78°F July 25; minimum, freezing point on many days during December to February.
EXTREMES, 1950-54.--Dissolved solids: Maximum, 868 ppm Feb. 2, 1951; minimum 96 ppm June 19, 1951.
Hardness: Maximum, 476 ppm Feb. 2, 1951; minimum, 52 ppm May 21-23, 1954.
Specific conductance: Maximum daily, 1,210 micromhos Feb. 2, 1951; minimum daily, 129 micromhos May 22, 1954.
Water temperatures: Maximum, 78°F July 25, 1954; minimum, freezing point on many days during winter month.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1953 to September 1954 given in WSP 1339.

Chemical analyses, in parts per million, water year October 1953 to September 1954

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
Oct. 1-21, 1953	2,561	--	--	--	--	40	--	176		113	--	--	--	--	337	0.46	2,330	186	42	32	1.3	526	7.4
Oct. 22-31	3,175	--	--	--	--	41	--	186		118	--	--	--	--	352	.48	3,020	196	43	31	1.3	547	7.8
Nov. 1-30	3,124	--	--	--	--	36	--	172		107	--	--	--	--	322	.44	2,720	182	41	30	1.2	504	7.8
Dec. 1-31	2,766	18	0.00	47	17	35	3.5	175		100	9.0	0.6	2.2	0.26	324	.44	2,420	186	42	29	1.1	507	7.7
Jan. 1-17, 1954	2,095	--	--	--	--	37	--	178		112	--	--	--	--	339	.46	1,920	195	49	29	1.2	532	7.9
Jan. 18-21	1,413	--	--	--	--	59	--	255		207	--	--	--	--	549	.75	2,090	316	107	29	1.4	820	7.7
Jan. 22-31	1,960	--	--	--	--	35	--	187		109	--	--	--	--	353	.48	1,870	203	50	27	1.1	541	7.7
Feb. 1-28	2,683	--	--	--	--	32	--	161		99	--	--	--	--	316	.43	2,290	177	45	28	1.0	482	7.9
Mar. 1-31	2,253	16	.00	45	17	36	3.7	167		107	9.5	.6	1.6	.29	325	.44	1,980	183	46	29	1.2	506	8.0
Apr. 1-15	2,997	--	--	--	--	36	--	172		105	--	--	--	--	324	.44	2,620	179	38	30	1.2	497	7.7
Apr. 16-May 10	4,030	--	--	--	--	25	--	140		67	--	--	--	--	242	.33	2,630	136	21	29	.9	382	7.8
May 11-16	13,510	--	--	--	--	9.9	--	89		24	--	--	--	--	139	.19	5,070	81	8	21	.5	208	7.6
May 17-20	19,130	--	--	--	--	7.5	--	69		17	--	--	--	--	105	.14	5,420	61	4	21	.4	164	7.4
May 21-23	30,870	--	--	--	--	6.2	--	60		15	--	--	--	--	101	.14	8,420	52	3	21	.4	136	7.4
May 24-27	20,880	13	.17	14	5.1	8.2	1.9	62		18	25	.4	1.2	.06	104	.14	5,860	56	5	24	.5	147	7.4
May 28-June 16	12,810	--	--	--	--	13	--	79		23	--	--	--	--	127	.17	4,390	68	3	30	.7	195	7.0
June 17-22	16,300	--	--	--	--	11	--	72		20	--	--	--	--	115	.16	5,060	61	2	31	.6	175	7.2
June 23-29	32,890	--	--	--	--	7.3	--	66		12	--	--	--	--	101	.14	8,970	55	1	23	.4	147	6.9
June 30-July 9	21,610	--	--	--	--	10	--	65		17	--	--	--	--	106	.14	6,180	56	3	28	.6	162	7.1
July 10-21	16,800	--	--	--	--	12	--	74		21	--	--	--	--	119	.16	5,400	62	1	30	.7	182	7.0

YELLOWSTONE RIVER BASIN--Continued

YELLOWSTONE RIVER AT BILLINGS, MONT.--Continued

Chemical analyses, in parts per million, water year October 1953 to September 1954--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
July 22-26, 1954.....	11,000	--	--	--	--	17	--	90		32	--	--	--	--	151	0.21	4,480	78	4	32	0.8	233	7.4
July 27-31.....	8,262	--	--	--	--	20	--	104		40	--	--	--	--	181	.25	4,040	92	7	32	.9	271	7.7
Aug. 1-17.....	6,139	--	--	--	--	23	--	117		51	--	--	--	--	206	.28	3,410	106	10	32	1.0	314	7.6
Aug. 18-Sept. 3	3,886	--	--	--	--	29	--	138		74	--	--	--	--	233	.32	2,440	132	19	32	1.1	389	7.7
Sept. 4-30	3,257	16	.00	38	16	34	3.3	161		95	8.0	0.5	1.0	0.21	294	.40	2,590	160	28	31	1.2	462	7.7
Weighted average a.	6,319	--	--	--	--	19	--	105		47	--	--	--	--	184	0.25	3,140	101	15	29	0.8	283	--

a Represents 100 percent of runoff for water year October 1953 to September 1954.

YELLOWSTONE RIVER BASIN--Continued

YELLOWSTONE RIVER AT BILLINGS, MONT.--Continued

Temperature (°F) of water, water year October 1953 to September 1954
(Once-daily measurement between 4 p.m. and 5 p.m.)

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

a Reading obtained at 3 p.m.
b Reading obtained at 11 a.m.

YELLOWSTONE RIVER BASIN--Continued

WIND RIVER AT RIVERTON, WYO.

LOCATION.--At gaging station, at bridge on State Highway 320, three-quarters of a mile southeast of Riverton, Fremont County.
DRAINAGE AREA.--2,320 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: March 1947 to September 1949.
Water temperatures: April 1947 to September 1949, April to September 1953, August to September 1954.
Sediment records: October 1948 to December 1953, August to September 1954.
EXTREMES, October to December 1953, August to September 1954.--Sediment concentrations: Maximum daily, not determined; minimum daily, 8 ppm Oct. 1.
Sediment loads: Maximum daily, 700 tons (estimated) Oct. 22; minimum daily, 3 tons Oct.1.
EXTREMES, 1947-54.--Water temperatures: Maximum (1947-48, 1953), 73°F Aug. 31, 1948; minimum (1947-49), freezing point on many days during winter months.
Sediment concentrations (1948-54): Maximum daily, 3,100 ppm Aug. 4, 1952; minimum daily, not determined.
Sediment loads (1948-54): Maximum daily, 36,800 tons June 14, 1953; minimum daily, 1 ton on many days during 1953.
REMARKS.--Records of discharge for water year October 1953 to September 1954 given in WSP 1339.

Temperature (°F) of water, August to September 1954
(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											--	59
2											--	63
3											--	62
4											--	59
5											--	58
6											--	54
7											--	--
8											--	59
9											--	55
10											--	56
11											--	--
12											--	61
13											--	--
14											--	55
15											--	56
16											--	--
17											--	52
18											62	53
19											--	49
20											60	--
21											57	50
22											--	--
23											--	58
24											--	57
25											58	54
26											58	53
27											--	--
28											58	54
29											64	47
30											62	43
31											61	--
Average											--	--

YELLOWSTONE RIVER BASIN--Continued

WIND RIVER AT RIVERTON, WYO.--Continued

Suspended sediment, October to December 1953, August to September 1954

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	140	8	3	566	--	e 70	475	--	
2	160	--	e 15	618	50	a 85	459	11	b 14
3	240	--	e 65	842	96	218	435	--	
4	330	310	276	645	--		414	29	
5	750	260	526	690	20	b 40	407	--	
6	900	215	522	681	--		386	--	
7	880	169	402	663	--		435	31	
8	814	172	378	524	--		421	--	b 34
9	618	138	230	475	19		353	--	
10	540			483	--		386	31	
11	515			475	--		379	--	
12	470			483	--		393	--	
13	470			491	--		414	--	e 75
14	460			491	--	b 25	421	140	159
15	460	--	e 130	499	--		--	--	--
16	500			491	20		--	--	--
17	510			499	--		--	--	--
18	500			515	--		--	--	--
19	550			499	--		--	--	--
20	609	--	e 300	400	39		--	--	--
21	660	--	e 420	451	--	b 45	--	--	--
22	700	--	e 700	515	--		--	--	--
23	520	400	b 550	592			--	--	--
24	280	--	e 150	583	60	95	--	--	--
25	317	--	e 90	592			--	--	--
26	428	--	e 110	618	--		--	--	--
27	709			636	29	b 50	--	--	--
28	718	57	111	681	--		--	--	--
29	738			491	--	e 30	--	--	--
30	766	80	a 170	483	18	23	--	--	--
31	574	--	e 100	--	--	--	--	--	--
Total	16,826	--	6,640	16,672	--	1,456	5,778	--	582

	July			August			September		
1				--	--	--	208	13	7
2				--	--	--	290	28	22
3				--	--	--	317	34	29
4				--	--	--	386	40	42
5				--	--	--	491	60	80
6				--	--	--	592	135	216
7				--	--	--	491	75	a 100
8				--	--	--	400	42	45
9				--	--	--	379	47	48
10				--	--	--	365		
11				--	--	--	341		
12				--	--	--	341	26	26
13				--	--	--	347		
14				--	--	--	400		
15				--	--	--	400		
16				--	--	--	365		
17				223			341		
18				215			305		
19				198			305		
20				177	16	9	295		
21				212			290		
22				255			270		
23				270			243	16	13
24				255			270		
25				239	28	19	300		
26				227			305		
27				227			305		
28				201			323		
29				180			353		
30				180	14	7	407		
31				187			--	--	--
Total				3,246	--	187	10,425	--	940

Total discharge for period Oct. 1 to Dec. 14, 1953, Aug. 17 to Sept. 30, 1954 (cfs-days)..... 52,947

Total load for period Oct. 1 to Dec. 14, 1953, Aug. 17 to Sept. 30, 1954 (tons)..... 9,805

e Estimated.

a Computed from estimated concentration graph.

b Computed from partly estimated concentration data.

YELLOWSTONE RIVER BASIN--Continued

POPO AGIE RIVER NEAR RIVERTON, WYO.

LOCATION.--Downstream side of bridge on Sand Draw road, a quarter of a mile upstream from gaging station, which is 1¼ miles upstream from mouth and 2 miles southeast of Riverton, Fremont County.
DRAINAGE AREA.--2,010 square miles, approximately.
RECORDS AVAILABLE.--Water temperatures: March to September 1949, May to September 1953.
Sediment records: March 1949 to December 1953 (discontinued).
EXTREMES, 1949-53.--Sediment concentrations: Maximum daily, 3,650 ppm May 23, 1952; minimum daily, not determined.
Sediment loads: Maximum daily, 24,000 tons May 23, 1952; minimum daily, not determined.
REMARKS.--Flow affected by ice Nov. 21 to Dec. 15. Records of discharge for water year October 1953 to September 1954 given in WSP 1339.

Chemical analyses, in parts per million, May to September 1954

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									
May 7, 1954	526	14	0.02	64	24	61		159	232	11	0.3	2.5	0.09	507		0.69		258	128	34	1.6	738	7.5	
June 2	610	8.6	.05	46	15	37		115	147	6.0	.2	.8	.03	327		.44		176	82	31	1.2	502	7.7	
July 5	1,160	6.6	.00	34	13	29		93	112	4.0	.2	.9	.07	249		.34		137	61	31	1.1	397	7.1	
Aug. 1	231	6.6	.00	75	32	77		187	305	11	.4	.4	.15	627		.85		320	167	34	1.9	893	7.9	
Sept. 9	84	6.9	.00	105	55	136		251	525	21	.5	.5	.21	1,050	974	1.43		488	282	38	2.7	1,390	7.8	

YELLOWSTONE RIVER BASIN--Continued

POPO AGIE RIVER NEAR RIVERTON, WYO.--Continued

Suspended sediment, October to December 1953

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	106	14		220	--		240	--	
2	103	--		217	--		230	44	
3	103	--		217	20		220	--	
4	105	16		214	--		210	60	
5	114	18		214	45		220	--	
6	126	17		220	--		220	--	
7	138	--		217	--		250	57	
8	140	22		204	--		220	--	a 29
9	132	12		198	51		200	--	
10	148	--	a 6	210	--		210	38	
11	142	--		217	--	a 20	210	--	
12	142	--		214	--		220	--	
13	140	--		214	--		240	--	
14	140	--		210	--		220	43	
15	138	--		204	--		230	--	
16	142	--		198	31		--	--	--
17	142	--		198	--		--	--	--
18	145	--		217	--		--	--	--
19	148	--		198	--		--	--	--
20	150	--		155	33		--	--	--
21	189	--	e 15	180	--		--	--	--
22	242	--	e 50	220	--		--	--	--
23	224	--	e 26	290	90		--	--	--
24	220	--		280	85		--	--	--
25	220	--		270	63		--	--	--
26	220	--		270	35	a 48	--	--	--
27	217	23	a 15	270	--		--	--	--
28	220	27		260	--		--	--	--
29	220	--		260	--		--	--	--
30	217	--		250	--		--	--	--
31	224	--		--	--	--	--	--	--
Total	5,057	--	331	6,706	--	852	3,340	--	435

Total discharge for period Oct. 1 to Dec. 15, 1953 (cfs-days)..... 15,103

Total load for period Oct. 1 to Dec. 15, 1953 (tons)..... 1,618

e Estimated.

a Computed from partly estimated concentration data.

MUSKRAT CREEK NEAR SHOSHONI, WYO.

LOCATION.--At gaging station, 1¾ miles upstream from mouth and 7 miles southwest of Shoshoni, Fremont County.

DRAINAGE AREA.--760 square miles, approximately.

RECORDS AVAILABLE.--Sediment records: June 1950 to September 1954.

EXTREMES, 1953-54.--No flow during year.

EXTREMES, 1950-54.--Sediment concentrations: Maximum daily, not determined; minimum daily, no flow on many days each year.

Sediment loads: Maximum daily, 150,000 tons (estimated) July 22, 1951; minimum daily, 0 tons on many days each year.

REMARKS.--Records of discharge for water year October 1953 to September 1954 given in WSP 1339.

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YELLOWSTONE RIVER BASIN--Continued

FIVEMILE CREEK ABOVE WYOMING CANAL, NEAR PAVILLION, WYO.

LOCATION.--At gaging station, 1,400 feet upstream from Wyoming Canal siphon and 4 miles north of Pavillion, Fremont County.
DRAINAGE AREA.--143 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to November 1951.
Water temperatures: October 1950 to September 1951.
Sediment records: October 1949 to September 1954.
EXTREMES, 1953-54.--Sediment concentrations: Maximum daily, 16,900 ppm July 17; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 2,130 tons July 17; minimum daily, 0 tons on many days.
EXTREMES, 1949-54.--Sediment concentrations: Maximum daily, 77,400 ppm Sept. 20, 1950; minimum daily, no flow on many days each year.
Sediment loads: Maximum daily, 123,000 tons Sept. 20, 1950; minimum daily, 0 tons on many days each year.
REMARKS.--Records of discharge for water year October 1953 to September 1954 given in WSP 1339.

Suspended sediment, water year October 1953 to September 1954

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	0		0	0.2					
2	0		0	.4	559	e 1			
3	0		0	.5					
4	0		0	.3					
5	0		0	0		0			
6	0		0	0		0			
7	0		0	0		0			
8	0		0	0		0			
9	0		0	0		0			
10	0		0	.1		(t)			
11	0		0	0		0			
12	0		0	0		0			
13	0		0	0		0			
14	0		0	0		0			
15	0		0	0		0			
16	0		0	0		0			
17	0		0	0		0			
18	0		0	0		0			
19	0		0	0		0			
20	0		0	0		0			
21	.5		e 1	0		0			
22	0		0	0		0			
23	0		0	0		0			
24	0		0	0		0			
25	.1	1,030	(t)	0		0			
26	0		0	.2		(t)			
27	.1		(t)	0		0			
28	0		0	0		0			
29	.1		(t)	0		0			
30	.4		e 1	0		0			
31	.2		(t)	--		--			
Total	1.4		3	1.7		5	0		0

e Estimated.
t Less than 0.50 ton.

YELLOWSTONE RIVER BASIN--Continued

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

Suspended sediment, water year October 1953 to September 1954--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	--	0	0	--	0
2				0	--	0	0	--	0
3				.2	800	sa 1	0	--	0
4				.1	--	(t)	0	--	0
5				.5	800	sa 3	0	--	0
6				.5	800	sa 3	0	--	0
7				1.0	850	sa 6	.2	--	e 3
8				1.5	700	sa 6	.3	5,000	sa 7
9				1.0	650	sa 4	.4	4,200	sa 7
10				1.0	--	e 4	.2	--	e 5
11				1.0	--	e 3	.2	3,300	sa 3
12				3.0	1,200	sa 15	0	--	0
13				4.0	1,200	sa 16	0	--	0
14				4.0	1,000	sa 22	0	--	0
15				1.0	--	e 6	2.0	1,900	sa 20
16				3.0	700	sa 16	1.0	1,900	sa 15
17				3.0	2,700	sa 55	.5	--	e 10
18				1.0	2,700	sa 18	.5	--	e 7
19				0	--	0	.2	2,900	sa 4
20				.5	200	sa 1	.1	2,900	sa 2
21				3.0	1,600	sa 26	.1	5,200	sa 2
22				2.0	--	e 20	.4	--	e 6
23				3.0	4,200	sa 60	.1	--	e 2
24				2.0	3,000	sa 38	1.3	5,800	sa 40
25				1.0	2,600	sa 9	.4	2,000	sa 4
26				.5	3,100	sa 6	0	--	0
27				0	--	0	.3		
28				0	--	0	.2	--	e 2
29				--	--	--	.1		
30				--	--	--	0	--	0
31				--	--	--	0	--	0
Total	0		0	37.8	--	338	8.5	--	143

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	0.9	3,900	9	4.4	7,380	s 155	0	--	0
2	1.0	5,100	14	1.5	5,980	24	0	--	0
3	.2			1.0	4,560	s 15	0	--	0
4	.2	3,350	2	.9	--	e 8	0	--	0
5	.2			.2	800	(t)	0	--	0
6	0	--	0	0	--	0	0	--	0
7	0	--	0	.8	--	e 10	0	--	0
8	0	--	0	.8	--	e 10	0	--	0
9	0	--	0	.7	4,900	9	0	--	0
10	0	--	0	4.1	7,200	sa 200	0	--	0
11	0	--	0	3.6	7,400	sa 85	0	--	0
12	0	--	0	1.7	--	e 26	0	--	0
13	0	--	0	1.8	5,300	26	0	--	0
14	0	--	0	1.8	5,700	28	0	--	0
15	0	--	0	2.9	6,300	49	0	--	0
16	0	--	0	2.0	--	e 20	0	--	0
17	0	--	0	2.6	--	e 28	0	--	0
18	0	--	0	1.0	--	e 10	0	--	0
19	0	--	0	.5	2,700	4	0	--	0
20	0	--	0	0	--	0	0	--	0
21	0	--	0	.4	--	e 4	0	--	0
22	0	--	0	3.6	6,410	s 91	0	--	0
23	0	--	0	1.5	4,450	s 20	0	--	0
24	0	--	0	.8	--	e 10	0	--	0
25	0	--	0	.4	--	e 4	0	--	0
26	0	--	0	0	--	0	3.5	10,000	s 670
27	0	--	0	0	--	0	.6	9,600	sa 60
28	0	--	0	0	--	0	0	--	0
29	.1	--	e 1	.6	--	e 7	0	--	0
30	.3	--	e 4	.3	--	e 3	0	--	0
31	--	--	--	.2	--	e 2	--	--	--
Total	2.9	--	34	40.1	--	848	4.1	--	730

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

YELLOWSTONE RIVER BASIN--Continued

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

Suspended sediment, water year October 1953 to September 1954--Continued

Day	July			August			September		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	0	--	0						
2	0	--	0						
3	0	--	0						
4	0	--	0						
5	0	--	0						
6	0	--	0						
7	0	--	0						
8	0	--	0						
9	0	--	0						
10	0	--	0						
11	0	--	0						
12	0	--	0						
13	0	--	0						
14	0	--	0						
15	0	--	0						
16	0	--	0						
17	14	16,900	s 2,130						
18	.1	3,200	sb 5						
19	0	--	0						
20	1.8	10,000	sb 120						
21	.1	--	e 1						
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	16.0	--	2,256	0		0	0		0

Total discharge for year (cfs-days) 112.5

Total load for year (tons) 4,357

e Estimated.

s Computed by subdividing day.

b Computed from estimated concentration graph.

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

Particle-size analyses of suspended sediment, February to July 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; V, visual accumulation tube)

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. 12, 1954.....	2:00 p.m.	5.4	33	2,040	4,110		18		35		55	64	76	86	91	100	VPWCM
May 11.....	10:50 a.m.	3.2	72	7,670	4,750		2		68		91	98	100	--	--		VPN
May 11.....	10:50 a.m.	3.2	72	7,670	4,980		55		75		91	98	100	--	--		VPWCM
June 26	9:00 p.m.	16	64	106,000	3,790		42		73		91	97	100	--	--		VPWCM
June 26	11:20 p.m.	16	64	65,500	5,500		61		90		94	96	98	99	100		VPWCM
July 17.....	3:20 p.m.	10	--	24,600	4,570		51		85		93	95	99	100	--		VPWCM
July 17.....	4:05 p.m.	171	--	65,300	6,110		31		58		90	99	100	--	--		VPWCM
July 17.....	6:35 p.m.	31	--	62,600	6,290		52		84		95	98	100	--	--		VPWCM

YELLOWSTONE RIVER BASIN--Continued

FIVEMILE CREEK NEAR RIVERTON, WYO.

LOCATION.--At gaging station, 3 miles downstream from Ocean drain, 12½ miles north of Riverton, Fremont County, and 13 miles upstream from mouth.
DRAINAGE AREA.--342 square miles.
RECORDS AVAILABLE.--Chemical analyses: September 1950 to November 1951.
Water temperatures: October 1950 to September 1951, October 1952 to September 1954.
Sediment records: October 1949 to September 1954.
EXTREMES, 1953-54.--Water temperatures: Maximum, 70°F July 14; minimum, freezing point on many days during November to May.
Sediment concentrations: Maximum daily, 18,000 ppm Apr. 17; minimum daily, not determined.
Sediment loads: Maximum daily, 6,040 tons July 20; minimum daily, not determined.
EXTREMES, 1949-54.--Water temperatures (1950-51, 1952-54): Minimum, freezing point on many days during winter mouths each year.
Sediment concentrations: Maximum daily, 89,500 ppm Sept. 20, 1950; minimum daily, not determined.
Sediment loads: Maximum daily, 199,000 tons Sept. 20, 1950; minimum daily, not determined.
REMARKS.--Investigations indicate that practically all the total sediment load is transported in suspension at this contracted section of the creek. Flow affected by ice Dec. 8 to Feb. 9, Feb. 11-14, 24-26, Mar. 9. Records of discharge for water year October 1953 to September 1954 given in WSP 1339.

Temperature (°F) of water, water year October 1953 to September 1954
/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	50	46	34	32	--	--	--	32	51	61	60	59
2	50	40	32	a 32	--	32	--	34	47	59	59	64
3	42	39	32	a 32	a 32	--	32	35	48	57	60	63
4	43	39	32	32	--	32	--	43	54	62	62	59
5	41	36	32	32	a 33	--	39	46	--	64	63	59
6	42	40	32	a 32	32	32	--	48	--	65	61	54
7	43	35	32	32	--	--	45	46	44	65	58	57
8	43	32	32	32	--	32	--	47	47	63	59	58
9	42	32	32	32	a 35	--	--	54	53	64	--	54
10	43	35	32	--	a 34	33	39	53	59	65	61	56
11	43	37	32	32	--	--	--	55	55	64	60	54
12	42	36	32	32	--	a 32	37	53	59	67	61	55
13	42	37	32	a 32	34	--	--	51	--	67	61	56
14	43	38	32	a 32	--	--	45	54	--	70	61	56
15	44	39	32	a 32	a 32	32	37	50	55	66	62	55
16	47	37	32	--	--	--	39	53	55	66	60	52
17	43	35	32	32	32	32	41	52	53	67	59	52
18	41	--	32	32	--	--	--	53	52	67	57	47
19	41	32	32	--	32	32	41	58	56	67	57	46
20	41	32	32	32	--	--	42	63	57	66	57	49
21	43	32	32	--	--	--	40	60	59	65	57	48
22	39	32	a 32	32	a 37	34	40	53	59	59	52	49
23	--	a 37	32	--	--	--	42	53	62	58	56	56
24	41	32	32	--	38	32	43	64	65	60	57	54
25	41	a 34	32	32	--	--	45	55	61	62	59	53
26	37	36	32	--	33	32	44	50	64	64	58	54
27	37	32	--	32	--	--	43	44	65	65	58	52
28	37	32	32	--	--	--	49	43	59	63	56	51
29	38	a 38	32	32	--	--	38	45	53	62	56	47
30	46	32	32	--	--	32	38	50	56	64	59	45
31	38	--	32	--	--	32	--	54	--	59	60	--
Average	42	36	32	--	--	--	--	50	56	64	59	54

a Reading obtained between 4 p.m. and 7 p.m.

YELLOWSTONE RIVER BASIN--Continued

FIVEMILE CREEK NEAR RIVERTON, WYO.--Continued

Suspended sediment, water year October 1953 to September 1954

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	94	4,500	1,140	26	910	64	29	1,350	106
2	102	3,980	1,100	25	1,000	67	28	1,430	108
3	104	4,270	1,200	25	990	67	26	1,500	s 120
4	94	3,720	944	26	990	70	28	1,300	s 118
5	55	2,410	358	27	1,180	86	22	1,100	65
6	31	1,390	116	26	1,380	97	12		
7	24	1,030	67	24	1,240	80	11		
8	21	750	43	22	1,110	66	13		
9	20	650	35	24	950	62	15		
10	20	570	31	25	840	57	14		
11	22	750	45	26	1,010	71	12		
12	21	940	53	26	1,450	102	12		
13	21	730	41	25	1,090	74	11		
14	19	780	40	26	1,090	77	11		
15	18	700	34	26	1,110	78	10		
16	20	680	37	26	1,210	85	10		
17	21	660	37	27	1,310	97	10		
18	21	670	38	25	1,550	105	10		
19	20	860	46	25	1,940	131	11	176	6
20	24	1,530	99	24	1,680	s 123	13		
21	35	2,010	s 221	26	1,600	s 128	12		
22	22	1,180	70	28	1,550	s 138	12		
23	23	1,270	79	29	1,820	143	12		
24	25	850	57	29	1,980	s 177	12		
25	24	790	51	29	1,920	s 165	12		
26	24	720	47	32	1,720	149	12		
27	23	990	61	29	1,690	132	13		
28	24	1,020	66	29	1,720	135	14		
29	25	1,020	69	29	1,560	122	14		
30	26	950	67	29	1,650	129	14		
31	26	900	63	--	--	--	14		
Total	1,049	--	6,355	795	--	3,077	449	--	673

Day	January			February			March		
1	15	470	19	18			20	--	e 110
2	16	680	29	19	1,480	80	13	1,500	sa 80
3	17	1,090	50	21			15	--	e 100
4	18	1,270	62	22			16	1,900	sa 110
5	20	1,040	56	24			19	1,800	sa 130
6	21			26			21	2,100	sa 160
7	22			28			29	--	e 250
8	22			30			33	3,000	sa 360
9	22			28			30	--	e 400
10	22			26			27	5,300	s 448
11	21			24			22	--	e 200
12	19	810	44	23			15	1,900	s 77
13	20			22			17	--	e 100
14	21			24	2,550	179	19		
15	18			29			18		
16	17			25			21		
17	15			27			21		
18	14			27			18		
19	13			25			18		
20	13			25			19		
		413	14					2,430	131
21	13			26			19		
22	13			24			20		
23	15			28			21		
24	19			32	3,700	320	21		
25	17			28	--	e 220	23		
26	16			24	2,220		23		
27	16	885	41	21	--	e 160	24		
28	17			22	--		16		
29	20			--	--	--	16		
30	19			--	--	--	14	1,930	83
31	18			--	--	--	16		
Total	549	--	1,213	698	--	4,840	624	--	4,691

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

YELLOWSTONE RIVER BASIN--Continued

FIVEMILE CREEK NEAR RIVERTON, WYO.--Continued

Suspended sediment, water year October 1953 to September 1954--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	18	2,500	sa 130	93	12,000	sa 3,900	135	7,350	2,680
2	15			73	10,000	1,970	138	7,150	2,660
3	14			55	8,100	1,200	140	6,700	2,530
4	14			61	8,100	1,330	139	6,350	2,380
5	13			61	6,900	1,140	121	6,250	2,040
6	13			61	9,200	1,520	134	6,900	2,500
7	12	1,700	55	91	12,500	3,070	140	7,000	2,650
8	12			74	8,300	1,660	140	6,800	2,570
9	13			69	8,400	1,570	133	6,450	2,320
10	11			68	7,750	1,420	133	7,100	2,550
11	11			76	8,100	1,660	124	5,850	1,960
12	11			77	6,650	1,380	128	6,200	2,140
13	11			83	7,000	1,570	138	5,500	2,050
14	21	7,410	s 468	87	7,000	1,640	144	5,150	2,000
15	29	7,500	587	90	8,200	1,990	134	5,250	1,900
16	21	5,400	306	96	7,750	2,010	129	4,920	1,710
17	50	18,000	s 2,760	106	7,100	2,030	132	4,500	1,600
18	44	--	e 1,400	105	8,400	2,380	127	4,600	1,580
19	65	15,100	s 3,070	122	7,500	2,470	130	4,450	1,560
20	67	11,500	2,080	123	7,500	2,490	130	5,050	1,770
21	56	7,900	1,190	112	8,350	2,530	130	4,700	1,650
22	56	6,600	998	136	8,240	3,030	132	4,950	1,760
23	54	6,080	887	132	7,600	2,710	132	5,200	1,850
24	51	5,600	771	121	7,600	2,480	127	5,400	1,850
25	67	9,300	1,680	132	7,700	2,740	132	5,080	1,810
26	73	10,000	1,970	138	8,150	3,040	142	5,400	2,070
27	56	7,700	1,160	130	7,600	2,670	194	9,760	5,110
28	73	9,750	1,920	128	7,200	2,490	190	7,950	4,080
29	78	8,150	1,720	123	7,150	2,370	163	8,250	3,630
30	67	7,080	1,280	122	6,980	2,300	147	8,020	3,180
31	--	--	--	136	7,600	2,790	--	--	--
Total	1,096	--	25,037	3,081	--	67,550	4,158	--	70,140

	July			August			September		
1	132	7,300	2,600	164	6,700	2,970	111	5,080	1,520
2	124	6,750	2,260	168	6,300	2,860	112	4,620	1,400
3	128	6,000	2,070	161	6,800	2,960	117	4,520	1,430
4	129	6,600	2,300	148	6,550	2,620	115	5,450	1,690
5	151	6,820	2,780	140	6,500	2,460	114	5,800	1,790
6	134	6,250	2,260	138	6,320	2,360	115	5,450	1,690
7	121	5,700	1,860	136	6,850	2,520	115	5,300	1,650
8	112	5,120	1,550	147	7,200	2,860	112	4,750	1,440
9	118	5,500	1,750	152	7,100	2,910	115	5,050	1,570
10	111	5,560	1,670	154	6,550	2,720	159	6,000	2,580
11	118	6,500	2,070	138	5,600	2,090	214	6,720	3,880
12	121	6,100	1,990	136	5,680	2,070	211	6,550	3,730
13	130	7,200	2,530	152	6,150	2,520	202	5,750	3,140
14	147	7,300	2,900	157	6,050	2,570	181	7,960	3,890
15	161	6,850	2,980	167	6,100	2,750	122	8,000	2,640
16	168	6,950	3,150	164	5,950	2,640	92	6,400	1,590
17	187	7,600	3,840	145	5,780	2,260	86	5,700	1,320
18	196	11,000	5,820	140	5,500	2,080	79	4,320	922
19	194	8,990	4,710	163	7,200	3,170	76	4,100	841
20	213	10,500	6,040	161	6,200	2,700	70	3,320	628
21	213	8,800	5,060	163	6,000	2,640	65	4,450	781
22	168	7,250	3,290	164	5,750	2,550	63	3,200	544
23	157	6,950	2,950	174	5,950	2,800	68	5,050	927
24	146	6,350	2,500	161	5,550	2,410	81	3,950	864
25	134	5,780	2,090	145	5,500	2,150	89	4,900	1,180
26	138	5,950	2,220	135	5,350	1,950	89	5,500	1,320
27	135	5,700	2,080	130	5,400	1,900	92	5,050	1,250
28	144	5,350	2,080	123	5,150	1,710	96	4,700	1,220
29	152	5,750	2,360	126	5,000	1,700	92	4,500	1,120
30	159	6,450	2,770	123	4,800	1,590	90	4,400	1,070
31	157	6,680	2,830	118	4,550	1,450	--	--	--
Total	4,598	--	87,360	4,593	--	74,940	3,343	--	49,617

Total discharge for year (cfs-days) 25,033

Total load for year (tons) 395,493

e Estimated.

s Computed by subdividing day.

a Computed from partly estimated concentration graph.

FIVEMILE CREEK NEAR RIVERTON, WYO.--Continued

Particle-size analyses of suspended sediment, November 1953 to September 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; V, visual accumulation tube)

Date of collection	Time	Discharge (cfs)	Water temperature (°F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Nov. 30, 1953	11:00 a.m.	30	32	2,720	1,540		2		13		30	52	82	89	94	100	VPN
Nov. 30	11:00 a.m.	30	32	2,720	1,800		12		17		30	52	82	89	94	100	VPWCM
Jan. 4, 1954	10:30 a.m.	a 18	32	896	1,380	15	19	21	27		41	49	92	--	100	--	BWCM
Feb. 12	12:45 p.m.	a 23	32	3,160	4,010		16		26		50	71	90	94	97	99	VPWCM
May 7	1:35 p.m.	106	62	13,900	3,510		3		45		71	88	96	99	100	--	VPN
May 7	1:35 p.m.	106	62	13,900	3,740		32		50		71	88	96	99	100	--	VPWCM
May 17	2:25 p.m.	116	73	7,760	3,810		3		41		67	85	97	100	--	--	VPN
May 17	2:25 p.m.	116	73	7,760	4,090		29		41		67	85	97	100	--	--	VPWCM
June 4	9:30 a.m.	157	54	7,180	3,020		23		34		54	73	91	96	99	100	VPWCM
June 18	9:55 a.m.	140	57	4,840	1,320		8		26		44	61	85	91	98	100	VPN
June 18	9:55 a.m.	140	57	4,840	1,460		25		32		44	61	85	91	98	100	VPWCM
June 27	9:35 a.m.	206	65	11,300	3,100		39		57		72	86	96	99	100	--	VPWCM
July 6	4:10 p.m.	130	81	5,770	2,320		29		40		56	75	93	97	100	--	VPWCM
July 16	10:25 a.m.	197	71	7,050	2,160		0		24		54	75	91	97	99	100	VPN
July 16	10:25 a.m.	197	71	7,050	3,540		25		38		54	75	91	97	99	100	VPWCM
Aug. 26	4:25 p.m.	130	69	5,540	2,740		22		33		51	69	87	93	96	100	VPWCM
Sept. 3	10:00 a.m.	122	65	4,460	1,920		15		23		36	53	77	87	92	98	VPWCM
Sept. 3	11:05 a.m.	124	67	4,570	2,340		2		23		--	--	--	--	--	--	PN
Sept. 3	11:05 a.m.	124	67	4,570	2,310		14		23		--	--	--	--	--	--	PWCM
Sept. 15	3:40 p.m.	123	68	7,640	1,940		31		48		70	80	92	96	98	100	VPWCM
Sept. 28	4:25 p.m.	92	57	4,640	2,850		22		31		49	69	91	97	100	--	VPWCM

a Daily mean discharge.

YELLOWSTONE RIVER BASIN--Continued

FIVEMILE CREEK NEAR SHOSHONI, WYO.

LOCATION.--At gaging station, 1 mile 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 1954.
Sediment records: August 1948 to September 1954.
EXTREMES, 1953-54.--Water temperatures: Maximum, 72°F July 18; minimum, freezing point on many days during November to April.
Sediment concentrations: Maximum daily, 13,600 ppm May 1; minimum daily, not determined.
Sediment loads: Maximum daily, 12,400 tons July 21; minimum daily, not determined.
EXTREMES, 1948-54--Water temperatures: Maximum, 84°F June 10, 1949; minimum, freezing point on many days during winter months each year.
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.--Sampling section modified by an artificial contraction built 200 feet upstream during August 1952. Flow affected by ice Dec. 10 to Jan. 7, Jan. 20-23, Mar. 2-7, 12-14. Records of discharge for water year October 1953 to September 1954 given in WSP 1339.

Temperature (°F) of water, water year October 1953 to September 1954
(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	48	39	32	a 31	32	31	32	--	--	65	63	58
2	45	40	33	32	31	--	43	43	a 51	61	62	60
3	41	39	--	32	--	--	43	45	50	59	60	60
4	44	37	--	34	--	--	45	46	53	61	a 71	56
5	41	35	--	34	31	--	40	48	56	67	63	61
6	--	38	--	31	--	40	40	50	52	66	60	53
7	42	36	32	--	32	--	40	48	46	66	61	54
8	41	34	--	32	32	32	36	48	51	64	a 70	52
9	42	33	--	31	32	35	43	53	55	69	69	54
10	42	33	32	--	31	--	37	54	58	65	63	54
11	43	36	--	32	33	--	54	54	52	65	62	56
12	42	34	31	32	32	--	40	56	54	66	63	59
13	--	35	--	--	33	--	43	55	59	69	62	55
14	41	37	--	a 31	--	--	48	55	57	68	62	54
15	42	38	--	32	32	--	38	56	58	66	65	54
16	47	37	--	--	32	31	41	65	56	68	62	50
17	41	35	--	32	32	--	50	60	54	68	62	51
18	43	35	a 32	31	32	--	50	63	56	72	63	47
19	41	31	--	32	31	31	43	59	57	68	56	49
20	42	32	--	--	31	34	45	62	66	66	59	46
21	43	32	33	--	33	41	39	63	61	66	55	49
22	44	--	31	--	--	35	43	55	65	60	51	49
23	40	34	--	32	32	34	45	50	65	60	54	55
24	41	32	--	32	33	33	45	--	65	61	59	52
25	41	31	--	31	32	31	52	--	69	67	60	50
26	38	35	--	31	33	42	48	--	67	64	60	50
27	37	31	35	--	31	34	48	--	69	71	56	50
28	38	32	--	--	32	33	52	--	60	65	55	--
29	37	33	a 32	31	--	32	38	--	59	64	--	45
30	40	32	--	--	--	31	39	--	a 69	66	59	44
31	--	--	a 32	--	--	32	--	51	--	61	58	--
Average	42	35	--	--	32	--	43	--	58	65	61	53

a Reading obtained between 11 a.m. and 1 p.m.

YELLOWSTONE RIVER BASIN--Continued

FIVEMILE CREEK NEAR SHOSHONI, WYO.--Continued

Suspended sediment, water year October 1953 to September 1954

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	215	6,300	3,660	48	1,500	194	55	2,500	371
2	241	5,600	3,640	48	2,700	350	51	2,800	386
3	254	5,500	3,770	45	2,800	340	51	3,500	482
4	221	3,300	1,970	47	2,800	355	53	4,900	701
5	120	4,900	1,590	48	4,300	557	48	3,700	480
6	81	3,500	765	43	4,200	544	40	2,700	292
7	67	3,200	579	43	2,800	325	39	1,800	190
8	53	3,300	472	43	3,200	372	39	2,600	274
9	51	3,100	427	43	2,200	255	45	3,500	425
10	48	2,700	350	41	5,600	620	40	3,700	400
11	47	2,300	292	41	5,100	565	31	2,800	234
12	48	2,800	363	43	4,200	488	29	2,100	164
13	48	2,900	376	44	5,800	689	28	3,200	242
14	48	2,500	324	44	4,600	546	28	1,750	132
15	48	3,000	389	45	4,700	571	28	1,700	129
16	48	3,700	480	47	4,700	596	28	1,700	129
17	48	2,600	337	48	3,900	505	30	1,200	97
18	48	2,200	285	53	3,700	529	32	1,600	138
19	48	2,900	376	47	3,400	431	34	--	
20	53	3,500	501	45	4,300	522	36	--	
21	67	5,600	1,010	48	5,600	726	33	--	
22	48	3,800	492	56	4,700	711	32	--	
23	50	3,500	472	59	3,900	621	31	--	
24	55	3,400	505	59	4,300	685	31	470	
25	51	2,900	399	55	3,800	564	31	--	e 65
26	48	4,100	531	55	4,500	668	31	--	
27	48	3,300	428	55	3,400	505	31	--	
28	50	4,400	594	56	2,000	302	34	--	
29	51	4,600	633	58	2,700	423	33	1,380	
30	50	2,800	378	56	3,200	484	33	--	
31	50	2,200	297	--	--	--	32	553	
Total	2,403	--	26,685	1,468	--	15,043	1,117	--	6,111

Day	January			February			March		
1	33	--		34	835		29	4,800	376
2	34	--		38	--		26	--	e 200
3	35	--		40	--		25	--	e 100
4	35	1,260		43	--		26	1,600	112
5	36	--		43	1,610		30	3,300	267
6	37	--		47	--		32	4,200	363
7	39	--		53	--		35	6,500	614
8	40	775		55	--	e 110	37	4,960	s 602
9	38	--		51	--		32	7,400	639
10	38	--		48	--		29	5,300	415
11	35	--		45	--		30	4,000	324
12	33	--		39	741		29	2,900	227
13	35	--		37	--		27	4,500	328
14	37	--		43	--		30	4,100	332
15	35	592		48	--		37	4,700	470
16	28	--	e 75	51	--		37	3,200	320
17	27	--		45	1,800		37	2,800	280
18	23	--		47	--		33	2,100	187
19	21	--		45	2,450	e 250	30	2,300	186
20	21	--		40	--		29	2,200	172
21	21	--		40	--		32	2,500	216
22	21	857		35	--		32	2,500	216
23	30	--		35	--		32	2,300	199
24	35	--		45	6,400	s 982	34	2,200	202
25	30	--		38	7,480	767	33	2,300	205
26	30	--		32	5,400	467	33	2,500	223
27	31	--		29	8,900	697	34	2,700	248
28	32	--		30	7,400	599	32	2,100	181
29	37	--		--	--	--	30	2,200	178
30	33	--		--	--	--	25	2,100	142
31	32	--		--	--	--	27	2,800	204
Total	992	--	2,325	1,176	--	7,302	964	--	8,728

e Estimated.
s Computed by subdividing day.

YELLOWSTONE RIVER BASIN--Continued

FIVEMILE CREEK NEAR SHOSHONI WYO.--Continued

Suspended sediment, water year October 1953 to September 1954--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	30	3,100	251	206	13,600	s 8,290	289	9,100	7,100
2	29	2,300	180	147	11,500	4,560	293	8,400	6,650
3	28	2,000	151	139	7,500	2,810	289	8,500	6,630
4	28	1,800	136	130	7,000	2,460	289	8,200	6,400
5	27	1,800	131	141	6,200	2,360	258	7,800	5,430
6	24	1,700	110	136	8,500	3,120	268	8,600	6,220
7	22	1,300	77	170	11,300	5,190	278	8,200	6,150
8	21	1,300	74	150	8,500	3,440	272	8,200	6,020
9	19	1,400	72	147	4,900	1,940	268	7,300	5,280
10	19	1,300	67	133	5,600	2,010	268	8,000	5,790
11	19	1,300	67	96	6,800	1,760	258	7,400	5,150
12	21	1,300	74	98	6,800	1,800	261	7,600	5,360
13	23	1,300	81	184	8,800	4,370	282	7,000	5,330
14	38	3,100	318	176	7,500	3,560	296	6,800	5,430
15	75	7,200	1,460	178	7,500	3,600	325	7,500	6,580
16	40	5,800	626	190	8,100	4,160	314	7,100	6,020
17	71	12,000	2,300	190	8,600	4,410	344	7,100	6,590
18	94	7,600	1,930	196	7,800	4,130	336	6,900	6,260
19	144	8,300	3,230	228	8,400	5,170	336	6,500	5,900
20	128	9,200	3,180	224	9,100	5,500	318	5,900	5,070
21	111	6,700	2,010	215	9,000	5,220	300	5,600	4,540
22	94	5,600	1,420	261	10,900	7,680	289	5,600	4,370
23	79	5,500	1,170	268	9,400	6,800	296	6,200	4,960
24	81	4,700	1,030	254	7,800	5,350	293	6,200	4,900
25	94	6,700	1,700	251	8,600	5,830	293	6,700	5,300
26	109	8,600	2,530	264	8,600	6,130	347	7,400	6,930
27	120	6,100	1,980	272	8,600	6,320	389	8,300	8,720
28	161	8,000	3,480	282	8,400	6,400	389	9,300	9,770
29	161	8,500	3,690	275	8,200	6,090	355	8,400	8,050
30	161	6,900	3,000	278	8,000	6,000	332	8,100	7,260
31	--	--	--	289	7,500	5,850	--	--	--
Total	2,071	--	36,525	6,168	--	142,310	9,125	--	184,160
	July			August			September		
1	293	8,000	6,330	389	8,300	8,720	272	5,200	3,820
2	275	6,800	5,050	389	8,400	8,820	286	4,900	3,780
3	261	6,900	4,860	362	7,600	7,430	282	4,700	3,580
4	247	6,900	4,600	336	7,400	6,710	258	4,300	3,000
5	275	7,900	5,870	303	7,100	5,810	264	4,400	3,140
6	268	7,500	5,430	289	7,100	5,540	268	4,100	2,970
7	258	6,600	4,600	289	7,200	5,620	282	4,100	3,120
8	258	6,700	4,670	289	6,900	5,380	254	4,300	2,950
9	247	7,100	4,740	289	7,200	5,620	228	4,200	2,590
10	231	7,200	4,490	303	7,200	5,890	268	5,800	4,200
11	231	6,800	4,240	293	7,100	5,620	336	7,500	6,800
12	238	6,900	4,430	296	6,800	5,430	340	8,000	7,340
13	258	7,300	5,090	318	7,000	6,010	321	6,800	5,890
14	336	7,400	6,710	318	6,900	5,920	303	7,000	5,730
15	396	8,200	8,770	314	6,700	5,680	224	7,300	4,420
16	370	9,200	9,190	314	7,300	6,190	199	5,200	2,790
17	358	9,500	9,180	296	6,500	5,190	181	4,300	2,100
18	362	11,300	11,000	296	5,800	4,640	164	3,900	1,730
19	358	10,400	10,000	321	--	e 5,800	155	3,700	1,550
20	408	11,100	12,200	321	7,000	6,070	144	3,300	1,280
21	432	10,600	12,400	332	--	e 6,300	130	3,300	1,160
22	392	9,100	9,630	336	--	e 7,000	125	3,300	1,110
23	351	8,400	7,960	347	7,700	7,210	144	3,200	1,240
24	314	8,200	6,950	318	6,600	5,670	167	4,000	1,800
25	289	7,600	5,930	296	6,200	4,960	176	3,900	1,850
26	296	8,500	6,790	278	6,000	4,500	170	3,900	1,790
27	282	7,000	5,330	278	7,000	5,250	173	3,700	1,730
28	318	7,100	6,100	272	5,600	4,110	167	4,200	1,890
29	347	7,200	6,750	293	6,000	4,750	167	3,700	1,670
30	355	7,900	7,570	286	5,400	4,170	164	4,000	1,770
31	358	8,000	7,730	275	4,900	3,640	--	--	--
Total	9,662	--	214,590	9,636	--	179,650	6,612	--	88,790
Total discharge for year (cfs-days)									51,394
Total load for year (tons)									912,219

e Estimated.

s Computed by subdividing day.

FIVEMILE CREEK NEAR SHOSHONI, WYO.--Continued

Particle-size analyses of suspended sediment, water year October 1953 to September 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; V, visual accumulation tube)

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. 16, 1953	12:15 p.m.	48	57	4,900	1,310		7		10		17	22	44	54	64	96	VPWCM
Nov. 30	1:20 p.m.	55	--	2,310	3,170		11		18		30	57	95	99	99	100	VPWCM
Feb. 12, 1954	11:05 a.m.	39	32	741	866		5		42		56	61	73	86	97	100	VPN
Feb. 12	11:05 a.m.	39	32	741	1,010		29		46		56	61	73	86	97	100	VPWCM
Feb. 17	9:10 a.m.	31	32	1,800	3,400		17		24		38	52	69	74	76	85	VPWCM
Mar. 10	3:55 p.m.	26	--	3,800	2,540		2		32		62	84	100	--	--	--	VPN
Mar. 10	3:55 p.m.	26	--	3,800	2,700		23		36		62	84	100	--	--	--	VPWCM
May 7	11:05 a.m.	190	51	10,200	3,610		30		45		67	82	93	98	99	100	VPWCM
May 17	10:05 a.m.	206	60	7,720	2,830		2		30		54	74	93	99	100	--	VPN
May 17	10:05 a.m.	206	60	7,720	2,970		23		33		54	74	93	99	100	--	VPWCM
June 4	12:45 p.m.	311	61	7,500	3,140		22		34		54	71	87	94	98	100	VPWCM
June 18	12:10 p.m.	362	64	5,900	1,820		6		27		45	63	84	92	97	100	VPN
June 18	12:10 p.m.	362	64	5,900	1,980		20		36		45	63	84	92	97	100	VPWCM
June 30	12:45 p.m.	355	69	7,660	2,780		20		32		49	65	84	90	97	100	VPWCM
July 16	12:05 p.m.	389	75	9,280	2,700		2		25		47	64	85	88	95	100	VPN
July 16	12:05 p.m.	389	75	9,280	3,060		19		28		47	64	85	88	95	100	VPWCM
Aug. 2	1:50 p.m.	412	74	9,130	2,190		21		29		44	59	80	88	94	100	VPWCM
Aug. 13	2:10 p.m.	325	--	7,080	1,410		5		27		37	52	79	92	99	100	VPN
Aug. 13	2:10 p.m.	325	--	7,080	1,370		19		24		37	52	79	92	99	100	VPWCM
Aug. 24	2:45 p.m.	318	70	6,340	1,230		16		18		33	56	87	96	98	100	VPWCM
Sept. 3	2:50 p.m.	289	71	4,810	1,020		6		23		37	53	73	83	95	100	VPN
Sept. 3	2:50 p.m.	289	71	4,810	1,190		10		20		37	53	73	83	95	100	VPWCM
Sept. 28	1:50 p.m.	167	56	3,880	2,120		18		28		39	54	77	88	95	100	VPWCM

YELLOWSTONE RIVER BASIN--Continued

POISON CREEK NEAR SHOSHONI, WYO.

LOCATION.--At gaging station, half a mile upstream from normal high-water line of Boysen Reservoir and 1 mile west of Shoshoni, Fremont County.
DRAINAGE AREA.--519 square miles.
RECORDS AVAILABLE.--Water temperatures: March to June 1949.
Sediment records: March 1949 to December 1953 (discontinued).
EXTREMES, October to December 1953.--Sediment concentrations: Maximum daily, not determined; minimum daily, no flow on many days.
Sediment loads: Maximum daily, not determined; minimum daily, 0 tons on many days.
EXTREMES, 1949-53.--Sediment concentrations: Maximum daily, not determined; minimum daily, no flow on many days each year.
Sediment loads: Maximum daily, 8,000 tons (estimated) July 23, 1950; minimum daily, 0 tons on many days each year.
REMARKS.--Records of discharge for October to December 1953 given in WSP 1279.

Suspended sediment, October to December 1953

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	0		0	0.2			0.4	72	
2	0		0	.2			.4	--	
3	0		0	.2			.3	--	
4	0		0	.1			.3	133	
5	0		0	.1			.2	--	e 0.1
6	0		0	.1			.1	--	
7	0		0	.1			.1	--	
8	0		0	.1			0	--	0
9	0		0	.1			0	--	0
10	0		0	.1		(t)	0	--	0
11	0		0	.1			0	--	0
12	0		0	.1			0	--	0
13	0		0	.1			.1		
14	0		0	.1			.1		
15	0		0	.1			.1		
16	0		0	.1			.1		
17	0		0	.1			.1		
18	0		0	.1			.1	--	(t)
19	0		0	0		0	.1		
20	0		0	0		0	.1		
21	0		0	0		0	.1		
22	0		0	0		0	.1		
23	.1			0		0	0	--	0
24	.1			0		0	0	--	0
25	.1			0		0	0	--	0
26	.1			0		0	0	--	0
27	.1		(t)	.1			0	--	0
28	.1			.2		e .1	0	--	0
29	.1			.2			0	--	0
30	.2			.3			0	--	0
31	.2			--		--	0	--	0
Total	1.1		0.4	2.9		1.1	2.8	--	0.8

Total discharge for period Oct. 1 to Dec. 31, 1953 (cfs-days)..... 6.8
Total load for period Oct. 1 to Dec. 31, 1953 (tons)..... 2.3

e Estimated.
t Less than 0.050 ton.

YELLOWSTONE RIVER BASIN--Continued

BADWATER CREEK AT BONNEVILLE, WYO.

LOCATION.--At gaging station at Bonneville, Fremont County, 3 miles upstream from normal high-water line of Boysen Reservoir.
DRAINAGE AREA.--790 square miles, approximately.
RECORDS AVAILABLE.--Sediment records: October 1947 to February 1954, August to September 1954.
EXTREMES, October 1953 to February 1954, August to September 1954.--Sediment concentrations: Maximum daily, 39,100 ppm Aug. 7; minimum daily, no flow on many days.
Sediment loads: Maximum daily,18,800 tons Aug. 6; minimum daily, 0 tons on many days.
EXTREMES, 1947-54.--Sediment concentrations: Maximum daily, 108,000 ppm July 11, 1949; minimum daily, no flow on many days each year.
Sediment loads: Maximum daily, 69,800 tons June 2, 1949; minimum daily, 0 tons on many days each year.
REMARKS.--No flow during period October to February; record is omitted. Records of discharge for water year October 1953 to September 1954 given in WSP 1339.

Suspended sediment, August to September 1954

Day	July			August			September		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1				0	--	0			
2				0	--	0			
3				0	--	0			
4				0	--	0			
5				0	--	0			
6				56	19,300	s 18,800			
7				10	39,100	sa 1,500			
8				0	--	0			
9				0	--	0			
10				0	--	0			
11				0	--	0			
12				0	--	0			
13				0	--	0			
14				0	--	0			
15				0	--	0			
16				0	--	0			
17				0	--	0			
18				0	--	0			
19				0	--	0			
20				0	--	0			
21				0	--	0			
22				0	--	0			
23				0	--	0			
24				0	--	0			
25				0	--	0			
26				0	--	0			
27				0	--	0			
28				0	--	0			
29				0	--	0			
30				0	--	0			
31				0	--	0			
Total				66	--	20,300	0		0

Total discharge for period Oct. 1, 1953, to Feb. 28, 1954, Aug. 1 to Sept. 30, 1954 (cfs-days) 66
Total load for period Oct. 1, 1953, to Feb. 28, 1954, Aug. 1 to Sept. 30, 1954 (tons)..... 20,300

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

YELLOWSTONE RIVER BASIN--Continued

MUDDY CREEK NEAR PAVILLION, WYO.

LOCATION.--270 feet upstream from Wyoming Canal siphon, three-quarters of a mile downstream from gaging station, 3¾ miles downstream from Sheep Creek, and 9½ miles northeast of Pavillion, Fremont County.
DRAINAGE AREA.--257 square miles.
RECORDS AVAILABLE.--Water temperatures: March to July 1949.
Sediment records: March 1949 to November 1953 (discontinued).
EXTREMES, October to November 1953.--Sediment concentrations: Maximum daily, 725 ppm Oct.21; minimum daily, not determined.
Sediment loads: Maximum daily, 8 tons Oct. 21; minimum daily, not determined.
EXTREMES, 1949-53.--Sediment concentrations: Maximum daily, not determined; minimum daily, no flow on several days during 1950-51, 1953.
Sediment loads: Maximum daily, 140,000 tons (estimated) July 4, 1950; minimum daily, 0 tons on several days during 1950-51, 1953.
REMARKS.--No appreciable inflow between sampling point and gaging station except during periods of heavy local runoff. Records of discharge for October to December 1953 given in WSP 1279.

Suspended sediment, October to November 1953

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	1.8			4.2		e 4			
2	2.2			5.0	399	5			
3	2.2	189	1	--		--			
4	3.0			--		--			
5	3.0			--		--			
6	4.6			--		--			
7	5.0			--		--			
8	5.6			--		--			
9	6.8			--		--			
10	6.2			--		--			
11	6.8			--		--			
12	6.8			--		--			
13	6.8	238	4	--		--			
14	6.8			--		--			
15	7.4			--		--			
16	6.2			--		--			
17	6.8			--		--			
18	6.8			--		--			
19	7.4			--		--			
20	7.4			--		--			
21	4.2	725	8	--		--			
22	3.8	722	7	--		--			
23	4.6			--		--			
24	5.6			--		--			
25	6.2	459	7	--		--			
26	5.6			--		--			
27	6.2			--		--			
28	5.6			--		--			
29	5.6	357	5	--		--			
30	5.0			--		--			
31	4.6			--		--			
Total	166.6	--	133	9.2		9			

Total discharge for period Oct. 1 to Nov. 2, 1953 (cfs-days)..... 175.8
Total load for period Oct. 1 to Nov. 2, 1953 (tons)..... 142

e Estimated.

YELLOWSTONE RIVER BASIN--Continued

MUDDY CREEK NEAR SHOSHONI, WYO.

LOCATION.--At gaging station, 1½ 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.
Sediment records: March 1949 to September 1954.
EXTREMES, 1953-54.--Sediment concentrations: Maximum daily, 49,000 ppm May 11; minimum daily, not determined.
Sediment loads: Maximum daily, 20,000 tons May 11; minimum daily, less than 0.50 ton on many days during December, January, and February.
EXTREMES, 1949-54.--Sediment concentrations: Maximum daily, not determined; 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, 56,700 ppm July 18. Flow affected by ice Nov. 20 to Mar. 19, Mar. 30 to Apr. 1. Records of discharge for water year October 1953 to September 1954 given in WSP 1339.

Suspended sediment, water year October 1953 to September 1954

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	17	--		7.6	--		7.0	--	
2	16	4,660		7.6	4,620		7.0	1,130	
3	18	--	e 250	7.1	--		7.0	--	e 30
4	19	--		8.9	6,290		6.5	2,400	
5	17	6,520		8.3	--		5.0	--	
6	12	--		7.6	2,960		4.5	--	
7	13	3,580	e 150	5.7	--		4.0	1,160	e 15
8	13	--		6.2	--		3.5	--	
9	8.3	--		7.6	7,340		2.0	--	
10	7.1	--		7.6	--	e 95	1.5	622	
11	6.7	--		7.6	--		1.5	199	
12	6.7	4,900		7.1	--		2.0	--	
13	6.2	--		6.2	6,460		2.5	--	
14	5.7	13,100		6.7	--		2.5	240	
15	5.7	--	e 90	6.2	--		2.5	--	
16	5.2	1,560		6.2	8,020		2.5	374	e 2
17	5.2	--		6.2	--		2.5	--	
18	5.2	--		5.7	--	e 50	2.5	444	
19	5.7	2,360		2.6	--	e 10	2.5	--	
20	6.2	--		1.0	200		3.0	--	
21	9.6	7,810		1.5	--	e 2	2.5	--	
22	7.6	4,600		2.0	--		1.5	--	
23	5.7	4,610		3.0	440		1.0	--	
24	5.7	--		4.0	--	e 5	.8	242	
25	6.7	--		5.5	422		.6	--	
26	6.7	--	e 80	6.5	--		.6	--	
27	6.7	2,260		8.0	1,800		.6	--	(t)
28	7.1	760		8.0	--	e 30	.7	--	
29	7.1	--		7.5	--		.7	--	
30	6.7	4,700		7.0	1,040		.7	--	
31	7.1	--		--	--	--	.7	176	
Total	275.6	--	3,660	182.7	--	1,846	82.4	--	213

e Estimated.
t Less than 0.50 ton.

YELLOWSTONE RIVER BASIN--Continued

MUDDY CREEK NEAR SHOSHONI, WYO.--Continued

Suspended sediment, water year October 1953 to September 1954--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	0.7	--		0.3	--		11	--	e 10
2	.8	--		.2	--		8.0	--	e 8
3	.8	--		.2	--		3.0	--	e 3
4	.8	--		.2	--	(t)	1.0	498	1
5	.8	--		.2	72		1.0	355	1
6	.8	--		.5	--		1.5	--	e 2
7	.6	--		1.0	--		2.0	--	e 5
8	.5	61		2.5	--		3.0	--	e 10
9	.4	--		4.0	--	e 2	4.0	--	e 25
10	.4	--		5.0	--		5.0	4,000	54
11	.4	--		6.0	--		4.0	--	e 20
12	.4	--		7.0	278		2.0	1,000	5
13	.4	--		7.5	--	e 6	2.0	--	e 5
14	.4	--		8.0	--		2.5	--	e 25
15	.4	328		8.5	--		4.0	8,100	87
16	.5	--	(t)	9.0	--		6.0	--	e 130
17	.5	--		10	--		9.0	--	e 200
18	.5	--		11	--		11	--	e 250
19	.5	--		10	398		13	8,700	305
20	.5	--		9.0	--	e 10	15	--	e 350
21	.2	--		9.5	--		18	--	e 450
22	.1	--		10	--		13	--	e 350
23	.2	--		10	--		11	--	e 250
24	.3	--		10	--		10	--	e 200
25	.3	--		12	--		7.6	--	e 150
26	.2	--		14	810	e 20	10	--	e 250
27	.1	--		10	--		13	--	e 350
28	.1	--		10	--		8.9	--	e 200
29	.2	--		--	--	--	7.6	5,500	113
30	.3	--		--	--	--	7.0	--	e 100
31	.4	--		--	--	--	7.0	9,900	187
Total	13.5	--	9	185.6	--	209	221.1	--	4,096

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	10	13,500	365	12	--	e 250	41	--	e 1,200
2	12	--	450	18	--	e 400	48	14,000	1,810
3	8.3	--		13	7,540		37	--	e 1,200
4	7.1	--		13	--		37	9,060	905
5	8.3	9,410	e 260	12	4,720	e 200	38	--	e 900
6	7.1	13,800		12	--		28	--	e 550
7	7.1	--		15	7,910	320	24	5,240	340
8	6.7	--		13	--	e 250	28	--	e 400
9	5.2	--		20	--	e 400	30	5,580	452
10	5.2	--		21	7,180	407	36	--	e 600
11	5.2	--		89	49,000	sa 20,000	36	7,500	729
12	5.7	9,290		40	32,100	s 3,790	35	--	e 700
13	6.2	--	e 140	17	--	e 600	21	--	e 300
14	6.2	8,410		12			23	5,700	354
15	6.2	--		12			32	7,900	683
16	5.7	--		12	8,040	260	34	6,800	624
17	5.2	--		13			29	8,200	642
18	5.2	--		13			25	6,000	405
19	5.2	5,640		7.6	8,910	183	24	--	e 350
20	5.2	--	e 85	8.3	--	e 150	23	--	e 300
21	4.3	8,100		6.7	4,360	79	25	8,300	560
22	6.7	--	e 150	8.9	--	e 100	19	5,800	a 300
23	4.3	--		12	--	e 150	13	3,500	123
24	4.8	--		12	4,940	160	12	2,600	a 85
25	5.2	--	e 110	8.9	--	e 100	21	5,200	295
26	4.3	14,300		12	12,000	389	22	5,700	a 340
27	4.3	3,860		33	14,000	a 1,200	45	12,000	s 1,630
28	4.3	--		46	13,000	1,610	35	11,000	a 1,000
29	11	--	e 300	43	--	e 1,500	33	10,000	891
30	7.1	--	e 150	35	--	e 900	41	10,200	1,130
31	--	--	--	34	8,010	735	--	--	--
Total	189.3	--	5,180	624.4	--	35,773	895	--	19,798

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

YELLOWSTONE RIVER BASIN --Continued

MUDDY CREEK NEAR SHOSHONI, WYO.--Continued

Suspended sediment, water year October 1953 to September 1954--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.....	39	10,200	1,070	13	5,720	201	27	3,800	277
2.....	35	9,000	851	8.9	4,700	113	14	--	e 100
3.....	29	--	e 500	6.2	--	e 70	12	2,720	88
4.....	26	--	e 400	8.9			7.6	--	e 55
5.....	30			11	5,820	151	11	--	e 90
6.....	30	5,970	484	8.9			14		
7.....	30			25	--	e 500	14		
8.....	21	--	e 300	39			17		
9.....	14	4,380	166	45			12		
10.....	12	--	e 150	43	7,840	889	14		
								2,970	120
11.....	7.6	--	e 120	39			14		
12.....	7.1	5,670	109	29	--	e 500	15		
13.....	9.6	9,330	242	27	5,500	401	16		
14.....	17	--	e 350	37	--	e 600	16		
15.....	15	3,000	122	44	--	e 800	14		
16.....	30	5,700	462	49	--	e 1,000	12	--	
17.....	47	--	e 1,000	60	9,400	1,520	11	3,680	e 110
18.....	100	41,700	s 12,500	38	5,800	595	10	--	
19.....	61	16,700	2,750	28	--	e 330	6.7	--	
20.....	82	25,200	s 6,350	29	4,210	330	5.7	776	
21.....	62	17,700	2,960	32	--	e 500	5.2	--	
22.....	57	--	e 2,000	33	--	e 570	5.7	1,700	e 40
23.....	46	--	e 1,100	32	6,580	569	7.1	--	
24.....	44	--	e 1,000	29	6,920	542	6.2	1,680	
25.....	39	--	e 950	28	5,600	423	4.8	--	
26.....	36	--	e 850	28	--	e 420	6.2		
27.....	29	--	e 550	38			6.2	2,420	39
28.....	37	9,920	s 1,080	41			5.2		
29.....	28			41	5,500	594	2.9	--	e 20
30.....	26	5,210	352	41			5.2	2,620	37
31.....	21			41			--	--	--
Total.	1,067.3	--	40,440	972.9	--	16,963	317.7	--	2,594

Total discharge for year (cfs-days)..... 5,027.5
Total load for year (tons)..... 130,781

e Estimated.
s Computed by subdividing day.

YELLOWSTONE RIVER BASIN--Continued

MUDDY CREEK NEAR SHOSHONI, WYO.-Continued

Particle-size analyses of suspended sediment, water year October 1953 to September 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; V, visual accumulation tube)

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. 16, 1953	11:15 a.m.	2.6	--	1,560	854		12		16		28	47	88	95	96	100	VPWCM
Nov. 9	1:50 p.m.	14	--	7,420	1,090		2		7		20	40	82	93	98	100	VPN
Nov. 9	1:50 p.m.	14	--	7,420	1,340		8		9		20	40	82	93	98	100	VPWCM
Nov. 30	11:50 a.m.	a 7.0	32	1,040	1,980		14		21		34	60	92	99	99	100	VPWCM
Mar. 10, 1954	4:20 p.m.	a 5.0	--	13,600	5,330		1		27		50	73	96	99	100	--	VPN
Mar. 10	4:20 p.m.	a 5.0	--	13,600	6,870		19		27		50	73	96	99	100	--	VPWCM
May 7	9:45 a.m.	15	48	7,540	2,190		17		24		41	62	94	99	99	100	VPWCM
May 17	1:15 p.m.	15	79	7,250	2,410		5		30		57	72	93	99	100	--	VPN
May 17	1:15 p.m.	15	79	7,250	2,440		23		34		57	72	93	99	100	--	VPWCM
June 4	11:10 a.m.	37	--	9,060	2,960		13		20		42	60	86	93	98	100	VPWCM
June 18	10:45 a.m.	23	64	5,940	850		5		19		29	47	82	92	97	100	VPN
June 18	10:45 a.m.	23	64	5,940	1,130		13		17		29	47	82	92	97	100	VPWCM
June 30	11:10 a.m.	44	67	10,300	1,840		20		30		49	64	89	91	98	100	VPWCM
July 16	8:00 a.m.	24	68	5,710	1,620		2		11		40	66	92	97	99	100	VPN
July 16	8:00 a.m.	24	68	5,710	1,720		11		15		40	66	92	97	99	100	VPWCM
July 18	10:45 a.m.	114	72	54,600	5,210		37		57		81	90	98	100	--	--	VPWCM
July 20	10:15 a.m.	126	71	35,200	4,100		16		25		59	73	92	96	98	100	VPWCM
Aug. 8	7:20 p.m.	42	--	8,240	4,280		18		26		44	68	92	97	99	100	VPWCM
Aug. 17	1:20 p.m.	65	71	10,200	3,050		20		28		48	68	93	98	100	--	VPWCM
Aug. 24	2:05 p.m.	31	74	6,920	1,900		3		24		43	57	76	86	95	100	VPN
Aug. 24	2:05 p.m.	31	74	6,920	1,910		19		30		43	57	76	86	95	100	VPWCM
Sept. 3	12:05 p.m.	13	78	2,720	748		0		14		28	47	88	96	99	100	VPN
Sept. 3	12:05 p.m.	13	78	2,720	765		7		14		28	47	88	96	99	100	VPWCM
Sept. 30	2:50 p.m.	8.3	61	3,280	2,120		7		11		20	45	93	99	100	--	VPWCM

a Daily mean discharge.

WIND RIVER BELOW BOYSEN RESERVOIR, WYO.

LOCATION.--At tailrace of power plant at Boysen Dam, 0.6 mile upstream from gaging station and 12.4 miles north of Shoshoni, Fremont County.
DRAINAGE AREA.--7,741 square miles.
RECORDS AVAILABLE.--Chemical analyses: November 1953 to September 1954 (discontinued).
Water temperatures: December 1953 to September 1954 (discontinued).
EXTREMES, November 1953 to September 1954.--Dissolved solids: Maximum, 830 ppm June 18-19; minimum, 444 ppm July 20 to Aug. 25.
Hardness: Maximum, 303 ppm June 18-19; minimum, 200 ppm Aug. 26 to Sept. 27.
Specific conductance: Maximum daily, 1,380 micromhos June 18; minimum daily, 647 micromhos Aug. 18.
Water temperatures (December to September): Minimum, 37°F Jan. 20.
REMARKS.--Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1953 to September 1954 given in WSP 1339.

Chemical analyses, in parts per million, November 1953 to September 1954

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
Nov. 24-30, 1953....	1,131	--	--	--	--	76	--	166		230	--	--	--	--	495	0.67	1,510	223	87	43	2.2	752	7.5
Dec. 1-31.....	1,140	9.5	0.00	61	18	77	3.2	167		233	13	0.4	0.4	0.10	520	.71	1,600	225	88	42	2.2	765	7.8
Jan. 1-21, 1954.....	1,053	--	--	--	--	82	--	174		244	--	--	--	--	538	.73	1,530	237	94	43	2.3	804	8.0
Jan. 22-Feb. 28.....	391	--	--	--	--	85	--	--		--	--	--	--	--	554	.75	585	244	--	43	2.4	822	--
Mar. 1-31.....	356	8.7	.00	65	21	89	3.2	183		265	16	.5	.8	.12	583	.79	560	250	100	43	2.4	847	8.1
Apr. 1-30.....	1,026	--	--	--	--	85	--	--		--	--	--	--	--	558	.76	1,550	248	--	43	2.3	837	--
May 1-31.....	1,794	--	--	--	--	86	--	--		--	--	--	--	--	566	.77	2,740	252	--	43	2.4	842	--
June 1-17	1,563	9.9	.00	62	20	79	3.6	173		230	16	.3	.9	.08	524	.71	2,210	236	94	42	2.2	789	7.9
June 18-19.....	1,540	--	--	--	--	147	--	175		375	66	--	--	--	830	1.13	3,450	303	159	51	3.7	1,210	7.3
June 20-July 19	1,346	--	--	--	--	73	--	169		221	--	--	--	--	497	.68	1,810	225	86	41	2.1	741	7.4
July 20-Aug. 25.....	1,527	--	--	--	--	66	--	158		201	--	--	--	--	444	.60	1,830	207	77	41	2.0	678	7.4
Aug. 26-Sept. 27....	1,178	11	.00	53	17	66	2.8	154		198	11	.3	.6	.09	445	.61	1,420	200	74	41	2.0	664	7.8
Sept. 28.....	1,200	--	--	--	--	92	--	168		248	27	--	--	--	548	.75	1,780	236	98	46	2.6	840	7.5
Sept. 29-30.....	1,195	--	--	--	--	71	--	160		209	--	--	--	--	460	.63	1,480	210	79	42	2.1	702	7.7
Weighted average a.	1,115	--	--	--	--	77	--	169		230	--	--	--	--	514	0.70	1,550	229	90	42	2.2	768	--
Weighted average b.	1,119	--	--	--	--	77	--	169		230	--	--	--	--	511	0.69	1,540	230	91	42	2.2	765	--

a Includes estimates where data are missing. Represents 85 percent of runoff for water year October 1953 to September 1954.
b Includes estimated data for missing period. Represents 100 percent of runoff for water year October 1953 to September 1954.

YELLOWSTONE RIVER BASIN--Continued

WIND RIVER BELOW BOYSEN RESERVOIR, WYO.--Continued

Temperature (°F) of water, December 1953 to September 1954
(Once-daily measurement between 4 p.m. and 6 p.m.)

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

BIGHORN RIVER AT THERMOPOLIS, WYO.

LOCATION.--At Broadway Street Bridge at Thermopolis, Hot Springs County, just downstream from Thermopolis Creek and about a quarter of a mile upstream from gaging station, which is upstream from principal hot springs inflow.
DRAINAGE AREA.--8,080 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: April 1947 to January 1954 (discontinued).
Water temperatures: April 1947 to January 1954 (discontinued).
Sediment records: March 1946 to September 1952.
EXTREMES, 1947-54.--Dissolved solids (1947-49, 1951-54): Maximum, 756 ppm Mar. 30, 1953; minimum, 176 ppm July 7-15, 1947.
Hardness (1947-49, 1951-54): Maximum, 346 ppm Apr. 1-20, 1947; minimum, 104 ppm June 22-24, 1951.
Specific conductance (1947-49, 1951-54): Maximum daily, 1,270 micromhos Apr. 26, 1947; minimum daily, 245 micromhos June 10, 1948.
Water temperatures: Maximum, 80°F June 29, 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 regional office at Lincoln, Nebr. Records of discharge for October to December 1953 given in WSP 1279.

Chemical analyses, in parts per million, October 1953 to January 1954

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
Oct. 1-31, 1953.....	1,210					71		168		222					485	0.66	1,580	228	90	40	2.0	736	7.6
Nov. 1-30.....	1,222					72		175		225					508	.69	1,680	238	94	40	2.0	763	7.8
Dec. 1-31.....	1,199	9.0	0.00	65	20	72	3.0	178		235	14	0.5	0.5	0.09	521	.71	1,690	245	99	39	2.0	775	7.7
Jan. 1-21, 1954.....	--					75		181		236					539	.73	--	249	101	40	2.1	794	7.8

YELLOWSTONE RIVER BASIN--Continued

BIGHORN RIVER AT THERMOPOLIS, WYO.--Continued

Temperature (°F) of water, October 1953 to January 1954
(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	59	50	44	40								
2	60	54	42	37								
3	55	50	44	--								
4	52	48	38	a 39								
5	55	51	42	a 41								
6	55	50	41	a 39								
7	50	48	42	a 45								
8	56	47	38	a 42								
9	50	47	38	b 40								
10	55	46	42	41								
11	55	50	40	b 40								
12	54	47	b 42	38								
13	50	49	b 41	b 36								
14	50	50	b 40	36								
15	50	51	b 40	34								
16	58	47	b 43	32								
17	50	49	b 42	--								
18	55	43	b 41	35								
19	55	40	b 39	35								
20	53	42	42	b 32								
21	52	40	40	32								
22	51	47	40	--								
23	50	45	35	--								
24	50	45	35	--								
25	51	49	36	--								
26	50	46	37	--								
27	50	44	36	--								
28	52	45	34	--								
29	50	44	36	--								
30	52	43	33	--								
31	51	--	35	--								
Average	53	47	39	--								

a Reading obtained between 4 p.m. and 5 p.m.
b Reading obtained between 12 m. and 2 p.m.

Periodic determinations of suspended-sediment discharge, October to November 1953

Date	Discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Discharge (tons per day)
Oct. 6, 1953	1,440	118	459
Nov. 3	1,200	15	49

YELLOWSTONE RIVER BASIN--Continued

FIFTEENMILE CREEK NEAR WORLAND, WYO.

LOCATION.--At gaging station, 1¾ miles upstream from mouth and 2¾ miles west of Worland, Washakie County.
DRAINAGE AREA.--500 square miles, approximately.
RECORDS AVAILABLE.--Sediment records: March 1951 to September 1954.
EXTREMES, 1953-54.--Sediment concentrations: Maximum daily, 97,100 ppm June 27; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 96,500 tons July 16; minimum daily, 0 tons on many days.
EXTREMES, 1951-54.--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.--No flow during period January to March; record is omitted. Records of discharge for water year October 1953 to September 1954 given in WSP 1339.

Suspended sediment, water year October 1953 to September 1954

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	0	--	0						
2	0	--	0						
3	0	--	0						
4	0	--	0						
5	0	--	0						
6	0	--	0						
7	0	--	0						
8	0	--	0						
9	0	--	0						
10	0	--	0						
11	0	--	0						
12	0	--	0						
13	0	--	0						
14	0	--	0						
15	0	--	0						
16	0	--	0						
17	0	--	0						
18	0	--	0						
19	0	--	0						
20	0	--	0						
21	132	73,000	s 29,900						
22	40	52,000	5,820						
23	19	37,200	1,980						
24	12	22,000	713						
25	7.0	--	e 350						
26	1.7	--	e 30						
27	.1	--	e 1						
28	0	--	0						
29	0	--	0						
30	0	--	0						
31	0	--	0						
Total	211.8	--	38,794	0		0	0		0

e Estimated.
s Computed by subdividing day.

YELLOWSTONE RIVER BASIN--Continued

FIFTEENMILE CREEK NEAR WORLAND, WYO.--Continued

Suspended sediment, water year October 1953 to September 1954--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	0	--	0	0	--	0	0	--	0
2	16	25,000	sa 2,200	0	--	0	0	--	0
3	21	39,100	2,300	22	35,200	s 3,050	0	--	0
4	25	39,400	s 3,120	61	41,600	7,110	0	--	0
5	9.0	36,900	930	35	38,600	s 3,960	0	--	0
6	4.8	28,200	365	13	30,400	s 1,160	0	--	0
7	2.4	25,200	163	7.2	24,400	474	0	--	0
8	1.2	22,300	72	2.8	20,200	153	0	--	0
9	.8	26,000	56	1.6	16,600	72	0	--	0
10	0	--	0	.8	15,200	33	0	--	0
11	0	--	0	.4	10,200	11	0	--	0
12	0	--	0	1.0	10,100	s 87	0	--	0
13	0	--	0	.8	21,400	46	0	--	0
14	0	--	0	0	--	0	0	--	0
15	0	--	0	0	--	0	0	--	0
16	0	--	0	0	--	0	0	--	0
17	0	--	0	0	--	0	0	--	0
18	0	--	0	0	--	0	0	--	0
19	0	--	0	0	--	0	0	--	0
20	0	--	0	0	--	0	0	--	0
21	0	--	0	0	--	0	0	--	0
22	0	--	0	0	--	0	0	--	0
23	0	--	0	0	--	0	0	--	0
24	0	--	0	0	--	0	0	--	0
25	0	--	0	0	--	0	0	--	0
26	0	--	0	0	--	0	294	13,900	s 59,400
27	0	--	0	0	--	0	298	97,100	83,900
28	0	--	0	0	--	0	138	86,400	s 36,100
29	0	--	0	0	--	0	140	59,000	sa 30,000
30	0	--	0	0	--	0	21	20,100	1,140
31	--	--	--	0	--	0	--	--	--
Total	80.2	--	9,206	145.6	--	16,156	891	--	210,540

Day	July			August			September		
1	11	6,000	178	0	--	0			
2	5.2	1,540	22	0	--	0			
3	3.2	1,010	9	0	--	0			
4	.8	240	1	0	--	0			
5	0	--	0	0	--	0			
6	0	--	0	4.2	5,600	sb 700			
7	0	--	0	6.1	31,000	sb 800			
8	0	--	0	0	--	0			
9	0	--	0	0	--	0			
10	0	--	0	0	--	0			
11	0	--	0	0	--	0			
12	0	--	0	0	--	0			
13	0	--	0	0	--	0			
14	0	--	0	0	--	0			
15	0	--	0	0	--	0			
16	457	55,800	s 96,500	0	--	0			
17	31	53,000	4,600	0	--	0			
18	11	45,000	1,390	0	--	0			
19	4.4	24,900	296	0	--	0			
20	2.0	25,600	138	0	--	0			
21	1.4	8,200	31	0	--	0			
22	0	--	0	0	--	0			
23	0	--	0	0	--	0			
24	0	--	0	0	--	0			
25	0	--	0	0	--	0			
26	0	--	0	0	--	0			
27	0	--	0	0	--	0			
28	1.7	3,800	sb 350	0	--	0			
29	7.4	43,800	s 1,080	0	--	0			
30	.4	15,500	s 33	0	--	0			
31	0	--	0	0	--	0			
Total	536.5	--	104,628	10.3	--	1,500	0		0

Total discharge for year (cfs-days) 1,875.4

Total load for year (tons) 380,824

s Computed by subdividing day.

a Computed from partly estimated concentration graph.

b Computed from estimated concentration graph.

FIFTEENMILE CREEK NEAR WORLAND, WYO.--Continued

Particle-size analyses of suspended sediment, October 1953 to July 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; V, visual accumulation tube)

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. 24, 1953	12:50 p.m.	13		22,000	3,820		93		98		98	--	--	--			SPWCM
Apr. 3, 1954	3:55 p.m.	46		43,200	6,230		81		97		99	--	--	--			SPWCM
May 4	4:25 p.m.	68		48,000	4,430		66		86		96	--	--	--			SPWCM
May 7	9:15 a.m.	8.4	50	25,400	4,230		96		100		--	--	--	--			PWCM
June 26	9:10 p.m.	1,830		70,500	3,370		53		71		88	94	99	100			VPWCM
June 26	11:05 p.m.	896		72,600	3,550		46		66		86	93	99	100			VPWCM
June 27	7:20 a.m.	453		142,000	3,400		48		70		91	95	99	100			VPWCM
June 27	10:45 a.m.	503		124,000	3,280		49		70		91	96	100	--			VPWCM
June 27	4:30 p.m.	140		90,200	5,480		63		89		97	99	100	--			VPWCM
June 28	9:25 a.m.	86		79,600	2,720		74		94		98	--	--	--			SPWCM
June 29	8:35 a.m.	50		71,400	3,060		78		97		100	--	--	--			SPWCM
July 1	4:20 p.m.	8.4		3,890	2,720		33		--		100	--	--	--			SPN
July 16	8:40 a.m.	907		76,200	3,720		41		62		82	90	98	99	100		VPWCM
July 16	4:00 p.m.	453		74,400	3,160		50		70		86	93	98	100			VPWCM
July 16	7:50 p.m.	150		63,000	3,110		60		84		94	--	--	--			SPWCM
July 18	6:50 a.m.	16		59,000	2,970		84		100		--	--	--	--			PWCM
July 21	11:30 a.m.	1.4		8,290	3,640		100		--		--	--	--	--			PWCM

YELLOWSTONE RIVER BASIN--Continued
BIGHORN RIVER AT KANE, WYO.

LOCATION.--At gaging station at bridge on State Highway 14, half a mile upstream from Shoshone River and 1½ miles northeast of Kane, Big Horn County.
DRAINAGE AREA.--15,900 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: December 1949 to September 1953.
Water temperatures: July to September 1949, October 1950 to September 1954.
Sediment records: March 1946 to September 1954.
EXTREMES, 1953-54.--Water temperatures: Maximum, 85°F July 12; minimum, freezing point on several days during December to March.
Sediment concentrations: Maximum daily, 16,200 ppm July 17; minimum daily, not determined.
Sediment loads: Maximum daily, 158,000 tons June 28; minimum daily, not determined.
EXTREMES, 1946-54.--Water temperatures (1950-54): Maximum, 85°F July 14, 30, 1953, July 12, 1954; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 972 000 tons June 25, 1946; minimum daily, not determined.
Sediment loads: Maximum daily, 972,000 tons June 25, 1946; minimum daily, not determined.
REMARKS.--Flow affected by ice Jan. 2-8, Jan. 16 to Feb. 18, Mar. 4-7. Records of discharge for water year October 1953 to September 1954 given in WSP 1339.

Temperature (°F) of water, water year October 1953 to September 1954
(Twice-daily measurements between 7 a.m. and 10 a.m., and between 4 p.m. and 8 p.m.)

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

a Reading obtained between 11 a.m. and 3 p.m.

YELLOWSTONE RIVER BASIN--Continued

BIGHORN RIVER AT KANE, WYO.--Continued

Suspended sediment, water year October 1953 to September 1954

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.....	1,300	690	2,420	1,990	700	3,760	1,800	721	3,500
2.....	1,140	441	1,360	1,720	--	e 2,900	1,800	777	3,780
3.....	1,220	540	1,780	1,760	574	2,730	1,740	406	1,910
4.....	1,250	648	2,190	1,700	658	3,020	1,590	294	1,260
5.....	1,460	900	3,550	1,820	714	3,510	1,550	469	1,960
6.....	1,390	630	2,360	1,850	--	e 3,600	1,560	532	2,240
7.....	1,420	576	2,210	1,770	574	2,740	1,570	553	2,340
8.....	1,400	621	2,350	1,750	567	2,680	1,680	392	1,780
9.....	1,380	567	2,110	1,690	490	2,240	1,780	288	1,380
10.....	1,430	540	2,080	1,570	504	2,140	2,020	210	1,150
11.....	1,450	648	2,540	1,550	532	2,230	2,110	280	1,600
12.....	1,490	810	3,260	1,580	490	2,090	2,120	200	1,140
13.....	1,620	882	3,860	1,590	497	2,130	2,260	63	384
14.....	1,570	702	2,980	1,600	448	1,940	2,320	84	526
15.....	1,560	621	2,620	1,630	406	1,790	2,260	78	476
16.....	1,570	675	2,860	1,630	889	3,910	2,230	75	452
17.....	1,550	747	3,130	1,660	448	2,010	2,190	77	455
18.....	1,560	738	3,110	1,690	441	2,010	2,230		
19.....	1,580	702	2,990	1,700	455	2,090	2,220		
20.....	1,600	828	3,580	1,700	742	3,410	1,940		
21.....	1,860	2,650	13,300	1,700	658	3,020	1,810		
22.....	2,380	5,310	34,100	1,700	--	e 2,600	1,850	357	1,900
23.....	1,950	10,700	56,300	1,700	511	2,350	1,990		
24.....	1,770	3,190	15,200	1,800	637	3,100	1,820		
25.....	1,820	1,180	5,800	1,800	651	3,160	1,870		
26.....	1,850	798	3,990	1,800	609	2,960	2,030		
27.....	1,810	714	3,490	1,800	588	2,860	1,940		
28.....	1,770	707	3,380	1,800	644	3,130	2,000	77	416
29.....	1,940	924	4,840	1,800	637	3,100	1,870	76	384
30.....	2,040	945	5,210	1,800	539	2,620	2,020	36	196
31.....	2,030	1,060	5,810	--	--	--	2,040	37	204
Total.	50,160	--	204,760	51,650	--	81,830	60,210	--	46,533

	January			February			March		
1.....	2,020	1,230	6,710	920	--	e 300	940	263	667
2.....	2,000	101	545	920	--	e 300	836	198	447
3.....	2,000	92	497	920	126	313	772	698	1,450
4.....	2,000	94	508	920			800	175	378
5.....	2,000	72	389	920			900	63	153
6.....	2,000	634	3,420	920			950	53	136
7.....	1,900	864	4,430	920			1,020	930	2,560
8.....	1,800	440	2,140	920			1,100	990	2,940
9.....	1,760	311	1,480	940			1,050	600	1,700
10.....	1,810	344	1,680	960	--	e 320	1,110	550	1,650
11.....	1,750	387	1,830	980			1,170	740	2,340
12.....	1,810	120	586	1,000			1,010	609	1,660
13.....	1,810	118	577	1,000			806	297	646
14.....	1,850	156	779	1,000			876	173	409
15.....	1,870	34	172	1,000			1,110	336	1,010
16.....	1,800	22	107	1,100	188	558	980	432	1,140
17.....	1,700			1,100	--	e 800	972	384	1,010
18.....	1,600			1,100	--	e 1,100	964	360	937
19.....	1,500			1,130	485	1,480	884	228	544
20.....	1,400	--	e 100	1,090	236	695	940	288	731
21.....	1,300			1,040	594	1,670	956	276	712
22.....	1,200	--	e 200	1,150	569	1,770	948	240	614
23.....	1,200	--	e 300	1,150	699	2,170	900	348	846
24.....	1,200	--	e 200	1,110	605	1,810	908	204	500
25.....	1,200			1,280	712	2,460	908	384	941
26.....	1,200	--	e 100	1,160	645	2,020	900	192	467
27.....	1,100			1,030	571	1,590	892	372	896
28.....	1,000			956	684	1,770	900	288	700
29.....	940			--	--	--	844	324	738
30.....	920	--	e 300	--	--	--	806	804	1,750
31.....	920			--	--	--	844	345	786
Total.	48,560	--	28,550	28,636	--	24,646	28,996	--	31,458

e Estimated.

YELLOWSTONE RIVER BASIN--Continued

BIGHORN RIVER AT KANE, WYO.--Continued

Suspended sediment, water year October 1953 to September 1954--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	844	253	577	2,260	1,820	11,100	2,420	960	6,270
2	932	935	2,350	2,600	2,420	17,000	2,440	748	4,930
3	932	2,410	6,060	2,630	1,520	10,800	2,400	994	6,440
4	1,030	3,630	10,100	2,720	3,690	27,100	2,070	799	4,470
5	1,190	3,900	12,500	2,770	4,230	31,600	1,870	697	3,520
6	1,090	2,560	7,530	2,500	3,230	21,800	1,950	960	5,050
7	1,030	2,110	5,870	1,970	2,030	10,800	2,120	1,030	5,900
8	932	1,150	2,890	1,700	1,140	5,230	1,960	790	4,180
9	1,470	2,420	9,600	1,580	931	3,970	1,750	604	2,850
10	1,500	1,550	6,280	1,580	893	3,810	1,660	578	2,590
11	1,380	1,150	4,280	2,050	3,910	21,600	1,710	774	3,570
12	1,360	920	3,380	2,360	4,240	27,000	1,740	527	2,480
13	1,380	870	3,240	2,380	4,140	26,600	1,740	468	2,200
14	1,420	860	3,300	2,560	2,800	19,400	1,870	578	2,920
15	1,430	1,330	5,140	2,710	2,200	16,100	2,080	629	3,530
16	1,370	730	2,700	2,950	2,400	19,100	2,040	740	4,080
17	1,330	590	2,120	2,980	2,370	19,100	2,040	722	3,980
18	1,320	800	2,850	2,620	1,980	14,000	1,990	561	3,010
19	1,280	750	2,590	2,790	1,700	12,800	1,900	--	e 2,800
20	1,350	480	1,750	3,130	1,750	14,800	1,800	476	2,310
21	1,260	510	1,740	3,390	1,960	17,900	1,860	442	2,220
22	1,200	640	2,070	3,680	2,450	24,300	2,080	570	3,200
23	1,100	590	1,750	4,170	3,220	36,300	2,120	561	3,210
24	1,020	560	1,540	3,520	2,320	22,000	2,020	552	3,010
25	948	450	1,150	2,710	1,280	9,370	2,230	877	5,280
26	1,390	780	2,930	2,460	1,010	6,710	2,150	954	5,540
27	1,470	760	3,020	2,920	1,450	11,400	3,200	5,120	s 56,400
28	1,340	570	2,060	2,850	1,280	9,850	4,220	13,900	s 158,000
29	1,380	770	2,870	2,690	1,550	11,300	3,600	8,760	85,100
30	1,960	1,390	7,360	2,600	1,220	8,560	2,500	7,060	47,700
31	--	--	--	2,600	1,100	7,720	--	--	--
Total	37,638	--	121,597	82,430	--	499,120	65,530	--	446,740

	July			August			September		
1	2,200	4,460	26,500	1,030	550	1,530	785	138	292
2	1,900	1,760	9,030	998	490	1,320	764	180	371
3	1,780	931	4,470	1,040	420	1,180	785	134	284
4	1,660	684	3,070	998	520	1,400	836	150	339
5	1,550	567	2,370	1,020	350	964	940	220	558
6	1,430	414	1,600	1,180	1,010	3,220	998	3,720	10,000
7	1,230	477	1,580	1,310	1,530	5,410	1,020	660	1,820
8	1,230	441	1,460	1,500	2,240	9,070	1,040	321	901
9	1,090	360	1,060	1,190	4,080	13,100	1,020	221	609
10	852	297	683	989	1,290	3,440	998	204	550
11	764	288	594	900	690	1,680	998	215	579
12	715	216	417	828	580	1,300	980	273	722
13	708	225	430	836	550	1,240	1,080	2,900	8,460
14	687	198	367	876	320	757	989	900	2,400
15	687	180	334	892	460	1,110	998	519	1,400
16	1,210	2,940	s 15,900	852	427	982	1,020	332	914
17	1,480	16,200	64,700	813	478	1,050	1,010	437	1,190
18	1,170	12,500	39,500	792	320	684	1,010	--	e 1,200
19	884	11,000	26,300	785	296	627	1,030	--	e 1,200
20	813	2,300	5,050	757	212	433	1,070	415	1,200
21	940	1,700	4,310	778	279	586	1,130	364	1,110
22	1,690	4,090	s 20,100	836	530	1,200	1,140	355	1,090
23	1,960	3,000	15,900	820	194	430	1,170	432	1,360
24	1,950	1,600	8,420	820	180	399	1,190	457	1,470
25	2,000	1,250	6,750	764	138	285	1,230	480	1,590
26	2,030	1,220	6,690	785	180	382	1,250	424	1,430
27	2,020	1,080	5,890	799	149	321	1,280	408	1,410
28	2,020	900	4,910	687	142	263	1,290	499	1,740
29	1,870	980	4,950	566	132	202	1,260	--	e 1,700
30	1,800	720	3,500	620	184	308	1,320	486	1,730
31	1,580	940	4,010	729	330	650	--	--	--
Total	43,900	--	290,845	27,790	--	55,523	31,631	--	49,619

Total discharge for year (cfs-days) 557,131

Total load for year (tons) 1,881,221

e Estimated.

s Computed by subdividing day.

BIGHORN RIVER AT KANE, WYO.--Continued

Particle-size analyses of suspended sediment, water year October 1953 to September 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; V, visual accumulation tube)

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. 22, 1953	12:25 p.m.	2,790	--	6,500	4,480		60		79		87	92	99	100	--		VPWCM
Oct. 22	3:45 p.m.	2,740	--	5,420	3,210		2		66		83	90	98	99	100		VPN
Oct. 22	3:45 p.m.	2,740	--	5,420	3,330		53		68		83	90	98	99	100		VPWCM
Oct. 23	5:15 a.m.	2,070	--	14,600	3,520		74		--		94	--	--	--	--		SPWCM
Feb. 23, 1954	12:45 p.m.	1,170	37	743	1,280		15		22		38	52	92	99	100		VPWCM
Apr. 5	12:50 p.m.	1,170	52	5,570	7,220		2		86		91	--	--	--	--		SPN
Apr. 5	12:50 p.m.	1,170	52	5,570	7,620		68		87		91	--	--	--	--		SPWCM
Apr. 8	5:50 p.m.	908	51	1,000	2,140		58		68		75	81	96	100	--		VPWCM
May 6	5:50 p.m.	2,350	--	2,430	2,890		4		65		78	87	97	100	--		VPN
May 6	5:50 p.m.	2,350	--	2,430	2,910		53		65		78	87	97	100	--		VPWCM
May 12	10:10 a.m.	2,480	66	4,320	2,800		54		74		85	92	98	100	--		VPWCM
May 27	12:45 p.m.	3,150	55	1,640	2,160		13		23		51	76	96	100	--		VPWCM
June 7	3:35 p.m.	2,140	62	805	1,550		13		17		38	68	96	100	--		VPWCM
June 25	11:45 a.m.	2,440	72	1,100	1,040		11		15		37	64	90	99	100		VPN
June 25	11:45 a.m.	2,440	72	1,100	1,090		14		19		37	64	90	99	100		VPWCM
June 27	5:40 p.m.	4,730	--	8,540	3,040		52		76		85	94	99	100	--		VPWCM
June 28	2:00 p.m.	4,240	68	12,800	4,730		61		87		93	97	100	--	--		VPWCM
July 7	8:00 a.m.	1,220	75	492	1,590		33		50		68	91	100	--	--		VPWCM
July 18	5:30 p.m.	964	83	18,600	3,500		78		97		99	--	--	--	--		SPWCM
July 19	7:40 a.m.	900	74	13,200	3,860		82		97		98	--	--	--	--		SPWCM
July 22	10:00 p.m.	2,000	69	4,500	2,600		62		80		92	96	100	--	--		VPWCM
Aug. 9	3:45 p.m.	1,100	80	3,930	5,190		4		95		95	97	100	--	--		VPN
Aug. 9	3:45 p.m.	1,100	80	3,930	4,630		71		92		95	97	100	--	--		VPWCM
Sept. 6	9:20 a.m.	956	61	12,200	4,150		63		95		99	--	--	--	--		SPWCM
Sept. 13	12:50 p.m.	1,180	64	6,820	5,770		2		85		95	--	--	--	--		SPN
Sept. 13	12:50 p.m.	1,180	64	6,820	4,670		52		89		95	--	--	--	--		SPWCM
Sept. 22	1:35 p.m.	1,130	66	398	1,260		16		25		38	45	69	--	89		BWCM

YELLOWSTONE RIVER BASIN--Continued

BIGHORN RIVER AT KANE, WYO.--Continued

Particle-size analyses of bed material, July to September 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; V, visual accumulation tube)

Date of collection	Number of sampling points	Discharge (cfs)	Water temperature (°F)	Bed material											Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	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	
July 16, 1954.....	4	1,600					0	6	68	98	100						SV
July 16.....	4	2,580					0	5	57	88	95	96	97	98	100		SV
Sept. 22.....	5	1,130					0	3	45	97	100						SV

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BIGHORN RIVER AT BIGHORN, MONT.

LOCATION.--At bridge on U. S. Highways 10 and 12, 1 mile upstream from mouth, 1 mile southwest of Bighorn, Treasure County, and 3½ miles downstream from gaging station near Custer, Mont.
RECORDS AVAILABLE.--Chemical analyses: February 1950 to September 1954.
Water temperatures: April 1949 to September 1951, August 1952 to September 1954.
Sediment records: July 1947 to September 1954 (discontinued).
EXTREMES, 1953-54.--Dissolved solids: Maximum, 932 ppm Mar. 1-31; minimum, 430 ppm May 22-25.
Hardness: Maximum, 440 ppm Mar. 1-31; minimum, 204 ppm July 5-11.
Specific conductance: Maximum daily, 1,390 micromhos Mar. 5, 6; minimum daily, 624 micromhos May 23.
Water temperatures: Maximum, 85°F July 17; minimum, freezing point on Mar. 2, 5, 31, Apr. 2, and probably on many other days during winter months.
Sediment concentrations: Maximum daily, 9,130 ppm Aug. 14; minimum daily, not determined.
Sediment loads: Maximum daily, 116,000 tons June 30; minimum daily, 150 tons (estimated) Jan. 20.
EXTREMES, 1947-54.--Dissolved solids (1951-54): Maximum, 932 ppm Mar. 1-31, 1954; minimum, 304 ppm June 23, 1951.
Hardness (1951-54): Maximum, 440 ppm Mar. 1-31, 1954; minimum, 151 ppm June 23, 1951.
Specific conductance (1951-54): Maximum daily, 1,390 micromhos Mar. 5, 6, 1954; minimum daily, 384 micromhos June 20, 1951.
Water temperatures (1949-51, 1952-54): Maximum, 89°F Aug. 7, 1953; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 23,200 ppm May 24, 1952; minimum daily, not determined.
Sediment loads: Maximum daily, 727,000 tons May 24, 1952; minimum daily, 136 tons Dec. 11, 1949.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. No appreciable inflow between gaging station and sampling point except small amounts of irrigation waste water. Discharge records for gaging station near Custer for water year October 1953 to September 1954 given in WSP 1339.

Chemical analyses, in parts per million, water year October 1953 to September 1954

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
Oct. 1-20, 1953.....	2,225	--	--	--	--	137	--	226		468	--	--	--	--	915	1.24	5,500	399	214	43	3.0	1,270	7.9
Oct. 21-Nov. 19	3,170	--	--	--	--	119	--	231		398	--	--	--	--	819	1.11	7,010	376	187	41	2.7	1,150	7.9
Nov. 20-Dec. 19.....	2,881	13	0.00	100	34	114	4.3	246		390	17	0.6	2.2	0.19	832	1.13	6,470	391	189	38	2.5	1,150	7.9
Dec. 20-Jan. 16, 1954	2,680	--	--	--	--	100	--	225		353	--	--	--	--	740	1.01	5,350	355	170	38	2.3	1,050	8.1
Jan. 23-Feb. 28	2,036	--	--	--	--	106	--	234		390	--	--	--	--	816	1.11	4,490	392	200	37	2.3	1,130	8.1
Mar. 1-31.....	1,889	13	.00	105	43	124	4.5	259		453	20	.5	2.2	.21	932	1.27	4,750	440	228	38	2.6	1,260	8.0
Apr. 1-30.....	2,363	--	--	--	--	119	--	233		418	--	--	--	--	843	1.15	5,380	383	192	40	2.6	1,170	7.9
May 1-12.....	3,630	--	--	--	--	101	--	207		338	--	--	--	--	697	.95	6,830	313	143	41	2.5	1,000	7.8
May 13-21.....	4,054	--	--	--	--	68	--	175		248	--	--	--	--	535	.73	5,860	258	114	36	1.8	783	7.9
May 22-25.....	5,333	12	.00	56	18	53	2.8	152		185	8.0	.3	3.0	.09	430	.58	6,190	212	87	35	1.6	641	7.8
May 26-31.....	4,173	--	--	--	--	73	--	174		250	--	--	--	--	539	.73	6,070	256	113	38	2.0	793	7.9
June 1-26	3,740	--	--	--	--	85	--	191		288	--	--	--	--	622	.85	6,280	285	128	39	2.2	888	7.6
June 27-28	3,550	--	--	--	--	80	--	185		278	--	--	--	--	601	.82	5,760	278	126	38	2.1	860	7.6
June 29-30	5,875	--	--	--	--	94	--	208		325	--	--	--	--	702	.95	11,100	318	147	39	2.3	980	7.5
July 1-4	4,213	--	--	--	--	80	--	186		275	--	--	--	--	592	.81	6,730	273	120	39	2.1	856	7.6
July 5-11.....	4,796	--	--	--	--	62	--	145		204	--	--	--	--	453	.62	5,870	204	85	40	1.9	663	7.5
July 12-19.....	3,520	--	--	--	--	71	--	153		224	--	--	--	--	495	.67	4,700	219	94	41	2.1	725	7.5
July 20-27	3,170	--	--	--	--	95	--	191		303	--	--	--	--	644	.88	5,510	276	119	43	2.5	921	7.8

YELLOWSTONE RIVER BASIN--Continued

BIGHORN RIVER AT BIGHORN, MONT.--Continued

Chemical analyses, in parts per million, water year October 1953 to September 1954--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
July 28-Aug. 14	2,145	--	--	--	--	121	--	205		393	--	--	--	--	784	1.07	4,540	331	163	44	2.9	1,100	7.8
Aug. 15-31	1,831	--	--	--	--	134	--	200		435	--	--	--	--	858	1.17	4,240	349	185	46	3.1	1,190	7.7
Sept. 1-30	2,023	13	.00	85	37	135	4.4	213		443	18	.6	2.0	.20	871	1.18	4,760	363	188	44	3.1	1,210	7.8
Weighted average a.	2,739	--	--	--	--	105	--	213		359	--	--	--	--	745	1.01	5,510	340	165	40	2.5	1,050	--
Weighted average b.	2,704	--	--	--	--	105	--	213		359	--	--	--	--	745	1.01	5,440	340	165	40	2.5	1,050	--

a Represents 99 percent of runoff for water year October 1953 to September 1954.

b Includes estimated data for missing period. Represents 100 percent of runoff for water year October 1953 to September 1954.

YELLOWSTONE RIVER BASIN--Continued

BIGHORN RIVER AT BIGHORN, MONT.--Continued

Temperature (°F) of water, water year October 1953 to September 1954
/Twice-daily measurements between 7 a.m. and 9 a.m. and between 5 p.m. and 8 p.m./

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

a Reading obtained between 10 a.m. and 4 p.m.

YELLOWSTONE RIVER BASIN--Continued

BIGHORN RIVER AT BIGHORN, MONT.--Continued

Suspended sediment, water year October 1953 to September 1954

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	2,120	176	1,010	3,060	638	5,270	3,030	225	1,840
2	2,100	160	907	3,200	570	4,920	3,010	240	1,950
3	2,100	192	1,090	3,130	458	3,870	3,010	315	2,560
4	2,060	144	801	3,050	360	2,960	3,010	278	2,260
5	2,160	184	1,070	3,050	--	e 2,500	3,000	225	1,820
6	2,210	216	1,290	3,050	248	2,040	2,950	330	2,630
7	2,240	344	2,080	3,080	--	e 2,500	2,920	345	2,720
8	2,240	328	1,980	3,110	330	2,770	2,850	345	2,650
9	2,270	328	2,010	3,110	382	3,210	2,800	352	2,660
10	2,280	224	1,380	3,210	375	3,250	2,700	240	1,750
11	2,200	232	1,380	3,250	308	2,700	2,600	300	2,110
12	2,170	184	1,080	3,420	240	2,220	2,600	375	2,630
13	2,180	208	1,220	3,470	262	2,450	2,600	465	3,260
14	2,290	240	1,480	3,470	390	3,650	2,600	472	3,310
15	2,290	216	1,340	3,430	352	3,260	2,600	--	e 3,500
16	2,270	256	1,570	3,380	322	2,940	2,500	540	3,640
17	2,280	192	1,180	3,310	308	2,750	2,700	510	3,720
18	2,330	224	1,410	3,280	278	2,460	2,750	510	3,790
19	2,340	240	1,520	3,130	278	2,350	2,800	487	3,680
20	2,370	320	2,050	3,010	315	2,560	2,950	480	3,820
21	2,510	738	5,000	3,000	315	2,550	2,950	660	5,260
22	2,760	1,020	7,600	3,000	285	2,310	2,900	675	5,290
23	3,560	2,380	22,900	2,980	300	2,410	2,900	398	3,120
24	3,350	2,820	25,500	2,980	315	2,530	2,900	420	3,290
25	3,230	6,600	57,600	3,030	322	2,630	2,800	308	2,330
26	3,200	4,100	35,400	3,060	322	2,660	2,850	667	5,130
27	3,180	1,420	12,200	3,090	368	3,070	2,850	435	3,350
28	3,160	772	6,590	3,090	345	2,880	2,850	525	4,040
29	3,060	622	5,140	3,090	278	2,320	2,900	502	3,930
30	2,900	615	4,820	3,080	308	2,560	2,850	322	2,480
31	3,000	540	4,370	--	--	--	2,850	420	3,230
Total	78,410	--	214,968	94,900	--	86,550	87,580	--	97,750
	January			February			March		
1	2,850	345	2,650	1,750	280	1,320	1,800	600	2,920
2	2,800	338	2,560	1,600	350	1,510	1,600	160	691
3	2,850	315	2,420	1,600	300	1,300	1,300	310	1,090
4	2,900	300	2,350	1,700	320	1,470	950	230	590
5	2,900	308	2,410	1,700	330	1,510	1,300	120	421
6	2,950	375	2,990	1,800	460	2,240	1,690	390	1,780
7	2,850	458	3,520	1,800	250	1,220	1,930	600	3,130
8	2,750	570	4,230	1,800	200	972	2,240	850	5,140
9	2,650	368	2,630	1,900	190	975	2,460	1,200	7,970
10	2,450	--	e 2,500	1,900	300	1,540	2,200	680	4,040
11	2,400	360	2,330	1,800	130	632	2,230	530	3,190
12	2,400	172	1,110	1,850	130	649	2,280	--	e 4,000
13	2,300	90	559	2,000	140	756	2,160	630	3,670
14	2,150	--	e 400	2,000	230	1,240	1,640	470	2,080
15	1,800	--	e 300	2,000	140	756	1,790	360	1,740
16	1,500	--	e 250	1,950	80	421	1,890	360	1,840
17	1,000	--	e 200	1,950	170	895	2,000	470	2,540
18	1,200	--	e 350	2,050	280	1,550	1,980	410	2,190
19	1,100	--	e 200	2,050	200	1,110	1,980	460	2,460
20	900	--	e 150	2,000	370	2,000	1,910	--	e 2,500
21	1,000	--	e 160	1,900	710	3,640	1,960	480	2,540
22	1,200	--	e 200	2,300	550	3,420	2,000	470	2,540
23	1,600	--	e 300	2,800	1,130	8,540	1,960	320	1,690
24	2,000	--	e 460	2,300	1,480	9,190	1,990	310	1,670
25	2,300	--	e 700	2,200	1,340	7,960	2,000	400	2,160
26	2,500	--	e 1,000	2,100	900	5,100	1,950	330	1,740
27	2,350	--	e 700	2,100	1,010	5,730	1,920	400	2,070
28	2,000	--	e 500	2,160	870	5,070	1,840	420	2,090
29	1,900	80	410	--	--	--	1,890	450	2,300
30	1,800	180	875	--	--	--	1,830	--	e 2,200
31	1,800	230	1,120	--	--	--	1,890	600	3,060
Total	65,150	--	40,534	55,060	--	72,716	58,560	--	78,042

e Estimated.

YELLOWSTONE RIVER BASIN--Continued

BIGHORN RIVER AT BIGHORN, MONT.--Continued

Suspended sediment, water year October 1953 to September 1954--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.....	1,880	460	2,340	2,990	1,200	9,690	4,350	742	8,710
2.....	1,840	340	1,690	3,630	1,630	16,000	4,400	705	8,380
3.....	1,890	480	2,450	4,350	2,410	28,300	4,450	735	8,630
4.....	2,030	420	2,300	4,400	1,860	22,100	4,520	908	11,100
5.....	2,320	948	5,940	4,600	1,900	23,600	4,180	758	8,550
6.....	2,940	3,940	31,300	4,850	3,870	50,700	3,770	660	6,720
7.....	3,030	7,550	61,800	4,200	4,140	46,900	4,250	728	8,350
8.....	2,740	5,300	39,200	3,450	2,860	26,600	4,850	1,420	18,600
9.....	2,350	2,850	16,800	2,780	1,410	10,600	4,300	2,770	32,200
10.....	2,380	2,040	13,100	2,590	1,010	7,060	4,050	1,220	13,300
11.....	2,640	1,330	9,480	2,720	873	6,410	3,830	864	8,930
12.....	2,500	1,130	7,630	3,000	972	7,870	3,670	578	5,730
13.....	2,340	756	4,780	3,500	1,290	12,200	3,650	750	7,390
14.....	2,290	578	3,570	3,630	2,060	20,200	3,580	728	7,040
15.....	2,350	595	3,780	3,770	2,250	22,900	3,710	637	6,380
16.....	2,470	620	4,130	4,200	2,000	22,700	3,750	645	6,530
17.....	2,400	629	4,080	4,380	1,740	20,600	3,540	532	5,080
18.....	2,360	544	3,470	4,620	1,580	19,700	3,360	525	4,760
19.....	2,290	492	3,040	4,280	1,230	14,200	3,310	540	4,830
20.....	2,530	612	4,180	3,960	1,030	11,000	3,200	495	4,280
21.....	2,350	561	3,560	4,150	1,010	11,300	3,060	540	4,460
22.....	2,390	612	3,950	4,880	1,440	19,000	3,000	585	4,740
23.....	2,320	578	3,620	5,430	2,050	30,100	3,090	480	4,000
24.....	2,300	552	3,430	6,120	2,680	44,300	3,230	510	4,450
25.....	2,200	646	3,840	4,900	1,740	23,000	3,090	510	4,250
26.....	2,090	434	2,450	3,980	1,120	12,000	3,060	682	5,630
27.....	2,230	476	2,870	3,750	825	8,350	3,160	630	5,380
28.....	2,400	646	4,190	4,080	915	10,100	3,940	1,240	s 15,600
29.....	2,510	621	4,210	4,580	960	11,900	6,180	5,860	97,800
30.....	2,520	722	4,910	4,400	802	9,530	5,570	7,730	116,000
31.....	--	--	--	4,250	802	9,200	--	--	--
Total.	70,880	--	262,090	126,420	--	588,110	116,100	--	448,000

	July			August			September		
1.....	4,280	5,450	63,000	2,250	630	3,830	1,610	88	383
2.....	3,790	3,130	32,000	2,060	620	3,450	1,540	80	333
3.....	3,980	3,120	33,500	1,930	730	3,800	1,480	96	384
4.....	4,800	2,170	28,100	1,940	480	2,510	1,500	160	648
5.....	5,120	1,840	25,400	1,800	360	1,750	1,660	153	686
6.....	5,200	1,560	21,900	1,760	390	1,850	1,860	484	2,430
7.....	5,120	1,470	20,300	1,910	430	2,220	2,230	840	5,060
8.....	4,780	1,290	16,600	2,230	540	3,250	2,220	600	3,600
9.....	4,880	1,310	17,300	2,440	690	4,550	2,200	2,520	15,000
10.....	4,420	1,240	14,800	2,390	1,030	6,650	2,040	711	3,920
11.....	4,050	1,020	11,200	2,140	1,070	6,180	2,020	288	1,570
12.....	3,810	893	9,190	2,010	2,600	14,100	2,020	202	1,100
13.....	3,540	874	8,350	1,880	840	4,260	2,070	232	1,300
14.....	3,250	788	6,910	1,990	9,130	s 54,900	2,060	330	1,840
15.....	3,030	750	6,140	2,040	2,010	11,100	2,070	495	2,770
16.....	2,950	750	5,970	2,040	710	3,910	2,070	570	3,190
17.....	3,560	1,160	11,100	1,930	2,060	10,700	2,070	472	2,640
18.....	4,120	2,340	26,000	1,840	970	4,820	2,070	240	1,340
19.....	3,900	5,400	56,900	1,730	450	2,100	2,070	202	1,130
20.....	3,470	4,400	41,200	1,720	290	1,350	2,070	225	1,260
21.....	3,180	3,740	32,100	1,620	320	1,400	2,070	225	1,260
22.....	3,080	1,830	15,200	1,720	290	1,350	2,070	202	1,130
23.....	3,140	1,430	12,100	1,990	550	2,960	2,150	195	1,130
24.....	3,500	1,550	14,600	2,060	730	4,060	2,200	240	1,430
25.....	3,280	2,030	18,000	2,040	680	3,750	2,120	218	1,250
26.....	3,010	1,260	10,200	1,840	693	3,440	2,150	240	1,390
27.....	2,700	970	7,070	1,780	378	1,820	2,220	300	1,800
28.....	2,520	770	5,240	1,740	272	1,280	2,230	285	1,720
29.....	2,470	680	4,530	1,720	200	929	2,270	232	1,420
30.....	2,480	660	4,420	1,720	176	817	2,280	225	1,390
31.....	2,410	696	4,490	1,600	136	588	--	--	--
Total.	113,820	--	583,810	59,860	--	169,674	60,690	--	64,504

Total discharge for year (cfs-days)..... 987,130

Total load for year (tons)..... 2,706,748

s Computed by subdividing day.

YELLOWSTONE RIVER BASIN--Continued

BIGHORN RIVER AT BIGHORN, MONT.--Continued

Particle-size analyses of suspended sediment, October 1953 to August 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; V, visual accumulation tube)

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. 25, 1953	6:00 p.m.	3,260	44	7,860	6,110	--	77	--	94	--	94	--	--		--	--	SPWCM
Oct. 31	12:55 p.m.	3,010	--	551	1,330	31	35	40	48	53	61	72	96		99	100	BWCM
Jan. 6, 1954	1:05 p.m.	a 2,950	--	432	715	--	17	--	24	--	30	51	94	99	100	--	VPWCM
Apr. 2	1:45 p.m.	1,830	32	325	875	44	54	61	71	76	78	79	95		99	100	BWCM
Apr. 15	11:50 a.m.	2,300	51	580	1,580	31	37	44	54	60	67	74	94		99	100	BWCM
May 5	2:10 p.m.	4,800	56	1,960	4,350	--	34	--	52	--	76	93	100		--	--	VPWCM
May 7	9:10 a.m.	4,350	56	4,390	5,460	--	2	--	82	--	91	96	100		--	--	VPN
May 7	9:10 a.m.	4,350	56	4,390	5,400	--	62	--	82	--	91	96	100		--	--	VPWCM
May 20	1:00 p.m.	3,900	71	940	2,160	--	38	--	62	--	82	95	100		--	--	VPWCM
June 2	10:10 a.m.	4,380	52	727	1,150	--	27	--	37	--	58	83	100		--	--	VPWCM
June 30	11:10 a.m.	5,840	68	8,480	2,820	--	9	--	86	--	92	96	100		--	--	VPN
June 30	11:10 a.m.	5,840	68	8,480	2,710	--	67	--	89	--	92	96	100		--	--	VPWCM
July 6	1:45 p.m.	5,200	77	1,670	2,520	--	30	--	42	--	64	89	100		--	--	VPWCM
July 19	5:30 p.m.	3,810	79	4,440	5,210	--	67	--	89	--	91	96	100		--	--	VPWCM
July 20	7:05 a.m.	3,560	--	3,470	4,500	--	3	--	87	--	91	96	100		--	--	VPN
July 20	7:05 a.m.	3,560	--	3,470	4,660	--	67	--	87	--	91	96	100		--	--	VPWCM
Aug. 3	4:10 p.m.	1,910	77	554	1,730	45	55	60	66	69	71	77	92		100	--	BWCM
Aug. 16	2:35 p.m.	2,070	72	508	1,280	4	15	25	37	51	65	76	93		99	100	BWCM
Aug. 17	9:00 a.m.	2,010	65	3,420	4,210	--	4	--	93	--	95	96	100		--	--	VPN
Aug. 17	9:00 a.m.	2,010	65	3,420	4,060	--	79	--	92	--	95	96	100		--	--	VPWCM

a Daily mean discharge.

TONGUE RIVER NEAR ACME, WYO.

LOCATION.--At gaging station at highway bridge, just upstream from Ash Creek and 3.2 miles northeast of Acme, Sheridan County.
DRAINAGE AREA.--894 square miles.
RECORDS AVAILABLE.--Chemical analyses: January 1952 to September 1954.
REMARKS.--Records of discharge for water year October 1953 to September 1954 given in WSP 1339.

Chemical analyses, in parts per million, water year October 1953 to September 1954

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. 5, 1953	75	5.0	0.04	73	45	41		304		192	4.5	0.3	1.7	0.14	530	0.72		368	119	20	0.9	814	7.8
Nov. 4	176	--	--	66	37	29		281		139	3.5	--	--	--	--	--		318	88	16	.7	682	8.0
Dec. 2	176	--	--	62	34	27		260		131	3.5	--	--	--	--	--		296	83	17	.7	642	8.0
Jan. 6, 1954	a 185	--	--	66	35	25		274		128	3.5	--	--	--	--	--		309	84	15	.6	660	7.8
Feb. 2	a 170	--	--	61	32	27		246		129	4.5	--	--	--	--	--		283	81	17	.7	636	7.3
Mar. 4	a 110	7.0	.00	75	43	35		294		183	4.5	.2	2.5	--	507	.69		364	123	17	.8	788	7.7
Apr. 6	257	--	--	61	36	32		251		155	3.0	--	--	--	--	--		302	96	19	.8	684	7.6
May 6	a 388	5.2	.01	47	22	21		192		87	2.5	.2	1.0	.05	284	.39		208	51	18	.6	470	7.5
June 1	611	7.2	.03	33	14	12		137		50	1.5	.1	.9	.05	190	.26		142	30	15	.4	316	7.2
July 6	203	--	--	45	24	16		197		79	1.5	--	--	--	--	--		211	49	14	.5	456	7.7
Aug. 3	29	--	--	53	40	38		260		153	4.5	--	--	--	--	--		296	83	22	1.0	683	7.8
Sept. 8	41	6.4	.00	64	52	49		302		210	6.0	.3	2.3	.17	559	.76		372	124	22	1.1	840	7.8

a Daily mean discharge.

TONGUE RIVER AT MILES CITY, MONT.

LOCATION.--At gaging station, 4 miles south of Miles City, Custer County, and 8 miles upstream from mouth.
RECORDS AVAILABLE.--Chemical analyses: January 1951 to September 1954.
Water temperatures: April 1949 to September 1954.
Sediment records: June 1946 to September 1951.
EXTREMES, 1953-54.--Dissolved solids: Maximum, 1,430 ppm July 26 to Aug. 4; minimum, 266 ppm Aug. 18-19.
Hardness: Maximum, 464 ppm Jan. 1-24; minimum 102 ppm Oct. 22-24.
Specific conductance: Maximum daily, 2,260 micromhos July 29; minimum daily, 384 micromhos Aug. 18.
Water temperatures: Maximum, 86°F July 20; minimum, freezing point on many days during November to April.
EXTREMES, 1949-54.--Dissolved solids (1951-54): Maximum, 1,430 ppm July 26 to Aug. 4, 1954; minimum, 200 ppm June 23-27, 1953.
Hardness (1951-54): Maximum, 556 ppm Nov. 26 to Dec. 5, 1952; minimum, 96 ppm Mar. 29, 1952.
Specific conductance (1951-54): Maximum daily, 2,280 micromhos July 24, 1953; minimum daily, 288 micromhos June 21, 1953.
Water temperatures: Maximum, 86°F July 20, 1954; minimum, freezing point on many days during winter months.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1953 to September 1954 given in WSP 1339.

Chemical analyses, in parts per million, water year October 1953 to September 1954

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
Oct. 1-6, 1953	9.00	--	--	--	--	210	--	480	0	473	--	--	--	--	1,080	1.47	26.2	446	52	51	4.3	1,570	7.9
Oct. 7-8	109	--	--	--	--	83	--	299	0	255	--	--	--	--	611	.83	180	331	86	35	2.0	928	7.8
Oct. 9-21	156	--	--	--	--	53	--	250	0	186	--	--	--	--	473	.64	199	288	83	29	1.4	735	7.5
Oct. 22-24	1,095	--	--	--	--	84	--	183	0	130	--	--	--	--	360	.49	1,060	102	0	64	3.6	565	7.4
Oct. 25-31	323	--	--	--	--	49	--	239	0	178	--	--	--	--	450	.61	392	279	83	28	1.3	703	8.0
Nov. 1-30	395	--	--	--	--	48	--	265	0	210	--	--	--	--	523	.71	558	335	118	24	1.1	788	7.8
Dec. 1-7	334	--	--	--	--	52	--	282	0	238	--	--	--	--	577	.78	520	367	136	24	1.2	854	7.9
Dec. 8-31	159	11	0.00	88	58	75	5.0	358	0	323	6.0	0.4	1.1	0.15	753	1.02	323	460	166	26	1.5	1,080	8.2
Jan. 1-24, 1954	175	--	--	--	--	74	--	361	0	308	--	--	--	--	757	1.03	358	464	168	26	1.5	1,090	8.0
Jan. 25-Feb. 14	233	--	--	--	--	66	--	331	0	268	--	--	--	--	688	.94	433	414	143	26	1.4	982	8.0
Feb. 15-23	282	--	--	--	--	54	--	273	0	214	--	--	--	--	547	.74	416	338	114	26	1.3	819	8.0
Feb. 24-Mar. 8	210	9.4	.00	68	46	65	4.8	292	0	245	5.0	.4	1.2	.12	610	.83	346	358	119	28	1.5	900	8.0
Mar. 9	330	--	--	--	--	58	--	285	0	235	--	--	--	--	600	.82	535	356	122	26	1.3	866	8.0
Mar. 10-12	294	--	--	--	--	53	--	268	0	219	--	--	--	--	546	.74	433	335	115	26	1.3	814	8.1
Mar. 13-28	236	--	--	--	--	65	--	293	0	263	--	--	--	--	614	.84	391	368	128	28	1.5	916	7.9
Mar. 29-Apr. 17	200	--	--	--	--	74	--	301	0	285	--	--	--	--	659	.90	356	380	133	30	1.7	976	7.9
Apr. 18-May 13	230	--	--	--	--	60	--	265	5	255	--	--	--	--	593	.81	368	360	134	27	1.4	886	8.3
May 14-26	224	--	--	--	--	45	--	238	0	166	--	--	--	--	440	.60	266	274	79	26	1.2	688	8.1
May 27-June 7	637	17	.01	36	18	33	3.0	174	0	85	1.5	.6	2.6	.08	290	.39	499	164	21	30	1.1	452	8.0
June 8-18	315	--	--	41	19	38	--	183	0	109	2.0	--	--	--	320	.44	272	181	30	31	1.2	505	7.6
June 19-26	132	--	--	52	29	60	--	243	0	171	3.5	--	--	--	463	.63	165	249	50	34	1.7	705	7.8

June 27-July 10.....	110	--	--	57	33	71	--	263	0	205	4.5	--	--	--	527	.72	157	276	60	56	1.9	799	7.7
July 11-16.....	29.2	--	--	69	41	123	--	344	0	313	5.5	--	--	--	742	1.01	58.5	342	0	44	2.9	1,100	7.8
July 17-18	45.0	--	--	61	33	165	--	341	0	345	5.0	--	--	--	812	1.10	98.7	288	8	55	4.2	1,190	7.7
July 19-25	18.1	--	--	64	36	214	--	387	0	440	6.0	--	--	--	988	1.34	48.3	308	0	61	3	1,420	7.9
July 26-Aug. 4	9.53	--	--	87	59	305	--	524	0	665	10	--	--	--	1,430	1.94	36.8	461	31	78	6.7	1,990	8.1
Aug. 5-6	36.4	--	--	43	16	151	--	304	0	243	2.0	--	--	--	638	.87	62.7	174	0	65	5.0	960	7.7
Aug. 7-15.....	34.1	--	--	65	33	168	--	353	0	358	5.0	--	--	--	847	1.15	78.0	397	8	55	4.3	1,220	7.7
Aug. 16-17.....	985	--	--	59	17	92	--	276	0	174	1.0	--	--	--	498	.68	1,320	206	0	49	2.8	757	7.6
Aug. 18-19.....	572	--	--	33	8	46	--	186	0	63	1.0	--	--	--	266	.36	411	113	0	46	1.9	418	7.7
Aug. 20-22.....	55.0	--	--	52	23	93	--	233	0	225	3.0	--	--	--	545	.74	80.9	224	33	47	2.7	808	7.7
Aug. 23-24.....	27.5	--	--	72	41	138	--	339	0	350	6.0	--	--	--	810	1.10	60.1	347	69	46	3.2	1,170	7.6
Aug. 25-26.....	54.0	--	--	65	33	76	--	274	0	228	2.0	--	--	--	574	.78	83.7	296	71	36	1.9	854	8.1
Aug. 27-Sept. 5	8.12	--	--	--	--	146	--	356	0	350	--	--	--	--	814	1.11	17.8	331	44	49	3.5	1,180	7.8
Sept. 6-8	203	--	--	--	--	87	--	205	0	153	--	--	--	--	424	.58	232	140	0	57	3.2	637	7.6
Sept. 9-30	28.3	15	.00	68	43	119	6.3	348	0	303	5.0	.4	1.2	.21	737	1.00	56.3	347	62	42	2.8	1,070	7.7
Weighted average a.	212	--	--	--	--	60	--	b 267	--	213	--	--	--	--	536	0.73	307	311	92	30	1.5	301	--

a Represents 100 percent of runoff for water year October 1953 to September 1954
b Includes carbonate as bicarbonate.

YELLOWSTONE RIVER BASIN--Continued

TONGUE RIVER AT MILES CITY, MONT.--Continued

Temperature (°F) of water, water year October 1953 to September 1954
/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	44	35	33	32	32	32	35	54	58	58	54
2	49	46	35	32	32	32	32	37	55	60	59	55
3	40	39	32	32	32	32	32	33	53	62	63	58
4	43	36	--	32	32	32	38	40	58	70	61	60
5	40	40	--	33	32	32	44	44	62	72	64	60
6	41	40	--	33	32	32	46	51	59	74	65	60
7	44	38	32	32	32	32	40	52	56	66	60	54
8	45	36	32	32	32	32	39	51	55	73	62	57
9	47	37	32	32	32	32	45	54	58	72	62	54
10	48	37	32	32	32	32	40	49	59	68	62	54
11	47	37	32	32	32	--	38	54	58	68	64	56
12	46	38	33	32	32	33	43	57	60	82	66	61
13	47	38	32	32	32	32	49	54	68	68	64	62
14	47	39	32	32	32	32	54	55	66	67	63	54
15	51	40	32	32	32	32	43	58	62	--	66	56
16	50	40	32	32	33	32	44	54	64	--	55	56
17	49	37	32	32	33	33	46	56	56	75	56	54
18	47	37	32	32	32	38	45	58	57	68	52	51
19	47	34	32	32	32	34	43	65	61	67	58	50
20	45	32	32	32	33	35	42	60	60	86	63	49
21	48	32	32	32	33	36	35	58	63	68	62	41
22	39	32	32	32	33	33	44	56	62	64	63	47
23	38	40	32	32	32	34	48	59	69	56	58	53
24	40	33	32	--	33	36	47	56	70	60	59	49
25	40	32	32	--	32	33	47	58	66	66	63	50
26	35	35	32	32	34	33	48	61	66	64	65	53
27	42	32	32	32	32	32	52	56	67	68	55	51
28	42	34	32	32	32	32	38	52	63	65	50	50
29	43	34	32	32	--	32	35	49	58	65	60	44
30	46	33	32	32	--	32	38	58	58	67	66	41
31	43	--	--	32	--	32	--	56	--	58	66	--
Average	44	37	32	32	32	33	42	53	61	67	61	53

MIDDLE FORK POWDER RIVER ABOVE KAYCEE, WYO.

LOCATION.--At gaging station, 2 miles upstream from Red Fork, 2 miles downstream from Beaver Creek, and about 10 miles southwest of Kaycee, Johnson County.
DRAINAGE AREA.--450 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: June 1952 to September 1954 (discontinued).
Water temperatures: June 1949 to September 1954 (discontinued).
Sediment records: April 1949 to September 1953.
EXTREMES, 1953-54.--Dissolved solids: Maximum, 922 ppm Oct. 8-9; minimum, 228 ppm May 6-21.
Hardness: Maximum, 618 ppm Oct. 8-9; minimum, 160 ppm May 6-21.
Specific conductance: Maximum daily, 1,320 micromhos Oct. 22; minimum daily, 307 micromhos May 13.
Water temperatures: Minimum, freezing point on many days during December to March.
EXTREMES, 1949-54.--Dissolved solids (1952-54): Maximum, 3,220 ppm July 29, 1953; minimum, 216 ppm May 24-31, 1953.
Hardness (1952-54): Maximum, 2,080 ppm July 29, 1953; minimum, 154 ppm May 24-31, 1953.
Specific conductance (1952-54): Maximum daily, 3,120 micromhos July 29, 1953; minimum daily, 289 micromhos May 28, 1953.
Water temperatures: Maximum (1949-53), 80°F July 6, 24, Aug. 5-7, 1951; minimum, freezing point on many days during winter months.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1953 to September 1954 given in WSP 1339.

Chemical analyses, in parts per million, water year October 1953 to September 1954

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
Oct. 1-7, 1953	23.0			150	43	35		214		415	16		1.8	0.13	830	1.13	51.5	552	377	12	0.6	1,090	7.9
Oct. 8-9	26.0			157	55	37		227		463	13		1.4	.19	922	1.25	64.7	618	432	12	.6	1,180	7.9
Oct. 10-31	33.8			160	48	36		226		453	15		1.6	.18	889	1.21	81.1	598	413	12	.6	1,160	7.8
Nov. 1-30	42.9			142	44	32		217		383	15		1.9	.13	789	1.07	91.4	535	357	11	.6	1,050	7.8
Dec. 1-31	41.9			142	42	30		229		365	15		2.8	.12	768	1.04	86.9	526	338	11	.6	1,030	7.8
Jan. 1-31, 1954	41.6			140	43	31		229		373	15		3.1	.13	769	1.05	86.4	528	340	11	.6	1,040	7.9
Feb. 1-28	43.8			144	41	31		223		380	15		3.0	.15	781	1.06	92.4	528	345	11	.6	1,040	8.0
Mar. 1-20	48.8			148	40	32		226		390	14		3.0	.13	797	1.08	105	536	351	11	.6	1,050	8.0
Apr. 4-7	62.3			97	35	23		162		270	9.0		1.5	.11	574	.78	96.6	386	253	11	.5	796	7.6
Apr. 8-17	60.7			116	39	25		209		298	13		2.1	.10	648	.88	106	448	277	11	.5	897	7.9
Apr. 18-25	74.4			86	27	18		176		197	9.0		2.0	.08	465	.63	93.4	326	182	11	.4	677	7.8
Apr. 26-May 5	135			61	17	12		134		123	5.5		2.8	.06	322	.44	117	223	113	10	.3	485	7.7
May 6-21	192			45	12	8.2		106		82	3.5		1.9	.05	228	.31	118	160	73	10	.3	353	7.8
May 22-31	107			66	19	14		135		148	6.0		.8	.06	350	.48	101	244	133	11	.4	526	7.7
June 1-18	60.3			70	24	18		151		166	9.5		1.0	.07	392	.53	63.8	275	151	12	.5	589	7.5
June 19-23	29.6			70	24	18		154		166	11		1.0	.07	391	.53	31.2	273	147	12	.5	590	7.2
June 24-July 2	26.3			93	33	23		176		255	13		1.3	.08	530	.72	37.6	367	223	12	.5	763	7.6
July 3-10	22.8			108	35	30		168		313	16		.9	.02	624	.85	38.4	415	277	13	.6	861	7.5
July 11-17	18.9			92	32	25		162		263	13		.6	.02	534	.73	27.3	362	229	13	.6	764	7.8
July 18-24	20.4			91	32	26		158		265	14		.5	.03	529	.72	29.1	358	228	13	.6	758	7.7

MIDDLE FORK POWDER RIVER ABOVE KAYCEE, WYO.

Chemical analyses, in parts per million, water year October 1953 to September 1954--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
July 25-Aug. 5, 1954.	18.3			117	40	36		168		370	14		.7	.07	703	.96	34.7	456	318	14	.7	953	7.6
Aug. 6-7.....	51.0			108	28	21		376		113	9.0		.7	.04	508	.69	70.0	385	77	10	.5	769	7.3
Aug. 8-16.....	22.8			116	33	28		194		325	13		1.7	.06	655	.89	40.3	425	266	12	.6	907	7.5
Aug. 17-22.....	20.5			125	32	32		202		328	13		.9	.05	652	.89	36.1	444	278	13	.7	924	8.1
Aug. 23-Sept. 3	15.3			107	31	27		171		310	14		.7	.04	610	.83	25.2	394	254	12	.6	856	7.6
Sept. 4-10	19.4			117	45	32		164		405	13		.4	.06	698	.95	36.6	476	342	12	.6	955	7.8
Sept. 11-21	18.3			123	45	33		166		413	15		.6	.06	743	1.01	36.7	494	358	12	.6	997	7.6
Weighted average a.	49.9			102	31	23		178		258	11		2.0	0.09	559	0.76	75.3	382	236	12	0.5	774	--
Weighted average b.	49.2			104	31	23		180		264	11		2.0	0.09	569	0.77	75.6	387	239	11	0.5	787	--

a Represents 95 percent of runoff for water year October 1953 to September 1954.
b Includes estimated data for missing periods. Represents 100 percent of runoff for water year October 1953 to September 1954.

YELLOW RIVER BASIN--Continued

MIDDLE FORK POWDER RIVER ABOVE KAYCEE, WYO.--Continued

Temperature (°F) of water, water year October 1953 to September 1954
/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	--	a 49	a 37	32	32	--	--	34	--	--	a 73	a 73
2	51	a 47	a 36	a 32	32	--	--	a 41	--	--	--	--
3	48	--	--	a 32	32	32	--	a 46	52	--	--	--
4	44	--	--	32	32	a 32	--	a 58	--	--	--	--
5	44	--	33	32	a 32	a 32	--	a 61	--	--	--	--
6	45	--	33	--	32	a 34	49	--	--	a 76	--	--
7	45	--	32	32	32	a 36	--	50	a 62	--	59	a 68
8	--	--	--	a 32	32	a 32	--	56	--	--	--	--
9	48	--	a 33	32	32	--	--	49	--	--	a 75	--
10	--	--	a 33	a 32	32	--	45	49	--	--	a 71	--
11	53	a 46	--	a 32	32	--	48	46	--	--	a 73	--
12	45	--	a 34	32	34	a 32	43	50	--	--	a 72	--
13	47	42	--	32	39	a 32	--	54	a 60	73	--	--
14	47	--	a 35	32	--	a 36	--	--	a 60	a 78	a 76	a 66
15	48	a 50	32	32	36	a 41	--	50	a 67	--	--	a 68
16	49	a 47	--	32	--	a 44	--	57	--	--	--	--
17	48	--	a 33	32	--	--	--	--	--	--	--	--
18	47	a 36	32	32	37	--	--	54	--	--	--	--
19	44	--	--	32	a 36	--	--	58	--	--	68	--
20	44	33	32	32	--	--	--	59	--	a 82	--	--
21	47	33	a 32	32	--	--	--	66	a 75	--	--	--
22	42	--	32	32	--	--	50	--	a 78	a 76	--	--
23	44	--	a 32	32	a 38	--	56	--	--	--	--	--
24	a 46	a 38	a 32	32	a 38	--	a 56	--	--	--	--	--
25	a 44	a 36	32	--	--	--	a 55	61	--	--	--	--
26	a 44	--	32	a 32	--	--	a 60	56	--	--	68	--
27	41	--	--	32	--	--	a 61	a 58	--	a 69	--	--
28	a 48	--	--	32	--	--	42	a 55	--	--	a 68	--
29	a 48	--	--	32	--	--	37	56	a 70	--	--	--
30	a 50	--	32	32	--	--	a 39	56	--	--	a 73	--
31	--	--	a 32	32	--	--	--	--	--	--	--	--
Average	46	--	--	32	--	--	--	--	--	--	--	--

a Reading obtained between 1 p.m. and 6 p.m.

MIDDLE FORK POWDER RIVER NEAR KAYCEE, WYO.

LOCATION.--At gaging station cableway at Jay Bar U Ranch, 1½ miles downstream from North Fork Powder River and 6 miles east of Kaycee, Johnson County.
DRAINAGE AREA.--980 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: November 1949 to November 1950, May 1952 to September 1954 (discontinued).
Water temperatures: March 1950 to December 1953, May to September 1954 (discontinued).
Sediment records: March 1950 to September 1953.
EXTREMES, 1953-54.--Dissolved solids: Maximum, 1,970 ppm Aug. 1-7.
Hardness: Maximum, 794 ppm Aug. 1-7.
Specific conductance: Maximum daily, 2,870 micromhos Aug. 5; minimum daily, 449 micromhos May 12.
Water temperatures: Maximum 86°F July 18, 20; minimum, freezing point on several days during November.
EXTREMES, 1950-54.--Dissolved solids: Maximum (1952-54), 2,180 ppm July 30-31, 1953; minimum (1952-53), 366 ppm May 29 to June 5, 1953.
Hardness: Maximum (1952-54), 1,420 ppm July 30-31, 1953; minimum (1952-53), 204 ppm May 29 to June 5, 1953.
Specific conductance (1952-54): Maximum daily, 2,870 micromhos Aug. 5, 1954; minimum daily, 449 micromhos May 12, 1954.
Water temperatures: Maximum, 86°F July 18, 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 regional office at Lincoln, Nebr. Records of discharge for water year October 1953 to September 1954 given in WSP 1339.

Chemical analyses, in parts per million, water year October 1953 to September 1954

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
Oct. 1-18, 1953	1.68			155	56	156		245		588	102		0.8	0.27	1,280	1.74	5.81	616	415	35	2.7	1,690	7.8
Oct. 19-31	37.1			148	57	139		258		573	71		.8	.21	1,210	1.65	121	605	393	33	2.5	1,590	8.0
Nov. 1-13	54.9			131	52	126		234		510	65		.5	.22	1,100	1.50	163	541	349	34	2.4	1,450	7.6
Nov. 14-Dec. 2	87.1			138	50	116		230		498	61		1.7	.16	1,070	1.46	252	551	362	31	2.1	1,420	7.9
Jan. 6, 1954	90			130	42	89		247		393	53		2.5	.14	895	1.22	218	498	295	28	1.7	1,240	7.8
Feb. 2	100			122	39	87		228		380	50		2.7	.11	862	1.17	233	464	277	29	1.8	1,180	7.8
Mar. 3	54			143	52	121		277		500	59		2.3	.24	1,100	1.50	160	571	344	32	2.2	1,470	8.0
Apr. 6	127			119	49	86		227		415	46		1.6	.13	914	1.24	313	499	313	27	1.7	1,230	8.1
May 1	282			78	24	61		169		230	31		2.9	.10	570	.78	434	294	155	31	1.5	819	7.7
May 2-10	257			61	21	39		141		176	22		2.0	.07	414	.56	287	239	123	26	1.1	634	7.6
May 11-17	330			50	15	26		129		112	15		2.5	.05	305	.41	272	186	80	23	.8	481	7.8
May 18-26	131			65	21	46		148		186	26		1.4	.08	457	.62	162	250	129	28	1.3	682	7.5
May 27-June 8	30.8			92	34	77		197		310	46		1.3	.11	714	.97	59.4	370	208	30	1.7	1,010	7.5
June 9-27	.54			118	45	139		226		460	85		.6	.17	1,030	1.40	1.50	479	294	38	2.8	1,420	7.8
June 28-July 6	.88			130	49	152		237		525	95		.7	.18	1,140	1.55	2.71	527	333	38	2.9	1,560	7.9
July 7-31	.38			154	63	228		225		703	166		.5	.25	1,550	2.11	1.59	641	456	43	3.9	2,070	7.9
Aug. 1-7	1.10			196	74	308		246		930	227		1.5	.33	1,970	2.68	5.85	794	592	45	4.7	2,600	7.5
Aug. 8-26	.34			162	60	189		253		655	133		2.8	.22	1,430	1.94	1.31	650	443	38	3.2	1,920	7.5
Aug. 27-Sept. 26	.14			169	73	268		212		845	196		.4	.28	1,790	2.43	.68	721	547	44	4.3	2,380	7.8
Sept. 27-30	.33			143	62	166		231		615	115		.4	.20	1,290	1.75	1.15	610	421	36	2.9	1,740	7.7

YELLOWSTONE RIVER BASIN--Continued

MIDDLE FORK POWDER RIVER NEAR KAYCEE, WYO.--Continued

Temperature (°F) of water, October to December 1953 and May to September 1954
/Once-daily measurement between 6 a.m. and 11 a.m./

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

a Reading obtained between 1 p.m. and 5 p.m.

YELLOWSTONE RIVER BASIN--Continued

POWDER RIVER AT ARVADA, WYO.

LOCATION.--At county highway bridge, 0.1 mile south of Arvada, Sheridan County, a quarter of a mile upstream from Wildhorse Creek, and half a mile downstream from gaging station.
DRAINAGE AREA.--6,050 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: December 1949 to July 1952, May to August 1953.
Water temperatures: March 1949 to September 1954.
Sediment records: April 1946 to September 1954.
EXTREMES, 1953-54.--Water temperatures: Maximum, 90°F July 16; minimum, freezing point probably on many days during November to March.
Sediment concentrations: Maximum daily, 105,000 ppm July 19; minimum daily, no flow on many days during October, July, August, and September.
Sediment loads: Maximum daily, 351,000 tons Aug. 8; minimum daily, 0 tons on many days during October, July, August, and September.
EXTREMES, 1946-54.--Water temperatures (1949-54); Maximum, 90°F July 16, 1954; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 105,000 ppm July 19, 1954; minimum daily, no flow on many days each year.
Sediment loads: Maximum daily, 2,340,000 tons May 24, 1952; minimum daily, 0 tons on many days each year.
REMARKS.--There is no appreciable inflow between gaging station and sampling point except during periods of intense local rainfall. Flow affected by ice Nov. 18 to Mar. 3, Mar. 13-15. Records of discharge for water year October 1953 to September 1954 given in WSP 1339.

Temperature (°F) of water, water year October 1953 to September 1954
(Once-daily measurement between 3 p.m. and 8 p.m. No flow on many days during October, July, August, and September)

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

a Reading obtained between 9 a.m. and 1 p.m.

YELLOWSTONE RIVER BASIN--Continued

POWDER RIVER AT ARVADA, WYO.--Continued

Suspended sediment, water year October 1953 to September 1954

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	35	620	59	110	--	e 2,000
2	0	--	0	36	720	70	80	4,450	961
3	0	--	0	39	780	82	50	2,700	365
4	0	--	0	39	830	87	35	1,200	113
5	0	--	0	40	985	106	25	570	38
6	0	--	0	42	--	e 120	30	295	24
7	0	--	0	48	1,050	136	32	430	37
8	0	--	0	52	1,190	167	35	--	
9	0	--	0	58	1,470	230	37	--	
10	0	--	0	61	1,530	252	40	420	
11	0	--	0	64	1,660	287	40	--	
12	0	--	0	67	--	e 320	45	--	e 55
13	0	--	0	70	1,790	338	50	467	
14	0	--	0	72	1,790	348	50	--	
15	0	--	0	72	1,770	344	55	--	
16	0	--	0	74	--	e 340	60	313	
17	0	--	0	74	1,720	344	65	--	
18	0	--	0	60	--	e 260	70	485	
19	0	--	0	30	--	e 80	75	--	
20	0	--	0	15	--	e 24	90	--	
21	0	--	0	20	654		85	--	e 120
22	0	--	0	23	--		77	676	
23	0	--	0	25	620		70	--	
24	0	--	0	27	--		60	--	
25	0	--	0	26	567	e 44	60	--	
26	0	--	0	29	--		55	461	
27	0	--	0	27	--		50	--	
28	14	212	s 10	35	--		60	476	e 70
29	23	340	21	60	12,800	s 2,890	55	--	
30	28	380	29	150	9,100	3,690	50	502	
31	33	435	39	--	--	--	50	--	
Total	98	--	99	1,470	--	10,926	1,746	--	5,483

Day	January			February			March		
1	54	501		56	--	e 46	45	--	e 85
2	52	--		57	303	47	35	275	26
3	60	--		70	278	53	45	295	36
4	59	614		80	258	56	60	--	e 60
5	65	--		90	--	e 70	80	507	110
6	70	--		100	--	e 80	100	370	100
7	80	486		110	--	e 100	120	470	153
8	70	516	e 90	130	--	e 200	310	3,400	s 5,900
9	60	--		150	1,020	413	340	9,200	8,450
10	55	--		190	524	269	255	7,670	5,280
11	60	--		170	--	e 200	225	7,510	4,560
12	60	532		150	--	e 140	205	7,890	s 4,590
13	58	--		180	488	238	150	1,050	426
14	65	--		220	--	e 420	120	1,300	421
15	55	--		260	--	e 800	250	7,450	5,030
16	45	--		320	1,440	1,240	240	5,700	3,690
17	50	--		370	--	e 2,100	245	6,750	4,470
18	60	400		420	3,590	4,070	255	7,800	5,370
19	56	402		450	--	e 5,000	266	6,280	4,510
20	40	--		430	3,280	3,810	382	11,200	11,600
21	45	--		400			316	9,300	7,940
22	50	--		380	--	e 5,000	288	13,400	10,400
23	55	--		370			358	13,000	a 13,000
24	45	--	e 55	355	6,260	6,000	364	10,500	10,300
25	47	--		250	5,710	3,850	352	11,200	10,600
26	50	322		120	6,620	2,150	376	11,700	11,900
27	51	--		80	--	e 700	316	10,400	8,870
28	52	--		60	--	e 270	250	9,100	6,140
29	53	--		--	--	--	266	8,000	5,750
30	54	--		--	--	--	382	9,930	10,200
31	55	300		--	--	--	240	8,600	5,570
Total	1,731	--	2,230	6,018	--	47,322	7,236	--	165,537

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

YELLOWSTONE RIVER BASIN--Continued

POWDER RIVER AT ARVADA, WYO.--Continued

Suspended sediment, water year October 1953 to September 1954--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.....	220	6,800	4,040	371	8,250	8,260	80	1,450	313
2.....	220	6,600	3,920	395	8,100	8,640	80	1,440	311
3.....	215	5,600	3,250	330	7,200	6,420	77	1,340	279
4.....	352	10,000	9,500	295	5,680	4,520	68	1,120	206
5.....	430	18,200	s 25,300	284	5,750	4,410	59	890	142
6.....	666	35,600	66,400	250	5,800	3,920	54	670	98
7.....	578	37,600	60,900	235	4,900	3,110	48	520	67
8.....	465	25,900	32,500	261	5,100	3,590	40	480	52
9.....	394	17,400	18,500	284	6,300	4,830	38	480	49
10.....	340	11,500	10,600	289	6,200	4,840	105	23,100	s 10,100
11.....	282	8,200	6,240	278	5,970	4,480	65	30,700	5,390
12.....	240	6,300	4,080	353	8,330	7,940	31	8,400	703
13.....	215	5,100	2,960	413	9,800	10,900	23	1,870	116
14.....	210	4,550	2,580	377	9,900	10,100	22	1,120	67
15.....	220	4,650	2,760	318	8,750	7,510	18	670	33
16.....	215	4,100	2,380	306	7,300	6,030	14	410	15
17.....	210	4,550	2,580	533	39,300	58,700	11	260	8
18.....	230	5,000	3,100	312	21,800	18,400	10	210	6
19.....	215	5,100	2,960	261	9,550	6,730	8.0	200	4
20.....	185	4,300	2,150	240	9,200	5,960	8.4	200	5
21.....	225	4,080	2,480	209	7,250	4,090	6.0	200	3
22.....	250	6,250	4,220	204	7,900	4,350	4.3	210	2
23.....	220	5,200	3,090	190	6,950	3,570	8.9	305	7
24.....	190	4,450	2,280	190	5,750	2,950	14	335	13
25.....	170	3,900	1,790	151	4,330	1,770	11	305	9
26.....	165	3,500	1,560	181	5,900	2,880	6.7	310	6
27.....	160	3,700	1,600	186	5,480	2,750	3.8	220	2
28.....	185	4,100	2,050	168	3,900	1,770	3.5	230	2
29.....	260	5,900	4,140	141	2,920	1,110	1.2	240	1
30.....	328	8,300	7,350	116	2,350	736	.4	225	(t)
31.....	--	--	--	95	1,650	423	--	--	--
Total.	8,255	--	297,260	8,216	--	215,689	919.2	--	18,009

	July			August			September		
1.....	0	--	0	0.4	490	1			
2.....	3.8	268	s 4	0	--	0			
3.....	3.2	295	3	0	--	0			
4.....	1.0	175	(t)	0	--	0			
5.....	0	--	0	10	11,700	s 1,350			
6.....	0	--	0	248	97,500	s 77,700			
7.....	0	--	0	35	63,000	6,170			
8.....	0	--	0	1,250	85,700	s 351,000			
9.....	0	--	0	322	59,200	53,400			
10.....	0	--	0	111	51,800	16,100			
11.....	0	--	0	80	48,600	s 11,600			
12.....	0	--	0	81	55,300	12,500			
13.....	0	--	0	54	--	e 6,000			
14.....	0	--	0	1,230	69,000	s 296,000			
15.....	0	--	0	158	18,800	s 9,270			
16.....	52	65,300	s 12,900	77	2,500	520			
17.....	76	77,600	s 20,000	399	21,200	s 47,400			
18.....	429	74,700	s 172,000	96	8,890	s 2,780			
19.....	792	105,000	s 253,000	24	960	s 70			
20.....	327	72,000	65,900	12	275	9			
21.....	166	59,200	27,500	8.0	150	3			
22.....	184	63,500	32,700	7.0	--	e 3			
23.....	91	50,300	12,800	3.6	121	1			
24.....	58	37,000	6,010	2.6	107	1			
25.....	44	--	e 3,500	1.1	123	(t)			
26.....	32	--	e 2,500	.6	--	(t)			
27.....	21	34,500	2,030	0	--	0			
28.....	15	12,800	518	0	--	0			
29.....	8.5	2,300	53	0	--	0			
30.....	5.3	1,090	16	0	--	0			
31.....	2.0	750	4	0	--	0			
Total.	2,310.8	--	611,438	4,210.3	--	891,879	0		0

Total discharge for year (cfs-days)..... 42,210.3
Total load for year (tons)..... 2,265,872

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

POWDER RIVER AT ARVADA, WYO.--Continued

Particle-size analyses of suspended sediment, November 1953 to August 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, acid water; D, dispersed; M, mechanically dispersed; V, visual accumulation tube)

Date of collection	Time	Discharge (cfs)	Water temperature (°F)	Suspended sediment											Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters									
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
Nov. 3, 1953	3:20 p.m.	40	--	650	1,860		82		--		96	--	--				SPWCM
Nov. 14	12:35 p.m.	70	46	1,820	3,100		77		95		96	--	--				SPWCM
Nov. 29	3:50 p.m.	a 60	35	40,400	3,170		40		68		96	100	--				VPWCM
Dec. 3	11:00 a.m.	a 50	32	2,920	6,180		66		88		93	97	100				VPWCM
Jan. 7, 1954	10:05 a.m.	a 80	32	486	1,300		81		88		95	97	100				VPWCM
Feb. 3 b	11:10 a.m.	a 70	32	329	717		40		61		82	--	--				SPWCM
Feb. 24	11:35 a.m.	a 355	--	6,260	7,040		40		59		77	92	100				VPWCM
Mar. 9	2:30 p.m.	406	36	11,200	3,450		5		60		88	96	100				VPN
Mar. 9	2:30 p.m.	406	36	11,200	3,280		41		65		88	96	100				VPWCM
Mar. 22	3:45 p.m.	266	44	13,800	3,300		4		83		91	--	--				SPN
Mar. 22	3:45 p.m.	266	44	13,800	3,260		67		84		91	--	--				SPWCM
Apr. 5 b	12:45 p.m.	340	50	11,100	3,990		3		64		88	--	--				SPN
Apr. 5 b	12:45 p.m.	340	50	11,100	3,930		46		69		88	--	--				SPWCM
May 5	4:15 p.m.	261	63	6,180	2,940		33		55		88	97	100				VPWCM
May 12	1:55 p.m.	306	--	6,540	4,280		38		59		92	99	100				VPWCM
May 18	12:20 p.m.	306	67	19,200	3,210		51		78		93	98	100				VPWCM
June 1	12:50 p.m.	83	67	1,350	2,770		57		76		89	97	100				VPWCM
July 16	7:15 a.m.	83	68	70,400	3,720		68		96		97	--	--				SPWCM
July 16	4:00 p.m.	80	90	91,600	4,680		70		99		99	--	--				SPWCM
July 17	2:25 p.m.	48	86	72,800	3,190		76		98		100	--	--				SPWCM
July 18	6:40 p.m.	783	78	188,000	4,390		40		62		85	93	100				VPWCM
July 19	5:05 p.m.	583	--	91,700	5,150		61		85		96	98	100				VPWCM
July 20	6:05 p.m.	250	--	67,000	3,450		71		95		98	--	--				SPWCM
July 24	12:00 m.	58	--	36,700	3,490		85		--		98	--	--				SPWCM
Aug. 6	2:45 p.m.	195	--	93,600	5,370		58		92		98	98	100				VPWCM
Aug. 9	1:35 p.m.	260	--	60,500	3,700		75		94		98	--	--				SPWCM
Aug. 11	11:25 p.m.	288	68	59,900	3,300		75		--		97	--	--				SPWCM
Aug. 12	6:20 a.m.	91	65	56,000	3,620		73		99		100	--	--				SPWCM
Aug. 14	6:15 a.m.	3,290	59	84,000	3,440		54		77		96	98	99	100			VPWCM
Aug. 14	11:10 a.m.	1,410	64	92,900	4,140		49		78		98	100	--				VPWCM
Aug. 14	9:55 p.m.	376	65	39,500	3,380		60		90		97	--	--				SPWCM

a Daily mean discharge.
b Observation about half a mile upstream from daily sampling station.

YELLOWSTONE RIVER BASIN--Continued

CLEAR CREEK NEAR ARVADA, WYO.

LOCATION.--At gaging station, 300 feet downstream from Cabin Creek, 1½ miles upstream from mouth, and 16 miles north of Arvada, Sheridan County.
DRAINAGE AREA.--1,110 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to June 1954 (discontinued).
Water temperatures: March 1950 to September 1953.
Sediment records: March 1950 to September 1953.
REMARKS.--Records of discharge for water year October 1953 to September 1954 given in WSP 1339.

Chemical analyses, in parts per million, October 1953 to June 1954

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 $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH	Color
														Parts per million		Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate					
														Residue at 180°C	Sum									
Oct. 8, 1953...	22	3.7	0.05	219	118	193		302	1,130	8.0	0.4	20	0.23	2,090	1,840	2.84		1,030	782	29	2.6	2,360	8.0	
Nov. 3.....	98			164	75	112		296	680	7.5								718	475	25	1.8	1,620	7.6	
Dec. 3.....	a 70			155	69	97		298	603	6.5								669	425	24	1.6	1,490	8.0	
Jan. 7, 1954...	a 90			130	55	77		273	468	5.0								550	326	23	1.4	1,250	7.7	
Feb. 3.....	a 80			125	54	74		267	453	5.0								536	317	23	1.4	1,220	7.7	
Mar. 3.....	a 70			149	64	95		273	585	6.0								634	410	25	1.6	1,430	8.0	
Apr. 5.....	100			108	60	79		229	473	5.0								516	328	25	1.5	1,210	8.2	
May 5.....	124			74	35	49		168	283	2.5								330	192	24	1.2	812	7.7	
June 1.....	2.2			151	76	134		327	675	5.5								687	419	30	2.2	1,640	7.8	
June 24.....	2.8			191	107	188		348	990	8.0								918	633	31	2.7	2,160	7.3	

a Daily mean discharge.

POWDER RIVER NEAR LOCATE, MONT.

LOCATION.--At gaging station at bridge on U. S. Highway 12 at present site of Locate (5 miles west of former site of Locate), Custer County, 3 miles upstream from Locate Creek and 25 miles east of Miles City.
RECORDS AVAILABLE.--Chemical analyses: December 1949 to September 1954.
Water temperatures: February 1951 to May 1954.
Sediment records: March 1950 to September 1953.
EXTREMES, 1953-54.--Dissolved solids: Maximum, 3,460 ppm July 23 5o Aug. 5; minimum, 486 ppm Sept. 7-8.
Hardness: Maximum, 1,590 ppm July 23 to Aug. 5; minimum, 62 ppm Oct. 22-24.
Specific conductance: Maximum daily, 3,940 micromhos July 23; minimum daily, 686 micromhos Sept. 8.
Water temperatures (October to May): Minimum, freezing point on many days during November to April.
EXTREMES, 1951-54.--Dissolved solids: Maximum, 3,460 ppm July 23 to Aug. 5, 1954; minimum, 278 ppm Mar. 29, 1952.
Hardness: Maximum, 1,590 ppm July 23 to Aug. 5, 1954; minimum, 62 ppm Oct. 22-24, 1953.
Specific conductance: Maximum daily, 3,940 micromhos July 23, 1954; minimum daily, 407 micromhos Feb. 14, 1952.
Water temperatures: Maximum (1951-53), 85°F on several days during July 1952, 1953; minimum, freezing point on many days during winter months each year.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1953 to September 1954 given in WSP 1339.

Chemical analyses, in parts per million, water year October 1953 to September 1954

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
Oct. 1-21, 1953	8.89	--	--	--	--	335	--	286	1,070	37	--	--	--	1,910	--	2.60	45.8	668	433	52	5.6	2,430	7.9
Oct. 22-24	600	--	--	--	--	137	--	180	201	--	--	--	--	495	--	.67	802	62	0	83	7.6	735	7.4
Oct. 25-26	70.5	--	--	--	--	228	--	243	598	16	--	--	--	1,130	--	1.54	215	349	150	59	5.3	1,560	7.9
Oct. 27-Nov. 20	58.4	--	--	--	--	243	--	272	960	36	--	--	--	1,780	--	2.42	281	748	525	41	3.9	2,160	7.9
Nov. 21-Dec. 8	118	--	--	--	--	219	--	280	930	52	--	--	--	1,750	--	2.38	558	798	568	37	3.4	2,140	8.0
Dec. 9-20	76.7	13	0.00	273	98	326	9.6	397	1,330	76	0.9	4.5	0.21	2,450	2,330	3.33	507	1,090	764	39	4.3	2,860	7.7
Dec. 21-Jan. 8, 1954	156	--	--	--	--	206	--	354	905	56	--	--	--	1,800	--	2.45	758	862	572	34	3.1	2,180	7.9
Jan. 9-Feb. 4	111	--	--	--	--	210	--	378	870	60	--	--	--	1,780	--	2.42	533	848	538	35	3.1	2,180	8.1
Feb. 5-28	402	--	--	--	--	136	--	223	555	40	--	--	--	1,120	--	1.52	1,220	528	345	36	2.6	1,470	7.9
Mar. 1-31	458	10	.00	168	55	184	6.1	239	730	60	.6	4.2	.15	1,420	1,340	1.93	1,760	644	448	38	3.2	1,830	8.0
Apr. 1-25	332	--	--	--	--	234	--	226	890	55	--	--	--	1,620	--	2.20	1,450	670	485	43	3.9	2,060	7.5
Apr. 26-May 4	311	--	--	--	--	174	--	225	690	49	--	--	--	1,330	--	1.81	1,120	593	408	39	3.1	1,720	7.7
May 5-17	436	--	--	--	--	127	--	204	510	40	--	--	--	1,010	--	1.37	1,190	468	301	37	2.5	1,350	7.7
May 18-25	762	--	--	--	--	78	--	173	338	22	--	--	--	700	--	.95	1,440	348	206	32	1.8	976	7.6
May 26-June 2	402	--	--	--	--	94	--	172	318	20	--	--	--	709	--	.96	770	295	154	41	2.4	956	7.7
June 3	330	--	--	--	--	156	--	204	388	24	--	--	--	822	--	1.12	732	265	98	56	4.2	1,170	7.8
June 4-14	154	16	.05	117	40	200	6.7	229	605	43	1.0	2.4	.15	1,210	1,140	1.65	503	458	270	48	4.1	1,640	8.0
June 15-19	79.6	--	--	--	--	260	--	263	890	58	--	--	--	1,680	--	2.28	361	656	440	46	4.4	2,120	8.0
June 20	140	--	--	--	--	211	--	a 252	700	41	--	--	--	1,270	--	1.73	480	477	270	46	4.2	1,680	8.2
June 21-July 5	23.8	--	--	--	--	284	--	260	955	50	--	--	--	1,850	--	2.52	119	658	445	48	4.8	2,220	7.8

a Includes equivalent of 6 ppm of carbonate (CO_3).

YELLOWSTONE RIVER BASIN--Continued

POWDER RIVER NEAR LOCATE, MONT.--Continued

Chemical analyses, in parts per million, water year October 1953 to September 1954--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids: Parts per million: Residue at 180°C	Dissolved solids: Parts per million: Sum	Dissolved solids: Tons per acre-foot	Dissolved solids: Tons per day	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Per cent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
July 16-21, 1954.....	16.9	--	--	--	--	272	--	300	655	23	--	--	--	1,320	--	1.80	60.2	362	116	62	6.2	1,740	7.4
July 22	191	--	--	--	--	176	--	324	363	9.0	--	--	--	852	--	1.16	439	260	0	59	4.7	1,200	7.3
July 23-Aug. 5	56.4	--	--	--	--	392	--	370	1,940	106	--	--	--	3,460	--	4.71	527	1,590	1,290	34	4.3	3,780	7.1
Aug. 6-7.....	113	--	--	--	--	286	--	238	835	34	--	--	--	1,650	--	2.24	503	506	311	55	5.5	2,040	7.5
Aug. 8	1,380	--	--	--	--	126	--	418	605	18	--	--	--	1,350	--	1.84	5,030	684	341	29	2.1	1,650	7.2
Aug. 9-11.....	506	--	--	--	--	89	--	197	600	9.0	--	--	--	1,100	--	1.50	1,500	600	438	24	1.6	1,380	7.2
Aug. 12-13.....	293	--	--	--	--	176	--	262	1,400	45	--	--	--	2,410	--	3.28	1,910	1,320	1,110	22	2.1	2,670	7.0
Aug. 14-16.....	234	--	--	--	--	182	--	218	770	32	--	--	--	1,490	--	2.03	941	600	421	40	3.2	1,750	7.1
Aug. 17	1,780	--	--	--	--	202	--	428	885	44	--	--	--	1,850	--	2.52	8,890	844	493	34	3.0	2,170	7.1
Aug. 18	1,700	--	--	--	--	83	--	276	325	8.0	--	--	--	786	--	1.07	3,610	388	162	32	1.8	1,030	7.0
Aug. 19-25	217	--	--	--	--	92	--	171	660	11	--	--	--	1,290	--	1.75	756	636	496	24	1.6	1,450	8.2
Aug. 26-31	54.3	--	--	--	--	166	--	206	915	22	--	--	--	1,650	--	2.24	242	772	603	31	2.6	1,950	7.5
Sept. 1-4	15.3	--	--	--	--	269	--	257	1,040	34	--	--	--	1,810	--	2.46	74.8	734	523	44	4.3	2,230	8.0
Sept. 5-6	2,118	--	--	--	--	109	--	314	265	8.0	--	--	--	652	--	.89	3,730	280	23	43	2.8	969	7.3
Sept. 7-8	514	--	--	--	--	96	--	173	228	2.0	2.3	--	--	486	--	.66	674	194	52	52	3.0	727	7.7
Sept. 9-12	90.5	--	--	--	--	140	--	179	475	15	--	--	--	892	--	1.21	218	350	203	46	3.3	1,220	7.5
Sept. 13-30	15.6	17	.00	147	49	258	8.2	283	835	30	.5	.4	.19	1,540	1,480	2.09	64.9	567	335	49	4.7	1,970	7.7
Weighted average b..	226	--	--	--	--	165	--	247	654	40	--	--	--	1,290	--	1.75	787	576	373	38	3.0	1,640	--

b Includes estimates where data are missing. Represents 100 percent of runoff for water year October 1953 to September 1954.

YELLOWSTONE RIVER BASIN--Continued

POWDER RIVER NEAR LOCATE, MONT.--Continued

Temperature (°F) of water, October 1953 to May 1954
/Once-daily measurement between 6 a.m. and 9 a.m./

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

a Reading obtained between 11 a.m. and 2 p.m.

YELLOWSTONE RIVER BASIN--*Continued*

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 1954.
Water temperatures: January 1951 to September 1954.
EXTREMES, 1953-54.--Dissolved solids: Maximum, 1,370 ppm Jan. 2-3; minimum, 206 ppm June 27 to July 1.
Hardness: Maximum, 629 ppm Jan. 2-3; minimum, 109 ppm June 27 to July 21.
Specific conductance: Maximum daily, 1,810 micromhos Jan. 2; minimum daily, 277 micromhos June 29.
Water temperatures: Maximum, 79°F July 12, 16, 22, 27; minimum, freezing point on many days during January to March.
EXTREMES, 1951-54.--Dissolved:: Maximum, 1,370 ppm Jan. 2-3, 1954; minimum, 206 ppm June 27 to July 1, 1954.
Hardness: Maximum, 649 ppm Jan. 2-3, 1954; minimum, 109 ppm June 27 to July 21, 1954.
Specific conductance: Maximum daily, 2,780 micromhos Jan. 14, 1951; minimum daily, 277 micromhos June 29, 1954.
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 regional office at Lincoln, Nebr. No appreciable inflow between gaging station and sampling station. Discharge records for gaging station near Sidney for water year October 1953 to September 1954 given in WSP 1339.

Chemical analyses, in parts per million, water year October 1953 to September 1954

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
Oct. 1-21, 1953.....	4,392	--	--	--	--	101	--	214		310	--	--	--	--	672	0.91	7,970	300	125	42	2.5	974	7.8
Oct. 22-31.....	7,860	--	--	--	--	113	--	223		325	--	--	--	--	693	.94	14,710	293	110	46	2.9	1,000	7.6
Nov. 1-30.....	6,744	--	--	--	--	88	--	226		285	--	--	--	--	639	.87	11,640	309	124	38	2.2	918	8.0
Dec. 1-Jan. 1, 1954..	5,566	15	0.00	85	30	93	4.8	246		303	15	0.6	2.0	0.23	691	.94	10,380	337	135	37	2.2	983	7.8
Jan. 2-3	5,000	--	--	--	--	187	--	463		603	--	--	--	--	1,370	1.86	18,500	649	269	39	3.2	1,790	7.9
Jan. 4-19	4,000	--	--	--	--	92	--	251		303	--	--	--	--	696	.95	7,520	347	141	37	2.2	1,000	8.0
Jan. 20-Feb. 3	2,667	--	--	--	--	114	--	291		383	--	--	--	--	856	1.16	6,160	417	178	37	2.4	1,200	8.0
Feb. 4-28.....	7,160	--	--	--	--	76	--	202		255	--	--	--	--	584	.79	11,290	286	120	37	2.0	851	7.8
Mar. 1-11.....	4,345	--	--	--	--	84	--	213		293	--	--	--	--	648	.88	7,600	320	145	36	2.0	936	8.0
Mar. 12-22.....	5,909	11	.00	74	31	86	4.2	211		293	17	.6	2.2	.22	651	.89	10,390	314	141	37	2.1	937	8.0
Mar. 23-Apr. 4.....	7,803	--	--	--	--	99	--	219		345	--	--	--	--	726	.99	15,300	341	161	39	2.3	1,040	7.9
Apr. 5-6.....	18,130	--	--	--	--	89	--	197		283	--	--	--	--	602	.82	29,500	282	120	41	2.3	890	7.9
Apr. 7-16.....	6,386	--	--	--	--	103	--	216		328	--	--	--	--	706	.96	12,170	316	139	41	2.5	1,020	7.8
Apr. 17-May 12.....	7,354	--	--	--	--	77	--	197		260	--	--	--	--	564	.77	11,200	271	109	38	2.0	838	7.7
May 13-15.....	11,970	--	--	--	--	61	--	175		192	--	--	--	--	453	.62	14,640	220	76	38	1.8	687	7.8
May 16-23.....	21,840	--	--	--	--	32	--	124		99	--	--	--	--	278	.38	16,390	140	38	33	1.2	422	7.5
May 24-31.....	28,540	--	--	--	--	22	--	120		65	--	--	--	--	228	.31	17,570	123	25	28	.9	338	7.7
June 1-7	17,660	--	--	--	--	44	--	128		119	--	--	--	--	320	.44	15,260	143	38	40	1.6	473	7.6
June 8	15,100	--	--	--	--	50	--	146		135	--	--	--	--	374	.51	15,250	163	43	40	1.7	541	8.0
June 9-26	17,860	18	.02	35	10	35	3.4	120		98	6.0	.4	1.2	.14	277	.38	13,360	130	32	36	1.3	419	7.9

June 27-July 1.....	36,200	--	--	31	7.7	22	--	112	57	3.5	--	--	--	206	.28	20,130	109	17	31	.9	312	7.8
July 2-21	22,990	--	--	30	8.3	27	--	108	73	4.5	--	--	--	217	.30	13,470	109	20	35	1.1	338	7.4
July 22-27	14,720	--	--	37	11	38	--	129	107	6.5	--	--	--	294	.40	11,680	138	32	37	1.4	447	7.4
July 28-Aug. 7	8,837	--	--	43	15	53	--	148	151	8.5	--	--	--	372	.51	8,880	168	47	41	1.8	562	7.9
Aug. 8-20.....	8,957	--	--	57	18	71	--	181	206	9.5	--	--	--	485	.66	11,730	218	70	41	2.1	724	7.7
Aug. 21-31.....	5,802	--	--	--	--	76	--	185	232	--	--	--	--	524	.71	8,210	237	85	41	2.2	773	7.8
Sept. 1-6	3,695	--	--	--	--	87	--	181	258	--	--	--	--	550	.75	5,490	237	89	44	2.5	817	7.9
Sept. 7-30	5,411	14	.00	59	27	96	4.6	200	278	12	.5	1.9	.21	598	.81	8,740	256	92	44	2.6	877	7.6
Weighted average a .	9,336	--	--	--	--	60	--	167	187	--	--	--	--	445	0.61	11,220	212	75	38	1.8	654	--

a. Represents 100 percent of runoff for water year October 1953 to September 1954.

YELLOWSTONE RIVER BASIN--Continued

YELLOWSTONE RIVER NEAR SIDNEY, MONT.--Continued

Temperature (°F) of water, water year October 1953 to September 1954
/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	57	39	a 38	34	--	32	33	--	54	62	73	73
2	60	44	b 36	33	a 33	32	--	a 43	55	b 64	72	72
3	56	46	36	b 34	34	32	34	a 44	a 57	69	b 72	70
4	58	45	35	33	34	32	a 34	a 48	65	a 71	69	68
5	a 57	45	36	32	35	32	35	49	65	b 73	68	b 65
6	a 56	42	36	33	a 33	32	36	51	60	b 75	--	--
7	58	a 43	34	a 34	--	33	37	53	a 60	75	--	63
8	57	43	33	33	33	33	a 38	56	64	b 76	72	a 64
9	57	40	33	33	34	34	a 45	a 58	--	b 76	b 70	a 65
10	57	a 43	a 34	--	32	33	49	61	60	b 74	71	66
11	58	42	33	32	32	34	a 51	--	a 64	b 71	a 74	b 65
12	a 59	44	34	32	--	33	54	b 55	63	79	a 72	a 63
13	60	46	33	33	33	32	a 54	63	64	--	73	61
14	61	a 45	34	a 32	a 33	33	a 54	b 62	68	a 75	a 74	a 64
15	59	45	--	32	34	32	54	b 62	a 71	77	72	a 62
16	58	--	a 33	32	34	33	--	a 63	69	79	b 70	b 60
17	58	a 45	--	32	35	34	50	63	67	77	69	b 58
18	59	b 42	--	32	--	33	49	63	a 68	77	69	61
19	58	46	35	a 32	34	33	48	65	69	--	70	--
20	55	37	33	32	33	34	47	68	69	76	a 70	a 56
21	52	36	--	32	35	34	47	68	b 68	b 75	71	--
22	50	37	33	--	--	34	49	63	73	79	71	60
23	49	a 38	33	32	34	33	50	b 68	75	--	73	60
24	--	38	34	32	34	33	52	61	b 73	74	71	61
25	45	--	34	32	a 33	33	51	b 62	72	--	a 70	62
26	44	--	33	--	a 34	33	b 48	58	72	a 77	71	63
27	42	40	34	32	34	32	45	54	70	79	72	b 63
28	41	38	35	a 32	a 33	32	44	53	70	77	73	57
29	39	39	a 34	--	--	32	44	58	68	75	75	b 52
30	38	36	--	a 32	--	32	b 43	56	b 64	72	--	52
31	39	--	--	a 32	--	32	--	b 55	--	b 69	b 75	--
Average	53	42	34	32	34	33	46	58	66	74	72	62

a Reading obtained between 12 m. and 2 p.m.
b Reading obtained between 8 a.m. and 10 a.m.

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 1954.
Water temperatures: May 1951 to September 1954.
EXTREMES, 1953-54.--Dissolved solids: Maximum, 587 ppm Feb. 1-9; minimum, 251 ppm June 28 to July 11.
Hardness: Maximum, 302 ppm Feb. 1-9; minimum, 127 ppm June 28 to July 11.
Specific conductance: Maximum daily, 908 micromhos Feb. 3, 5; minimum daily, 342 micromhos June 28.
Water temperatures: Maximum, 79°F July 2.
EXTREMES, 1950-54.--Dissolved solids: Maximum, 587 ppm Feb. 1-9, 1954; minimum, 251 ppm June 28 to July 11, 1954.
Hardness: Maximum, 302 ppm Feb. 1-9, 1954; minimum, 127 ppm June 1-30, 1951; June 28 to July 11, 1954.
Specific conductance: Maximum daily, 908 micromhos Feb. 3, 5, 1954; minimum daily, 320 micromhos June 24, 1951.
Water temperatures (1951-54): Maximum, 79°F July 2, 1954.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1953 to September 1954 given in WSP 1339.

Chemical analyses, in parts per million, water year October 1953 to September 1954

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
Oct. 1-31, 1953.....	33,170	--	--	--	--	59	--	188		185	--	--	--	--	456	0.62	40,840	226	72	36	1.7	678	7.4
Nov. 1-21.....	21,890	--	--	--	--	64	--	199		206	--	--	--	--	493	.67	29,140	251	88	36	1.8	733	7.7
Nov. 22-Dec. 13.....	15,850	14	0.00	66	24	70	4.0	212		225	11	0.7	0.9	0.15	529	.72	22,640	265	91	36	1.9	787	7.9
Jan. 1-13, 1954.....	10,650	--	--	--	--	71	--	219		233	--	--	--	--	552	.75	15,870	280	100	36	1.8	818	7.9
Jan. 14-31	8,361	--	--	--	--	69	--	221		222	--	--	--	--	544	.74	12,280	280	99	35	1.8	804	7.7
Feb. 1-9.....	13,170	--	--	--	--	75	--	232		250	--	--	--	--	587	.80	20,870	302	112	35	1.9	867	8.0
Feb. 10-Mar. 3	15,690	--	--	--	--	61	--	185		194	--	--	--	--	458	.62	19,400	229	77	37	1.7	697	7.9
Apr. 10-30.....	23,710	11	.01	50	18	62	5.4	176		179	8.0	.4	1.9	.18	429	.58	27,460	201	57	39	1.9	656	7.9
May 1-12	15,100	--	--	--	--	73	--	201		218	--	--	--	--	515	.70	21,000	244	79	39	2.0	779	8.1
May 13-16.....	16,400	--	--	--	--	38	--	138		116	--	--	--	--	306	.42	13,550	159	46	34	1.3	484	7.9
May 17-21.....	24,040	--	--	--	--	46	--	157		138	--	--	--	--	358	.49	23,240	183	54	35	1.5	558	7.5
May 22	27,600	--	--	--	--	72	--	200		206	--	--	--	--	496	.67	36,960	238	74	40	2.0	760	7.9
May 23-June 1.....	34,670	--	--	--	--	32	--	140		93	--	--	--	--	291	.40	27,240	146	31	32	1.2	426	7.8
June 2-27	24,370	15	.00	40	14	50	3.4	147		134	7.0	.3	1.4	.11	355	.48	23,360	158	37	40	1.7	528	7.7
June 28-July 11.....	35,250	--	--	--	--	32	--	122		88	--	--	--	--	251	.34	23,890	127	27	35	1.2	394	7.1
July 12	30,200	--	--	--	--	52	--	178		163	--	--	--	--	416	.57	33,920	208	62	35	1.6	619	7.9
July 13-31.....	29,000	--	--	--	--	42	--	143		128	--	--	--	--	327	.44	25,600	164	47	36	1.4	505	7.6
Aug. 1-31.....	34,780	--	--	--	--	55	--	177		176	--	--	--	--	427	.58	40,100	216	71	36	1.6	645	7.6
Sept. 1-30.....	32,130	14	.00	52	24	57	4.2	188		186	9.5	.7	.6	.14	455	.62	39,470	229	75	35	1.6	680	7.8
Weighted average a .	24,450	--	--	--	--	56	--	175		170	--	--	--	--	421	0.57	27,790	209	65	37	1.7	633	--
Weighted average b .	22,890	--	--	--	--	58	--	179		176	--	--	--	--	433	0.59	26,760	215	68	37	1.7	650	--

a Represents 91 percent of runoff for water year October 1953 to September 1954.
b Includes estimated data for missing periods. Represents 100 percent of runoff for water year October 1953 to September 1954.

MISSOURI RIVER MAIN STEM--Continued

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

Temperature (°F) of water, water year October 1953 to September 1954
(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	59	50	42	--	a 33		--	44	--	69	65	64
2	73	47	42	--	a 33		--	44	--	79	61	64
3	56	46	38	--	a 33		--	52	--	68	60	62
4	58	46	37	a 33	a 34		--	46	--	74	64	63
5	56	46	36	a 33	--		--	47	--	72	65	62
6	54	43	40	a 34	--		--	52	62	71	66	60
7	54	45	--	a 33	a 34		--	55	--	--	66	61
8	53	--	--	a 33	a 33		--	57	--	72	--	--
9	55	44	36	a 33	--		--	57	--	75	--	--
10	54	45	--	a 34	--		42	54	--	71	66	58
11	55	45	--	a 33	a 34		41	--	--	70	65	59
12	53	--	--	a 33	a 33		42	56	--	74	66	--
13	54	42	--	a 33	a 34		43	58	--	70	67	--
14	55	42	--	--	a 34		43	--	--	77	66	54
15	56	41	--	--	a 34		43	--	62	73	--	--
16	54	--	--	--	a 34		44	58	62	69	--	60
17	55	40	--	--	a 34		--	58	62	74	--	--
18	55	41	--	--	a 34		--	58	64	75	68	58
19	53	--	--	a 33	a 34		--	60	64	71	67	--
20	54	--	--	a 33	--		--	58	63	74	66	52
21	52	42	--	a 33	--		--	58	63	76	64	51
22	51	--	--	a 33	a 34		--	64	--	72	65	55
23	50	--	--	a 33	a 34		--	62	68	74	63	59
24	48	42	--	a 33	--		--	62	69	73	--	58
25	47	41	--	a 33	a 35		--	60	68	74	64	60
26	44	42	--	a 33	a 33		--	62	70	67	64	61
27	44	43	--	--	a 35		46	60	70	71	66	55
28	46	--	--	--	a 34		44	60	63	70	--	64
29	47	--	--	--	--		--	58	64	70	--	--
30	49	40	--	a 33	--		--	56	--	68	64	50
31	47	--	--	a 33	--		--	55	--	62	65	--
Average	53	--	--	--	--		--	56	--	72	--	--

a Reading obtained between 1 p.m. and 6 p.m.

LITTLE MISSOURI RIVER AT MARMARTH, N. DAK.

LOCATION.--At gaging station at bridge on U. S. Highway 12 in Marmarth, Slope County, 1½ miles downstream from Little Beaver Creek.
DRAINAGE AREA.--4,570 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: December 1949 to September 1951.
Water temperatures: August 1952 to September 1954 (discontinued).
Sediment records: August 1952 to September 1954 (discontinued).
EXTREMES, 1953-54.--Water temperatures: Maximum, 90°F July 7; minimum, freezing point on many days during November to April.
Sediment concentrations: Maximum daily, 27,000 ppm Oct. 22; minimum daily, not determined.
Sediment loads: Maximum daily, 108,000 tons Sept. 6; minimum daily, not determined.
EXTREMES, 1952-54.--Water temperatures: Maximum, 90°F July 7, 1954; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 27,000 ppm Oct. 22, 1953; minimum daily, not determined.
Sediment loads: Maximum daily, 379,000 tons June 19, 1953; minimum daily, less than 0.50 ton on many days during 1952-53.
REMARKS.--Flow affected by ice Nov. 20-28, Dec. 1 to Mar. 9, Mar. 13-17, 21, 22, Mar. 27 to Apr. 4. Records of discharge for water year October 1953 to September 1954 given in WSP 1339.

Temperature (°F) of water, water year October 1953 to September 1954
(Once-daily measurement between 3 p.m. and 7 p.m., except November to March between 1 p.m. and 4 p.m.)

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

a Reading obtained between 9 a.m. and 12 m.

LITTLE MISSOURI RIVER BASIN--Continued

LITTLE MISSOURI RIVER AT MARMARTH, N. DAK.--Continued

Suspended sediment, water year October 1953 to September 1954

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	11			24	190	12	30		
2	8.4			21	270	15	32		
3	7.8			17	130	6	30		
4	7.2			18	180	9	30		
5	7.2			12	510	17	30		
6	8.4			13			30		
7	6.2			21			25	94	6
8	5.2			19			22		
9	2.6			19			20		
10	5.2			20			15		
		34	1						
11	3.0			22			12		
12	5.8			19			10		
13	11			14			8		
14	12			20			6		
15	11			18			5		
16	12			15			5		
17	11			14			5		
18	14			14	101	5	5		
19	12			17			5		
20	11			20			5		
21	140	12,000	sa 13,000	22			5		
22	174	27,000	12,700	22			5	65	1
23	132	12,600	4,490	22			5		
24	77	5,300	1,100	22			5		
25	55	4,100	609	22			5		
26	42	5,400	612	24			4.5		
27	33	5,400	481	25			4.5		
28	34	3,600	330	25			4.5		
29	32	1,600	138	22			4.5		
30	34	590	54	24			4.5		
31	26	240	17	--	--	--	4.5		
Total	951.0	--	33,551	587	--	184	382.0	--	91

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	4.5			15	21	1	14	--	e 15
2	4.5			40	75	a 8	12	350	11
3	4.5			250	425	287	12	190	6
4	4.5			300	1,570	1,270	12	130	4
5	4.5			280	1,670	1,260	14	120	5
6	4.5			250	1,460	986	15	120	5
7	4.5			220	1,160	689	20	175	9
8	4.5			200	1,000	a 550	30	160	13
9	4.5			150	940	381	70	260	49
10	4.5			100	375	101	111	470	141
11	4.5			50	480	a 65	129	800	279
12	4.5			35	550	52	105	475	135
13	4.5			35	545	52	60	270	44
14	4.5			35	500	a 48	50	270	36
15	4.5			40	490	53	60	225	36
16	4	60	1	35	560	53	70	280	53
17	4			32	580	50	70	480	91
18	4			32	750	65	70	1,170	221
19	4			28	500	38	66	870	155
20	4			25	380	a 26	44	1,390	s 153
21	4			22	400	24	60	920	149
22	4			20	580	31	60	690	112
23	4			25	930	63	64	980	169
24	4			22	770	46	96	1,940	s 564
25	5			20	700	a 38	114	2,130	s 726
26	6			18	1,020	50	57	2,050	315
27	7			16	690	30	90	1,300	316
28	8			15	460	19	80	1,060	229
29	8			--	--	--	70	870	164
30	8			--	--	--	60	800	130
31	8			--	--	--	60	870	141
Total	153.5		31	2,310	--	6,336	1,845	--	4,476

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

LITTLE MISSOURI RIVER BASIN--Continued

LITTLE MISSOURI RIVER AT MARMARTH, N. DAK.--Continued

Suspended sediment, water year October 1953 to September 1954--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.....	70	870	164	39	170	18	15	550	sa 36
2.....	70	665	126	40	160	17	53	5,800	830
3.....	70	365	69	39	170	18	129	6,400	2,230
4.....	80	1,390	300	40	120	13	141	8,000	3,050
5.....	703	5,920	s 16,000	38	120	12	81	8,400	1,840
6.....	2,150	15,700	s 97,700	34	120	11	68	7,500	1,380
7.....	618	6,800	11,300	31	140	12	68	7,000	1,290
8.....	820	7,300	16,200	30	70	6	61	4,200	692
9.....	1,120	6,600	20,000	24	100	6	44	2,700	321
10.....	2,570	9,460	65,600	22	75	4	74	5,020	1,000
11.....	905	7,300	17,800	20	75	4	255	19,000	sa 14,000
12.....	893	4,900	11,800	14	75	3	57	7,360	1,130
13.....	612	3,600	5,950	17	55	3	40	1,460	s 170
14.....	430	2,400	2,790	14	50	2	36	560	54
15.....	270	1,930	1,410	14	50	2	30	320	26
16.....	190	1,420	728	11	50	1	24	290	19
17.....	147	1,120	445	11	50	1	24	140	9
18.....	147	860	341	12	50	2	22	130	8
19.....	117	680	215	12	50	2	193	22,700	s 19,000
20.....	108	480	140	11	40	1	82	10,100	s 2,440
21.....	105	450	128	10	40	1	51	6,300	868
22.....	102	390	107	11	75	2	40	1,920	207
23.....	123	611	s 178	18	100	5	39	1,320	139
24.....	81	1,020	223	20	90	5	28	1,770	134
25.....	68	525	96	18	80	4	44	2,740	s 372
26.....	57	210	32	16	85	4	32	2,150	186
27.....	57	175	27	15	140	6	24	680	44
28.....	57	190	29	25	150	10	162	15,000	s 11,200
29.....	55	150	22	20	120	6	426	15,500	s 16,600
30.....	44	160	19	16	100	4	460	8,400	10,400
31.....	--	--	--	14	80	3	--	--	--
Total.	12,839	--	269,939	656	--	188	2,803	--	89,675

	July			August			September		
1.....	243	3,050	s 2,140	3.5	400	4	42	270	31
2.....	188	1,500	761	2.6	130	1	33	160	14
3.....	114	2,270	s 626	2.4	220	1	30	170	14
4.....	70	2,450	463	1.5	220	1	27	110	8
5.....	55	2,340	347	2.1	450	3	330	8,600	sa 29,000
6.....	38	1,040	107	3.0	380	3	1,340	24,900	s 108,000
7.....	28	250	19	16	5,570	s 679	282	6,390	s 6,010
8.....	20	180	10	38	15,300	1,570	509	9,210	s 18,600
9.....	17	160	7	21	13,100	743	128	8,870	s 4,010
10.....	11	150	4	17	11,200	514	33	2,920	260
11.....	17	356	s 18	11	8,400	249	18	1,120	54
12.....	6.2	130	2	276	15,400	s 18,600	10	470	13
13.....	3.5			372	12,400	12,500	11	210	6
14.....	3.0			315	6,190	s 5,550	9.8	200	5
15.....	2.8	119	1	133	4,600	1,650	6.5	225	4
16.....	2.2			476	14,500	s 22,900	7.2	170	3
17.....	2.1	779	4	195	6,800	3,580	5.8	120	2
18.....	1.7	700	3	141	7,600	2,890	3.2	150	1
19.....	1.7	120	1	151	5,700	2,320	4.8	125	2
20.....	14	4,590	s 357	586	11,300	s 20,400	5.2	240	3
21.....	22	8,200	487	476	13,000	16,700	3.5		
22.....	359	15,900	15,400	388	9,800	10,300	2.4		
23.....	101	11,100	s 3,480	266	5,700	4,090	3.2		
24.....	30	2,080	s 193	154	4,100	1,700	3.2		
25.....	19	460	24	129	2,700	940	2.2		
								148	1
26.....	12	180	6	122	3,100	1,020	2.1		
27.....	8.4	190	4	614	9,750	s 17,600	1.5		
28.....	44	5,610	s 758	288	6,000	4,670	.8		
29.....	27	1,420	s 128	102	3,020	832	1.3		
30.....	9.1	490	12	62	1,140	191	.9		
31.....	4.2	540	6	50	450	61	--	--	--
Total.	1,473.9	--	25,371	5,414.1	--	152,262	2,856.6	--	166,050

Total discharge for year (cfs-days)..... 32,271.1
Total load for year (tons)..... 748,154

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

LITTLE MISSOURI RIVER BASIN--Continued

LITTLE MISSOURI RIVER AT MARMARTH, N. DAK.--Continued

Particle-size analyses of suspended sediment, February to August 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; V, visual accumulation tube)

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. 9, 1954.....	10:55 a.m.	79	--	1,070	1,370		1		97		99	--	--	--			SPN
Feb. 9	10:55 a.m.	79	--	1,070	1,460		98		98		99	--	--	--			SPWCM
Apr. 1	2:00 p.m.	72	33	1,080	1,970	90	96	99	100		--	--	--	--			BWCM
Apr. 9	5:30 p.m.	1,390	--	6,990	4,010		6		71		89	94	99	100			VPN
Apr. 9	5:30 p.m.	1,390	--	6,990	3,910		60		72		89	94	99	100			VPWCM
June 2.....	6:00 p.m.	55	51	5,140	2,850		96		100		--	--	--	--			PWCM
June 3.....	5:30 p.m.	147	63	7,380	5,330		97		100		--	--	--	--			PWCM
June 4.....	6:00 p.m.	135	65	8,230	3,290		100		--		--	--	--	--			PWCM
June 5.....	11:00 a.m.	79	69	8,360	2,940		100		--		--	--	--	--			PWCM
June 8.....	4:30 p.m.	57	70	3,140	2,230		99		100		--	--	--	--			PWCM
June 19	6:30 p.m.	235	63	32,100	3,590		70		100		--	--	--	--			PWCM
July 20.....	6:00 p.m.	38	72	11,700	9,500		99		100		--	--	--	--			PWCM
July 21.....	11:30 a.m.	22	80	7,980	2,840		100		--		--	--	--	--			PWCM
July 22.....	10:00 a.m.	588	62	12,000	4,670		76		100		--	--	--	--			PWCM
Aug. 7	6:00 p.m.	32	74	20,100	4,120		96		100		--	--	--	--			PWCM
Aug. 8	6:30 p.m.	30	75	13,600	4,300		100		--		--	--	--	--			PWCM
Aug. 13	6:30 p.m.	288	75	9,590	1,950		82		94		95	--	--	--			SPWCM

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, 9 miles downstream from Garrison Dam.
DRAINAGE AREA.--181,400 square miles, approximately.
RECORDS AVAILABLE.--Water temperatures: June 1952 to September 1954.
EXTREMES, 1952, 1954.--Water temperatures: Maximum, 76°F July 27, 28, 1954.
REMARKS.--Records of discharge for water years 1952-54 given in WSP 1239, 1279, 1339.

Temperature (°F) of water, June to September 1952
(Recorder with temperature attachment, continuous ethyl alchol 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																	--	--	68	67	74	73	61	60
2																	--	--	68	68	74	73	61	60
3																	--	--	69	67	73	72	62	61
4																	--	--	72	69	72	71	63	62
5																	--	--	74	72	71	70	63	63
6																	--	--	74	73	71	70	63	61
7																	--	--	73	70	71	71	63	61
8																	--	--	71	69	71	70	65	63
9																	--	--	73	70	70	69	65	64
10																	--	--	73	72	70	70	67	65
11																	--	--	73	72	70	68	68	67
12																	--	--	72	71	68	68	69	68
13																	--	--	71	69	70	68	68	66
14																	--	--	--	--	71	70	66	62
15																	--	--	--	--	71	70	62	61
16																	--	--	72	70	70	69	62	61
17																	--	--	73	71	69	68	62	61
18																	--	--	73	71	69	69	61	60
19																	--	--	73	72	70	69	60	59
20																	--	--	72	70	70	69	59	58
21																	--	--	71	69	70	69	59	58
22																	--	--	71	69	69	68	59	58
23																	--	--	69	68	70	69	58	57
24																	--	--	70	69	72	70	59	58
25																	--	--	71	70	73	72	60	59
26																	66	65	72	71	73	73	61	60
27																	65	64	73	72	73	72	61	61
28																	64	63	73	72	72	71	62	61
29																	65	64	72	71	71	69	62	62
30																	67	65	72	70	69	67	62	61
31																	--	--	73	71	67	61	--	--
Average																	--	--	72	70	71	70	62	61

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MISSOURI RIVER MAIN STEM--Continued

MISSOURI RIVER BELOW GARRISON DAM, N. DAK.--Continued

Temperature (°F) of water, water year October 1952 to September 1953

/Recorder with temperature attachment, continuous ethyl alcohol actuated thermograph, October, November, April to June/

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

MISSOURI RIVER BELOW GARRISON DAM, N. DAK.--Continued

Temperature (°F) of water, water year October 1953 to September 1954
/Recorder with temperature attachment, continuous ethyl alcohol actuated thermograph, April to September 1954/

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

GRAND RIVER BASIN

GRAND RIVER NEAR SHADEHILL, S. DAK.

LOCATION.--At spillway and irrigation outlets of Shadehill Reservoir, three-quarters of a mile west of Shadehill, Perkins County, and 4 miles downstream from confluence of North and South Forks of Grand River.
DRAINAGE AREA.--3,120 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: April to October 1952, March 1953 to September 1954.
Water temperatures: August to September 1954.
REMARKS.--Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Flow is regulated by an ungated spillway and by a regulated irrigation outlet. Reservoir spills at elevation 2,272. Gaging station, Grand River at Shadehill, is 1 mile downstream. Records of elevation furnished by Bureau of Reclamation.

Chemical analyses, in parts per million, water year October 1953 to September 1954

Date of collection	Gage height (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. 5, 1953	2,271.68	--		--	--	--	--	--	--	--	--			--	--	--	--	--	--	--	--	913	--
Oct. 12	2,271.62	--		34	13	155	6.8	265	0	240	3.5			0.27	--	--	--	137	0	70	5.8	915	7.7
Oct. 19	2,271.61	--		--	--	--	--	--	--	--	--			--	--	--	--	--	--	--	--	923	--
Oct. 26	2,271.65	--		--	--	--	--	--	--	--	--			--	--	--	--	--	--	--	--	935	--
Nov. 2	2,271.65	--		37	13	157	7.0	271	0	249	7.0			.27	632	0.86	3.45	148	0	69	5.6	950	7.9
Nov. 4	2,271.64	--		33	14	155	7.0	266	0	250	3.5			.28	--	--	--	140	0	69	5.7	930	7.9
Dec. 1	2,271.69	--		--	--	--	--	--	--	--	--			--	--	--	--	--	--	--	--	940	--
Jan. 5, 1954	2,271.73	--		--	--	--	--	--	--	--	--			--	--	--	--	--	--	--	--	963	--
Feb. 9	2,271.77	--		37	13	172	7.4	292	0	265	3.5			.29	--	--	--	148	0	70	6.1	1,010	8.2
Mar. 26	2,272.22	--		36	14	175	7.1	283	6	275	3.5			.29	663	.90	50.5	147	0	71	6.3	1,020	8.4
Apr. 2	2,272.22	--		--	--	--	--	--	--	--	--			--	--	--	--	--	--	--	--	1,020	--
Apr. 9	2,272.78	--		--	--	--	--	--	--	--	--			--	--	--	--	--	--	--	--	1,020	--
Apr. 16	2,272.69	--		--	--	--	--	--	--	--	--			--	--	--	--	--	--	--	--	1,030	--
Apr. 23	2,272.45	--		--	--	--	--	--	--	--	--			--	--	--	--	--	--	--	--	1,030	--
Apr. 30	2,272.33	1.6	0.06	36	14	177	7.3	282	7	278	4.0	0.3	1.0	.26	666	.91	113	147	0	71	6.4	1,030	8.4
May 7	2,272.21	1.8		34	15	177	7.4	297	0	278	3.5			.27	672	.91	64.8	147	0	71	6.4	1,030	7.7
May 14	2,272.14	--		--	--	--	--	--	--	--	--			--	--	--	--	--	--	--	--	1,030	--
May 22	2,272.05	--		--	--	--	--	--	--	--	--			--	--	--	--	--	--	--	--	1,030	--
May 28	2,272.27	--		--	--	--	--	--	--	--	--			--	--	--	--	--	--	--	--	1,040	--
June 8 a	2,272.39	--		--	--	--	--	--	--	--	--			--	--	--	--	--	--	--	--	1,040	--
June 11	2,272.33	--		--	--	--	--	--	--	--	--			--	--	--	--	--	--	--	--	1,040	--
June 18	2,272.21	1.9		34	15	182	7.4	300	0	280	4.0			.32	688	.94	81.4	145	0	72	6.6	1,040	7.9
June 25	2,272.19	--		--	--	--	--	--	--	--	--			--	--	--	--	--	--	--	--	1,050	--
July 3	2,272.07	--		--	--	--	--	--	--	--	--			--	--	--	--	--	--	--	--	1,060	--
July 16	2,271.91	--		--	--	--	--	--	--	--	--			--	--	--	--	--	--	--	--	1,070	--

July 26	2,271.84	1.4		33	16	189	7.4	310	0	295	4.0			.29	704	.96	9.28	148	0	72	6.8	1,080	8.2
Aug. 2	2,271.74	--		--	--	--	--	--	--	--	--			--	--	--	--	--	--	--	--	1,080	--
Aug. 11	2,271.60	--		--	--	--	--	--	--	--	--			--	--	--	--	--	--	--	--	1,090	--
Aug. 13-Sept. 13	--	5.0		35	15	192	8.5	307	6	298	5.0			.27	725	.99	8.52	151	0	72	6.8	1,100	8.3
Sept. 14-30	--	3.7		35	16	197	8.9	305	10	308	5.0			.29	739	1.01	11.1	152	0	72	7.0	1,120	8.5
Weighted average b	--	--		--	--	177	--	--	--	--	--			--	667	0.91	42.1	147	--	72	6.4	1,030	--

a Sample collected from service spillway of Shadehill Dam. All others collected from irrigation outlet.

b Weighted with discharge at gaging station 1 mile downstream from dam. Mean discharge for water year was 23.4 cfs. Includes estimated data for missing periods. Represents 100 percent of runoff for water year October 1953 to September 1954.

GRAND RIVER BASIN--Continued

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

Temperature (°F) of water, August to September 1954
(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											--	--
2											68	a 67
3											--	--
4											--	--
5											--	--
6											--	--
7											--	--
8											--	--
9											--	53
10											--	a 65
11											--	--
12											--	--
13											--	--
14											--	62
15											--	a 62
16											66	--
17											--	a 62
18											65	--
19											--	--
20											64	--
21											65	60
22											--	58
23											67	58
24											68	57
25											67	56
26											66	--
27											65	59
28											65	56
29											--	55
30											65	55
31											--	--
Average											--	--

a Reading obtained between 11 a.m. and 2 p.m.

LANCE CREEK AT SPENCER, WYO.

LOCATION.--At cableway 150 feet downstream from gaging station, three-eighths of a mile south of Spencer, Niobrara County, 1 mile upstream from mouth, and 34 miles south of Newcastle.
DRAINAGE AREA.--2,070 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: November 1951 to July 1952.
Water temperatures: March to September 1953.
Sediment records: April 1950 to September 1954 (discontinued).
EXTREMES, 1953-54.--Sediment concentrations: Maximum daily, 56,000 ppm July 19, 21; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 147,000 tons Aug. 6; minimum daily, 0 tons on many days.
EXTREMES, 1 950-54.--Sediment concentrations: Maximum daily, 56,000 ppm July 19, 21, 1954; minimum daily, no flow on many days each year.
Sediment loads: Maximum daily, 281,000 tons June 27, 1952; minimum daily, 0 tons on many days each year.
REMARKS.--Maximum observed sediment concentration during water year, 96,000 ppm July 20. No flow during period October to March; record is omitted. Records of discharge for water year October 1953 to September 1954 given in WSP 1339.

Suspended sediment, April to September 1954

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1.....	0.8	--	e 1	0.2	--	(t)	0	--	0
2.....	4.6	--	e 5	.4	--	(t)	0	--	0
3.....	1.8	--	e 1	.1	--	(t)	0	--	0
4.....	2.1	413	2	.1	--	(t)	0	--	0
5.....	1.6	--	e 1	0	--	0	0	--	0
6.....	12	5,300	sa 240	.1	30	(t)	0	--	0
7.....	13	9,000	b 320	0	--	0	0	--	0
8.....	9.7	5,000	131	0	--	0	0	--	0
9.....	7.2	3,650	71	0	--	0	0	--	0
10.....	4.1	1,400	15	0	--	0	0	--	0
11.....	2.4	700	5	0	--	0	0	--	0
12.....	1.1	395	1	0	--	0	0	--	0
13.....	.9	295	1	0	--	0	0	--	0
14.....	.5	280	(t)	0	--	0	0	--	0
15.....	.8	320	1	0	--	0	0	--	0
16.....	.6	--	(t)	0	--	0	0	--	0
17.....	.4	--	(t)	.1	--	(t)	0	--	0
18.....	.4	--	(t)	0	--	0	0	--	0
19.....	.8	--	(t)	0	--	0	0	--	0
20.....	.9	83	(t)	0	--	0	0	--	0
21.....	.7	--	(t)	0	--	0	0	--	0
22.....	.5	--	(t)	.2	2,600	sa 9	0	--	0
23.....	.2	--	(t)	2.1	8,000	b 46	0	--	0
24.....	.1	--	(t)	.2	132	(t)	0	--	0
25.....	.1	--	(t)	0	--	0	0	--	0
26.....	.1	--	(t)	0	--	0	0	--	0
27.....	.1	--	(t)	0	--	0	9.1	16,000	sb 1,200
28.....	0	--	0	0	--	0	1.4	3,300	12
29.....	0	--	0	0	--	0	0	--	0
30.....	.1	--	(t)	0	--	0	0	--	0
31.....	--	--	--	0	--	0	--	--	--
Total.	67.6	--	798	3.5	--	56	10.5	--	1,212

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

CHEYENNE RIVER BASIN--Continued

LANCE CREEK AT SPENCER, WYO.--Continued

Suspended sediment, April to September 1954--Continued

Day	July			August			September		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	0	--	0	0	--	0			
2	0	--	0	0	--	0			
3	0	--	0	0	--	0			
4	0	--	0	0	--	0			
5	0	--	0	620	38,000	sb 120,000			
6	0	--	0	1,460	36,000	147,000			
7	0	--	0	886	33,100	82,100			
8	0	--	0	234	33,000	21,600			
9	0	--	0	52	22,000	a 3,100			
10	0	--	0	40	7,400	799			
11	0	--	0	24	--	e 300			
12	0	--	0	12	--	e 100			
13	0	--	0	20	--	e 250			
14	409	36,300	s 68,500	19	--	e 200			
15	38	18,000	sa 2,600	25	--	e 300			
16	1.1	2,200	a 7	8.4	--	e 50			
17	26	47,000	sa 3,900	3.6	--	e 10			
18	1.2	7,000	sa 32	1.1	501	1			
19	74	56,000	sb 19,000	.7	--	(t)			
20	108	55,700	s 23,800	.3	--	(t)			
21	315	56,000	a 49,000	.4	--	(t)			
22	46	27,000	a 3,400	.2	--	(t)			
23	5.1	5,500	b 75	0	--	0			
24	1.2	--	e 15	0	--	0			
25	.7	--	e 1	0	--	0			
26	.1	--	(t)	0	--	0			
27	0	--	0	0	--	0			
28	0	--	0	0	--	0			
29	0	--	0	0	--	0			
30	0	--	0	0	--	0			
31	0	--	0	0	--	0			
Total	1,025.4	--	170,330	3,406.7	--	375,811	0		0

Total discharge for year (cfs-days) 4,513.7
Total load for year (tons) 548,207

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

LANCE CREEK AT SPENCER, WYO.--Continued

Particle-size analyses of suspended sediment, April to August 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; V, visual accumulation tube)

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. 9, 1954.....	12:00 m.	7.2	58	4,920	3,520		99		100		--						PWCM
May 23.....	8:00 a.m.	5.6	54	16,000	2,700		96		100		--						PWCM
Aug. 5.....	5:00 p.m.	1,470	46	75,600	4,350		58		84		97						SPWCM
Aug. 6.....	3:15 a.m.	1,290	--	45,700	6,520		59		85		95	98	100				VPWCM
Aug. 7.....	3:00 p.m.	980	--	42,400	2,860		56		77		94						SPWCM
Aug. 10.....	2:55 p.m.	43	--	6,160	4,150		89		99		99						SPWCM

CHEYENNE RIVER BASIN--Continued

BEAVER CREEK NEAR NEWCASTLE, WYO.

LOCATION.--At gaging station at bridge on county road, 1 mile downstream from Sheep Creek and 23 miles south of Newcastle, Weston County.
DRAINAGE AREA.--1,320 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: December 1949 to September 1952, December 1952 to August 1953.
Sediment records: March 1950 to September 1954.
EXTREMES, 1953-54.--Sediment concentrations: Maximum daily, 17,600 ppm June 23; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 14,000 tons Aug. 8; minimum daily, 0 tons on many days.
EXTREMES, 1950-54.--Sediment concentrations: Maximum daily, not determined; minimum daily, no flow on many days during 1950, 1952-54.
Sediment loads: Maximum daily, 56,000 tons (estimated) May 30, 1953; minimum daily, 0 tons on many days during 1950, 1952-54.
REMARKS.--Records of discharge for water year October 1953 to September 1954 given in WSP 1339.

Suspended sediment, water year October 1953 to September 1954

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	0.2	--		2.5	--		9.2	--	
2	.2	6		2.4	28		8.8	55	
3	.3	--		2.0	29		8.4	--	
4	.4	--		2.0	17		8.0	53	
5	.5	5		2.0	--	a 0.2	7.5	--	
6	.5	--		2.0	21		7.0	--	
7	.5	8		4.7	--		7.5	44	
8	.5	16		2.5	--		7.0	--	
9	.5	12		3.3	21		6.0	62	
10	.5	--		7.1	--		7.0	--	
11	.5	--		7.4	--		6.5	59	
12	.4	13		7.8	39		7.0	--	
13	.4	--		7.8	24		6.5	--	
14	.2	12		7.8	--		6.0	34	
15	.1	--	(t)	7.8	--		6.5	--	
16	.2	12		8.6	37		6.3	31	a 0.7
17	.1	--		9.7	--		6.0	30	
18	.1	--		9.4	67		6.5	27	
19	.1	11		8.4	--		7.0	--	
20	.1	--		8.5	45	a .8	8.0	--	
21	.1	18		8.8	--		7.5	20	
22	.2	--		9.0	--		6.0	--	
23	.6	62		9.0	20		6.4	24	
24	.5	--		9.0	--		6.8	--	
25	.5	--		9.0	23		7.2	--	
26	.4	8		8.8	--		7.0	21	
27	.3	--		9.0	25		6.6	--	
28	.3	7		9.5	--		7.0	25	
29	.3	--		10	--		6.8	--	
30	2.6	13	0.1	9.5	46		6.6	24	
31	2.9	--	e .1	--	--	--	7.0	--	
Total	15.0	--	0.6	205.3	--	18.6	217.6	--	21.7

e Estimated.
t Less than 0.050 ton.
a Computed from partly estimated concentrations.

CHEYENNE RIVER BASIN--Continued

BEAVER CREEK NEAR NEWCASTLE, WYO.--Continued

Suspended sediment, water year October 1953 to September 1954--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	7.2	--		11	50		8.0	414	
2	7.0	24		12	53		6.7	239	
3	7.4	--		13	55		7.5	318	
4	7.0	15		14	--		9.0	--	
5	7.3	17		13	50		12	319	
6	7.7	17		13	--		15	--	
7	8.0	--		15	--	a 2.5	17	--	
8	8.0	19		17	88		20	301	
9	7.4	--		18	--		20	--	
10	7.0	--		16	77		20	374	
11	6.8	15		13	--		17	--	
12	6.5	--		14	79		13	379	
13	6.8	12		15	--		10	--	
14	7.0	--		16	--		9.0	--	
15	6.5	7		15	236		8.0	299	
16	5.0	--	a 0.5	16	--		9.5	344	a 11
17	5.5	--		16	240		10	279	
18	6.0	18		17	--		11	--	
19	6.0	--		17	167		12	256	
20	5.0	27		16	--		12	--	
21	6.0	--		16	--	a 8.2	13	--	
22	7.0	14		16	--		14	293	
23	8.0	--		17	178		21	--	
24	7.5	--		17	187		20	292	
25	6.5	34		16	--		16	--	
26	7.0	--		14	188		14	323	
27	7.5	50		11	--		12	--	
28	8.0	32		10	--		11	--	
29	8.5	56		--	--	--	11	406	
30	9.0	--		--	--	--	11	--	
31	10	--		--	--	--	11	233	
Total	220.1	--	15.5	414	--	155.5	400.7	--	341

Day	April			May			June		
1	11	--		0.1	--		5.1	420	sb 46
2	11	249		.1	--		44	1,340	s 217
3	11	--		.1	20		8.4	420	b 9.5
4	11	--		.1	--		2.9	250	2.0
5	11	54	a 3.1	.1	7		1.6	--	e 1.0
6	10	--		.1	16		1.0	--	e .5
7	7.8	30		.1	356	a 0.1	70	8,430	s 2,470
8	4.7	--		.1	--		56	8,000	sb 1,400
9	2.4	77		.1	--		14	7,300	276
10	3.1	--		.1	444		11	--	e 22
11	3.3	--		.1	--		18	419	s 23
12	2.5	43		.1	310		5.0	--	e 5.0
13	1.6	--	a .3	0	--	0	2.0	--	e 1.6
14	.5	33		0	--	0	.4	--	e .3
15	1.2	--		0	--	0	.1		
16	1.9	46		0	--	0	.1		
17	1.7	--		0	--	0	.1	--	(t)
18	.6	--		0	--	0	.1		
19	.4	13		0	--	0	.1		
20	.3	15	(t)	0	--	0	.1		
21	.2	35		0	--	0	0	--	0
22	.2	--		3.9	240	sb 60	78	14,000	sb 4,300
23	.1	28		30	3,200	sb 320	48	17,600	s 2,420
24	.1	--		4.2	700	8	27	4,040	s 393
25	.1	--		1.4	--	e 1.4	13	812	s 40
26	.1	30	(t)	.7	--	e .3	4.2	220	b 2.4
27	.1	68		.4	--	e .1	1.7	150	b .7
28	.1	85		1.7	100	s .6	2.0	145	.8
29	.1	--		1.2	--	e .4	2.2	135	.8
30	.1	127		.4	--	e .1	1.3	100	b .4
31	--	--	--	.3	--	e .1	--	--	--
Total	98.2	--	24.9	45.4	--	392.2	417.4	--	11,632.2

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

CHEYENNE RIVER BASIN--Continued

BEAVER CREEK NEAR NEWCASTLE, WYO.--Continued

Suspended sediment, water year October 1953 to September 1954--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	0.8	90	b 0.2	0.1	--	(t)	0.1	48	(t)
2	.4	80	.1	0	--	0	0		0
3	.2	--	(t)	0	--	0	0		0
4	.1	--	(t)	0	--	0	0		0
5	.1	--	(t)	0	--	0	0		0
6	.1	25	(t)	0	--	0	0		0
7	0	--	0	0	--	0	0		0
8	0	--	0	356	12,000	sb14,000	0		0
9	0	--	0	111	5,930	s 2,770	0		0
10	0	--	0	18	598	s 33	0		0
11	0	--	0	8.1	1,500	33	0		0
12	0	--	0	64	4,900	sb 1,400	0		0
13	0	--	0	98	7,360	s 2,320	0		0
14	0	--	0	39	--	e 300	0		0
15	28	2,200	sb 240	52	4,800	sb 950	0		0
16	9.6	800	sb 26	57	4,660	s 955	0		0
17	3.8	--	e 1.7	13	950	sb 36	0		0
18	3.7	110	sb 3.4	6.5	363	6.4	0		0
19	67	2,860	s 586	3.3	--	e 2.2	0		0
20	22	180	11	1.2	--	e .6	0		0
21	9.4	181	s 5.4	.6	--	e .2	0		0
22	26	320	sb 26	.3	--	(t)	0		0
23	8.4	--	e 2.4	.1	58	(t)	0		0
24	14	220	sb 12	0	--	0	0		0
25	8.4	180	b 4.0	0	--	0	0		0
26	2.4	101	.7	0	--	0	0		0
27	1.7	165	s 1.3	.1	19	(t)	0		0
28	1.4	--	e .3	2.2	100	sb .7	0		0
29	1.0	--	e .2	2.4	120	b .8	0		0
30	.3	50	(t)	1.2	68	.2	0		0
31	.2	--	(t)	.2	50	(t)	--		--
Total	209.0	--	920.8	834.3	--	22,808.2	0.1		(t)

Total discharge for year (cfs-days) 3,077.1
Total load for year (tons) 36,331.2

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

BEAVER CREEK NEAR NEWCASTLE, WYO.--Continued

Particle-size analyses of suspended sediment, June 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed)

Date of collection	Time	Discharge (cfs)	Water temperature (°F)	Suspended sediment											Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters									
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
June 7, 1954.....	5:30 p.m.	129	67	16,900	4,360		83		100								PWCM
June 24	4:00 p.m.	14	77	751	1,270		86		97		98	99	100				BWCM

CHEYENNE RIVER BASIN--Continued

HAT CREEK NEAR EDGEMONT, S. DAK.

LOCATION.--At gaging station at bridge on State Highway 87, 2 miles upstream from mouth, 2 miles west of Heppner, and 12½ miles southeast of Edgemont, Fall River County.
DRAINAGE AREA.--1,044 square miles.
RECORDS AVAILABLE.--Water temperatures: April 1951 to September 1953.
Sediment records: October 1950 to September 1954 (discontinued).
EXTREMES, 1953-54.--Sediment concentrations: Maximum daily, 9,180 ppm May 23; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 92,100 tons May 23; minimum daily, 0 tons on many days.
EXTREMES, 1950-54.--Sediment concentrations: Maximum daily, 25,000 ppm June 10, 1953; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 92,100 tons May 23, 1954; minimum daily, 0 tons on many days.
REMARKS.--Flow affected by ice Mar. 1-4, 12-15, 28-31. No flow during period October to December; record is omitted. Records of discharge for water year October 1953 to September 1954 given in WSP 1339.

Suspended sediment, January to September 1954

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							0.1		
2							.1		
3							.1		
4							.1		
5							.4		
6							.4		
7							.4		
8							.2	--	(t)
9							.2		
10							.1		
11							.1		
12							.1		
13							.1		
14							.1		
15							.4		
16							1.0	144	0.4
17							1.0	--	e .4
18							2.4	--	e 2.0
19							4.0	--	e 5.0
20							4.0	--	e 5.0
21							15	--	e 50
22							22	--	e 80
23							30	--	e 150
24							54	1,850	270
25							33	3,230	288
26							25	670	45
27							16	220	9.5
28							12	760	25
29							8	390	8.4
30							8	440	9.5
31							12	590	19
Total	0		0	0		0	250.3	--	967.6

e Estimated.
t Less than 0.050 ton.

CHEYENNE RIVER BASIN--Continued

HAT CREEK NEAR EDGEMONT, S. DAK.--Continued

Suspended sediment, January to September 1954--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	250	10	0.2	--		19	98	5.0
2	10	160	a 4.4	.2	21		32	61	5.3
3	8	113	2.4	.2	--		21	35	2.0
4	14	130	a 5.0	.2	113		15	28	1.1
5	18	169	8.2	.1	--		8	50	1.1
6	8	145	3.1	.2	104		10	55	1.5
7	7	98	1.8	.1	--		11	53	1.6
8	3.2	43	.4	.1	173		10	31	.8
9	.1	--		.1	116		10	35	.9
10	.8	22		.1	--		9	50	1.2
11	.6	--		.2	79	(t)	9	45	1.1
12	.2	--		.2	--		8	42	.9
13	.2	32		.2	136		8	51	1.1
14	.2	--		.1	--		7	77	1.5
15	.2	19		.1	111		7	92	1.7
16	.2	--		.1	--		6	91	1.5
17	.2	22		.1	85		6	83	1.3
18	.2	--		.1	--		5	82	1.1
19	.2	21		.1	85		5	83	1.1
20	.2	--	(t)	.1	--		4	88	1.0
21	.1	31		0	--	0	3	102	.8
22	.1	--		28	--	e 300	2	80	.4
23	.1	--		2,890	9,180	s 92,100	1	80	.2
24	.1	16		840	7,000	15,900	3	85	a .7
25	.1	--		203	4,010	2,200	2	98	.5
26	.2	26		83	1,030	s 250	1	79	.2
27	.2	--		47	440	56	.5	73	.1
28	.2	29		29	228	18	.5	62	.1
29	.1	--		20	142	7.7	.5	81	.1
30	.1	24		16	97	4.2	1	135	.4
31	--	--	--	16	72	3.1	--	--	--
Total	87.8	--	35.6	4,174.8	--	110,839.8	224.5	--	36.3

Day	July			August			September		
1	1	170	a 0.5	0	--	0			
2	1	167	.5	0	--	0			
3	30	--	e 260	0	--	0			
4	1	147	.4	0	--	0			
5	.5	190	.3	0	--	0			
6	.3	145	.1	0	--	0			
7	.1	130	(t)	0	--	0			
8	0	--	0	0	--	0			
9	0	--	0	0	--	0			
10	0	--	0	0	--	0			
11	0	--	0	51	--	e 750			
12	0	--	0	8	319	s 8.3			
13	0	--	0	.6	148	.2			
14	0	--	0	1.6	102	.4			
15	0	--	0	4.8	137	1.8			
16	0	--	0	.4	113	.1			
17	0	--	0	0	--	0			
18	0	--	0	0	--	0			
19	0	--	0	0	--	0			
20	0	--	0	0	--	0			
21	0	--	0	0	--	0			
22	0	--	0	0	--	0			
23	0	--	0	0	--	0			
24	0	--	0	0	--	0			
25	0	--	0	0	--	0			
26	0	--	0	0	--	0			
27	0	--	0	0	--	0			
28	0	--	0	0	--	0			
29	0	--	0	0	--	0			
30	0	--	0	0	--	0			
31	0	--	0	0	--	0			
Total	33.9	--	261.8	66.4	--	760.8	0		0

Total discharge for year (cfs-days) 4,837.7

Total load for year (tons) 112,901.9

e Estimated.

s Computed by subdividing day.

t Less than 0.050 ton.

a Computed from estimated concentration graph.

CHEYENNE RIVER BASIN--Continued

HAT CREEK NEAR EDGEMONT, S. DAK.--Continued

Particle-size analyses of suspended sediment, May 1954

(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; V, visual accumulation tube)

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 23, 1954.....	3:30 p.m.	7,120		9,780	3,130		78		93		97	99	100				VPWCM
May 23	6:30 p.m.	3,780		8,540	5,420		78		97		98	100	--				VPWCM
May 24	5:45 a.m.	1,050	51	7,140	4,340		82		96		98	99	100				VPWCM
May 24	5:00 p.m.	445		7,420	4,550		4		97		98	99	100				VPN
May 24	5:00 p.m.	445		7,420	4,150		87		--		98	99	100				VPWCM

CHEYENNE RIVER BASIN--Continued

CHEYENNE RIVER NEAR HOT SPRINGS, S. DAK.

LOCATION.--At gaging station at bridge on State Highway 87, a quarter of a mile downstream from Cascade Creek and 10 miles southwest of Hot Springs, Fall River County.
DRAINAGE AREA.--8,710 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: April 1947 to September 1951.
Water temperatures: July 1947 to Septemher 1949, April 1951 to September 1954.
Sediment records: April 1946 to September 1954.
EXTREMES, 1953-54.--Water temperatures: Maximum, 86°F June 22, 23; minimum, 38°F Mar. 28,30.
Sediment concentrations: Maximum daily, 48,100 ppm Aug. 7; minimum daily, not determined.
Sediment loads: Maximum daily, 162,000 tons May 23; minimum daily, less than 0.50 ton on many days.
EXTREMES, 1946-54.--Water temperatures (1947-49, 1951-54): Maximum, 89°F June 12, 1952; minimum, freezing point on many days during winter months 1947-49.
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 1953 to September 1954 given in WSP 1339.

Temperature (°F) of water, water year October 1953 to September 1954
(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	69	63	--	49	--	47	44	56	65	a 75	72	73
2	67	57	49	--	56	44	--	54	60	--	77	70
3	63	60	--	52	--	44	62	--	75	--	75	--
4	65	a 58	--	--	54	--	57	--	75	--	75	70
5	65	53	--	57	48	52	--	70	80	--	73	--
6	67	--	48	59	40	--	58	--	66	--	68	--
7	66	55	--	54	47	52	58	68	68	78	a 70	70
8	66	--	48	--	--	46	66	68	75	80	a 64	68
9	71	60	--	49	a 49	52	64	60	66	--	a 64	75
10	66	--	a 48	--	45	58	62	65	68	--	a 66	72
11	68	60	--	51	46	--	65	67	78	--	a 67	75
12	65	--	50	--	51	42	--	70	80	--	a 62	--
13	a 68	61	--	49	48	45	72	78	72	--	a 70	--
14	68	--	49	--	a 50	48	62	79	62	--	a 66	--
15	66	--	--	40	51	44	--	71	80	--	a 76	--
16	66	--	53	--	50	--	--	64	70	82	a 64	--
17	67	56	--	50	54	51	66	72	70	--	a 62	--
18	65	--	52	--	54	42	59	75	70	--	a 63	66
19	68	--	--	47	48	44	60	75	73	--	a 65	--
20	65	--	54	--	52	44	64	80	68	--	a 66	65
21	58	--	--	48	52	44	64	75	72	a 78	80	67
22	59	--	45	--	48	52	66	67	86	a 68	74	70
23	59	--	--	48	56	50	60	a 55	86	a 68	76	69
24	58	--	52	--	51	45	68	a 51	--	a 68	77	68
25	58	--	--	46	53	--	65	68	82	a 76	75	67
26	57	--	52	--	43	52	67	a 57	71	a 76	--	69
27	--	58	--	55	43	50	67	a 55	a 68	--	74	69
28	64	--	50	--	48	38	65	a 50	74	--	--	--
29	62	--	--	--	--	45	58	a 50	72	76	80	--
30	62	52	52	57	--	38	--	71	--	75	75	--
31	62	--	--	56	--	42	--	75	--	70	78	--
Average	64	--	--	--	49	47	62	66	73	--	71	--

a Reading obtained between 6 a.m. and 11 a.m.

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CHEYENNE RIVER BASIN--Continued

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

Suspended sediment, water year October 1953 to September 1954

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	25			22			27		
2	25			22			27		
3	25			22			25		
4	25			22			25		
5	26	11	1	22			24		
6	26			22			24		
7	25			22	7	(t)	24	33	2
8	25			22			24		
9	25			22			24		
10	25			22			24		
11	26			22			24		
12	25			22			23		
13	25			22			24		
14	25			21			24		
15	25			20			22		
16	25	11	1	20			23		
17	25			21			23		
18	25			21			22		
19	26			21			22		
20	26			21			21		
21	26			21	6	(t)	21		
22	26			21			21	7	(t)
23	22			21			21		
24	20			21			21		
25	20			21			21		
26	20			22			21		
27	20	7	(t)	22			21		
28	21			21			21		
29	21			22			21		
30	21			26	85	6	20		
31	21			--	--	--	20		
Total	743	--	26	649	--	17	705	--	35

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	20			24			37	213	21
2	20			24	5	(t)	35	67	6
3	19			25			35	21	2
4	19			29	60	5	32	14	1
5	18	3	(t)	30	78	6	32	28	2
6	18			53	458	s 79	33	--	e 2
7	18			55	495	74	35	19	2
8	17			56	566	86	55	270	s 45
9	17			45	265	32	62	340	57
10	17			43	312	36	58	310	49
11	17			35	69	7	58	470	74
12	17			38	91	9	40	232	25
13	18			68	819	s 169	39	174	18
14	17			66	711	127	42	178	20
15	17	4	(t)	52	397	56	47	242	31
16	18			47	295	37	61	412	68
17	19			43	273	32	62	508	85
18	19			39	223	23	66	420	75
19	20			39	150	16	52	210	29
20	20			37	165	16	47	158	20
21	20	4	(t)	44	235	28	45	150	18
22	20			45	238	29	56	193	29
23	21			37	200	20	55	167	25
24	21			36	220	21	77	560	116
25	21			39	189	20	66	420	75
26	21			49	178	24	55	328	49
27	22	12	1	54	239	35	48	247	32
28	22			48	245	32	64	400	69
29	24			--	--	--	55	330	49
30	24			--	--	--	62	431	72
31	25			--	--	--	72	478	93
Total	606	--	11	1,200	--	1,020	1,583	--	1,259

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

CHEYENNE RIVER BASIN--Continued

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

Suspended sediment, water year October 1953 to September 1954--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	241	34	21			42	31	4
2	56	201	30	20			48	112	15
3	48	172	22	22			46	57	7
4	52	170	24	23			41	104	12
5	60	198	32	17	9	(t)	37	226	23
6	50	72	10	20			29	62	5
7	45	21	3	23			30	55	4
8	36	23	2	20			28	169	13
9	31			16			26	38	3
10	30			16	150	7	50	124	17
11	29	9	1	16	147	6	40	288	31
12	28			14	89	3	36	76	7
13	27			14			27		
14	27	51	4	15			27		
15	24	45	3	16			27		
16	22	136	8	16			28		
17	21			16	16	1	28		
18	21			16			29		
19	22			16			30	23	2
20	24	7	(t)	16			31		
21	23			16			31		
22	23			61	480	sa 460	31		
23	22			3,900	15,400	162,000	31		
24	21			2,020	7,380	40,300	31		
25	21			391	3,650	s 4,110	77	455	s 117
26	21	2	(t)	215	1,720	s 1,090	113	2,240	s 816
27	21			91	387	95	68	320	59
28	21			69	265	49	46	78	10
29	21			47	170	22	33	27	2
30	20			40	178	19	38	374	s 81
31	--	--	--	41	182	20	--	--	--
Total	919	--	181	7,244	--	208,194	1,179	--	1,250

	July			August			September		
1	49	574	s 96	19	135	7	16		
2	33	45	4	20	112	6	16	7	(t)
3	54	--	e 75	21	90	5	16		
4	44	--	e 22	21	30	2	13	35	1
5	31	53	4	24	10	1	11	215	6
6	28	--	e 3	306	28,700	s 42,900	10	52	1
7	28	87	7	1,140	48,100	154,000	10		
8	27	51	4	775	21,100	44,200	11		
9	28	18	1	585	38,500	63,100	14		
10	27	16	1	469	22,400	s 31,500	14		
11	27	25	2	286	19,700	s 19,400	14	16	1
12	26			212	10,800	s 7,270	14		
13	26	--	e 2	313	14,100	11,900	14		
14	26			242	8,800	5,750	14		
15	39	1,300	sa 500	177	2,440	s 1,270	13		
16	91	17,900	s 3,890	102	800	220	13		
17	104	15,000	sa 6,500	125	2,370	s 862	13		
18	220	14,700	s 10,400	100	3,760	s 1,110	13		
19	58	950	149	61	820	135	13		
20	52	2,500	sa 850	41	256	28	13		
21	134	6,580	2,380	24	173	11	13		
22	165	21,800	s 12,100	20	143	8	13	13	(t)
23	120	33,500	11,300	16	102	4	13		
24	48	13,900	s 1,940	15	100	4	13		
25	29	1,780	s 158	13	139	5	14		
26	19	300	15	13			15		
27	18	340	17	14			15		
28	18	330	16	14			15		
29	28	443	33	16	26	1	17	76	3
30	25	222	15	17			16		
31	21	133	8	17			--	--	--
Total	1,643	--	50,496	5,218	--	383,704	409	--	33

Total discharge for year (cfs-days) 22,098
Total load for year (tons) 646,226

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

CHEYENNE RIVER BASIN--Continued

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

Particle-size analyses of suspended sediment, May to August 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; V, visual accumulation tube)

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 23, 1954	11:00 a.m.	2,520	55	14,300	4,320		4		52		71	87	99	100			VPN
May 23	11:00 a.m.	2,520	55	14,300	3,840		42		59		71	87	99	100			VPWCM
Aug. 7	10:55 a.m.	1,500	70	51,600	4,300		65		95		95	--	--	--			SPWCM
Aug. 11	11:50 a.m.	194	--	12,900	3,650		84		93		93	--	--	--			SPWCM
Aug. 18	2:15 p.m.	634	74	2,670	3,910		98		--		99	--	--	--			SPWCM

BELLE FOURCHE RIVER BELOW WHITEWOOD CREEK NEAR VALE, S. DAK.

LOCATION.--At bridge on State Highway 79, 1½ miles downstream from Whitewood Creek, 3 miles northwest of Vale, Butte County, and 6 miles south of Newell.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to August 1954 (discontinued).
REMARKS.--No gaging station in vicinity of sampling station.

Chemical analyses, in parts per million, October 1953 to August 1954

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids			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. 6, 1953				270	89	92		232		995	11							1,040	850	16	1.2	1,970	7.3
Nov. 4				277	93	89		298		965	13							1,070	826	15	1.2	1,990	7.3
Dec. 1				229	86	84		269		835	14							926	705	17	1.2	1,800	7.4
Jan. 5, 1954				289	111	108		269		1,120	17							1,180	959	17	1.4	2,230	7.2
Feb. 9				229	97	114		245		955	17							972	771	20	1.6	1,960	7.2
Mar. 22				232	92	108		249		925	18							957	753	20	1.5	1,910	7.2
Apr. 12				179	68	91		185		725	12							726	574	21	1.5	1,550	7.6
May 4				201	88	99		224		835	18							862	678	20	1.5	1,780	7.5
June 18				206	82	70		230		770	10							852	663	15	1.0	1,660	7.1
July 6				238	107	123		191		1,080	13							1,030	873	21	1.7	2,060	7.6
Aug. 9				238	87	104		194		960	13							952	793	19	1.5	1,880	7.4

MISCELLANEOUS ANALYSES OF STREAMS IN CHEYENNE RIVER BASIN

Chemical analyses, in parts per million, water year October 1953 to September 1954

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			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				
BELL FOURCHE RIVER BELOW MOORCROFT, WYO.																							
Nov. 19, 1953.....	2.3			61	41	511	622		870	13								322	0	78	12	2,530	8.0
Feb. 10, 1954.....	a .1			100	44	451	587		875	13								431	0	69	9.4	2,500	7.5
Mar. 10.....	a .5			149	86	451	598		1,150	12								724	234	58	7.3	2,820	7.7
Apr. 12.....	.2			105	65	399	519		920	10								530	104	62	7.5	2,440	8.0

a Daily mean discharge.

Periodic determinations of suspended-sediment discharge, water year October 1953 to September 1954

Date	Discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Discharge (tons per day)
CHEYENNE RIVER AT ANGOSTURA RESERVOIR OUTLET, S. DAK.			
Jan. 6, 1954.....	134	7	2.5
Aug. 4.....	1.4	7	(t)

t Less than 0.050 ton.

MISSOURI RIVER MAIN STEM--Continued

MISSOURI RIVER AT PIERRE, S. DAK.

LOCATION.--At bridge on U. S. Highway 14 at Pierre, Hughes County, 0.3 mile upstream from gaging station and 1.5 miles upstream from Bad River.
DRAINAGE AREA.-243,5500 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to September 1954.
Water temperatures: March 1951 to September 1954.
EXTREMES, 1953-54.--Dissolved solids: Maximum, 684 ppm Jan. 1 to Feb. 2; minimum, 307 ppm July 29 to Aug. 17.
Hardness: Maximum, 338 ppm Jan. 1 to Feb. 2; minimum, 145 ppm July 29 to Aug. 17.
Specific conductance: Maximum daily, 1,040 micromhos Jan. 23; minimum daily, 440 micromhos Aug. 6.
Water temperatures: Maximum, 78°F July 11-12; minimum, freezing point on many days during November, January, and March.
EXTREMES, 1951-54.--Dissolved solids: Maximum, 704 ppm May 1-3, 1953; minimum, 264 ppm June 18-26, 1952.
Hardness: Maximum, 338 ppm Jan. 1 to Feb. 2, 1954; minimum, 134 ppm July 9, 1951.
Specific conductance: Maximum daily, 1,040 micromhos Jan. 23, 1954; minimum daily, 394 micromhos July 3, 1951.
Water temperatures: Maximum, 80°F Aug. 2, 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 regional office at Lincoln, Nebr. Records of discharge for water year October 1953 to September 1954 given in WSP 1339.

Chemical analyses, in parts per million, water year October 1953 to September 1954

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
Oct. 1-31, 1953.....	33,120	--	--	--	--	58	--	185		185	--	--	--	--	449	0.61	40,150	227	75	36	1.7	678	7.8
Nov. 1-30.....	24,700	11	0.00	60	22	67	3.7	196		205	9.5	0.7	1.4	0.14	499	.68	33,280	240	79	37	1.9	736	7.9
Dec. 1-31.....	9,840	--	--	--	--	80	--	233		248	--	--	--	--	588	.80	15,620	289	98	38	2.0	861	8.0
Jan. 1-Feb. 2, 1954..	8,640	--	--	--	--	94	--	270		290	--	--	--	--	684	.93	15,960	338	117	38	2.2	997	8.0
Feb. 3-Mar. 2.....	11,800	--	--	--	--	72	--	214		224	--	--	--	--	532	.72	16,950	263	88	37	1.9	798	7.7
Mar. 3-Apr. 5.....	18,310	13	.00	57	21	68	4.7	191		200	9.5	.4	1.3	.15	479	.65	23,680	228	71	39	2.0	726	7.9
Apr. 6-8.....	14,830	--	--	--	--	82	--	205		248	--	--	--	--	562	.76	22,500	259	91	41	2.2	841	7.8
Apr. 9-12.....	26,330	--	--	--	--	78	--	195		235	--	--	--	--	534	.73	37,960	245	85	41	2.2	805	7.6
Apr. 13-30.....	27,470	--	--	--	--	70	--	184		195	--	--	--	--	454	.62	33,670	208	57	42	2.1	708	7.7
May 1-25.....	25,270	13	.00	47	17	64	4.9	172		173	8.0	.6	1.4	.15	424	.58	28,930	189	48	42	2.0	649	8.0
May 26-30.....	26,580	--	--	--	--	90	--	197		263	--	--	--	--	581	.79	41,700	249	87	44	2.5	857	7.8
May 31-June 4.....	27,400	--	--	--	--	83	--	200		221	10	--	--	--	521	.71	38,540	222	58	44	2.4	766	7.8
June 5-13	28,300	--	--	--	--	69	--	177		193	8.0	--	--	--	452	.61	34,540	200	55	42	2.1	680	7.6
June 14-July 9.....	16,380	--	--	--	--	59	--	159		152	7.0	--	--	--	384	.52	16,980	168	38	43	2.0	579	7.5
July 10-20.....	26,550	--	--	--	--	59	--	156		151	7.5	--	--	--	378	.51	27,100	164	36	43	2.0	575	7.4
July 21-28.....	35,060	--	--	--	--	50	--	152		128	6.5	--	--	--	339	.46	32,090	153	28	41	1.8	517	7.6
July 29-Aug. 17.....	39,040	--	--	--	--	43	--	142		113	5.5	--	--	--	307	.42	32,360	145	29	39	1.6	469	7.8
Aug. 18-24.....	39,340	--	--	--	--	50	--	162		148	7.0	--	--	--	373	.51	39,620	182	49	37	1.6	566	7.8
Aug. 25-31.....	38,910	--	--	--	--	55	--	170		168	--	--	--	--	402	.55	42,230	202	63	37	1.7	618	7.7
Sept. 1-30	39,140	15	.00	54	20	63	4.6	184		180	8.5	.7	1.2	.14	458	.62	48,400	216	65	38	1.9	668	7.8
Weighted average a .	23,600	--	--	--	--	64	--	183		184	--	--	--	--	450	0.61	28,670	213	63	37	1.9	675	--

a Represents 100 percent of runoff for water year October 1953 to September 1954.

MISSOURI RIVER MAIN STEM--Continued

MISSOURI RIVER AT PIERRE, S. DAK.

Temperature (°F) of water, water year October 1953 to September 1954
/Once-daily measurement at 7 a.m./

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

a Reading obtained at 8:30 a.m.

BAD RIVER BASIN

MISCELLANEOUS ANALYSES OF STREAMS IN BAD RIVER BASIN IN SOUTH DAKOTA

Chemical analyses, in parts per million, water year October 1953 to September 1954

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			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				
BAD RIVER NEAR MIDLAND																							
Oct. 7, 1953.....	0.9			226	48	409	194		1,360	54								761	602	54	6.5	2,790	7.6
Dec. 2.....	1.6			267	51	482	259		1,550	70								877	665	54	7.1	3,210	7.5

WHITE RIVER NEAR KADOKA, S. DAK.

LOCATION.--At gaging station at bridge on State Highway 73, 5 miles downstream from Cottonwood Creek, 6 miles south of Kadoka, Jackson County, and 7 miles upstream from Pass Creek.
DRAINAGE AREA.--5,000 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: March 1949 to June 1953.
Water temperatures: April 1949 to September 1954 (discontinued).
Sediment records: April 1949 to September 1954 (discontinued).
EXTREMES, 1953-54.--Water temperatures: Maximum, 85°F July 5, 13; minimum, freezing point on many days during January to April.
Sediment concentrations: Maximum daily, 69,300 ppm July 21; minimum daily, no flow July 17, 18.
Sedimenet loads: Maximum daily, 1,010,000 tons May 23; minimum daily, 0 tons July 17,18.
EXTREMES, 1949-54.--Water temperatures: Minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 76,200 ppm June 2, 1951; minimum daily, no flow on several days during 1950, 1952, and 1954.
Sediment loads: Maximum daily, 1,500,000 tons (estimated) July 28, 1953; minimum daily, 0 tons on several days during 1950, 1952, and 1954.
REMARKS.--Flow affected by ice Dec. 14 to Feb. 14, Feb. 27 to Mar. 17, Mar. 28-31. Records of discharge for water year October 1953 to September 1954 given in WSP 1339.

Temperature (°F) of water, water year October 1953 to September 1954
(Once-daily measurement between 8 a.m. and 12 m.)

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

a Reading obtained between 2 p.m. and 6 p.m.
b Includes estimated temperature, 32°F, on missing days.

WHITE RIVER BASIN--Continued

WHITE RIVER NEAR KADOKA, S. DAK.--Continued

Suspended sediment, water year October 1953 to September 1954

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	3.0			37	5,000	500	35	173	16
2	2.9	266	2	31	4,360	365	38	--	e 17
3	2.7			28	2,210	167	46	148	18
4	2.8			24	1,790	116	46	--	e 24
5	2.7			23	700	a 44	44	235	28
6	2.2			25	450	30	42	--	e 32
7	2.2			26	420	a 30	37	383	38
8	2.2	149	1	26	450	32	37	710	71
9	2.2			23	280	a 17	33	3,030	270
10	2.9			23	75	47	22	--	e 170
11	4.8			23			19	2,800	144
12	5			23			19	--	e 100
13	7			22			20		
14	8			21			19		
15	8	149	3	21	81	5	19		
16	7			21			19	1,500	81
17	6			21			18		
18	6			22			20		
19	6			21			24		
20	7	370	7	27			32	--	e 90
21	203	11,000	sa 22,000	23			30		
22	885	51,000	126,000	19			26		
23	706	50,500	99,800	18			25		
24	320	37,500	33,600	18			26	1,030	76
25	348	34,600	33,700	23	187	13	28		
26	172	25,100	11,700	28			28		
27	49	13,600	1,800	31			28	--	e 15
28	37	9,200	a 900	35			28		
29	31	8,730	731	28			28	91	7
30	37	8,560	855	32			28		
31	37	6,870	686	--	--	--	28		
Total	2,915.6	--	331,818	743	--	1,536	892	--	2,084

Day	January			February			March		
1	28			30	60	5	40	4,090	442
2	30			50	280	a 38	30	4,700	a 380
3	32			70	890	168	20	4,980	269
4	34			80	530	114	30	5,400	a 440
5	36	81	7	200	1,700	918	40	6,500	a 700
6	36			200	1,780	961	50	8,050	1,090
7	34			180	1,410	685	55	8,670	1,290
8	32			160	1,350	583	60	5,780	936
9	30			160	1,600	a 700	80	7,670	1,660
10	28			180	2,100	1,020	100	3,500	a 950
11	26	--	e 10	170	2,030	932	100	1,140	308
12	24	188	12	180	2,400	a 1,200	80	1,000	a 220
13	22	--	e 12	200	3,510	1,900	60	1,050	170
14	20	230	12	250	3,700	a 2,500	50	900	a 120
15	18	--	e 15	284	3,560	2,730	40	870	94
16	16	394	17	191	2,200	a 1,100	40	700	76
17	14	--	e 15	105	900	255	500	3,200	a 4,300
18	12	386	13	91	880	216	1,510	27,800	113,000
19	10	--	e 6	80	1,600	346	1,770	31,600	s 165,000
20	8	111	2	77	1,700	a 360	711	18,500	35,500
21	7	--	e 1	63	1,650	281	580	15,800	24,700
22	6			60	1,490	241	866	13,800	32,300
23	5			63	650	a 110	1,200	21,600	70,000
24	4			60	300	49	703	13,200	25,100
25	4	70	1	63	315	54	471	8,200	10,400
26	4			80	310	67	368	5,500	5,460
27	5			65	500	a 90	330	5,320	4,740
28	6			50	1,900	a 260	310	3,830	3,210
29	7			--	--	--	330	3,540	3,150
30	8			--	--	--	220	2,650	1,570
31	20	--	e 3	--	--	--	160	2,430	1,050
Total	566	--	197	3,442	--	17,883	10,904	--	508,625

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

WHITE RIVER BASIN--Continued

WHITE RIVER NEAR KADOKA, S. DAK.--Continued

Suspended sediment, water year October 1953 to September 1954--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	219	2,600	1,540	49	490	65	554	23,800	35,600
2	219	3,850	2,280	63	910	155	574	39,600	s 72,800
3	310	4,480	3,750	131	5,440	1,920	734	33,000	s 74,400
4	276	4,910	3,660	194	5,810	s 3,280	372	18,400	18,500
5	235	4,740	3,010	235	11,900	7,550	192	16,200	8,400
6	227	3,950	2,420	181	10,600	5,180	146	12,600	4,970
7	170	3,930	1,800	130	9,100	3,190	1,060	41,200	s 151,000
8	166	3,900	1,750	89	7,500	1,800	2,240	64,100	s 431,000
9	143	3,000	1,160	87	5,710	1,340	334	38,200	35,700
10	121	2,120	693	73	4,640	915	266	25,100	18,000
11	116	1,250	392	63	2,990	509	248	27,500	18,400
12	107	1,100	318	63	1,750	298	181	14,300	6,990
13	73	590	116	52	1,090	153	149	15,100	6,070
14	67	390	71	52	720	101	320	30,200	26,100
15	65	500	88	49	1,150	152	233	11,100	6,980
16	61	355	58	44	480	57	107	10,400	3,000
17	49	310	41	49	300	40	77	3,900	811
18	50	340	46	119	9,000	s 3,200	82	1,500	332
19	50	300	41	105	11,300	3,200	77	1,800	374
20	53	270	39	69	17,000	3,170	160	7,200	s 3,320
21	44	410	49	56	13,100	1,980	121	7,800	2,550
22	45	230	28	508	43,000	s 63,700	77	5,600	1,160
23	45	200	24	4,680	64,000	s 1,010,000	67	4,150	751
24	42	150	17	3,080	54,700	s 512,000	87	3,030	s 1,110
25	41	120	13	933	35,400	92,500	678	43,600	82,800
26	41	100	11	464	27,400	34,300	233	28,600	s 19,900
27	44	100	12	530	20,100	28,800	325	25,700	22,600
28	42	120	14	735	20,200	40,100	240	28,200	18,300
29	41	270	30	615	14,000	23,200	506	32,800	s 49,300
30	55	820	122	336	18,900	17,100	314	28,700	24,300
31	--	--	--	455	26,100	32,100	--	--	--
Total.	3,217	--	23,593	14,289	--	1,892,055	10,754	--	1,145,518

Day	July			August			September		
1	115	19,200	5,960	35	17,600	1,660	2.8	5,300	40
2	69	15,000	2,790	29	17,000	1,330	2.6	4,000	28
3	50	12,100	1,630	16	18,000	778	1.7	2,100	10
4	29	9,050	709	16	16,400	708	1.2	1,300	4
5	20	7,400	400	3.1	14,900	125	1.2	1,000	3
6	17	4,850	223	4.5	11,600	141	1.2	1,300	4
7	19	4,100	210	2.6	6,200	44	2.2	2,000	12
8	12	2,350	76	.1	1,900	1	27	15,400	s 2,820
9	11	1,240	37	1.4	1,100	4	40	30,800	3,330
10	6	920	15	.8	1,950	4	69	28,600	5,330
11	3.8	369	4	4.0	12,000	s 153	34	16,800	1,540
12	3.1	573	5	141	35,700	s 14,900	24	6,850	444
13	1.7	526	2	65	30,400	5,340	17	2,950	135
14	.2	367	(t)	39	21,900	2,310	10	2,000	54
15	.2	434	(t)	34	18,800	1,730	4.5	2,140	26
16	.1	610	(t)	24	15,000	972	4.5	1,650	20
17	0	--	0	21	11,700	652	1.2	951	3
18	0	--	0	21	11,400	595	3.3	1,890	17
19	6	--	e 200	18	10,100	481	2.4	198	1
20	796	39,600	s 102,000	42	10,300	1,170	1.5	2,580	10
21	1,560	69,300	303,000	39	9,500	a 1,000	16	1,500	65
22	814	51,000	116,000	198	21,700	11,600	11	2,060	61
23	252	36,300	25,600	80	23,100	4,990	6	1,570	25
24	126	24,000	8,160	22	13,400	796	3.3	1,840	16
25	65	17,900	3,140	19	4,900	251	1.9	1,370	7
26	44	15,000	1,780	30	1,450	117	1.4	712	3
27	31	14,000	1,170	22	2,400	143	.8	788	2
28	31	11,400	954	11	8,800	261	.5	843	1
29	280	33,700	s 28,300	6	15,900	258	.7	856	2
30	135	30,000	10,900	6	17,100	277	1.4	455	2
31	59	22,900	3,650	18	11,900	578	--	--	--
Total.	4,556.1	--	616,916	968.5	--	53,369	294.3	--	14,015

Total discharge for year (cfs-days) 53,541.5

Total load for year (tons) 4,607,609

e Estimated.

s Computed by subdividing day.

t Less than 0.50 ton.

a Computed from estimated concentration graph.

WHITE RIVER BASIN--Continued

WHITE RIVER NEAR KADOKA, S. DAK.--Continued

Particle-size analyses of suspended sediment, March to September 1954
(*Methods of analysis:* B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; V, visual accumulation tube)

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. 3, 1954	11:45 a.m.	a 20	32	4,960	3,730		83		94		96	97	99	100			VPWCM
Mar. 18	12:45 p.m.	1,310	35	28,500	4,010		56		75		93	--	--	--			SPWCM
Apr. 5	3:10 p.m.	223	--	4,750	3,450		1		100		--	--	--	--			PN
Apr. 5	3:10 p.m.	223	--	4,750	3,400		91		100		--	--	--	--			PWCM
Apr. 22	12:30 p.m.	49	50	234	662		85		94		99	100	--	--			BWCM
May 23	7:15 p.m.	7,440	--	79,300	7,100		39		64		94	--	--	--			SPWCM
June 7	2:30 p.m.	1,320	--	49,800	5,090		46		71		96	99	99	100			VPWCM
June 29	1:30 p.m.	769	75	41,200	2,910		42		74		95	--	--	--			SPN
June 29	1:30 p.m.	769	75	41,200	2,790		47		75		95	--	--	--			SPWCM
July 20	2:45 p.m.	1,100	85	41,700	3,630		52		73		95	97	97	97	98	100	VPWCM
Aug. 3	11:45 p.m.	16	79	18,600	2,880		100		--		--	--	--	--			PWCM
Aug. 16	2:50 p.m.	24	77	14,800	3,660		100		--		--	--	--	--			PWCM
Sept. 8	5:10 p.m.	121	--	51,200	4,150		79		99		100	--	--	--			SPWCM
Sept. 13	9:00 a.m.	17	63	3,140	2,260		100		--		--	--	--	--			PWCM
Sept. 21	12:30 p.m.	25	60	1,490	4,300		86		100		--	--	--	--			PWCM

a Daily mean discharge.

WHITE RIVER BASIN--Continued

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

LOCATION.--At gaging station, 1 mile upstream from small tributary, 2 miles downstream from Pine Creek, and 2½ miles northeast of White River, Mellette County.
DRAINAGE AREA.--1,570 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1954.
Water temperatures: February 1951 to September 1954.
Sediment records: December 1950 to September 1954.
EXTREMES, 1953-54.--Dissolved solids: Maximum, 460 ppm June 8; minimum, 244 ppm Aug. 22-31.
Hardness: Maximum, 195 ppm Aug. 21; minimum, 109 ppm Aug. 22-31.
Specific conductance: Maximum daily, 610 micromhos June 8; minimum daily, 279 micromhos Aug. 24.
Water temperatures: Maximum, 94°F July 10; minimum, freezing point Dec. 9, 20, Jan. 6, Feb. 9.
Sediment concentrations: Maximum daily, 6,710 ppm Aug. 21; minimum daily, 23 ppm Jan. 11, 16.
Sediment loads: Maximum daily, 2,710 tons Mar. 19; minimum daily, 4 tons Jan. 11, 15, 16.
EXTREMES, 1950-54.--Dissolved solids (1952-54): Maximum, 948 ppm Aug. 3, 1953; minimum, 244 ppm Aug. 22-31, 1954.
Hardness (1952-54): Maximum, 435 ppm June 15, 1953; minimum, 109 ppm Aug. 22-31, 1954.
Specific conductance (1952-54): Maximum daily, 1,200 micromhos Aug. 3, 1953; minimum daily, 279 micromhos Aug. 24, 1954.
Water temperatures (1951-54): Maximum, 97°F June 18, 1953; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 19,300 ppm May 29, 1951; minimum daily, not determined.
Sediment loads: Maximum daily, 99,600 tons Mar. 29, 1952; minimum daily, not determined.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Flow affected by ice Jan. 11 to Feb. 16, Mar. 4-6, 13-14. Records of discharge for water year October 1953 to September 1954 given in WSP 1339.

Chemical analyses, in parts per million, water year October 1953 to September 1954

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
Oct. 1-31, 1953	73.9			43	5.5	25		192		30	2.0		0.5	0.07	270	0.37	53.9	130	0	28	1.0	370	7.5
Nov. 1-30	96.0			41	5.2	23		180		29	2.0		1.1	.07	255	.35	66.1	124	0	28	.9	344	7.9
Dec. 1-31	77.6			45	6.4	26		196		37	2.5		2.1	.06	285	.39	59.7	139	0	28	1.0	380	8.2
Jan. 1-31, 1954	89.7			48	6.8	29		221		32	2.5		2.7	.07	305	.41	73.9	148	0	29	1.0	411	7.7
Feb. 1-28	142			41	4.7	26		175		38	2.0		2.0	.07	256	.35	98.2	122	0	30	1.0	353	7.9
Mar. 1-11	188			43	5.2	28		190		34	2.0		2.0	.06	290	.39	147	129	0	31	1.1	377	7.6
Mar. 12-Apr. 5	226			44	6.6	31		197		45	2.0		1.5	.08	301	.41	184	137	0	32	1.2	401	7.9
Apr. 6-28	136			45	6.0	30		208		36	1.5		1.3	.12	316	.43	116	137	0	31	1.1	407	7.8
Apr. 29	172			53	8.0	37		196		87	2.0		1.9	.08	354	.48	164	165	4	32	1.3	499	7.8
Apr. 30-May 30	148			45	8.4	30		211		35	3.0		.7	.08	304	.41	121	147	0	30	1.1	403	7.5
May 31	93			52	9.4	36		220		81	2.0		.5	.26	360	.49	90.4	168	0	29	1.2	492	7.5
June 1-7	131			46	7.1	34		206		56	3.5		1.0	.09	325	.44	115	144	0	32	1.2	431	7.5
June 8	167			66	7.2	50		210		139	5.0		1.2	.07	460	.63	207	194	22	33	1.6	610	7.5
June 9-30	100			42	6.3	29		205		35	2.5		.8	.11	314	.43	84.8	131	0	30	1.1	392	7.4
July 1-31	60.4			40	6.1	26		197		29	3.0		.9	.08	295	.40	48.1	125	0	29	1.0	363	7.6
Aug. 1-20	63.0			37	5.5	23		185		20	3.0		1.5	.08	272	.37	46.3	115	0	28	.9	331	8.0
Aug. 21	68.0			57	13	21		262		19	2.0		.5	.05	332	.45	61.0	195	0	19	.7	485	7.3
Aug. 22-31	68.1			36	4.6	20		173		22	2.0		1.2	.10	244	.33	44.9	109	0	26	.8	313	7.7
Sept. 1-30	60.9			37	5.5	21		179		22	2.5		1.2	.06	250	.34	41.1	115	0	26	.8	321	7.7
Weighted average[a]	107			43	6.2	28		196		36	2.3		1.4	0.08	289	0.39	83.5	133	0	30	1.1	381	--

a Represents 100 percent of runoff for water year October 1953 to September 1954.

WHITE RIVER BASIN--Continued

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

Temperature (°F) of water, water year October 1953 to September 1954/
/Once-daily measurement between 7 a.m. and 2 p.m./

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

a Reading obtained between 4 p.m. and 7 p.m.

WHITE RIVER BASIN--Continued

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

Suspended sediment, water year October 1953 to September 1954

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	71	161	s 35	91	85	21	83	86	19
2	76	183	s 41	84	95	22	86	82	19
3	75	189	38	82	92	20	80	97	21
4	66	179	s 42	86	59	14	86	200	46
5	74	124	s 28	75	52	11	78	164	35
6	77	126	s 31	86	57	13	78	98	21
7	77	119	s 30	102	62	17	82	78	17
8	73	102	20	94	79	20	80	--	e 22
9	72	250	s 54	83	78	17	67	105	19
10	68	119	22	83	62	14	78	108	23
11	59	122	19	94	61	15	68	115	21
12	61	130	s 23	94	59	15	74	80	16
13	55	438	s 159	83	58	13	80	120	26
14	68	158	29	97	56	15	60	112	18
15	67	150	27	97	47	12	63	117	20
16	65	115	20	100	55	15	62	108	18
17	64	128	22	100	72	19	69	132	25
18	62	127	21	97	54	14	70	87	16
19	59	142	23	100	54	15	85	84	19
20	64	137	24	93	110	28	117	95	30
21	71	140	26	90	127	31	82	168	37
22	88	358	s 122	92	137	34	46	98	12
23	80	102	22	111	169	51	32	68	6
24	75	74	15	135	148	54	36	78	8
25	78	72	15	129	119	41	52	129	18
26	94	88	22	123	102	44	92	71	18
27	86	75	17	88	85	20	94	95	24
28	86	81	19	102	85	23	110	87	26
29	88	65	15	100	85	23	83	87	19
30	100	78	21	88	90	21	140	84	32
31	91	60	15	--	--	--	93	102	26
Total	2,290	--	1,017	2,879	--	672	2,406	--	677

Day	January			February			March		
1	111	110	33	160	30	13	214	425	246
2	129	114	40	170	38	17	98	220	58
3	132	41	15	160	42	18	86	152	35
4	102	68	19	140	60	23	90	270	66
5	117	97	31	140	92	35	150	464	188
6	116	93	29	140	70	26	250	767	518
7	120	77	25	140	75	28	293	424	335
8	117	66	21	140	75	28	259	528	369
9	99	68	18	150	75	30	211	528	301
10	77	43	9	150	85	34	217	1,100	s 758
11	65	23	4	150	127	51	202	1,450	790
12	60	85	14	150	143	58	127	--	e 300
13	60	182	29	150	162	66	75	218	44
14	60	57	9	150	236	96	125	252	85
15	60	26	4	150	220	89	141	683	s 339
16	60	23	4	160	362	156	142	1,340	s 595
17	65	44	8	175	365	172	221	1,950	s 1,530
18	65	45	8	131	2,010	s 852	224	2,840	1,720
19	65	64	11	121	629	205	286	3,510	2,710
20	70	59	11	109	385	113	199	2,510	1,350
21	70	51	10	117	534	169	214	1,050	607
22	70	92	17	113	531	s 294	231	1,260	786
23	70	57	11	109	273	80	220	690	410
24	75	43	9	117	210	66	231	524	327
25	75	40	8	138	241	90	242	410	268
26	75	54	11	148	227	91	231	508	317
27	85	43	10	138	237	88	268	632	457
28	100	58	16	167	426	192	300	427	346
29	120	52	17	--	--	--	280	439	332
30	140	45	17	--	--	--	280	380	287
31	150	35	14	--	--	--	270	2,300	s 2,000
Total	2,780	--	482	3,983	--	3,180	6,377	--	18,474

e Estimated.
s Computed by subdividing day.

WHITE RIVER BASIN--Continued

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

Suspended sediment, water year October 1953 to September 1954--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1.....	287	687	532	157	540	229	92	650	161
2.....	268	511	370	157	450	191	124	950	318
3.....	268	390	282	176	396	188	172	1,720	799
4.....	280	781	590	181	422	206	138	1,030	384
5.....	236	780	497	220	368	219	121	448	146
6.....	225	489	297	242	495	323	113	280	85
7.....	203	408	224	224	378	229	159	1,670	s 816
8.....	167	416	188	220	350	208	167	1,750	789
9.....	162	302	132	192	313	162	113	563	171
10.....	157	333	141	192	315	163	108	258	75
11.....	148	341	136	176	312	148	110	234	69
12.....	141	567	s 252	157	214	91	110	516	153
13.....	141	932	355	146	239	94	104	215	60
14.....	128	654	226	152	211	87	117	260	a 80
15.....	138	758	282	148	221	88	125	270	91
16.....	125	660	223	125	190	64	95	214	55
17.....	113	370	113	112	206	62	96	212	55
18.....	125	345	116	131	215	76	108	279	81
19.....	113	288	88	134	157	57	104	260	73
20.....	117	330	104	104	140	39	100	206	56
21.....	117	395	125	109	135	40	96	167	43
22.....	109	220	65	113	128	39	94	151	38
23.....	113	250	76	139	445	s 339	93	137	34
24.....	113	196	60	104	997	s 299	92	137	34
25.....	109	199	59	92	265	66	89	119	29
26.....	113	194	59	96	200	52	96	140	36
27.....	138	250	93	100	194	52	91	140	34
28.....	121	250	82	100	168	45	95	152	39
29.....	172	540	251	92	138	34	85	148	34
30.....	192	832	431	94	159	40	85	125	29
31.....	--	--	--	93	1,320	s 369	--	--	--
Total.	4,839	--	6,449	4,478	--	4,299	3,292	--	4,867

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.....	82	122	27	55	72	11	65	235	41
2.....	85	148	34	58	99	16	60	175	28
3.....	88	835	s 232	53	97	14	52	187	26
4.....	83	172	39	49	71	9	52	260	a 36
5.....	78	113	24	46	82	10	55	270	40
6.....	71	110	21	46	89	11	57	256	39
7.....	67	102	18	57	85	13	49	208	28
8.....	68	111	20	67	101	18	46	136	17
9.....	61	108	18	56	116	18	64	234	40
10.....	54	105	15	55	89	13	82	250	55
11.....	60	95	15	59	116	18	82	268	59
12.....	59	100	16	78	137	29	71	275	53
13.....	51	92	13	78	127	27	71	239	46
14.....	47	82	10	67	108	20	74	240	48
15.....	45	95	12	62	112	19	70	202	38
16.....	42	128	s 19	68	134	25	68	205	38
17.....	47	141	s 21	69	145	27	69	205	38
18.....	46	89	11	85	252	58	60	178	29
19.....	46	87	11	85	576	132	64	165	29
20.....	52	142	s 24	67	355	s 68	54	106	15
21.....	71	165	32	68	6,710	s 1,560	55	113	17
22.....	79	113	24	102	2,770	s 816	55	210	31
23.....	69	98	18	100	850	230	49	219	29
24.....	62	100	17	73	403	79	55	115	17
25.....	58	97	15	67	196	35	55	80	12
26.....	49	85	11	55	177	26	56	96	15
27.....	45	90	11	52	210	a 30	55	85	13
28.....	44	83	10	55	223	33	58	236	37
29.....	49	82	11	55	215	32	57	208	32
30.....	60	84	14	57	248	38	67	129	23
31.....	53	96	14	65	338	59	--	--	--
Total.	1,871	--	777	2,009	--	3,494	1,827	--	969

Total discharge for year (cfs-days)..... 39,031
Total load for year (tons)..... 45,357

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

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

Particle-size analyses of suspended sediment, February to August 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; V, visual accumulation tube)

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. 18, 1954.....	6:35 p.m.	125	--	6,610	6,240		9		35		90	98	100		--		VPN
Feb. 18	6:35 p.m.	125	--	6,610	7,010		26		50		90	98	100		--		VPWCM
Mar. 9	12:00 m.	167	42	465	1,020		44		47		52	57	86		99		BWCM
Mar. 17.....	4:15 p.m.	248	35	5,520	2,750		20		34		76	94	99		--		VPN
Mar. 17.....	4:15 p.m.	248	35	5,520	2,950		26		43		76	94	99		100		VPWCM
Apr. 21	5:30 p.m.	125	--	412	1,760		26		31		38	44	76		96	100	BWCM
Aug. 21	7:05 a.m.	85	76	14,900	2,720		55		79		99	--	--		--		SPWCM

Particle-size analyses of bed material, water year October 1953 to September 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; V, visual accumulation tube)

Date of collection	Number of sampling points	Discharge (cfs)	Water temperature (°F)	Bed material												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	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	
Oct. 19, 1953.....	4	68					0	1	27	89	93	94	--	--	--	--	S
Apr. 21, 1954	5	125					--	0	33	84	92	92	93	96	98	100	SV
May 17	4	117					--	0	18	68	80	83	86	91	98	100	SV
June 29	4	74					--	0	14	78	92	93	95	97	98	100	SV
July 20	4	14					0	2	18	82	96	97	99	100	--	--	SV
Aug. 17	4	78					--	0	15	75	92	94	96	99	100	--	SV
Sept. 21	3	7					--	0	11	83	96	98	99	100	--	--	SV

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NIOBRARA RIVER BASIN

NIOBRARA RIVER NEAR HAY SPRINGS, NEBR.

LOCATION.--At gaging station at bridge on State Highway 87, 4 miles upstream from Box Butte Creek and 14 miles south of Hay Springs, Sheridan County.
RECORDS AVAILABLE.--Water temperatures: February to December 1951, October 1952 to September 1954.
Sediment records: February to December 1951, October 1952 to September 1954.
EXTREMES, 1953-54.--Water temperatures: Maximum, 94°F June 21; minimum, freezing point on many days during November to March.
Sediment concentrations: Maximum daily, 3,670 ppm May 23; minimum daily, not determined.
Sediment loads: Maximum daily, 5,000 tons May 23; minimum daily, 1 ton or less on many days.
EXTREMES, 1951, 1952-54.--Water temperatures: Maximum, 94°F June 21, 1954; minimum, freezing point on many days during winter months each year.
Sediment concentrations: Maximum daily, 16,600 ppm Sept. 4, 1951; minimum daily, not determined.
Sediment loads: Maximum daily, 68,700 tons July 28, 1951; minimum daily, 0.50 ton Aug. 15, 1953.
REMARKS.--Flow affected by ice Nov. 20-22, Dec. 4 to Feb. 8, Feb. 12, Mar. 2-8, 12-17, Mar. 28 to Apr. 3. Records of discharge for water year October 1953 to September 1954 given in WSP 1339.

Temperature (°F) of water, water year October 1953 to September 1954
(Once-daily measurement between 1 p.m. and 6 p.m.)

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

a Reading obtained between 0 a.m. and 12 m.

NIOBRARA RIVER BASIN--Continued

NIOBRARA RIVER NEAR HAY SPRINGS, NEBR.--Continued

Suspended sediment, water year October 1953 to September 1954

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	28	400	a 30	13			22		
2	16	140	6	12			22		
3	16			12	77	2	23		
4	15			12			22		
5	13			13			22		
6	14	74	3	15	--	e 3	22		
7	16			18	--	e 4	25		
8	15			23			23		
9	15			23	72	4	23		
10	12			23			23		
11	18			25			24		
12	16	58	2	27			21		
13	12			24			24		
14	12			27			20		
15	12			24	--	e 12	22		
16	9.9			22			23	60	4
17	11	46	1	19			23		
18	11			18			29		
19	12	83	3	22			28		
20	15	109	s 5	18	158	9	25		
21	28	228	s 18	20			19		
22	20	86	5	25			15		
23	17	33	2	46	270	34	19		
24	18	60	3	27	110	8	18		
25	19	190	10	23			19		
26	17	110	5	22			21		
27	18	110	5	20	--	e 8	22		
28	16	60	3	18			20		
29	15	40	2	18			22		
30	14	40	a 2	20	110	6	22		
31	15	60	2	--	--	--	22		
Total	485.9	--	137	629	--	246	685		124

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	24			25			25		
2	21			24			23		
3	20			34			27		
4	25			36			26		
5	24			35			28		
6	25			36			30		
7	26			31			30		
8	23			28	191	15	27		
9	23			28			27		
10	18			27			25	108	8
11	18			27			27		
12	19			27			25		
13	24			31			22		
14	24			31			22		
15	24			28			25		
16	20	43	3	25	110		32		
17	21			23	--		30		
18	21			28	346		34	207	s 22
19	21			30	--		21	94	s 6
20	19			27	--		42		
21	21			28	--		48		
22	23			23	243	b 12	40		
23	23			24	--		42		
24	24			28	121		36		
25	22			27	--		33	313	29
26	25			30	57		33		
27	24			24	--		31		
28	23			27	166		23		
29	24			--	--	--	28		
30	22			--	--	--	36		
31	25			--	--	--	20		
Total	696		93	792	--	381	918	--	512

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

NIOBRARA RIVER BASIN--Continued

NIOBRARA RIVER NEAR HAY SPRINGS, NEBR.--Continued

Suspended sediment, water year October 1953 to September 1954--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	28			31			31		
2	29			33			30		
3	30			33			28	83	6
4	36			31			25		
5	30	193	16	31			20		
6	31			30	174	15	24	182	s 14
7	33			31			44	344	41
8	30			33			30	170	a 14
9	27			31			25	160	a 11
10	23	90	6	30			27	168	12
11	23	80	5	25			22		
12	23	70	a 4	23			22	90	5
13	20	60	3	22			22		
14	22			20	78	5	27	70	5
15	23			20			25	75	5
16	23			20			30	120	a 10
17	22	89	5	27	115	8	33	180	16
18	22			20	55	3	66	500	sb 120
19	20			19	74	4	54	591	s 94
20	22			19	60	3	38	250	26
21	25			17	60	3	36	150	15
22	17			20	210	s 15	28	105	8
23	18			313	3,670	s 5,000	23	110	7
24	22	90	5	54	600	87	16	105	5
25	24			34	280	26	28	260	sb 60
26	36			34	265	24	74	1,070	≤ 235
27	31			38	308	32	25	375	s 29
28	25	105	8	32	180	16	19		
29	27			28			23	140	b 8
30	28			33	102	9	23		
31	--	--	--	36			--	--	--
Total	770	--	262	1,168	--	5,428	918	--	796

Day	July			August			September		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	13			8.7			9.9		
2	13			9.3			11		
3	13	97	3	9.3			12		
4	12			9.3			13		
5	11			11			12		
6	9.3			12			16		
7	9.9			12			12		
8	9.9			12			11		
9	9.3			14			11		
10	9.3			12	47	1	11		
11	9.3	88	b 2	12			11		
12	8.7			12			11		
13	8.7			11			9.9		
14	8.7			11			9.9		
15	8.7			9.9			9.9	36	1
16	9.3			11			9.9		
17	11			11			11		
18	9.9	--	e 2	11			11		
19	12			9.9			9.9		
20	16			17	601	s 31	9.9		
21	15	60	b 3	60	803	s 146	11		
22	17			36	180	17	12		
23	13			18	90	4	12		
24	12			14	80	3	12		
25	13	59	2	12			14		
26	11			12			14		
27	9.9			11			14		
28	9.9			11	48	1	15	60	2
29	8.7	28	1	11			17	130	6
30	8.7			12			36	238	23
31	8.7			11			--	--	--
Total	338.9	--	65	433.4	--	227	379.3	--	58

Total discharge for year (cfs-days) 8,213.5

Total load for year (tons) 8,329

e Estimated.

s Computed by subdividing day.

a Computed from estimated concentration graph.

b Computed from partly estimated concentration graph.

NIOBRARA RIVER NEAR HAY SPRINGS, NEBR.--Continued

Particle-size analyses of suspended sediment, May to June 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; V, visual accumulation tube)

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 23, 1954	8:20 a.m.	332	51	4,110	2,130		61		78		86	94	100				VPWCM
June 26	7:35 a.m.	97	66	1,250	1,290		53		84		88						SPWCM

Particle-size analyses of bed material, water year October 1953 to September 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; V, visual accumulation tube)

Date of collection	Number of sampling points	Discharge (cfs)	Water temperature (°F)	Bed material												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	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
Oct. 20, 1953	3	14					0	2	22	87	96	98	--	--			S
Apr. 21, 1954	3	22					0	2	42	88	96	97	98	99			SV
June 2	3	30					--	0	16	81	93	95	98	100			SV
June 23	3	22					--	0	28	89	97	99	100	--			SV
Aug. 4	3	9.3					0	1	29	89	96	97	99	100			SV
Sept. 8	3	12					0	1	28	85	93	95	98	100			SV

NIOBRARA RIVER BASIN--Continued

NIOBRARA RIVER NEAR GORDON, NEBR.

LOCATION.--At gaging station at bridge on State Highway 27, 4 miles downstream from Rush Creek and 11 miles south of Gordon, Sheridan County.
DRAINAGE AREA.--2,595 square miles.
RECORDS AVAILABLE.--Water temperatures: July 1953 to September 1954.
Sediment records: October 1947 to December 1950, July 1953 to September 1954.
EXTREMES, 1953-54.--Water temperatures: Maximum, 94°F July 12; minimum, freezing point on several days during December to March.
Sediment concentrations: Maximum daily, 4,400 ppm June 26; minimum daily, 50 ppm July 13.
Sediment loads: Maximum daily, 3,300 tons May 23; minimum daily, 9 tons July 13.
EXTREMES, 1947-50, 1953-54.--Water temperatures (July 1953 to September 1954): Maximum, 94°F July 12, 1954; minimum, freezing point on several days during winter months.
Sediment concentrations: Maximum daily, 5,360 ppm Mar. 15, 1948; minimum daily, not determined.
Sediment loads: Maximum daily, 22,900 tons June 17, 1948; minimum daily, 2 tons Feb. 3, 1950.
REMARKS.--Flow affected by ice Nov. 23 to Dec. 30, Jan. 6 to Feb. 2, Mar. 1-15. Records of discharge for water year October 1953 to September 1954 given in WSP 1339.

Temperature (°F) of water, water year October 1953 to September 1954
(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 34	33	42	48	a 38	--	a 78	84	a 67
2	--	51	--	--	37	--	a 37	a 36	54	--	75	79
3	--	a 46	32	37	--	34	53	55	70	--	--	--
4	--	a 44	--	34	35	a 32	--	60	73	--	80	a 67
5	--	43	a 33	38	--	36	61	a 52	78	87	72	a 64
6	--	--	--	36	40	--	a 52	a 55	77	--	69	a 63
7	62	--	35	--	--	40	58	a 50	a 63	85	78	77
8	a 49	--	--	--	52	--	a 41	65	a 56	--	70	70
9	a 53	49	33	36	--	50	a 49	54	a 73	88	87	61
10	66	a 38	a 36	--	38	--	61	53	82	--	76	77
11	68	--	35	32	--	a 48	58	58	74	--	72	77
12	a 62	a 37	--	--	a 32	--	62	a 56	74	94	75	81
13	a 54	--	--	34	--	a 32	a 53	--	80	84	80	77
14	a 59	a 45	33	--	--	--	a 58	a 65	68	--	86	a 61
15	a 58	--	--	a 32	52	37	a 44	71	--	--	75	74
16	60	52	32	--	--	38	a 43	68	--	--	--	68
17	60	--	--	33	48	a 41	63	65	65	--	--	a 57
18	67	a 35	37	34	--	a 40	--	68	74	85	76	68
19	--	--	--	a 33	a 37	a 34	a 45	63	84	--	--	63
20	62	--	33	--	--	39	a 58	83	73	--	75	65
21	a 56	--	--	--	48	45	a 45	80	78	--	79	--
22	a 48	--	a 33	--	--	a 37	60	76	78	67	--	70
23	a 41	34	a 34	34	a 40	44	a 58	62	93	76	--	68
24	46	--	35	--	--	a 38	65	75	86	84	--	70
25	43	--	--	32	a 36	44	69	67	83	80	85	72
26	a 37	--	34	--	--	a 38	--	63	a 68	80	77	a 65
27	a 44	--	--	35	44	--	68	65	--	77	80	a 66
28	a 48	--	36	--	--	33	64	60	74	82	83	67
29	a 50	--	--	34	--	a 37	a 34	70	a 68	80	--	a 50
30	a 50	--	37	--	--	38	41	74	70	76	78	a 42
31	56	--	--	35	--	a 32	--	67	--	78	78	--
Average	--	--	--	--	--	--	54	62	74	--	--	67

a Reading obtained between 9 a.m. and 11 a.m.

NIOBRARA RIVER BASIN--Continued

NIOBRARA RIVER NEAR GORDON, NEBR.--Continued

Suspended sediment, water year October 1953 to September 1954

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	80	160	35	80	400	a 85	94	--	
2	85	340	78	80	430	93	82	--	
3	77	300	62	80	270	58	97	100	
4	82	300	66	70	270	51	92	--	
5	82	240	53	85	310	71	82	--	
6	88	320	76	85	320	a 75	73	--	
7	80	310	67	82	370	82	75	850	
8	80	330	71	91	440	a 110	74	--	e 110
9	80	260	56	102	500	140	64	330	
10	82	350	77	94	440	110	65	1,100	
11	82	450	100		--		72	760	
12	80	300	65		500		68	--	
13	77	150	31		--		67	--	
14	75	270	55		300		65	65	
15	77	310	64		--		58	--	
16	80	390	84		440		51	900	
17	77	270	56	100	--	e 110	49	--	
18	82	160	35		410		47	750	
19	85	210	48		--		49	--	
20	85	450	100		--		53	720	
21	102	1,100	300		--		61	--	
22	108	850	250		--		42	580	
23	108	950	280	124			63	320	b 95
24	102	830	230	121			69	510	
25	125	680	230	120			68	--	
26	111	400	120	119	--	e 170	71	370	
27	96	360	93	127			74	--	
28	88	430	100	135			74	440	
29	80	520	110	138			77	--	
30	77	500	a 100	117			103	410	110
31	77	380	79	--	--	--	125	--	e 150
Total	2,690	--	3,171	3,050	--	3,555	2,204	--	3,240

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	114	470		154	810	340	120	520	170
2	118	--		199	1,400	750	80	--	e 110
3	128	--		206	1,000	560	67	480	
4	128	540		176	1,300	620	72	580	
5	128	310		168	--	e 460	78	1,500	
6	125	800		168	820		97	--	
7	125	650		180	--		111	860	
8	123	--		135	830		108	--	
9	108	500		111	--		100	900	b 260
10	94	--		105	1,500		100	--	
11	99	400		121	--		95	640	
12	103	--		121	980		90	--	
13	110	400		121	--		80	2,400	
14	101	--		125	--		70	--	
15	72	270	b 150	131	1,100		120	960	310
16	52	--		138	--		161	880	380
17	79	540		161	840	b 340	153	940	390
18	108	500		145	--		184	1,500	750
19	109	1,600		142	600		157	790	330
20	98	--		157	--		164	1,200	530
21	122	80		157	740		161	1,100	480
22	108	--		149	--		149	1,100	440
23	105	300		145	480		145	870	340
24	102	--		145	--		151	1,100	450
25	102	500		145	720		161	1,000	430
26	109	--		145	--		168	950	430
27	104	430		164	1,300		184	880	440
28	110	--		125	--		161	520	230
29	131	320	110	--	--	--	157	800	340
30	151	--	e 130	--	--	--	153	1,100	450
31	163	320	140	--	--	--	135	1,500	550
Total	3,429	--	4,580	4,139	--	10,550	3,932	--	10,670

e Estimated.
a Computed from partly estimated concentration graph.
b Computed on basis of samples obtained about 3 or 4 times a week.

NIOBRARA RIVER BASIN--Continued

NIOBRARA RIVER NEAR GORDON, NEBR.--Continued

Suspended sediment, water year October 1953 to September 1954--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	131	1,000	350	135	360	130	118	300	a 95
2	105	830	240	145	190	74	118	410	130
3	100	850	230	142	380	150	118	370	120
4	105	800	a 220	149	510	210	121	400	130
5	138	630	230	161	570	250	121	450	150
6	118	750	240	172	430	200	121	460	s 160
7	111	380	110	157	320	a 140	309	3,400	s 3,000
8	135	610	220	145	260	100	206	2,300	1,300
9	131	580	210	138	270	100	184	1,400	700
10	128	250	86	121	520	170	135	540	200
11	125	240	81	114	980	300	121	510	170
12	121	530	170	118	1,100	350	108	590	170
13	114	650	a 200	118	650	a 200	105	390	110
14	121	700	230	121	480	160	99	270	72
15	121	740	240	114	660	200	108	480	140
16	108	640	190	118	420	130	105	420	120
17	100	640	170	142	510	200	102	330	91
18	118	760	240	149	500	200	111	470	140
19	118	690	220	142	430	160	125	680	230
20	114	590	180	135	450	160	114	820	250
21	114	340	100	128	310	110	105	470	130
22	111	420	130	118	330	110	102	280	a 75
23	114	600	180	248	3,800	s 3,300	96	230	60
24	111	580	170	164	2,300	1,000	85	290	67
25	121	360	120	121	1,200	390	80	410	s 110
26	131	400	140	114	800	250	176	4,400	2,100
27	142	650	250	121	920	300	157	3,300	1,400
28	138	740	280	118	700	220	125	2,000	680
29	145	840	330	108	500	150	121	540	180
30	142	630	240	108	400	120	111	370	110
31	--	--	--	114	290	89	--	--	--
Total	3,631	--	5,997	4,198	--	9,623	3,807	--	12,390

	July			August			September		
1	94	200	51	65	190	33	65	340	60
2	85	--	e 50	68	300	55	68	280	51
3	88	--	e 60	63	260	44	70	160	30
4	88	--	e 60	60	170	28	72	95	18
5	80	310	67	60	210	34	75	270	55
6	75	320	a 65	75	190	38	75	340	69
7	75	330	67	77	170	35	77	410	85
8	75	280	a 55	65	170	30	75	210	43
9	75	200	41	68	340	62	77	200	42
10	70	140	a 26	63	360	61	72	210	41
11	70	100	19	58	270	42	72	150	29
12	68	65	12	65	260	46	72	170	33
13	63	50	9	63	190	32	75	240	49
14	65	100	18	58	150	23	75	160	32
15	68	--	e 20	54	180	26	72	230	45
16	68	--	e 20	56	250	38	70	300	a 55
17	75	--	e 35	60	300	49	72	300	58
18	75	170	34	70	210	40	75	260	a 53
19	82	--	e 75	70	110	a 20	72	230	45
20	108	--	e 200	70	85	16	68	290	53
21	82	--	e 90	99	670	180	72	260	51
22	96	430	110	121	690	230	72	330	64
23	88	250	59	99	640	170	72	250	49
24	77	210	44	80	330	71	72	380	74
25	72	200	39	68	290	53	77	350	73
26	75	220	45	65	360	63	80	360	a 80
27	70	70	13	63	310	53	77	390	81
28	75	95	19	70	470	89	77	550	110
29	75	160	32	77	330	69	77	680	140
30	65	160	28	65	350	61	105	620	180
31	65	240	42	65	200	35	--	--	--
Total	2,387	--	1,505	2,160	--	1,826	2,230	--	1,848

Total discharge for year (cfs-days) 37,857
Total load for year (tons) 68,955

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

NIOBRARA RIVER NEAR GORDON, NEBR.--Continued

Particle-size analyses of suspended sediment, March to June 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; V, visual-accumulation tube)

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, 1954	11:15 a.m.	153	41	896	859		8		10		24	64	95	99	100		VPWCM
May 23	1:45 p.m.	403	59	7,200	3,090		34		56		71	92	99	100			VPWCM
June 7	11:20 a.m.	317	63	2,390	837		1		13		37	81	99	100			VPN
June 7	11:20 a.m.	317	63	2,390	1,180		2		9		37	81	99	100			VPWCM
June 26	10:15 a.m.	172	68	4,410	1,270		24		31		44	71	98	100			VPWCM

Particle-size analyses of bed material, water year October 1953 to September 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed)

Date of collection	Number of sampling points	Discharge (cfs)	Water temperature (°F)	Bed material											Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	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	
Oct. 20, 1953	4	85					0	2	29	95	98	99	100				S
Apr. 22, 1954	4	99					0	2	59	96	99	99	100				S
June 2	3	114					0	2	52	95	98	99	100				S
June 23	4	94					0	5	48	95	99	100	--				S
Aug. 4	4	63					0	5	56	94	98	99	--				S
Sept. 8	3	75					0	2	53	91	96	98	99	100			S

NIOBRARA RIVER BASIN--Continued
NIOBRARA RIVER NEAR CODY, NEBR.

LOCATION.--At county bridge, a quarter of a mile downstream from gaging station, 3 miles upstream from Medicine Creek, 5 miles downstream from Bear Creek, and 10 miles south of Cody, Cherry County.
RECORDS AVAILABLE.--Water temperatures: October 1948 to September 1954.
Sediment records: April 1948 to September 1954 (discontinued).
EXTREMES, 1953-54.--Water temperatures: Maximum, 94°F July 10; minimum, freezing point Jan. 25, 26, and probably on several other days during December and January.
Sediment concentrations: Maximum daily, 4,040 ppm May 25; minimum daily, 410 ppm July 10.
Sediment loads: Maximum daily, 4,580 tons July 20; minimum daily, 230 tons July 10.
EXTREMES, 1948-54.--Water temperatures: Maximum, 94°F July 10, 1954; minimum, freezing point on many days during winter months.
Sediment concentrations (1949-54): Maximum daily, 6,780 ppm Aug. 27, 1950; minimum daily, not determined.
Sediment loads: Maximum daily, 58,000 tons June 18, 1948; minimum daily, not determined.
REMARKS.--Investigations indicate that practically all the total sediment load is transported in suspension at this contracted section of the river.
Records of discharge for water year October 1953 to September 1954 given in WSP 1339.

Temperature (°F) of water, water year October 1953 to September 1954
/Twice-daily measurements between 5 a.m. and 8 a.m., and between 4 p.m. and 7 p.m./

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

a Reading obtained between 9 a.m. and 3 p.m.

NIOBRARA RIVER BASIN--Continued

NIOBRARA RIVER NEAR CODY, NEBR.--Continued

Suspended sediment, water year October 1953 to September 1954

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	219	740	440	302	1,580	1,290	319	2,510	2,160
2	215	800	460	298	1,590	1,280	310	1,560	1,310
3	212	1,020	580	290	1,450	1,140	310	1,390	1,170
4	226	910	560	274	1,460	1,080	306	1,500	1,240
5	226	1,100	670	286	1,470	1,140	310	1,540	1,290
6	238	1,180	760	302	1,680	1,370	310	1,540	1,290
7	238	1,160	740	294	1,600	1,280	314	1,690	1,430
8	234	950	600	294	1,720	1,370	319	2,500	2,150
9	242	1,120	730	290	1,820	1,430	294	2,060	1,640
10	250	1,110	750	298	1,740	1,400	294	2,240	1,780
11	242	1,010	660	290	1,680	1,320	282	1,930	1,470
12	250	900	610	286	1,790	1,380	306	3,550	2,930
13	238	1,050	670	278	1,680	1,260	310	2,050	1,720
14	250	1,050	710	282	1,670	1,270	286	1,620	1,250
15	254	1,320	910	274	1,950	1,440	286	1,820	1,410
16	250	950	640	270	1,610	1,170	239	1,680	1,080
17	254	1,010	690	282	1,750	1,330	195	1,460	770
18	250	970	650	282	1,750	1,330	230	1,630	1,010
19	250	940	630	282	1,650	1,260	290	1,630	1,280
20	258	1,160	810	278	1,700	a 1,300	320	1,960	1,690
21	342	1,220	1,130	270	2,000	a 1,500	310	2,050	1,720
22	395	2,000	2,130	286	1,880	1,450	233	1,670	1,050
23	350	1,910	1,800	319	1,560	1,340	170	910	420
24	342	1,570	1,450	355	1,300	1,250	220	1,420	840
25	310	1,500	1,260	346	1,850	1,730	270	2,590	1,890
26	294	1,560	1,240	342	1,550	1,430	310	1,860	1,560
27	302	1,650	1,350	337	1,720	1,570	324	1,540	1,350
28	294	1,450	1,150	332	1,640	1,470	314	1,650	1,400
29	294	1,530	1,210	332	1,710	1,530	298	1,590	1,280
30	298	1,330	1,070	324	1,750	1,530	306	1,680	1,390
31	294	1,550	1,230	--	--	--	302	1,450	1,180
Total	8,311	--	28,290	8,975	--	40,640	8,887	--	44,150
	January			February			March		
1	319	1,620	1,400	400	1,600	1,730	350	1,760	1,660
2	324	1,610	1,410	405	2,000	2,190	190	1,330	680
3	310	2,080	1,740	410	1,940	2,150	160	1,360	590
4	310	1,960	1,640	425	1,670	1,920	240	1,850	1,200
5	314	2,010	1,700	425	1,670	1,920	320	2,000	1,730
6	324	1,590	1,390	435	1,590	1,870	390	2,280	2,400
7	332	1,620	1,450	420	1,930	2,190	425	2,290	2,630
8	337	1,450	1,320	395	1,640	1,750	395	2,310	2,460
9	302	1,770	1,440	395	1,800	1,920	370	1,840	1,840
10	242	1,390	910	365	1,810	1,780	342	1,650	1,520
11	250	1,440	970	337	1,580	1,440	332	1,600	1,430
12	274	1,400	1,040	328	1,660	1,470	310	1,730	1,450
13	294	1,420	1,130	350	1,550	1,460	170	1,920	880
14	310	1,650	1,380	346	1,610	1,500	190	1,580	810
15	298	1,740	1,400	337	1,630	1,480	355	1,720	1,650
16	210	1,760	1,000	337	1,580	1,440	385	1,870	1,940
17	150	1,030	420	342	1,420	1,310	430	1,950	2,260
18	160	710	310	332	1,600	1,430	460	2,190	2,720
19	200	960	520	328	1,680	1,490	450	2,250	2,730
20	160	600	a 260	319	1,480	1,270	395	2,410	2,570
21	210	650	a 360	342	1,750	1,620	390	1,890	1,990
22	220	840	500	342	2,490	2,300	410	1,950	2,160
23	240	880	570	337	2,020	1,840	430	1,910	2,220
24	210	610	350	332	1,550	1,390	450	2,050	2,490
25	190	650	330	337	1,640	1,490	450	2,490	3,030
26	220	460	270	365	1,620	1,600	420	2,110	2,390
27	280	790	600	380	1,810	1,860	450	1,940	2,360
28	300	930	750	365	1,730	1,700	455	2,140	2,630
29	337	1,420	1,290	--	--	--	430	2,410	2,800
30	332	1,440	1,290	--	--	--	425	2,170	2,490
31	350	1,300	1,230	--	--	--	410	2,010	2,230
Total	8,309	--	30,370	10,231	--	47,510	11,379	--	61,940

a Computed from estimated concentration graph.

NIOBRARA RIVER BASIN--Continued

NIOBRARA RIVER NEAR CODY, NEBR.--Continued

Suspended sediment, water year October 1953 to September 1954--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	410	2,000	2,210	390	1,980	2,080	290	1,440	1,130
2	395	2,280	2,430	375	2,080	2,110	319	1,710	1,470
3	390	2,330	2,450	370	2,140	2,140	278	1,720	1,290
4	375	1,840	1,860	360	1,800	1,750	274	1,560	1,150
5	365	1,920	1,890	360	1,640	1,590	274	1,120	830
6	370	1,790	1,790	350	1,650	1,560	278	1,080	810
7	360	1,740	1,690	350	1,710	1,620	332	1,490	1,340
8	350	1,720	1,630	337	1,760	1,600	430	1,850	2,150
9	328	1,650	1,460	337	1,850	1,680	337	1,680	1,530
10	314	1,570	1,330	342	1,680	1,550	350	1,520	1,440
11	319	1,490	1,280	324	1,480	1,290	306	1,430	1,180
12	324	1,610	1,410	306	1,480	1,220	290	1,290	1,010
13	314	1,330	1,130	302	1,430	1,170	290	1,190	930
14	306	1,320	1,090	302	1,550	1,260	456	2,340	s 3,570
15	310	1,470	1,230	298	1,330	1,070	319	2,320	2,000
16	306	1,570	1,300	298	1,470	1,180	350	1,420	1,340
17	306	1,240	1,020	302	1,240	1,010	328	1,300	1,150
18	314	1,210	1,030	310	1,560	1,310	324	1,300	1,140
19	324	1,360	1,190	324	1,690	1,480	324	970	850
20	302	1,430	1,170	294	1,440	1,140	314	990	840
21	310	1,650	1,380	286	1,340	1,030	324	1,250	1,090
22	306	1,450	1,200	298	1,270	1,020	286	960	740
23	286	1,220	940	286	1,440	1,110	266	730	520
24	294	1,460	1,160	637	2,530	4,350	250	740	500
25	298	1,390	1,120	365	4,040	3,980	246	720	480
26	302	1,600	1,300	314	2,520	2,140	311	1,020	s 1,140
27	306	1,730	1,430	310	1,810	1,510	450	2,200	s 2,830
28	342	1,540	1,420	302	1,850	1,510	337	1,930	1,760
29	380	2,110	2,160	274	1,650	1,220	310	1,600	1,340
30	385	1,920	2,000	274	1,600	1,180	286	1,200	930
31	--	--	--	278	1,570	1,180	--	--	--
Total	9,991	--	44,700	10,255	--	50,040	9,529	--	38,480

Day	July			August			September		
1	282	1,020	780	215	650	380	219	700	410
2	270	960	700	212	750	430	215	730	420
3	258	1,030	720	208	640	360	208	1,400	790
4	254	830	570	215	470	270	212	710	410
5	246	580	390	215	550	320	226	830	510
6	242	660	430	223	730	440	238	780	500
7	234	570	360	230	770	480	238	660	420
8	230	670	420	238	970	620	258	670	470
9	226	510	310	238	730	470	246	690	460
10	212	410	230	230	610	380	234	880	560
11	204	520	290	262	690	490	234	840	530
12	200	650	350	250	730	490	230	710	440
13	190	650	330	226	690	420	226	730	450
14	186	580	290	226	540	330	226	670	410
15	179	540	260	212	630	360	226	640	390
16	186	560	280	208	680	380	230	600	370
17	190	520	270	215	560	330	242	630	410
18	190	850	440	223	630	380	250	730	490
19	204	1,530	840	242	860	560	258	640	450
20	729	1,990	s 4,580	250	810	550	262	580	410
21	416	3,860	4,340	270	1,140	830	258	610	420
22	328	2,340	2,070	294	1,290	1,020	254	600	410
23	290	1,420	1,110	328	1,330	1,180	246	630	420
24	266	910	650	286	1,190	920	246	520	350
25	258	820	570	246	1,010	670	238	600	390
26	238	760	490	208	1,190	670	234	810	510
27	238	770	490	208	830	470	238	760	490
28	238	810	520	208	790	440	238	660	420
29	234	730	460	230	830	520	234	780	490
30	234	800	510	258	780	540	250	870	590
31	226	690	420	234	780	490	--	--	--
Total	7,878	--	24,470	7,308	--	16,190	7,114	--	13,790

Total discharge for year (cfs-days) 108,167
Total load for year (tons) 440,570

s Computed by subdividing day.

NIOBRARA RIVER NEAR CODY, NEBR.--Continued

Particle-size analyses of suspended sediment, water year October 1953 to September 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; V, visual accumulation tube)

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, 1953	10:15 a.m.	246	53	1,070	--	--	--	--	--	--	7	16	52		88	100	V
Oct. 19	1:45 p.m.	250	--	864	--	--	--	--	--	--	8	17	66		98	100	V
Nov. 5	9:45 a.m.	290	41	1,500	--	--	--	--	--	--	6	14	60		97	100	V
Dec. 2	12:35 p.m.	310	37	1,520	--	--	--	--	--	--	9	20	62		95	100	V
Dec. 22	2:00 p.m.	a 233	--	1,640	--	--	--	--	--	--	8	19	52		98	100	V
Feb. 10, 1954	2:00 p.m.	375	--	1,790	--	--	--	--	--	--	15	31	70		92	100	V
Mar. 24	9:35 a.m.	440	37	2,000	--	--	--	--	--	--	11	24	67		94	100	V
Apr. 13	10:05 p.m.	346	55	1,340	--	--	--	--	--	--	16	37	72		95	100	V
Apr. 27	9:25 a.m.	306	54	1,960	--	--	--	--	--	--	9	21	62		88	100	V
May 13	4:10 p.m.	286	73	1,430	--	--	--	--	--	--	9	22	66		97	100	V
May 25	10:05 a.m.	390	62	4,580	4,100	18	24	28	30	30	36	45	70		97	100	VPWCM
May 25	10:05 a.m.	390	62	4,580	4,010	16	22	28	30	32	36	45	70		97	100	VPN
June 10	10:50 a.m.	375	71	1,190	1,240	6	8	10	12	15	26	48	79		97	100	VPWCM
June 24	9:55 a.m.	254	77	822	--	--	--	--	--	--	12	26	64		99	100	V
July 9	8:45 a.m.	230	72	631	--	--	--	--	--	--	14	28	64		98	100	V
July 21	4:15 p.m.	282	83	3,740	2,640	17	24	29	31	33	38	43	73		98	100	VPWCM
Aug. 4	12:55 p.m.	223	73	504	--	--	--	--	--	--	14	27	70		99	100	V
Aug. 18	5:05 p.m.	219	75	676	--	--	--	--	--	--	12	22	66		98	100	V
Sept. 1	10:10 a.m.	230	--	734	--	--	--	--	--	--	14	25	60		92	100	V
Sept. 15	11:35 a.m.	230	68	659	--	--	--	--	--	--	12	24	65		98	100	V
Sept. 30	1:45 p.m.	242	53	868	--	--	--	--	--	--	9	20	63		92	100	V

a Daily mean discharge.

NIOBRARA RIVER BASIN--Continued

MISCELLANEOUS ANALYSES OF STREAMS IN NIOBRARA RIVER BASIN IN NEBRASKA

Periodic determinations of suspended-sediment discharge, water year October 1953 to September 1954

Date	Discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Discharge (tons per day)
NIOBRARA RIVER NEAR NORDEN			
Oct. 7, 1953	749	902	1,820
Oct. 22	1,160	1,980	6,200
Nov. 5	846	870	1,990

Particle-size analyses of suspended sediment, water year October 1953 to September 1954
(Method of analysis: V, visual accumulation tube)

Date	Time	Discharge (cfs)	Water temperature (°F)	Suspended sediment				
				Percent finer than indicated size, in millimeters				
				Concentration (ppm)	0.062	0.125	0.250	0.500
NIOBRARA RIVER NEAR NORDEN								
Oct. 7, 1953	12:05 p.m.	749		902	11	30	86	100
Nov. 5	2:15 p.m.	846	44	870	14	33	82	100

Particle-size analyses of bed material, water year October 1953 to September 1954
(Method of analysis: V, visual accumulation tube)

Date	Number of sampling points	Bed material				
		Percent finer than indicated size, in millimeters				
		0.062	0.125	0.250	0.500	1.000
NIOBRARA RIVER NEAR NORDEN						
Oct. 7, 1953	3	0	1	42	97	100
Nov. 5	3	0	1	38	97	100

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 1954.
EXTREMES, June 1953 to September 1954.--Water temperatures: Maximum, 83°F July 18-20, 1953, July 13, 20, 1954; minimum freezing point on many days during November to January.
REMARKS.--Records of discharge for 1953 and 1954 water years given in WSP 1279 and 1339.

Temperature (°F) of water, June to September 1953
/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																	--	--	75	73	80	78	79	76
2																	70	68	73	71	79	75	78	73
3																	72	68	75	72	75	71	73	66
4																	71	66	75	73	75	69	66	63
5																	66	61	74	72	78	71	64	62
6																	61	59	73	70	73	69	64	61
7																	60	58	72	70	69	68	66	62
8																	59	57	71	69	71	67	67	64
9																	61	58	76	68	73	68	68	65
10																	65	60	74	70	73	71	71	67
11																	75	65	80	72	73	70	69	66
12																	80	72	77	74	74	70	67	64
13																	82	77	78	75	76	71	65	63
14																	78	74	81	75	74	70	66	62
15																	74	69	82	77	76	71	65	63
16																	75	67	80	78	77	72	65	62
17																	71	70	81	76	76	71	64	62
18																	72	67	83	76	77	73	63	60
19																	72	69	83	78	76	74	63	61
20																	69	66	83	80	76	73	61	57
21																	67	64	81	78	75	72	61	55
22																	67	65	78	76	74	71	60	56
23																	66	64	77	74	73	71	59	57
24																	66	64	74	72	74	70	58	57
25																	66	64	77	73	76	72	59	55
26																	68	65	78	73	76	73	57	55
27																	68	68	77	74	76	75	58	55
28																	71	67	79	76	75	74	59	56
29																	75	70	81	75	79	72	58	56
30																	74	73	79	76	77	74	58	56
31																	--	--	81	77	78	75	--	--
Average																	70	66	78	74	75	72	64	61

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

Temperature (°F) of water, water year October 1953 to September 1954
/Recorder with temperature attachment, continuous ethyl alcohol actuated thermograph/

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

JAMES RIVER NEAR SCOTLAND, S. DAK.

LOCATION.--Temperature recorder 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.--Water temperatures: January 1953 to September 1954.
EXTREMES, January 1953 to September 1954.--Water temperatures: Maximum, 87°F July 19,20,1953; minimum, freezing point on many days during winter months.
REMARKS.--Records of discharge for 1953 and 1954 water years given in WSP 1279 and 1339.

Temperature (°F) of water, January to September 1953
(Recorder with temperature attachment, continuous ethyl alchol 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							--	--	32	32	32	32	42	40	47	46	73	69	84	82	85	84	81	80
2							--	--	32	32	32	32	42	42	46	45	73	69	85	84	84	84	81	80
3							--	--	32	32	32	32	42	41	45	44	74	70	84	82	84	82	80	76
4							--	--	32	32	32	32	42	41	49	45	74	71	82	81	82	80	76	72
5							--	--	32	32	32	32	43	42	51	49	73	67	82	79	80	80	72	70
6							--	--	32	32	32	32	43	43	55	51	67	63	79	78	80	78	72	70
7							--	--	32	32	32	32	43	43	58	55	63	58	81	79	78	76	71	70
8							--	--	32	32	32	32	43	43	60	57	61	60	81	80	76	75	72	70
9							--	--	32	32	32	32	43	42	61	60	63	61	81	80	75	75	74	72
10							--	--	32	32	32	32	42	41	61	59	64	62	81	80	76	75	75	73
11							--	--	32	32	32	32	41	41	59	57	72	64	80	79	76	75	74	72
12							--	--	32	32	32	32	42	40	57	52	78	72	82	80	75	75	72	70
13							--	--	32	32	32	32	44	41	52	51	82	76	84	82	75	75	70	68
14							--	--	32	32	32	32	44	44	51	51	83	81	86	84	76	75	70	68
15							--	--	32	32	32	32	44	42	54	51	83	79	86	85	76	75	69	68
16							--	--	32	32	32	32	42	41	56	54	80	77	86	81	75	74	68	67
17							--	--	32	32	32	32	42	40	56	56	79	76	85	84	75	74	69	68
18							--	--	32	32	36	32	41	40	59	56	82	78	85	83	75	75	68	65
19							--	--	32	32	36	35	41	40	61	59	83	81	87	85	75	75	67	65
20							--	--	32	32	37	35	42	40	61	61	84	80	87	86	75	75	67	64
21							--	--	32	32	38	37	46	42	61	59	80	78	86	85	75	75	64	62
22							--	--	32	32	39	38	51	46	60	59	78	76	85	83	75	75	63	60
23							--	--	32	32	39	39	55	51	60	60	78	76	84	83	76	75	62	60
24							--	--	32	32	38	37	55	53	60	60	79	77	84	82	76	75	62	60
25							--	--	32	32	37	37	53	48	64	60	78	76	83	82	77	76	62	59
26							--	--	32	32	38	37	48	45	67	63	77	75	84	83	78	77	61	58
27							--	--	32	32	38	38	49	47	67	57	76	75	84	83	78	77	60	57
28							--	--	32	32	39	38	49	48	63	58	77	76	84	83	78	77	62	58
29							--	--	--	--	41	39	48	47	69	63	79	77	83	83	78	77	62	60
30							32	32	--	--	42	41	47	47	71	68	82	79	83	82	79	77	60	57
31							32	32	--	--	42	42	--	--	72	69	--	--	84	82	80	79	--	--
Average							--	--	32	32	35	34	45	43	58	56	76	73	84	82	78	77	69	67

JAMES RIVER BASIN--Continued

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

Temperature (°F) of water, water year October 1953 to September 1954
/Recorder with temperature attachment, continuous ethyl alchol 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	57	51	48	34	34	33	33	33	33	34	33	38	35	49	47	67	62	78	76	77	75	80	78
2	64	61	51	49	34	34	33	33	33	33	35	33	38	37	47	43	68	67	78	75	78	75	79	75
3	64	59	51	49	34	33	33	33	33	33	33	33	37	36	43	41	66	64	78	76	78	75	78	75
4	59	55	49	46	34	33	33	33	33	33	34	33	37	35	47	43	67	65	78	75	78	76	79	75
5	57	54	46	42	33	33	33	33	33	33	33	32	40	37	50	46	67	66	78	74	77	75	79	77
6	56	54	42	39	33	33	33	33	33	33	33	32	47	40	50	50	70	67	78	76	77	75	79	77
7	55	52	39	38	33	33	33	33	33	33	33	32	50	47	52	50	72	69	79	77	76	74	78	73
8	56	52	39	37	33	33	33	33	33	33	35	33	49	46	54	50	75	71	80	77	78	72	76	64
9	56	52	39	37	33	33	33	33	33	32	33	33	51	47	58	52	76	73	80	78	80	75	69	68
10	58	54	40	38	33	33	33	33	33	32	35	33	53	49	60	54	79	76	80	77	80	75	71	66
11	58	54	41	40	33	33	33	33	33	33	35	35	53	49	62	57	81	78	81	78	78	75	73	69
12	58	55	42	40	33	33	33	33	33	33	35	33	52	49	65	60	82	79	82	80	75	73	72	70
13	60	56	43	40	33	33	33	33	33	33	33	33	57	50	66	62	80	78	83	81	74	73	72	70
14	61	57	44	42	33	33	33	33	33	33	33	33	59	56	67	63	79	78	83	80	77	73	72	70
15	62	58	45	43	33	33	33	33	33	33	33	33	60	54	67	65	79	77	80	78	82	75	71	68
16	63	61	45	44	33	33	33	33	33	33	33	33	54	52	69	66	78	76	81	78	81	78	70	69
17	62	60	47	44	33	33	33	33	33	33	34	32	55	51	69	66	77	75	81	79	79	75	70	69
18	64	61	47	45	33	33	33	33	33	33	34	34	56	55	68	65	77	70	81	77	80	75	70	70
19	65	61	45	41	33	33	33	33	33	33	34	34	58	55	67	63	76	67	83	78	81	75	71	68
20	65	63	41	36	33	33	33	33	33	33	34	34	56	55	67	64	69	69	83	78	81	77	70	67
21	65	63	36	36	33	33	33	33	33	33	36	34	58	54	68	65	70	69	80	76	81	78	67	63
22	63	59	37	36	33	33	33	33	33	33	36	36	55	53	72	67	72	69	81	75	80	76	65	60
23	59	56	37	36	33	33	33	33	33	33	36	36	54	53	72	68	74	68	79	73	80	74	66	62
24	56	53	36	35	33	33	33	33	33	33	36	36	61	54	69	66	77	74	79	75	83	77	66	64
25	53	51	36	35	33	33	34	33	34	33	36	36	63	57	69	66	79	76	82	77	85	80	68	63
26	53	50	35	34	33	33	33	33	34	33	36	35	63	60	68	64	79	78	83	80	83	79	68	64
27	51	49	35	35	33	33	33	33	36	33	36	36	60	58	66	63	79	77	83	79	81	79	69	66
28	49	47	35	34	33	33	33	33	34	33	36	35	63	58	66	64	78	75	80	78	82	79	69	67
29	51	47	34	34	34	33	33	33	--	--	36	34	62	54	66	62	78	76	80	78	82	81	69	65
30	52	49	34	34	34	33	33	33	--	--	36	34	54	49	68	64	78	75	80	78	81	79	65	61
31	52	50	--	--	33	33	33	33	--	--	36	34	--	--	68	64	--	--	78	77	81	78	--	--
Average	58	55	41	40	33	33	33	33	33	33	34	34	53	50	62	59	75	72	80	77	80	76	72	68

PART 6-B. MISSOURI RIVER BASIN BELOW SIOUX CITY, IOWA

LITTLE SIOUX RIVER BASIN

LITTLE SIOUX RIVER AT CORRECTIONVILLE, IOWA

LOCATION.--At gaging station at bridge on U. S. Highway 20, 0.2 mile upstream from Bacon Creek, 0.5 mile west of Correctionville, Woodbury County, and 0.8 mile downstream from Pierson Creek.
DRAINAGE AREA.--2,450 square miles, approximately.
RECORDS AVAILABLE.--Water temperatures: May 1951 to September 1954.
Sediment records: May 1950 to September 1954.
EXTREMES, 1953-54.--Water temperatures: Maximum, 81°F July 12; minimum, freezing point probably on many days during December to March.
Sediment concentrations: Maximum daily, 11,900 ppm June 19; minimum daily, not determined.
Sediment loads: Maximum daily, 257,000 tons June 19; minimum daily, not determined.
EXTREMES, 1950-54.--Water temperatures (1951-54): Maximum, 81°F June 13, 1952, July 12, 1954; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 12,200 ppm July 12, 1950, minimum daily, not determined.
Sediment loads: Maximum daily, 257,000 tons June 19, 1954; minimum daily, not determined.
REMARKS.--Flow affected by ice Dec. 9 to Feb. 19, Mar. 3-8. Records of discharge for water year October 1953 to September 1954 given in WSP 1340.

Temperature (°F) of water, water year October 1953 to September 1954
(Once-daily measurement generally between 6 a.m. and 9 a.m.)

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

LITTLE SIOUX RIVER BASIN--Continued

LITTLE SIOUX RIVER AT CORRECTIONVILLE, IOWA--Continued

Suspended sediment, water year October 1953 to September 1954

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	120			117			139		
2	118			117			141	--	e 10
3	116	--	e 25	117	60	19	174	--	e 20
4	113			116			213	--	e 35
5	111			111			203	55	30
6	109			105			169		
7	108			110			160	--	e 17
8	110	91	27	116	34	10	182		
9	112			122			129	--	
10	114			130			132	--	
11	117			131			140	--	e 13
12	119			131			145	32	
13	122	102	34	134			150	--	
14	125			136	66	24	140		
15	128			137			130		
								--	e 9
16	132	107	38	136			128		
17	133	108	39	135			127		
18	139	155	58	134	121	44	122	--	
19	122	119	39	144	131	51	120	54	
20	118			179	97	47	120	--	
21	117	108	34	182	56	28	118	--	
22	116			176	--	e 20	116	--	e 13
23	116			166			114	--	
24	116			165	--	e 15	112	42	
25	117			164			110	--	
26	118			156	--		108	--	
27	118	72	23	150	--		107		
28	118			142	25	e 10	106		
29	118			136	--		103	--	e 7
30	118			139	--		102		
31	117			--	--	--	100		
Total	3,675	--	924	4,134	--	612	4,160	--	409

Day	January			February			March		
1	97	--		40	--		628	476	807
2	95	18		40	--		548	360	a 530
3	94	--		40	--		300	120	a 97
4	92	--		42	--		220	100	a 59
5	91	--		44	--	e 2	250	199	134
6	90	--		46	20		300	200	162
7	83	--		48	--		350	117	111
8	78	--		52	--		400	188	203
9	74	--		55	--		501	267	361
10	70	--		60	--		568	373	572
11	66	22		66	--	e 3	736	772	1,530
12	62	18		72	--		724	590	a 1,200
13	59	--		84	14		520	280	a 390
14	56	--		100	--		370	175	a 170
15	54	--		115	--		397	190	sb 210
16	54	86	e 5	145	33	e 10	556	275	s 436
17	52	--		150	--		1,030	1,870	s 6,020
18	50	--		160	--		1,810	3,120	15,200
19	48	--		190	19		2,100	3,460	19,600
20	46	--		560	858	s 1,540	1,940	2,410	12,600
21	45	--		761	845	1,740	1,900	2,060	10,600
22	44	--		952	1,210	3,110	1,990	1,880	10,100
23	43	64		866	1,120	2,620	2,170	1,830	10,700
24	42	--		826	852	1,900	2,140	1,500	8,670
25	42	--		1,060	1,420	4,060	1,580	1,240	5,290
26	41	--		872	1,070	s 2,610	1,300	935	3,280
27	40	--		795	642	1,380	1,220	808	2,660
28	40	--		761	652	1,340	1,110	749	2,240
29	40	--		--	--	--	1,070	624	1,800
30	40	36		--	--	--	956	565	1,460
31	40	--		--	--	--	866	426	996
Total	1,868	--	155	9,002	--	20,392	30,550	--	118,188

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

LITTLE SIOUX RIVER BASIN--Continued

LITTLE SIOUX RIVER AT CORRECTIONVILLE, IOWA.--Continued

Suspended sediment, water year October 1953 to September 1954--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	795	356	764	501	214	289	1,820	6,680	s 35,200
2	744	304	611	564	220	335	1,070	2,410	6,960
3	694	266	498	727	400	785	1,300	2,220	7,790
4	644	220	383	956	696	1,800	1,180	1,490	4,750
5	612	220	364	1,150	815	2,530	1,080	1,020	2,970
6	564	262	399	1,180	855	2,720	1,000	950	2,570
7	621	799	s 1,420	1,110	698	2,090	913	846	2,090
8	704	1,760	3,350	994	522	1,400	816	692	1,520
9	628	645	1,090	902	450	1,100	734	600	1,190
10	596	420	676	795	392	841	1,370	6,100	sb 27,000
11	564	342	521	727	350	687	3,550	7,400	sb 70,000
12	532	300	431	660	312	556	2,820	3,590	27,300
13	516	285	397	612	293	484	2,960	2,270	18,100
14	501	276	373	533	300	432	1,940	1,350	7,070
15	516	515	717	505	612	834	1,290	1,050	3,660
16	532	463	665	486	520	682	1,070	900	2,600
17	596	500	805	442	375	448	1,000	755	2,040
18	612	550	909	414	300	335	1,400	9,400	sb 50,000
19	628	498	844	400	247	267	9,210	11,900	s 257,000
20	612	430	711	383			12,800	3,320	s 120,000
21	596	370	595	358			17,500	2,000	94,500
22	564	317	483	337	158	149	12,400	764	25,600
23	516	258	359	329			12,600	554	18,800
24	501	251	340	342			13,200	415	14,800
25	486			380	174	179	11,700	357	11,300
26	486			350	200	189	9,430	380	9,680
27	456	221	274	442	830	sb 1,200	7,590	432	8,850
28	428			710	2,060	3,950	6,480	470	8,220
29	428			620	1,270	2,130	5,570	500	7,520
30	471			583	785	1,240	4,720	720	9,180
31	--	--	--	1,820	7,700	s 47,300	--	--	--
Total	17,143	--	19,349	20,312	--	75,548	150,513	--	858,260

Day	July			August			September		
1	4,120	916	10,200	456			848	468	1,070
2	3,680	898	8,920	442			710	400	767
3	3,070	932	7,730	442	216	251	628	342	580
4	2,620	927	6,560	414			564	320	487
5	2,220	899	5,390	394			516	249	347
6	1,990	828	4,450	369			548	840	1,240
7	1,810	762	3,720	356			486	420	551
8	1,630	663	2,920	350	179	169	442	233	278
9	1,500	632	2,560	348			428	228	263
10	1,380	586	2,180	321			428	211	244
11	1,260	575	1,960	308			400	208	225
12	1,150	570	1,770	287			380	222	228
13	1,070	508	1,470	271			372		
14	994	472	1,270	263	166	124	367		
15	920	461	1,150	256			356		
16	866	415	970	263			350	171	168
17	830	398	892	306	210	174	358		
18	778	366	769	313	217	183	372		
19	727	300	589	375	333	337	367		
20	677	317	579	400	278	300	367		
21	644			372	225	226	375		
22	628	282	474	394	230	245	378		
23	596			389	207	217	369	140	136
24	564			389	210	221	348		
25	548	249	365	353	172	164	323		
26	516			630	730	sb 1,500	308		
27	486			994	1,460	3,920	295		
28	471			1,150	1,410	s 4,480	282	114	88
29	471	242	308	1,160	1,240	3,880	274		
30	471			1,070	708	2,050	276		
31	456			994	589	1,580	--	--	--
Total	39,143	--	70,106	14,829	--	22,321	12,515	--	8,744

Total discharge for year (cfs-days) 307,844

Total load for year (tons) 1,195,008

s Computed by subdividing day.

b Computed from partly estimated concentration graph.

LITTLE SIOUX RIVER BASIN--Continued

LITTLE SIOUX RIVER AT CORRECTIONVILLE, IOWA--Continued

Particle-size analyses of suspended sediment, February to June 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed)

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. 20, 1954	3:00 p.m.	710	34	1,990	3,100		44	57	--		97	98		100			SPWCM
Mar. 16	4:00 p.m.	580	37	691	3,750		35	47	--		93	94		96			SPWCM
Apr. 13	5:00 p.m.	501	54	307	3,100		41	--	72		96	99		100			SPWCM
May 5	11:35 a.m.	1,150	--	798	4,770		30	--	59		94	97		100			SPWCM
June 4	10:55 a.m.	1,180	56	1,460	5,090		42	--	70		98	--		--			SPWCM
June 11	7:55 a.m.	3,730	70	9,740	3,830		40	--	72		98	--		--			SPWCM
June 11	3:35 p.m.	3,950	74	5,610	4,360		50	--	78		97	--		--			SPWCM
June 19	11:00 a.m.	10,400	--	10,600	4,180		45	--	76		99	--		--			SPWCM
June 20	1:00 p.m.	11,800	73	2,170	5,030		78	--	93	97	99	--		--			SPWCM
June 30	6:10 p.m.	4,520	81	754	2,160		24	--	47		91	95		--			SPWCM

LITTLE SIOUX RIVER BASIN--Continued

LITTLE SIOUX RIVER NEAR KENNEBEC, IOWA

LOCATION.--At gaging station at bridge on county road "A," 1.3 miles south of Kennebec, Monona County, 5.5 miles northeast of Onawa, and 6.5 miles upstream from Maple River.
DRAINAGE AREA.--2,730 square miles, approximately.
RECORDS AVAILABLE.--Water temperatures: May 1951 to September 1954.
Sediment records: May 1950 to September 1954.
EXTREMES, 1953-54.--Water temperatures: Maximum, 82°F July 13; minimum, freezing point probably on many days during December to March.
Sediment concentrations: Maximum daily, 20,700 ppm May 27; minimum, not determined.
Sediment loads: Maximum daily, 255,000 tons June 19; minimum, not determined.
EXTREMES, 1950-54.--Water temperatures (1951-54): Maximum, 83°F June 24, 1952; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 40,800 ppm June 18, 1950; minimum daily, not determined.
Sediment loads: Maximum daily, 520,000 tons June 18, 1950; minimum daily, not determined.
REMARKS.--Flow affected by ice Dec. 10 to Feb. 17, Mar. 3-6. Records of discharge for water year October 1953 to September 1954 given in WSP 1340.

Temperature (°F) of water, water year October 1953 to September 1954
/Once-daily measurement generally between 6 a.m. and 9 a.m./

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

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

LITTLE SIOUX RIVER BASIN--Continued

LITTLE SIOUX RIVER NEAR KENNEBEC, IOWA--Continued

Suspended sediment, water year October 1953 to September 1954

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	158			144			167	--	e 20
2	154			144			170		
3	148			144			199	--	e 25
4	148			143			242	--	e 45
5	148			143			258	--	e 50
		141	57						
6	146			142			238	--	e 45
7	146			135	76	29	203	69	38
8	148			138			190		
9	147			141			178	--	e 20
10	148			142			170		
11	151			144			160		
12	148			145			160		
13	148			144			160	--	e 10
14	146			148			160		
15	148			150			150		
		142	57						
16	153			150	101	41	140	--	
17	150			149			130	--	
18	151			148			120	--	
19	156			155			120	--	
20	148			188	140		120	--	e 7
21	145			199	--		110	--	
22	141			196	--	e 71	110	--	
23	142			190	--		110	--	
24	142			180	--		120	22	
25	144			178	--		140		
		112	44						
26	146			178	--		140		
27	145			172	--	e 20	140	--	e 9
28	147			168	--		140		
29	146			165	45		130		
30	146			155	--		130		
31	144			--	--	--	130		
Total	4,578	--	1,624	4,718	--	1,098	4,835	--	479

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	120	17		50	21		770	722	1,500
2	120	--		50	--		605	640	a 1,000
3	120	--		50	--		400	400	a 430
4	120	--		50	--		250	250	a 170
5	118	--		50	--	e 3	190	380	195
			e 6						
6	115	--		52	--		250	885	597
7	110	--		54	20		404	520	567
8	105	--		58	--		416	590	663
9	100	--		60	--		430	490	569
10	100	22		70			542	515	754
11	95	--		80	--	e 8	652	725	1,280
12	92	22		90			897	1,490	3,610
13	88	--	e 5	100			644	950	a 1,700
14	85	--		110	--	e 20	416	720	a 810
15	82	--		120			302	376	307
16	80	--		130	112	39	357	645	622
17	77	--		150	228	92	595	1,060	s 1,820
18	75	8		174	190	a 89	1,500	4,090	s 17,600
19	72	--		190	298	153	2,110	4,620	26,300
20	70	--		367	1,600	sb 1,800	2,330	4,260	26,800
21	68	--		616	1,750	2,910	2,180	2,950	17,400
22	66	--		834	1,820	4,100	2,130	2,540	14,600
23	65	--		1,030	2,160	6,010	2,380	2,600	16,700
24	64	--	e 3	908	1,470	3,600	2,530	2,640	18,000
25	62	--		960	1,420	3,680	2,260	2,080	12,700
26	60	--		1,140	1,840	5,660	1,690	1,650	7,530
27	58	36		872	1,210	2,850	1,440	1,260	4,900
28	56	--		872	885	2,080	1,320	1,080	3,850
29	54	--		--	--	--	1,280	880	a 3,000
30	53	--		--	--	--	1,200	789	2,560
31	52	--		--	--	--	1,040	720	2,020
Total	2,602	--	133	9,287	--	33,174	33,510	--	190,554

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

LITTLE SIOUX RIVER BASIN--Continued

LITTLE SIOUX RIVER NEAR KENNEBEC, IOWA--Continued

Suspended sediment, water year October 1953 to September 1954--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.....	928	698	1,750	528	595	848	2,450	13,100	86,700
2.....	856	460	1,060	620	1,240	2,080	1,520	7,210	29,600
3.....	788	451	960	686	620	1,150	1,440	5,690	22,100
4.....	720	450	a 870	839	695	1,570	1,470	2,970	11,800
5.....	669	426	769	1,040	1,000	2,810	1,310	2,000	7,070
6.....	636	595	1,020	1,160	1,180	3,700	1,190	1,620	5,210
7.....	542	460	673	1,200	1,090	3,530	1,060	1,510	4,320
8.....	721	1,000	sb 2,100	1,080	875	2,550	935	1,300	3,280
9.....	737	1,630	3,240	964	698	1,820	822	1,100	2,440
10.....	652	945	1,660	892	520	1,250	784	1,200	2,540
11.....	636	596	1,020	788	487	1,040	2,400	8,080	s 57,500
12.....	620	425	711	737	462	919	3,420	6,820	s 64,600
13.....	604	428	698	686	390	722	3,050	4,210	34,700
14.....	572	415	641	636	346	594	2,930	2,800	22,200
15.....	572	600	927	556	445	668	1,770	1,910	9,130
16.....	588	900	1,430	528	730	1,040	1,300	1,470	5,160
17.....	588	495	786	500	496	670	1,130	1,360	4,150
18.....	652	536	944	472	400	510	1,030	1,350	3,750
19.....	652	600	1,060	444	325	390	4,750	18,400	s 255,000
20.....	686	645	1,190	416	265	298	9,650	5,930	s 151,000
21.....	720	2,210	4,300	404	290	316	11,800	6,240	199,000
22.....	636	745	1,280	380	300	308	13,100	2,210	78,200
23.....	588	450	714	368	300	a 300	13,100	1,560	55,200
24.....	528	450	642	368	216	215	13,000	1,360	47,700
25.....	528	495	706	368	195	194	12,600	1,320	44,900
26.....	487	426	560	392	250	265	12,700	1,210	41,500
27.....	472	375	478	1,050	20,700	s 75,300	11,400	1,110	34,200
28.....	444	310	372	771	17,500	36,400	8,910	1,200	28,900
29.....	430	486	564	754	6,090	12,400	6,740	1,560	28,400
30.....	472	704	897	620	3,650	6,110	5,680	1,710	26,200
31.....	--	--	--	790	4,870	s 11,800	--	--	--
Total.	18,724	--	34,022	21,037	--	171,767	153,441	--	1,366,450

Day	July			August			September		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1.....	4,760	1,810	23,300	515			1,140	800	2,460
2.....	4,220	1,610	18,300	515			960	625	1,620
3.....	3,650	1,500	14,800	515	489	660	820	510	a 1,100
4.....	3,180	1,410	12,100	485			715	500	a 970
5.....	2,730	1,260	9,290	470			650	480	a 840
6.....	2,450	1,120	7,410	440			620	410	686
7.....	2,180	1,090	6,420	426			620	340	569
8.....	2,000	984	5,310	426	427	488	582	400	629
9.....	1,820	903	4,440	426			560	5,900	sb 9,300
10.....	1,660	840	3,760	399			485	671	879
11.....	1,500	806	3,260	386			470	409	519
12.....	1,380	750	2,790	386			440	377	448
13.....	1,260	704	2,400	360			412		
14.....	1,140	652	2,010	334	426	403	386		
15.....	1,030	610	1,700	321			373		
16.....	960	564	1,460	313			373		
17.....	890	524	1,260	347	892	836	373		
18.....	855	563	1,300	412	732	814	386	298	311
19.....	802			412	546	607	386		
20.....	768	509	1,020	485	600	786	373		
21.....	715			515	575	800	360		
22.....	680			485	595	779	399		
23.....	665			545	800	1,180	426		
24.....	635			500	480	648	386		
25.....	605	508	850	500	460	621	360	194	186
26.....	575			455	410	504	347		
27.....	530			957	1,680	s 4,460	329		
28.....	500	513	693	1,180	1,720	5,480	351	1,300	sb 1,300
29.....	485			1,490	1,800	7,240	340	1,500	sb 1,500
30.....	485			1,340	1,680	6,080	296	500	400
31.....	500	661	892	1,300	1,590	5,580	--	--	--
Total.	45,610	--	132,454	17,640	--	44,573	14,718	--	27,385

Total discharge for year (cfs-days)..... 330,700
Total load for year (tons)..... 2,003,713

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

LITTLE SIOUX RIVER BASIN--Continued

LITTLE SIOUX RIVER NEAR KENNEBEC, IOWA--Continued

Particle-size analyses of suspended sediment, February to June 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed)

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. 24, 1954	10:15 a.m.	908	36	1,440	2,080		52	58	--		92	--		--			SPWCM
Apr. 13	11:45 a.m.	604	52	460	4,410		38		68		93	96		100			SPWCM
May 4	5:50 p.m.	874	--	809	2,530		23		42		82	95		--			SPWCM
May 27	7:00 a.m.	1,360	60	76,800	3,790		25		48		98	--		--			SPWCM
June 3	11:50 a.m.	1,620	--	6,080	4,460		36		63		97	--		--			SPWCM
June 11	10:35 a.m.	2,030	75	7,640	6,650		34		65		94	98		--			SPWCM
June 11	6:30 p.m.	3,270	75	10,100	4,320		30		60		95	97		--			SPWCM
June 12	7:00 a.m.	3,740	72	8,290	7,340		33		66		96	98		--			SPWCM
June 19	11:40 p.m.	5,090	72	24,900	4,670		28		54		98	99		--			SPWCM
June 20	10:05 a.m.	9,100	--	5,370	4,790		54		72		95	98		--			SPWCM
June 30	2:00 p.m.	5,690	81	1,700	4,400		24		40		88	94		100			SPWCM

NORTH PLATTE RIVER BELOW GUERNSEY RESERVOIR, WYO.

LOCATION.--Three hundred feet downstream from gaging station, 1 mile northwest of Guernsey, Platte County, and 1.1 miles downstream from Guernsey Dam.
DRAINAGE AREA.--16,200 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to August 1954.
Water temperatures: October 1951, April to September 1952, March to September 1953, May to August 1954.
Sediment records: April 1947 to June 1953.
EXTREMES, May to August 1954.--Dissolved solids: Minimum, 374 ppm Aug. 9-19.
Hardness: Minimum, 203 ppm July 15-24.
Specific conductance: Minimum daily, 551 micromhos July 22.
EXTREMES, 1951-54.--Dissolved solids: Minimum, 300 ppm May 17-31, 1953.
Hardness: Minimum, 160 ppm May 2-10, 1952.
Specific conductance: Minimum daily, 429 micromhos May 21, 1953.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1953 to September 1954 given in WSP 1340.

Chemical analyses, in parts per million, October 1953 to August 1954

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. 21, 1953..	20	--	--	--	--	66	--	214	228	--	--	--	--	547		0.74	29.5	291	116	33	1.7	822	7.8	--
Nov. 3.....	21	--	--	--	--	85	--	210	300	--	--	--	--	651		.89	36.9	322	150	36	2.1	952	7.5	--
Dec. 2.....	25	7.4	0.00	80	29	80	5.8	214	270	24	0.5	3.2	0.12	625		.85	42.3	317	142	35	2.0	923	7.4	5
Jan. 5, 1954...	25	--	--	--	--	112	--	265	380	--	--	--	--	865		1.18	58.4	419	202	37	2.4	1,200	7.5	--
Feb. 3.....	22	10	.00	90	33	96	5.4	227	333	29	.5	4.2	.13	740		1.01	44.0	360	174	36	2.2	1,050	7.6	4
Mar. 2.....	247	--	--	--	--	103	--	219	358	--	--	--	--	775		1.05	517	369	189	38	2.3	1,110	7.3	--
Apr. 8.....	20	--	--	--	--	93	--	222	328	--	--	--	--	729		.99	39.4	356	174	36	2.1	1,040	7.9	--
Apr. 20.....	20	--	--	--	--	100	--	225	345	--	--	--	--	770		1.05	41.6	368	183	37	2.3	1,090	7.8	--
May 1-6.....	374	--	--	--	--	108	--	217	373	--	--	--	--	799		1.09	807	374	196	39	2.4	1,140	7.8	--
May 7-9.....	1,653	--	--	--	--	102	--	205	360	--	--	--	--	756		1.03	3,370	350	182	39	2.4	1,080	8.0	--
May 10-12.....	2,207	--	--	--	--	90	--	188	303	--	--	--	--	670		.91	3,990	314	160	38	2.2	980	8.1	--
May 13-17.....	2,668	13	.00	67	25	75	4.9	175	255	22	.3	1.5	.12	566		.77	4,080	269	125	37	2.0	835	7.8	8
May 18-24.....	1,937	--	--	--	--	42	--	164	148	--	--	--	--	398		.54	2,080	216	82	30	1.2	594	7.3	--
May 25-June 5.	161	--	--	--	--	41	--	168	145	--	--	--	--	388		.53	169	216	78	29	1.2	586	7.3	--
June 9-12	1,054	--	--	--	--	45	--	174	161	--	--	--	--	417		.57	1,190	227	84	30	1.3	621	7.3	--
June 13-14	1,105	--	--	--	--	59	--	a 186	208	--	--	--	--	494		.67	1,470	256	103	33	1.6	731	8.5	--
June 15-19	1,568	--	--	--	--	49	--	166	177	--	--	--	--	433		.59	1,830	232	96	31	1.4	654	7.3	--
June 20-July 4.	2,129	--	--	--	--	39	--	160	145	--	--	--	--	376		.51	2,160	209	78	29	1.2	567	7.7	--
July 5-14.....	4,032	--	--	--	--	41	--	163	149	--	--	--	--	392		.53	4,270	214	80	29	1.2	591	7.5	--
July 15-24.....	3,774	--	--	--	--	39	--	163	136	--	--	--	--	383		.52	3,900	203	69	30	1.2	561	7.7	--

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

PLATTE RIVER BASIN--Continued

NORTH PLATTE RIVER BELOW GUERSEY RESERVOIR, WYO.--Continued

Chemical analyses, in parts per million, October 1953 to August 1954--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 25-31, 1954	3,331	--	--	--	--	39	--	162	143	--	--	--	--	380		0.52	3,420	211	78	29	1.2	575	7.3	--
Aug. 1-8.....	3,989	16	0.00	53	19	39	3.6	161	146	12	0.5	1.4	0.08	383		.52	4,130	210	78	28	1.2	573	7.6	6
Aug. 9-19.....	3,239	--	--	--	--	39	--	160	144	--	--	--	--	374		.51	3,270	206	75	29	1.2	560	7.5	--
Aug. 20-31.....	2,652	--	--	--	--	41	--	166	151	--	--	--	--	386		.52	2,760	215	79	29	1.2	589	8.1	--
Weighted average b ...	2,265	--	--	--	--	45	--	165	161	--	--	--	--	411		0.56	2,510	220	85	31	1.3	614	--	--
Weighted average c ...	956	--	--	--	--	48	--	169	173	--	--	--	--	432		0.59	1,120	229	90	31	1.4	644	--	--

b Represents 82 percent of runoff for water year October 1953 to September 1954.

c Includes estimated data for missing periods. Represents 100 percent of runoff for water year October 1953 to September 1954.

PLATTE RIVER BASIN--Continued

NORTH PLATTE RIVER BELOW GUERNSEY RESERVOIR, WYO.--Continued

Temperature (°F) of water, May to August 1954
(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								--	--	--	--	
2								--	--	--	72	
3								43	--	--	--	
4								47	--	--	72	
5								48	--	--	71	
6								50	--	--	71	
7								50	57	72	--	
8								--	--	72	--	
9								--	58	73	--	
10								50	60	--	--	
11								50	59	--	72	
12								50	--	72	--	
13								52	--	--	72	
14								50	67	--	--	
15								56	--	--	--	
16								59	--	--	72	
17								62	--	--	--	
18								65	63	--	--	
19								65	65	72	--	
20								66	--	--	--	
21								65	65	71	--	
22								67	--	71	--	
23								64	67	--	--	
24								64	70	--	--	
25								62	71	--	65	
26								61	--	72	--	
27								60	--	--	68	
28								--	72	71	--	
29								--	a 73	72	--	
30								--	--	72	--	
31								57	--	--	--	
Average								--	--	--	--	

a Reading obtained at 5:30 p.m.

PLATTE RIVER BASIN--Continued

LARAMIE RIVER NEAR UVA, WYO.

LOCATION.--At gaging station at private bridge, 7½ miles east of Uva, Platte County, and 9½ miles downstream from Chugwater Creek.
RECORDS AVAILABLE.--Water temperatures: October 1952 to September 1954.
Sediment records: October 1952 to September 1954.
EXTREMES, 1953-54.--Water temperatures: Minimum, freezing point on several days during December to March.
Sediment concentrations: Maximum daily, 1,800 ppm July 20; minimum daily, not determined.
Sediment loads: Maximum daily, 420 tons July 19, 20; minimum daily, 1 ton on many days.
EXTREMES, 1952-54.--Water temperatures: Maximum (1952-53), 82°F July 3, 1953; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 1,900 ppm July 31, 1953; minimum daily, not determined.
Sediment loads: Maximum daily, 2,950 tons July 31, 1953; minimum daily, 1 ton on many days.
REMARKS.--Flow affected by ice Nov. 21, 22, Dec. 22-26, 28-31, Jan. 11-13, 16, 25-27, Mar. 3-5, 13, 14. Records of discharge for water year October 1953 to September 1954 given in WSP 1340.

Temperature (°F) of water, water year October 1953 to September 1954
/Once-daily measurement between 6 a.m. and 11 a.m./

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

a Reading obtained between 1 p.m. and 5 p.m.

PLATTE RIVER BASIN--Continued

LARAMIE RIVER NEAR UVA, WYO.--Continued

Suspended sediment, water year October 1953 to September 1954

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	14	77	3	47	60	8	82		
2	14	72	3	44	72	9	80		
3	15	63	3	47	60	8	80		
4	16	50	2	55	93	14	78		
5	12	60	2	59			80		
6	8.0	58	1	63			74		
7	6.4	68	1	64			82		
8	5.6	70	1	59			82		
9	8.0	77	2	61			74		
10	10	86	2	63			78		
11	9.4	73	2	63			78		
12	12	81	3	66			84		
13	18	60	3	66			78		
14	23	65	4	66	144	26	80		
15	20	60	a 3	68			86		
16	22	62	4	68			80	69	15
17	23	62	4	68			78		
18	27	64	5	70			78		
19	30	60	5	74			84		
20	30	53	4	72			84		
21	29	75	6	64			86		
22	36	102	10	70			70		
23	44	94	11	78	116		80		
24	52	--	e 11	78	--		80		
25	54	--	e 8	76	--		80		
26	55	33	5	78	--	e 24	84		
27	55	50	7	80	--		88		
28	54	58	8	80	--		80		
29	55	68	10	80	--		86		
30	59	68	11	80	--		86		
31	59	65	10	--	--	--	86		
Total	875.4	--	154	2,007	--	699	2,506		465

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	84			80			64		
2	84			80			55		
3	84			78			60		
4	84			78			70		
5	86			78			74		
6	90			78			70		
7	92			76			70		
8	90			76			66		
9	86			76			64		
10	84			74			64		
11	76			74			63		
12	80			74			59		
13	80			70			55		
14	86			70			66		
15	82			68	59	11	74		
16	80	64	14	68			72	79	14
17	88			70			70		
18	94			70			68		
19	96			70			68		
20	63			66			68		
21	78			70			66		
22	102			70			66		
23	98			66			66		
24	80			68			64		
25	76			68			63		
26	72			68			61		
27	76			64			61		
28	82			61			61		
29	84			--		--	64		
30	80			--		--	68		
31	80			--		--	66		
Total	2,597		434	2,009		308	2,026		434

e Estimated.

a Computed from estimated concentration graph.

PLATTE RIVER BASIN--Continued

LARAMIE RIVER NEAR UVA, WYO.--Continued

Suspended sediment, water year October 1953 to September 1954--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	74			32			16	84	4
2	84			35			14	66	2
3	82			36			15	94	4
4	78			36	18	2	13	126	4
5	74	50	10	35			9.4	100	3
6	68			35			6.4	93	2
7	68			31			5.6		
8	64			32			5.2		
9	61			32			5.2		
10	54	--		31			5.6	106	2
					62	4			
11	54	52		29			6.8		
12	52	--		26			5.6		
13	50	--		19			8.7	110	b 3
14	47	--		14			12	340	a 11
15	47	--		6.8	--	e 1	8.7	260	b 6
16	49	62		6.0	--	e 1	8.7	180	a 4
17	49	--		65	183	s 41	7.2	150	a 3
18	47	73		36	106	10	6.8	130	a 2
19	47	--	e 7	21	106	6	8.7	120	a 3
20	47	--		15			8.0	115	2
21	47	46		15			7.6		
22	46	--		14	97	4	5.2		
23	45	51		13			5.2		
24	45	--		14			5.6	77	1
25	44	56		14			5.6		
26	44	--		9.4			4.8		
27	40	43		6.8			4.8		
28	27	--		6.0	70	1	5.6	176	3
29	27	9	e 1	7.2			5.2	67	1
30	30	--		6.8			5.6	--	e 1
31	--	--	--	15	75	3	--	--	--
Total	1,591	--	219	694.0	--	135	231.8	--	77

Day	July			August			September		
1	6.8	--	e 1	3.0	143	1	2.5		
2	7.6	--	e 2	2.2	98	1	2.8		
3	8.7	--	e 3	2.5	170	b 1	3.0		
4	8.0	128		2.0	134	1	2.8		
5	9.4	--		2.0	140	a 1	3.0		
6	11	215		9.4	150	4	3.5		
7	11	--		12	141	5	3.2		
8	12	184	e 5	11	159	5	3.0		
9	12	--		10	168	5	3.2		
10	14	--		14	160	a 6	4.4		
11	14	--		15	138	6	4.4		
12	20	130	sb 8	8.7	120	a 3	2.8		
13	23	120	a 7	11	150	4	3.0		
14	24	100	a 6	12	138	4	3.2		
15	50	1,000	sb 300	9.4	142	4	3.0		
								79	1
16	46	1,600	sa 280	8.0	140	a 3	3.0		
17	19	380	a 19	9.4	160	4	2.8		
18	24	600	sb 40	8.7	170	a 4	2.5		
19	53	1,200	sa 420	7.6	170	3	2.0		
20	72	1,800	sa 420	3.5			2.5		
21	36	443	s 46	2.8			2.5		
22	14	236	9	3.8			2.2		
23	14	240	9	3.8			1.8		
24	11	180	5	3.8			2.0		
25	12	162	5	4.4	96	1	2.0		
26	13	147	5	3.2			2.2		
27	9.4	158	4	3.0			2.2		
28	3.8	128	1	2.8			2.0		
29	3.8	120	1	2.8			2.5		
30	3.5	130	1	2.5			3.8		
31	2.5	130	1	2.5			--		--
Total	568.5	--	1,633	196.8	--	77	83.8		30

Total discharge for year (cfs-days) 15,386.3

Total load for year (tons) 4,665

e Estimated.

s Computed by subdividing day.

a Computed from estimated concentration graph.

b Computed from partly estimated concentration graph.

LARAMIE RIVER NEAR UVA, WYO.--Continued

Particle-size analyses of bed material, water year October 1953 to September 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; V, visual accumulation tube)

Date of collection	Number of sampling points	Discharge (cfs)	Water temperature (°F)	Bed material											Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	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	
Oct. 21, 1953.....	2	29					0	2	7	38	78	93	--	--			S
Apr. 21, 1954	4	50					1	4	16	55	85	95	98	100			SV
June 24	2	5.6					1	2	10	42	80	92	98	100			SV
Aug. 3.....	2	1.5					1	3	14	43	84	94	99	100			SV
Sept. 7	2	3.0					0	2	6	32	68	82	94	98	100		SV

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PLATTE RIVER BASIN--Continued

CLEAR CREEK BELOW IDAHO SPRINGS, COLO.

LOCATION.--At gaging station at bridge on county road at east edge of Idaho Springs, Clear Creek County, and three-quarters of a mile downstream from Soda Creek.
DRAINAGE AREA.--264 square miles.
RECORDS AVAILABLE.--Water temperatures: April 1952 to September 1954.
Sediment records: April 1952 to September 1954.
EXTREMES, 1953-54.--Water temperatures: Maximum, 67°F July 31; minimum, freezing point on several days during December to March.
Sediment concentrations: Maximum daily, 1,140 ppm May 20; minimum daily, not determined.
Sediment loads: Maximum daily, 1,460 tons May 20; minimum daily, 1 ton Sept. 20, 22, and probably on several other days during water year.
EXTREMES, 1952-54.--Water temperatures: Maximum, 67°F July 31, 1954; minimum, freezing point probably on many days during winter months.
Sediment concentrations: Maximum daily, 3,900 ppm June 10, 1952; minimum daily, not determined.
Sediment loads: Maximum daily, 22,000 tons June 10, 1952; minimum daily, 1 ton Apr. 16, 1952, Sept. 20, 22, 1954, and probably on several other days during 1953-54.
REMARKS.--Flow affected by ice Nov. 20-22, Dec. 6-15, Dec. 21 to Jan. 4, Jan. 10-23, 26, 27, Jan. 31 to Feb. 8, Feb. 28 to Mar. 7, Mar. 13-15, 19. Records of discharge for water year October 1953 to September 1954 given in WSP 1340.

Temperature (°F) of water, water year October 1953 to September 1954
(Once-daily measurement generally between 6 a.m. and 10 a.m.)

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

a Reading obtained between 11 a.m. and 6 p.m.

PLATTE RIVER BASIN--Continued

CLEAR CREEK BELOW IDAHO SPRINGS, COLO.--Continued

Suspended sediment, water year October 1953 to September 1954

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	65	13		61	--		52	--	
2	65	7		62	--		52	16	
3	65	--		62	--		47	14	
4	65	14		70	26		41	21	
5	65	--		61	19		44	--	
6	65	9		62	--		42	--	
7	60	--		54	20		44	34	
8	62	8		42	--		40	--	
9	60	--		54	128		38	11	
10	58	43		56	38		45	--	
11	60	--		57	--		48	--	
12	55	9		56	25		46	11	
13	60	--		57	--		48	--	
14	60	14		55	10		44	13	
15	60	--		56	--		46	--	
16	60	--	a 2.4	55	20	a 5.5	47	18	a 1.9
17	65	--		52	--		46	--	
18	60	--		51	102		44	21	
19	60	--		38	--		44	--	
20	60	--		36	44		43	22	
21	62	8		40	--		40	--	
22	65	--		44	37		36	--	
23	65	8		62	50		42	10	
24	65	--		55	26		46	--	
25	62	7		55	--		48	15	
26	68	--		55	30		45	--	
27	68	--		58	--		38	10	
28	65	12		54	32		42	--	
29	63	23		50	28		44	--	
30	63	--		51	30		44	11	
31	62	28		--	--	--	42	--	
Total	1,938	--	74.4	1,621	--	165.0	1,368	--	58.9

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	40	14		36	--		26	--	
2	40	--		36	--		24	--	
3	38	18		38	52		28	61	
4	38	--		36	--		32	--	
5	40	14		36	58		36	56	
6	42	--		34	--		35	--	
7	42	18		36	28		34	63	
8	43	--		38	--		36	--	
9	42	14		39	--		38	44	
10	38	--		38	57		37	--	
11	36	--		39	--		33	17	
12	38	9		40	69		22	--	
13	40	--		41	--		30	62	
14	40	16		40	24		35	--	
15	42	--		35	22	a 4.8	34	170	
16	42	17	a 2.4	30	17		32	--	a 4.8
17	42	25		36	160		32	50	
18	40	--		34	--		24	--	
19	38	--		30	--		28	142	
20	36	--		25	46		31	--	
21	40	18		42	--		29	28	
22	38	--		34	38		29	--	
23	40	40		31	--		29	--	
24	42	--		37	52		29	23	
25	43	30		33	--		27	--	
26	40	--		34	--		27	20	
27	38	--		27	38		27	--	
28	41	33		28	--		29	--	
29	41	--		--	--	--	29	15	
30	40	27		--	--	--	28	--	
31	38	46		--	--	--	26	--	
Total	1,238	--	74.4	983	--	134.4	936	--	148.8

a Computed from samples obtained from four times a week.

PLATTE RIVER BASIN--Continued

CLEAR CREEK BELOW IDAHO SPRINGS, COLO.--Continued

Suspended sediment, water year October 1953 to September 1954--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1.....	26	40		84	28	6.4	249	60	a 40
2.....	27	--		78	28	5.9	242	48	a 32
3.....	29	45		78	29	6.1	228	50	31
4.....	30	--		86	22	5.1	242	56	37
5.....	33	17		97	50	13	273	116	86
6.....	34	--		106	67	19	289	105	82
7.....	38	13		116	138	43	257	60	42
8.....	35	--	a 2.0	131	218	77	242	45	29
9.....	37	--		158	390	166	242	47	31
10.....	39	13		186	355	178	245	48	32
11.....	39	11		166	175	78	249	46	31
12.....	37	11		175	282	133	253	43	29
13.....	38	17		201	556	302	265	53	38
14.....	47	--		192	320	166	261	51	36
15.....	41	24	2.7	217	632	370	265	49	35
16.....	34	32	b 3.0	238	772	496	261	44	31
17.....	42	44	b 5.0	293	1,060	839	297	93	75
18.....	51	34	4.7	321	932	808	333	151	136
19.....	58	40	6.3	357	1,050	s 1,080	349	151	142
20.....	56	31	4.7	428	1,140	s 1,460	337	108	98
21.....	58	37	5.8	464	710	889	317	85	73
22.....	57	26	b 4.0	432	398	464	317	86	74
23.....	72	38	7.4	373	210	211	325	76	67
24.....	78	103	22	321	190	165	321	68	59
25.....	87	103	24	325	191	168	317	59	50
26.....	84	49	11	313	147	124	301	61	50
27.....	82	28	6.2	277	100	75	253	47	32
28.....	88	39	9.3	257	81	56	231	40	25
29.....	101	104	28	249	77	52	214	38	22
30.....	94	45	11	253	74	51	207	45	25
31.....	--	--	--	265	83	59	--	--	--
Total.	1,572	--	183.1	7,237	--	8,565.5	8,182	--	1,570

	July			August			September		
1.....	204	41	23	112	13	3.9	65	--	e 100
2.....	207	47	26	110	11	3.3	66	57	10
3.....	192	25	13	104	10	2.8	67	33	6.0
4.....	180	23	11	106	38	sb 12	74	29	5.8
5.....	175	24	11	127	80	b 28	71	23	4.4
6.....	186	120	b 60	146	--	e 75	68	18	3.3
7.....	175	69	33	136	36	13	65	11	1.9
8.....	166	35	16	116	16	b 5.0	70	14	2.6
9.....	166	46	21	106	12	3.4	72	32	6.2
10.....	153	24	9.9	103	17	4.7	66	15	2.7
11.....	146	39	15	104	14	3.9	63	23	3.9
12.....	139	30	11	108	50	b 15	62	12	2.0
13.....	146	41	16	110	17	5.0	61	11	1.8
14.....	166	98	s 48	101	15	4.1	60	10	1.6
15.....	166	76	34	103	13	3.6	60	9	1.5
16.....	156	1,100	s 598	108	27	7.9	60	8	1.3
17.....	195	843	s 531	112	55	17	55	8	1.2
18.....	164	97	43	97	20	5.2	54	14	2.0
19.....	156	64	27	92	14	3.5	54	8	1.2
20.....	169	72	33	88	12	2.9	51	7	1.0
21.....	153	39	16	103	16	4.4	51	8	1.1
22.....	164	49	22	95	11	2.8	52	7	1.0
23.....	175	42	20	92	11	2.7	57	13	b 2.0
24.....	158	28	12	88	13	3.1	116	110	b 34
25.....	156	30	13	81	11	2.4	94	44	11
26.....	175	35	17	75	9	1.8	90	38	9.2
27.....	148	28	11	68	9	1.7	103	45	13
28.....	151	26	11	65	11	1.9	108	44	13
29.....	134	18	6.5	63	9	1.5	92	18	4.5
30.....	125	13	4.4	60	8	1.3	87	13	3.1
31.....	123	13	4.3	58	9	1.4	--	--	--
Total.	5,069	--	1,717.1	3,037	--	244.2	2,114	--	252.3

Total discharge for year (cfs-days)..... 35,295
Total load for year (tons)..... 13,188.1

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

CLEAR CREEK BELOW IDAHO SPRINGS, COLO.--Continued

Particle-size analyses of suspended sediment, May to September 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, ptpette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed, V, visual accumulation tube)

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 17, 1954	5:55 a.m.	301	45	1,280	--		--		--		25	50	88		98	100	V
May 17	5:15 p.m.	245	58	561	--		--		--		25	55	96		100	--	V
May 20	8:50 p.m.	600	53	2,420	--		--		--		26	54	88		100	--	V
May 21	2:30 p.m.	397	52	374	--		--		--		26	54	86		97	100	V
May 21	11:25 p.m.	530	48	675	--		--		--		19	42	80		98	100	V
June 4	12:05 a.m.	253	--	42	--		--		--		53	73	96		100	--	V
June 17	7:15 a.m.	297	48	72	--		--		--		44	64	87		100	--	V
July 16	8:45 p.m.	177	59	5,770	7,290		40		64		95	100	--		--	--	VPWCM
Sept. 1	6:10 p.m.	129	56	8,460	10,600		33		58		95	100	--		--	--	VPWCM

PLATTE RIVER BASIN--Continued

NORTH CLEAR CREEK NEAR BLACKHAWK, COLO.

LOCATION:--At gaging station, 2.3 miles upstream from mouth and 4¼ miles southeast of Blackhawk, Gilpin County.
DRAINAGE AREA.--55.8 square miles.
RECORDS AVAILABLE.--Water temperatures: April 1952 to September 1954.
Sediment records: April 1952 to September 1954.
EXTREMES, 1953-54.--Water temperatures: Maximum, 78°F July 9; minimum, freezing point on many days during November to March.
Sediment concentrations: Maximum daily, 4,000 ppm July 16; minimum daily, 0 ppm Aug. 25-31, Sept. 11-22.
Sediment loads: Maximum daily, 70 tons July 16; minimum daily, 0 tons Aug. 25-31, Sept. 11-22.
EXTREMES, 1952-54.--Water temperatures: Maximum, 78°F July 9, 1954; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 28,000 ppm June 11, 1952; minimum daily, 0 ppm Aug. 25-31, Sept. 11-22, 1954.
Sediment loads: Maximum daily, 10,000 tons June 7, 1952; minimum daily, 0 tons Aug. 25-31, Sept. 11-22, 1954.
REMARKS.--Flow affected by ice Nov. 18-27, Dec. 1 to Jan. 5, Feb. 19, 20, Feb. 28 to Mar. 6, Mar. 12-19, 25-27, Mar. 30 to Apr. 2. Records of discharge for water year October 1953 to September 1954 given in WSP 1340.

Temperature (°F) of water, water year October 1953 to September 1954
(Once-daily measurement between 10 a.m. and 3 p.m.)

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

a Reading obtained between 4 p.m. and 7 p.m.

PLATTE RIVER BASIN--Continued

NORTH CLEAR CREEK NEAR BLACKHAWK, COLO.--Continued

Suspended sediment, water year October 1953 to September 1954

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1.....	1.7	--		2.1	13		2.1	--	
2.....	1.7	8		2.1	--		1.9	26	
3.....	1.7	--		2.1	--		2.0	--	
4.....	1.9	--		3.1	--		2.0	--	
5.....	1.9	12		2.8	13		1.9	--	
6.....	1.9	12		2.3	14		2.0	12	
7.....	1.7	--		2.1	18		2.0	--	
8.....	1.6	--		1.7	15		1.6	--	
9.....	1.6	13		1.9	19		1.8	--	
10.....	1.7	--		1.7	21		2.0	--	
11.....	1.7	--		1.9	14		1.8	17	
12.....	1.7	--		2.1	--		1.9	--	
13.....	1.9	12		2.1	--		2.0	--	
14.....	2.1	--		2.1	--		2.0	15	
15.....	1.9	--		2.1	8		1.8	--	
16.....	1.7	--	a 0.1	2.1	--	a 0.1	1.7	--	a 0.1
17.....	1.7	29		1.9	--		1.6	12	
18.....	1.7	--		1.8	--		1.6	--	
19.....	1.7	--		1.6	24		1.7	--	
20.....	1.7	12		1.5	--		1.7	--	
21.....	1.7	15		1.8	--		1.6	12	
22.....	2.3	26		2.1	--		1.5	--	
23.....	2.3	--		2.5	33		1.5	--	
24.....	2.1	--		2.2	--		1.6	10	
25.....	1.9	21		2.0	--		1.9	--	
26.....	1.9	--		1.9	20		1.8	--	
27.....	2.1	--		1.8	18		1.8	10	
28.....	2.3	10		1.9	24		1.6	--	
29.....	2.1	--		1.9	32		1.8	--	
30.....	2.1	--		2.1	52		1.9	11	
31.....	2.1	--		--	--	--	1.9	--	
Total.	58.1	--	3.1	61.3	--	3.0	56.0	--	3.1

Day	January			February			March		
1.....	1.8	--		1.9			1.2		
2.....	1.9	--		2.0			1.1		
3.....	1.7	--		2.0			1.2		
4.....	1.8	13		1.9	54	0.3	1.4		
5.....	1.6	--		1.8			1.5		
6.....	1.9	--		1.9			1.7		
7.....	1.6	--		2.1	59	s .5	1.7		
8.....	1.5	12		2.2	57	.4	1.9		
9.....	1.4	--		2.1	50	s .4	1.9		
10.....	1.3	--		1.9	44	s .3	2.3		
11.....	1.3	12		2.0	40	s .4	2.1		
12.....	1.4	--		1.9	32	s .3	1.4		
13.....	1.4	--		2.1	30	.2	1.5		
14.....	1.4	14		2.3	15	.1	1.7		
15.....	1.5	--		1.9	11	.1	1.7		
16.....	1.5	--	(t)	1.8	41	s .3	1.7	20	b 0.1
17.....	1.4	--		2.4	50	s .5	1.6		
18.....	1.4	--		2.2	43	.3	1.5		
19.....	1.3	13		1.2	42	.1	1.8		
20.....	1.2	--		1.6	34	.1	2.1		
21.....	1.4	--		2.2	41	s .4	2.1		
22.....	1.6	--		2.0	28	.2	2.1		
23.....	1.6	13		2.2	78	s 1.0	2.1		
24.....	1.7	--		1.9			2.1		
25.....	1.5	12		1.9			1.7		
26.....	1.3	--		1.9	19	.1	1.6		
27.....	1.5	--		1.9			1.6		
28.....	1.8	8		1.5			1.9		
29.....	1.8	--		--	--	--	2.1		
30.....	1.6	--		--	--	--	1.9		
31.....	1.8	--		--	--	--	1.9		
Total.	47.9	--	1.5	54.7	--	7.9	54.1		3.1

s Computed by subdividing day.
t Less than 0.050 ton.
a Computed on basis of infrequent samples.
b Computed from partly estimated concentration graph.

PLATTE RIVER BASIN--Continued

NORTH CLEAR CREEK NEAR BLACKHAWK, COLO.--Continued

Suspended sediment, water year October 1953 to September 1954--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	1.7			6.7	33	0.6	7.6	17	0.3
2	1.8			5.7	44	.7	8.1	29	.6
3	2.3			6.7	47	.9	8.1	28	.6
4	2.8			7.6	40	.8	7.6	19	.4
5	2.8			7.1	70	1.3	6.7	20	.4
6	3.4			6.7	27	.5	6.7	16	.3
7	4.3			7.1	24	.5	6.7	16	.3
8	3.4			7.1	18	.3	6.7	15	.3
9	3.8			7.6	22	.5	6.2	13	.2
10	4.3	13	b 0.1	9.1	59	1.4	6.2	13	.2
11	3.8			10	98	2.6	5.7	12	.2
12	3.8			10	64	1.7	5.2	12	.2
13	3.8			9.5	42	1.1	5.7	12	.2
14	4.7			9.5	34	.9	6.2	16	.3
15	3.8			7.6	45	.9	6.2	15	.3
16	2.5			10	62	1.7	5.7	11	.2
17	3.4			10	58	1.6	5.2	10	.1
18	4.7			9.5	72	1.8	5.2	14	.2
19	5.2			9.5	54	1.4	5.2	12	.2
20	4.7			9.5	44	1.1	5.2	9	.1
21	5.2			10	56	1.5	4.3	7	.1
22	4.3			10	75	2.0	3.8	4	(t)
23	4.3	17	b .2	13	178	6.2	3.4	3	(t)
24	5.2			10	56	1.5	3.1	4	(t)
25	5.2			9.5	55	1.4	3.4	6	.1
26	4.7			9.5	42	1.1	4.3	11	.1
27	4.7			8.6	25	.6	4.7	43	.5
28	5.2			8.1	30	.7	3.4	18	.2
29	6.2	25	b .4	8.1	70	1.5	3.1	11	.1
30	6.7	42	.8	7.6	32	.7	3.1	7	.1
31	--	--	--	7.6	19	.4	--	--	--
Total	122.7	--	5.1	268.5	--	39.9	162.7	--	6.9

Day	July			August			September		
1	3.4	11	0.1	1.4	6	(t)	1.9	2,080	s 21
2	3.8	10	.1	1.4	8	(t)	1.3	361	1.3
3	3.1	6	(t)	1.3	10	(t)	1.2	16	.1
4	3.1	4	(t)	1.7	118	s 0.8	1.4	311	s 1.3
5	3.1	4	(t)	1.7	94	.4	1.3	154	.5
6	3.8	350	3.6	2.3	1,410	s 11	1.2	16	.1
7	3.1	29	.2	2.1	222	1.3	1.1	8	(t)
8	3.1	7	.1	1.7	38	.2	1.0	7	(t)
9	3.1	7	.1	1.4	48	.2	1.0	5	(t)
10	2.5	8	.1	1.3	43	.2	1.0	3	(t)
11	2.3	6	(t)	1.4	20	.1	.9	0	0
12	2.3	4	(t)	1.4	12	.1	1.0	0	0
13	2.3	3	(t)	2.1	8	(t)	1.0	0	0
14	2.8	21	.2	1.6	4	(t)	.9	0	0
15	3.8	2,460	s 31	1.4	4	(t)	.9	0	0
16	3.4	4,000	s 70	1.6	5	(t)	.9	0	0
17	6.2	2,390	s 29	2.1	48	s .4	.9	0	0
16	5.2	151	2.1	1.7	49	.2	.9	0	0
19	3.4	51	.5	1.6	50	.2	.8	0	0
20	3.4	28	.3	1.6	18	.1	.8	0	0
21	3.1	65	.5	1.4	6	(t)	.8	0	0
22	2.8	17	.1	1.6	3	(t)	.8	0	0
23	2.8	13	.1	1.4	3	(t)	1.0	52	s .3
24	2.3	11	..1	1.3	2	(t)	2.3	628	s 4.5
25	2.3	26	.2	1.2	0	0	2.1	380	s 5.5
26	4.3	139	s 1.8	1.1	0	0	1.4	22	.1
27	2.3	18	.1	1.1	0	0	1.9	29	.1
28	2.1	12	.1	1.1	0	0	1.7	26	.1
29	1.9	9	(t)	1.0	0	0	1.3	24	.1
30	1.7	8	(t)	1.1	0	0	1.2	21	.1
31	1.6	7	(t)	1.0	0	0	--	--	--
Total	94.4	--	140.7	46.1	--	15.4	35.9	--	35.2

Total discharge for year (cfs-days) 1,062.4

Total load for year (tons) 264.9

s Computed by subdividing day.

t Less than 0.050 ton.

b Computed from partly estimated concentration graph.

NORTH CLEAR CREEK NEAR BLACKHAWK, COLO.--Continued

Particle-size analyses of suspended sediment, July to September 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed)

Date of collection	Time	Discharge (cfs)	Water temperature (°F)	Suspended sediment											Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters									
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
July 6, 1954	8:40 p.m.	3.5	62	4,220	5,790	--	68	--	96	--	100		--				SPWCM
July 15	4:00 p.m.	6.2	64	8,800	4,520	--	52	--	88	--	97		--				SPWCM
July 15	8:25 p.m.	3.2	61	5,740	5,900	54	76	93	98	99	100		--				SPWCM
July 15	8:25 p.m.	3.2	61	5,740	6,000	3	8	52	99	99	100		--				SPNM
July 16	8:30 p.m.	15	63	5,760	5,650	--	36	--	70	--	90		--				SPWCM
July 16	9:40 p.m.	5.0	60	12,100	3,110	--	46	--	79	--	96		98				SPWCM
July 16	11:45 p.m.	4.6	60	69,200	4,670	38	53	69	86	94	97		--				SPWCM
July 17	1:00 a.m.	3.5	59	16,600	4,280	45	62	79	93	98	99		100				SPWCM
July 17	10:00 p.m.	9.1	60	1,140	1,970	11	14	18	24	43	81		--				SBWCM
Aug. 6	6:20 p.m.	4.3	62	3,370	4,670	--	60	--	94	--	99		--				SPWCM
Aug. 6	10:00 p.m.	2.8	58	7,300	4,990	50	69	86	96	98	100		--				SPWCM
Aug. 6	10:00 p.m.	2.8	58	7,300	5,140	--	1	4	66	99	100		--				SPNM
Sept. 1	6:00 p.m.	14	55	10,100	2,710	18	23	35	48	69	83		93				SPWCM
Sept. 1	6:00 p.m.	14	55	10,100	2,730	8	14	26	45	71	85		93				SPNM
Sept. 1	7:05 p.m.	4.6	55	17,000	5,880	--	46	--	84	--	97		--				SPWCM
Sept. 1	8:30 p.m.	2.5	55	5,430	3,720	--	53	--	92	--	98		--				SPWCM
Sept. 2	1:00 a.m.	1.8	54	1,220	1,670	53	69	87	96	100	--		--				BWCM
Sept. 4	6:20 p.m.	1.7	59	2,220	3,170	--	63	--	94	--	99		--				SPWCM
Sept. 24	1:00 a.m.	3.5	50	2,430	3,560	--	63	--	91	--	99		--				SPWCM
Sept. 25	6:20 p.m.	4.3	54	1,670	2,300	--	41	--	70	--	94		--				SPWCM

PLATTE RIVER BASIN--Continued

BIJOU CREEK NEAR WIGGINS, COLO.

LOCATION.--At gaging station at bridge on U. S. Highways 6 and 34, 2 miles northeast of Wiggins, Morgan County, and 5.7 miles downstream from Antelope Creek.
DRAINAGE AREA.--1,420 square miles, approximately.
RECORDS AVAILABLE.--Sediment records: April 1950 to September 1954.
EXTREMES, 1953-54.--Sediment concentrations: Maximum daily, 123,000 ppm July 16; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 260,000 tons July 30; minimum daily, 0 tons on many days.
EXTREMES, 1950-54.--Sediment concentrations: Maximum daily, 127,000 ppm July 30, 1950; minimum, daily, no flow on many days each year.
Sediment loads: Maximum daily, 2,500,000 tons Aug. 3, 1951; minimum daily, 0 tons on many days each year.
REMARKS.--No flow during period October to June, record is omitted. Maximum observed sediment concentration during water year, 264,000 ppp Aug. 14. Records of discharge for water year October 1953 to September 1954 given in WSP 1340.

Suspended sediment, July to September 1954

Day	July			August			September		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1.....	0	--	0	2.5	110,000	a 800	0		0
2.....	0	--	0	.5	--	e 150	0		0
3.....	0	--	0	0	--	0	0		0
4.....	0	--	0	0	--	0	0		0
5.....	0	--	0	2.2	--	e 800	0		0
6.....	0	--	0	224	87,500	s 88,900	0		0
7.....	0	--	0	61	95,900	s 16,000	0		0
8.....	0	--	0	5.8	109,000	1,830	0		0
9.....	0	--	0	0	--	0	0		0
10.....	0	--	0	0	--	0	0		0
11.....	0	--	0	0	--	0	0		0
12.....	0	--	0	0	--	0	0		0
13.....	0	--	0	0	--	0	0		0
14.....	0	--	0	70	44,700	s 30,500	0		0
15.....	86	41,700	s 40,700	30	102,000	8,870	0		0
16.....	89	123,000	31,700	2.9	70,200	348	0		0
17.....	17	100,000	a 4,900	0	--	0	0		0
18.....	2.5	--	e 700	0	--	0	0		0
19.....	0	--	0	0	--	0	0		0
20.....	0	--	0	4.6	101,000	s 1,990	0		0
21.....	0	--	0	.8	59,000	s 274	0		0
22.....	0	--	0	0	--	0	0		0
23.....	0	--	0	0	--	0	0		0
24.....	0	--	0	0	--	0	0		0
25.....	0	--	0	0	--	0	0		0
26.....	0	--	0	0	--	0	0		0
27.....	0	--	0	0	--	0	1.0		e 400
28.....	3.2	18,600	s 1,960	0	--	0	2.5		e 900
29.....	7.0	115,000	s 3,610	0	--	0	0		0
30.....	549	77,000	sa260,000	0	--	0	0		0
31.....	32	106,000	9,840	0	--	0	--		--
Total.	785.7	--	353,410	404.3	--	150,462	3.5		1,300
Total discharge for year (cfs-days).....									1,193.5
Total load for year (tons).....									505,172

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

BIJOU CREEK NEAR WIGGINS, COLO.--Continued

Particle-size analyses of suspended sediment, July to September 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed)

Date of collection	Time	Discharge (cfs)	Water temperature (°F)	Suspended sediment											Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters									
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
July 15, 1954	7:00 p.m.	416	--	161,000	4,090	--	74	--	96	--	99	100	--				SPWCM
July 16	10:25 a.m.	225	--	129,000	6,360	--	77	--	95	--	100	--	--				SPWCM
July 28	9:45 p.m.	2.0	--	215,000	4,180	--	78	--	97	--	99	99	100				SPWCM
July 28	10:00 p.m.	40	--	213,000	6,480	--	77	--	96	--	100	--	--				SPWCM
July 30	2:25 p.m.	632	76	112,000	5,210	--	69	--	86	--	96	98	--				SPWCM
July 30	5:40 p.m.	266	--	105,000	3,490	66	77	86	94	97	98	98	100				SPWCM
July 30	5:40 p.m.	266	--	105,000	3,500	5	7	43	92	96	98	98	100				SPN
July 30	10:40 p.m.	127	--	102,000	3,780	69	81	92	96	98	99	99	100				SPWCM
July 30	10:40 p.m.	127	--	102,000	3,840	4	5	27	95	97	99	99	100				SPN
July 31	8:15 a.m.	34	--	101,000	5,540	--	83	--	94	--	100	--	--				SPWCM
Aug. 6	4:00 p.m.	560	73	118,000	4,060	59	69	78	85	90	94	96	--				SPWCM
Aug. 6	4:00 p.m.	560	73	118,000	4,040	3	5	19	87	92	94	96	--				SPN
Aug. 6	5:40 p.m.	409	73	113,000	4,310	--	71	--	87	--	96	97	100				SPWCM
Aug. 6	10:20 p.m.	179	--	107,000	5,840	65	75	86	93	96	97	98	--				SPWCM
Aug. 7	3:45 a.m.	153	--	98,200	4,100	66	77	--	95	--	98	99	100				SPWCM
Aug. 7	11:00 a.m.	36	77	76,000	3,960	74	87	96	99	99	100	--	--				SPWCM
Aug. 7	3:50 p.m.	25	74	110,000	5,150	70	87	--	99	--	100	--	--				SPWCM
Aug. 8	11:30 a.m.	6.2	--	111,000	5,910	79	92	--	100	--	--	--	--				PWCM
Aug. 14	4:05 p.m.	719	--	231,000	5,020	48	58	67	78	88	92	93	100				SPWCM
Aug. 14	4:05 p.m.	719	--	231,000	5,230	5	7	18	79	89	92	93	100				SPN
Aug. 14	4:40 p.m.	336	86	166,000	4,070	57	68	--	87	--	97	98	100				SPWCM
Aug. 14	6:25 p.m.	232	79	124,000	7,180	59	70	--	92	--	98	98	100				SPWCM
Aug. 14	10:20 p.m.	118	69	106,000	6,220	65	76	88	95	98	99	99	100				SPWCM
Aug. 15	7:35 a.m.	44	67	101,000	5,140	72	84	94	99	99	100	--	--				SPWCM
Sept. 28	7:00 a.m.	4.3	--	86,300	4,340	76	89	--	98	--	100	--	--				SPWCM

PLATTE RIVER BASIN--Continued

BIJOU CREEK NFAR WIGGINS, COLO.--Continued

Particle-size analyses of bed material, July to August 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; V, visual accumulation tube)

Date of collection	Number of sampling points	Discharge (cfs)	Water temperature (°F)	Bed material											Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	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	
July 30, 1954.....	4	173					5	10	44	84	93	98	99	100			SV
Aug. 7	4	35					8	10	21	69	93	98	100				SV
Aug. 14	2	210					20	36	47	68	84	95	100				SV

SOUTH PLATTE RIVER AT JULESBURG, COLO.

LOCATION.--At gaging station at bridge on State Highway 51, 0.5 mile southeast of Julesburg, Sedgwick County, 4 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 1954.
Water temperatures: October 1945 to September 1954.
EXTREMES, 1953-54.--Dissolved solids: Maximum, 1,560 ppm Dec. 12 to Jan. 15; minimum, 480 ppm Sept. 15.
Hardness: Maximum, 740 ppm Dec. 12 to Jan. 15; minimum, 246 ppm Sept. 15.
Specific conductance: Maximum daily, 2,180 micromhos Dec. 23; minimum daily, 725 micromhos Sept. 15.
Water temperatures: Maximum, 92°F July 17; minimum, freezing point on several days during December, January, and March.
EXTREMES, 1945-54.--Dissolved solids: Maximum, 1,610 ppm Feb. 1, 1951; minimum, 446 ppm Aug. 19, 1953.
Hardness: Maximum, 770 ppm Jan. 1-10, 1947; minimum, 173 ppm Mar. 1-12, 1947.
Specific conductance: Maximum daily, 2,180 micromhos Dec. 23, 1953; minimum daily, 617 micromhos Aug. 19, 1953.
Water temperatures: Maximum (1946-49, 1950-54), 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 regional office at Lincoln, Nebr. Records of discharge for water year October 1953 to September 1954 given in WSP 1340.

Chemical analyses, in parts per million, water year October 1953 to September 1954

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
Oct. 1-10, 1953	48.1	--	--	--	--	162	--	--	--	--	--	--	--	1,340	--	1.82	174	623	--	36	2.8	1,750	--
Oct. 11-Nov. 10	127	--	--	--	--	178	--	--	--	--	--	--	--	1,500	--	2.04	514	708	--	35	2.9	1,940	--
Nov. 11-Dec. 11	268	35	0.04	212	51	185	26	392	720	70	0.6	0.5	0.29	1,540	1,490	2.09	1,110	737	416	34	3.0	1,970	7.5
Dec. 12-Jan. 15, 1954	307	--	--	--	--	183	--	--	--	--	--	--	--	1,560	--	2.12	1,290	740	--	35	2.9	1,970	--
Jan. 16-31	278	--	--	--	--	181	--	--	--	--	--	--	--	1,540	--	2.09	1,160	728	--	35	2.9	1,950	--
Feb. 1-28	258	--	--	--	--	181	--	--	--	--	--	--	--	1,480	--	2.01	1,030	700	--	36	3.0	1,880	--
Mar. 1-31	248	30	.00	191	53	179	15	296	730	63	.7	4.4	.26	1,480	1,410	2.01	991	696	453	35	3.0	1,870	8.1
Apr. 1-13	187	--	--	--	--	173	--	--	--	--	--	--	--	1,420	--	1.93	717	656	--	36	2.9	1,830	--
Apr. 14-18	70.2	--	--	--	--	140	--	--	--	--	--	--	--	1,200	--	1.63	227	564	--	35	2.6	1,590	--
Apr. 19-May 15	65.7	--	--	--	--	160	--	--	--	--	--	--	--	1,340	--	1.82	238	624	--	36	2.8	1,740	--
May 16-25	71.0	--	--	--	--	138	--	--	--	--	--	--	--	1,180	--	1.60	226	565	--	35	2.5	1,570	--
May 26-June 11	34.4	32	.00	160	46	148	17	243	635	63	.7	2.6	.22	1,290	1,220	1.75	120	590	391	34	2.7	1,660	7.8
June 12	30.0	--	--	--	--	122	--	--	--	--	--	--	--	1,070	--	1.46	86.7	509	--	34	2.4	1,440	--
June 13-21	31.4	--	--	--	--	156	--	--	--	--	--	--	--	1,320	--	1.80	112	624	--	35	2.7	1,700	--
June 22-July 9	20.1	--	--	--	--	153	--	--	--	--	--	--	--	1,260	--	1.71	68.4	566	--	37	2.8	1,630	--
July 10-Aug. 10	15.5	--	--	--	--	152	--	--	--	--	--	--	--	1,260	--	1.71	52.7	566	--	37	2.8	1,630	--
Aug. 11-Sept. 14	16.7	41	.00	144	55	153	18	244	640	60	.8	2.4	.24	1,280	1,230	1.74	57.7	585	385	35	2.7	1,650	7.9
Sept. 15	94.0	--	--	--	--	51	--	--	--	--	--	--	--	480	--	.65	122	246	--	31	1.4	725	--
Sept. 16-30	25.0	--	--	--	--	158	--	--	--	--	--	--	--	1,310	--	1.78	88.4	624	--	36	2.7	1,710	--
Weighted average a	140	--	--	--	--	178	--	--	--	--	--	--	--	1,490	--	2.03	563	702	--	36	2.9	1,890	--

a Represents 100 percent of runoff for water year October 1953 to September 1954.

PLATTE RIVER BASIN--Continued

SOUTH PLATTE RIVER AT JULESBURG, COLO.--Continued

Temperature (°F) of water, water year October 1953 to September 1954
[Once-daily measurement between 2 p.m. and 4 p.m.]

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

a Reading obtained between 10 a.m. and 12 m.
b Reading obtained between 6 p.m. and 8 p.m.

PLATTE RIVER AT BRADY, NEBR.

LOCATION.--At gaging stations just downstream from bridges on highway half a mile and 2½ miles, respectively, 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 1954.
Water temperatures: March 1951 to September 1954.
EXTREMES, 1953-54.--Dissolved solids: Maximum, 612 ppm Mar. 4; minimum, 379 ppm Nov. 1-30.
Hardness: Maximum, 276 ppm Mar. 4; minimum, 182 ppm May 29 to June 30.
Specific conductance: Maximum daily, 872 micromhos Jan. 27 (chan. 1); minimum daily, 358 micromhos Dec. 28 (chan. 1).
Water temperatures: Maximum, 80°F July 12 (chan. 1); minimum, freezing point on many days during December, January, and March.
EXTREMES, 1951-54.--Dissolved solids: Maximum, 896 ppm Feb. 19-22, 1953; minimum, 278 ppm Nov. 26, 1952.
Hardness: Maximum, 333 ppm Feb. 19-22, 1953; minimum, 151 ppm June 8, 1951.
Specific conductance: Maximum daily, 1,070 micromhos Feb. 19,1953 (chan. 1); minimum daily, 345 micromhos Nov. 26, 1952 (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-Dounty Diversion) near Maxwell, Nebr. Records of specific conductance of daily samples, taken at each of the two major channels, available in regional office at Lincoln, Nebr. Records of discharge for water year October 1953 to September 1954 given in WSP 1340.

Chemical analyses, in parts per million, water year October 1953 to September 1954

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
Oct. 1-31, 1953	121	--	--	--	--	57	--	205	0	124	--	--	--	--	408	0.55	133	188	20	40	1.8	612	7.7
Nov. 1-30	162	--	--	--	--	50	--	204	0	109	--	--	--	--	379	.52	166	186	19	37	1.6	578	7.6
Dec. 1-22	159	36	0.00	57	12	50	8.6	211	0	108	14	0.5	1.9	0.10	406	.55	174	193	20	35	1.6	601	7.8
Dec. 23-27	184	--	--	--	--	62	--	235	0	146	--	--	--	--	484	.66	240	231	38	37	1.6	708	7.8
Dec. 28-Jan. 18, 1954	185	--	--	--	--	48	--	215	0	113	--	--	--	--	422	.57	211	201	25	34	1.5	596	8.1
Jan. 19-Feb. 7	316	--	--	--	--	53	--	209	0	133	--	--	--	--	444	.60	379	210	39	35	1.6	639	8.0
Feb. 8-28	206	--	--	--	--	45	--	204	0	112	--	--	--	--	396	.54	220	195	28	33	1.4	575	8.1
Mar. 1-3	142	--	--	--	--	49	--	228	0	114	--	--	--	--	423	.58	162	211	24	34	1.5	613	8.2
Mar. 4	219	--	--	--	--	73	--	232	10	200	--	--	--	--	612	.83	362	276	69	36	1.9	828	8.5
Mar. 5-31	180	32	.00	56	13	44	8.4	204	0	104	14	.5	1.7	.09	394	.54	191	195	28	32	1.4	576	8.1
Apr. 1-30	160	--	--	--	--	49	--	200	0	116	--	--	--	--	396	.54	171	193	29	36	1.5	591	7.9
May 1-28	184	--	--	--	--	47	--	197	0	111	--	--	--	--	384	.52	191	187	25	35	1.5	576	8.0
May 29-June 30	124	36	.00	51	13	53	9.8	192	0	120	16	.5	.8	.11	404	.55	135	182	25	37	1.7	593	8.2
July 1-30	1,070	--	--	--	--	75	--	240	0	145	--	--	--	--	477	.65	1,380	201	4	45	2.3	716	7.8
July 31-Aug. 19	660	--	--	--	--	70	--	231	0	130	--	--	--	--	451	.61	804	192	3	44	2.2	674	7.8
Aug. 20-31	106	--	--	--	--	62	--	218	0	129	--	--	--	--	428	.58	122	186	7	42	2.0	635	7.8
Sept. 1-30	117	39	.00	49	15	60	9.4	211	0	130	16	.5	.7	.13	425	.58	134	185	12	40	1.9	629	8.0
Weighted average a	267	--	--	--	--	61	--	b 220	--	128	--	--	--	--	437	0.59	315	196	16	40	1.9	649	--

a Represents 100 percent of runoff for water year October 1953 to September 1954.
b Includes carbonate as bicarbonate.

PLATTE RIVER BASIN--Continued

PLATTE RIVER AT BRADY, NEBR.--Continued

CHANNEL 1

Temperature (°F) of water, water year October 1953 to September 1954
/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	54	47	38	33	34	35	36	37	59	70	71	67
2	55	50	36	34	34	32	45	a 45	55	71	74	68
3	52	47	35	31	34	a 34	38	35	53	73	72	63
4	47	44	a 34	33	34	a 33	48	54	56	76	72	70
5	47	41	32	34	a 35	a 36	53	49	58	75	70	70
6	46	37	33	34	34	33	50	54	69	75	67	68
7	47	a 34	--	34	35	34	50	50	57	75	66	61
8	a 70	35	34	34	35	34	44	48	57	74	67	62
9	49	a 43	a 33	33	34	39	45	50	61	72	67	63
10	50	37	33	33	34	44	53	48	70	71	70	60
11	55	38	33	a 33	33	a 52	48	51	66	79	68	60
12	50	36	32	a 33	33	a 34	48	53	65	80	--	a 74
13	a 64	43	33	a 33	36	a 33	50	55	70	75	68	64
14	56	46	32	33	38	33	49	--	63	74	68	60
15	54	42	a 36	--	40	32	50	64	66	71	74	60
16	57	44	32	33	--	33	41	68	66	72	70	65
17	52	43	32	a 32	36	a 44	51	56	65	77	72	65
18	56	42	32	32	36	45	52	61	65	76	71	62
19	54	35	34	33	36	37	50	55	68	78	69	59
20	59	33	34	a 32	33	a 44	50	55	73	77	68	57
21	58	--	32	a 32	39	32	48	59	68	74	68	49
22	47	34	a 32	a 33	40	38	44	66	67	75	72	50
23	44	34	33	a 34	34	38	48	60	68	67	69	52
24	47	34	35	32	38	38	51	54	74	67	71	57
25	49	35	32	a 33	38	38	59	53	--	72	74	52
26	40	35	32	a 33	41	38	62	56	76	74	70	60
27	45	35	33	33	34	43	51	59	72	74	72	60
28	45	38	33	33	33	40	56	55	70	74	73	61
29	48	34	33	33	--	33	44	57	66	77	75	55
30	47	34	33	33	--	33	39	62	67	74	71	49
31	47	--	33	a 35	--	--	--	57	--	73	71	--
Average	51	39	33	33	36	37	48	54	65	74	70	61

a Reading obtained between 12 m. and 3 p.m.

PLATTE RIVER BASIN--Continued

PLATTE RIVER AT BRADY, NEBR.--Continued

CHANNEL 4

Temperature (°F) of water, water year October 1953 to September 1954
/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	56	50	41	37	40	39	39	41	57	70	71	68
2	57	54	41	37	38	33	45	a 47	57	65	73	68
3	55	50	39	36	39	40	39	40	52	71	70	65
4	50	47	a 35	36	39	a 35	45	54	55	73	71	70
5	50	45	36	38	a 44	a 43	51	50	58	72	70	70
6	50	40	34	39	40	34	51	54	67	73	67	70
7	50	a 40	37	39	40	35	51	50	58	73	66	63
8	a 67	42	37	39	39	36	44	50	58	71	67	64
9	50	a 45	a 37	35	40	41	45	52	60	70	68	63
10	53	41	37	33	38	44	52	50	69	70	69	61
11	55	40	37	a 34	35	a 51	48	51	68	76	67	62
12	53	40	34	a 34	34	--	47	53	64	78	66	72
13	a 63	46	38	a 33	38	a 37	50	55	68	72	67	66
14	56	47	33	33	39	34	50	57	64	72	68	63
15	55	45	a 40	--	42	34	51	63	65	70	75	61
16	58	46	35	32	36	36	43	67	69	70	70	65
17	54	46	31	a 33	37	43	47	60	65	75	72	66
18	56	46	35	32	37	46	52	59	67	75	70	64
19	54	40	37	33	40	40	52	58	67	76	69	60
20	60	33	40	a 33	34	43	50	57	72	72	68	59
21	59	34	39	a 33	40	40	50	60	69	72	68	53
22	50	35	32	a 33	40	39	45	64	65	73	72	53
23	47	40	33	a 34	36	41	49	61	67	64	68	55
24	50	39	35	a 33	40	40	54	55	71	66	69	59
25	49	39	34	a 32	41	40	57	54	72	71	72	54
26	45	40	35	a 33	41	39	60	56	75	73	70	59
27	47	40	37	32	38	43	53	53	71	73	71	61
28	49	42	33	33	34	44	56	56	70	73	73	62
29	50	39	35	33	--	34	47	56	68	76	73	55
30	50	39	35	36	--	36	43	59	68	72	71	52
31	50	--	35	a 42	--	35	--	60	--	72	71	--
Average	53	42	36	35	39	39	49	55	65	72	70	62

a Reading obtained between 12 m. and 3 p.m.

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

LOCATION.--At gaging station at Parshall Flume in sec. 28, T. 13 N., R. 29 W., near Maxwell, Lincoln County.
RECORDS AVAILABLE.--Chemical analyses: March 1951 to September 1954.
Water temperatures: March 1951 to September 1954.
EXTREMES, 1953-54.--Dissolved solids: Maximum, 730 ppm Mar. 1-3; minimum, 451 ppm Nov. 1-30.
Hardness: Maximum, 322 ppm Mar. 1-3; minimum, 188 ppm Aug. 20-31.
Specific conductance: Maximum daily, 1,080 micromhos Jan. 21; minimum daily, 589 micromhos Nov. 8.
Water temperatures: Maximum, 84°F June 25, July 11, 19; minimum, 33°F on many days during November to March.
EXTREMES, 1951-54.--Dissolved solids: Maximum, 902 ppm Mar. 27 to Apr. 14, 1952; minimum, 368 ppm May 15, 1951.
Hardness: Maximum, 373 ppm June 2-8, 1952; minimum, 171 ppm May 15, 1951.
Specific conductance: Maximum daily, 1,210 micromhos Mar. 26, Apr. 6, 14, 15, 1952; minimum daily, 499 micromhos May 15, 1951.
Water temperatures: Maximum, 85°F June 13, 15, 1952; 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, Neb. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Records of discharge for water year October 1953 to September 1954 given in reports of State Engineer.

Chemical analyses, in parts per million, water year October 1953 to September 1954

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
Oct. 1-31, 1953	1,460	--	--	--	--	72	--	223		148	--	--	--	--	469	0.64	1,850	199	16	44	2.2	701	7.9
Nov. 1-30	1,240	--	--	--	--	65	--	214		143	--	--	--	--	451	.61	1,510	196	21	42	2.0	668	7.6
Dec. 1-22	1,320	29	0.00	62	16	71	11	223		170	21	0.5	2.1	0.15	503	.68	1,790	221	38	40	2.1	735	7.8
Dec. 23-27	1,100	--	--	--	--	74	--	236		191	--	--	--	--	553	.75	1,640	254	60	39	2.0	806	8.0
Dec. 28-Jan. 18, 1954	1,260	--	--	--	--	83	--	238		223	--	--	--	--	607	.83	2,070	273	78	40	2.2	868	8.2
Jan. 19-Feb. 7	1,280	--	--	--	--	87	--	236		263	--	--	--	--	652	.89	2,250	296	102	39	2.2	939	8.1
Feb. 8-28	1,250	--	--	--	--	76	--	215		228	--	--	--	--	586	.80	1,980	265	89	38	2.0	842	8.1
Mar. 1-3	1,080	--	--	--	--	100	--	228		305	--	--	--	--	730	.99	2,130	322	135	40	2.4	1,030	7.8
Mar. 4	1,080	--	--	--	--	96	--	232		293	--	--	--	--	704	.96	2,050	316	126	40	2.3	1,000	7.9
Mar. 5-31	1,250	30	.00	74	20	75	11	212		220	25	.5	3.6	.13	578	.79	1,950	265	91	37	2.0	835	7.7
Apr. 1-30	1,280	--	--	--	--	84	--	205		240	--	--	--	--	600	.82	2,070	267	99	41	2.2	879	7.9
May 1-28	1,220	--	--	--	--	75	--	209		198	--	--	--	--	525	.71	1,730	231	60	41	2.1	783	8.0
May 29-June 30	1,480	20	.00	53	19	80	11	206		183	23	.5	1.8	.13	505	.69	2,020	210	41	44	2.4	763	8.0
July 1-30	2,090	--	--	--	--	80	--	229		160	--	--	--	--	480	.65	2,710	198	10	47	2.5	735	7.9
July 31-Aug. 19	2,020	--	--	--	--	75	--	227		151	--	--	--	--	464	.63	2,530	191	5	46	2.4	708	8.0
Aug. 20-31	1,170	--	--	--	--	77	--	219		153	--	--	--	--	462	.63	1,460	188	8	47	2.4	701	7.5
Sept. 1-30	1,530	28	.00	49	17	75	11	221		150	21	.5	.9	.16	462	.63	1,910	191	10	44	2.4	702	7.5
Weighted average a	1,420	--	--	--	--	77	--	220		202	--	--	--	--	519	0.71	1,990	224	44	43	2.2	770	--

a Represents 100 percent of runoff for water year October 1953 to September 1954.

PLATTE RIVER BASIN--Continued

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

Temperature (°F) of water, water year October 1953 to September 1954
/Once-daily measurement between 4 p.m. and 5 p.m./

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

a Reading obtained between 8 a.m. and 9 a.m.

PLATTE RIVER BASIN--Continued

MIDDLE LOUP RIVER AT DUNNING, NEBR. (TOTAL-LOAD SECTION)

LOCATION.--At downstream measuring sill of turbulence flume beneath bridge on State Highway 2 at northeast limits of Dunning, Blaine County, 1,150 feet downstream from gaging station, and 1 mile upstream from Dismal River.
DRAINAGE AREA.--1,760 square miles, approximately, of which about 80 square miles contribute directly to surface runoff.
RECORDS AVAILABLE.--Water temperatures: October 1949 to September 1954.
Sediment records: March 1950 to September 1952, October 1953 to September 1954 (discontinued).
EXTREMES, 1953-54.--Water temperatures: Maximum, 90°F July 10, 12, 19; minimum, freezing point on many days during November to March.
EXTREMES, 1949-54.--Water temperatures: Maximum, 91°F June 13, 1953; minimum, freezing point on many days during winter months.
Sediment concentrations (1950-52): Maximum daily, 3,800 ppm Feb. 23, 1952; minimum daily, 56 ppm Jan. 23, 1952.
Sediment loads (1950-52): Maximum daily, 5,160 tons Mar. 31, 1952; minimum daily, 21 tons Jan. 23, 1952.
REMARKS.--Investigations indicate that practically all the total sediment load is transported in suspension at this section of the river. Records of discharge for water year October 1953 to September 1954 given in WSP 1340.

Temperature (°F) of water, water year October 1953 to September 1954
/7-day mercury-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	67	53	57	48	46	37	38	35	32	32	--	32	54	37	--	--	69	52	82	68	78	67	79	68
2	68	55	55	48	41	34	38	35	32	32	32	32	--	--	--	--	62	51	83	68	80	66	78	64
3	60	51	48	46	34	32	37	33	32	32	32	32	--	--	--	--	60	47	81	70	79	65	79	63
4	61	46	48	45	32	32	39	33	38	32	33	32	--	--	60	43	69	51	87	69	79	69	80	70
5	60	48	46	39	32	32	41	33	44	36	33	32	--	--	66	48	74	57	84	70	72	65	76	68
6	58	47	38	32	32	32	42	34	44	38	--	32	--	--	62	54	77	62	83	70	67	63	72	62
7	60	46	40	32	36	32	43	36	45	34	45	32	--	--	62	50	68	54	87	70	70	62	66	61
8	62	49	46	35	35	32	40	36	49	37	47	32	--	--	66	50	77	57	86	71	81	62	72	60
9	64	50	46	36	32	32	35	32	49	38	50	41	--	--	57	52	79	64	82	69	82	64	73	60
10	65	52	48	38	38	32	33	32	46	38	57	42	62	46	58	51	80	68	90	68	79	67	70	60
11	64	54	44	39	38	32	32	32	37	34	51	44	63	48	61	52	80	67	89	74	70	64	--	--
12	63	52	50	40	37	32	32	32	37	32	42	32	58	49	66	54	80	64	90	75	70	64	72	60
13	64	52	52	41	36	32	32	32	47	35	33	32	68	47	69	54	78	66	86	71	70	64	74	64
14	66	54	54	44	33	32	33	32	50	39	33	32	68	54	74	57	71	64	78	70	84	66	70	62
15	64	54	54	44	37	32	32	32	48	42	35	32	58	45	75	62	78	63	81	68	83	70	72	60
16	65	56	53	45	33	32	32	32	48	37	43	33	60	41	75	59	77	64	86	66	75	68	78	63
17	64	54	53	44	33	32	32	32	51	40	50	36	67	48	64	60	76	64	89	72	81	67	72	64
18	64	54	48	40	35	32	32	32	50	39	46	40	68	51	66	56	73	62	87	74	80	68	75	63
19	65	54	40	34	--	32	33	32	46	33	40	36	56	51	68	56	82	65	90	72	79	65	72	60
20	66	56	34	32	43	37	32	32	42	32	50	34	65	48	69	54	80	70	84	71	77	65	67	58
21	62	54	33	32	41	32	33	32	48	35	42	38	60	46	79	59	74	65	85	70	80	66	--	--
22	56	46	32	32	33	32	33	32	43	37	48	38	52	45	76	65	82	63	75	64	75	68	--	--
23	55	45	41	32	33	32	33	32	48	33	42	38	65	46	65	60	83	66	72	61	78	66	--	--
24	51	46	42	35	33	32	32	32	54	40	43	38	67	53	71	55	86	67	82	62	80	67	--	--
25	51	44	40	33	32	32	32	32	46	41	43	34	70	56	68	56	89	72	84	68	86	69	--	--
26	50	39	44	36	33	32	32	32	47	39	50	34	62	46	60	56	84	71	83	70	84	71	70	57
27	51	44	44	34	33	32	32	32	43	34	52	40	66	52	69	56	81	70	79	70	84	69	72	58
28	58	45	44	38	32	32	32	32	--	32	46	33	68	56	66	53	87	--	87	69	85	73	72	61
29	59	48	43	36	32	32	32	32	--	--	42	33	60	43	70	51	81	68	82	71	84	74	60	52
30	58	48	42	34	32	32	32	32	--	--	47	35	44	39	77	56	81	66	82	69	83	67	54	50
31	56	49	--	--	35	33	32	32	--	--	50	35	--	--	67	56	--	--	82	68	81	70	--	--
Average	61	50	45	38	35	32	34	33	44	36	43	35	--	--	67	55	77	63	84	69	78	67	72	61

PLATTE RIVER BASIN--Continued

MIDDLE LOUP RIVER AT DUNNING, NEBR. (TOTAL-LOAD SECTION).--Continued

Monthly and annual summary of water and suspended-sediment discharge, water year October 1953 to September 1954

Month	Discharge (cfs-days)	Runoff (acre-feet)	Suspended sediment					
			Load (tons)	Daily load (tons)			Concentration (ppm)	
				Mean	Maximum	Minimum	Weighted mean	Maximum observed
October	11,570	22,950	28,519	920			913	--
November	11,446	22,700	46,430	1,550			1,500	--
December	12,328	24,450	50,650	1,630			1,520	3,730
January	11,270	22,350	30,500	984			1,000	--
February	10,990	21,800	49,810	1,780			1,680	--
March	12,618	25,030	65,900	2,130			1,930	--
April	11,834	23,470	50,450	1,680			1,580	--
May	12,433	24,660	35,362	1,140			1,050	--
June	11,285	22,380	25,915	864			851	--
July	11,051	21,920	17,770	573			596	--
August	11,201	22,220	24,420	788			807	--
September	11,062	21,940	27,000	900			904	--
Water year 1953-54	139,088	275,900	452,726	1,210			1,210	3,730

PLATTE RIVER BASIN--Continued

MIDDLE LOUP RIVER AT DUNNING, NEBR. (TOTAL-LOAD SECTION)--Continued

Particle-size analyses of suspended sediment, water year October 1953 to September 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; V, visual accumulation tube)

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. 6, 1953	5:50 p.m.	354	56	950							8	25	69	91	100	--	V
Oct. 22	8:45 a.m.	457	48	1,240							8	29	65	87	98	100	V
Oct. 23	3:30 p.m.	364	54	879							10	32	67	91	100	--	V
Nov. 4	2:40 p.m.	357	47	1,090							5	18	51	77	97	100	V
Nov. 17	1:40 p.m.	417	52	1,090							7	28	69	99	100	--	V
Feb. 10, 1954	9:55 p.m.	461	--	2,240							10	33	73	88	97	100	V
Apr. 14	1:45 p.m.	360	63	1,330							5	17	59	84	98	--	V
Apr. 14	6:25 p.m.	374	66	1,570							4	12	43	67	96	--	V
Apr. 27	7:05 p.m.	354	64	966							8	14	65	89	98	100	V
May 12	5:40 p.m.	367	65	869							13	24	68	88	100	--	V
May 26	10:20 a.m.	360	56	1,060							5	21	66	87	99	100	V
May 26	3:20 p.m.	357	59	1,240							6	20	60	83	94	--	V
May 26	6:55 p.m.	395	59	1,550							5	17	52	74	97	100	V
June 9	2:50 p.m.	351	77	980							12	25	59	82	98	100	V
June 25	11:15 a.m.	357	80	744							14	28	57	84	94	100	V
July 8	4:40 p.m.	342	86	564							18	34	60	86	96	100	V
July 20	4:40 p.m.	348	85	624							14	26	52	77	98	100	V
Aug. 3	8:50 a.m.	364	66	654							8	28	59	82	97	100	V
Aug. 3	1:30 p.m.	364	78	742							8	19	41	72	91	--	V
Aug. 17	4:15 p.m.	374	81	687							11	27	66	90	98	100	V
Aug. 31	4:10 p.m.	348	82	618							13	28	66	91	98	100	V
Sept. 29	4:10 p.m.	371	59	798							8	22	62	82	90	100	V

PLATTE RIVER BASIN--Continued

SALT CREEK AT LINCOLN, NEBR.

LOCATION.--At gaging station at bridge on North 27th Street at north edge of Lincoln, Lancaster County, 1 mile downstream from Oak Creek.
RECORDS AVAILABLE.--Water temperatures: May to September 1951.
Sediment records: March to September 1951, March 1952 to September 1954 (discontinued).
EXTREMES, 1953-54.--Sediment concentrations: Maximum daily, 13,400 ppm June 17; minimum daily, not determined.
Sediment loads: Maximum daily, 263,000 tons June 17, minimum daily, not determined.
EXTREMES, 1951, 1952-54.--Sediment concentrations: Maximum daily, 41,100 ppm Mar. 31, 1952; minimum daily, not determined.
Sediment loads: Maximum daily, 857,000 tons June 2, 1951; minimum daily, not determined.
REMARKS.--Maximum observed sediment concentration during water year, 69,100 ppm July 2.
Records of discnarge for water year October 1953 to September 1954 given in WSP 1340.

Suspended sediment, water year October 1953 to September 1954

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	34	--		26	20		45		e 6
2	35	--		27	--		48		
3	34	--		27	--		183		e 200
4	32	--		35	--		153		e 150
5	32	--		30	--		140		e 75
6	34	--		31	--		66		
7	32	--		38	--		51		e 10
8	34	--		32	31		54		
9	34	--		33	--		48		
10	32	--	e 2	33	--	e 3	48		
11	32	19		27	--		42		
12	32	--		34	--		42		
13	32	--		34	--		42		
14	34	--		37	--		42		
15	32	--		41	22		45		
16	32	--		42	--		38		
17	32	--		42	--		37		
18	73	160	sa 44	65	--	e 20	37		
19	73	--	e 24	283	1,000	sa 800	35		
20	35			153	340	a 140	38		e 6
21	35			117	--	e 45	48		
22	33	--	e 5	84	--	e 15	41		
23	31			69	--	e 10	41		
24	28			56			41		
25	44	79	9	53	--	e 7	40		
26	37			42			44		
27	30			47			41		
28	30	--	e 4	77	--	e 15	44		
29	30			44	--	e 7	42		
30	31			44			42		
31	30			--	--	--	42		
Total	1,099	--	160	1,703	--	1,138	1,700		605

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

PLATTE RIVER BASIN--Continued

SALT CREEK AT LINCOLN, NEBR.--Continued

Suspended sediment, water year October 1953 to September 1954--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	47			41			64		
2	45			40			64		
3	42			45			51		
4	42			47			50		
5	47			51			48		
6	47			59			47		
7	44			50			59		
8	45			50			59	--	e 10
9	44			50			61		
10	38			51		e 6	53		
11	40			33			54		
12	37			41			66		
13	38			56			59		
14	35			54			50		
15	38			59			42		
16	37		e 5	54			42	--	e 8
17	34			58			48		
18	38			53			68	--	e 60
19	40			138		e 220	61	63	10
20	44			186		e 260	54		
21	41			98	120	32	48		
22	41			111		e 35	51	--	e 7
23	41			88			48		
24	38			78		e 20	54		
25	45			84			58		
26	42			73			50	18	
27	38			73		e 12	50	--	e 4
28	40			64			50	--	
29	40			--		--	53	69	10
30	41			--		--	48	--	e 4
31	42			--		--	48	15	
Total	1,271		155	1,885		751	1,658	--	306

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	48	22		256	3,810	s 2,940	69	700	130
2	50	--		1,960	10,900	s 60,900	266	4,260	s 3,280
3	48	--		1,400	7,070	s 31,000	129	3,150	1,100
4	45	46		220	2,010	1,190	162	--	e 1,000
5	47	--	e 5	113	950	290	75	--	e 130
6	48	--		84	590	134	50	--	e 20
7	58	20		73	400	79	48	--	e 16
8	50	--		59	200	a 32	50	90	12
9	44	--		53	--		1,640	10,800	s 59,400
10	51	--		58	--		1,870	6,960	35,100
11	78	--	e 70	54	150		391	2,650	s 3,150
12	75	--	e 50	53	--		150	630	s 272
13	53	247	35	53	--	e 8	104	180	a 50
14	45			50	--		109	150	a 44
15	51	--	e 8	50	--		129	145	51
16	45			48	--		162	110	s 37
17	38	74		54	--		6,850	13,400	s 263,000
18	38	--		83	282	s 95	2,970	5,500	44,100
19	47	--	e 4	66	145	26	742	3,090	s 6,940
20	48	--		58	70	a 11	241	662	431
21	121	662	s 258	58	125	20	200	395	213
22	82	300	66	48	120	a 16	259	1,000	sa 800
23	77	130	27	299	2,880	s 4,420	200	--	e 320
24	59	--	e 8	274	4,610	s 3,910	127	--	e 140
25	48	--	e 6	145	3,200	1,250	109	--	e 100
26	56			90	740	180	102		
27	53	50	7	61	300	49	90	--	
28	44	39	5	113	608	s 194	92	--	e 90
29	84	588	s 322	540	7,740	11,300	86	348	
30	285	5,800	s 4,770	132	2,610	s 1,120	78	--	e 50
31	--	--	--	69	1,220	227	--	--	--
Total	1,916	--	5,720	6,674	--	119,455	17,550	--	420,256

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

PLATTE RIVER BASIN--Continued

SALT CREEK AT LINCOLN, NEBR.--Continued

Suspended sediment, water year October 1953 to September 1954--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.....	77	--	e 40	350	3,200	sa 4,100	96	--	e 15
2.....	1,780	12,700	s103,000	588	4,740	s 9,610	84	--	e 14
3.....	365	4,880	s 6,380	420	3,300	sa 4,400	78	--	e 12
4.....	117	515	163	109	1,000	a 300	75		
5.....	75	90	18	71	320	a 60	62	--	
6.....	75	100	20	326	1,800	sa 2,100	61	--	e 7
7.....	68	120	a 22	1,100	5,030	14,900	62	34	
8.....	58	65	10	1,810	3,660	17,900	62	--	
9.....	65	60	a 11	1,160	2,220	s 7,500	80	109	24
10.....	410	2,720	s 4,630	165	950	sa 460	62	--	e 10
11.....	193	1,100	s 615	132	620	221	61		
12.....	88	150	36	71	--	e 50	47	--	
13.....	61	48	8	68	--	e 40	44	--	
14.....	58	38	a 6	100	--	e 60	44	--	e 5
15.....	53	36	a 5	58	--	e 15	44	20	
16.....	44	38	a 5	71	--	e 26	51		
17.....	40			512	3,300	sa 5,100	48	--	e 6
18.....	33			438	3,230	s 4,160	48		
19.....	40			216	2,300	sa 1,400	44	--	
20.....	44			115	1,400	a 440	42	--	
21.....	44			539	3,140	s 7,510	47	--	
22.....	42			1,130	6,380	s 23,600	47	--	
23.....	42			3,620	6,220	60,800	44	--	e 4
24.....	34	--	e 4	2,770	2,820	21,100	48	15	
25.....	37			776	2,010	4,210	47	--	
26.....	44			220	--	e 550	44	--	
27.....	47			187	--	e 380	50		
28.....	47			171	--	e 180	50		
29.....	45			113	--	e 60	50	--	e 5
30.....	44			104	63	18	51		
31.....	51	--	e 5	94	--	e 15	--	--	--
Total.	4,221	--	115,030	17,604	--	191,265	1,673	--	215

Total discharge for year (cfs-days)..... 58,954

Total load for year (tons)..... 855,056

e Estimated.

s Computed by subdividing day.

a Computed from partly estimated concentration graph.

PLATTE RIVER BASIN--Continued

SALT CREEK AT LINCOLN, NEBR.--Continued

Particle-size analyses of suspended sediment, June to August 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; V, visual accumulation tube)

Date of collection	Time	Discharge (cfs)	Water temperature (°F)	Suspended sediment											Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters									
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
June 9, 1954	2:45 p.m.	2,760		12,500	26,000	6	14	53	70	81	97	98	99		100		VPN
June 9	2:45 p.m.	2,760		12,500	20,800	37	53	66	78	88	97	98	99		100		VPWCM
June 17	2:35 p.m.	11,800		13,700	19,200	31	44	56	67	80	94	96	98		99	100	VPWCM
Aug. 8	2:55 p.m.	1,930		3,170	9,140	50	60	67	74	85	94	96	99		100		VPWCM
Aug. 23	10:15 a.m.	4,180		5,490	12,600	38	49	59	66	81	94	96	98		100		VPWCM

PLATTE RIVER BASIN--Continued

MISCELLANEOUS ANALYSES OF STREAMS IN PLATTE RIVER BASIN

Periodic determinations of suspended-sediment discharge, water year October 1953 to September 1954

Date	Discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Discharge (tons per day)
BIG THOMPSON RIVER AT ESTES PARK, COLO.			
Nov. 29, 1953	18	2	0.1
Dec. 26	a 13	3	.1
Dec. 26	a 13	27	.9
Feb. 15, 1954	20	4	.2
Apr. 11	20	2	.1
May 20	266	12	8.6
May 20	394	46	49
May 21	287	10	7.7
May 22	386	16	17
May 22	330	12	11
May 23	354	12	11
May 23	298	5	4.0
May 23	290	9	7.0
May 24	272	3	2.2
May 24	221	6	3.6
May 25	239	5	3.2
May 25	204	5	2.8
May 25	252	7	4.8
May 26	266	6	4.3
May 26	224	3	1.8
May 27	211	3	1.7
May 27	186	4	2.0
May 27	176	3	1.4
May 28	188	4	2.0
May 28	164	7	3.1
May 29	144	5	1.9
May 29	143	3	1.2
May 30	154	4	1.7
May 30	139	4	1.5
May 31	149	5	2.0
June 2	128	4	1.4
June 2	128	3	1.0
June 3	125	2	.7
June 3	113	3	.9
June 3	117	4	1.3
June 4	139	4	1.5
June 4	129	3	1.0
June 4	129	4	1.4
June 5	198	9	4.8
June 5	199	5	2.7
June 5	194	4	2.1
June 5	176	4	1.9
June 5	164	18	8.0
June 6	217	2	1.2
June 6	186	6	3.0
June 7	190	1	.5
June 7	157	2	.8
June 7	152	3	1.2
June 8	152	7	2.9
June 9	140	3	1.1
June 9	129	2	.7
June 9	125	3	1.0
June 10	154	2	.8
June 10	145	2	.8
June 10	154	3	1.2
June 11	178	4	1.9
June 11	157	3	1.3
June 12	175	2	.9
June 12	157	3	1.3
June 12	154	2	.8

a Daily mean discharge.

PLATTE RIVER BASIN--Continued

MISCELLANEOUS ANALYSES OF STREAMS IN PLATTE RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge, water year October 1953 to September 1954--Continued

Date	Discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Discharge (tons per day)
BIG THOMPSON RIVER AT ESTES PARK, COLO.--Continued			
June 13, 1954	196	3	1.6
June 13	172	3	1.4
June 14	202	3	1.6
June 14	187	3	1.5
June 15	192	7	3.6
June 15	174	2	.9
June 15	169	4	1.8
June 15	169	3	1.4
June 15	171	3	1.4
June 16	181	4	2.0
June 16	181	3	1.5
June 16	178	4	1.9
June 16	176	4	1.9
June 16	162	3	1.3
June 17	176	5	2.4
June 18	229	9	5.6
June 19	245	11	7.3
June 21	229	5	3.1
June 22	243	7	4.6
June 23	243	7	4.6
June 23	226	5	3.0
June 23	222	7	4.2
June 24	241	4	2.6
June 24	227	10	6.1
June 25	235	4	2.5
June 26	226	4	2.4
June 27	227	7	4.3
June 29	202	3	1.6
June 29	194	5	2.6
June 29	190	3	1.5
June 30	180	3	1.4
July 24	119	5	1.6
July 25	100	4	1.1
Aug. 21	54	2	.3
Aug. 23	52	2	.3
MIDDLE LOUP RIVER 7½ MILES NORTHWEST OF MILBURN, NEBR.			
Oct. 6, 1953	806	493	1,070
Oct. 25	898	672	1,630
Nov. 4	862	1,150	2,680
Nov. 17	828	662	1,480
Dec. 1	817	862	1,900
Feb. 11, 1954	839	1,410	3,190
Apr. 28	806	655	1,430
May 13	839	600	1,360
May 27	806	694	1,510
June 9	751	648	1,310
June 23	806	713	1,550
July 10	710	374	717
Aug. 4	640	438	757
Aug. 18	839	486	1,100
Sept. 1	730	444	875
Sept. 15	740	577	1,150
Sept. 29	910	690	1,700
MIDDLE LOUP RIVER AT ARCADIA, NEBR.			
Oct. 6, 1953	763	538	1,110
Oct. 19	691	770	1,440
Nov. 2	891	782	1,880
Nov. 17	847	708	1,620
Dec. 23	a 357	1,630	1,570

a Daily mean discharge.

PLATTE RIVER BASIN--Continued

MISCELLANEOUS ANALYSES OF STREAMS IN PLATTE RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge, water year October 1953 to September 1954--Continued

Date	Discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Discharge (tons per day)
MIDDLE LOUP RIVER AT ARCADIA, NEBR.--Continued			
Feb. 11, 1954	1,190	1,630	5,240
Mar. 23	830	1,630	3,650
Apr. 29	1,160	1,140	3,570
May 12	821	1,370	3,040
May 25	738	680	1,350
June 8	714	526	1,010
June 22	830	507	1,140
July 8	470	343	435
July 20	305	189	156
Aug. 2	588	374	594
Aug. 17	668	487	878
Aug. 31	676	352	642
Sept. 14	602	413	671
Sept. 28	691	365	681
MIDDLE LOUP RIVER AT ST. PAUL, NEBR.			
Oct. 5, 1953	755	815	1,660
Oct. 21	834	341	768
Nov. 2	969	650	1,700
June 17, 1954	19,000	13,200	677,000
June 18	5,220	7,990	113,000
NORTH LOUP RIVER AT BURWELL, NEBR.			
Oct. 21, 1953	467	476	600
Nov. 3	555	449	673
Nov. 16	564	499	760
Nov. 30	564	1,060	1,610
Feb. 9, 1954	785	804	1,700
Mar. 1	573	644	996
Mar. 22	780	970	2,040
Apr. 12	590	432	688
Apr. 12	590	334	532
Apr. 26	502	441	598
May 10	653	592	1,040
May 10	617	472	786
May 24	432	348	406
June 21	519	430	603
July 7	303	176	144
July 19	153	104	43
Aug. 2	227	118	72
Aug. 2	227	148	91
Aug. 16	311	146	123
Aug. 30	390	286	301
Sept. 13	357	226	218
Sept. 13	365	244	240
Sept. 27	326	210	185
CALAMUS RIVER NEAR BURWELL, NEBR.			
Oct. 6, 1953	323	265	231
Oct. 21	326	218	192
Nov. 3	306	293	242
Nov. 16	348	247	232
Nov. 30	370	317	317
Feb. 9, 1954	386	428	446
Mar. 1	326	346	305
Apr. 12	344	183	170
Apr. 26	333	208	187
May 10	344	213	198
May 24	292	208	164
June 7	312	178	150
June 21	394	260	277
July 7	292	197	155
July 19	270	152	111

PLATTE RIVER BASIN--Continued

MISCELLANEOUS ANALYSES OF STREAMS IN PLATTE RIVER BASIN--Continued

Periodic determinations of suspended-sediment discharge, water year October 1953 to September 1954--Continued

Date	Discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Discharge (tons per day)
CALAMUS RIVER NEAR BURWELL, NEBR.--Continued			
Aug. 2, 1954	306	180	149
Aug. 16	273	166	122
Aug. 30	250	136	92
Sept. 13	276	140	104
Sept. 27	286	171	132
NORTH LOUP RIVER AT ORD, NEBR.			
Oct. 5, 1953	652	627	1,100
Oct. 20	741	246	492
Nov. 3	930	249	625
Nov. 16	980	410	1,080
Nov. 30	1,030	783	2,180
Feb. 9, 1954	a 1,100	2,010	5,970
Mar. 1	1,160	669	2,100
Mar. 22	1,340	875	3,170
May 11	1,180	403	1,280
May 11	1,220	335	1,100
May 24	750	248	502
June 22	920	372	924
July 8	524	200	283
July 19	304	81	66
Aug. 4	475	143	183
Aug. 5	398	108	116
Aug. 16	559	175	264
Aug. 31	714	244	470
Sept. 14	612	261	431
NORTH LOUP RIVER NEAR COTESFIELD, NEBR.			
Oct. 5, 1953	711	623	1,200
Oct. 20	889	482	1,160
Nov. 3	919	675	1,670
NORTH LOUP RIVER NEAR ST. PAUL, NEBR.			
Oct. 5, 1953	646	362	631
Oct. 21	727	274	538
Nov. 2	905	370	904
SALT CREEK AT ROCA, NEBR.			
June 17, 1954	2,370	6,080	38,900
June 17	2,750	4,550	33,800
June 17	2,260	4,360	26,600
June 18	1,800	3,100	15,100

a Daily mean discharge.

MISCELLANEOUS ANALYSES OF STREAMS IN PLATTE RIVER BASIN--Continued

Particle-size analyses of suspended sediment, water year October 1953 to September 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; V, visual accumulation tube)

Date of collection	Time	Discharge (cfs)	Water temperature (°F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000
MIDDLE LOUP RIVER 7½ MILES NORTHWEST OF MILBURN, NEBR.																
Oct. 25, 1953	11:15 a.m.	898	47	672							17	47	87	100	--	V
Feb. 11, 1954	11:05 a.m.	839	34	1,410							17	41	86	100	--	V
Apr. 28	11:50 a.m.	806	--	655							23	63	99	100	--	V
May 13	10:25 a.m.	839	59	600							22	53	95	100	--	V
May 27	3:50 p.m.	806	71	694							16	46	91	100	--	V
June 9	11:30 a.m.	751	70	648	2,940	17	22	23	25	27	38	60	93	100	--	VPWCM
June 23	11:10 a.m.	806	76	713							16	30	71	95	100	V
July 10	11:15 a.m.	710	77	374							28	52	88	100	--	V
Aug. 18	11:00 a.m.	839	a 71	486							33	61	93	100	--	V
Sept. 1	5:10 p.m.	730	80	444							24	47	80	98	100	V
Sept. 15	6:35 p.m.	740	--	577							14	39	76	95	100	V
Sept. 29	11:15 a.m.	910	56	690							18	46	96	100	--	V
MIDDLE LOUP RIVER AT ARCADIA, NEBR.																
Oct. 6, 1953	10:35 a.m.	763	--	538							14	26	58	97	100	V
Oct. 19	3:10 p.m.	691	--	770							15	32	65	97	100	V
Nov. 2	4:45 p.m.	891	56	782							23	62	98	100	--	V
Nov. 17	8:30 a.m.	847	49	708							14	41	88	99	100	V
Dec. 23	4:30 p.m.	b 357	32	1,630							4	18	86	100	--	V
Feb. 11, 1954	4:30 p.m.	1,190	32	1,630							12	34	85	100	--	V
Mar. 23	11:05 a.m.	830	a 40	1,630							20	45	91	100	--	V
Apr. 29	1:15 p.m.	1,160	47	1,140							20	60	94	100	--	V
May 12	11:25 a.m.	821	a 59	1,370							16	42	86	100	--	V
May 25	11:15 a.m.	738	a 62	680							20	51	96	100	--	V
June 8	2:25 p.m.	714	78	526							25	50	89	100	--	V
June 22	3:20 p.m.	830	80	507							38	61	90	100	--	V
July 8	1:10 p.m.	470	84	343							26	46	87	100	--	V
July 20	11:00 a.m.	305	a 75	189							40	61	95	100	--	V
Aug. 17	10:50 a.m.	668	a 74	487							23	50	95	100	--	V
Sept. 28	1:50 p.m.	691	72	365							25	53	93	100	--	V

a Interpolated.
b 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 1953 to September 1954--Continued
(*Methods of analysis:* B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; V, visual accumulation tube)

Date of collection	Time	Discharge (cfs)	Water temperature (°F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000
MIDDLE LOUP RIVER AT ST. PAUL, NEBR.																
Oct. 5, 1953	9:35 a.m.	755		815	--	--	--	--	--	--	16	45	82	96	98	100	V
Oct. 21	2:45 p.m.	834		341	--	--	--	--	--	--	44	66	96	100			V
Nov. 2	9:55 a.m.	969	50	650	--	5	6	6	7	10	15	41	85	100			VPWCM
June 17, 1954	5:30 p.m.	19,000		13,200	13,300	26	36	44	50	55	66	81	94	100			VPN
June 17	5:30 p.m.	19,000		13,200	12,000	28	36	43	47	52	64	81	94	100			VPWCM
June 18	10:00 a.m.	5,220		7,990	11,400	38	50	57	60	66	75	84	96	100			VPWCM
NORTH LOUP RIVER AT BURWELL, NEBR.																
Oct. 21, 1953	9:45 a.m.	467	59	476	--	--	--	--	--	--	25	43	74	97	100		V
Nov. 3	11:05 a.m.	555	--	449	--	--	--		--	--	15	39	76	99	100		V
Nov. 30	12:40 p.m.	564	39	1,060	--	--	--		--	--	9	29	90	100	--		V
Feb. 9, 1954	11:20 a.m.	785	--	804	1,700	9	9		14	19	30	51	84	100	--		VPWCM
Mar. 1	12:10 p.m.	573	41	644	1,080	--	4		6	--	19	44	86	100	--		VPWCM
Mar. 22	2:50 p.m.	780	47	970	1,190	5	5		7	9	16	48	89	100	--		VPWCM
Apr. 12	4:20 p.m.	590	61	432	--	--	--		--	--	23	49	88	100	--		V
Apr. 12	5:35 p.m.	590	--	334	--	--	--		--	--	23	52	88	100	--		V
May 10	1:30 p.m.	653	--	592	--	--	--		--	--	17	40	91	100	--		V
May 10	3:20 p.m.	617	--	472	--	--	--		--	--	16	41	80	96	100		V
June 21	4:00 p.m.	519	76	430	--	--	--		--	--	27	58	89	99	100		V
July 7	3:30 p.m.	303	90	176	--	--	--		--	--	31	49	80	100	--		V
July 19	1:50 p.m.	153	95	104	--	--	--		--	--	42	58	97	100	--		V
Aug. 2	4:20 p.m.	227	86	118	--	--	--		--	--	43	66	95	100	--		V
Aug. 2	5:05 p.m.	227	84	148	--	--	--		--	--	35	55	92	100	--		V
Sept. 13	4:55 p.m.	357	75	226	--	--	--		--	--	23	40	80	95	100		V
Sept. 13	6:50 p.m.	365	--	244	--	--	--		--	--	27	49	96	100	--		V
CALAMUS RIVER NEAR BURWELL, NEBR.																
Oct. 6, 1953	7:50 a.m.	323	48	265							16	35	89	100			V
Oct. 21	11:20 a.m.	326	--	218							18	34	90	100			V

Nov. 3	8:55 a.m.	306	--	293							14	38	89	100			V
Nov. 16	4:35 p.m.	348	54	247							18	46	96	100			V
Nov. 30	2:45 p.m.	370	--	317							15	31	92	100			V
Feb. 9, 1954	8:30 a.m.	386	--	428							14	38	90	100			V
Mar. 1	11:30 a.m.	326	41	346							17	35	73	100			V
Apr. 12	12:55 p.m.	344	56	183							26	53	96	100			V
Apr. 26	1:05 p.m.	333	61	208							32	60	96	100			V
May 24	2:00 p.m.	292	67	208							39	67	97	100			V
July 19	12:40 p.m.	270	83	152							48	74	97	100			V
Aug. 2	2:00 p.m.	306	81	180							42	57	91	98	100		V
Aug. 16	12:10 p.m.	273	75	166							32	60	97	100			V
Aug. 30	3:30 p.m.	250	84	136							42	69	97	100			V
Sept. 27	12:20 p.m.	286	69	171							26	56	94	100			V
NORTH LOUP RIVER AT ORD, NEBR.																	
Oct. 5 1953	4:30 p.m.	652	61	627							20	50	92	100	--		V
Oct. 20	1:45 p.m.	741	67	246							34	52	89	100	--		V
Nov. 3	3:00 p.m.	930	47	249							35	54	87	100	--		V
Nov. 16	1:45 p.m.	980	52	410							20	38	84	100	--		V
Nov. 30	11:10 a.m.	1,030	38	783							14	37	90	99	100		V
Mar. 1, 1954	3:50 p.m.	1,160	41	669			4		6		23	46	82	99	100		VPWCM
May 11	10:10 a.m.	1,180	a 59	403							18	54	86	100	--		V
July 19	4:35 p.m.	304	93	81							57	75	96	100	--		V
Aug. 4	7:10 p.m.	475	81	143							46	62	86	100	--		V
Aug. 5	6:50 p.m.	398	--	108							40	61	92	99	100		V
Sept. 14	10:30 a.m.	612	a 65	261							29	46	90	100	--		V
NORTH LOUP RIVER NEAR COTESFIELD, NEBR.																	
Oct. 5, 1953	3:10 p.m.	711	60	623							26	34	45	85	100		V
Oct. 20	11:50 a.m.	889	62	482	1,170		7		11		30	38	59	88	99	100	VPWCM
Nov. 3	3:55 p.m.	919	46	675							16	44	88	100	--		V
NORTH LOUP RIVER NEAR ST. PAUL, NEBR.																	
Oct. 5, 1953	12:50 p.m.	646	--	362	1,440	19	22	22	25	34	57	68	84	100			VPWCM
Oct. 21	1:45 p.m.	727	64	274							54	70	98	100			V
Nov. 2	1:30 p.m.	905	55	370							46	64	83	97	100		V

a Interpolated.

PLATTE RIVER BASIN--Continued

MISCELLANEOUS ANALYSES OF STREAMS IN PLATTE RIVER BASIN--Continued

Periodic determinations of bed material, water year October 1953 to September 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; V, visual accumulation tube)

Date of collection	Number of sampling points	Discharge (cfs)	Water temperature (°F)	Bed material												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	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	
MIDDLE LOUP RIVER 7½ MILES NORTHWEST OF MILBURN, NEBR.																
Oct. 6, 1953	3	806				0	2	34	85	95	97	99	100			SV
Oct. 25	3	898				--	2	32	84	96	98	99	100			SV
Feb. 11, 1954	3	839				--	2	33	76	89	94	98	100			SV
Apr. 28	5	806				0	3	27	70	87	94	98	100			SV
Aug. 18	5	839				0	3	47	73	87	93	97	100			SV
MIDDLE LOUP RIVER AT ARCADIA, NEBR.																
Oct. 19, 1953	5	691				0	2	38	87	98	99	100				SV
Mar. 23, 1954	5	1,160				0	2	50	95	100	--	--				V
May 12	5	821				0	4	63	94	98	99	100				SV
May 25	5	738				0	2	49	95	99	100	--				SV
July 20	5	305				0	1	30	86	98	100	--				SV
Aug. 17	5	668				0	2	27	87	97	99	100				SV
MIDDLE LOUP RIVER AT ST. PAUL, NEBR																
Oct. 5, 1953	3	755				0	1	24	81	95	98	100				SV
Oct. 21	3	834				0	1	22	61	87	95	99	100			SV
NORTH LOUP RIVER AT BURWELL, NEBR.																
Oct. 5, 1953	3	382				0	1	23	71	85	91	96	99			SV
Apr. 12, 1954	3	590				0	1	34	81	89	94	97	100			SV
May 10	3	653				--	0	14	69	89	95	98	100			SV
Aug. 2	3	227				0	1	28	87	96	98	100	--			SV
Sept. 13	3	365				0	1	31	76	90	95	99	100			SV
CALAMUS RIVER NEAR BURWELL, NEBR.																
Feb. 9, 1954	3	386				0	1	26	73	86	90	95	98			SV
Apr. 12	3	348				0	1	32	90	98	98	99	100			SV
June 21	3	390				0	1	36	83	93	95	98	100			SV
Aug. 2	3	306				0	4	39	75	88	93	97	100			SV
Aug. 30	3	253				0	1	31	81	94	97	99	100			SV

NORTH LOUP RIVER AT ORD, NEBR.

Oct. 5, 1953.....	3	652					0	1	21	67	87	93	97	99			SV
Oct. 20	3	741					0	1	18	60	80	89	96	99			SV
May 11, 1954	3	1,220					0	1	28	75	88	92	96	99			SV
June 22	5	920					0	1	19	65	86	92	98	100			SV
Sept. 14.....	5	612					--	0	22	72	92	97	99	100			SV

NORTH LOUP RIVER NEAR COTESFIELD, NEBR.

Oct. 5, 1953.....	3	711					1	8	40	84	95	98	99	100			SV
Oct. 20	3	889					0	1	24	73	89	94	99	100			SV

NORTH LOUP RIVER NEAR ST. PAUL, NEBR.

Oct. 5, 1953.....	3	646					0	1	13	47	68	83	91	98			SV
Oct. 21	3	738					0	3	39	86	96	99	100				SV

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MISSOURI RIVER MAIN STEM--Continued

MISSOURI RIVER AT NEBRASKA CITY, NEBR.

LOCATION.--At gaging station at Waubonsie Highway Bridge at Nebraska City, Otoe County.
DRAINAGE AREA.--414,400 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: January 1951 to September 1954.
Water temperatures: May 1951 to September 1954.
EXTREMES, 1953-54.--Dissolved solids: Maximum, 548 ppm Jan. 14 to Feb. 9; minimum, 273 ppm June 23-25.
Hardness: Maximum, 274 ppm Jan. 14 to Feb. 9; minimum, 159 ppm June 23-25.
Specific conductance: Maximum daily, 895 micromhos Jan. 22; minimum daily, 422 micromhos June 24.
Water temperatures: Maximum, 83°F July 17, 20; minimum, freezing point on many days during December to March.
EXTREMES, 1951-54.--Dissolved solids: Maximum, 600 ppm Jan. 1-10, 1952; minimum, 273 ppm June 23-25, 1954.
Hardness: Maximum, 344 ppm Jan. 1-10, 1952; minimum, 159 ppm June 23-25, 1954.
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 regional office at Lincoln, Nebr. Records of discharge for water year October 1953 to September 1954 given in WSP 1340.

Chemical analyses, in parts per million, water year October 1953 to September 1954

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
Oct. 1-31, 1953	34,920	-	--	--	--	61	--	188		182	--	--	--	--	470	0.64	44,310	228	74	37	1.7	697	7.9
Nov. 1-30	21,640	--	--	--	--	56	--	193		162	--	--	--	--	451	.61	30,000	228	70	35	1.6	675	7.8
Dec. 1-23	21,700	16	0.00	63	18	57	5.2	198		165	20	0.5	3.0	0.12	467	.64	27,360	233	71	34	1.6	687	7.7
Dec. 24-Jan. 13, 1954	13,380	--	--	--	--	63	--	226		167	--	--	--	--	507	.69	18,320	260	75	35	1.7	760	7.7
Jan. 14-Feb. 9	11,940	--	--	--	--	71	--	231		188	--	--	--	--	548	.75	17,670	274	85	36	1.9	818	7.8
Feb. 10-28	27,960	--	--	--	--	48	--	190		136	--	--	--	--	414	.56	31,250	217	61	33	1.4	629	8.0
Mar. 1-31	33,940	19	.00	68	21	57	6.2	207		178	18	.5	4.2	.12	484	.66	44,350	254	84	32	1.6	727	7.8
Apr. 1-30	35 330	--	--	--	--	58	--	209		178	--	--	--	--	485	.66	46,260	252	81	33	1.6	731	7.8
May 1-2	40,600	--	--	--	--	67	--	189		182	--	--	--	--	483	.66	52,950	229	74	39	1.9	737	7.9
May 3-6	46,380	--	--	--	--	57	--	190		161	--	--	--	--	449	.61	56,230	222	66	36	1.7	684	7.6
May 7-June 1	35,950	--	--	--	--	64	--	194		184	--	--	--	--	480	.65	46,590	232	73	37	1.8	731	7.9
June 2-5	46,500	--	--	--	--	56	--	195		137	--	--	--	--	402	.55	50,470	213	53	34	1.5	631	7.5
June 6-19	41,360	--	--	--	--	53	--	180		148	--	--	--	--	416	.57	46,460	208	60	36	1.6	638	7.8
June 20-22	94,000	14	.02	56	14	41	6.8	182		123	9.0	.6	5.1	.10	375	.51	95,180	199	50	30	1.3	575	8.2
June 23-25	80 570	--	--	--	--	23	--	148		81	--	--	--	--	273	.37	59,390	159	38	24	.8	426	7.7
June 26-28	58,230	--	--	--	--	23	--	152		85	--	--	--	--	289	.39	45,440	172	47	23	.8	445	7.7
June 29-July 1	44,130	--	--	--	--	34	--	187		127	--	--	--	--	382	.52	45,520	226	73	25	1.0	588	7.9
July 2-31	34,790	--	--	--	--	69	--	192		204	--	--	--	--	498	.68	46,780	241	84	38	1.9	752	7.7
Aug. 1-10	37,100	--	--	--	--	67	--	176		174	--	--	--	--	440	.60	44,070	202	58	42	2.1	681	7.4
Aug. 11-21	34,030	--	--	--	--	57	--	174		146	--	--	--	--	389	.53	35,740	186	43	40	1.8	610	7.4
Aug. 22-25	42,550	--	--	--	--	43	--	167		107	--	--	--	--	323	.44	37,110	170	33	35	1.4	521	7.4
Aug. 26-Sept. 14	33 560	14	.00	47	14	45	5.4	164		121	15	.5	.7	.13	347	.47	31,440	174	40	35	1.5	536	7.4
Sept. 15-30	34,410	--	--	--	--	48	--	170		131	--	--	--	--	363	.49	33,730	190	51	35	1.5	576	7.4
Weighted average a	31,630	--	--	--	--	56	--	190		162	--	--	--	--	443	0.60	37,830	223	67	35	1.6	672	--

a Represents 100 percent of runoff for water year October 1953 to September 1954.

MISSOURI RIVER MAIN STEM--Continued

MISSOURI RIVER AT NEBRASKA CITY, NEBR.--Continued

Temperature (°F) of water, water year October 1953 to September 1954
/Once-daily measurement at 2 p.m., Oct. 1 to Apr. 5; at 7 a.m., Apr. 6 to Sept. 30/

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

a Reading obtained at 7 p.m.

NISHNABOTNA RIVER BASIN

DAVIDS CREEK NEAR HAMLIN, IOWA

LOCATION.--At gaging station, downstream side of bridge on State Highway 64, 5.2 miles east of Hamlin, Audobon County, and 8 miles upstream from mouth and East Nishnabotna River

DRAINAGE AREA.--26.1 square miles.
RECORDS AVAILABLE.--Water temperatures: July 1952 to September 1953.
Sediment records: July 1952 to September 1954.
EXTREMES, 1953-54.--Sediment concentrations: Maximum daily, 7,200 ppm June 15; minimum daily, no flow Jan. 14.
Sediment loads: Maximum daily, 1,000 tons June 15, 21; minimum daily, 0 tons Jan. 14.
EXTREMES, 1952-54.--Sediment concentrations: Maximum daily, 7,200 ppm June 15, 1954; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 6,290 tons June 4, 1953; minimum daily, 0 tons on many days.
REMARKS.--Flow affected by ice Dec. 12-14, 16, 21, 22, 28-30, Jan. 5, 9, 10, 12, Jan. 16 to Feb. 14, Mar. 3. Records of discharge for water year October 1953 to September 1954 given in WSP 1340.

Suspended sediment, water year October 1953 to September 1954

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	0.1	--		0.2	--		0.4	--	
2	.2	--		.2	--		.6	--	
3	.1	87		.2	--		1.0	60	
4	.1	--		.2	--		1.0	--	
5	.2	--	(t)	.2	--		.6	64	e 0.1
6	.1	--		.2	--	(t)	.6	--	
7	.1	125		.2	83		.6	--	
8	.3	--		.2	--		.5	--	
9	.3	--		.2	--		.3	--	
10	.2	123		.2	--		.3	--	
11	.2	--		.3	--		.3	--	
12	.1	--		.5	--		.3	55	
13	.3	--		1.2	--		.3	--	
14	.2	--		.6	87		.2	--	(t)
15	.3	--		.4	--	e 0.1	.2	--	
16	.1	--		.5	--		.2	--	
17	.3	83		.4	--		.1	--	
18	.3	--		.4	--		.1	--	
19	.3	--	e 0.1	.8	--		.2	25	
20	.3	--		1.4	60	.2	.2	--	
21	.2	--		.9	65	.2	.2	--	
22	.3	--		.6	--		.1	--	
23	.3	--		.6	--		.1	--	
24	.3	75		.6	--		.1	--	
25	.3	--		.3	--		.2	--	(t)
26	.4	--		.3	--	e .1	.2	26	
27	.6	--		.6	--		.2	--	
28	.3	--		.3	118		.2	--	
29	.3	--		.4	57		.2	--	
30	.3	--		.6	--		.2	--	
31	.2	80	(t)	--	--	--	.2	--	
Total	7.6	--	2.5	13.7	--	2.6	9.9	--	1.3

e Estimated.
t Less than 0.050 ton.

NISHNABOTNA RIVER BASIN--Continued

DAVIDS CREEK NEAR HAMLIN, IOWA--Continued

Suspended sediment, water year October 1953 to September 1954--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	0.2	--		0.2	--		0.8	--	
2	.2	22		.2	--		.6	--	
3	.2	--		.2	--		.4	--	
4	.2	--		.2	25		.3	--	(t)
5	.2	--		.3	--		.3	--	
6	.2	--		.3	--		.4	37	
7	.2	--	(t)	.3	--	(t)	.6		
8	.2	22		.3	--		.8		
9	.1	--		.3	--		.8		
10	.1	--		.3	--		.8	--	e 0.1
11	.1	--		.3	--		.7		
12	.1	--		.3	--		.6		
13	.1	--		.4	25		.3	--	
14	0	--	0	.9	45	a 0.1	.2	24	(t)
15	.1			1.0	148	.4	.4	--	
16	.1			.7			1.2		
17	.1			.6	--	e .2	1.6		
18	.1			.6			1.3	--	e .4
19	.1			1.2	140	a .5	1.3		
20	.1			3.8	192	2.0	.8	77	
21	.1			1.2			.7	--	
22	.1			.8			.8	--	e .2
23	.1	--	(t)	1.2	--	e .3	.7	--	
24	.1			.7			1.0	--	
25	.1			1.3	--		1.4	72	.3
26	.1			1.0	--	e .1	.8	--	e .1
27	.1			1.3	26		.8	49	.1
28	.1			.8	--		2.5	96	a .6
29	.1			--	--	--	.8		
30	.1			--	--	--	1.3	--	e .3
31	.1			--	--	--	1.4		
Total	3.8	--	0.2	20.7	--	5.4	26.4	--	5.5

Day	April			May			June		
1	1.3	79		3.6	188	1.8	2.4	77	0.5
2	1.4	--		10	540	sa 20	1.6	142	.6
3	.7	53	e 0.2	6.1	410	6.8	3.4	199	1.8
4	.7	--		3.1	128	1.1	1.8	125	.6
5	1.2	70	a .2	2.0	100	a .5	1.2	--	e .4
6	2.5	190	1.3	1.8	110	sb .6	.9		
7	1.5	160	.6	1.5	79		.9		
8	.8	--		1.2	77		.7		
9	.7	--		1.0	--	e .2	.7		
10	.7	116	e .2	1.0	52		.7	116	.2
11	.6	--		1.3	83	sb .4	.6		
12	.6	--		1.2	100	a .3	.6		
13	.5	--		.7			.6		
14	.4	99		.7			.7		
15	.6	--		.7			36	7,200	sb 1,000
16	.7	73	e .1	.7			4.7	650	8.2
17	.4	122		.6			2.3	292	1.8
18	.4	--		.6	67	.1	1.5	200	.8
19	.4	73		.7			1.2	198	.6
20	.6	--		.6			1.4	140	sb 1.0
21	3.1	190	sb 2.0	.6			50	5,800	sb 1,000
22	1.3	100	a .4	.6			6.1	1,050	17
23	.7			.6			2.3	346	2.1
24	.7			.8	65	sb .2	1.5	200	.8
25	.8			.8	75	a .2	1.4	167	.6
26	.8	83	.2	.6	64	.1	.9		
27	.9			1.4	--	e .2	.7		
28	.7			2.1	61	.3	.7	79	.2
29	.6			1.3	78	.3	.7		
30	2.6	110	sb .8	.6	--	e .2	.6		
31	--	--	--	.8	102	.2	--	--	--
Total	28.9	--	9.3	49.3	--	35.1	128.8	--	2,039.6

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.

NISHNABOTNA RIVER BASIN--Continued

DAVIDS CREEK NEAR HAMLIN, IOWA--Continued

Suspended sediment, water year October 1953 to September 1954--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	0.5			0.1	--		1.3		
2	.3			.1	--		1.0		
3	.4			.1	36		.9		
4	.5			.1	--		.7		
5	.4	88	0.1	.1	--	(t)	.6	71	0.1
6	.3			.1	--		.4		
7	.2			.2	48		.4		
8	.3			.3	--		.5		
9	.2			.3	--		.6		
10	.2			.3	--		.6		
11	.2			.3	41		.4	49	.1
12	.1			.3	--		.3	--	
13	.1			.3	--		.3	37	(t)
14	.1			.3	47		.4	--	
15	.2	50	(t)	.1	--	(t)	.7	73	sb .2
16	.2			.2	--		.5	--	
17	.1			.4	--		.6	--	
18	.1			.3	29		.5	61	e .1
19	.2			.3	--		.4	--	
20	.2			.3	--		.5	57	
21	.1			6.5	760	sa 76	.3	--	
22	.1			22	990	sb 150	.4	--	
23	.2			90	2,400	sb 890	.3	--	
24	.1			19	709	sb 43	.3	--	
25	.1			4.7	248	3.1	.3	36	(t)
26	.1	39	(t)	6.2	250	sb 4.6	.3	--	
27	.1			9.7	365	9.6	.3	--	
28	.1			5.3	192	2.7	.6	--	e .1
29	.1			2.7	147	1.1	.9	83	.2
30	.1			1.8	100	.5	1.2	107	.3
31	.1			2.1	62	.4	--	--	--
Total	6.0	--	1.3	174.5	--	1,181.5	16.5	--	2.6

Total discharge for year (cfs-days) 486.1
Total load for year (tons) 3,286.9

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.

DAVIDS CREEK NEAR HAMLIN, IOWA--Continued

Particle-size analyses of suspended sediment, June to August 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed)

Date of collection	Time	Discharge (cfs)	Water temperature (°F)	Suspended sediment											Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters									
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
June 15, 1954	10:00 a.m.	44	67	9,360	6,980		69		92		99						SPWCM
June 21	8:15 a.m.	107	68	10,100	6,660		60		85		97	97		100			SPWCM
Aug. 22	10:20 a.m.	20	69	971	3,710		86		95		100						SPWCM
Aug. 27	2:00 p.m.	14	75	405	1,500		77		96		99						SPWCM

KANSAS RIVER BASIN

REPUBLICAN RIVER AT STRATTON, NEBR.

LOCATION.--At gaging station, half a mile south of Stratton, Hitchcock County, half a mile downstream from Muddy Creek, 10 miles upstream from Trenton Dam, and 19 miles downstream from South Fork Republican River.
DRAINAGE AREA.--7,940 square miles, approximately, of which about 1,740 square miles contribute directly to surface runoff.
RECORDS AVAILABLE.--Water temperatures: December 1950 to September 1951, February 1953 to June 1954 (discontinued).
Sediment records. December 1950 to September 1951, February 1953 to June 1954 (discontinued).
EXTREMES, October 1953 to June 1954.--Water temperatures: Minimum, freezing point on many days during November to March.
Sediment concentrations: Maximum daily, 6,150 ppm June 13, minimum daily, no flow on many days.
Sediment loads: Maximum daily, 9,330 tons June 13; minimum daily, 0 tons on many days.
EXTREMES, 1950-51.--Water temperatures: Maximum (1950-51), 94°F July 20, Aug. 2, 1951, minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 19,400 ppm Sept. 3, 1951; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 485,000 tons Sept. 3, 1951; minimum daily, 0 tons on many days.
REMARKS.--Flow affected by ice Nov. 5-7, 19-25, Dec. 3 to Feb. 3, Feb. 28, Mar. 2-6, 12, 13. Records of discharge for water year October 1953 to September 1954 given in WSP 1340.

Temperature (°F) of water, October 1953 to June 1954
(Once-daily measurement between 7 a.m. and 9 a.m. Many days of no flow.)

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

a Reading obtained between 10 a.m. and 3 p.m.

KANSAS RIVER BASIN--Continued

REPUBLICAN RIVER AT STRATTON, NEBR.--Continued

Suspended sediment, October 1953 to June 1954

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	28	190	14	91	140	34
2	0	--	0	26	200	14	87	130	31
3	0	--	0	26	160	11	64	--	e 17
4	0	--	0	32	190	16	38	42	4
5	0	--	0	43	200	23	52	42	6
6	0	--	0	61	390	64	80	100	22
7	0	--	0	95	380	97	105	94	27
8	0	--	0	76	370	76	83	57	13
9	0	--	0	73	250	49	114	54	17
10	0	--	0	67	210	38	96	44	11
11	0	--	0	61	170	28	88	39	9
12	0	--	0	61	150	25	94	120	30
13	0	--	0	58	140	22	86	71	16
14	0	--	0	61	160	26	99	260	69
15	0	--	0	73	180	35	78	56	12
16	0	--	0	76	150	31	68	67	12
17	0	--	0	80	210	45	70	81	15
18	0	--	0	64	180	31	73	70	14
19	0	--	0	57	150	23	91	76	19
20	0	--	0	20	69	4	130	110	39
21	0	--	0	41	63	7	144	100	39
22	0	--	0	44	81	10	64	86	15
23	0	--	0	54	110	16	50	55	7
24	0	--	0	103	97	27	83	54	12
25	2.0	--	e 2	162	230	100	106	55	16
26	12	--	e 12	230	300	190	108	52	15
27	22	320	19	138	240	89	105	46	13
28	28	300	23	119	270	87	100	76	21
29	28	260	20	95	140	36	98	71	19
30	32	190	16	91	140	34	105	140	40
31	30	170	14	--	--	--	108	56	16
Total	154.0	--	106	2,215	--	1,268	2,758	--	630

	January			February			March		
1	117	27	9	275	110	82	91	370	91
2	117	38	12	337	170	150	60	550	89
3	124	110	37	350	500	470	70	170	32
4	130	110	39	195	600	320	75	130	26
5	146	55	22	110	720	210	120	480	160
6	150	53	21	119	590	190	90	540	130
7	163	66	29	119	590	190	133	1,000	360
8	157	96	41	128	500	170	138	700	260
9	130	120	42	172	360	170	138	1,020	380
10	66	--	e 30	167	500	230	138	1,320	490
11	68	85	16	147	500	200	156	780	330
12	64	73	13	128	550	190	130	1,070	380
13	100	43	12	133	480	170	90	450	110
14	80	140	30	142	520	200	128	390	130
15	84	54	12	142	410	160	183	760	380
16	87	160	38	138	390	150	183	700	350
17	76	260	53	133	350	130	206	1,000	560
18	42	90	10	142	390	150	156	860	360
19	34	68	6	152	860	350	138	820	310
20	29	90	7	119	--	e 260	128	630	220
21	33	110	10	123	650	220	147	610	240
22	38	110	11	123	600	200	147	630	250
23	41	71	8	119	680	220	152	720	300
24	44	46	5	119	350	110	167	730	330
25	55	78	12	87	470	110	167	620	280
26	64	90	16	87	520	120	156	550	230
27	63	75	13	76	460	94	142	630	240
28	62	68	12	76	600	120	123	530	180
29	68	63	12	--	--	--	119	520	170
30	84	--	e 12	--	--	--	103	600	170
31	133	37	13	--	--	--	110	530	160
Total	2,650	--	603	4,158	--	5,336	4,084	--	1,698

e Estimated.

KANSAS RIVER BASIN--Continued

REPUBLICAN RIVER AT STRATTON, NEBR.--Continued

Suspended sediment, October 1953 to June 1954--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	119	490	160	67	550	99	35	--	e 34
2	133	880	320	106	620	180	248	2,730	s 1,910
3	128	750	260	138	510	190	147	1,340	530
4	128	510	180	152	640	260	76	550	110
5	128	390	130	142	600	230	49	330	44
6	128	300	100	114	650	200	30	230	19
7	119	360	120	64	490	85	28	220	17
8	114	400	120	41	440	49	26	120	8
9	106	420	120	50	450	61	19	140	7
10	110	340	100	64	300	52	15	97	4
11	103	320	89	76	360	74	10	80	2
12	110	330	98	91	310	76	5.0	83	1
13	99	360	96	104	460	130	291	6,150	s 9,330
14	95	370	95	95	280	72	277	5,650	s 4,600
15	87	330	78	91	300	74	106	2,300	660
16	76	290	60	91	260	64	50	600	81
17	64	280	48	156	1,100	460	30	390	32
18	58	250	39	236	2,100	1,340	30	580	47
19	58	180	28	236	1,310	830	30	820	66
20	58	400	63	172	590	270	70	780	150
21	67	850	150	123	380	130	45	600	73
22	61	360	59	91	310	76	29	400	31
23	64	250	43	67	250	45	10	230	6
24	64	240	41	53	170	24	0	--	0
25	58	210	33	52	180	25	0	--	0
26	55	260	39	79	940	s 320	0	--	0
27	46	300	37	67	690	120	0	--	0
28	58	270	42	52	310	44	0	--	0
29	52	240	34	41	200	22	0	--	0
30	49	140	19	30	160	13	0	--	0
31	--	--	--	20	150	8	--	--	--
Total	2,595	--	2,801	2,961	--	5,623	1,656.0	--	17,762

Total discharge for period Oct. 1, 1953 to June 30, 1954 (cfs-days) 23,231.0

Total load for period Oct. 1, 1953 to June 30, 1954 (tons) 41,827

e Estimated.

s Computed by subdividing day.

REPUBLICAN RIVER AT STRATTON, NEBR.--Continued

Particle-size analyses of suspended sediment, November 1953 to June 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation, P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; V, visual accumulation tube)

Date of collection	Time	Discharge (cfs)	Water temperature (°F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000
Nov. 6, 1953	8:30 a.m.	a 61	33	362	463	70	80	83	84	86	90	97	100	--	--		BWCM
Jan. 4, 1954	11:15 a.m.	a 130	--	344	--	--	--	--	--	--	17	30	96	100	--		V
Jan. 4	12:10 p.m.	a 130	--	243	--	--	--	--	--	--	30	44	86	98	100		V
Mar. 18	7:35 a.m.	178	42	982	3,480	--	47	--	56	--	64	77	97	100	--		VPWCM
May 4	7:30 a.m.	156	46	717	2,160	--	34	--	43	--	62	77	97	100	--		VPWCM
May 17	12:45 p.m.	156	59	778	2,690	--	41	--	48	--	72	87	99	100	--		VPWCM
May 18	5:30 p.m.	250	74	2,560	2,560	26	31	35	38	42	54	64	84	94	100		VPWCM
May 18	5:30 p.m.	250	74	2,560	2,610	4	7	34	37	40	54	64	84	94	100		VPNM
June 1	11:30 p.m.	114	58	768	1,480	--	36	--	46	--	63	76	98	100	--		VPWCM
June 2	8:00 a.m.	341	55	4,480	4,890	--	40	--	48	--	70	88	98	100	--		VPWCM
June 3	10:50 a.m.	152	60	1,260	3,010	61	76	--	82	--	86	93	99	100	--		VPWCM
June 3	10:50 a.m.	152	60	1,260	3,010	4	10	67	80	80	86	93	99	100	--		VPNM
June 13	1:30 p.m.	602	73	15,800	13,400	--	50	--	65	--	75	86	98	100	--		VPWCM
June 13	3:00 p.m.	818	73	16,400	4,280	--	47	--	59	--	66	74	94	99	100		VPWCM
June 13	5:00 p.m.	541	68	12,500	4,450	--	54	--	67	--	73	80	93	98	100		VPWCM
June 14	10:15 a.m.	282	--	5,460	5,260	65	82	89	92	93	95	97	100	--	--		VPWCM
June 14	10:15 a.m.	282	--	5,460	5,310	4	7	59	92	94	95	97	100	--	--		VPNM
June 15	9:30 a.m.	114	69	3,260	4,240	--	53	--	58	--	60	61	76	93	99	100	VPWCM
June 17	3:00 p.m.	a 30	86	364	1,600	--	79	--	91	--	94	--	--	--	--		SPWCM

a Daily mean discharge.

KANSAS RIVER BASIN--Continued

RED WILLOW CREEK NEAR RED WILLOW, NEBR.

LOCATION.--At gaging station at bridge on U. S. highways 6 and 34, three-quarters of a mile north of Red Willow, Red Willow County, and 2½ miles upstream from mouth.
DRAINAGE AREA.--710 square miles, approximately, of which about 400 square miles contribute directly to surface runoff.
RECORDS AVAILABLE.--Chemical analyses: October 1950 to October 1952.
Water temperatures: January 1950 to September 1953.
Sediment records: January 1950 to November 1953 (discontinued).
EXTREMES, 1950-53.--Sediment concentrations: Maximum daily, 41,300 ppm July 18, 1951; minimum daily, 80 ppm Jan. 9, 1952.
Sediment loads: Maximum daily, 60,600 tons May 21, 1951; minimum daily, 4 tons Jan. 5, 1950.
REMARKS.--Flow affected by ice Nov. 6, 7. Records of discharge for water year October 1953 to September 1954 given in WSP 1340.

Suspended sediment, October to November 1953

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	14	181	6.8	28	680	51			
2	14	181	6.8	28	710	54			
3	14	181	6.8	28	700	53			
4	15	157	6.4	30	810	66			
5	15	164	6.6	31	730	61			
6	15	173	7.0	28	680	51			
7	16	186	8.0	30	880	71			
8	17	234	11	39	1,660	175			
9	18	231	11	39	1,070	113			
10	18	260	13	--	--	--			
11	18	269	13	--	--	--			
12	18	269	13	--	--	--			
13	18	245	12	--	--	--			
14	18	240	12	--	--	--			
15	19	272	14	--	--	--			
16	19	290	15	--	--	--			
17	20	312	17	--	--	--			
18	20	357	19	--	--	--			
19	21	374	21	--	--	--			
20	21	357	20	--	--	--			
21	29	1,810	s 154	--	--	--			
22	25	700	47	--	--	--			
23	33	1,400	125	--	--	--			
24	32	1,100	95	--	--	--			
25	30	920	75	--	--	--			
26	30	840	68	--	--	--			
27	32	920	79	--	--	--			
28	30	810	66	--	--	--			
29	30	790	64	--	--	--			
30	30	770	62	--	--	--			
31	29	700	55	--	--	--			
Total	678	--	1,129.4	281	--	695			

Total discharge for period Oct. 1 to Nov. 9, 1953 (cfs-days) 959
Total load for period Oct. 1 to Nov. 9, 1953 (tons) 1,824.4

s Computed by subdividing day.

REPUBLICAN RIVER ABOVE MEDICINE CREEK AT CAMBRIDGE, NEBR.

LOCATION.--At bridge south of Cambridge, Furnas County, on State Highway 47, 1 mile upstream from gaging station at Cambridge, a quarter of a mile upstream from confluence with Medicine Creek, and 2.3 miles upstream from Cambridge diversion dam.
DRAINAGE AREA.--13,200 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: December 1950 to September 1954.
Water temperatures: December 1950 to September 1954.
EXTREMES, 1953-54.--Dissolved solids: Maximum, 394 ppm June 19-30; minimum, 196 ppm July 26-29.
Hardness: Maximum, 236 ppm Dec. 1-31; minimum, 126 ppm July 26-29.
Specific conductance: Maximum daily, 726 micromhos Jan. 21; minimum daily, 267 micromhos Aug. 17.
Water temperatures: Maximum, 92°F June 17, 23; minimum, freezing point on many days during December to March.
EXTREMES, 1950-54.--Dissolved solids: Maximum (1951-54), 444 ppm Nov. 26 to Dec. 3, 1952; minimum, 190 ppm Sept. 1-5, 1953.
Hardness: Maximum, 272 ppm Nov. 26 to Dec. 3, 1952; minimum, 113 ppm Sept. 1-5, 1953.
Specific conductance: Maximum daily (1951-54), 830 micromhos Aug. 21, 1952; minimum daily, 267 micromhos Aug. 17, 1954.
Water temperatures: Maximum, 97°F Aug. 19, 1952, July 28, 1953; minimum, freezing point on many days during winter months.
REMARKS.--Daily samples for chemical analysis composited by discharge. Records of specific conductance of daily samples available in regional office at Lincoln, Nebr. Water discharge computed by subtracting the discharge of Medicine Creek at Cambridge from that of the Republican River at Cambridge. Discharge records for the Republican River at Cambridge and Medicine Creek at Cambridge for water year October 1953 to September 1954 given in WSP 1340.

Chemical analyses, in parts per million, water year October 1953 to September 1954

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as $CaCO_3$		Percent sodium	Sodium adsorption ratio	Specific conductance (micromhos at 25°C)	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Noncarbonate				
Oct. 24-Nov. 3, 1953.	38.7	--	--	--	--	31	--	300	0	46	--	--	--	--	387	0.53	40.4	229	0	23	0.9	581	8.0
Nov. 4-30	129	--	--	--	--	29	--	291	0	41	--	--	--	--	362	.49	126	224	0	22	.8	553	8.0
Dec. 1-31	129	52	0.00	63	19	30	14	306	0	42	10	1.1	4.4	0.12	393	.53	137	236	0	20	.8	572	8.1
Jan. 1-31, 1954	107	--	--	--	--	30	--	301	0	43	--	--	--	--	386	.52	112	234	0	22	.8	578	8.0
Feb. 1-28	187	48	.00	56	16	25	13	264	0	34	8.5	.8	4.2	.12	336	.46	170	204	0	20	.8	498	8.0
Mar. 1-31	132	--	--	--	--	29	--	298	0	40	--	--	--	--	386	.52	138	229	0	22	.8	556	8.2
Apr. 1-18	123	--	--	--	--	31	--	286	0	42	--	--	--	--	379	.52	126	215	0	24	.9	551	8.2
Apr. 19-30	71.8	--	--	--	--	33	--	283	5	47	--	--	--	--	386	.52	74.8	220	0	25	1.0	572	8.2
May 1-17	117	44	.00	51	18	32	15	267	0	45	11	.9	3.3	.13	355	.48	112	200	0	24	1.0	537	8.0
May 18-21	259	--	--	--	--	27	--	248	0	38	--	--	--	--	341	.46	238	184	0	24	.9	495	7.5
May 22-31	150	--	--	--	--	31	--	286	0	46	--	--	--	--	371	.50	150	214	0	24	.9	558	8.0
June 1-10	99.2	--	--	--	--	32	--	274	0	42	--	--	--	--	364	.50	97.5	201	0	26	1.0	536	7.7
June 11-14	27.5	--	--	--	--	34	--	282	0	46	--	--	--	--	367	.50	27.2	200	0	27	1.0	548	8.0
June 15-18	91.0	--	--	--	--	27	--	236	0	39	--	--	--	--	315	.43	71.4	171	0	25	.9	471	7.6
June 19-30	11.3	--	--	--	--	34	--	293	5	38	--	--	--	--	394	.54	12.0	209	0	26	1.0	551	8.2
July 26-29	36.3	--	--	--	--	7.5	--	176	0	4.0	--	--	--	--	196	.27	19.2	126	0	11	.3	296	7.5
Aug. 17-20	319	--	--	--	--	11	--	172	0	16	--	--	--	--	216	.29	186	128	0	15	.4	315	7.5
Aug. 21-25	22.2	--	--	--	--	17	--	204	0	22	--	--	--	--	267	.36	16.0	146	0	19	.6	381	7.7
Sept. 21-30	26.5	40	.00	40	19	34	17	251	0	50	11	1.0	1.2	.22	339	.46	24.3	178	0	27	1.1	513	7.4
Weighted average a	b 116	--	--	--	--	28	--	c 280	--	40	--	--	--	--	361	0.49	113	213	0	22	0.8	534	--
Weighted average d	87.7	--	--	--	--	28	--	c 280	--	40	--	--	--	--	361	0.49	85.5	213	0	22	0.8	534	--

a Represents 99 percent of runoff for water year October 1953 to September 1954.
b Average for periods of sampling only.
c Includes carbonate as bicarbonate.
d Includes estimated data for missing periods. Represents 100 percent of runoff for water year.

KANSAS RIVER BASIN--Continued

REPUBLICAN RIVER ABOVE MEDICINE CREEK AT CAMBRIDGE NEBR.--Continued

Temperature (°F) of water, water year October 1953 to September 1954
(Once-daily measurement between 1 p.m. and 3 p.m.)

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

a Reading obtained between 4 p.m. and 6 p.m.
b Reading obtained between 9 a.m. and 11 a.m.

KANSAS RIVER BASIN--Continued

MEDICINE CREEK AT MAYWOOD, NEBR.

LOCATION.--At bridge on U. S. Highway 83, 150 feet upstream from gaging station, a quarter of a mile east of Maywood, Frontier County, and 5 miles upstream from Brushy Creek.
DRAINGAE AREA.--207 square miles, of which 82 square miles contribute directly to surface runoff.
RECORDS AVAILABLE.--Water temperatures: April 1951 to September 1954.
Sediment records: April 1951 to September 1954.
EXTREMES, 1953-54.--Water temperatures: Maximum, 84°F July 4; minimum, freezing point Jan. 21, 22, and probably on several other days during winter months.
Sediment concentrations: Maximum daily, 4,550 ppm May 16; minimum daily, not determined.
Sediment loads: Maximum daily, 2,150 tons May 16; minimum daily, not determined.
EXTREMES, 1951-54.--Water temperatures: Maximum, 86°F July 13, 1953; minimum, freezing point on several days during winter months.
Sediment concentrations: Maximum daily, 20,000 ppm July 12, 1951; minimum daily, 34 ppm Oct. 28, 1952.
Sediment loads: Maximum daily, 22,700 tons May 20, 1951; minimum daily, 2 tons Oct. 27, 28, 1952.
REMARKS.--Flow affected by ice Nov. 21-23, Dec. 3-7, 9, 10, 12, 14, 21-25, Jan. 10, Jan. 13 to Feb. 1, Mar. 2-5, 13, 14. Records of discharge for water year October 1953 to September 1954 given in WSP 1340.

Temperature (°F) of water, water year October 1953 to September 1954
(Once-daily measurement between 7 a.m. and 12 m.)

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

a Reading obtained between 1 p.m. and 7 p.m.

KANSAS RIVER BASIN--Continued

MEDICINE CREEK AT MAYWOOD, NEBR.--Continued

Suspended sediment, water year October 1953 to September 1954

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	15	167		23	--		27	--	
2	16	189		23	145	a 9	27	112	
3	16	112		23	--		25	--	
4	17	--		27	211	15	27	376	
5	17	146	a 7	31	222	19	30	--	a 22
6	18	--		32	--		28	341	
7	19	165		33	178		27	--	
8	19	--		33	148		26	353	
9	18	155		33	145		25	--	
10	18	--		33	154		27	394	
11	19	146		33	131		26	--	
12	19	--		32	160		26	161	
13	19	194		34	--	a 13	28	--	
14	20	--		34	153		27	121	
15	20	192	a 10	32	--		28	122	
16	20	--		30	152		27	112	
17	21	208		29	--		27	--	
18	20	--		28	128		27	98	
19	20	200		28	--		26	--	
20	20	210		28	312		28	154	
21	34	612	s 59	27	--		28	--	a 9
22	39	450	b 48	28	376	a 26	25	81	
23	30	247	20	30	--		27	--	
24	27	202	15	35	228		27	193	
25	30	213	17	35	--		27	--	
26	28	--		31	203		26	154	
27	25	161		30	--		26	--	
28	24	--	a 10	28	129	a 11	26	136	
29	24	174		28	--		26	--	
30	23	--		27	105		25	119	
31	23	131		--	--	--	25	--	
Total	678	--	389	898	--	454	827	--	409

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	26	--		35	--	e 50	28	--	
2	27	163		35	455	43	25	395	e 26
3	27	--		35	432	41	20	--	
4	26	192		35	364	34	28	696	53
5	27	--		35	393	37	27	979	71
6	27	163		35	256	24	23	--	
7	28	--		34	286	26	25	401	
8	29	237	a 13	33	309	28	25	--	
9	28	--		34	--		26	--	
10	26	117		33	377		27	--	
11	24	118		31	--		27	358	e 28
12	23	140		28	218		28	--	
13	22	--		29	--		27	--	
14	23	345		31	299		29	--	
15	20	--		31	--		28	--	
16	15	--		30	375		31	--	
17	18	--		30	--		31	--	
18	20	180		30	236		30	315	
19	18	--		31	--	a 28	29	--	
20	17	--		32	334		28	240	
21	17	82		31	--		27	190	a 17
22	23	121	a 6	31	408		27	--	
23	20	--		31	--		27	200	
24	23	104		29	397		28	219	
25	15	--		31	--		28	188	
26	15	74		31	378		27		
27	25	92		31	--		25		
28	28	110		29	286		25	--	e 12
29	30	--		--	--	--	24		
30	35	270	26	--	--	--	25		
31	38	550	56	--	--	--	27		
Total	740	--	361	891	--	843	832	--	746

e Estimated.
s Computed by subdividing day.
a Computed on basis of samples obtained about four times a week.
b Computed from estimated concentration graph.

KANSAS RIVER BASIN--Continued

MEDICINE CREEK AT MAYWOOD, NEBR.--Continued

Suspended sediment, water year October 1953 to September 1954--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	28	150	b 11	26	460	32	20	292	16
2	27	159	12	37	724	72	27	735	54
3	24	127	8	39	670	71	24	261	17
4	24	130	8	34	551	51	21	205	12
5	25	180	12	30	560	45	20	240	13
6	24	185	12	28	500	38	19	251	13
7	23	165	10	28	433	33	17	219	10
8	23	148	9	26	409	29	16	212	9
9	23	140	9	26	382	27	15	259	10
10	23	135	8	26	402	28	15	237	10
11	23	144	9	26	407	29	15	249	10
12	23	131	8	27	405	30	14	241	9
13	24	159	10	26	460	32	15	828	s 37
14	23	191	12	24	450	29	23	1,200	s 80
15	24	193	13	46	1,880	s 792	80	3,120	s 722
16	24	185	12	185	4,550	s 2,150	67	1,270	s 291
17	23	171	11	154	1,960	s 984	25	499	34
18	23	188	12	61	840	138	23	394	24
19	24	187	12	39	450	47	21	379	21
20	28	325	25	30	334	27	19	337	17
21	38	,310	s 143	26	274	19	18	304	15
22	32	435	38	24	288	19	16	307	13
23	28	337	25	22	230	14	15	260	11
24	26	510	36	22	198	12	14	262	10
25	25	567	38	21	187	11	13	274	10
26	24	524	34	22	214	13	12	232	8
27	23	444	28	24	278	18	12	192	6
28	23	443	28	23	230	14	12	222	7
29	22	430	26	21	220	b 12	12	239	8
30	23	330	20	20	200	b 11	13	217	8
31	--	--	--	20	230	12	--	--	--
Total	747	--	639	1,163	--	4,839	633	--	1,505

Day	July			August			September		
1	13	215	8	13	207	7	14	149	6
2	12	214	7	14	211	8	13	148	5
3	12	263	9	14	203	8	13	140	5
4	12	227	7	13	182	6	13	153	5
5	12	235	8	12	167	5	14	244	9
6	12	205	7	12	170	6	15	245	10
7	11	221	7	13	175	6	17	222	10
8	11	221	7	15	227	9	16	165	7
9	11	211	6	18	307	15	16	152	7
10	11	210	6	20	363	20	15	146	6
11	11	289	9	18	307	15	14	131	5
12	10	267	7	17	248	11	14	147	6
13	10	227	6	16	223	10	14	158	6
14	9.6	230	6	20	515	s 30	14	142	5
15	9.3	202	5	33	755	67	15	196	8
16	9.4	199	5	24	470	30	16	220	10
17	9.7	203	5	20	370	20	16	199	9
18	10	213	6	46	1,360	s 239	15	165	7
19	10	264	7	96	1,470	381	14	143	5
20	11	241	7	104	1,010	284	14	119	4
21	11	228	7	36	675	66	14	125	5
22	11	218	6	22	405	24	14	92	3
23	12	181	6	18	291	14	14	106	4
24	13	223	8	17	242	11	14	108	4
25	13	224	8	16	207	9	14	107	4
26	13	237	8	15	199	8	14	122	5
27	13	228	8	14	186	7	15	133	5
28	14	210	8	14	193	7	17	187	9
29	14	193	7	14	200	8	17	122	6
30	13	187	7	14	192	7	16	90	4
31	13	189	7	14	185	7	--	--	--
Total	357.0	--	215	732	--	1,345	441	--	184

Total discharge for year (cfs-days) 8,939.0
Total load for year (tons) 11,929

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

KANSAS RIVER BASIN--Continued

MEDICINE CREEK AT MAYWOOD, NEBR.--Continued

Particle-size analyses of suspended sediment, April to August 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed)

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. 21, 1954	9:25 a.m.	46	46	3,140	4,750	--	47	--	78	--	98						SPWCM
May 16	7:10 a.m.	172	--	4,330	2,730	--	38	--	48	--	92						SPWCM
May 16	6:25 p.m.	231	69	2,740	3,360	--	34	--	40	--	92						SPWCM
May 16	10:40 p.m.	238	--	2,300	1,920	41	46	46	47	56	93						SPWCM
May 16	10:40 p.m.	238	--	2,300	1,950	17	43	49	52	63	93						SPNM
May 17	6:15 a.m.	274	--	6,740	8,520	--	31	--	47	--	96						SPWCM
May 28	9:45 a.m.	23	--	226	868	--	53	60	66	83	100						BWCM
June 13	8:00 p.m.	19	--	5,360	6,440	--	34	--	63	--	98						SPWCM
June 15	5:17 a.m.	52	--	3,270	2,490	--	29	--	45	--	96						SPWCM
June 15	2:00 p.m.	98	--	3,430	4,900	29	41	54	63	75	97						SPWCM
June 15	2:00 p.m.	98	--	3,430	5,130	8	20	49	60	73	97						SPNM
Aug. 18	5:10 p.m.	74	69	2,790	3,650	26	38	47	54	70	97						SPWCM
Aug. 18	5:10 p.m.	74	69	2,790	3,790	23	33	44	54	70	97						SPNM
Aug. 18	9:29 p.m.	83	69	2,170	2,800	--	35	--	52	--	95						SPWCM
Aug. 19	7:35 a.m.	94	--	1,640	3,300	--	38	--	50	--	95						SPWCM

Particle-size analyses of bed material, April to August 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; V, visual accumulation tube)

Date of collection	Number of sampling points	Discharge (cfs)	Water temperature (°F)	Bed material											Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	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	
Apr. 15, 1954	3	24					39	72	82	88	90	93	100				SV
Aug. 19	3	101					9	23	31	40	52	62	82	97			SV

KANSAS RIVER BASIN--Continued

BRUSHY CREEK NEAR MAYWOOD, NEBR.

LOCATION.--At bridge on U. S. Highway 83, 150 feet upstream from gaging station, 2 miles south of Maywood, Frontier, County, 2½ miles upstream from Frazier Creek, and 5 miles upstream from mouth.
DRAINAGE AREA.--130 square miles, approximately, of which about 72 square miles contribute directly to surface runoff.
RECORDS AVAILABLE.--Water temperatures: April 1951 to September 1954.
Sediment records: April 1951 to September 1954.
EXTREMES, 1953-54.--*Water temperatures: Maximum, 83°F July 6; minimum, freezing point on* several days during December and January.
Sediment concentrations: Maximum daily, 8,280 ppm June 2; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 10,100 tons May 15; minimum daily, 0 tons on many days.
EXTREMES, 1951-54.--Water temperatures: Maximum, 89°F Aug. 1, 1953; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, 22,700 ppm June 8, 1951; minimum daily, no flow on many days during 1953-54.
Sediment loads: Maximum daily, 58,000 tons Sept. 2, 1951; minimum daily, 0 tons on many days during 1951, 1953-54.
REMARKS.--Maximum observed sediment concentration during water year, 72,400 ppm May 15. Flow affected by ice Nov. 21, 22, Dec. 3-5, Dec. 21 to Feb. 2, May 12, 13. Records of discharge for water year October 1953 to September 1954 given in WSP 1340.

Temperature (°F) of water, water year October 1953 to September 1954
(Once-daily measurement between 6 a.m. and 11 a.m. Many days of no flow)

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

a Reading obtained between 12 m. and 7 p.m.

KANSAS RIVER BASIN--Continued

BRUSHY CREEK NEAR MAYWOOD, NEBR.--Continued

Suspended sediment, water year October 1953 to September 1954

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	0.1	24	(t)	0.1	--		0.6	--	
2	.1	--	(t)	.1	43		.6	23	
3	0	--	0	.1	--		.4	--	
4	.1	22		.2	--		.5	34	
5	.1	--		.2	--		.6	--	
6	.1	--		.3	10		.8	--	
7	.1	--		.4	--		.8	12	
8	.1	--		.4	--		.7	--	
9	.1	30		.4	24		.7	--	
10	.1	--		.4	--		.7	--	
11	.1	--	(t)	.4	--		.6	16	
12	.1	42		.5	--		.6	--	
13	.1	--		.5	73		.6	--	
14	.2	--		.5	83		.6	15	
15	.2	25		.6	--		.7	32	
16	.3	26		.5	25	(t)	.6	--	(t)
17	.4	--		.5	--		.6	--	
18	.4	--		.4	--		.6	24	
19	.4	22		.5	9		.6	--	
20	.6	530	s 2.1	.5	--		.7	--	
21	2.0	659	s 5.0	.5	--		.6	8	
22	.7	--		.4	10		.4	--	
23	.7	18		.6	--		.4	--	
24	.7	--		.7	--		.4	13	
25	.8	--		.6	--		.4	--	
26	.6	20	(t)	.6	--		.5	--	
27	.6	--		.6	10		.5	--	
28	.6	--		.6	--		.5	15	
29	.4	14		.6	--		.5	--	
30	.2	16		.6	11		.5	--	
31	.1	--		--	--	--	.4	--	
Total	11.1	--	7.6	13.3	--	1.1	17.7	--	0.9

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day	Mean discharge (cfs)	Suspended sediment: Mean concentration (ppm)	Suspended sediment: Tons per day
1	0.4	11		1.2	--		0.5	--	
2	.4	12		1.1	33		.3	--	
3	.4	--		.8	--		.5	14	
4	.4	10		.7	--		.5	--	
5	.4	--		.7	41		.7	36	
6	.4	--		.7	--		.7	--	
7	.4	--		.6	--		.6	--	
8	.4	21		.7	--		.7	6	
9	.4	--		.7	6		.7	--	
10	.3	--		.7	--		.8	--	
11	.2	15		.6	--	a 0.1	.8	26	
12	.2	--		.6	16		.7	--	
13	.1	--		.7	--		.8	12	
14	.1	--		.8	--		.9	--	
15	.1	6		.7	--		1.0	--	
16	.1	--	(t)	.7	37		.9	10	(t)
17	.2	--		.7	--		1.0	--	
18	.2	22		.6	22		.8	14	
19	.2	--		.6	--		.7	--	
20	.2	--		.5	50		.7	30	
21	.3	6		.5	--		.7	--	
22	.2	16		.4	--		.7	--	
23	.2	--		.3	22		.8	7	
24	.2	--		.3	--		.9	16	
25	.3	--		.4	--	(t)	.7	--	
26	.3	4		.4	--		.6	26	
27	.3	9		.4	29		.6	--	
28	.2	--		.4	--		.6	--	
29	.3	--		--	--	--	.6	--	
30	.4	14		--	--	--	.6	7	
31	.6	48		--	--	--	.6	--	
Total	8.8	--	0.4	17.5	--	2.3	21.7	--	1.0

s Computed by subdividing day.
t Less than 0.050 ton.
a Computed on basis of infrequent samples.

KANSAS RIVER BASIN--Continued

BRUSHY CREEK NEAR MAYWOOD, NEBR.--Continued

Suspended sediment, water year October 1953 to September 1954--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	0.6			1.1	168	s 0.6	1.1	273	s 2.6
2	.4			1.4	77	.3	12	8,280	s 806
3	.2			.9	64	.2	.8	--	e 1.0
4	.3			.9	23	.1	.8	187	.4
5	.2			.7	20	(t)	.7	81	.2
6	.3			.7	28	.1	.7	52	.1
7	.3			.7	37	.1	.6	68	.1
8	.3			.6			.6	50	.1
9	.5			.6			.6	65	.1
10	.6			.7			.6	60	.1
11	.6			.7	20	(t)	.5	90	.1
12	.7			.7			.6	89	.1
13	.7			.7			8.4	2,640	s 439
14	.8			.6			12	4,310	s 298
15	1.1	15	(t)	74	6,290	s 10,100	139	7,480	s 6,920
16	.9			75	7,910	s 4,670	1.2	812	s 3.2
17	.9			7.8	4,780	s 146	.6	336	.5
18	.7			.7	1,030	s 2.4	.5	174	.2
19	.7			.6	230	.4	.5	120	.2
20	.7			.7	109	.2	.4	85	.1
21	.6			.7	104	.2	.3	70	.1
22	.5			.7	105	.2	.3	83	.1
23	.5			.8	126	.3	.3	76	.1
24	.6			.9	85	.2	.3	64	.1
25	.5			.9	80	.2	.2		
26	.6			1.2	59	.2	.2		
27	.6			1.1	35	.1	.2	64	(t)
28	.7			1.0	34	.1	.2		
29	.7			1.0	31	.1	.2		
30	.9			1.1	33	.1	.2		
31	--		--	.9	27	.1	--	--	--
Total	17.7		0.7	180.1	--	14,922.5	184.6	--	8,472.7

Day	July			August			September		
1	0.2			0	--	0	0	--	0
2	.2			.1	--	(t)	0	--	0
3	.2			0	--	0	0	--	0
4	.2			0	--	0	0	--	0
5	.2			0	--	0	0	--	0
6	.1			0	--	0	0	--	0
7	.1	43	(t)	0	--	0	0	--	0
8	.1			9.7	--	e 500	0	--	0
9	.1			17	3,620	s 388	0	--	0
10	.1			.3	463	.4	0	--	0
11	.1			.2	190	.1	0	--	0
12	.1			.2	128	.1	0	--	0
13	0	--	0	.2	130	.1	0	--	0
14	0	--	0	.3	--	.1	0	--	0
15	0	--	0	.2	62	(t)	.1	--	(t)
16	0	--	0	.2	82	(t)	0	--	0
17	0	--	0	.3	76	.1	.1	42	(t)
18	0	--	0	.2	--	(t)	0	--	0
19	0	--	0	.2	104	(t)	0	--	0
20	0	--	0	.2	120	.1	0	--	0
21	0	--	0	.1	--		0	--	0
22	0	--	0	.1	51		0	--	0
23	.1	--		.1	--	(t)	0	--	0
24	.1	32	(t)	.1	51		0	--	0
25	.1	--		.1	--		0	--	0
26	0	--	0	0	--	0	0	--	0
27	0	--	0	0	--	0	0	--	0
28	0	--	0	0	--	0	.1	90	(t)
29	0	--	0	0	--	0	.1	--	(t)
30	0	--	0	0	--	0	0	--	0
31	0	--	0	0	--	0	--	--	--
Total	2.0	--	0.2	29.8	--	889.3	0.4	--	0.1

Total discharge for year (cfs-days) 504.7

Total load for year (tons) 24,298.8

e Estimated.

s Computed by subdividing day.

t Less than 0.050 ton.

KANSAS RIVER BASIN--Continued

BRUSHY CREEK NEAR MAYWOOD, NEBR.--Continued

Particle-size analyses of suspended sediment, May to August 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed, M, mechanically dispersed; V, visual accumulation tube)

Date of collection	Time	Discharge (cfs)	Water temperature (°F)	Suspended sediment												Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters										
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
May 15, 1954	10:20 p.m.	1,340	61	36,300	5,900	--	25	--	42	--	97	--					SPWCM
May 16	1:10 a.m.	461	--	28,600	3,930	--	29	--	47	--	94	--					SPWCM
May 17	9:45 a.m.	28	--	9,520	2,990	--	55	--	77	--	98	--					SPWCM
June 2	2:10 a.m.	94	54	35,900	4,830	24	31	39	50	73	96	--					SPWCM
June 2	2:10 a.m.	94	54	35,900	4,830	4	8	28	45	71	96	--					SPNM
June 13	10:20 p.m.	98	--	30,200	5,720	--	37	--	63	--	97	--					SPWCM
June 13	11:15 p.m.	136	--	16,200	5,800	--	34	--	57	--	93	--					SPWCM
June 14	2:23 a.m.	32	--	7,720	5,830	--	64	--	90	--	99	--					SPWCM
June 14	9:05 a.m.	4.2	--	4,140	3,270	--	87	--	97	--	100	--					SPWCM
June 15	3:20 a.m.	862	59	15,700	3,450	29	38	46	53	65	97	100					VPWCM
June 15	3:20 a.m.	862	59	15,700	3,480	6	17	40	51	65	97	100					VPNM
June 15	4:10 a.m.	598	--	14,300	5,040	--	40	--	58	--	96	--					SPWCM
June 16	10:00 a.m.	1.3	--	968	1,350	--	96	--	98	--	100	--					SPWCM
Aug. 9	12:30 a.m.	128	--	11,000	4,620	--	46	--	74	--	100	--					SPWCM
Aug. 9	1:00 a.m.	103	68	10,800	3,020	38	52	67	79	93	100	--					SPWCM
Aug. 9	1:00 a.m.	103	68	10,800	3,140	10	24	53	76	92	100	--					SPNM
Aug. 9	9:15 a.m.	5.5	65	3,010	2,350	--	89	--	98	--	100	--					SPWCM

KANSAS RIVER BASIN--Continued

FOX CREEK AT CURTIS, NEBR.

LOCATION.--At bridge on State Highway 23N, 50 feet downstream from gaging station, half a mile upstream from mouth and 1 mile east of Curtis, Frontier County.
DRAINAGE AREA.--77 square miles, approximately.
RECORDS AVAILABLE.--Water temperatures: April 1951 to August 1952, October 1953 to September 1954.
Sediment records: April 1951 to September 1954.
EXTREMES, 1953-54.--Water temperatures: Maximum, 86°F July 18.
Sediment concentrations: Maximum daily, 8,750 ppm May 16; minimum daily, not determined.
Sediment loads: Maximum daily, 6,480 tons May 16; minimum daily, less than 0.50 ton on many days.
EXTREMES, 1951-54.--Water temperatures: Maximum (1951-52, 1953-54), 86°F July 18, 1954; minimum (1951-52), freezing point Dec. 19, 1951, Jan. 23, 1952.
Sediment concentrations: Maximum daily, 37,600 ppm June 8, 1951; minimum daily, not determined.
Sediment loads: Maximum daily, 131,000 tons May 31, 1951; minimum daily, less than 0.50 ton on many days each year.
REMARKS.--Flow affected by ice Nov. 20-22, Dec. 3-6, 9, 10, 12, 14, 18, 22, Jan. 10, 13-17, 19-21, 23-27, Mar. 2-4, 13, 14. Records of discharge for water year October 1953 to September 1954 given in WSP 1340.

Temperature (°F) of water, water year October 1953 to September 1954
(Once-daily measurement between 6 a.m. and 11 a.m.)

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

a Reading obtained between 12 m. and 5 p.m.

KANSAS RIVER BASIN--Continued

FOX CREEK AT CURTIS, NEBR.--Continued

Suspended sediment, water year October 1953 to September 1954

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	5.4	40		7.1	27		7.6	24	
2	5.3	43		7.1	--		7.7	--	
3	5.2	--		7.1	17		7.6	36	
4	5.3	38		7.6	--		7.7	--	
5	5.5	--		7.7	17		7.6	40	
6	5.6	25		7.8	--		7.8	--	
7	5.7	--		7.9	24		7.8	30	
8	5.9	31	a 0.5	7.8	24		7.8	--	
9	5.9	--		7.7	20		7.6	21	
10	5.9	36		7.5	--		7.7	--	
11	5.9	--		7.5	18		7.8	23	
12	5.9	26		7.5	--		7.6	--	
13	6.1	--		7.5	19		7.8	26	
14	6.2	22		7.5	--		7.7	--	
15	6.3	--		7.5	24		7.9	37	
16	6.4	31	.5	7.5	--	a 0.4	7.9	--	a 0.6
17	6.6	30	b .5	7.5	19		7.9	22	
18	6.6	31	.6	7.5	--		7.8	--	
19	6.6	36	b .6	7.6	15		8.1	27	
20	6.6	47	.8	7.5	--		8.2	--	
21	8.5	86	2.0	7.6	23		8.2	31	
22	7.4	32		7.7	--		7.0	--	
23	6.6	--		7.8	24		8.2	28	
24	6.7	25		8.1	--		8.2	--	
25	7.0	--		7.8	22		8.2	21	
26	6.7	22	a .5	7.6	--		8.2	--	
27	6.8	--		7.6	25		8.3	27	
28	6.9	30		7.6	--		8.3	--	
29	7.0	--		7.5	28		8.2	24	
30	7.0	30		7.5	--		8.2	--	
31	7.1	--		--	--	--	8.2	23	
Total	196.6	--	17.5	227.2	--	12.0	244.8	--	18.6

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	8.3	--		10	143	3.9	11		
2	8.3	28		11	202	6.0	9.0		
3	8.2	--		10	166	4.5	10		
4	8.3	25		9.6	138	3.6	10		
5	8.3	--		9.2	90	2.2	11		
6	8.4	26		8.9	71		11		
7	8.4	--		8.7	--		10		
8	8.5	29		8.7	64	a 1.6	10	48	b 1.3
9	8.5	--		8.7	--		10		
10	8.1	29		8.7	73		10		
11	8.2	24		8.4	--		9.8		
12	8.2	32		8.5	119		9.8		
13	7.7	--	a 0.9	8.3	--		9.0		
14	7.8	71		8.3	--		9.1		
15	7.8	--		8.3	90		9.2		
16	7.0	72		8.3	68	a 1.8	9.1		
17	7.5	--		8.4	--		9.0		
18	8.4	--		8.5	74		9.1		
19	7.7	--		8.5	--		8.9		
20	6.6	--		8.9	48		8.8		
21	8.0	68		9.3	--		8.8		
22	8.4	43		9.5	40		8.8		
23	8.0	--		9.5	--		8.8		
24	7.7	--		9.8	36		8.8	34	b .8
25	7.7	30		10	--	a 1.1	8.7		
26	8.0			10	--		8.4		
27	8.2			10	42		8.5		
28	9.0	75	b 1.8	11	--		8.4		
29	9.4			--	--	--	8.3		
30	9.8			--	--	--	8.2		
31	9.4			--	--	--	8.2		
Total	253.8	--	33.3	257.0	--	55.0	287.7	--	32.3

a Computed from infrequent samples.
b Computed from partly estimated concentration graph.

KANSAS RIVER BASIN--Continued

FOX CREEK AT CURTIS, NEBR.--Continued

Suspended sediment, water year October 1953 to September 1954--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	8.1			8.7			6.0	280	sb 5.5
2	7.9			9.0			6.6	755	13
3	7.9			8.7			5.9	232	3.7
4	8.0			8.4			5.8	180	b 2.8
5	8.2	35	0.8	8.4			5.7	161	2.5
6	8.1			8.6			5.2	138	1.9
7	8.0			8.6			4.9	138	1.8
8	8.0			8.5	127	3.0	4.8	140	b 1.8
9	8.1			8.6			4.8	140	b 1.8
10	8.2			8.7			4.7	146	1.9
11	8.2			8.7			4.5	150	b 1.8
12	8.4			8.8			4.6	170	b 2.2
13	8.4			8.8			5.4	650	sb 12
14	8.5			8.8			7.9	1,580	s 38
15	8.5	53	1.2	31	1,780	s 1,460	38	5,570	s 1,250
16	8.2			117	8,750	s 6,480	8.3	1,100	25
17	8.2			12	3,260	s 120	7.0	600	b 11
18	8.3			8.2	1,750	39	6.6	412	7.3
19	8.3			7.8	900	b 19	6.6	320	5.7
20	8.5			7.7	250	5.2	6.5	307	5.4
21	10	380	s 11	7.4	193	3.9	6.5	292	5.1
22	8.4			7.3	177	3.5	6.6	242	4.3
23	8.2			7.0	157	3.0	6.6	220	b 4.0
24	8.2			6.7	141	2.6	6.6	220	b 4.0
25	8.3			6.6	128	2.3	7.2	263	5.1
26	8.2	146	3.3	6.6	110	b 2.0	6.5	248	4.4
27	8.3			6.6	120	b 2.2	6.8	304	5.6
28	8.4			6.3	150	2.6	5.9	321	5.1
29	8.3			6.2	128	2.1	6.0	342	5.5
30	8.3			6.1	142	2.3	6.0	240	b 3.8
31	--	--	--	6.0	144	2.3	--	--	--
Total	248.6	--	60.7	377.8	--	8,194.0	214.5	--	1,442.0

	July			August			September		
1	5.6	218	3.3	4.6	148	1.8	4.5	125	1.5
2	5.4	190	b 2.8	4.5	156	1.9	4.4	120	1.4
3	5.4	183	2.7	4.5	129	1.6	4.3	111	1.3
4	5.2	180	b 2.6	4.2	105	1.2	4.3	138	1.6
5	5.2	180	b 2.6	4.1	127	1.4	5.0	240	sb 3.8
6	5.0	197	2.7	4.8	135	1.7	4.8	346	4.5
7	4.9	180	2.4	4.8	108	1.4	4.3	196	2.3
8	4.8	180	2.3	5.2	150	2.1	4.4	200	2.4
9	4.7	170	2.2	5.7	162	2.5	4.6	222	2.8
10	4.6	160	b 2.0	5.9	183	2.9	4.3	148	1.7
11	4.5	160	b 1.9	4.8	178	2.3	4.2	125	1.4
12	4.3	150	b 1.7	5.0	142	1.9	4.1	94	1.0
13	4.1	142	1.6	4.9	130	1.7	3.9	100	1.1
14	3.9	126	1.3	4.8	124	1.6	4.0	125	1.4
15	3.9	120	1.3	5.3	172	2.5	4.4	107	1.3
16	4.2	120	b 1.4	4.8	167	2.2	4.4	81	1.0
17	4.2	120	1.4	5.2	184	2.6	4.3	121	1.4
18	4.2	125	1.4	17	1,280	s 152	4.3	99	1.1
19	4.3	127	1.5	8.2	1,480	s 38	4.3	77	.9
20	4.0	124	1.3	7.8	1,370	s 32	4.3	102	1.2
21	3.9	108	1.1	5.6	510	7.7	4.3	102	1.2
22	4.2	112	1.3	5.4	189	2.8	4.4	94	1.1
23	4.2	103	1.2	5.4	170	b 2.4	4.5	77	.9
24	4.2	125	1.4	5.4	203	3.0	4.6	77	1.0
25	4.3	137	1.6	5.2	172	2.4	4.6	74	.9
26	4.5	150	1.8	5.1	149	2.1	4.7	69	.9
27	4.6	142	1.8	4.8	142	1.8	4.8	92	1.2
28	4.6	140	1.7	4.8	157	2.0	4.9	97	1.3
29	4.5	144	1.7	4.8	160	2.1	5.5	117	1.7
30	4.3	119	1.4	4.6	163	2.0	5.0	105	1.4
31	4.3	125	1.5	4.6	162	2.0	--	--	--
Total	140.0	--	56.9	171.8	--	285.6	134.4	--	46.7

Total discharge for year (cfs-days) 2,754.2

Total load for year (tons) 10,254.6

s Computed by subdividing day.

b Computed from partly estimated concentration graph.

KANSAS RIVER BASIN--Continued

FOX CREEK AT CURTIS, NEBR.--Continued

Particle-size analyses of suspended sediment, May to August 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed)

Date of collection	Time	Discharge (cfs)	Water temperature (°F)	Suspended sediment											Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters									
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
May 15, 1954	9:15 p.m.	21		4,710	3,690	--	49	--	69	--	99						SPWCM
May 16	12:20 a.m.	759		26,600	5,110	--	25	--	43	--	97						SPWCM
May 17	11:50 a.m.	21		5,870	3,910	42	55	66	74	85	99						SPWCM
May 17	11:50 a.m.	21		5,870	4,070	13	30	60	73	86	99						SPNM
June 2	12:35 a.m.	7.2		2,390	3,500	--	52	--	85	--	100						SPWCM
June 15	6:15 a.m.	225		17,900	4,430	--	25	--	45	--	98						SPWCM
June 15	7:50 a.m.	148		14,200	4,200	--	46	--	72	--	99						SPWCM
June 15	5:30 p.m.	15		3,750	5,320	--	59	--	80	--	100						SPWCM
Aug. 18	6:15 p.m.	82		4,740	5,590	23	34	44	57	76	98						SPWCM
Aug. 18	6:15 p.m.	82		4,740	5,500	6	16	37	56	76	98						SPNM
Aug. 18	7:35 p.m.	80	70	4,390	6,180	--	58	--	80	--	99						SPWCM
Aug. 20	2:20 p.m.	8.5		1,950	3,030	--	83	--	97	--	100						SPWCM

KANSAS RIVER BASIN--Continued

DRY CREEK NEAR CURTIS, NEBR.

LOCATION.--At gaging station at county road bridge, 2½ miles upstream from mouth and 3½ miles east of Curtis, Frontier County.
DRAINAGE AREA.--20 square miles, approximately.
RECORDS AVAILABLE.--Sediment records: April 1951 to September 1954.
EXTREMES, 1953-54.--Sediment concentrations: Maximum daily, 13,400 ppm May 15; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 8,380 tons May 15; minimum daily, 0 tons on many days.
EXTREMES, 1951-54.--Sediment concentrations: Maximum daily, not determined; minimum daily, no flow on many days each year.
Sediment loads: Maximum daily, 95,000 tons (estimated) June 8, 1951; minimum daily, 0 tons on many days each year.
REMARKS.--Maximum observed sediment concentration during water year, 126,000 ppm May 15. No flow during period October to December; record is omitted. Flow affected by ice Jan. 30 to Feb. 5. Records of discharge for water year October 1953 to September 1954 given in WSP 1340.

Suspended sediment, January to September 1954

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	15		e 400			
2.....	0		0	2.0		e 85			
3.....	0		0	.5		e 7			
4.....	0		0	1.0		e 8			
5.....	0		0	.2		e 1			
6.....	0		0	0		0			
7.....	0		0	0		0			
8.....	0		0	0		0			
9.....	0		0	0		0			
10.....	0		0	0		0			
11.....	0		0	0		0			
12.....	0		0	0		0			
13.....	0		0	0		0			
14.....	0		0	0		0			
15.....	0		0	0		0			
16.....	0		0	0		0			
17.....	0		0	0		0			
18.....	0		0	0		0			
19.....	0		0	0		0			
20.....	0		0	0		0			
21.....	0		0	0		0			
22.....	0		0	0		0			
23.....	0		0	0		0			
24.....	0		0	0		0			
25.....	0		0	0		0			
26.....	0		0	0		0			
27.....	0		0	0		0			
28.....	0		0	0		0			
29.....	0		0	--		--			
30.....	1.0		e 1	--		--			
31.....	4.5		e 17	--		--			
Total.	5.5		18	18.7		501	0		0

e Estimated.

KANSAS RIVER BASIN--Continued

DRY CREEK NEAR CURTIS, NEBR.--Continued

Suspended sediment, January to September 1954--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	0		0	0	--	0	0		0
2	0		0	0	--	0	0		0
3	0		0	0	--	0	0		0
4	0		0	0	--	0	0		0
5	0		0	0	--	0	0		0
6	0		0	0	--	0	0		0
7	0		0	0	--	0	0		0
8	0		0	0	--	0	0		0
9	0		0	0	--	0	0		0
10	0		0	0	--	0	0		0
11	0		0	0	--	0	0		0
12	0		0	0	--	0	0		0
13	0		0	0	--	0	.1		e 1
14	0		0	0	--	0	.2	2,400	a 1
15	0		0	30	13,400	s 8,380	0		0
16	0		0	7.1	9,190	s 702	0		0
17	0		0	4.5	7,600	sa 280	0		0
18	0		0	0	--	0	0		0
19	0		0	0	--	0	0		0
20	.2		e 1	0	--	0	0		0
21	0		0	0	--	0	0		0
22	0		0	0	--	0	0		0
23	0		0	0	--	0	0		0
24	0		0	0	--	0	0		0
25	0		0	0	--	0	0		0
26	0		0	0	--	0	0		0
27	0		0	0	--	0	0		0
28	0		0	0	--	0	0		0
29	0		0	0	--	0	0		0
30	0		0	0	--	0	0		0
31	--		--	0	--	0	--		--
Total	0.2		1	41.6	--	9,362	0.3		2

Day	July			August			September		
1				0		0	0	--	0
2				0		0	0	--	0
3				0		0	0	--	0
4				0		0	0	--	0
5				0		0	0	--	0
6				0		0	0	--	0
7				0		0	0	--	0
8				0		0	3.2	1,910	s 85
9				0		0	.6	1,520	s 7
10				0		0	0	--	0
11				0		0	0	--	0
12				0		0	0	--	0
13				0		0	0	--	0
14				0		0	0	--	0
15				0		0	0	--	0
16				0		0	0	--	0
17				0		0	0	--	0
18				0		0	0	--	0
19				2.6		e 320	0	--	0
20				5.6		e 380	0	--	0
21				0		0	0	--	0
22				0		0	0	--	0
23				0		0	0	--	0
24				0		0	0	--	0
25				0		0	0	--	0
26				0		0	0	--	0
27				0		0	0	--	0
28				0		0	0	--	0
29				0		0	0	--	0
30				0		0	0	--	0
31				0		0	--	--	--
Total	0		0	8.2		700	3.8	--	92

Total discharge for year (cfs-days) 78.3

Total load for year (tons) 10,676

e Estimated.

s Computed by subdividing day.

a Computed from partly estimated concentration graph.

DRY CREEK NEAR CURTIS, NEBR.--Continued

Particle-size analyses of suspended sediment, February to September 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; V, visual accumulation tube)

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. 1, 1954	4:25 p.m.	a 15	32	15,600	5,460	--	22	--	38	--	96	--					SPWCM
May 15	9:12 p.m.	467	--	114,000	4,760	--	18	--	28	--	89	100					VPWCM
May 15	9:48 p.m.	288	--	114,000	5,480	--	18	--	29	--	90	100					VPWCM
May 16	5:14 a.m.	9.7	--	9,400	3,910	--	78	--	96	--	100	--					SPWCM
May 17	7:00 a.m.	20	--	25,600	7,980	28	36	43	52	67	96	--					SPWCM
May 17	7:00 a.m.	20	--	25,600	8,100	6	15	36	48	67	96	--					SPNM
Aug. 20	8:15 a.m.	4.1	66	2,560	2,860	--	88	--	97	--	100	--					SPWCM
Sept. 8	7:22 p.m.	26	69	15,100	5,770	--	55	--	93	--	100	--					SPWCM
Sept. 8	8:25 p.m.	26	69	12,700	4,500	43	62	83	94	97	100	--					SPWCM
Sept. 8	8:25 p.m.	26	69	12,700	4,660	5	11	58	94	99	100	--					SPNM

a Daily mean discharge.

KANSAS RIVER BASIN--Continued

MEDICINE CREEK ABOVE HARRY STRUNK LAKE, NEBR.

LOCATION.--At gaging station, a third of a mile downstream from top of Harry Strunk Lake flood-control pool, Frontier County, 3¾ miles southeast of Stockville, and 13½ miles upstream from Medicine Creek Dam.
RECORDS AVAILABLE.--Water temperatures: October 1952 to September 1954.
Sediment records: April 1951 to September 1954.
EXTREMES, 1953-54.--Water temperatures: Minimum, freezing point on several days during December and January.
Sediment concentrations: Maximum daily, 20,000 ppm May 16; minimum daily, 58 ppm Oct. 1.
Sediment loads: Maximum daily, 37,000 tons May 16; minimum daily, 5 tons Oct. 1, 2, Sept. 24.
EXTREMES, 1951-54.--Water temperatures (1952-54): Minimum, freezing point probably on many days during winter months.
Sediment concentrations: Maximum daily, not determined; minimum daily, not determined.
Sediment loads: Maximum daily, 490,000 tons (estimated) June 22, 1951; minimum daily, 5 tons Sept. 17, 30, Oct. 1, 2, 1953, Sept. 24, 1954.
REMARKS.--Flow affected by ice Nov. 20-22, Dec. 3-12, 14, 16, 18, 19, Dec. 21 to Jan. 1, Jan. 3, Jan. 9 to Feb. 3, Feb. 12, 19, 20, Mar. 2-6, 14. Records of discharge for water year October 1953 to September 1954 given in WSP 1340.

Temperature (°F) of water, water year October 1953 to September 1954
(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	--	--	44	--	--	--	54	--	72	a 76	84	a 77
2	--	--	--	--	35	36	53	--	62	--	92	--
3	--	a 49	34	--	40	--	--	a 44	63	--	90	--
4	--	--	32	38	45	--	65	64	71	--	--	--
5	64	--	33	--	47	--	--	--	79	--	80	--
6	--	--	33	37	--	--	64	--	--	a 80	69	--
7	--	--	--	--	45	--	69	--	74	--	72	--
8	--	--	a 33	40	49	43	60	--	83	--	80	a 65
9	--	46	--	--	a 39	--	68	--	85	77	76	--
10	--	43	34	34	44	--	65	56	--	--	84	78
11	--	41	31	--	41	--	53	57	85	--	78	--
12	66	43	--	32	--	--	66	58	--	--	--	75
13	--	47	34	--	a 41	--	70	74	70	86	78	75
14	--	45	33	34	47	--	69	79	73	87	90	--
15	--	53	34	--	45	50	57	78	71	80	--	--
16	--	50	36	--	47	--	61	55	--	93	--	86
17	--	50	--	--	49	--	70	60	--	90	80	82
18	--	43	--	a 33	--	--	68	68	--	a 94	80	76
19	--	36	--	33	--	--	55	70	--	90	--	74
20	--	33	34	--	45	--	67	70	--	90	75	74
21	--	--	34	33	--	a 44	65	70	--	89	78	68
22	--	35	34	34	--	51	50	78	--	70	77	67
23	--	43	--	--	--	--	64	66	--	75	79	--
24	--	40	--	31	--	--	--	73	89	--	a 74	62
25	--	40	--	--	a 42	--	--	68	--	a 85	80	--
26	a 47	45	32	32	--	--	70	63	--	--	85	72
27	--	47	--	--	--	--	71	79	--	--	--	--
28	--	--	37	31	--	--	68	78	--	93	a 79	73
29	--	--	--	--	--	a 35	--	--	--	85	85	60
30	--	--	34	--	--	--	--	83	--	87	82	58
31	--	--	35	31	--	--	--	65	--	83	--	--
Average	--	--	--	--	--	--	63	--	--	--	--	--

a Reading obtained between 10 a.m. and 12 m.

KANSAS RIVER BASIN--Continued

MEDICINE CREEK ABOVE HARRY STRUNK LAKE, NEBR.--Continued

Suspended sediment, water year October 1953 to September 1954

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	29	58	5	50	198	27	58	245	38
2	29	60	5	51	196	27	58	--	e 36
3	31	70	6	53	183	26	50	229	31
4	31	71	6	63	287	49	40	73	8
5	34	72	7	61	272	45	45	197	24
6	35	71	7	66	445	79	55	163	24
7	37	77	8	66	486	87	55	--	e 65
8	39	88	9	64	343	59	73		
9	39	87	9	65	330	58	60		
10	38	85	9	65	298	52	60		
11	37	82	8	64	309	53	65		
12	37	77	8	64	282	49	70	627	109
13	38	73	7	64	303	52	64		
14	40	78	8	63	265	45	63		
15	41	95	11	63	249	42	63		
16	43	121	14	61	289	48	60		
17	44	152	18	60	252	41	61		
18	46	165	20	58	262	41	61	--	e 65
19	45	165	20	57	236	36	61		
20	46	198	25	58	537	84	60	396	64
21	61	592	98	54	--	e 75	61	359	59
22	63	558	95	55	494	73	50	68	9
23	63	468	80	60	379	61	45		
24	59	414	66	59	221	35	55	--	e 24
25	55	315	47	60	583	94	73		
26	55	250	37	60	470	76	66	162	
27	54	225	33	58	338	53	62	--	
28	51	216	30	55			55	292	a 42
29	50	189	26	58	--	e 46	56	--	
30	50	187	25	57			54	354	
31	50	193	26	--	--	--	64	869	150
Total	1,370	--	773	1,792	--	1,605	1,823	--	1,966

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	69	--		103	--	e 300	61	--	
2	61	750		119	1,470	472	58	636	
3	60	--		106	--	e 1,200	55	--	
4	60	512		81	1,730	378	51	393	
5	61	392	a 90	75	1,340	271	55	--	
6	61	554		72			59	--	a 100
7	60	--		70			59	623	
8	60	555		67	807	150	57	617	
9	60	--		67			59	739	
10	57	931	143	69			60	--	
11	55	984	146	66			61	902	
12	51	248	34	65			64		
13	48	--	e 65	63			63	--	e 140
14	47	722	92	64			61		
15	45			66			63	714	121
16	45	--	e 55	65	662	116	63	--	
17	55			65			64	618	
18	65	151		65			65	--	
19	65	137		65			63	473	
20	56	--		64			60	--	
21	54	151		64			60	542	
22	51	354		64			59	502	
23	47	--	a 25	61			59	--	
24	44	151		63			60	541	a 80
25	42	--		61	543	92	63	--	
26	45	138		63			60	--	
27	47	--		63			59	525	
28	74	237		61			58	--	
29	82	--	e 75	--	--	--	57	450	
30	80	--		--	--	--	58	--	
31	87	468		--	--	--	58	275	
Total	1,794	--	2,005	1,977	--	5,267	1,852	--	2,921

e Estimated.
a Computed on basis of samples obtained about four times a week.

KANSAS RIVER BASIN--Continued

MEDICINE CREEK ABOVE HARRY STRUNK LAKE, NEBR.--Continued

Suspended sediment, water year October 1953 to September 1954--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.....	59	420	67	58	580	91	47	340	43
2.....	59	410	65	64	650	112	74	4,200	sb 900
3.....	57	320	b 50	69	790	147	63	2,500	425
4.....	55	255	38	69	750	140	53	900	129
5.....	54	280	b 40	65	715	125	49	590	78
6.....	53	355	51	64	705	122	47	570	72
7.....	53	420	60	63	680	116	43	560	65
8.....	52	405	57	63	600	102	43	400	46
9.....	52	355	50	63	570	97	41	360	40
10.....	54	345	50	60	580	94	39	330	35
11.....	54	335	49	61	550	91	38	340	35
12.....	54	285	42	61	550	91	37	360	36
13.....	54	320	47	61	540	89	39	650	b 70
14.....	55	360	53	59	540	86	69	2,910	s 566
15.....	57	425	65	74	1,800	sb 850	149	6,490	s 3,620
16.....	54	380	55	571	20,000	sb 37,000	145	6,000	2,350
17.....	57	380	58	286	11,900	9,190	88	2,050	s 516
18.....	54	400	58	195	6,850	3,870	61	970	160
19.....	54	400	58	103	2,330	648	52	720	101
20.....	55	380	56	77	1,370	285	49	600	79
21.....	58	520	81	67	970	175	46	470	58
22.....	72	1,450	282	60	850	138	42	420	48
23.....	65	780	137	55	700	104	38	395	41
24.....	64	700	b 120	53	550	79	35	360	34
25.....	59	750	b 120	51	470	65	34	310	28
26.....	57	740	114	51	490	67	34	305	28
27.....	55	690	102	53	540	77	33	280	25
28.....	54	630	92	53	550	79	33	320	28
29.....	53	630	90	50	490	66	40	1,600	b 170
30.....	54	500	73	50	420	57	34	650	60
31.....	--	--	--	49	400	53	--	--	--
Total.	1,687	--	2,280	2,778	--	54,306	1,595	--	9,886

	July			August			September		
1.....	33	405	36	23	220	14	29	125	10
2.....	30	285	23	22	200	12	27	124	9
3.....	31	305	26	23	260	16	25	125	8
4.....	31	330	28	22	240	14	24	142	9
5.....	29	350	27	20	160	9	25	136	9
6.....	27	290	21	21	150	9	28	202	15
7.....	27	280	20	25	200	14	27	194	14
8.....	27	250	18	30	467	s 57	29	194	15
9.....	26	280	20	58	2,040	s 394	36	732	71
10.....	28	400	30	49	2,250	s 313	31	303	25
11.....	27	275	20	37	930	93	28	168	13
12.....	24	240	16	34	510	47	27	155	11
13.....	23	245	15	42	1,210	s 259	26	137	10
14.....	23	240	15	45	2,440	s 331	27	123	9
15.....	21	240	14	38	800	82	30	140	11
16.....	22	290	17	55	--	e 280	31	152	13
17.....	23	270	17	312	10,800	s 10,300	31	163	14
18.....	23	250	16	81	3,600	sb 1,000	30	163	13
19.....	22	220	13	91	2,500	b 600	28	146	11
20.....	23	220	14	116	2,900	908	28	127	10
21.....	21	215	12	116	2,080	651	27	106	8
22.....	23	320	20	70	1,020	193	27	91	7
23.....	27	300	22	54	590	86	27	77	6
24.....	25	270	18	46	530	66	27	73	5
25.....	27	270	20	42	370	42	29	82	6
26.....	25	270	18	38	320	33	30	92	7
27.....	27	270	20	35	245	23	31	100	8
28.....	27	270	20	33	225	20	31	95	8
29.....	25	240	16	32	180	16	33	107	10
30.....	23	230	14	31	160	13	35	102	10
31.....	21	205	12	30	130	11	--	--	--
Total.	791	--	598	1,671	--	15,906	864	--	375

Total discharge for year (cfs-days)..... 19,994
Total load for year (tons)..... 97,888

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

MEDICINE CREEK ABOVE HARRY STRUNK LAKE, NEBR.--Continued

Particle-size analyses of suspended sediment, December 1953 to August 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; V, visual accumulation tube)

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. 14, 1953	4:15 p.m.	63	33	540	2,490	--	15	--	28	--	77	--					SPWCM
Feb. 4, 1954	2:55 p.m.	77	33	1,890	6,390	--	17	--	28	--	85	--					SPWCM
May 1	8:05 p.m.	64	--	596	7,310	--	22	--	31	--	81	--					SPWCM
May 16	9:30 a.m.	538	--	17,000	4,050	--	36	--	61	--	92	--					SPWCM
May 17	12:55 a.m.	268	--	12,800	6,590	--	37	--	55	--	97	--					SPWCM
May 17	9:50 a.m.	274	--	15,800	5,480	22	27	32	39	57	90	100					VPWCM
May 17	9:50 a.m.	274	--	15,800	5,520	4	6	28	38	58	95	--					SPNM
May 17	3:55 p.m.	321	--	13,800	6,870	--	32	--	49	--	95	99	100				VPWCM
May 18	12:53 p.m.	174	65	6,380	3,010	--	27	--	43	--	96	--					SPWCM
May 18	2:50 p.m.	162	--	6,560	7,200	22	29	36	44	64	96	100					VPWCM
May 18	2:50 p.m.	162	--	6,560	7,380	2	4	26	42	61	96	100					VPNM
May 21	3:45 p.m.	66	--	912	3,400	--	28	--	48	--	95	--					SPWCM
June 2	1:40 p.m.	80	--	3,950	4,300	--	29	--	50	--	97	--					SPWCM
June 15	7:04 p.m.	368	71	14,900	7,400	36	45	58	68	79	98	100					VPWCM
June 15	7:04 p.m.	368	71	14,900	7,410	5	8	47	66	78	98	100					VPNM
June 16	11:25 a.m.	137	--	6,620	3,450	41	45	54	62	76	97	100					VPWCM
June 16	11:25 a.m.	137	--	6,620	3,560	9	22	49	60	73	97	100					VPNM
Aug. 8	10:47 p.m.	55	--	1,420	4,400	--	29	--	54	--	99	--					SPWCM
Aug. 13	11:00 p.m.	96	78	6,120	4,430	38	50	63	76	88	98	--					SPWCM
Aug. 13	11:00 p.m.	96	78	6,120	4,420	9	20	50	73	88	98	--					SPNM
Aug. 17	2:44 a.m.	284	67	21,800	4,420	--	24	--	42	--	97	--					SPWCM
Aug. 17	5:08 a.m.	782	67	11,700	4,040	--	43	--	66	--	96	--					SPWCM
Aug. 17	7:40 a.m.	482	67	9,980	3,440	--	44	--	69	--	97	--					SPWCM
Aug. 17	12:43 p.m.	249	--	10,000	4,190	35	45	54	64	80	97	--					SPWCM
Aug. 17	12:43 p.m.	249	--	10,000	4,220	8	19	44	61	79	97	--					SPNM
Aug. 18	5:53 p.m.	64	80	1,450	3,150	--	48	--	71	--	98	--					SPWCM
Aug. 18	7:45 p.m.	64	80	1,700	3,380	--	56	--	76	--	97	--					SPWCM
Aug. 20	5:05 p.m.	124	75	3,490	4,970	--	39	--	56	--	92	--					SPWCM

KANSAS RIVER BASIN--Continued

MEDICINE CREEK ABOVE HARRY STRUNK LAKE, NEBR.--Continued

Particle-size analyses of bed material, April to August 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; V, visual accumulation tube)

Date of collection	Number of sampling points	Discharge (cfs)	Water temperature (°F)	Bed material											Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	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	
Apr. 15, 1954....	3	57					0	2	9	53	86	96	100	--			SV
May 24.....	2	51					2	5	18	39	64	75	88	98			SV
July 13	3	24					0	3	17	58	82	93	99	100			SV
July 19	3	22					1	5	10	44	73	87	97	100			SV
Aug. 18.....	3	65					1	2	5	33	60	79	92	99			SV

KANSAS RIVER BASIN--Continued

MITCHELL CREEK ABOVE HARRY STRUNK LAKE, NEBR.

LOCATION.--At gaging station at top of Harry Strunk Lake flood-control pool, Frontier County, 2½ miles southwest of Orafino, 9½ miles upstream from Medicine Creek Dam, and 14 miles northwest of Cambridge.
DRAINAGE AREA.--53 square miles, approximately.
RECORDS AVAILABLE.--Sediment records: October 1951 to September 1954.
EXTREMES, 1953-54.--Sediment concentrations: Maximum daily, 22,000 ppm May 16; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 20,000 tons May 16; minimum daily, 0 tons on many days.
EXTREMES, 1951-54.--Sediment concentrations: Maximum daily, 22,000 ppm May 16, 1954; minimum daily, no flow on many days each year.
Sediment loads: Maximum daily, 20,000 tons May 16, 1954; minimum daily, 0 tons on many days each year.
REMARKS.--No flow during period October to December; record is omitted. Records of discharge for water year October 1953 to September 1954 given in WSP 1340.

Suspended sediment, January to September 1954

Day	January			February			March		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	0		0	0.8	240	sa 0.6	0		0
2	0		0	1.2	260	a .9	0		0
3	0		0	12	900	sa 36	0		0
4	0		0	11	598	s 19	0		0
5	0		0	5.2	395	5.5	0		0
6	0		0	1.9	--	e 1.4	0		0
7	0		0	.3	--	e .2	0		0
8	0		0	.1	--	(t)	0		0
9	0		0	0	--	0	0		0
10	0		0	0	--	0	0		0
11	0		0	0	--	0	0		0
12	0		0	0	--	0	0		0
13	0		0	0	--	0	0		0
14	0		0	0	--	0	0		0
15	0		0	0	--	0	0		0
16	0		0	0	--	0	0		0
17	0		0	0	--	0	.1		(t)
18	0		0	0	--	0	.1		(t)
19	0		0	0	--	0	0		0
20	0		0	0	--	0	0		0
21	0		0	0	--	0	0		0
22	0		0	0	--	0	0		0
23	0		0	0	--	0	0		0
24	0		0	0	--	0	0		0
25	0		0	0	--	0	0		0
26	0		0	0	--	0	0		0
27	0		0	0	--	0	0		0
28	0		0	0	--	0	0		0
29	0		0	--	--	--	0		0
30	0		0	--	--	--	0		0
31	.1		e .1	--	--	--	0		0
Total	0.1		0.1	32.5	--	63.6	0.2		0.1

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

KANSAS RIVER BASIN--Continued

MITCHELL CREEK ABOVE HARRY STRUNK LAKE, NEBR.--Continued

Suspended sediment, January to September 1954--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				0	--	0	0	--	0
2				0	--	0	11	7,300	sa 460
3				0	--	0	1.7	--	e 5.5
4				0	--	0	.2	--	e .2
5				0	--	0	0	--	0
6				0	--	0	0	--	0
7				0	--	0	0	--	0
8				0	--	0	0	--	0
9				0	--	0	0	--	0
10				0	--	0	0	--	0
11				0	--	0	0	--	0
12				0	--	0	0	--	0
13				0	--	0	0	--	0
14				0	--	0	20	20,000	sa 1,500
15				0	--	0	.7	1,800	sa 5.5
16				282	22,000	sa20,000	0	--	0
17				25	--	e 1,100	0	--	0
18				2.4	5,800	sa 55	0	--	0
19				0	--	0	0	--	0
20				0	--	0	0	--	0
21				0	--	0	0	--	0
22				0	--	0	0	--	0
23				0	--	0	0	--	0
24				0	--	0	0	--	0
25				0	--	0	0	--	0
26				0	--	0	0	--	0
27				0	--	0	0	--	0
28				0	--	0	0	--	0
29				0	--	0	3.6	4,080	s 169
30				0	--	0	1.7	3,900	sa 30
31				0	--	0	--	--	--
Total	0		0	309.4	--	21,155	38.9	--	2,170.2

Day	July			August			September		
1				0	--	0			
2				0	--	0			
3				0	--	0			
4				0	--	0			
5				0	--	0			
6				0	--	0			
7				0	--	0			
8				.3	--	e 3.8			
9				2.8	--	e 18			
10				.4	--	e .6			
11				0	--	0			
12				0	--	0			
13				0	--	0			
14				6.3	3,900	sa 90			
15				0	--	0			
16				3.4	3,900	sa 60			
17				16	--	e 340			
18				5.2	2,700	sa 65			
19				.3	--	e .7			
20				0	--	0			
21				0	--	0			
22				2.4	--	e 32			
23				.7	--	e 2.6			
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	0		0	37.8	--	612.7	0		0

Total discharge for year (cfs-days) 418.9

Total load for year (tons) 24,001.7

e Estimated.

s Computed by subdividing day.

a Computed from partly estimated concentration graph.

MITCHELL CREEK ABOVE HARRY STRUNK LAKE, NEBR.--Continued

Particle-size analyses of suspended sediment, February to August 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed)

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. 4, 1954	4:50 p.m.	8.7	33	515	1,420	70	81	90	98	100	--		--				BWCM
May 16	4:35 a.m.	1,390	--	18,200	5,080	37	48	60	75	88	99		100				SPWCM
May 16	4:35 a.m.	1,390	--	18,200	5,330	5	8	27	67	89	99		100				SPN
May 17	6:40 a.m.	2.9	--	7,230	2,560	--	91	--	98	--	100		--				SPWCM
May 18	2:45 p.m.	1.0	--	4,960	3,410	--	90	--	91	--	99		--				SPWCM
June 2	11:15 a.m.	18	57	14,700	5,550	--	60	--	94	--	100		--				SPWCM
June 14	10:15 a.m.	13	--	22,400	4,260	50	67	85	95	99	100		--				SPWCM
June 14	10:15 a.m.	13	--	22,400	4,300	9	15	75	97	98	100		--				SPN
June 29	7:45 p.m.	20	--	21,900	3,930	--	78	--	96	--	100		--				SPWCM
June 30	9:45 a.m.	1.4	--	4,000	2,840	--	93	--	97	--	100		--				SPWCM
Aug. 14	7:55 a.m.	14	--	6,410	4,100	--	75	--	--	--	100		--				SPWCM
Aug. 16	11:00 a.m.	3.0	71	4,160	5,110	--	88	--	98	--	100		--				SPWCM
Aug. 18	2:40 p.m.	5.8	76	3,720	2,610	--	88	--	99	--	100		--				SPWCM

KANSAS RIVER BASIN--Continued

MEDICINE CREEK AT CAMBRIDGE, NEBR.

LOCATION.--At gaging station, 100 feet upstream from county highway bridge, three-quarters of a mile north of Cambridge, Furnas County, 2½ miles upstream from mouth, and 7½ miles downstream from Medicine Creek Dam. Prior to Oct. 5, at county highway bridge 100 feet downstream.
DRAINAGE AREA.--1,070 square miles, approximately, of which about 680 square miles contribute directly to surface runoff.
RECORDS AVAILABLE.--Water temperatures: March 1951 to September 1954.
Sediment records: November 1945 to December 1949, March 1951 to September 1954.
EXTREMES, 1953-54.--Water temperatures: Maximum, 88°F Aug. 27; minimum, freezing point on several days during November to March.
Sediment concentrations: Maximum daily, 1,400 ppm July 13; minimum daily, not determined.
Sediment loads: Maximum daily, 1,020 tons July 22; minimum daily, less than 0.50 ton on many days.
EXTREMES, 1945-49, 1951-54.--Water temperatures (1951-54): Maximum, 94°F June 20, 1952; minimum, freezing point on many days during winter months.
Sediment concentrations: Maximum daily, not determined; minimum daily, not determined.
Sediment loads: Maximum daily, 3,700,000 tons June 22, 1947; minimum daily, less than 0.50 ton on many days.
REMARKS.--Flow affected by ice Nov. 7, 8, 20-22, Dec. 3 to Feb. 5, Mar. 2-4, 13, 14.
Records of discharge for water year October 1953 to September 1954 given in WSP 1340.

Temperature (°F) of water, water year October 1953 to September 1954
/Once-daily measurement between 5 a.m. and 11 a.m./

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

a Reading obtained between 1 p.m. and 7 p.m.

KANSAS RIVER BASIN--Continued

MEDICINE CREEK AT CAMBRIDGE, NEBR.--Continued

Suspended sediment, water year October 1953 to September 1954

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	42	108	12	2.0	58	0.3	1.2	--	
2	42	95	11	1.5	45	.2	1.5	--	
3	42	105	12	1.5	40	.2	1.6	--	
4	43	90	10	3.8	62	.6	1.9	--	
5	43	91	11	3.5	53	.5	2.7	--	e 0.1
6	43	78	9.1	3.3	23	.2	1.9	28	
7	43	78	9.1	3.5	23	.2	1.8	19	
8	31	72	6.0	4.0	21	.2	1.7	--	
9	30	65	5.3	3.3	--		2.1	--	
10	29	69	5.4	3.1	--		3.7	25	
11	28	67	5.1	2.4	--		4.4	--	
12	28	67	5.1	2.6	39		4.2	13	
13	28	68	5.1	2.2	--		4.8	--	
14	28	66	5.0	2.2	--		4.1	--	
15	28	64	4.8	1.9	--		5.6	--	
16	28	76	5.7	1.7	--		4.5	--	
17	28	70	5.3	1.7	32		4.4	22	
18	26	55	3.9	1.7	--		4.1	--	
19	18	37	1.8	2.2	26		4.6	11	
20	26	85	6.0	2.2	26	e .1	4.6	--	
21	35	127	12	2.0	--		4.2	--	e .2
22	36	92	8.9	2.0	--		1.8	--	
23	38	76	7.8	1.9	--		5.6	30	
24	38	76	7.8	1.9	17		5.5	--	
25	40	96	10	1.7	--		4.3	--	
26	41	91	10	1.5	--		4.0	--	
27	40	91	9.8	1.2	--		4.0	--	
28	40	90	9.7	1.4	--		4.0	--	
29	40	84	9.1	1.2	--		4.0	--	
30	23	48	3.0	1.2	--		3.6	10	
31	5.0	36	.5	--	--	--	4.3	--	
Total	1,030.0	--	227.3	66.3	--	4.6	110.7	--	5.2

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	4.5	--		21	60	3.4	65	--	
2	5.0	--		36	138	13	66	--	
3	4.7	8		42	106	12	69	320	e 46
4	5.2	--		57	166	26	67	--	
5	4.8	--		67	--	e 50	69	229	43
6	4.4	--		62	460	77	69	242	45
7	4.1	4		63	480	a 80	66	191	34
8	3.5	14		51	409	56	65	181	32
9	2.8	--		60	460	a 75	64	205	35
10	1.7	--		63	337	57	63	275	47
11	3.2	9		63	232	39	63	200	34
12	2.6	--		64	--	e 50	63	176	30
13	2.6	11		64	--	e 50	63	320	b 55
14	3.0	--		64	240	41	64	--	e 75
15	2.9	9	e 0.2	64	220	a 38	61	380	63
16	3.3	--		49	160	sb 26	61	310	51
17	3.8	--		5.3	30	.4	61	255	42
18	4.1	--		52	550	a 75	62	185	31
19	4.0	--		59	400	a 65	63	252	43
20	3.2	--		59	282	45	64	256	44
21	3.4	17		60	265	43	64	203	35
22	5.1	--		60	255	41	65	198	35
23	6.7	--		60	240	b 38	66	166	30
24	4.5	--		52	170	24	66	166	30
25	4.0	--		63	--	e 34	65	258	45
26	4.2	--		64	172	30	65	224	39
27	4.7	--		64	173	30	66	198	35
28	5.5	38		64	160	28	66	161	29
29	8.8	--	e .5	--	--	--	67	170	a 30
30	11	--	e 1.0	--	--	--	66	150	a 26
31	16	--	e 2.0	--	--	--	66	140	25
Total	147.3	--	9.1	1,552.3	--	1,146.8	2,010	--	1,247

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

KANSAS RIVER BASIN--Continued

MEDICINE CREEK AT CAMBRIDGE, NEBR.--Continued

Suspended sediment, water year October 1953 to September 1954--Continued

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1.....	62	125	21	28	73	5.5	99	350	94
2.....	38	100	b 10	27	76	5.5	98	430	114
3.....	36	118	11	26	74	5.2	97	400	105
4.....	35	94	8.9	26	56	3.9	97	390	102
5.....	34	90	8.3	26	51	3.6	97	390	102
6.....	34	91	8.4	26	52	3.7	97	420	110
7.....	33	95	8.5	27	53	3.9	90	395	96
8.....	33	88	7.8	26	44	3.1	61	250	41
9.....	33	86	7.7	27	49	3.6	38	170	17
10.....	32	86	7.4	27	56	4.1	37	180	18
11.....	34	76	7.0	26	50	3.5	37	190	19
12.....	34	70	6.4	24	58	3.8	36	186	18
13.....	33	64	5.7	24	60	3.9	36	174	17
14.....	26	71	5.0	24	71	4.6	36	174	17
15.....	31	260	sb 24	26	170	sa 16	36	166	16
16.....	28	89	6.7	36	1,100	sb 130	36	188	18
17.....	27	63	4.6	28	355	27	36	206	20
18.....	26	66	4.6	80	840	s 194	36	210	20
19.....	27	68	5.0	105	850	241	36	196	19
20.....	26	60	4.2	105	550	156	36	263	26
21.....	27	96	7.0	105	470	133	36	203	20
22.....	27	78	5.7	102	440	121	43	280	sb 36
23.....	26	68	4.8	101	440	120	58	413	65
24.....	24	76	4.9	100	451	122	54	336	49
25.....	22	82	4.9	100	430	116	63	430	73
26.....	23	92	5.7	99	430	115	66	432	77
27.....	22	89	5.3	99	430	115	66	384	68
28.....	22	81	4.8	99	440	118	79	550	a 120
29.....	24	63	4.1	98	420	111	82	544	120
30.....	24	54	3.5	99	420	112	83	506	113
31.....	--	--	--	98	440	116	--	--	--
Total.	903	--	222.9	1,844	--	2,120.9	1,802	--	1,730
	July			August			September		
1.....	83	488	109	171	760	351	87	556	131
2.....	82	437	97	151	580	236	91	536	132
3.....	83	486	109	135	480	175	98	510	135
4.....	82	453	100	127	450	154	98	508	134
5.....	85	466	107	156	660	278	98	498	132
6.....	85	516	118	156	680	286	89	421	101
7.....	92	602	150	149	620	249	88	354	84
8.....	107	780	225	150	620	251	75	339	69
9.....	129	1,010	352	150	790	320	68	240	44
10.....	137	1,060	392	147	630	250	60	181	29
11.....	136	820	301	140	540	204	60	177	29
12.....	158	1,000	sb 420	138	510	190	60	180	29
13.....	265	1,400	b 1,000	110	370	110	58	181	28
14.....	226	1,080	659	91	330	81	42	115	13
15.....	232	960	601	92	360	89	33	87	7.8
16.....	252	850	578	91	370	91	33	104	9.3
17.....	253	850	581	61	--	e 170	31	94	7.9
18.....	255	870	599	18	114	5.5	30	89	7.2
19.....	271	820	600	18	118	5.7	30	84	6.8
20.....	270	1,030	751	18	84	4.1	30	78	6.3
21.....	300	960	778	22	110	b 6.5	31	74	6.2
22.....	308	1,230	1,020	33	192	17	51	188	26
23.....	300	1,070	867	39	190	20	52	183	26
24.....	285	1,060	816	39	183	19	48	165	21
25.....	285	900	693	39	198	21	36	94	9.1
26.....	282	850	647	39	151	16	34	93	8.5
27.....	264	901	642	37	119	12	34	99	9.1
28.....	215	750	435	39	121	13	33	104	9.3
29.....	162	650	284	39	142	15	24	107	6.9
30.....	163	580	255	63	480	b 80	22	71	4.2
31.....	168	690	313	67	300	54	--	--	--
Total.	6,015	--	14,599	2,725	--	3,773.8	1,624	--	1,261.6

Total discharge for year (cfs-days)..... 19,829.6
Total load for year (tons)..... 26,348.2

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

MEDICINE CREEK AT CAMBRIDGE, NEBR.--Continued

Particle-size analyses of suspended sediment, May to August 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; V, visual accumulation tube)

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 16, 1954.....	8:50 a.m.	35	63	1,130	1,670	47	60	70	78	92	98	--	--				SBWCM
June 9	11:00 a.m.	38	69	162	607	24	30	33	40	56	93	--	--				SBWCM
June 30	1:35 p.m.	82	80	502	1,040	15	19	22	27	40	88	--	--				SBWCM
July 9	11:50 a.m.	123	76	880	1,880	10	11	14	17	30	79	--	--				SBWCM
July 9	11:50 a.m.	123	76	880	1,850	4	6	9	14	28	79	--	--				SBNM
July 13	3:00 p.m.	279	83	1,220	1,240	8	11	13	17	29	79	95	100				VBWCM
July 16	2:50 p.m.	252	--	696	2,280	13	14	18	22	34	80	96	100				VBWCM
July 19	9:25 a.m.	274	--	679	1,240	13	15	18	23	33	79	96	100				VBWCM
July 21	5:15 a.m.	308	75	942	1,170	11	13	16	20	34	77	93	98		100		VBWCM
July 28	10:15 a.m.	232	--	762	1,720	10	12	15	19	29	82	97	100				VBWCM
Aug. 3	12:40 p.m.	137	80	486	2,410	12	14	17	20	32	81	96	100				VBWCM
Aug. 3	7:10 p.m.	129	80	463	1,050	12	14	17	20	34	83	95	100				VBWCM
Aug. 12.....	10:00 a.m.	139	73	411	1,340	9	12	14	17	27	87	99	100				VBWCM
Aug. 17.....	2:05 p.m.	44	--	383	1,160	31	39	48	58	72	94	--	--				SBWCM

Particle-size analyses of bed material, March to August 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed; V, visual accumulation tube)

Date of collection	Number of sampling points	Discharge (cfs)	Water temperature (°F)	Bed material											Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	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
Mar. 18, 1954....	3	62					0	1	9	57	85	94	99	100			SV
July 9	4	123					0	4	24	66	88	96	99	100			SV
July 13	3	271					0	2	13	52	81	92	98	100			SV
Aug. 3.....	4	129					0	2	19	69	88	96	99	100			SV

KANSAS RIVER BASIN--Continued

WHITE ROCK CREEK AT LOVEWELL, KANS.

LOCATION.--At gaging station at highway bridge, half a mile northwest of Lovewell, Jewell County, and 9.5 miles upstream from mouth.
DRAINAGE AREA.--358 square miles, approximately.
RECORDS AVAILABLE.--Water temperatures: February 1950 to September 1953.
Sediment records: February 1950 to November 1953 (discontinued).
EXTREMES, 1950-53.--Sediment concentrations: Maximum daily, 32,000 ppm Apr. 25, 1951; minimum daily, no flow on many days during July to October 1953.
Sediment loads: Maximum daily, 284,000 tons July 10, 1950; minimum daily, 0 tons on many days during July to October 1953.
REMARKS.--Records of discharge for water year October 1953 to September 1954 given in WSP 1340.

Suspended sediment, October to November 1954

Day	October			November			December		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	0.1	43	(t)	0.8	63	0.2			
2	.1			.6					
3	.1			.5					
4	0	--	0	1.1					
5	0	--	0	1.0					
6	0	--	0	1.0					
7	0	--	0	1.6					
8	0	--	0	2.1					
9	0	--	0	2.0					
10	0	--	0	--		--			
11	0	--	0	--		--			
12	0	--	0	--		--			
13	0	--	0	--		--			
14	0	--	0	--		--			
15	0	--	0	--		--			
16	173	3,320	s 5,860	--		--			
17	180	6,920	s 4,290	--		--			
18	21	2,550	145	--		--			
19	5.4	930	14	--		--			
20	5.2	393	5.5	--		--			
21	5.4	202	2.9	--		--			
22	5.4	118	1.7	--		--			
23	4.6	86	1.1	--		--			
24	4.0	82	.9	--		--			
25	3.2	67	4	--		--			
26	2.6			--		--			
27	2.5			--		--			
28	2.0			--		--			
29	1.9			--		--			
30	1.5			--		--			
31	1.2			--		--			
Total	419.2	--	10,323.9	10.7		1.8			

Total discharge for period Oct. 1 to Nov. 9, 1953 (cfs-days) 429.9
Total load for period Oct. 1 to Nov. 9, 1953 (tons) 10,325.7

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

WHITE ROCK CREEK AT LOVEWELL, KANS.--Continued

Particle-size analyses of suspended sediment, October 1953
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S, sieve; N, in native water; W, in distilled water; C, chemically dispersed; M, mechanically dispersed)

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. 17, 1953.....	8:15 a.m.	149	62	6,700	4,560		78		96		100						SPWCM
Oct. 17.....	10:50 a.m.	95	63	7,040	4,550		82		100		--						PWCM
Oct. 17.....	2:35 p.m.	77	66	6,880	4,920		84		99		100						SPWCM

KANSAS RIVER BASIN--Continued

MISCELLANEOUS ANALYSES OF STREAMS IN KANSAS RIVER BASIN IN NEBRASKA

Periodic determinations of suspended-sediment discharge, water year October 1953 to September 1954

Date	Discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Discharge (tons per day)
MEDICINE CREEK BELOW HARRY STRUNK LAKE			
Oct. 9, 1953	28	38	2.9
Oct. 27	40	37	4.0
Feb. 9, 1954	59	2	.3
Apr. 16	23	17	1.1
May 14	21	18	1.0
June 30	79	25	5.3
July 13	232	10	6.3
Aug. 3	136	24	8.8
REPUBLICAN RIVER AT CAMBRIDGE			
Oct. 6, 1953	42	86	9.8
Oct. 13	23	74	4.6
Oct. 20	26	148	10
Oct. 27	88	345	82
Nov. 2	59	339	54
Nov. 3	62	294	49

Particle-size analyses of suspended sediment, water year October 1953 to September 1954
(Methods of analysis: B, bottom withdrawal tube; D, decantation; P, pipette; S sieve; N, in native water; W, in distilled water; C, chemically dispersed; M mechanically dispersed)

Date of collection	Time	Discharge (cfs)	Water temperature (°F)	Suspended sediment											Methods of analysis
				Concentration of sample (ppm)	Concentration of suspension analyzed (ppm)	Percent finer than indicated size, in millimeters									
						0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.350	0.500	1.000	
REPUBLICAN RIVER AT CAMBRIDGE																	
Oct. 27, 1953	9:35 a.m.	88	43	345	1,740		68		78		92						SPWCM
Nov. 2	4:25 p.m.	59	61	339	1,680		67		81		93						SPWCM

HONEY CREEK NEAR RUSSELL, IOWA

LOCATION.--At gaging station on downstream side of highway bridge, 0.7 mile upstream from mouth and 5.5 miles southeast of Russell, Lucas County.
DRAINAGE AREA.--13.8 square miles.
RECORDS AVAILABLE.--Sediment records: June 1952 to September 1954.
EXTREMES, 1953-54.--Sediment concentrations: Maximum daily, 2,400 ppm Apr. 26; minimum daily, no flow on many days.
Sediment loads: Maximum daily, 940 tons Apr. 26; minimum daily, 0 tons on many days.
EXTREMES, 1952-54.--Sediment concentrations: Maximum daily, 9,840 ppm June 20, 1952; minimum daily, no flow on many days each year.
Sediment loads: Maximum daily, 2,500 tons (estimated) June 21, 1952; minimum daily, 0 tons on many days each year.
REMARKS.--No flow during period October to March; record is omitted. Records of discharge for water year October 1953 to September 1954 given in WSP 1340.

Suspended sediment, April to September 1954

Day	April			May			June		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1	0	--	0	2.1	45	0.3	7.8	590	s 13
2	0	--	0	11	1,600	sa 64	6.3	410	sa 8.9
3	0	--	0	4.7	340	4.3	7.1	330	sa 7.2
4	0	--	0	2.3	85	b .5	4.6	170	sb 2.5
5	0	--	0	1.5	49	.2	2.2	--	e .6
6	0	--	0	1.2	28	.1	1.4	--	e .3
7	0	--	0	.8	--	e .1	.8	--	e .1
8	0	--	0	.5	23		.4	44	
9	0	--	0	.4	--		.4	46	
10	0	--	0	.4	--		.3	--	(t)
11	0	--	0	.3	--	(t)	.2	45	
12	0	--	0	.2	--		1.0	130	b .4
13	0	--	0	.2	--		.6	--	e .2
14	0	--	0	.1	--		.2	91	(t)
15	0	--	0	0	--	0	1.7	1,700	sa 26
16	0	--	0	0	--	0	1.7	400	b 1.8
17	0	--	0	0	--	0	.9	--	e .4
18	0	--	0	0	--	0	.2	--	e .1
19	0	--	0	0	--	0	0	--	0
20	0	--	0	0	--	0	0	--	0
21	0	--	0	0	--	0	0	--	0
22	0	--	0	0	--	0	.3	138	.1
23	0	--	0	0	--	0	0	--	0
24	0	--	0	0	--	0	0	--	0
25	1.3	290	sb 2.5	0	--	0	0	--	0
26	49	2,400	sa 940	0	--	0	0	--	0
27	17	1,100	sa 100	.2	--		0	--	0
28	2.7	155	1.1	.2	25	(t)	0	--	0
29	1.5	45	.2	.1	--		0	--	0
30	1.3	42	.1	0	--	0	0	--	0
31	--	--	--	2.3	710	sb 22	--	--	--
Total	72.8	--	1,043.9	28.5	--	91.7	38.1	--	61.8

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

CHARITON RIVER BASIN--Continued

HONEY CREEK NEAR RUSSELL, IOWA--Continued

Suspended sediment, April to September 1954--Continued

Day	July			August			September		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1				0	--	0			
2				0	--	0			
3				0	--	0			
4				0	--	0			
5				0	--	0			
6				0	--	0			
7				0	--	0			
8				0	--	0			
9				0	--	0			
10				0	--	0			
11				0	--	0			
12				0	--	0			
13				0	--	0			
14				0	--	0			
15				0	--	0			
16				0	--	0			
17				0	--	0			
18				0	--	0			
19				0	--	0			
20				0	--	0			
21				0	--	0			
22				.6	600	sb 6.9			
23				0	--	0			
24				0	--	0			
25				0	--	0			
26				6.7	2,100	sb 62			
27				3.2	170	sb 1.9			
28				.2	--	e .1			
29				0	--	0			
30				0	--	0			
31				0	--	0			
Total	0		0	10.7	--	70.9	0		0

Total discharge for year (cfs-days) 150.1

Total load for year (tons) 1,268.3

e Estimated.

s Computed by subdividing day.

b Computed from estimated concentration graph.

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