Quality of Surface Waters of Alaska, 1961-63

GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1953

Prepared in cooperation with the Alaska Department of Health and Welfare, the city of Anchorage, and the U.S. Bureau of Reclamation

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

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PREFACE

This report was prepared by the Geological Survey in cooperation with the Alaska Department of Health and Welfare, the city of Anchorage, and Bureau of Reclamation, U. S. Department of the Interior by personnel of the Water Resources Division under the direction of L. B. Leopold, chief hydrologist, and S. K. Love, chief, Quality of Water Branch.

The data were collected and computed under the supervision of the district chemist in Palmer, Alaska, F. B. Walling, 1960-61, succeeded by R. G. Schupp, 1961-63.

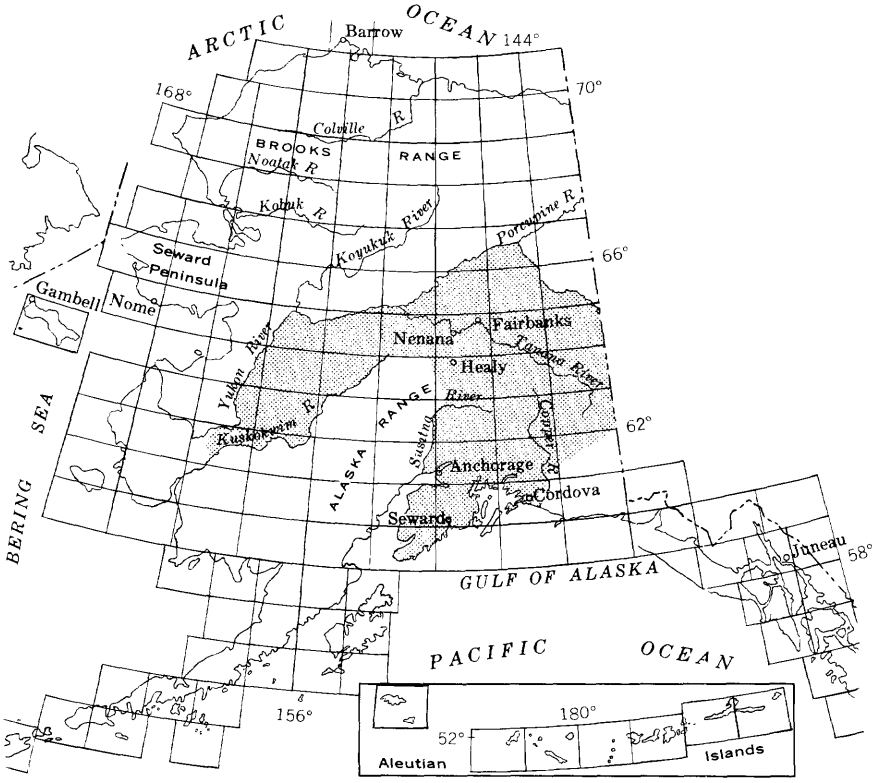

Figure 1. Map of Alaska showing general area of water-quality station operation.

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

ILLUSTRATION

QUALITY OF SURFACE WATERS OF ALASKA, 1961-63

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

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

The collection of water quality data (chemical quality, water temperatures, and suspended sediment) in Alaska was begun by the Geological Survey in 1948. Records of these data, combined with streamflow records, were published in three-year compilation volumes from 1948 to 1956 (1948-50, 1951-53, 1954-56) and from 1957 to 1960 in four annual volumes. The data given in this volume were collected during the water years October 1961 to September 1963. The stream locations of these records are arranged in downstream order according to the Geological Survey method of reporting streamflow. Stations on tributary streams are listed between stations on the main stem in the order in which those tributaries enter the main stem.

A station number has been assigned as an added means of identification for each stream location where regular measurements of water quantity or quality have been made. The numbers have been assigned to conform with the standard downstream order of listing gaging stations. Gaps are left in the numbers to allow for new stations that may be established; hence the numbers are

not consecutive. The numbering system consists of two digits followed by a hyphen and a six digit number. The notation to the left of the hyphen identifies the part or hydrologic region used by the Geological Survey for reporting hydrologic data. The number to the right of the hyphen consists of only the essential digits of the complete number. For example, a station whose number is 30-0120.00 is shown in this report as 30-120. The part designated for Alaska is 30.

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

During the period covered in this report, the Geological Survey maintained 31 stations on 28 streams for the study of chemical and physical characteristics of surface water. In general, samples were collected during open-water season (usually April to September) and periodically during period of ice cover.

Samples for chemical-quality studies were collected daily at 10 stations and periodically at 5 stations. Samples were also collected less frequently at many other points. Water temperatures were measured daily (during open-water season) at 12 stations. Suspended-sediment samples were collected daily during open-water season at 7 stations and periodically at 16 stations. Particle-size distribution of sediment were determined at most of these stations.

COLLECTION AND EXAMINATION OF SAMPLES

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

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

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

CHEMICAL QUALITY

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

TEMPERATURE

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

perature. Thermometers used for determining water temperature were accurate to plus or minus 0.5°F.

SEDIMENT

Suspended-sediment samples were collected daily during the open-water season with a US D-49 depth-integrated cable-suspended sampler (U. S. Interagency, 1952, p. 86-90 and U. S. Interagency, 1963, p. 56-77) from a fixed point at one vertical in the cross section. Depth-integrated samples were collected periodically at three or more verticals in the cross-section to determine the cross-sectional distribution of the concentration of suspended sediment with respect to that at the daily sampling vertical and occasionally, point-integrated samples were taken with a US P-46 sampler.

Sediment concentrations were determined by weighing the solid residue after filtration or evaporation of the samples. For stations where samples were collected periodically, the concentrations reported are instantaneous concentrations or concentration of composites of several samples. For regular daily stations, daily mean concentrations were obtained for the period during which samples were taken by plotting the instantaneous concentration on a copy of the gage-height-recorder chart. The plotted concentrations were connected by a continuous curve. Daily mean concentrations were estimated from the graph. Footnotes to daily values in the tables are used to indicate methods of computation.

In addition to sediment concentrations and loads, records of particle size are reported also for most of the sediment stations. Generally particle size was determined by a combination of sieve analysis and bottom-withdrawal tube analysis (U. S. Interagency, 1943, p. 82-90). Sizes larger than 0.062 mm (sand size) were determined by sieve analysis and those smaller than 0.062 mm were determined by bottom-withdrawal tube or pipet analysis. Native or distilled water, as noted in the tables of analyses, was used as the settling medium. Usually distilled water with a dispersing agent was used. Results obtained with distilled water and a dispersing agent as a settling medium approximate the ultimate particle size of the finer fractions; whereas, results obtained with native water as the settling medium more nearly simulate the particle size existing in the stream.

EXPRESSION OF RESULTS

Quantities of water for analysis are most conveniently measured in the laboratory by use of volumetric glassware. The analytical results thus obtained in this report are expressed in

weights of solute in a given volume of water. To express the results in parts of solute per million (ppm) of water the data must be converted. For most waters this conversion is made by assuming that the liter of water sample weighs 1 kilogram; and thus milligrams per liter are equal to parts per million.

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

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

Conversion factors: Parts per million to equivalents per million

Ion	Multiply by	Ion	Multiply by
Bicarbonate (HCO_3^{-1})	0.01639	Iron (Fe^{+3})	0.05372
Calcium (Ca^{+2})	.04990	Magnesium (Mg^{+2})	.08226
Carbonate (CO_3^{-2})	.03333	Nitrate (NO_3^{-1})	.01613
Chloride (Cl^{-1})	.02821	Phosphate (PO_4^{-3})	.03159
Chromium (Cr^{+6})	.11539	Potassium (K^{+1})	.02557
Fluoride (F^{-1})	.05264	Sodium (Na^{+1})	.04350
Hydrogen (H^{+1})	.99209	Sulfate (SO_4^{-2})	.02082

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

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

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

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

The discharge of the streams is reported in cubic feet per second (see Streamflow, p. 15) and the temperature in degrees Fahrenheit. Color is expressed in units of the platinum-cobalt scale proposed by Hazen (1892, p. 427-428). A unit of color is produced by one milligram per liter of platinum in the form of the chloroplatinate ion. Hydrogen-ion concentration is expressed in terms of pH units. By definition the pH value of a solution is the negative logarithm of the concentration of gram ions of hydrogen. However, the pH meter that is generally used in Survey laboratories determines the activity of the hydrogen ions as distinguished from concentration.

In this report, discharge-weighted averages were computed for the water year for a few daily sampling stations where sampling stations where samples could be collected for at least 292 days during the water year. A discharge-weighted average approximates the composition of water 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 concentration of sediment in parts per million is computed as 1,000,000 times the ratio of the weight of sediment to the weight of water-sediment mixture. Daily sediment loads are expressed in tons per day and except for subdivided days are usually obtained by multiplying daily mean sediment concentration in parts per million by the daily mean discharge, and the appropriate conversion factor, normally 0.0027.

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

COMPOSITION OF SURFACE WATERS

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

The mineral constituents and physical properties of natural waters reported in the tables of analyses include those that have a practical bearing on the value of the waters for most purposes. The analyses generally include results for silica, iron, calcium, magnesium, sodium, potassium, alkalinity as carbonate and bicarbonate, sulfate, chloride, fluoride, nitrate, pH, dissolved solids, and specific conductance. The source and significance of the different constituents and properties of natural waters in the area covered in this report are discussed in the following paragraphs. The constituents are arranged in the order that they appear on standard analytical statement cards which are used to process the chemical quality data in this report.

MINERAL CONSTITUENTS IN SOLUTION

Silica (SiO_2)

Silica is dissolved from practically all rocks. Some natural surface waters contain less than 5 parts per million of silica and few contain more than 50 parts, but the more common range is from 10 to 30 parts per million. Silica affects the usefulness of a water because it contributes to the formation of boiler scale; it usually is removed from feed water for high-pressure boilers. Silica also forms troublesome deposits on the blades of steam turbines.

Iron (Fe)

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

Calcium (Ca)

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

Magnesium (Mg)

Magnesium is dissolved from many rocks, particularly from dolomite 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.

Bicarbonate and carbonate (HCO_3)

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

Sulfate (SO_4)

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

Chloride (Cl)

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

Fluoride (F)

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

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

Nitrate (NO_3)

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

It has been reported that as much as 2 parts per million of nitrate in boiler water tends to decrease intercrystalline cracking of boiler steel. Studies made in Illinois indicate that nitrates in excess of 70 parts per million (as NO_3) may contribute to methemoglobinemai ("blue babies")(Faucett and Miller, 1946, p. 593), and more recent investigations conducted in Ohio show that drinking water containing nitrates in the range of 44 to 88 ppm (as NO_3) may cause methemoglobinemia (Waring, 1949). In a report published by the National Research Council, Maxcy (1950, p. 271) concludes that a nitrate content in excess of 44 parts per million (as NO_3) should be regarded as unsafe for infant feeding. U. S. Public Health Service (1962) sets 45 ppm as the upper limit.

Phosphate (PO_4)

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

may therefore contain considerable amounts of phosphate.

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. Water with less than 500 parts per million of dissolved solids are usually satisfactory for domestic and some industrial uses. Water containing several thousand parts per million of dissolved solids are sometimes successfully used for irrigation where practices permit the removal of soluble salts through the application of large volumes of water on well-drained lands, but generally water containing more than about 2,000 ppm is considered to be unsuitable for long-term irrigation under average conditions.

PROPERTIES AND CHARACTERISTICS OF WATER

Hardness

Hardness is the characteristic of water that receives the most attention in industrial and domestic use. It is commonly recognized by the increased quantity of soap required to produce lather. The use of hard water is also objectionable because it contributes to the formation of scale in boilers, water heaters, radiators, and pipes, with the resultant decrease in rate of heat transfer, possibility of boiler failure, and loss of flow.

Hardness is caused almost entirely by compounds of calcium and magnesium. Other constituents--such as iron, manganese, aluminum, barium, strontium, and free acid--also cause hardness, although they usually are not present in quantities large enough to have any appreciable effect.

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

Noncarbonate hardness is the difference between the hardness calculated from the total amount of calcium and magnesium in solution and the carbonate hardness. If the carbonate hardness (expressed as calcium carbonate) equal the amount of calcium and magnesium hardness (also expressed as calcium carbonate) there is no noncarbonate hardness. Noncarbonate hardness is about equal to the amount of hardness remaining after water is boiled.

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The scale formed at high temperatures by the evaporation of water containing noncarbonate hardness commonly is tough, heat resistant, and difficult to remove.

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

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

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

Acidity (H^{+1})

The use of the terms acidity and alkalinity is widespread in the literature of water analysis and is a cause of confusion to those who are more accustomed to seeing a pH of 7.0 used as a neutral point. Acidity of a natural water represents the content of free carbon dioxide and other uncombined gases, organic acids and salts of strong acids and weak bases that hydrolyze to give hydrogen ions. Sulfates of iron and aluminum in mine and industrial wastes are common sources of acidity. The presence of acidity is reported in those waters which have a pH below 4.5.

Specific conductance (micromhos per centimeter at 25°C)

Specific conductance is a convenient, rapid determination used to estimate the amount of dissolved solids in water. It is a measure of the ability of water to transmit a small electrical current (see p. 6). The more dissolved solids in water than can transmit electricity the greater the specific conductance of the water. Commonly, the amount of dissolved solids (in parts per million) is about 65 percent of the specific conductance (in micromhos). This relation is not constant from stream to stream or from well to well and it may even vary in the same source with changes in the composition of the water (Durfor and Becker, 1964, p. 27-29).

Hydrogen-ion concentration (pH)

Hydrogen-ion concentration is expressed in terms of pH units (see p. 6). The values of pH often are used as a measure of the solvent power of water or as an indicator of the chemical behavior certain solutions may have toward rock minerals.

The degree of acidity or alkalinity of water, as indicated by the hydrogen-ion concentration, expressed as pH, is related to the solvent power of water or as an indicator of the chemical behavior certain solutions may have toward rock minerals.

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

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

Color

In water analysis the term "color" refers to the appearance of water that is free from suspended solids. Many turbid waters that appear yellow, red, or brown when viewed in the stream show very little color after the suspended matter has been removed. The yellow-to-brown color of some waters is usually caused by organic matter extracted from leaves, roots, and other organic substances in the ground. In some areas objectionable color in water results from industrial wastes and sewage. Clear deep water may appear blue as the result of a scattering of sunlight by the water molecules. Water for domestic use and some industrial uses should be free from any perceptible color. A color less than 15 units generally passes unnoticed (U. S. Public Health Service, 1962).

The extent to which a water is colored by material in solution is commonly reported as a part of a water analysis because a significant color in water may indicate the presence of organic material that may have some bearing on the dissolved solids content. Color in water is expressed in terms of units between 0 and 500 or more based on the above standard (see p. 6).

Temperature

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

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

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

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

pollutional effects may be especially serious when low flow conditions coincide with high temperatures. Summary temperature data of water are essential for planning multiple uses of water resources.

SEDIMENT

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

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

STREAMFLOW

Most of the records of stream discharge, used in conjunction with the chemical analyses and in the computation of sediment

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

More complete records of stream discharge in Alaska may be obtained by writing to District chief, Water Resources Division, U. S. Geological Survey, Juneau, Alaska.

PUBLICATIONS

Reports giving records of chemical quality and temperatures of surface waters and suspended-sediment loads of streams in the area covered by this volume for the water years 1948-63, are listed below:

Numbers of water-supply papers containing records for Alaska, 1948-63

Years	WSP	Years	WSP
1948-50	1372	1958	1570
1951-53	1466	1959	1640
1954-56	1486	1960	1720
1957	1500	1961-63	1953

Geological Survey reports containing chemical analyses of surface waters of Alaska prior to 1948 are listed below. 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.

Bulletin 770. The data of geochemistry, 1924.

*Water-Supply Paper 372. A water-power reconnaissance in south-central Alaska, 1915.

*Water-Supply Paper 418. Mineral springs of Alaska, with a chapter on the chemical character of some surface waters of Alaska, 1917.

Some of the reports listed are available for consultation in the larger public and institutional libraries. Copies of Geological Survey publications still in print may be purchased at a nominal cost from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20242, who will, upon request, furnish lists giving prices.

LITERATURE CITED

American Society for Testing Materials, 1954, Manual on industrial water: Am. Soc. for Testing Mat., Philadelphia, Pa., p. 356.

Durfor, C. N. and Becker, E., 1964, Public water supplies of the 100 largest cities in the United States; 1962: U. S. Geol. Survey, Water-Supply Paper 1812, p. 17-29.

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

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

International Union of Pure and Applied Chemistry, 1961, Table of Atomic weights based on carbon-12: Chem. and Eng. News, v. 39, no. 42, Nov. 20, 1961, p. 43.

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

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

Rainwater, F. H., and Thatcher, L. L., 1960, Methods for collection and analysis of water samples: U. S. Geol. Survey Water-Supply Paper 1454, 301 p.

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

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

U. S. Interagency Report 14, 1963, A study of methods in measurement and analysis of sediment loads of streams, determination of fluvial sediment discharge, p. 56-77; U. S. Engineer Office, St. Paul, Minn.

U. S. Public Health Service, 1962, Drinking water standards: U. S. Dept. Health, Education, and Welfare, Public Health Service: Pub. no. 956.

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

CHEMICAL ANALYSES, WATER TEMPERATURES, AND SEDIMENT

COPPER RIVER BASIN

2080. TONSINA RIVER AT TONSINA

LOCATION.--At gaging station, near left bank on downstream side of bridge on Richardson Highway at Tonsina, 0.4 mile upstream from Bernard Creek, and 0.6 mile upstream from Squirrel Creek.
DRAINAGE AREA.--420 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: August 1950 to September 1954, May to August 1956, October 1957 to September 1963.
Water temperatures: June to October 1953, May 1959 to September 1963.
Sediment records: May 1953 to July 1963 (periodic).
EXTREMES (for observation) 1960-63.--Dissolved solids: Maximum, 78 ppm Apr. 8, 1961; minimum, 34 ppm, July 1-10, 1963.
Hardness: Maximum, 58 ppm Apr. 8, 17, 1961; minimum, 26 ppm July 1-10, 1963.
Specific conductance: Maximum, 125 micromhos Apr. 8, 1961; minimum, 58 micromhos July 1-10, 1963.
EXTREMES, 1959-63.--Water temperatures: Maximum, 66°F Aug. 18, 1961.

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

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (calculated)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
Oct. 1, 2, 4-9, 1960	705	6.2	0.05	12	3.8	1.4	0.3	41	9.0	3.0	0.1	0.1	56	46	12	78	7.2	5
Oct. 10, 11, 13-16, 18, 19	486	5.4	.07	12	4.0	1.6	.4	44	8.0	3.0	.1	.1	57	46	10	81	7.3	5
Oct. 24	336	6.7	.00	13	2.6	1.7	.3	45	8.0	1.0	.0	.2	56	43	6	85	7.0	10
Apr. 8, 1961	81	8.6	.07	18	3.3	3.5	1.1	67	7.0	3.5	.0	.2	78	58	4	125	7.3	10
Apr. 17	78	8.2	.04	17	3.6	2.	.8	63	9.0	2.5	.0	.2	75	58	6	121	7.6	5
Apr. 25-30	78	5.8	.00	11	3.8	1.8	1.8	45	6.1	2.5	.0	.6	55	43	6	80	7.2	40
May 1-8	348	6.7	.09	12	4.0	1.4	1.2	47	9.0	2.5	.0	.7	61	46	8	86	7.1	50
May 12-20	721	6.7	.09	12	2.4	1.6	.8	41	7.0	2.5	.0	.6	54	40	6	83	7.0	30
May 21-31	1270	5.8	.09	12	2.1	1.5	.5	38	7.0	2.5	.1	.4	51	38	8	78	7.0	20
June 1-10	1310	5.1	.02	11	.9	1.4	.7	34	5.0	1.0	.2	.4	43	31	3	71	7.1	10
June 11-20	2690	4.5	.02	11	.6	1.2	.4	34	3.0	1.0	.2	.3	39	30	2	67	6.8	10
June 21-27, 29, 30	3110	4.9	.00	11	.1	1.1	.5	33	2.0	1.0	.2	.4	37	28	1	64	7.3	10
July 1, 3, 5-10	2980	4.6	.02	9.9	1.2	1.0	.4	32	6.0	1.0	.0	.1	40	30	4	68	7.6	10
July 11-16, 18-20	2240	4.5	.02	11	1.0	1.1	.4	32	6.0	1.0	.0	.1	41	32	6	67	7.6	10
July 21-31	2330	4.4	.02	9.9	1.2	1.0	.4	31	6.0	1.0	.0	.1	39	30	4	67	7.5	10
Aug. 1-10	3600	3.6	.02	9.6	1.2	1.0	.4	30	6.0	1.0	.0	.1	38	29	4	62	7.3	10
Aug. 11-20	1860	4.3	.00	8.8	1.7	1.1	.5	32	5.0	1.0	.0	.1	38	29	3	66	7.1	10
Aug. 21-31	1760	3.7	.02	9.6	1.2	1.1	.3	30	5.0	1.0	.0	.6	38	29	4	65	7.2	10
Sept. 1-10	932	4.3	.02	9.2	2.2	1.2	.5	35	5.0	1.0	.0	.0	40	32	3	69	7.3	10
Sept. 11-20	1590	4.0	.03	10	1.7	1.1	.5	33	6.0	1.0	.0	.1	40	32	5	67	7.2	5
Sept. 21, 22, 27, 28	1030	5.1	.02	11	1.1	1.2	.5	35	5.0	1.0	.0	.1	42	32	3	71	7.3	5

COPPER RIVER BASIN--Continued

2080. TONSINA RIVER AT TONSINA--Continued

Chemical analyses, in parts per million, water year October 1961 to September 1962

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)	Dissolved solids (calculated)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
May 4-6, 20, 25-31, 1962	599	6.0	0.03	12	2.1	1.5	0.4	42	5.0	1.0	0.4	0.5	50	38	4	78	7.0	10
June 1-3, 8, 10	1,300	8.8	.05	11	1.7	1.3	.4	38	6.0	.5	.1	.6	49	35	4	76	6.9	20
June 11-19, 21, 23	2,620	7.8	.05	9.0	1.6	1.2	.4	30	6.0	1.0	.2	.5	43	29	4	61	7.5	20
June 25-July 2	3,170	7.2	.05	9.4	1.8	1.1	.3	32	6.0	1.0	.2	.5	44	31	5	70	6.9	10
July 3-7, 9, 17, 18	2,900	6.1	.05	9.6	1.5	1.4	.4	30	5.0	2.0	.2	.5	42	30	5	66	7.2	10
July 19, 20, 22-26, 28-31	2,680	5.6	.05	9.4	1.6	1.0	.3	32	5.0	1.0	.2	.1	41	30	4	63	7.3	5
Aug. 4-6, 13, 15, 18, 20	2,310	6.3	.07	9.0	1.6	1.0	.4	31	5.0	1.0	.2	.1	40	29	4	63	7.5	10
Aug. 21-25, 27-31	1,880	5.5	.10	9.6	1.7	1.0	.4	32	6.0	1.0	.2	.1	42	31	5	63	7.3	10
Sept. 1-6, 8-10, 12, 13, 24	983	4.6	.14	11	1.2	1.2	.7	32	5.0	1.0	.2	.1	41	33	7	66	7.3	30

Chemical analyses, in parts per million, water year October 1962 to September 1963

May 21-31, 1963	1030	5.3	0.02	12	1.7	1.8	0.5	42	4.0	1.5	0.0	0.3	48	37	3	80	7.6	10
June 1-10	1640	4.3	.02	12	.7	1.4	.4	36	4.0	1.0	.0	.2	42	32	2	69	7.3	5
June 11-20	1490	3.9	.02	11	1.2	1.2	.3	35	4.0	1.0	.0	.1	40	32	3	66	7.5	5
June 21-30	2190	3.8	.02	10	1.0	1.2	.3	33	4.0	1.0	.0	.2	38	30	3	63	7.6	5
July 1-10	4010	3.6	.02	9.6	.5	1.3	.3	30	3.0	1.0	.0	.0	34	26	1	58	7.6	0
July 11-20	4570	3.7	.02	10	.5	1.2	.3	31	3.0	1.0	.0	.4	35	27	2	60	7.5	0
July 21-31	2680	4.0	.02	10	1.0	1.1	.3	32	4.0	1.5	.0	.4	38	29	3	63	7.6	0
Aug. 1-10	1960	3.9	.07	10	1.0	1.1	.4	30	5.0	2.0	.1	.2	39	30	5	65	7.4	10
Aug. 11-20	2170	3.0	.05	10	.7	2.3	.3	28	6.0	2.0	.2	.1	39	28	5	64	7.3	10
Aug. 21, 23, 25-31	2680	4.4	.05	9.2	1.2	1.0	.4	29	4.0	1.5	.0	.1	36	28	4	62	7.2	20
Sept. 1-10	2280	4.1	.07	10	1.0	1.3	.4	31	6.0	1.5	.1	.1	40	30	5	66	7.0	10
Sept. 11-20	1370	4.4	.07	11	1.2	1.3	.4	35	4.0	1.5	.1	.0	42	32	2	68	7.3	20
Sept. 21-30	480	3.9	.07	12	1.0	1.3	.4	38	4.0	1.5	.1	.0	43	33	2	72	7.1	30

COPPER RIVER BASIN--Continued

2080. TONSINA RIVER AT TONSINA--Continued

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

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

COPPER RIVER BASIN--Continued

2080. TONSINA RIVER AT TONSINA--Continued

Temperature (°F) of water, water year October 1961 to September 1962

Month	Day																													Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
April	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	40	42	40	38	41	41	42	--
May	--	--	--	40	40	40	--	--	45	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
June	40	40	40	--	--	--	--	40	--	44	45	45	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
July	--	--	--	--	--	45	--	--	--	--	--	--	--	--	50	50	58	55	60	55	--	53	50	53	50	50	--	53	51	53	--	--
August	--	--	--	57	--	--	--	--	--	--	--	--	53	--	53	--	--	--	--	52	54	52	50	50	50	--	50	52	58	44	40	--
September	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Temperature (°F) of water, water year October 1962 to September 1963

Month	Day																													Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
May	--	--	--	--	--	--	--	--	--	--	--	--	--	39	42	44	47	48	48	49	50	--	--	--	--	--	--	--	50	49	49	--
June	48	47	47	48	45	49	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	46	48	48	49	49	47	49	50	--	--
July	48	51	49	50	51	51	48	42	54	51	50	50	50	50	50	50	49	50	49	50	49	48	48	50	51	49	49	48	49	50	48	49
August	50	49	49	48	49	48	48	49	48	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	49	50	45	45	--
September	42	40	42	45	50	48	48	48	48	48	48	48	48	47	47	47	46	46	46	46	46	47	48	45	45	45	45	44	44	44	--	46

COPPER RIVER BASIN--Continued

2080. TONSINA RIVER AT TONSINA--Continued

Periodic determinations of suspended-sediment discharge and particle-size analyses water years October 1960 to September 1963
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water;
P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment											Method of analysis
							Percent finer than size indicated, in millimeters											
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
June 4, 1961			--	1150	24	74						--	--	--	--			--
July 7			--	2100	22	125						--	--	--	--			--
Aug. 8			--	2940	36	286						--	--	--	--			--
May 25, 1962			--	727	34	67												
June 24			--	6640	104	1860						--	--	--	--			--
July 24			--	2500	39	264						--	--	--	--			--
												--	--	--	--			--
May 14, 1963	1605		39	624	47	--						94	96	98	100			S
July 12			50	4970	127	--						68	78	88	97	100		S

ANCHOR RIVER BASIN

2400. ANCHOR RIVER AT ANCHOR POINT

LOCATION.--At gaging station, near right bank on downstream side of Sterling Highway bridge at Anchor Point, 0.1 mile downstream from North Fork, and 1 mile upstream from mouth.
DRAINAGE AREA.--226 square miles.
RECORDS AVAILABLE.--Chemical analyses: May 1953 to September 1954, October 1957 to September 1963.
Water temperatures: May 1953 to September 1954, April 1959 to September 1963.
Sediment records: July 1953 to August 1954 (periodic).
EXTREMES (for observation), 1961-63.--Dissolved solids: Maximum, 94 ppm Nov. 11-17, 19-21, 1961; minimum, 43 ppm May 18-31, 1962.
Hardness: Maximum, 39 ppm Aug. 11-20, 1962; minimum, 15 ppm May 9-18, 1961.
Specific conductance: Maximum, 102 micromhos Sept. 11-18 1962; minimum, 48 micromhos May 18-31, 1962.
EXTREMES, 1959-63.--Water temperatures: Maximum, 69°F July 28, 1963.

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

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (calculated)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 1-4, 6-10, 1960	266	36	0.05	6.4	4.0	5.3	1.4	40	4.0	6.0	0.1	0.6	84	32	0	75	7.0	20
Oct. 11-16, 18.....	193	39	.10	6.4	4.3	5.8	1.8	42	5.0	7.0	.2	.8	92	34	0	83	7.7	20
Oct. 23-25, 27, 30..	392	35	.03	6.0	4.3	5.0	1.4	37	4.0	6.0	.1	.6	80	32	2	71	7.1	20
Nov. 2-10.....	264	36	.07	6.0	4.5	5.4	1.7	42	2.0	6.0	.0	.6	83	34	0	73	7.1	20
Nov. 11-17, 19-21...	133	41	.07	6.0	5.0	6.0	1.9	40	6.0	7.0	.1	.6	94	36	2	82	7.0	20
Nov. 25.....	180	39	.31	7.1	3.3	6.4	1.4	46	2.0	5.0	.1	.1	88	31	0	93	6.9	20
Jan. 8, 1961.....	160	42	.00	7.1	3.8	5.2	1.0	42	2.0	6.5	.1	.2	89	33	0	72	7.0	10
Feb. 25.....	a 118	40	.10	7.1	4.5	6.5	1.5	48	1.0	5.5	.0	.2	90	36	0	85	7.2	5
Apr. 29, 30, May 1-8	1110	19	.03	4.0	1.7	3.9	.7	24	2.0	3.0	.1	.4	47	17	0	53	6.8	30
May 9-18.....	1060	19	.03	3.2	1.7	3.3	1.1	20	2.0	3.0	.1	.5	44	15	0	42	6.8	30
May 19-28.....	711	26	.00	3.6	2.4	4.4	1.4	25	2.0	4.5	.2	.4	57	19	0	51	6.7	30
May 29-31, June 1-7.	455	30	.03	4.8	2.6	5.0	1.6	34	2.0	4.5	.1	.4	68	22	0	65	7.0	20
June 8-19.....	316	31	.16	6.0	2.6	5.1	1.6	40	1.0	3.0	.1	.4	71	26	0	75	7.4	20
June 20-30.....	263	32	.24	6.0	3.1	5.1	1.6	42	1.0	3.5	.1	.4	74	28	0	78	7.4	20
July 1-10.....	196	32	.28	6.7	3.3	5.6	1.6	46	1.0	3.5	.0	.4	78	30	0	84	7.5	20
July 11-20.....	255	31	.26	6.4	3.1	5.3	1.4	45	1.0	3.0	.1	.5	74	28	0	78	7.5	20
July 21-30.....	248	26	.14	8.4	1.5	6.8	1.9	43	1.0	4.0	.1	.8	72	27	0	83	6.9	20
Aug. 7-19.....	295	23	.16	8.0	1.5	6.6	1.9	43	1.0	4.0	.2	.5	68	26	0	81	7.4	30
Aug. 20-31.....	184	25	.22	8.0	2.7	7.2	2.1	50	2.0	3.5	.2	.5	76	31	0	91	7.3	25
Sept. 1-10.....	298	21	.17	7.2	1.9	6.8	2.0	42	1.0	4.0	.1	.5	66	26	0	78	7.3	35
Sept. 11-20.....	977	18	.10	6.4	.7	5.5	1.6	30	1.0	4.0	.1	.7	53	19	0	62	7.1	50

a Discharge at time of sampling.

ANCHOR RIVER BASIN--Continued

2400. ANCHOR RIVER AT ANCHOR POINT--Continued

Chemical analyses, in parts per million, water year October 1961 to September 1962

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)	Dissolved solids (calculated)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
May 18-31, 1962	984	17	0.03	3.6	1.7	3.3	1.6	23	1.0	3.0	0.1	0.4	43	16	0	48	7.0	20
June 1-10	630	21	.05	3.8	2.3	3.9	1.4	30	1.0	3.0	.1	.3	52	18	0	57	7.0	20
June 11-20	614	23	.05	4.2	2.3	4.2	1.6	31	1.0	3.0	.1	.3	55	20	0	62	6.7	20
June 21-30	348	26	.08	4.8	2.9	4.8	1.6	36	1.0	3.5	.1	.4	63	24	0	69	7.7	30
July 1-10	171	26	.07	5.4	3.5	5.4	1.8	44	1.0	3.5	.1	.1	69	28	0	79	7.2	20
July 11-16	266	17	.05	6.0	3.9	5.1	1.9	46	1.0	3.0	.1	.1	61	31	0	78	7.7	20
July 22-30	140	25	.08	6.6	4.3	5.7	1.8	51	1.0	3.5	.1	.2	73	32	0	88	7.4	10
Aug. 1-10	92	27	.05	7.2	4.9	6.4	2.1	56	1.0	4.0	.1	.2	81	38	0	99	7.5	20
Aug. 11-20	89	28	.07	7.2	5.1	6.1	2.1	58	1.0	4.5	.1	.2	83	39	0	100	7.6	20
Aug. 21-31	134	28	.10	7.2	4.9	6.1	2.0	57	1.0	4.0	.1	.2	82	38	0	99	7.6	20
Sept. 1-10	135	29	.12	7.2	4.9	5.9	2.0	55	1.0	4.0	.1	.1	81	36	0	99	7.5	20
Sept. 11-18	121	29	.12	7.2	5.1	6.1	2.1	57	1.0	5.0	.1	.2	84	39	0	102	7.3	10

Chemical analyses, in parts per million, water year October 1962 to September 1963

May 7-19, 1963	395	13	0.19	4.0	2.7	3.6	2.7	33	1.0	3.0	0.2	0.2	47	21		67	7.2	20
May 23-31	225	21	.05	5.2	3.6	6.2	2.7	37	4.0	8.0	.1	.2	69	28		84	7.5	20
June 1-10	220	21	.02	5.2	3.6	6.3	2.1	36	5.0	7.5	.1	.3	69	28		88	7.0	20
June 11-20	216	22	.03	6.4	3.9	5.3	1.7	37	7.0	6.0	.2	.2	71	32	2	91	6.6	30
June 21-29	333	22	.05	6.4	2.2	5.3	1.5	34	3.0	5.0	.1	.2	63	25		78	7.1	30
July 1-6	360	23	.07	6.4	1.9	4.7	1.3	36	1.0	3.5	.1	.1	60	24		74	7.1	20
July 14-20	267	25	.20	6.4	2.9	5.0	1.3	42	3.0	3.0	.1	.2	68	28		77	7.6	30
July 21-31	260	26	.15	7.2	2.9	5.3	1.4	43	2.0	4.0	.1	.2	70	30		82	7.2	30
Aug. 1-10	175	29	.26	6.4	4.4	5.6	1.5	51	1.0	4.0	.2	.2	78	34		91	7.1	30
Aug. 11-20	151	24	.12	7.2	3.2	5.7	1.5	49	1.0	4.0	.1	.2	71	31		88	7.5	30
Aug. 21-31	652	25	.05	5.6	3.4	5.5	1.4	40	1.0	5.0	.2	.6	68	28		82	7.0	20
Sept. 1, 2, 4-10	369	28	.14	6.4	3.9	5.6	1.5	44	1.0	4.5	.2	.4	74	32		86	7.7	20
Sept. 11-20	405	22	.10	5.6	2.9	5.7	1.1	36	3.0	5.0	.1	.3	64	26		79	7.5	30
Sept. 21-30	534	19	.15	5.0	3.3	5.1	1.3	35	3.0	5.0	.1	.3	59	26		74	7.7	30

ANCHOR RIVER BASIN--Continued

2400. ANCHOR RIVER AT ANCHOR POINT--Continued

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

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

ANCHOR RIVER BASIN--Continued

2400. ANCHOR RIVER AT ANCHOR POINT--Continued

Temperature (°F) of water, water year October 1961 to September 1962

Month	Day																													Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
May	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	38	39	38	40	42	39	41	38	42	40	38	40	45	48	--
June	42	43	44	45	47	48	49	45	46	56	49	50	45	50	48	50	54	57	52	49	57	56	48	54	58	55	49	55	57	--	--	50
July	54	58	60	64	--	65	--	54	53	53	53	55	46	45	48	58	--	--	--	--	--	58	58	--	51	56	58	56	51	59	--	--
August	60	57	58	57	57	56	55	55	58	58	58	54	--	57	59	54	56	--	56	59	55	56	53	58	56	52	52	52	58	55	53	54
September	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Temperature (°F) of water, water year October 1962 to September 1963

Month	Day																													Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
May	--	--	--	--	--	--	39	39	40	41	44	42	41	43	--	41	40	41	40	46	--	--	--	45	49	52	45	49	57	51	54	--
June	55	--	--	--	--	49	51	50	45	41	46	49	45	45	56	55	55	54	53	47	47	47	46	41	46	45	49	56	55	--	--	49
July	52	50	49	55	54	52	--	--	--	--	--	--	--	59	55	58	55	61	59	57	51	55	49	60	58	54	63	69	60	59	55	--
August	55	60	55	49	56	55	53	58	59	57	58	62	62	51	54	55	55	58	55	54	55	49	50	49	47	49	56	55	55	55	54	55
September	55	55	--	55	53	53	53	51	53	52	50	56	53	54	52	45	50	51	51	54	53	55	52	45	45	45	45	44	45	45	--	51

NINILCHIK RIVER BASIN

2416. NINILCHIK RIVER AT NINILCHIK

LOCATION.--At gaging station, on downstream side of bridge, at mile post 137 Sterling Highway, at Ninilchik, and 1.1 miles upstream from mouth.
DRAINAGE AREA.--131 square miles.
RECORDS AVAILABLE.--Water temperatures: May to September 1963.
Sediment records: May to September 1963.
EXTREMES, May to September 1963.--Water temperatures: Maximum, 62°F July 14.
Sediment concentrations: Maximum daily, 236 ppm Sept. 27.
Sediment loads: Maximum daily, 204 tons Sept. 27.

Temperature (°F) of water, May to September 1963

Month	Day																													Aver-age
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
May	--	--	--	--	--	--	--	--	37	38	39	38	38	42	44	45	45	48	41	41	41	42	43	44	45	43	--	--	54	53	52	--
June	50	48	43	44	44	44	44	46	44	44	44	44	45	46	46	49	52	54	54	54	54	54	54	49	--	--	50	54	54	54	--	49
July	50	51	53	61	54	53	52	51	51	52	56	61	61	62	57	52	52	53	53	53	53	53	52	54	50	49	50	51	53	52	52	53
August	52	53	54	53	52	50	48	53	51	51	52	52	52	60	59	57	54	53	51	48	50	49	50	--	51	52	51	51	50	50	50	52
September	50	52	54	50	50	50	51	51	51	51	49	48	47	47	44	44	44	44	44	44	43	43	41	40	39	39	38	45	44	43	--	46

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NINILCHIK RIVER BASIN--Continued

2416. NINILCHIK RIVER AT NINILCHICK--Continued

Suspended sediment, May to September 1963

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				260	40	E 28	95	15	4
2				370	40	E 40	92	17	4
3				350	40	E 38	92	13	3
4				398	40	E 43	92	14	3
5				356	40	E 38	108	20	6
6				310	40	E 33	97	19	5
7				265	37	26	104	20	6
8				256	37	26	99	23	6
9				239	37	24	92	18	4
10				217	39	23	88	14	3
11				212	46	26	97	16	4
12				228	51	31	104	20	6
13				206	29	16	101	23	6
14				201	33	18	132	36	13
15				196	35	18	163	34	15
16				179	29	14	150	27	11
17				177	32	15	137	24	9
18				170	50	23	135	26	9
19				196	49	26	104	25	7
20				209	51	29	94	23	6
21				201	69	37	84	21	5
22				174	39	18	84	25	6
23				154	31	13	112	22	7
24				143	32	12	112	26	8
25				157	66	28	114	29	9
26				150	30	12	99	20	5
27				118	19	6	108	13	4
28				108	17	5	128	18	6
29				103	15	4	104	17	5
30				97	16	4	112	16	5
31				97	14	4	--	--	--
Total				6497	--	678	3233	--	190

Day	JULY			AUGUST			SEPTEMBER		
1	118	19	6	62	20	3	71	25	5
2	106	17	5	62	21	4	72	25	5
3	94	23	6	62	20	3	68	23	4
4	87	17	4	58	24	4	77	25	5
5	85	14	3	59	24	4	70	29	5
6	79	18	4	62	23	4	59	30	5
7	79	17	4	62	31	5	68	27	5
8	103	21	6	66	25	4	77	28	6
9	90	22	5	65	25	4	85	26	6
10	84	19	4	48	22	3	94	24	6
11	77	21	4	48	18	2	87	20	5
12	72	19	4	48	16	2	76	21	4
13	70	18	3	46	19	2	71	19	4
14	68	17	3	46	15	2	70	20	4
15	76	22	4	46	13	2	66	19	3
16	101	14	4	45	15	2	77	22	4
17	108	22	6	46	15	2	137	41	15
18	90	24	6	52	15	2	161	38	16
19	76	18	4	55	18	3	132	31	11
20	71	18	3	49	18	2	120	48	16
21	65	18	3	56	19	3	108	32	9
22	80	19	4	124	56	19	92	31	8
23	77	26	5	194	112	59	80	25	5
24	122	42	14	159	40	17	77	18	4
25	103	29	8	139	25	9	72	37	7
26	84	25	6	114	17	5	94	198	50
27	74	20	4	90	18	4	320	236	204
28	68	21	4	76	17	3	307	138	114
29	66	20	4	71	16	3	209	86	48
30	64	21	4	71	18	3	177	67	32
31	62	20	3	71	18	3	--	--	--
Total	2599	--	147	2252	--	187	3274	--	615

Total discharge for period May to September 1963 (cfs-days)..... 17855
Total suspended sediment load for period May to September 1963 (tons)..... 1817

E Estimated

TRAIL RIVER BASIN

2480. TRAIL RIVER NEAR LAWING

LOCATION.--At gaging station, near center of stream on downstream end of pier at bridge site on old Seward-Anchorage Highway, 0.2 mile upstream from Falls Creek, 0.2 mile downstream from Lower Trail Lake, 1.9 miles upstream from mouth, and 2.1 miles north of Lawing.
DRAINAGE AREA.--181 square miles.
RECORDS AVAILABLE.--Chemical analyses: October 1949 to September 1963.
Water temperatures: April 1959 to September 1963.
EXTREMES, 1959-63.--Dissolved solids (1961-63): Maximum, 68 ppm Jan. 1-10, Mar. 1-10, 1962; minimum, 38 ppm Aug. 1-5, 1962.
Hardness (1961-63): Maximum, 50 ppm Dec. 21-31, 1961, Feb. 11-20, 1962; minimum, 28 ppm Sept. 11-30, 1963.
Specific conductance (1961-63): *Maximum*, 109 *micromhos* Mar. 11-20, 1962; *minimum* 57 *micromhos* June 11-20, 1962.
Water temperatures: Maximum, 54°F June 16-18, 1959, July 11, 12, 1960, July 28, 1962.

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

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (calculated)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
Oct. 1-10, 1960.....	489	3.8	0.05	13	1.0	0.9	0.6	31	9.0	2.0	0.0	0.6	46	36	11	74	7.4	5
Oct. 11-18.....	335	3.9	.06	13	.7	1.4	.7	33	10	2.0	.0	.6	48	36	8	76	7.3	5
Oct. 19-31.....	691	4.0	.06	13	1.0	.9	.6	32	11	1.0	.0	.7	48	36	10	77	7.4	5
Nov. 1, 2.....	682	4.4	.03	13	1.9	1.3	.4	34	11	2.0	.0	.7	52	40	12	79	7.3	5
Nov. 26-30.....	205	5.1	.03	14	3.1	1.5	.6	38	13	2.0	.0	1.0	59	48	16	88	7.1	0
Dec. 1-10.....	386	5.7	.03	14	2.8	1.4	.5	39	11	2.5	.0	1.2	58	46	14	89	7.3	5
Dec. 11-20.....	650	5.3	.03	14	2.6	1.5	.5	36	13	2.0	.0	1.4	58	46	16	87	7.2	5
Dec. 21-31.....	323	5.7	.03	14	3.1	1.5	.5	38	13	2.5	.0	2.0	61	48	16	90	7.3	5
Jan. 1-10, 1961.....	271	6.6	.03	15	2.8	1.7	.5	40	13	2.0	.0	1.7	63	49	16	95	7.2	5
Jan. 11-20.....	237	5.7	.02	15	1.9	1.3	.6	42	11	1.0	.0	1.7	59	46	11	97	7.3	0
Jan. 21-31.....	1170	5.6	.03	14	1.0	1.5	.8	38	10	1.0	.0	2.1	55	39	8	87	7.2	0
Feb. 1-8.....	367	5.4	.07	14	1.4	1.1	.4	36	10	2.5	.1	1.7	55	41	12	88	7.0	10
Feb. 9-18.....	233	5.9	.03	15	2.6	1.2	.5	40	11	1.5	.2	3.0	61	48	15	88	7.5	5
Feb. 19-28.....	155	5.7	.03	15	2.6	1.6	.6	43	12	1.5	.1	2.6	63	48	13	93	7.3	5
Mar. 1-10.....	138	5.9	.00	16	1.9	1.5	.6	43	11	1.5	.1	3.0	62	48	13	96	7.5	5
Mar. 11-20.....	112	5.9	.03	15	1.9	1.6	.6	42	10	2.0	.1	2.9	61	46	11	96	7.3	5
Mar. 21-31.....	107	5.9	.03	15	2.8	1.4	.5	43	9.0	2.0	.1	2.9	61	49	14	96	7.5	5
Apr. 1-10.....	135	5.9	.03	15	2.6	1.3	.6	49	9.0	2.5	.1	2.8	64	48	8	96	7.5	5
Apr. 11-20.....	134	5.7	.03	15	2.1	2.1	.6	46	9.0	1.5	.1	3.0	62	46	8	96	7.2	5
Apr. 21-23, 28-30...	199	7.8	.00	15	2.4	1.6	.6	43	10	2.0	.0	1.7	62	48	12	100	7.5	5

TRAIL RIVER BASIN--Continued

2480. TRAIL RIVER NEAR LAWING--Continued

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

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (calculated)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
May 1-10	542	5.6	.00	14	3.1	1.4	.5	42	10	2.0	.1	2.0	60	48	13	94	7.3	5
May 11-15, 20-24	1080	5.6	.00	14	.5	1.2	.7	33	11	1.5	.0	2.2	53	37	10	86	7.3	5
May 25-31, June 1-3	1340	5.3	.00	13	1.0	1.2	.6	34	9.0	2.0	.0	1.8	51	36	8	84	7.0	5
June 4-13	1630	5.6	.00	13	1.2	1.1	.6	33	10	2.0	.1	1.8	51	38	10	84	7.0	5
June 14-22	2250	5.0	.02	12	1.4	.9	.4	33	10	1.0	.0	1.5	48	36	9	79	7.7	0
June 23-30	2340	4.4	.02	13	1.0	.8	.4	32	9.0	1.0	.0	1.2	47	36	10	77	7.6	0
July 1-10	2340	4.1	.02	12	1.2	.8	.4	31	10	1.0	.0	.8	45	35	10	74	7.5	0
July 11-20	2620	4.0	.02	12	.7	.8	.4	30	9.0	1.0	.0	.7	44	33	8	72	7.5	5
July 21-31	2190	4.1	.00	11	.9	.8	.5	29	7.0	1.0	.0	.8	39	31	7	69	7.2	--
Aug. 1-10	2370	4.3	.02	10	1.2	.7	.5	26	8.0	1.0	.0	.8	40	30	9	65	7.1	--
Aug. 11-20	1880	3.0	.02	10	1.5	1.0	.7	29	8.0	1.0	.0	.7	40	31	7	70	6.6	--
Aug. 21-31	1590	3.2	.02	10	1.5	.7	.5	27	8.0	1.0	.0	.9	39	31	9	68	7.1	--
Sept. 1-10	1050	3.9	.02	11	.6	.7	.5	28	7.0	.5	.0	1.0	39	30	7	69	7.1	--
Sept. 11-20	2130	4.3	.02	10	1.7	.8	1.0	30	7.0	1.0	.0	.8	42	32	7	70	7.0	--
Sept. 21-30	904	3.5	.02	11	1.3	.7	.7	31	8.0	1.0	.0	.7	42	33	8	71	7.1	--

TRAIL RIVER BASIN--Continued

2480. TRAIL RIVER NEAR LAWING--Continued

Chemical analyses, in parts per million, water year October 1961 to September 1962

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)	Dissolved solids (calculated)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
Oct. 1-10, 1961.....	773	3.5	0.02	11	1.6	0.8	0.7	32	8.0	1.0	0.0	0.9	44	34	8	74	7.2	5
Oct. 11-20.....	413	3.5	.02	12	1.5	.7	.6	34	8.0	1.0	.0	.7	45	36	8	77	7.2	5
Oct. 21-31.....	325	3.5	.02	11	2.1	.8	.6	33	9.0	1.0	.0	.9	45	36	9	78	7.3	5
Nov. 1-8.....	289	4.0	.02	12	1.7	.8	.7	34	8.0	1.5	.0	.7	46	37	9	81	7.3	5
Nov. 12, 14-17, 19, 20.....	359	5.2	.02	12	1.9	.8	.7	35	9.0	1.0	.0	1.0	49	38	9	83	7.3	5
Nov. 21-30.....	225	4.3	.02	14	1.7	1.0	.6	39	9.0	1.5	.0	1.2	52	42	10	90	7.4	5
Dec. 1-10.....	172	5.7	.02	15	1.6	1.1	.6	42	10	1.0	.0	1.4	57	45	11	98	7.5	5
Dec. 11-20.....	145	5.0	.02	16	1.5	1.1	.6	44	10	1.0	.0	1.3	59	46	10	100	7.4	5
Dec. 21-31.....	95	6.1	.02	17	1.8	1.3	.7	46	12	1.5	.0	1.6	65	50	12	108	7.3	5
Jan. 1-10, 1962.....	118	6.1	.03	17	1.2	1.4	.6	44	12	.5	.1	1.4	68	47	11	95	7.4	5
Jan. 11-20.....	122	4.5	.07	16	1.8	1.6	.7	46	11	1.5	.1	1.4	62	48	10	97	7.6	5
Jan. 21-31.....	90	5.0	.07	17	1.6	1.5	.6	46	11	1.5	.1	1.4	63	48	10	98	7.5	5
Feb. 1-10.....	89	5.3	.05	17	1.5	1.4	.6	46	9.0	2.0	.1	1.5	61	48	10	99	7.5	5
Feb. 11-20.....	85	5.7	.03	17	1.9	1.3	.5	48	10	1.5	.1	1.4	63	50	11	99	7.4	5
Feb. 21-28.....	78	6.0	.07	17	1.7	1.5	.6	48	10	1.5	.1	1.5	65	49	10	100	7.5	10
Mar. 1-10.....	70	8.6	.02	18	1.0	1.6	.8	49	11	1.5	.0	1.1	68	49	9	108	7.4	5
Mar. 11-20.....	63	5.2	.02	18	.9	1.6	.5	48	9.0	2.0	.0	.9	62	49	10	109	7.4	5
Mar. 21-31.....	66	5.2	.00	18	1.3	1.5	.5	48	10	2.0	.0	1.3	64	50	11	108	7.6	5

TRAIL RIVER BASIN--Continued

2480. TRAIL RIVER NEAR LAWING--Continued

Chemical analyses, in parts per million, water year October 1961 to September 1962--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)	Dissolved solids (calculated)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
Apr. 1-10	176	5.2	0.00	17	1.2	1.5	0.5	46	10	2.0	0.0	1.1	62	48	10	105	7.7	5
Apr. 11-20	179	5.2	.00	17	1.2	1.6	.5	46	9.0	2.0	.0	1.0	61	47	9	102	7.5	5
Apr. 21-30	260	5.0	.02	17	.5	1.6	.5	42	9.0	2.0	.0	1.0	55	44	10	99	7.5	5
May 1-10	316	7.7	.00	15	1.5	1.3	.4	42	10	1.5	.2	1.2	60	44	10	95	7.5	5
May 11-20	526	7.3	.00	14	1.5	1.1	.4	40	10	1.0	.2	1.2	57	42	9	89	7.3	5
May 21-31	662	6.3	.02	14	1.2	1.1	.4	38	9.0	1.0	.2	1.2	53	40	9	85	7.4	5
June 1-10	881	5.7	.02	10	1.2	.6	.3	29	6.0	1.0	.2	.8	40	30	6	67	7.1	5
June 11-20	2,010	5.4	.02	9.6	1.2	.6	.3	25	9.0	.5	.2	.9	40	29	9	57	6.7	5
June 21-30	2,220	4.9	.02	13	1.0	.8	.3	34	9.0	1.5	.2	1.0	49	36	8	77	7.4	5
July 1-10	2,310	4.0	.02	12	1.2	.8	.3	32	9.0	1.0	.2	.7	45	35	9	72	7.3	5
July 11-20	2,010	4.1	.03	11	1.5	.7	.3	31	8.0	1.0	.2	.6	42	34	9	70	7.3	5
July 21-31	1,790	4.5	.03	11	1.2	.8	.3	30	8.0	1.0	.2	.7	43	33	8	67	7.5	5
Aug. 1-5	1,650	3.7	.03	11	.9	.6	.4	29	6.0	1.0	.1	.3	38	30	6	65	7.4	5
Sept. 22-30	998	4.7	.03	11	1.1	.7	.5	29	7.0	1.0	.1	.3	40	32	8	66	7.3	5
Weighted average	--	4.8	.02	12.0	1.3	.8	.4	33	8.5	1.1	.2	.8	46	35	9	233	7.2	5
Time weighted average	598.2	5.2	.02	14.0	1.4	1.1	.5	39	9.3	1.3	.1	1.1	54	41	9	388	7.3	5
Tons per day	--	7.7	.04	20.0	2.1	1.3	.6	53	14.0	1.7	.2	1.3	75	--	--	--	--	--

TRAIL RIVER BASIN--Continued

2480. TRAIL RIVER NEAR LAWING--Continued

Chemical analyses, in parts per million, water year October 1962 to September 1963

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)	Dissolved solids (calculated)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
Oct. 1-10, 1962	392	3.8	0.05	11	0.7	0.7	0.4	27	9.0	1.5	0.1	0.4	41	31	9	69	7.4	5
Oct. 11-20	266	4.3	.05	12	.9	.7	.5	29	9.0	1.5	.1	.3	43	32	8	71	7.4	5
Oct. 21-31	344	3.8	.07	12	1.1	.8	.5	31	8.0	1.0	.1	.3	43	34	9	72	7.4	5
Nov. 1-10	1160	3.5	.03	13	.7	1.2	.6	32	9.0	1.0	.4	.3	46	35	9	77	7.6	5
Nov. 11-20	421	3.3	.03	13	1.6	1.0	.6	34	10	1.5	.1	.4	49	38	10	74	7.8	5
Nov. 21-30	239	2.9	.03	13	1.2	1.1	.8	35	9.0	2.0	.1	.3	47	38	9	78	7.8	5
Dec. 1-10	169	3.1	.03	14	1.0	1.2	.6	36	9.0	2.0	.1	.4	55	40	10	85	7.8	5
Dec. 11-20	254	3.6	.02	14	1.0	1.3	.6	39	9.0	2.0	.0	.4	51	40	8	89	7.7	5
Dec. 21-31	207	3.8	.03	15	1.6	1.2	.6	40	11	2.0	.1	.4	56	44	11	92	8.0	5
Jan. 1-10, 1963	124	3.3	.02	16	1.5	1.2	.6	42	12	2.0	.1	.5	58	47	13	99	8.0	5
Jan. 11-19	119	4.0	.03	16	1.5	1.4	.7	43	12	2.0	.1	.5	59	47	12	100	7.9	10
Jan. 20-31	124	4.2	.07	16	1.5	1.3	.6	45	10	1.5	.0	1.0	58	46	9	100	7.3	5
Feb. 1-10	89	4.2	.07	16	1.9	1.3	.5	48	11	1.0	.0	.1	60	48	9	100	7.4	5
Feb. 11-20	96	4.1	.07	16	1.9	1.2	.6	44	11	1.5	.0	1.0	59	48	12	98	7.4	5
Feb. 21-28	184	4.1	.08	16	1.2	1.3	.6	40	11	2.0	.0	.8	57	45	12	96	7.2	5
Mar. 1-10	191	4.2	.08	16	1.2	1.2	.6	43	10	1.5	.0	1.0	57	45	10	95	7.3	5
Mar. 11-20	133	3.6	.08	16	1.0	1.3	.7	42	10	2.5	.0	.1	56	44	10	96	7.2	5
Mar. 21-31	86	3.9	.08	16	1.5	1.3	.5	43	10	2.5	.0	1.0	58	47	12	96	7.3	5
Apr. 1-10	84	6.1	.02	16	1.1	1.7	.4	42	10	1.5	.0	2.2	60	44	10	99	7.7	0
Apr. 11-20	95	5.8	.02	16	1.1	1.4	.4	41	10	1.5	.0	1.9	58	44	10	99	7.6	0
Apr. 21-30	151	6.1	.02	16	.9	1.4	.4	41	10	1.5	.0	1.4	58	43	9	98	7.5	0
May 1-10	359	6.2	.02	16	.9	1.4	.4	40	8.0	2.0	.0	2.1	57	43	10	95	7.7	0
May 11-20	526	5.8	.02	15	.7	1.2	.4	39	8.0	1.5	.0	1.2	53	40	8	88	7.6	0
May 21-31	1010	4.3	.02	14	.7	1.1	.4	37	7.0	1.5	.0	1.2	48	38	8	84	7.6	0
June 1-10	1260	4.3	.02	13	1.0	1.0	.4	36	7.0	1.5	.0	1.4	48	37	7	84	7.5	0
June 11-20	1080	4.0	.02	13	1.0	1.0	.4	36	7.0	1.5	.0	1.3	47	37	7	83	7.6	0
June 21-30	1560	4.1	.02	14	.7	1.4	.3	36	7.0	1.5	.0	1.4	48	37	7	86	7.6	0
July 1-10	2350	3.7	.02	12	.7	1.0	.3	34	6.0	1.0	.0	1.0	43	34	6	79	7.6	0
July 11-20	2580	3.3	.02	12	.7	.9	.3	32	6.0	1.0	.0	.7	41	32	6	73	7.6	0
July 21-31	1850	3.5	.02	11	.7	.9	.3	31	6.0	1.0	.0	.6	40	31	5	70	7.3	0

TRAIL RIVER BASIN--Continued

2480. TRAIL RIVER NEAR LAWING--Continued

Chemical analyses, in parts per million, water year October 1962 to September 1963--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)	Dissolved solids (calculated)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
Aug. 1-10, 1963.....	1640	2.8	0.02	11	0.7	0.9	0.3	30	6.0	1.0	0.0	0.6	39	30	4	68	7.6	0
Aug. 11-20.....	1520	2.3	.05	11	.5	1.8	.3	28	7.0	1.5	.0	.3	39	29	6	68	7.8	10
Aug. 21-31.....	1800	2.5	.27	10	1.1	1.8	.3	29	7.0	1.0	.0	.4	38	30	6	65	7.7	10
Sept. 1-10.....	2020	3.0	.10	11	.6	1.8	.3	28	7.0	1.0	.0	.5	39	29	6	66	7.1	10
Sept 11-20.....	1110	2.7	.07	9.6	1.0	1.8	.3	27	8.0	1.0	.0	.3	38	28	6	66	7.0	5
Sept. 21-30.....	731	2.5	.10	10	.5	1.8	.3	26	9.0	1.0	.0	.7	39	28	7	66	7.1	5
Weighted average	735.1	3.5	.05	12.0	.8	1.3	.4	33	7.3	1.2	.0	.7	44	34	7	76	7.5	3
Time weighted average.....	--	3.9	.05	14.0	1.0	1.2	.5	36	8.8	1.5	.0	.8	50	38	9	84	7.5	4
Tons per day....	--	6.9	.11	24.0	1.6	2.5	.7	65	14.0	2.5	.1	1.5	87	--	--	--	--	--

TRAIL RIVER BASIN--Continued

2480. *TRAIL RIVER NEAR LAWING--Continued*

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

Month	Day																													Aver-age
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
October	44	44	44	44	43	43	42	42	42	42	42	42	41	41	42	40	40	39	38	41	41	40	40	40	40	40	40	40	39	40	40	41
November	40	39	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	34	34	34	34	34	--	--
December	34	34	33	34	34	33	33	34	34	33	35	34	33	33	34	33	34	34	33	34	33	33	34	33	33	34	34	34	33	33	33	34
January	33	33	33	33	33	33	33	32	32	32	32	33	33	32	32	32	32	32	32	32	33	33	34	34	34	33	33	33	33	33	33	33
February	32	33	33	33	33	33	33	33	32	33	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	--	--	--	32
March	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	33	33	32	32	32	32	32	33	32	33	33	33	32
April	33	33	33	33	34	34	35	34	34	34	34	35	35	35	34	34	35	35	35	35	35	35	36	--	--	--	--	38	37	38	--	35
May	38	39	41	40	40	40	42	40	42	41	42	42	43	42	43	--	--	--	--	42	45	44	42	45	44	44	48	46	45	40	44	42
June	42	44	45	45	44	45	44	44	46	42	46	46	48	46	48	48	48	49	49	48	49	48	48	49	49	49	51	51	50	50	--	47
July	50	49	49	49	50	50	50	50	50	50	46	46	43	47	48	46	48	49	49	48	48	48	48	49	49	49	50	50	51	51	51	49
August	51	52	50	50	49	49	49	49	49	49	49	48	49	48	49	49	49	49	49	49	49	49	49	48	48	48	48	48	48	49	49	49
September	49	50	50	50	50	49	49	49	49	49	48	48	49	49	49	48	47	46	46	46	45	45	45	46	44	--	44	44	44	44	--	47

TRAIL RIVER BASIN--Continued

2480. TRAIL RIVER NEAR LAWING--Continued

Temperature (°F) of water, water year October 1961 to September 1962

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

TRAIL RIVER BASIN--Continued

2480. TRAIL RIVER NEAR LAWING--Continued

Temperature (°F) of water, water year October 1962 to September 1963

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

KNIK RIVER BASIN

2810. KNIK RIVER NEAR PALMER

LOCATION.-- At gaging station near center of span on downstream side of bridge on Glenn Highway, 7 miles south of Palmer.
DRAINAGE AREA.--1,180 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: October 1957 to August 1958.
Water temperatures: May to September 1963.
Sediment records: July 1953 to August 1956, July, August 1961, May 1962 to September 1963.
EXTREMES, May 1962 to September 1963.-- Water temperatures (May to September 1963): Maximum, 46°F May 5, July 30, 1963.
Sediment concentrations: Maximum daily, 6,290 ppm June 27, 1962.
Sediment loads: Maximum daily, 518,000 tons June 28, 1962.

Temperature (°F) of water, May to September 1963

Month	Day																													Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
May	--	--	41	40	46	39	37	40	41	--	43	42	40	40	41	41	40	41	--	40	39	37	36	36	38	--	37	37	39	39	36	39
June	37	37	--	37	39	38	37	38	--	37	36	37	36	36	37	40	42	41	40	--	41	41	42	39	45	37	--	36	37	37	--	38
July	38	43	38	--	--	--	40	39	39	38	39	--	--	46	42	39	38	38	44	43	--	--	--	--	40	37	43	--	39	46	42	--
August	38	38	42	--	--	--	--	--	40	40	41	41	40	39	41	40	--	--	38	38	37	--	39	40	39	38	40	39	39	38	--	--
September	40	41	39	39	40	39	38	40	38	--	--	43	41	42	40	39	41	40	38	39	38	36	37	35	38	38	37	37	37	36	--	39

KNIK RIVER BASIN--Continued

2810. KNIK RIVER NEAR PALMER--Continued

Suspended sediment, May to September 1962

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				550	100	A	150	2350	240	A	1500
2				568	130	A	200	2270	230	A	1400
3				586	96		152	2320	250	A	1600
4				622	120	A	200	2400	260	A	1700
5				658	140	A	250	2240	252		1520
6				712	150	A	290	2200	220	A	1300
7				787	187		397	2350	245		1550
8				844	200	A	460	2320	220	A	1400
9				980	260	A	690	2450	182		1200
10				1120	310		937	2610	360	A	2500
11				1160	310	A	970	2690	450		3270
12				1120	180	A	540	3400	460	A	4200
13				1140	172		529	3720	581		5840
14				1040	180	A	500	3810	594		6110
15				960	150	A	390	3660	1200	A	12000
16				1180	178		567	4900	1700		22500
17				1220	240	A	790	6620	2500	A	45000
18				1270	275		943	7980	2890		62300
19				1200	200	A	650	9110	3100		76200
20				1270	200	A	680	9200	3000		74500
21				1350	213		776	9680	3470		90700
22				1440	240	A	930	10600	3260		93300
23				1420	208		797	10300	3200	A	89000
24				1550	280	A	1200	8560	2980		68900
25				1690	310		1410	8730	1680		39600
26				1880	360	A	1800	9200	2800	A	70000
27				2000	340	A	1800	19600	6290	S	334000
28				2000	253		1370	74800	2640	S	518000
29				1780	310	A	1500	144000	1260		490000
30				1800	320	A	1600	99400	992		266000
31				2120	321		1840	--	--		--
Total				38017	--		25308	473470	--		2387090

Day	JULY			AUGUST				SEPTEMBER			
	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day	Mean discharge (cfs)	Mean concentration (ppm)		Tons per day	Mean discharge (cfs)	Mean concentration (ppm)		Tons per day
1	41500	1150	129000	27000	1600	A	120000	16600	1500	A	67000
2	28700	1080	83700	23300	1400	A	89000	14800	1300	A	52000
3	23900	1100	71000	23500	1780		113000	16400	1860		82400
4	22600	1400	A 85000	21900	1400	A	83000	17100	1140		52600
5	23500	1760	112000	18200	997		49000	15500	924		38700
6	25000	1900	128000	18200	1090		53600	12800	950	A	33000
7	25800	1700	A 120000	18700	930	A	47000	11100	640	A	19000
8	25300	1600	A 110000	19100	925		47700	9860	340	A	9000
9	27100	1800	A 130000	18700	920	A	46000	8980	370		8970
10	26900	1660	120000	19400	990	A	52000	8310	372		8350
11	26100	1350	95100	20900	1100	A	62000	7980	370	A	8000
12	24800	1320	88400	21400	1200	A	69000	7580	340	A	7000
13	23400	1220	77100	21500	1100		63800	7150	310	A	6000
14	20900	1100	A 62000	20900	1100	A	62000	6550	273	A	4800
15	19100	940	A 48000	19900	1020		54800	5940	299	A	4600
16	17600	799	38000	19200	950	A	49000	5870	320	A	5100
17	18500	930	A 46000	18500	900	A	45000	5700	330	A	5100
18	17200	1000	A 46000	19000	910	A	47000	5420	370	A	5400
19	21200	1400	A 80000	20600	1200	A	67000	5220	370	A	5200
20	22700	1550	95000	20600	1760		97900	6370	330	A	5700
21	23200	1350	84600	20400	1200	A	66000	8980	490	A	12000
22	22400	1300	A 79000	20400	1100	A	61000	9200	500	A	12000
23	22600	1320	80500	18000	1240		60300	11300	690	A	21000
24	22500	1300	A 79000	17000	1400	A	64000	13100	1000	A	35000
25	22000	1160	68900	16000	1600	A	69000	12300	870	A	29000
26	21300	1100	A 63000	16000	1600	A	69000	10700	650	A	19000
27	21200	1190	68100	16200	1510		66000	9240	500	A	12000
28	21400	1200	A 69000	16900	910		41500	7820	428		9040
29	24000	1500	A 97000	27000	1600	A	120000	6730	280	A	5100
30	26500	2120	152000	24700	3010		201000	6040	220	A	3600
31	27000	1800	A 131000	20900	2300	A	130000	--	--		--
Total	735900	--	2736400	624000	--		2265600	290640	--		585660

Total discharge for period May to September 1962 (cfs-days)..... 2336520
Total suspended sediment loads for period May to September 1962 (tons)..... 8711086

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

KNIK RIVER BASIN--Continued

2810. KNIK RIVER NEAR PALMER--Continued

Suspended sediment, water year October 1962 to September 1963

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..				1620	255	A 1120	10500	1310	37100
2..				1530	230	A 950	10100	1330	36300
3..				1660	238	1070	9770	1120	A 29500
4..				1830	255	1260	9460	639	16300
5..				1640	221	978	9590	684	17700
6..				1460	340	1340	9330	711	17900
7..				1730	314	1470	8940	666	16100
8..				1530	196	810	8640	531	12400
9..				1420	255	978	9150	630	A 15600
10..				1460	323	A 1270	9720	594	15600
11..				1710	340	1570	9900	630	16800
12..				2270	468	2870	10400	684	19200
13..				2830	595	4550	11100	837	25100
14..				2770	527	3940	10300	612	17000
15..				3520	612	5820	9950	495	13300
16..				3310	476	4250	9590	531	13700
17..				3780	561	5720	9900	585	15600
18..				4110	620	6880	10400	675	19000
19..				4230	646	A 7380	10800	837	24400
20..				4770	604	7780	11800	945	A 30100
21..				5160	612	8530	12500	855	28800
22..				5630	714	10800	14900	930	36200
23..				6220	1060	17800	14300	855	33000
24..				6150	1350	22400	14200	738	28300
25..				6080	646	10600	14100	711	27100
26..				6550	578	A 10200	14600	765	30200
27..				6850	561	10400	15100	747	A 30400
28..				7340	969	19200	14400	639	24800
29..				8350	873	19700	13600	459	16800
30..				9990	1520	41000	14500	621	24300
31..				10700	1340	38700	--	--	--
Total				128200	--	271336	341540	--	688600

Day	JULY			AUGUST			SEPTEMBER		
1..	16000	882	38100	24500	1260	83300	22000	1490	88500
2..	17000	1250	57400	24200	1040	68000	24500	1840	122000
3..	18800	1530	77700	25400	1220	83700	26100	2000	141000
4..	20100	1720	A 93300	24300	1160	A 76100	25300	1920	131000
5..	21800	1850	A 109000	22400	1040	A 62900	24300	1870	123000
6..	24500	2350	A 155000	19600	858	A 45400	24100	1820	118000
7..	25800	1980	138000	16300	706	A 31100	22800	1500	92300
8..	23400	1710	108000	14700	680	A 27000	21200	1070	61200
9..	22000	1710	102000	15200	808	33200	20400	638	35100
10..	22800	1730	106000	16900	1080	49300	19300	638	A 33200
11..	24700	2200	147000	17700	1200	57300	18000	536	A 26000
12..	24200	2100	A 137000	18300	1160	57300	15800	425	18100
13..	25700	2060	A 143000	19700	1380	73400	13500	357	13000
14..	26700	1800	130000	20300	1260	69100	12400	306	10200
15..	28900	2600	203000	19900	1280	68800	11600	272	8520
16..	29200	1940	153000	19300	1320	68800	11000	255	7570
17..	28400	1500	115000	21200	1540	A 88100	10600	238	6810
18..	25200	1110	75500	28000	2640	A 200000	10000	238	6430
19..	21800	930	54700	29500	2920	232000	9650	245	6410
20..	21300	990	56900	24900	1960	132000	9400	230	5840
21..	22400	1170	A 70800	21300	1470	84500	8850	230	5500
22..	22700	1240	A 76000	23200	1930	A 121000	8520	255	5870
23..	23400	1240	A 78300	30100	2800	228000	8160	246	5420
24..	24400	1320	A 87000	34200	3410	315000	7660	230	4760
25..	24600	1120	74400	38200	3680	380000	7030	178	3380
26..	21600	774	45100	39100	3700	391000	6590	144	2560
27..	19600	672	35600	30000	2890	234000	7150	289	5580
28..	18300	688	A 34000	24200	2260	148000	8750	536	12700
29..	19600	935	49500	20900	1480	83500	8800	570	13500
30..	22000	1160	68900	20100	960	52100	8520	527	12100
31..	24300	1550	102000	20000	1120	A 60500	--	--	--
Total	711200	--	2921200	723600	--	3704400	431980	--	1125550

Total discharge for period May to September 1963 (cfs-days)..... 21162027
Total suspended sediment load for period May to September 1963 (tons)..... 8000058

A Computed from partly estimated-concentration graph.

KNIK RIVER BASIN--Continued

2810. KNIK RIVER NEAR PALMER--Continued

Particle-size analyses of suspended sediment, May 1962 to September 1963
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
June 5, 1962	1445		46	2100	232		41	57	73	81	89	94	96	99	100	--		SBWC
June 28	1300		42	80140	3050		12	18	25	36	48	63	74	84	93	100		SPWC
June 29	0840		39	143000	1690		13	18	25	31	40	49	58	70	84	93		SPWC
June 29	1630		41	155000	1390		17	22	27	38	47	56	67	81	94	99		SPWC
June 30	0930		37	119000	1070		20	25	42	56	67	75	83	90	99	100		SBWC
July 2	1030		37	27400	851		25	37	48	60	68	73	78	87	90	93		SBWC
May 27, 1963	1310		39	6480	1180		15	23	27	31	32	37	39	43	62	83		SPWC
July 8	1300		40	23400	1480		29	42	55	66	76	85	91	96	99	100		SPWC
July 30	1115		46	21600	1010		30	45	60	70	80	86	91	95	99	100		SPWC
Aug. 20	0900		39	25300	1390		29	43	56	69	78	86	92	98	100	--		SPWC
Aug. 27	1150		38	29900	1420		25	37	49	60	69	77	84	90	94	97		SPWC
Sept. 25	1400		38	6750	178		46	55	67	74	79	85	91	97	100	--		SBWC

MATANUSKA RIVER BASIN--Continued

2840. MATANUSKA RIVER AT PALMER

LOCATION.--At gaging station on left bank 100 feet downstream from bridge on Glenn Highway, and 1 mile east of Palmer.
DRAINAGE AREA.--2,070 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: May 1949 to October 1950, April 1951 to July 1953, October 1957 to September 1963.
Water temperatures: March to August 1952, April to September 1953, December 1958 to September 1963.
Sediment records: April 1953 to September 1954, April 1958 to September 1963.
EXTREMES (for observation), 1961-63.--Dissolved solids: Maximum, 184 ppm Dec. 10, 1963; minimum, 87 ppm Aug 13-17, 20, 1962.
Hardness: Maximum, 140 ppm Dec. 10, 1963; minimum 67 ppm Aug. 1-5, 7, 8, 10, 1961, Aug. 13-17, 20, 1962.
Specific conductance: Maximum, 309 micromhos Jan. 7, 1963; minimum, 147 micromhos Aug. 1-3, 7-9, 1963.
EXTREMES, 1958-63.--Water temperatures: Maximum, 56°F June 16, 25, 1959.
Sediment concentrations: Maximum daily, 16,100 ppm Aug. 25, 1959.
Sediment loads: Maximum daily, 1,300,000 tons Aug. 25, 1959.

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

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (calculated)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
Oct. 3-7, 1960.....	3400	7.5	0.02	32	7.1	7.6	0.8	83	50	3.0	.0	1.1	150	109	41	244	7.5	0
Oct. 13, 21, 27.....	2110	8.9	.02	36	6.7	7.4	.6	89	55	4.0	.0	1.2	164	118	44	258	7.4	0
Nov. 30.....	910	8.5	.00	39	8.8	7.8	.9	101	52	8.0	.2	1.2	176	134	50	290	7.8	5
Dec. 6, 9.....	970	8.5	.00	37	10	7.8	.9	100	52	9.5	.1	1.3	176	134	52	286	7.8	5
Jan. 9, 18, 22, 27, 1961.....	908	7.1	.07	40	5.2	7.3	.7	102	45	2.0	.0	1.2	159	122	38	281	7.5	10
Mar. 13, 20.....	480	7.3	.00	39	6.7	7.9	.8	102	43	9.0	.0	1.7	165	125	42	289	8.0	0
Apr. 3, 7, 10, 20...	560	7.0	.03	40	6.4	8.0	.6	102	43	9.0	.0	1.4	166	126	43	282	8.0	0
Apr. 24-30.....	1220	5.9	.07	34	6.0	7.3	.7	96	36	7.5	.0	1.4	146	110	31	240	7.8	0
May 1-10.....	2240	6.9	.00	31	4.3	7.4	.9	82	36	2.0	.0	.8	129	95	28	221	7.7	5
May 11-19.....	2640	6.7	.00	29	4.0	7.3	.9	77	32	3.0	.0	.9	122	89	26	205	7.5	5
May 22-31.....	3090	6.1	.00	27	4.3	7.0	.8	73	34	3.5	.0	.7	119	85	25	197	7.5	0
June 2-4, 7-13.....	5580	6.1	.00	26	3.6	5.6	.6	70	27	3.0	.1	.3	106	80	22	180	7.8	0
June 14-23.....	12500	6.4	.00	23	4.5	4.9	.7	68	25	2.5	.1	.7	101	76	20	165	7.7	0
June 24-30.....	13500	6.4	.00	24	3.8	5.3	.7	68	26	2.5	.2	.4	102	76	20	166	7.4	0
July 1, 3, 7-10.....	10400	5.8	.02	26	2.4	4.2	.7	64	28	3.0	.0	.3	101	75	22	171	7.6	0
July 11-20.....	10200	5.0	.02	25	2.1	3.5	.6	62	24	3.0	.0	.4	94	71	20	159	7.7	0
July 21, 23-25, 28, 29, 31.....	12100	4.5	.02	24	2.1	4.3	.6	61	23	2.0	.0	.2	91	68	18	151	7.8	0
Aug. 1-5, 7, 8, 10..	12000	4.7	.02	24	1.7	3.1	.6	60	23	2.0	.0	.3	89	67	18	150	7.8	0
Aug. 11, 14-18.....	8010	5.2	.00	26	3.2	3.9	.6	63	29	3.0	.1	.5	102	78	26	173	7.5	5
Aug. 21-25, 28-31...	7680	4.2	.00	26	2.4	3.4	.6	63	27	2.5	.2	.5	98	65	13	170	7.6	5
Sept. 1, 4-8.....	4920	5.4	.00	28	3.4	3.9	.6	68	33	3.5	.0	1.0	112	84	28	190	7.7	5
Sept. 11-16, 18-20..	5250	4.7	.00	29	3.5	4.1	.7	72	33	2.5	.0	1.7	114	87	28	197	7.5	5
Sept. 21-23, 25-30..	3880	5.4	.02	29	4.7	5.1	.7	72	38	2.5	.0	1.0	121	92	33	213	7.2	5

MATANUSKA RIVER BASIN--Continued

2840. MATANUSKA RIVER AT PALMER--Continued

Chemical analyses, in parts per million, water year October 1961 to September 1962

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)	Dissolved solids (calculated)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
Oct. 2-6, 9, 10, 1961	2,850	6.0	0.00	32	5.4	5.8	0.7	80	42	3.0	0.0	1.3	135	102	36	230	7.5	10
Oct. 18	1,700	5.9	.02	36	4.9	6.3	.6	87	46	4.0	.0	1.2	148	110	39	249	7.9	10
Oct. 19	1,600	6.5	.00	39	5.2	6.9	.7	92	50	5.0	.0	.8	159	119	44	262	7.9	0
Oct. 23	1,600	6.5	.00	40	4.6	6.9	.6	92	50	5.0	.0	1.2	160	118	43	260	7.9	0
Jan. 13, 1962	760	7.0	.02	40	5.8	7.2	.8	96	48	6.5	.0	1.4	164	124	45	276	7.9	10
Apr. 25-28, 30-May 4, 6	1,090	5.6	.07	38	2.9	7.1	.7	88	38	6.5	.1	2.5	144	106	34	222	7.9	5
May 7, 8, 10, 15-18	1,700	5.9	.08	35	2.9	7.0	.8	84	34	5.0	.1	1.9	140	100	31	215	7.9	5
May 21-30	3,880	5.1	.26	26	3.4	6.0	.9	70	28	2.0	.1	1.3	110	78	21	167	7.9	50
June 1-10	6,330	5.3	.24	29	3.6	6.2	.8	74	30	3.0	.1	1.1	115	83	22	177	8.1	30
June 12-15, 18-20	18,600	9.2	.00	27	3.0	4.3	.6	79	23	2.5	.0	1.2	110	80	15	179	7.8	5
June 21-30	17,400	6.6	.00	25	3.5	4.0	.6	71	23	2.5	.1	.8	101	78	20	172	7.8	5
July 1, 3, 4, 6-8, 10-16	14,400	5.9	.00	24	3.0	4.3	.9	67	24	2.0	.0	.4	98	73	18	166	7.6	0
July 17-19, 23-30	14,000	5.2	.02	23	3.0	3.2	.4	63	22	2.0	.0	.4	90	70	18	157	7.4	0
Aug. 1, 3-9	11,200	4.8	.00	22	2.9	2.8	.4	60	23	2.0	.0	.4	88	68	19	151	7.7	0
Aug. 13-17, 20	9,500	4.5	0.00	22	2.7	3.0	0.7	60	22	2.0	0.0	0.2	87	67	18	150	7.5	0
Aug. 22, 24, 26-31	15,100	5.4	.00	24	3.5	4.3	.6	66	25	2.5	.0	.4	95	75	21	171	7.6	0
Sept. 5-7	7,196	5.9	.02	28	3.9	4.5	.4	72	30	4.0	.0	.5	112	85	26	191	7.7	5
Sept. 11, 12, 14, 17, 20	4,350	6.1	.00	32	4.5	5.6	.5	78	36	4.0	.0	.7	127	98	34	218	7.8	0
Sept. 24, 26-28	2,960	6.2	.02	35	5.0	6.5	.5	84	43	4.0	.0	.7	142	108	39	242	7.8	5

MATANUSKA RIVER BASIN--Continued

2840. MATANUSKA RIVER AT PALMER--Continued

Chemical analyses, in parts per million, water year October 1962 to September 1963

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)	Dissolved solids (calculated)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
Oct. 1, 3, 5, 1962..	2310	6.5	0.00	37	5.2	7.0	0.6	88	49	5.0	0.0	0.9	154	115	43	256	7.9	5
Dec. 10.....	a630	6.1	.02	47	5.6	7.9	.7	105	56	8.0	.1	.3	184	140	54	299	8.3	10
Jan. 7, 1963.....	520	5.4	.02	43	6.3	7.6	.9	103	53	9.0	.0	.8	177	134	50	309	8.0	5
Jan. 30.....	610	4.9	.02	41	6.9	8.1	.9	100	56	9.0	.1	.6	177	132	50	251	8.2	5
Mar. 18.....	480	5.9	.00	42	6.3	7.3	.6	100	48	7.5	.2	.9	168	130	48	296	8.0	5
Apr. 10-12, 15, 19..	480	13	.00	42	4.1	8.1	.7	98	42	9.0	.0	.1	167	122	42	272	6.8	5
Apr. 24-26, 29, 30..	660	6.6	.00	40	4.6	8.1	.8	92	43	9.0	.1	.9	158	118	43	269	7.6	5
May 1-10.....	1540	16	.00	34	4.3	7.5	.8	80	41	5.5	.0	.9	149	102	36	238	7.6	5
May 11, 12, 14-18, 20.....	2850	9.8	.00	31	3.3	7.1	.8	76	35	4.0	.0	1.2	129	92	30	216	7.3	5
May 21-31.....	6620	14	.00	27	2.4	5.5	.6	66	28	3.0	.0	1.1	114	77	23	179	6.8	5
June 1-8, 10.....	6060	14	.00	28	2.7	5.4	.8	70	30	3.0	.0	1.0	119	82	25	189	7.0	5
June 11-15, 17-20...	6690	8.0	.00	27	2.2	4.7	.6	64	28	3.0	.1	.8	105	76	24	176	7.1	5
June 21-27, 29.....	7260	2.2	.00	26	1.7	4.0	.5	61	25	2.0	.0	.9	92	71	21	162	7.0	5
July 1-3, 7-9.....	16200	9.5	.00	26	1.5	3.2	.5	64	21	2.0	.0	.2	95	70	18	155	6.7	5
July 11, 14-20.....	14400	12	.00	26	1.2	3.2	.6	60	23	2.0	.0	.1	98	69	20	154	6.4	5
July 22-27, 30, 31..	10600	13	.00	25	1.5	3.1	.6	59	21	2.0	.1	.3	96	68	20	148	7.1	5
Aug. 1-3, 7-9.....	9760	12	.00	24	2.3	3.0	.5	58	21	2.0	.1	.2	94	68	20	147	6.9	5
Aug. 13, 19.....	13600	12	.00	27	1.7	3.0	.5	69	19	2.0	.1	.0	99	74	17	158	7.4	5
Aug. 21, 22, 26-30..	9680	5.0	.00	27	2.2	3.2	.6	68	24	2.0	.0	.0	97	76	20	166	6.9	5
Sept. 4-6, 9, 10....	7080	8.4	.00	26	2.3	3.2	.8	64	23	2.5	.1	.1	97	74	22	162	7.3	5
Sept. 12, 18.....	4950	12	.00	28	2.9	4.7	.9	66	30	3.0	.1	.0	114	82	28	192	7.3	5
Sept. 27, 30.....	3090	14	.00	31	3.2	5.7	.5	73	37	3.0	.0	.5	131	91	31	207	7.3	5

a Mean discharge period Dec. 1-30.

MATANUSKA RIVER BASIN--Continued

2840. MATANUSKA RIVER AT PALMER--Continued

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

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

MATANUSKA RIVER BASIN--Continued

2840. MATANUSKA RIVER AT PALMER--Continued

Temperature (°F) of water, water year October 1961 to September 1962

Month	Day																													Aver-age
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
October	--	40	38	38	36	33	--	--	32	32	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
November	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
December	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
January	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
February	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
March	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
April	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35	33	32	35	--	34	--	--
May	33	33	32	38	--	42	35	36	--	36	38	--	--	40	43	39	40	49	--	--	42	39	41	42	41	44	40	46	50	45	--	--
June	44	42	46	46	--	42	--	42	48	48	--	45	43	42	42	--	--	52	50	46	46	45	44	49	44	43	43	43	48	48	--	45
July	48	--	--	--	--	50	46	48	--	43	43	45	44	45	45	44	48	46	45	--	--	--	46	45	45	44	46	51	--	45	--	--
August	44	--	44	44	50	44	45	43	43	--	--	--	43	44	44	45	45	--	--	46	--	40	--	44	--	43	44	47	47	42	39	--
September	--	--	--	--	--	42	41	--	--	--	39	40	--	41	--	--	38	--	--	40	--	--	--	39	--	41	38	39	--	--	--	--

MATANUSKA RIVER BASIN--Continued

2840. MATANUSKA RIVER AT PALMER--Continued

Temperature (°F) of water, water year October 1962 to September 1963

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

MATANUSKA RIVER BASIN--Continued

2840. MATANUSKA RIVER AT PALMER--Continued

Suspended sediment, water year October 1960 to September 1961

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..				1270	372	1280	2980	315	A 2530
2..				1210	455	1490	3020	408	3330
3..				1290	500	1740	2830	330	2520
4..				1540	605	2520	2690	220	1600
5..				1870	950	4800	2870	550	A 4260
6..				2380	1370	8800	3800	1580	A 16200
7..				2820	1190	9060	4850	2690	35200
8..				3000	1600	13000	4330	1150	13400
9..				3410	1370	12600	4880	1540	20300
10..				3630	735	7200	7040	4320	82100
11..				3040	882	7240	7760	2430	50900
12..				2370	1120	7170	10000	3780	102000
13..				2000	542	2930	8350	2080	46900
14..				1900	380	1950	7850	1340	28400
15..				1980	435	2320	9100	2240	55000
16..				2690	735	5340	10200	2490	68600
17..				3630	1010	9900	11900	2680	86100
18..				3230	1970	17200	13200	3230	117000
19..				2940	1730	13700	14300	3820	147000
20..				2450	1080	A 7140	15200	4160	171000
21..				2300	745	A 4630	15000	4720	191000
22..				2550	610	4200	13400	3030	111000
23..				3230	887	7740	15000	3480	141000
24..				3170	825	7060	14600	2710	107000
25..				3350	892	8070	12600	4430	151000
26..				3230	670	5840	14200	4300	165000
27..				3130	470	A 3970	13700	4780	103000
28..				3070	380	3150	13200	3000	107000
29..				3090	495	4130	13100	2600	92000
30..				3210	508	4400	13100	1830	64700
31..				2890	302	2360	--	--	--
Total				81870	--	192930	285050	--	2287040

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..	12700	1500	51400	14700	2240	88900	5640	440	6700
2..	11600	1370	A 42900	13600	2000	73400	5400	400	A 5830
3..	11100	1120	33600	14300	2120	81800	5580	285	A 4290
4..	9700	960	A 25100	14100	2560	97400	5250	240	3400
5..	9200	950	A 23600	13300	1990	71500	4790	255	3300
6..	8850	970	A 23200	10400	1680	A 47200	4510	200	2440
7..	8950	1030	24900	8650	1600	37400	4490	150	1820
8..	9550	1280	33000	7350	1370	27200	4230	150	1710
9..	9100	1160	28500	7080	1700	A 32500	3830	155	A 1600
10..	10800	1940	56600	9600	2130	55200	3920	170	A 1800
11..	10500	1580	44800	9250	1040	26000	5100	320	4410
12..	9800	1270	33600	8950	985	A 23800	5890	680	10800
13..	8400	1150	26100	8500	880	A 20200	5960	1060	17000
14..	8600	1250	29000	8000	650	14000	5610	1030	15600
15..	10200	1310	36100	7660	525	10800	5640	1120	17000
16..	10700	1400	40400	7440	600	12000	5580	1050	15800
17..	10800	1410	41100	7580	688	14100	5340	770	A 11100
18..	10500	1340	38000	8150	595	13100	4880	525	6920
19..	11300	1150	35100	9200	560	A 13900	4540	385	4720
20..	11200	1090	33000	9250	685	A 17100	4070	240	2640
21..	11000	1030	30600	9300	895	22500	3780	180	1840
22..	10400	950	A 26700	9300	992	24900	3670	175	1730
23..	9910	870	23300	9350	1380	34800	4930	210	2800
24..	10100	1140	31100	8800	1110	26400	4790	190	A 2460
25..	11200	1130	34200	8050	1020	22200	4230	90	1030
26..	11700	1040	A 32800	7660	932	A 19300	3800	70	718
27..	12000	1200	A 38900	6780	700	A 12800	3560	60	577
28..	13500	2070	75400	6180	545	9090	3460	50	467
29..	14700	3320	132000	6220	480	8060	3560	55	529
30..	13800	3030	A 113000	6100	485	7990	3900	65	684
31..	14200	2050	78600	5780	455	7100	--	--	--
Total	336060	--	1316600	280580	--	972640	139930	--	151715

Total discharge for period May to September 1961 (cfs-days)..... 1123490
Total load for period May to September 1961 (tons)..... 4920925

A Computed from partly estimated-concentration graph.

MATANUSKA RIVER BASIN--Continued

2340. MATANUSKA RIVER AT PALMER--Continued

Suspended sediment, water year October 1961 to September 1962

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	510	18	25	1040	187	525	5790	1840	28800
2	544	20	29	1080	155	452	5460	908	13400
3	604	25	41	1140	166	511	4850	516	6760
4	580	24	38	1250	316	1070	4880	401	5280
5	580	46	72	1300	390	1400	4970	470	6300
6	544	42	62	1410	338	1290	4970	480	6440
7	604	36	59	1460	318	1250	6110	725	12000
8	598	40	64	1540	383	1590	6830	1150	21200
9	616	22	36	1720	280	1300	8500	1960	45000
10	592	20	32	1750	473	2230	10900	2290	67400
11	562	18	27	1720	297	1380	12800	9450	326000
12	568	16	24	1550	157	657	14900	5800	233000
13	568	22	34	1580	160	680	15500	2780	116000
14	568	28	43	1540	185	769	16700	3160	142000
15	568	28	43	1550	180	753	15700	2620	111000
16	616	41	68	1700	270	1240	20300	3940	216000
17	628	24	41	1790	332	1600	21300	4150	239000
18	668	24	43	2120	826	4730	23300	4100	260000
19	682	28	52	2140	960	5500	22100	4230	252000
20	745	54	109	2500	1000	6800	21900	4140	245000
21	815	126	277	2890	1210	9440	22700	4060	249000
22	858	210	490	3410	1710	15700	24200	4820	315000
23	906	238	582	3280	790	7000	18500	2830	141000
24	914	79	195	3320	815	7300	14300	1680	64900
25	890	124	298	4120	2010	22400	12300	1620	53800
26	994	197	529	4400	1380	16400	12300	2140	71100
27	1020	169	465	4850	760	10000	14800	2940	117000
28	1030	186	517	4430	860	10300	18600	2440	122000
29	1000	190	510	3750	501	5070	18700	2590	131000
30	1050	138	391	4380	760	8990	17100	2790	129000
31	--	--	--	5090	1600	22000	--	--	--
Total	21422	--	5196	75800	--	170327	421260	--	3746380

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	16800	2340	106000	16300	2550	112000	10500	2000	57000
2	14100	5500	210000	15300	2100	87000	8700	990	23000
3	13400	6120	221000	14100	1900	72000	10400	1400	39000
4	15500	5320	223000	12000	1710	55400	11100	1500	45000
5	17800	2600	120000	9550	1250	32200	8300	840	19000
6	17100	2590	120000	9100	1380	33900	6910	820	15300
7	17100	2840	131000	9350	1200	30000	6270	700	11800
8	17000	2370	109000	9450	1180	30100	5790	510	800
9	16500	2200	98000	9450	1440	36700	5390	390	5700
10	15500	2160	90400	9400	1200	30000	5160	330	4600
11	12800	1800	62200	9600	1000	26000	4940	289	3850
12	12300	1840	61100	9650	1100	29000	4790	265	3430
13	12500	1600	54000	9650	1760	45800	4760	240	3100
14	11900	1220	39200	10000	1910	51600	4480	178	2150
15	12400	1240	41500	8650	1430	33400	4350	160	1900
16	13100	1380	48800	8260	1580	35200	4140	130	1400
17	14000	1700	64300	8030	1420	30800	3920	113	1200
18	15300	2800	116000	7900	720	15000	3730	92	926
19	14400	2100	81600	8300	860	19000	3590	130	1300
20	14500	2300	90000	12400	2480	83000	3640	132	1300
21	15300	2200	91000	14700	3000	120000	3550	140	1300
22	13100	2000	71000	12300	1700	56400	3410	140	1300
23	12700	2080	71300	11600	1700	53000	3300	130	1200
24	12700	2060	70600	11500	1450	45000	3260	156	1370
25	12900	1780	62000	11300	1700	52000	3110	120	1000
26	12700	1720	59000	10900	1200	35300	2970	107	858
27	12500	1700	57400	13100	1680	59400	2870	90	697
28	14000	2080	78600	17600	2980	142000	2740	74	547
29	15200	2400	98000	23600	7420	473000	2660	73	520
30	15400	3200	133000	19200	8130	421000	2540	70	480
31	16200	2300	100000	12400	3980	133000	--	--	--
Total	446700	--	2979000	364640	--	2478200	151270	--	258228

Total discharge for period April to September 1962 (cfs-days)..... 1481092
Total load for period April to September 1962 (tons)..... 9637331

A Computed from partly estimated-concentration graph.

MATANUSKA RIVER BASIN--Continued

2840. MATANUSKA RIVER AT PALMER--Continued

Suspended sediment, water year October 1962 to September 1963

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..	460	30 E	37	829	416 A	931	6550	1080	19100
2..	450	30 E	36	1060	481	1380	6430	938	16300
3..	450	30 E	36	1550	819	3430	6110	677	11200
4..	480	30 E	39	2050	1310	7250	6030	639	10400
5..	500	30 E	40	1880	1590	8070	5830	626	9850
6..	520	30 E	42	1740	884	4150	5750	449	6970
7..	510	30 E	41	1510	682	2780	5680	422	6470
8..	510	30 E	41	1570	806	3420	5680	348	5340
9..	510	30 E	41	1740	754	3540	6150	683 A	11300
10..	500	43	58	1440	702	2730	6470	1270	22200
11..	480	39	50	1420	696	2670	6190	724	12100
12..	470	41	52	1800	897	4360	6230	739	12400
13..	460	30 E	37	2270	1460	8950	7040	1500	28500
14..	460	30 E	37	2950	1610	12800	6910	1420	26500
15..	460	25	31	2700	1190	8680	6510	950	16700
16..	470	40	51	2950	1230	9800	6150	676 A	11200
17..	470	40	51	3110	1250	10500	6350	598	10200
18..	480	40	52	3500	1150	10900	6830	832	15300
19..	490	40	53	4140	1290 A	14400	7180	1350	26200
20..	500	50	68	4400	2060	24500	7580	2360	48300
21..	520	60	84	5290	2900	41400	7720	2480	51700
22..	532	76	109	6430	3630	63000	7940	2540	54900
23..	530	70	100	7580	3560	72800	7620	1740	35800
24..	526	62	88	6590	1660	29500	7080	1110	21200
25..	550	70	104	6110	978	16100	6710	781	14100
26..	556	67	100	5830	737	11600	7040	1440	27800
27..	640	80	138	6070	1120	18400	7130	1460	28100
28..	745	100	201	6910	2640	49200	6830	918 A	16900
29..	773	136	284	7400	3000	59900	6830	717	13000
30..	787	288	612	7620	2670	54900	8380	1160 A	26200
31..	--	--	--	7000	1380	26100	--	--	--
Total	15789	--	2713	117439	--	588141	200930	--	616230

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..	17400	4550 S	215000	11700	1800	56900	6710	1290 A	23200
2..	15800	3120	133000	12200	1780	58600	6590	1240 A	22100
3..	14300	2510	96900	13200	1930	68800	6590	1230 A	21400
4..	14600	2660	105000	11700	1690	53400	6870	1230	22200
5..	13800	2620	97600	11700	1730	54600	7180	1350	26200
6..	14700	2860	114000	9250	1170	29200	7360	1080	21700
7..	16100	3050	132000	7490	899	18200	7080	930 A	18700
8..	17000	3340	153000	7000	856	16200	6470	840 A	14700
9..	16400	2950	131000	7000	856	16200	6750	830	14600
10..	16800	3300	150000	7540	1000	20400	7220	910	17700
11..	18700	4330	219000	7940	1200	25700	6910	750 A	14000
12..	18800	4180	212000	8450	1530	34900	6350	540	9260
13..	17800	3430	165000	9300	1990	50000	6030	480 A	7810
14..	16800	3050	138000	10400	2220	62300	5030	395 A	5360
15..	17400	3330	156000	10700	2460	71100	4220	300 A	3420
16..	15500	2830	118000	10200	2380	65500	3950	240 A	2560
17..	14800	2440	97500	11600	2540	79600	3660	190 A	1880
18..	12200	1950	64200	18700	3260	164000	3550	160	1530
19..	10200	1600	44100	18000	4070	198000	3410	145 A	1340
20..	9800	1460	38600	14900	3360	135000	3350	150 A	1360
21..	10800	1660	48400	11600	2760	86400	3280	140 A	1240
22..	11800	2100	66900	11700	2240	70800	3200	110 A	950
23..	11100	1840	55100	21100	3410	194000	3070	115	953
24..	10700	1490	43000	18400	4170	207000	2910	110	864
25..	10300	1350	37500	15200	3700	152000	2850	80	616
26..	9800	1210	32000	14200	3280	126000	2790	80 A	603
27..	9150	1080	26700	9400	2040	51800	3030	110	900
28..	9050	1070	26100	7490	1420	28700	3640	100 A	983
29..	9050	1280	31300	6790	1060	19400	3390	120 A	1100
30..	10400	1370	38500	6590	1230	21900	3150	110	936
31..	11600	2010	63000	6430	1230	21400	--	--	--
Total	422650	--	3048400	347870	--	2258000	146590	--	260165

Total discharge for period April to September 1963 (cfs-days)..... 1251268
Total suspended sediment load for period April to September 1963 (tons)..... 6773649

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

MATANUSKA RIVER BASIN--Continued

2840 MATANUSKA RIVER AT PALMER--Continued

Particle-size analyses of suspended sediment, water year October 1962 to September 1963

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

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment											Method of analysis
							Percent finer than size indicated, in millimeters											
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Apr. 29, 1963.....	0920		33	703	175		15	17	21	24	28	38	52	77	99	100		SBWC
May 3.....	1345		35	1580	2050		4	5	7	9	12	21	36	54	97	100		SBWC
July 30.....	1425		50	9800	1400		20	27	39	52	61	70	76	88	98	100		SPWC
Aug. 20.....	1200		45	21200	3190		19	28	42	57	68	78	86	95	99	100		SPWC

KUSKOKWIM RIVER BASIN

3040. KUSKOKWIM RIVER AT CROOKED CREEK

LOCATION.--At gaging station on right bank at village of Crooked Creek, 0.2 mile upstream from Crooked Creek.
DRAINAGE AREA.--31,000 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: May 1957 to September 1963.
Water temperatures: May 1957 to September 1963.
EXTREMES (for observation), 1961-63.--Dissolved solids: Maximum, 179 ppm Jan. 24, 1961; minimum 62 ppm May 24-31, 1962.
Hardness: 109 ppm Oct. 1-13, 1962; minimum, 46 ppm May 24-31, 1962.
Specific conductance: Maximum, 292 micromhos Jan 24, 1961; minimum, 93 micromhos May 24-31, 1962.
EXTREMES, 1957-63.--Water temperatures: Maximum, 68°F June 28, 1959, June 22, 1960, July 15, 1961.

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

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (calculated)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
Jan. 24, 1961.....	a 15900	10	0.05	32	6.7	4.1	21	110	24	11	0.2	14	179	108	18	292	6.7	50
May 15-24.....	45000	6.7	.03	18	4.8	1.5	1.0	68	11	2.5	.2	.9	80	64	9	129	7.2	30
May 25-31, June 1-3.	61100	10	.03	21	5.0	2.1	1.0	79	12	1.5	.2	.1	92	73	8	150	7.2	30
June 4-13.....	56500	8.9	.05	23	4.8	2.1	1.0	79	13	2.0	.2	.1	96	77	12	158	8.0	40
June 14-20.....	96600	10	.03	28	2.9	1.8	1.0	86	16	.5	.2	1.8	104	82	11	165	7.8	30
June 21, 22, 24, 25, 27-30.....	71400	11	.03	34	3.2	2.7	1.3	94	22	2.0	.2	.9	123	98	21	210	7.8	20
July 1, 3-10.....	77700	9.8	.07	27	5.5	2.5	.9	96	18	1.0	.2	.7	113	90	12	187	7.7	20
July 11-20.....	68300	9.4	.07	25	6.2	2.1	.9	92	16	1.0	.2	.1	107	88	12	178	8.0	20
July 21-31.....	72900	9.8	.03	28	4.9	2.0	.9	89	19	.5	.2	.8	112	90	17	177	7.3	10
Aug. 1-10.....	129300	7.7	.09	29	1.8	1.7	1.1	82	18	.5	.2	.7	101	80	13	168	7.2	30
Aug. 11-20.....	94500	11.0	.05	30	2.9	2.0	1.1	86	20	1.0	.3	.8	111	87	16	180	7.4	30
Aug. 21-31.....	111000	10.0	.05	26	4.6	1.7	1.0	86	15	1.0	.2	1.0	104	84	13	171	7.3	30
Sept. 1-10.....	90800	11.0	.05	28	3.4	1.9	.9	86	18	1.0	.2	1.2	106	84	13	167	7.4	30
Sept. 11-20.....	142000	11.0	.07	21	4.3	2.9	.8	76	11	1.0	.2	.6	90	70	8	147	7.6	30
Sept. 21-30.....	112000	10.0	.03	23	4.5	2.3	.8	80	12	1.0	.2	.5	93	76	10	154	7.6	25

3040. *KUSKOKWIM RIVER AT CROOKED CREEK*--Continued

Chemical analyses, in parts per million, water year October 1961 to September 1962

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)	Dissolved solids (calculated)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
Oct. 1-7, 1961.....	103,000	10	0.05	23	4.3	1.8	0.7	79	13	1.0	0.2	0.5	94	75	10	150	7.4	20
May 24-31, 1962.....	200,000	8.6	.10	15	1.9	1.2	.9	54	6.0	.0	.1	.8	62	46	2	93	7.9	20
June 1-10.....	147,000	7.7	.09	17	3.2	1.3	.6	62	9.0	.0	.1	.8	70	56	5	112	7.1	10
June 11-20.....	122,000	9.5	.05	21	4.6	1.8	.9	76	10	2.0	.1	.5	87	72	10	142	7.5	5
June 21-28.....	128,000	6.7	.05	29	5.1	2.0	1.2	97	18	.0	.2	.1	110	93	13	186	7.8	5
Aug. 2-10.....	63,400	9.4	.03	32	5.8	2.2	1.7	109	22	.0	.2	.4	128	105	16	214	7.8	5
Aug. 11, 12, 14, 15, 17, 18, 20....	48,700	8.9	.03	31	6.8	2.4	1.2	108	22	1.0	.2	.3	127	106	17	214	7.8	5
Aug. 21-31.....	67,700	7.5	.07	27	6.6	2.0	1.3	96	18	1.0	.2	.5	110	95	16	192	8.1	10
Sept. 1-10.....	164,000	7.0	.09	27	5.5	1.6	1.5	91	17	1.0	.2	.8	107	90	15	179	8.2	30
Sept. 11-20.....	87,400	8.2	.09	27	5.7	1.8	1.0	93	17	.0	.2	.5	108	90	14	181	7.9	20
Sept. 21-30.....	53,000	10	.12	28	7.2	2.2	1.0	104	17	1.0	.2	.6	118	100	15	198	8.0	20

Chemical analyses, in parts per million, water year October 1962 to September 1963

Oct. 1-13, 1962.....	41000	12	0.12	30	8.0	2.5	1.0	117	17	1.5	0.2	0.5	131	109	13	202	7.9	10
Oct. 14-20.....	33000	11	.09	33	8.0	2.6	1.0	124	17	1.0	.2	.8	136	116	14	239	8.0	10
Oct. 21-31.....	29500	12	.07	34	8.0	4.6	1.0	128	16	3.0	.2	2.0	144	119	14	306	7.8	5
June 28-30, 1963....	96000	6.8	.00	26	3.9	1.9	.7	89	9.0	1.5	.2	.2	94	82	9	160	7.3	10
July 1-10.....	120000	6.6	.00	27	5.4	1.7	.7	90	15	1.5	.2	.3	102	90	16	176	7.5	20
July 11-20.....	118000	6.6	.00	27	6.8	1.8	.7	96	17	1.5	.2	.2	109	96	17	190	7.0	10
July 21-31.....	113000	5.7	.00	27	5.4	1.7	.7	88	15	2.0	.1	.2	101	90	18	174	7.3	20
Aug. 1-10.....	112000	5.7	.00	28	5.1	1.7	.7	90	14	2.0	.1	.1	101	90	16	171	7.4	20
Aug. 11, 13-20.....	146000	5.5	.00	26	4.9	1.4	.8	90	13	2.0	.2	.1	98	86	12	165	7.3	40
Aug. 21-31.....	246000	5.2	.00	23	5.1	1.4	.8	76	14	1.5	.2	.3	88	78	16	148	7.2	50
Sept. 1, 2, 4, 6-10.	147000	6.4	.00	26	4.6	1.7	.8	85	13	1.5	.2	.2	96	84	14	164	7.0	50
Sept. 11-19.....	81300	7.0	.00	29	5.6	2.0	.8	100	14	1.5	.2	.1	109	95	13	182	7.2	20
Sept. 21-30.....	62100	6.5	.00	30	5.4	2.2	.8	104	16	1.5	.2	.1	113	98	13	190	7.0	10

KUSKOKWIM RIVER BASIN--Continued

3040. KUSKOKWIM RIVER AT CROOKED CREEK--Continued

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

Month	Day																													Aver-age
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
May	--	--	--	--	--	--	--	--	--	--	--	--	--	--	37	38	39	40	45	46	48	46	48	45	50	41	48	46	46	50	48	--
June	50	55	55	51	50	60	50	--	58	50	53	55	53	55	51	60	53	51	65	54	56	58	--	55	52	--	50	59	55	60	--	55
July	50	40	46	48	55	50	55	58	53	60	50	60	54	50	68	56	56	62	51	49	55	49	50	56	50	60	--	52	48	48	48	53
August	47	48	46	45	50	45	45	45	44	43	45	46	54	51	53	52	53	54	54	52	51	50	50	49	49	49	49	49	48	46	49	49
September	50	49	50	49	57	48	47	45	41	45	46	45	44	44	43	43	43	43	42	43	43	43	42	42	41	40	41	40	40	40	--	44

Temperature (°F) of water, water year October 1961 to September 1962

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

KUSKOKWIM RIVER BASIN--Continued

3040. KUSKOKWIM RIVER AT CROOKED CREEK--Continued

Temperature (°F) of water, water year October 1962 to September 1963

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

YUKON RIVER BASIN

3560. YUKON RIVER AT EAGLE

LOCATION.-- At gaging station on left bank at Eagle, 0.1 mile upstream from Mission Creek, 1.1 miles downstream from Castalia Creek, and 11 miles downstream from the international boundary.
DRAINAGE AREA.--113,500 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: April to October 1951, June to September 1952, July 1953 to November 1957, October 1961 to September 1962.
Water temperatures: May to October 1951, June to August 1952, October 1961 to September 1962.
Sediment records: July and October 1954, April and August 1955, July 1956 (periodic), October 1961 to September 1963 (daily).
EXTREMES, 1951-52, 1961-63.--Water temperatures: Maximum, 65°F Aug. 1, 2, 1962.
Sediment concentrations (1961-63): Maximum daily, 2,480 ppm July 15, 1963
Sediment loads (1961-63): Maximum daily, 1,850,000 tons July 15, 1963.

Chemical analyses, in parts per million, water year October 1961 to September 1962

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)	Dissolved solids (calculated)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
June 25-July 14, 1962	329,000	9.0	0.03	23	6.9	2.0	0.9	83	20	1.0	0.5	0.3	105	86	18	172	8.0	20
July 15-Aug. 3	220,000	7.5	.02	24	8.0	2.4	1.2	91	21	1.0	.1	.2	110	94	19	186	8.0	10
Aug. 5-25	177,000	7.6	.02	25	8.1	2.8	1.3	94	23	1.0	.1	.4	115	97	20	196	8.0	10
Aug. 26-Sept. 4	174,000	7.8	.03	25	7.9	2.7	1.2	95	23	1.0	.1	.3	116	96	18	196	8.1	25
Sept. 5-14	142,000	7.5	.02	27	8.4	2.5	1.0	99	24	1.0	.1	.2	121	102	21	203	8.0	10
Sept. 15-26	114,000	7.2	.02	27	8.3	2.2	.9	99	24	1.0	.1	.2	120	102	21	204	8.0	10

YUKON RIVER BASIN--Continued

3560. YUKON RIVER AT EAGLE--Continued

Temperature (°F) of water, water year October 1961 to September 1962

Month	Day																													Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
June	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	55	54	--	--
July	52	53	53	54	55	56	57	57	57	58	57	56	56	57	57	58	57	58	59	61	60	--	61	61	60	60	60	61	61	63	64	58
August	65	65	64	64	62	60	59	59	59	60	60	60	60	61	60	60	60	61	61	61	61	60	--	58	51	55	55	55	54	53	52	59
September	51	--	49	50	49	49	49	46	45	45	44	44	43	43	43	43	43	43	43	44	44	44	44	44	44	43	43	43	43	42	--	45

Temperature (°F) of water, water year October 1962 to September 1963

Month	Day																													Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
May	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	48	--	48	48	48	49	50	--
June	50	50	51	51	51	51	51	51	52	54	54	54	53	53	53	52	52	52	53	54	54	--	--	--	--	55	54	53	53	54	--	53
July	54	55	57	--	58	58	--	62	62	62	62	62	61	59	58	59	59	59	58	58	58	58	58	58	58	58	58	--	57	57	57	59
August	57	58	--	58	57	57	56	56	56	56	57	58	58	59	59	57	60	60	59	59	58	57	57	58	60	60	58	57	56	56	56	58
September	56	--	57	56	55	54	--	52	54	55	51	50	--	48	--	46	46	46	46	46	46	--	45	45	45	45	45	45	45	45	--	49

YUKON RIVER BASIN--Continued

3560. YUKON RIVER AT EAGLE--Continued

Suspended sediment, water year October 1961 to September 1962

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							360000	--	--
2							360000	--	--
3							350000	--	--
4							340000	--	--
5							330000	--	--
6							320000	--	--
7							310000	--	--
8							310000	--	--
9							300000	--	--
10							290000	--	--
11							290000	--	--
12							297000	--	--
13							312000	--	--
14							331000	--	--
15							377000	--	--
16							403000	--	--
17							420000	--	--
18							453000	--	--
19							466000	--	--
20							452000	--	--
21							416000	--	--
22							398000	--	--
23							397000	--	--
24							400000	--	--
25							404000	--	--
26							409000	482	532000
27							401000	418	452000
28							399000	404	435000
29							402000	414	449000
30							390000	345	363000
31							--	--	--
Total							11087000	--	2231000

Day	JULY			AUGUST			SEPTEMBER		
1	370000	299	299000	190000	542	278000	179000	258	125000
2	350000	274	259000	190000	770	395000	181000	456	223000
3	342000	265	245000	191000	760	392000	177000	796	380000
4	320000	275	238000	190000	1340	687000	170000	468	215000
5	310000	290	243000	192000	1240	643000	167000	286	129000
6	290000	260	204000	194000	958	502000	163000	196	86200
7	280000	272	206000	200000	902	487000	149000	67	27000
8	270000	328	239000	190000	1010	518000	151000	182	74200
9	280000	410	310000	183000	730	361000	143000	151	58300
10	273000	470	346000	177000	514	246000	138000	126	46900
11	272000	503	369000	179000	451	218000	133000	108	38800
12	274000	532	394000	184000	440	218000	130000	89	31200
13	275000	640	475000	184000	531	263000	126000	85	28900
14	263000	620	440000	183000	670	331000	123000	66	21900
15	255000	497	342000	176000	591	281000	122000	84	27700
16	247000	441	294000	170000	436	200000	120000	207	67100
17	242000	370	242000	168000	358	162000	118000	94	29900
18	242000	311	203000	165000	372	166000	116000	186	58200
19	240000	276	179000	164000	401	178000	115000	82	25500
20	240000	350	227000	169000	458	209000	113000	55	16800
21	232000	411	257000	169000	497	227000	111000	61	18300
22	230000	410 A	250000	169000	535	244000	110000	53	15700
23	230000	468	291000	168000	570 A	260000	111000	56	16800
24	220000	766	455000	166000	519	233000	110000	49	14600
25	220000	791	470000	167000	462	208000	111000	50	15000
26	210000	667	378000	166000	454	203000	110000	49	14600
27	210000	564	320000	169000	352	161000	110000	45	13400
28	200000	482	260000	172000	273	127000	109000	44	12900
29	200000	424	229000	172000	233	108000	109000	45	13200
30	200000	412	222000	174000	221	104000	110000	50	14800
31	200000	436	235000	179000	231	112000	--	--	--
Total	7987000	--	9121000	5510000	--	8722000	3935000	--	1860000

Total discharge for period June to September 1962 (cfs-days)..... 28519000
Total suspended sediment load for period June to September 1962 (tons)..... 31896000

A Computed from partly estimated-concentration graph.

YUKON RIVER BASIN--Continued

3560. YUKON RIVER AT EAGLE--Continued

Suspended sediment, water year October 1962 to September 1963

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				26000	6	421	200000	194	105000
2				30000	7	567	190000	187	95900
3				36000	9	875	182000	203	99800
4				55000	12	1780	180000	187	90900
5				84000	31	7030	183000	168	83000
6				120000	55	17800	185000	158	78900
7				120000	55	17800	180000	152	73900
8				130000	80	28100	174000	135	63400
9				140000	85	32100	172000	132	61300
10				160000	120	51800	176000	128	60800
11				170000	140	64300	184000	125	62100
12				140000	85	32100	189000	141	72000
13				160000	120	51800	193000	180	93800
14				160000	120	51800	202000	215	117000
15				170000	140	64300	215000	250	145000
16				170000	140	64300	224000	320	194000
17				170000	140	64300	224000	295	178000
18				180000	170	82600	225000	240	146000
19				190000	190	97500	221000	220	131000
20				200000	230	124000	205000	180	99600
21				230000	370	230000	199000	140	75200
22				252000	820	558000	195000	120	63200
23				276000	1020	760000	198000	130	69500
24				285000	1030	792000	203000	145	79500
25				284000	939	720000	213000	195	112000
26				289000	1070 A	835000	227000	220	135000
27				286000	650	502000	235000	240	152000
28				270000	335	244000	236000	235	150000
29				250000	320	216000	236000	255	162000
30				229000	259	160000	243000	250	164000
31				210000	216	122000	--	--	--
Total				5472000	--	5994273	6089000	--	3211800

	JULY			AUGUST			SEPTEMBER		
1	250000	270	182000	181000	346	169000	125000	540	182000
2	245000	345	228000	179000	345	167000	123000	400 E	133000
3	234000	300	190000	177000	360 A	172000	120000	374	121000
4	230000	250	155000	174000	405	190000	118000	347	110000
5	232000	310 A	194000	174000	540	254000	116000	337	106000
6	235000	385	244000	179000	690	333000	115000	351	109000
7	237000	460 A	294000	180000	845	411000	117000	400 E	126000
8	236000	495	315000	175000	765	361000	118000	441	140000
9	232000	530	332000	166000	500	224000	119000	515	165000
10	234000	594	375000	160000	420	181000	117000	397	125000
11	235000	690	438000	158000	310	132000	117000	260	82100
12	232000	710	445000	156000	250	105000	116000	230	72000
13	242000	740	484000	157000	230	97500	120000	210 E	68000
14	268000	2010 S	1450000	160000	245	106000	121000	203	66300
15	277000	2480	1850000	158000	265	113000	127000	203 E	69600
16	261000	1490	1050000	156000	322	136000	131000	203	71800
17	249000	1000	672000	154000	410	170000	136000	218	80000
18	239000	840	542000	153000	439	181000	140000	222	83900
19	231000	740	462000	150000	465	188000	143000	199	76800
20	227000	640	392000	150000	535	217000	141000	142	54000
21	223000	535	322000	156000	900	379000	137000	133	49200
22	220000	470	279000	156000	1330	560000	133000	120 E	43100
23	218000	362	213000	145000	1140	446000	131000	110	38900
24	210000	314	178000	138000	720	268000	128000	92	31800
25	210000	314	178000	137000	480	178000	126000	79	26900
26	210000	356	202000	141000	415	158000	124000	74	24800
27	204000	365	201000	144000	560	218000	123000	73	24200
28	199000	370 A	199000	144000	1080	420000	123000	65	21600
29	194000	382	200000	142000	1060	406000	120000	57	18500
30	189000	391	200000	138000	910	339000	119000	55	17700
31	186000	343	172000	132000	740	264000	--	--	--
Total	7089000	--	12668000	4870000	--	7543500	3744000	--	2338200

Total discharge for period May to September 1963 (cfs-days)..... 27264000
Total suspended sediment load for period May to September 1963 (tons)..... 31755773

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

YUKON RIVER BASIN--Continued

3560. YUKON RIVER AT EAGLE--Continued

Particle-size analyses of suspended sediment water year October 1961 to September 1963
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment											Method of analysis
							Percent finer than size indicated, in millimeters											
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Sept. 7, 1962.....	1040		49	149000	187		26	35	49	59	68	79	88	98	100			SBWC
May 22, 1963.....	1000		47	252000	651		10	17	25	37	62	90	95	96	100			SPWC
July 17.....	1200		59	206000	3860		20	32	43	57	72	88	95	99	100			SPWC
Aug. 16.....	1800		57	156000	403		34	39	51	52	66	86	92	98	100			SBWC

4680. YUKON RIVER AT RAMPART

LOCATION.--At gaging station on left bank at Rampart, 0.8 mile downstream from Squaw Creek, 1.2 miles downstream from Minook Creek, and 3.5 miles upstream from Russian Creek.
DRAINAGE AREA.--199,400 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: June 1954 to September 1963.
Water temperatures: June 1954 to September 1963.
Sediment records: June 1962 to August 1963.
EXTREMES (for observation), 1961-63.--Dissolved solids: *Maximum*, 193 ppm Aug. 9-17, 1962; *minimum*, 80 ppm May 28-31, 1962.
Hardness: Maximum, 162 ppm Aug. 9-17, 1962: minimum, 65 ppm May 28-31, 1962.
Specific conductance: Maximum, 317 micromhos Aug. 9-17, 1962: minimum, 128 micromhos May 28-31, 1962.
EXTREMES, 1954-56, 1960-63.--Water temperatures: Maximum, 67°F July 21, 1960.

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

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (calculated)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
Oct. 10, 1960.....	134000	7.2	0.00	30	12	3.4	1.1	117	28	2.0	0.1	0.1	142	124	28	241	7.5	10
Dec. 9.....	a 24200	9.0	.03	39	12	3.4	2.0	152	27	1.5	.2	.8	170	147	22	286	7.6	5
Jan. 21, 1961.....	a 23500	8.3	.02	36	12	2.6	1.8	144	27	2.0	.1	.3	161	140	22	277	7.6	0
Feb. 26.....	a 18800	6.8	.07	39	9.5	5.4	2.5	144	22	3.0	.0	.4	160	136	18	278	7.6	5
May 20-26.....	333000	6.8	.02	20	4.0	1.8	1.6	63	15	1.0	.1	1.2	83	66	15	139	7.4	70
May 27-31, June 1-3, 5, 6.....	445000	7.5	.02	23	5.5	2.2	1.3	76	20	1.5	.1	1.0	99	80	18	156	7.8	50
June 10-18.....	428000	8.0	.02	26	5.0	2.4	1.4	88	17	1.5	.1	.9	105	86	14	164	7.9	40
June 19, 24-30.....	369000	7.7	.02	36	9.0	3.7	.8	112	38	1.0	.1	1.4	153	127	35	257	7.7	20
July 1-8,10.....	318000	7.9	.02	36	11	4.3	.9	119	40	1.0	.1	1.1	161	135	38	274	7.6	10
July 11, 15-22.....	234000	8.1	.03	31	8.6	3.1	1.0	107	30	1.0	.1	.7	137	113	26	231	7.4	30
July 23-31.....	241000	8.2	.05	30	8.3	2.9	1.2	108	28	1.0	.1	1.0	134	109	20	224	7.8	30
Aug. 1, 3-7, 10.....	212000	11	.03	34	8.0	4.6	1.5	118	32	1.0	.1	1.2	151	118	21	240	7.7	10
Aug. 11-20.....	291000	7.6	.02	34	6.3	4.1	1.6	108	30	1.0	.2	1.2	139	111	22	229	7.6	20
Aug. 21-28, 30, 31..	257000	8.0	.02	42	9.5	5.1	1.4	136	40	1.0	.2	1.5	176	144	32	290	7.8	20
Analysis of additional sample																		
June 6, 1961.....	a463000	6.1	0.02	27	3.8	0.9	0.9	86	14	1.0	0.1	0.7	96	83	12	165	7.5	45

a Discharge at time of sampling.

YUKON RIVER BASIN--Continued

4680. YUKON RIVER AT RAMPART--Continued

Chemical analyses, in parts per million, water year October 1961 to September 1962

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)	Dissolved solids (calculated)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
May 28-31, 1962.....	618,000	4.7	0.02	21	3.0	1.3	1.3	65	13	2.0	0.1	1.8	80	65	12	128	8.1	60
June 1-10.....	742,000	5.5	.03	21	4.7	1.4	1.3	72	12	2.0	.1	1.3	84	73	14	141	7.4	55
June 11-20.....	607,000	7.6	.02	24	4.3	1.6	1.0	82	15	1.5	.1	.8	96	78	11	163	7.6	30
June 22-30.....	517,000	7.1	.02	28	6.3	2.1	1.1	98	20	1.0	.1	.9	115	97	17	195	7.7	25
July 1-10.....	456,000	6.4	.02	29	6.8	2.2	1.2	100	22	1.5	.0	1.3	119	101	19	205	7.6	20
July 11-20.....	347,000	6.4	.02	34	11	3.6	1.2	120	37	1.0	.1	1.8	155	131	33	264	7.7	10
July 21-30.....	301,000	7.1	.02	35	13	4.0	.9	126	43	1.0	.1	1.6	168	141	38	281	7.9	10
July 31-Aug. 8.....	317,000	8.5	.02	36	13	3.8	1.1	127	43	1.0	.1	1.9	170	145	41	285	7.6	15
Aug. 9-17.....	305,000	7.8	.02	41	15	4.3	1.1	144	50	1.5	.1	1.0	193	162	44	317	8.0	10
Aug. 24.....	249,000	6.0	.07	32	8.3	2.3	1.3	112	25	1.0	.2	.2	131	114	22	213	8.0	20
Aug. 25, 29-31.....	284,000	6.1	.05	34	9.2	2.6	.6	118	32	1.0	.2	.2	144	124	27	239	8.0	30
Sept. 1-7.....	345,000	7.5	.05	27	8.1	2.2	.7	93	29	1.5	.2	.6	123	102	26	200	8.3	40

Chemical analyses, in parts per million, water year October 1962 to September 1963

June 1, 3, 5-10, 1963.....	359000	5.0	0.02	28	9.1	3.1	1.0	94	33	1.0	0.2	0.5	127	107	40	223	7.6	45
June 11-20.....	354000	5.0	.02	25	7.9	2.5	.7	83	29	1.0	.2	.7	113	95	27	192	7.8	50
June 21-30.....	344000	5.0	--	29	9.6	2.9	.7	99	32	1.0	.2	.8	130	113	32	223	7.6	45
July 1-10.....	393000	5.2	.02	31	8.4	2.6	.9	108	28	1.0	.2	.4	131	113	24	224	7.8	30
July 11-20.....	325000	5.5	.02	35	11	3.6	.9	117	38	1.0	.2	.5	154	133	37	266	7.9	25
July 21-31.....	379000	5.7	.02	32	9.5	2.7	.8	110	31	1.0	.2	.6	138	118	28	236	7.8	25
Aug. 1-10.....	312000	4.8	.02	26	7.1	2.2	.5	91	21	1.5	.1	1.9	110	95	20	189	7.8	25
Aug. 11-20.....	302000	4.8	.02	28	8.3	2.5	.6	98	24	2.0	.1	1.6	120	104	24	204	7.9	20
Aug. 21-31.....	255000	5.6	.02	34	10	3.2	.8	116	32	2.0	.1	1.6	146	127	32	249	7.9	15
Sept. 1-10.....	200000	5.7	.02	35	8.6	3.0	1.3	119	28	1.0	.2	.3	142	123	25	246	7.8	15
Sept. 11-20.....	164000	5.8	.02	34	7.7	2.8	1.4	117	25	1.0	.2	.3	136	117	21	234	7.8	15
Sept. 21-30.....	168000	6.4	.02	32	7.7	2.6	1.1	108	24	1.0	.2	.3	128	111	22	221	7.9	15

4680. YUKON RIVER AT RAMPART--Continued

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

Month	Day																													Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
May	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	49	50	40	45	--	50	45	50	--	50	53	50	--
June	55	55	48	--	50	52	51	--	--	53	50	54	55	54	60	59	61	58	58	--	--	61	--	58	--	--	59	60	60	58	--	--
July	59	62	64	63	63	63	64	62	63	64	63	--	--	--	50	49	51	59	63	60	58	42	61	50	62	63	59	62	59	61	60	59
August	62	--	58	57	60	58	62	--	--	63	62	62	61	63	61	62	62	60	61	61	63	60	59	60	--	--	--	--	--	--	--	--
September																																

Temperature (°F) of water, water year October 1961 to September 1962

Month	Day																													Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
May	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35	37	38	40	--
June	40	40	41	42	43	44	44	43	42	44	45	45	48	49	50	50	51	52	53	52	51	50	51	49	48	48	48	50	50	50	--	47
July	50	52	51	51	52	53	53	54	52	54	54	53	52	50	49	50	55	56	54	52	51	50	48	41	48	47	48	50	53	54	55	51
August	55	56	54	48	46	45	43	45	46	48	48	51	54	51	49	48	46	--	--	--	--	--	--	--	44	--	--	--	40	38	34	--
September	33	36	35	33	--	35	34	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Temperature (°F) of water, water year October 1962 to September 1963

Month	Day																													Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
June	--	46	47	--	41	45	47	48	47	46	48	52	49	46	48	48	47	54	52	53	50	45	51	48	51	54	55	50	54	51	--	49
July	48	53	55	55	58	59	60	61	63	64	63	60	62	57	55	55	53	51	56	51	54	54	55	53	54	49	48	53	53	54	55	56
August	51	50	49	47	49	49	48	45	45	45	45	48	52	54	49	51	50	45	48	43	47	43	47	48	49	48	49	48	48	48	51	48
September	52	51	47	49	49	46	45	50	45	46	45	46	43	44	44	45	45	45	46	47	45	43	43	41	43	40	43	42	40	40	--	45

YUKON RIVER BASIN--Continued

4680. YUKON RIVER AT RAMPART--Continued

Periodic determinations of suspended-sediment discharge and particle-size analyses, June 1962 to August 1963

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

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment coucentration (ppm)	Sediment discharge (tons per day)	Suspended sediment											Method of analysis
							Percent finer than size indicated, in millimeters											
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
June 15, 1962.....	1500		52	d 593000	174	278000	6	12	24	40	61	82	93	97	99	100		SBWC
July 6.....	1200		53	d 454000	248	304000	12	21	30	44	58	80	91	98	100	--		SBWC
Aug. 24.....	1400		44	d 249000	296	199000	21	31	41	51	64	80	95	99	100	--		SBWC
June 5, 1963.....	1400		40	351000	474	--	11	16	25	29	48	70	87	97	100	--		SPWC
Aug. 8.....	1400		47	313000	262	--	30	37	44	56	68	74	87	98	99	100		SBWC

d Daily mean discharge

4760. TANANA RIVER NEAR TANACROSS

LOCATION.--At gaging station on right bank, 0.2 mile downstream from unnamed tributary, 0.2 mile north of Cathedral Rapids, 9 miles upstream from Robertson River, and 13 miles west of Tanacross.
DRAINAGE AREA.--8,550 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: December 1953 to October 1954, January to September 1955, May 1956, March 1957 to September 1963.
Water temperatures: June to September 1954, May 1957 to September 1963.
Sediment records: October 1953 to September 1956 (periodic), May 1957 to September 1963 (daily).
EXTREMES (for observation), 1961-63.--Dissolved solids: Maximum, 310 ppm Dec. 29, 1960; minimum, 101 ppm Aug. 21-29, 31, 1963.
Hardness: Maximum, 232 ppm Dec. 29, 1960; minimum, 75 ppm Aug. 21-29, 31, 1963.
Specific conductance: Maximum, 448 micromhos Dec. 29, 1960; minimum, 168 micromhos Aug. 21-29, 31, 1963.
EXTREMES, 1953-63.--Water temperatures (1954, 1957-63): Maximum, 65°F June 2, 7, July 3, 1958.
Sediment concentrations: Maximum daily, 5,370 ppm June 17, 1961.
Sediment loads: Maximum daily, 340,000 tons Aug 28, 1963.

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

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (calculated)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Specific conductance (micromhos at 25°C)	pH	Color
Oct. 1-11, 1960.....	6550	16	0.00	28	14	7.9	1.3	120	30	5.5	0.3	0.6	163	128	29	238	7.8	20
Dec. 14.....	a 3190	18	.02	44	8.6	6.0	2.2	157	27	4.0	.1	.6	188	146	17	304	7.7	0
Dec. 29.....	3000	44	.00	62	19	9.2	3.1	247	45	6.0	.3	.6	310	232	30	448	7.8	20
May 1-10, 1961.....	6260	15	.07	41	4.5	5.2	1.7	132	23	2.5	.1	2.1	160	121	13	250	7.5	10
May 11-20.....	10300	11	.09	32	6.4	5.3	2.1	112	19	3.0	.1	2.8	137	106	15	218	7.4	40
May 21-30.....	12600	11	.10	28	5.7	6.1	2.2	104	18	4.5	.1	2.7	130	94	8	206	7.2	50
May 31, June 1-10...	11500	10	.07	31	5.2	5.6	1.8	106	17	4.0	.1	2.5	129	98	12	214	7.5	50
June 11-20.....	17300	10	.03	33	4.8	5.4	1.7	105	19	3.0	.1	2.3	131	102	16	215	8.1	20
June 21-30.....	23700	10	.03	32	5.2	5.1	1.7	106	19	3.0	.1	1.9	130	102	14	218	7.5	20
July 1-10.....	17500	10	.03	30	5.2	5.7	1.7	106	17	2.5	.1	1.7	126	96	10	217	7.6	20
July 11-20.....	15600	9.6	.03	29	5.0	5.9	1.6	102	17	4.0	.1	1.8	124	92	9	212	7.6	10
July 21-31.....	18200	9.0	.03	28	4.8	5.6	1.4	94	17	3.0	.1	1.4	116	90	12	194	7.7	5
Aug. 1-10.....	24200	9.9	.02	34	3.2	5.5	1.6	110	18	3.5	.2	1.4	131	98	8	215	7.5	0
Aug. 11-20.....	16100	9.7	.03	35	3.3	5.5	1.5	110	19	4.0	.2	1.6	133	101	11	225	7.8	0
Aug. 21, 26-30.....	16100	10	.03	31	5.0	5.6	1.6	108	19	3.0	.1	1.4	130	98	9	218	7.6	0
Sept. 3-10.....	10700	10	.03	38	2.9	5.7	1.4	114	22	4.0	.1	1.3	141	107	14	235	7.5	0
Sept. 11-20.....	9570	11	.03	40	5.1	6.0	1.6	128	25	4.0	.1	1.8	158	121	16	260	7.9	0
Sept. 21-27.....	8020	9.9	.03	42	5.6	5.9	1.4	134	26	4.0	.2	1.1	162	128	18	267	7.9	0
Analysis of additional sample																		
June 5, 1961.....	11600	11	0.09	24	10	5.8	1.5	109	19	5.0	0.2	0.6	131	101	12	206	7.4	50

a Discharge at time of sampling.

YUKON RIVER BASIN--Continued

4760. TANANA RIVER NEAR TANACROSS--Continued

Chemical analyses, in parts per million, water year October 1961 to September 1962

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)	Dissolved solids (calculated)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
May 1-10, 1962.....	2,650	15	0.04	44	9.4	5.4	2.2	164	26	3.0	0.1	1.3	187	150	16	309	8.1	5
May 11-20.....	8,860	10	.07	34	8.5	4.6	1.8	125	23	2.0	.1	1.0	137	119	17	234	7.9	30
May 21, 23, 31.....	17,000	7.7	.09	29	5.1	3.3	1.5	99	16	1.0	.1	.7	114	93	12	184	7.8	50
June 1-10.....	18,400	8.0	.09	29	5.2	4.0	1.7	104	14	1.5	.2	1.1	116	94	9	195	7.5	30
June 11-15.....	18,300	8.0	.02	32	5.8	4.3	1.9	112	18	2.0	.1	2.5	130	103	11	219	7.9	10
June 21-30.....	29,700	9.0	.02	33	5.7	4.4	1.4	113	18	2.0	.1	1.4	131	105	12	220	7.9	5
July 1-10.....	24,500	9.5	.02	31	6.2	4.6	1.4	109	19	3.0	.1	1.5	130	104	15	219	7.8	5
July 11-20.....	27,000	8.9	.02	30	5.5	4.4	1.4	105	17	2.0	.1	1.5	123	97	11	207	8.1	5
July 21-31.....	27,000	8.9	.03	28	5.1	5.0	1.7	100	17	3.0	.1	.2	118	90	8	195	7.9	10
Aug. 1-6, 8, 10.....	29,200	7.7	.03	27	4.5	5.0	1.1	96	18	2.5	.2	.0	113	87	8	189	7.9	10
Aug. 11-20.....	31,200	8.1	.03	28	7.1	4.8	1.0	101	21	2.5	.2	.1	123	100	17	195	7.8	20
Aug. 21-28, 31.....	25,800	8.9	.03	29	6.0	5.0	1.1	102	20	3.0	.2	.1	123	98	14	197	7.9	10
Sept. 1-10.....	21,500	8.9	.02	31	6.1	5.4	1.2	109	21	3.0	.2	.1	131	102	13	208	8.0	10
Sept. 11-20.....	12,400	9.8	.03	36	7.3	5.4	1.0	126	27	2.0	.2	.0	151	120	17	243	8.0	20
Sept. 21-30.....	8,550	11	.02	41	9.4	5.7	1.3	147	28	3.5	.3	.1	172	140	19	271	8.1	20

4760. TANANA RIVER NEAR TANACROSS--Continued

Chemical analyses, in parts per million, water year October 1962 to September 1963

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)	Dissolved solids (calculated)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
Oct. 1-9, 1962	6390	11	0.02	42	9.1	6.2	1.3	152	27	3.5	0.2	0.0	175	142	17	284	8.2	10
Apr. 25-30, 1963	3110	15	.02	45	9.8	5.0	1.8	166	18	2.5	.4	1.6	181	152	16	299	7.7	5
May 1-10	8090	10	.02	33	6.3	4.3	1.5	121	15	1.0	.2	.5	131	108	9	225	7.4	5
May 11-20	11200	8.8	.05	32	6.3	4.0	1.4	115	16	1.0	.2	.8	128	105	11	214	7.5	30
May 21-31	12400	8.6	.02	32	5.7	4.6	1.6	110	17	2.0	.2	.8	126	104	14	220	7.6	15
June 1, 3-10	8320	9.3	.02	34	7.1	5.9	1.8	121	22	3.5	.2	.7	144	115	16	257	7.7	5
June 11-19	8600	9.4	.02	34	7.2	5.6	1.6	119	20	3.5	.2	.6	141	114	16	238	7.8	5
June 21-30	9260	10	.02	33	6.4	5.8	1.6	116	20	3.5	.2	.6	138	109	14	234	7.7	5
July 1-9	14600	8.8	.02	29	5.2	5.6	1.5	102	18	3.0	.2	1.1	122	95	9	207	7.7	5
July 18-31	24300	8.8	.02	28	4.5	5.4	1.3	94	17	2.5	.2	.6	114	89	12	196	7.7	5
Aug. 1-5, 8-10	19100	8.8	.02	28	4.1	5.5	1.2	99	15	2.5	.2	.4	115	87	6	193	7.7	5
Aug. 11-16, 18-20	15900	8.8	.02	28	5.5	5.9	1.4	102	16	3.0	.2	.4	119	93	9	202	7.8	5
Aug. 21-29, 31	24600	8.3	.02	24	3.9	5.3	1.2	88	12	2.5	.2	.3	101	75	3	168	7.7	5
Sept. 1-4	17700	9.0	.02	27	4.5	6.0	1.3	100	15	3.0	.2	.3	115	87	5	192	7.7	5

YUKON RIVER BASIN--Continued

4760. TANANA RIVER NEAR TANACROSS--Continued

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

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

YUKON RIVER BASIN--Continued

4760. TANANA RIVER NEAR TANACROSS--Continued

Temperature (°F) of water, water year October 1961 to September 1962

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

Temperature (°F) of water, water year October 1962 to September 1963

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

YUKON RIVER BASIN--Continued

4760. TANANA RIVER NEAR TANACROSS--Continued

Suspended sediment, water year October 1960 to September 1961

Day	APRIL			MAY			JUNE		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..				3260	310	2730	12100	462	15100
2..				3990	440	4740	11500	430	13400
3..				4780	460	5940	11200	535	16200
4..				4920	350	4650	11100	482	14400
5..				4850	275	3600	11600	502	15700
6..				5110	338	4660	11200	519	15700
7..				5920	356	5690	11000	410	12200
8..				7810	554	11700	11400	452	13900
9..				10600	612	17500	11600	460	14400
10..				11400	980	30200	11600	390	12200
11..				9800	1280	33900	12300	458	15200
12..				10400	1040	29200	13600	755	27700
13..				10400	960	27000	15800	1380	58900
14..				10100	639	17400	17600	3290	156000
15..				9800	555	14700	16600	3320	A 149000
16..				9370	715	18100	16100	3110	A 135000
17..				9580	662	17100	17800	5370	258000
18..				10400	644	18100	21300	3220	185000
19..				11400	758	23300	20800	1320	74100
20..				11800	824	26200	21200	1190	68100
21..				11600	755	23600	23200	2020	126000
22..				10900	545	16000	30600	3720	307000
23..				10600	500	14300	29300	2610	206000
24..				11100	538	16100	25500	1450	99800
25..				12800	720	24900	23600	1100	70100
26..				14400	958	37200	22500	988	60000
27..				14500	1050	41100	21500	1240	72000
28..				13800	779	29000	20900	1410	79600
29..				13600	650	23900	20400	1010	55600
30..				13200	590	21000	19800	920	49200
31..				12500	490	16500	--	--	--
Total				304690	--	580010	524700	--	2395500

Day	JULY			AUGUST			SEPTEMBER		
1..	19800	962	51400	24500	2400	159000	12000	709	23000
2..	19800	1040	55600	23400	2700	170000	11600	672	21000
3..	19900	1080	58000	26200	2450	173000	11300	778	23700
4..	19300	1140	59400	26300	2410	171000	11200	681	20600
5..	18400	1140	56600	25800	1970	137000	11300	629	19200
6..	17400	1070	50300	26600	1920	138000	11500	607	18800
7..	16000	948	41000	26000	1870	131000	11300	615	18800
8..	15300	984	40600	23000	1280	79500	10500	604	17100
9..	14700	972	38600	20500	1080	59800	9580	542	14000
10..	14500	905	35400	19200	1130	58600	9040	485	11900
11..	15600	915	38500	18600	1060	53200	8620	497	11600
12..	15500	1050	43900	18800	992	50400	8260	514	11500
13..	15800	1030	43900	18200	1020	50100	8530	471	10800
14..	15500	968	40500	17400	930	43700	9370	453	11500
15..	15200	880	36100	16500	900	40100	9760	558	14700
16..	13800	792	29500	15200	865	35500	10400	674	18900
17..	14200	796	30500	14300	829	32000	10900	793	23300
18..	15800	1280	54600	13900	771	28900	10600	800	22900
19..	17100	1400	64600	14300	768	29600	9890	656	17500
20..	17200	1250	58000	14200	818	31400	9340	618	15600
21..	17500	1200	56700	13900	810	30400	8860	521	12500
22..	17700	1460	69800	14300	841 A	32500	8440	457	10400
23..	17100	1200	55400	15100	1060 A	43200	8090	412	9000
24..	16800	962	43600	16500	1430 A	63700	7720	378	7880
25..	16100	985	42800	18200	1840	90400	7560	376	7670
26..	16000	1100	47500	19200	1940	100000	7810	318	6700
27..	16500	1050	46800	18700	1690	85300	7640	293	6040
28..	17800	1170	56200	16600	1440	64500	7250	261 A	5110
29..	19700	1600	85100	14600	1100	43400	7020	243 A	4600
30..	21400	1970	114000	13400	970	35100	6860	239 A	4430
31..	23900	2290	148000	12500	834	28100	--	--	--
Total	531300	--	1692900	575900	--	2288400	282240	--	420730

Total discharge for period May to September 1961 (cfs-days)..... 2218830
Total suspended load for period May to September 1961 (tons)..... 7377540

A Computed from partly estimated-concentration graph.

YUKON RIVER BASIN--Continued

4760. TANANA RIVER NEAR TANACROSS--Continued

Suspended sediment, water year October 1961 to September 1962

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..				2540	143	981	18100	648	31700
2..				2460	67	445	20500	857	47400
3..				2320	50	313	20800	857	48100
4..				2430	50	328	19300	680	35400
5..				2610	59	416	18700	640	32300
6..				2660	84	603	18800	647	32800
7..				2680	87	630	18300	603	29800
8..				2760	67	499	17600	604	28700
9..				2940	66	524	16400	553	24500
10..				3130	92	777	15300	480	19800
11..				3440	146	1360	16100	555	24200
12..				4100	209	2310	16100	729	31700
13..				5470	422	6230	17300	840	39200
14..				6620	496	8860	19600	1260	66700
15..				7580	643	13200	22500	1290	78400
16..				8920	890	21400	26200	1600	113000
17..				10900	1010	29700	33800	2360	215000
18..				12300	949	31500	38600	3140	327000
19..				13800	983	36600	37100	2730	273000
20..				15500	1390	58200	31800	1990	171000
21..				15800	1400	A 60000	30200	1540	126000
22..				16600	1200	A 54000	31600	1420	121000
23..				17300	1080	50400	33400	1530	138000
24..				17400	1020	47900	35200	1710	162000
25..				17200	1100	51100	33000	1450	129000
26..				17800	974	46800	28700	1230	95300
27..				18500	949	47400	26900	1180	85700
28..				19800	907	48500	26000	1080	75800
29..				19700	804	42800	25600	1030	71200
30..				18400	684	34000	26300	1120	79500
31..				17900	659	31800	--	--	--
Total				311560	--	729576	739800	--	2753200
	JULY			AUGUST			SEPTEMBER		
1..	26600	1140	81900	27700	1650	123000	26400	1670	119000
2..	26500	1020	73000	29000	1900	149000	27000	1670	122000
3..	25100	932	63200	30000	1940	157000	24800	2070	140000
4..	22800	907	55800	30200	1940	158000	21900	1620	95800
5..	22200	941	56400	30100	2010	163000	22100	1220	72800
6..	22400	874	52800	29800	2100	A 170000	22200	990	59300
7..	23600	1110	70700	29600	1550	124000	20200	981	53500
8..	24600	1390	92300	28700	1300	101000	18100	927	45300
9..	25000	1390	93800	27600	1300	96900	16600	792	35500
10..	26200	1710	121000	28300	1320	101000	15600	639	26900
11..	26600	1690	121000	30700	1650	137000	14700	618	24500
12..	27700	1500	112000	32800	1840	163000	13900	671	25200
13..	26600	1530	110000	32900	1560	138000	13300	548	19700
14..	24000	1290	83600	31500	1300	110000	12900	502	17500
15..	23500	1230	78000	30200	1210	98700	12600	588	20000
16..	25600	1310	90500	30000	1330	108000	12400	573	19200
17..	28900	1410	110000	30600	1230	102000	12100	539	17600
18..	29000	1190	93200	31100	1210	102000	11200	529	16000
19..	28900	1110	86600	31100	1210	102000	10600	544	15600
20..	29000	1020	79900	31400	1300	110000	10000	504	13600
21..	27600	1000	74500	31600	1330	113000	9640	491	12800
22..	28600	1140	88000	30700	1210	100000	9340	414	10400
23..	29700	1280	103000	28400	1210	92800	9040	457	11200
24..	28400	1230	94300	26500	1100	78700	8770	747	17700
25..	28100	1140	86500	25600	1080	74600	8560	498	11500
26..	27400	1110	82100	23600	999	63600	8350	796	17900
27..	25900	1090	76200	21900	972	57500	8230	729	16200
28..	25000	1060	71600	20500	891	49300	8030	459	9950
29..	25000	1030	69500	19800	880	A 47000	7860	388	8230
30..	25000	999	67400	20500	1100	A 61000	7720	370	7710
31..	26200	1260	89100	23000	1480	91900	--	--	--
Total	811700	--	2627900	875400	--	3343000	424140	--	1082590

Total discharge for period May to September 1962 (cfs-days)..... 3162600
Total suspended sediment load for period May to September 1962 (tons)..... 10536266

A Computed from partly estimated concentration graph.

YUKON RIVER BASIN--Continued

4760. TANANA RIVER NEAR TANACROSS--Continued

Suspended sediment, water year October 1962 to September 1963

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				3910	225	2380	10200	530	14600
2				4340	565	6620	9700	480 A	12600
3				5230	590	8330	9250	500	12500
4				7220	910	17700	8710	500 A	11800
5				8890	1000	24000	8380	510	11500
6				9640	900	23400	8060	610	13300
7				9830	780	20700	7750	450	9420
8				10300	860	23900	7420	460	9220
9				10500	830	23500	7330	440	8710
10				11000	790	23500	7810	510	10800
11				11500	870	27000	7860	540	11400
12				11000	2180 S	85000	8060	490	10700
13				11000	1550 S	52100	8440	720	16400
14				10500	990	28100	8800	710	16900
15				11300	1070	32600	9100	660	16200
16				11700	1000	31600	9610	800	20800
17				11400	840	25800	8950	680	16400
18				11100	730	21900	8380	550	12400
19				11000	1440	42800	8230	580	12900
20				11100	1110 A	33300	8200	555	12300
21				11700	720	22700	8470	570	13000
22				12500	890 A	30000	8890	600	14400
23				13800	1200	44700	9520	730	18800
24				15500	1580	66100	9550	790	20400
25				15600	1560	65700	9760	800	21100
26				13800	1130	42100	99490	1030	26400
27				11900	1000	32100	9130	780	19200
28				10800	1860	54200	9010	610	14800
29				10200	1680	46300	9070	720	17600
30				10100	1100	30000	9730	880	23100
31				10400	830	23300	--	--	--
Total				328760	--	1011430	262860	--	449650

Day	JULY			AUGUST			SEPTEMBER		
1	10200	940	25900	17800	980	47100	19100	1330	68600
2	11100	1100	33000	18400	1060	52700	18500	1340	66900
3	11800	1200	38200	19800	1360	72700	17100	1260	58200
4	13300	1360	48800	21600	1900	111000	16200	1180	51600
5	14900	1800	72400	22400	2010	122000	16100	1320 A	57400
6	15700	2390	101000	23000	1740 A	108000	16500	1090	48600
7	16800	2020	91600	22300	1560 A	93900	16800	1060	48100
8	18300	1890	93400	19800	1340	71600	17100	1040	48000
9	19600	2150	114000	17300	1160	54200	17000	1010	46400
10	21100	2140	122000	15500	1040	43500	16900	1040	47400
11	21700	2120	124000	14300	920	35500	16500	1060 A	47200
12	21600	1960	114000	13700	780	28800	15900	1080	46400
13	25200	2720	185000	13600	770	28300	15500	1070	44800
14	31400	3850	326000	14000	810	30600	14500	940	36800
15	31900	2780	239000	14400	900	35000	13000	910	31900
16	30200	2330	190000	15200	1000	41000	12000	840	27200
17	29100	2220	174000	16200	1150 A	50300	10700	840	24300
18	28900	1990	155000	17100	1290	59600	9830	740	19600
19	29400	1960	156000	18200	1480	72700	9190	620	15400
20	29800	1880	151000	22400	2400	145000	8680	615	14400
21	30300	1760	144000	25400	3110	213000	8440	500	11400
22	29400	1540	122000	24800	2760	185000	8090	480	10500
23	24400	1360	89600	21800	2160	127000	7920	520	11100
24	23500	1350	85600	20300	1660	91000	7700	430	8940
25	23200	1340	83990	23100	1950	122000	7440	395	7930
26	22200	1240	74300	26800	2740	198000	7250	400	7830
27	21300	1110	63800	29900	3700	299000	7050	350	6660
28	20600	1080	60100	31300	4020	340000	6860	320	5930
29	19900	1120	60200	27000	3160	230000	6750	300	5470
30	18900	1000	51000	21900	1870	110000	6670	340	6120
31	17900	980	47400	19700	1380 A	73400	--	--	--
Total	683600	--	3436200	629000	--	3291900	371270	--	921080

Total discharge for period May to September 1963 (cfs-days)..... 2275490
Total suspended sediment load for period May to September 1963 (tons)..... 9110260

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

4760. TANANA RIVER NEAR TANACROSS--Continued

Particle-size analyses of suspended sediment water years October 1960 to September 1963
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
June 5, 1961	0900		53	11400	463	1540	6	11	15	22	30	47	67	94	100	--		SBWC
Aug. 7	1350		51	29800	1720	4670	32	41	52	62	72	76	85	96	100	--		SPWC
Sept. 27	1715		47	[a] 7640	325	565	9	12	15	17	23	39	52	93	100	--		SBWC
May 21, 1962	1530		43	14700	1400	--	6	11	18	30	45	63	77	89	100	--		SPWC
June 27	0750		54	29200	1110	--	19	23	31	38	53	68	85	96	99	100		SPWC
July 26	0900		55	29800	1240	--	29	35	45	54	60	67	77	92	99	100		SPWC
Sept. 19	0930		38	12300	554	--	11	14	16	21	29	45	62	91	100	--		SBWC
May 18, 1963	1100		50	11700	674	--	10	12	18	25	37	56	77	96	100	--		SBWC
July 18	1400		54	28900	--	--	31	40	54	62	73	82	91	98	100	--		SPWC
Aug. 17	1400		54	16900	1300	--	25	33	37	46	51	62	75	96	100	--		SPWC

a Daily mean discharge.

YUKON RIVER BASIN--Continued

5140. CHENA RIVER AT FAIRBANKS

LOCATION.--At gaging station near center, on downstream side of bridge on Steese Highway (U. S. Highway 97) in Fairbanks, 0.15 mile upstream from Noyes Slough, 11 miles upstream from mouth, and 11 miles downstream from Chena Slough.
DRAINAGE AREA.--1,980 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: May to September 1953, January 1954 to September 1955, October 1957 to May 1958.
Water temperatures: May to September 1953, May 1962 to September 1963.
Sediment records: January 1954 to September 1955, May 1962 to September 1963.
EXTREMES, May 1962 to September 1963.--Water temperatures: Maximum, 66°F June 17, 1962.
Sediment concentrations: Maximum daily, 510 ppm May 17, 1962.
Sediment loads: Maximum daily, 14,600 tons May 18, 1962.

Temperature (°F) of water, water year October 1961 to September 1962

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

Temperature (°F) of water, water year October 1962 to September 1963

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

YUKON RIVER BASIN--Continued

5140. CHENA RIVER AT FAIRBANKS--Continued

Suspended sediment, May to September 1962

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				580	14	22	12100	229	7480
2				600	20	32	9500	272	6980
3				640	19	33	8210	252	5590
4				670	17	31	7030	223	4230
5				710	21	40	6890	235	4370
6				760	21	43	7180	206	3990
7				820	26	58	6580	172	3060
8				920	19	47	5880	144	2290
9				1100	25	74	5980	165	2660
10				1600	38	164	5350	147	2120
11				2330	50	314	5220	112	1580
12				2970	92	738	5090	88	1210
13				3940	28	298	4880	76	1000
14				5020	308	4170	4690	62	785
15				7340	310 A	6100	4500	46	559
16				9040	417	10200	4700	67	850
17				10300	510	14200	4390	78	924
18				11600	466	14600	3960	51	545
19				11400	404	12400	3650	37	365
20				11000	424	12600	3320	34	305
21				11900	427	13700	3110	34	285
22				12700	385	13200	3220	46	400
23				13100	363	12800	5350	250	3610
24				13200	337	12000	5590	219	3300
25				13400	342	12400	4340	66	773
26				13400	322	11600	3690	48	478
27				13800	302	11200	3320	38	341
28				13900	270	10100	3140	29	246
29				13700	246	9100	3110	32	269
30				13600	241	8850	3060	35	289
31				13300	220	7900	--	--	--
Total				229340	--	199014	157030	--	60884
	JULY			AUGUST			SEPTEMBER		
1	2900	40	313	4480	50	605	12000	310	10000
2	2680	32	232	4160	36	404	12500	296	9990
3	2510	26	176	3960	27	289	11700	227	7170
4	2360	28	178	3820	24	248	11400	174	5360
5	2270	25	153	3740	24	242	11100	139	4160
6	2180	17	100	3600	21	204	9540	131	3370
7	2140	20	116	3460	18	168	8270	90	2210
8	2080	22	124	3340	25	225	7270	96	1880
9	2040	15	83	3280	20	177	6520	114	2010
10	2020	14	76	3230	27	235	5980	103	1660
11	1960	13	69	3120	27	227	5520	89	1310
12	1900	10	51	2970	24	192	5130	80	1110
13	1950	11	58	2820	20	152	4820	62	807
14	3210	63	546	2700	24	175	4570	52	642
15	3890	92	966	2590	24	168	4340	41	480
16	3230	39	340	2490	17	114	4160	38	427
17	2830	25	191	2430	15	98	4040	44	480
18	2540	20	137	2470	15	100	3940	37	394
19	2390	15	97	2500	16	108	3800	28	287
20	2260	12	73	2470	12	80	3630	26	255
21	2160	6	35	2470	8	53	3520	29	276
22	2360	13	83	2470	18	120	3420	29	268
23	3880	108	1130	2490	15	101	3310	29	259
24	3870	144	1500	2490	10	67	3190	25	215
25	4380	140	1660	2660	10	72	3100	27	226
26	7500	334	6760	2830	13	99	3080	23	191
27	8960	301	7280	2990	15	121	3140	22	186
28	7460	118	2380	4520	124	1510	313	21	177
29	6240	83	1400	7220	199	3880	3020	21	171
30	5470	74	1090	8570	281	6500	2920	24	189
31	4920	69	916	10800	372	10800	--	--	--
Total	106540	--	28313	113140	--	27534	172060	--	56160

Total discharge for period May to September 1962 (cfs-days)..... 778110
Total suspended sediment load for period May to September 1962 (tons)..... 371905
A Computed from partly estimated-concentration graph.

YUKON RIVER BASIN--Continued

5140. CHENA RIVER AT FAIRBANKS--Continued

Suspended sediment, water year October 1962 to September 1963

Day	OCTOBER			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	2820	20	152	1200	84	272	2920	34	268
2	2750	18	134	2300	94	584	2650	34	243
3	2680	26	188	4400	128	1520	2520	26	177
4	2600	15	105	5600	143	2160	2440	22	145
5	2530	25	171	7000	158	2990	2430	19	125
6	2470	15	100	8800	196	4660	3000	72	583
7	2360	14	89	10000	222	5990	3420	84	776
8	2290	20	124	11000	278	8260	3330	50	450
9	2190	18	106	9500	326	8360	3310	43	384
10	2160	20	117	8720	304	7160	3020	37	302
11	2110	14	80	9170	334	8270	2820	27	206
12	2050	14	77	9720	340	8920	2660	21	151
13	1940	10	52	11000	358	10600	2560	20	138
14	1850	18	90	12100	350	11400	3360	22	200
15	1800	12	58	12600	330	11200	4700	172	2180
16	1760	16	76	13300	254	9120	4610	176	2190
17	1750	10	47	13700	224	8280	3530	68	648
18	1750	21	99	13000	180	6320	3220	45	391
19	1700	10	46	12100	276	9020	3530	60	572
20	1650	18	80	11600	281	8800	3810	60	617
21	1510	27	110	11900	266	8550	3820	56	578
22	1450	22	86	11600	278	8710	3630	45	441
23	1370	13	48	11400	292	8990	3270	38	336
24	1300	17	60	11500	206	6400	3970	64	686
25	1200	50	162	9230	200	4980	5180	206	2880
26	1100	41	122	5290	121	1730	4890	120	1580
27	1100	35	104	4350	86	1010	6640	339	7150
28	1000	30	81	4090	69	762	5700	312	4800
29	1000	45	122	3740	64	646	4410	120	1430
30	980	38	100	3460	60	560	4050	52	569
31	920	22	55	3220	34	296	--	--	--
Total	56140	--	3041	266590	--	176520	109400	--	31196
	JULY			AUGUST			SEPTEMBER		
1	3690	29	289	2990	32	258	2740	15	111
2	3470	44	412	2740	26	192	2620	14	99
3	3350	30	271	2860	24	185	2560	14	97
4	3050	40	329	3150	31	264	2480	14	94
5	2800	45	340	4110	83	921	2400	12	78
6	2590	41	287	5230	184	2600	2330	28	176
7	2460	28	186	5120	132	1820	2280	20	123
8	2330	26	164	4490	68	824	2220	22	132
9	2220	26	156	4090	50	552	2160	22	128
10	2180	18	106	4710	105	1340	2130	10	58
11	2180	27	159	6380	212	3650	2070	12	67
12	2180	44	259	6940	196	3670	2020	14	76
13	2150	33	192	6260	118	1990	1970	20	106
14	2080	26	146	5360	86	1240	1920	11	57
15	2090	27	152	4750	76	975	1870	21	106
16	2100	22	125	4390	38	450	1830	17	84
17	2150	21	122	4670	72	908	1780	12	58
18	2130	22	126	5400	96	1400	1740	18	84
19	2090	21	118	5530	64	956	1720	10	46
20	2160	25	146	5190	54	757	1680	13	59
21	2240	22	133	4770	39	502	1640	17	75
22	2260	27	165	4400	36	428	1600	14	60
23	2300	24	149	4090	23	254	1570	16	68
24	2240	18	109	3860	51	532	1540	17	71
25	2140	23	133	3650	40	394	1480	12	48
26	2100	23	130	3470	28	262	1460	9	35
27	2290	34	210	3340	24	216	1440	9	35
28	2780	44	330	3220	23	200	1420	10	38
29	4350	104	1220	3090	27	225	1400	12	45
30	3880	82	859	2980	13	104	1380	9	34
31	3300	45	401	2840	14	107	--	--	--
Total	79330	--	7924	134070	--	28176	57450	--	2348

Total discharge for period October 1962, May to September 1963 (cfs-days)..... 702980
Total suspended sediment load for period October 1962, May to September 1963 (tons)... 249205

YUKON RIVER BASIN--Continued

5140. CHENA RIVER AT FAIRBANKS--Continued

Particle-size analyses of suspended sediment, May 1962 to September 1963
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment											Method of analysis
							Percent finer than size indicated, in millimeters											
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
May 21, 1962	0845		37	13400	426			--	5	13	16	57	79	99	100			SBWC
July 26	1530		47	8290	461			4	11	25	50	80	91	98	100			SBWC
May 17, 1963	1500		41	13800	217		5	8	14	25	44	68	82	96	99	100		SBWC

YUKON RIVER BASIN--Continued

5180. NENANA RIVER NEAR HEALY

LOCATION.--At gaging station on right bank, 0.5 mile upstream from Healy Creek, 1.1 miles southeast of Healy, and 1.2 miles upstream from railroad bridge.
DRAINAGE AREA.--1,910 square miles, approximately.
RECORDS AVAILABLE.--Chemical analyses: June to December 1949, October 1953 to October 1954, May to September 1955, May to October 1956, January 1957 to September 1963.
Water temperatures: June to October 1949, August 1957 to September 1963.
Sediment records: June 1953 to September 1963.
EXTREMES, (for observation), 1961-63.--Dissolved solids: Maximum, 186 ppm Jan 4, 1961; minimum, 72 ppm May 16-25, 1961, May 21-31, 1962.
Hardness: Maximum, 150 ppm Jan 4, 1961; minimum, 56 ppm May 16-25, 1961, May 21-31, 1962.
Specific conductance: Maximum, 287 micromhos Jan. 4, 1961; minimum 121 micromhos May 21-31, 1962.
EXTREMES, 1953-63.--Water temperatures (1957-63): Maximum, 56°F Aug. 9, 1957.
Sediment concentrations: Maximum daily, 8,330 ppm July 11, 1963.
Sediment loads: Maximum daily, 585,000 tons June 25, 1953.

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

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (calculated)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
Jan. 4, 1961.....	a 790	9.7	0.00	40	12	5.3	1.9	119	53	6.0	0.1	0.3	186	150	52	287	7.7	5
May 6-15.....	2500	7.9	.02	21	2.8	2.4	1.5	62	18	1.0	.2	.6	85	64	13	146	7.6	30
May 16-25.....	9200	4.9	.00	18	2.7	2.6	1.2	50	17	1.0	.2	.6	72	56	11	127	7.3	20
May 26-31, June 1-4.	5210	6.0	.00	25	3.0	2.5	1.3	64	25	1.0	.2	.5	96	75	23	163	7.6	5
June 5-14.....	8760	5.1	.02	24	2.9	2.7	1.2	59	27	2.0	.1	.9	95	72	24	161	7.5	5
June 15-24.....	12100	4.7	.02	24	2.4	1.8	1.2	58	24	1.5	.2	.6	89	70	22	155	7.4	5
June 25-30.....	10400	6.0	.00	26	2.9	2.0	1.5	61	29	1.0	.1	.2	99	77	27	170	7.4	5
July 1-10.....	8650	5.2	.02	25	4.0	1.9	1.3	63	28	1.0	.2	.3	98	79	27	175	7.5	5
July 11-15, 17-20...	8660	5.3	.00	26	3.9	1.7	1.6	66	30	1.0	.2	.2	102	81	27	181	7.5	5
July 21-31.....	9830	5.1	.00	28	4.9	1.8	1.9	72	31	1.0	.2	.6	110	90	31	192	7.5	5
Aug. 1-10.....	15800	5.5	.00	29	4.7	1.8	2.0	76	32	1.0	.2	.4	114	92	30	198	7.6	5
Aug. 11-20.....	8590	5.4	.02	30	4.6	2.2	1.5	74	41	.5	.1	.3	122	94	33	202	7.6	5
Aug. 21-31.....	7450	5.8	.02	31	5.0	2.1	1.8	76	35	1.5	.2	.3	120	98	36	207	7.3	5
Sept. 1-10.....	3820	6.2	.00	34	5.4	2.8	1.3	84	43	1.5	.1	.2	136	107	38	225	7.7	5
Sept. 11-20.....	5470	6.4	.00	31	5.0	2.5	1.6	76	41	2.0	.2	.2	127	98	36	213	7.5	10
Sept. 21-30.....	3860	7.0	.02	33	5.9	3.3	1.3	92	42	1.0	.2	.2	133	104	37	224	7.5	10

a Discharge at time of sampling

YUKON RIVER BASIN--Continued

5180. NENANA RIVER NEAR HEALY--Continued

Chemical analyses, in parts per million, water year October 1961 to September 1962

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)	Dissolved solids (calculated)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
June 1-10, 1962.....	8,700	5.9	0.03	19	5.1	2.2	1.3	59	26	1.0	0.1	0.1	90	69	21	145	7.3	10
June 11-20.....	21,000	4.8	.02	22	5.7	1.8	1.4	72	23	.0	.1	.1	94	78	19	146	7.4	5
June 21-30.....	15,700	5.0	.02	25	5.7	1.9	1.4	70	32	.0	.1	.2	105	86	29	176	7.7	5
July 1-10.....	11,000	4.8	.02	25	5.4	1.9	1.5	68	33	1.0	.1	.1	105	85	29	177	7.9	5
July 11-20.....	9,600	4.8	.02	27	5.1	2.0	1.7	72	34	2.0	.1	.1	112	88	28	185	7.9	5
July 21-30.....	13,600	5.1	.02	27	7.4	2.1	1.6	77	36	1.5	.1	.0	119	98	35	187	7.9	5
Aug. 2-10.....	7,000	4.8	.02	30	5.4	2.1	2.4	71	41	2.0	.2	.1	124	96	38	203	8.1	5
Aug. 11-20.....	5,600	4.8	.02	28	5.0	2.1	1.8	65	39	2.0	.2	.1	115	91	38	193	8.0	10
Aug. 21-31.....	11,000	4.8	.02	27	5.5	2.1	1.8	72	36	1.5	.1	.0	114	90	31	187	7.9	10
Sept. 1-10.....	10,000	6.0	.02	29	7.7	2.7	1.3	80	40	2.0	.1	.0	128	104	38	207	8.2	20
Sept. 11-20.....	4,800	6.4	.02	32	7.5	3.3	1.2	89	43	2.0	.1	.0	140	110	37	226	7.8	10
Sept. 21-30.....	5,700	6.1	.02	30	8.3	3.1	1.2	86	42	2.0	.1	.0	135	108	37	218	7.8	10

Chemical analyses, in parts per million, water year October 1962 to September 1963

May 14-20, 1963.....	6060	4.3	0.05	23	4.9	2.7	1.9	71	21	2.0	0.1	1.0	96	77	19	166	7.5	20
May 21-31.....	10400	4.1	.04	17	3.4	1.4	1.5	50	18	1.5	.1	.2	72	56	10	121	7.6	10
June 1-10.....	8970	4.3	.02	20	3.4	1.9	1.2	58	19	1.5	.1	.2	81	64	16	136	7.1	10
June 11-20.....	8970	5.0	.04	22	4.1	2.0	1.2	57	27	1.5	.1	.0	91	71	24	150	6.8	10
June 21-30.....	11700	4.8	.04	22	3.6	1.6	1.2	60	23	2.0	.1	.0	88	70	13	149	7.3	10
July 1-10.....	14800	4.4	.02	22	3.9	1.5	1.3	60	24	1.5	.1	.2	89	71	22	152	7.2	10
July 11-20.....	16100	4.8	.02	24	4.6	1.4	2.0	66	27	1.5	.1	.0	97	79	25	167	7.5	10
July 21-31.....	11300	4.5	.01	25	4.9	1.8	1.4	64	32	1.5	.1	.1	102	82	30	175	7.5	10
Aug. 1-10.....	13600	4.5	.01	27	4.4	1.9	1.6	74	30	1.5	.1	.0	107	86	25	183	7.6	5
Aug. 11-20.....	12000	4.8	.02	28	5.2	1.3	2.0	76	32	1.5	.1	.0	112	91	29	193	7.5	5
Aug. 21-31.....	12400	4.2	.02	29	5.6	1.9	2.3	77	35	2.0	.2	.0	118	98	35	214	7.1	5
Sept. 1-10.....	6800	5.0	.02	28	5.4	2.4	1.9	73	36	2.0	.1	.1	117	92	32	203	7.5	5
Sept. 11-20.....	5450	6.1	.02	32	6.6	2.9	1.6	84	41	2.0	.1	.0	133	107	38	223	7.6	5
Sept. 21-30.....	4100	5.9	.02	33	7.5	3.3	1.6	90	43	2.0	.1	.5	141	113	39	234	7.7	5

YUKON RIVER BASIN--Continued

5180. NENANA RIVER NEAR HEALY--Continued

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

Month	Day																												Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
May	--	--	--	--	--	37	37	38	38	35	34	34	36	37	38	38	38	38	38	39	39	39	38	39	40	39	39	40	41	42	42	--
June	43	42	44	44	44	44	43	44	44	44	45	45	47	48	49	49	49	48	48	50	49	48	49	47	49	49	48	47	48	46	--	46
July	45	45	46	45	45	46	47	48	46	46	51	51	51	50	50	50	48	52	48	47	46	45	47	51	48	47	42	37	48	50	51	47
August	52	50	46	42	45	44	47	47	46	45	44	46	44	48	47	50	49	50	48	49	46	48	48	44	43	44	47	46	47	47	47	47
September	46	45	43	43	44	44	42	44	45	43	49	46	44	42	42	43	42	41	42	42	42	42	40	40	38	38	39	38	40	39	--	42

Temperature (°F) of water, water year October 1961 to September 1962

Month	Day																												Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
June	40	40	41	42	42	44	44	46	47	48	48	46	44	44	46	46	47	50	46	46	44	44	45	48	48	48	48	47	47	48	--	45
July	49	48	50	51	54	52	52	51	50	50	51	47	48	48	49	52	54	52	52	51	48	46	51	48	50	50	52	55	54	54	--	51
August	52	51	47	46	48	49	46	48	51	50	51	48	47	48	48	49	48	46	47	46	48	47	48	46	44	44	47	48	46	46	--	48
September	44	43	41	40	40	41	41	42	42	40	41	39	38	39	39	38	39	40	40	41	40	39	40	41	38	39	40	40	38	38	--	40

Temperature (°F) of water, water year October 1962 to September 1963

Month	Day																												Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
May	--	--	--	--	--	--	--	-	--	--	--	--	--	34	34	37	36	36	36	38	37	38	38	40	40	41	40	42	42	41	40	--
June	40	42	43	41	40	42	44	45	45	46	45	46	46	41	40	42	44	44	46	47	50	45	42	43	46	45	46	46	47	47	--	44
July	47	48	48	49	48	50	52	51	52	50	51	50	48	48	48	44	43	44	45	46	47	46	45	46	46	44	43	44	46	49	50	47
August	50	45	43	44	44	43	44	43	45	45	48	51	50	50	48	47	46	46	44	44	45	46	48	48	47	44	43	45	46	48	48	46
September	46	47	46	46	44	44	43	44	44	42	42	40	40	41	43	40	42	42	40	41	40	40	40	39	40	40	40	41	40	40	--	42

YUKON RIVER BASIN--Continued

5180. NENANA RIVER NEAR HEALY--Continued

Suspended sediment, water year October 1960 to September 1961

Day	APRIL			MAY			JUNE		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1							4600	124	1540
2							4700	142	1800
3							4500	200	2430
4							4100	110	1220
5							4000	60	648
6							4800	132	1710
7							5800	187	2930
8							5200	170	2390
9							5200	153	2150
10							8600	198	4600
11							13000	360	12600
12							14000	432	16300
13							15000	265	10700
14							12000	170	5510
15							11000	320	9500
16							11000	417	12400
17							11000	689	20500
18							11000	468	13900
19							12300	340	11300
20							13700	432	16000
21							12500	564	19000
22							12200	444	14600
23							12800	465	16100
24							13500	508	18500
25							11500	617	19200
26							11000	867	25700
27							10000	476	12800
28							9940	296	7940
29							9900	294	7860
30							10300	380	10600
31							--	--	--
Total							289140	--	302428

Day	JULY			AUGUST			SEPTEMBER		
	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day
1	9640	478	12400	10300	1220	33900	4690	131	1660
2	9240	356	8880	9300	1010	25400	4460	156	1880
3	9300	240	6030	12000	1960	63500	4230	128	1460
4	8440	196	4470	29200	4200	331000	3920	128	1350
5	7960	320	6880	23100	2940	183000	3550	78	748
6	8130	506	11100	20100	1950	106000	3390	57	522
7	8520	295	6790	16900	1100	50200	3650	61	601
8	8470	300	6860	13500	602	21900	3610	65	634
9	8380	327	7400	11700	704	22200	3360	65	590
10	8440	322	7340	12400	712	23800	3380	51	465
11	8790	910	21600	10900	500	14700	5620	453	6870
12	8190	444	9820	9610	365	9470	7490	988	20000
13	7820	510	10800	8730	212	5000	7430	776	15500
14	7110	635	12200	8160	145	3190	6160	378	6290
15	7030	465	8830	8050	195	4240	5420	191	2800
16	7460	370	7450	7940	200	4290	4810	144	1870
17	8190	1800	39800	7770	180	3780	4190	129	1460
18	10600	2410	69000	7680	212	4400	4110	68	754
19	10200	1500	41300	8500	670	15400	4980	85	1140
20	10000	900	24300	8580	835	19300	4500	69	838
21	10300	1250	34800	8760	970	22900	4170	125	1410
22	12000	1200	38900	9150	1210	29900	3840	85	892
23	11200	612	18500	10500	2500	70900	4110	74	821
24	9670	490	12800	10200	1400	38600	4880	34	448
25	9180	639	15800	8270	620	A 13800	4390	30	356
26	8880	613	14700	7080	385	7360	3800	94	964
27	8670	668	15600	6310	258	4400	3520	63	599
28	9390	1450	36800	5840	745	11700	3380	25	228
29	9900	1240	33100	5540	335	5010	3310	23	206
30	9420	1220	31000	5340	177	2550	3240	23	201
31	9540	1340	34500	4930	140	1860	--	--	--
Total	280060	--	609750	326340	--	1153650	131590	--	73657

Total discharge for period June to September 1961 (cfs-days)..... 1027130
Total suspended load for period June to September 1961 (tons)..... 2138485

A Computed from partly estimated-concentration graph.

YUKON RIVER BASIN--Continued

5180. NENANA RIVER NEAR HEALY--Continued

Suspended sediment, water year October 1961 to September 1962

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							11000	530	15700
2							9200	388	9640
3							8600	222	5150
4							8200	218	4830
5							7800	218	4590
6							7800	253	5330
7							8200	259	5730
8							8400	214	4850
9							8400	170	3860
10							9000	260	6320
11							9600	298	7720
12							11000	663	19700
13							15000	475	19200
14							19300	2720	141000
15							35900	2950	286000
16							31000	3040	254000
17							27000	2230	162000
18							21900	2040	121000
19							18200	2650	131000
20							16800	2710	123000
21							19200	2530	131000
22							23700	3160	202000
23							18500	2230	111000
24							14000	1200	45400
25							13000	1030	35100
26							13000	933	31700
27							13000	1200	42100
28							14000	925	35000
29							15000	883	35800
30							14000	733	27700
31							--	--	--
Total							449700	--	2027420

Day	JULY			AUGUST			SEPTEMBER		
1	14000	771	29100	9200	1100	A 27000	13000	2360	82800
2	11000	719	21400	9200	1510	37500	11000	2330	69200
3	10000	594	16000	9000	1720	41800	13000	817	28700
4	11000	580	17200	7800	1070	22500	16000	880	38000
5	11000	640	19000	7000	1730	32700	13000	975	34200
6	11000	532	15800	6500	1600	28100	10000	839	22600
7	11000	748	22200	6000	711	11500	8000	885	19100
8	11000	885	26300	6600	759	13500	7000	660	12500
9	10000	879	23700	6600	891	15900	6300	787	13400
10	10000	864	23300	6400	630	10900	5800	755	12400
11	9400	1020	25000	6200	852	14300	5400	728	10600
12	9400	1110	282000	6000	989	16000	5300	298	4260
13	11000	1270	37700	5800	865	13500	5200	62	870
14	10000	735	198000	5800	1190	18600	5000	430	5800
15	9700	713	9480	5800	922	14400	4700	610	7740
16	9200	512	12700	5800	600	9400	4700	378	4800
17	9400	558	14200	5400	590	8600	4400	585	6950
18	9700	606	15900	5200	805	11300	4200	802	9090
19	9100	713	17500	5000	961	13000	3990	716	7710
20	8600	1380	32000	5300	988	14100	5200	126	1770
21	15000	1660	67200	6000	994	16100	6000	408	6610
22	18700	2380	120000	7000	1410	26600	5200	752	10600
23	14000	3020	114000	6500	1550	27200	4900	704	9310
24	12000	3870	125000	6000	931	15100	5400	716	10400
25	16000	3060	132000	6400	1140	19700	6100	462	7610
26	13000	882	31000	7800	1040	21900	7000	517	9770
27	11000	644	19100	9800	922	24400	6600	365	6520
28	11000	1230	36500	12000	1130	36600	5800	450	7050
29	11000	1290	38900	17000	1450	66600	5100	548	7540
30	10000	1120	30200	22200	1790	107000	4600	525	6530
31	9500	1000	A 26000	18100	1220	59600	--	--	--
Total	346700	--	1166680	249400	--	795400	207890	--	474430

Total discharge for period June to September 1963 (cfs-days)..... 1253690
Total suspended sediment load for period June to September 1963 (tons)..... 4463930

YUKON RIVER BASIN--Continued

5180. NENANA RIVER NEAR HEALY,--Continued

Suspended sediment, water year October 1962 to September 1963

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							11000	720	21400
2							9400	830	21100
3							9400	390	9900
4							9400	1060	26900
5							9300	1240	31100
6							8200	340	7530
7							7300	80	1580
8							7400	530	10600
9							8600	700	16200
10							9200	300	7450
11							8800	390	9270
12							8600	430	9980
13							10000	470	12700
14							11100	1040	31200
15							10400	1150	32300
16							8400	910	20600
17							7800	360	7580
18							8000	230	4970
19							8200	250	5540
20							8400	630	14300
21							9200	710	17600
22							13700	1320	48800
23							16700	1680	75800
24							14000	650	24600
25							11000	610	18100
26							11000	840	24900
27							11000	1090	32400
28							11000	960	28500
29							9800	860	22800
30							9700	950	24900
31							---	---	---
Total							296500	--	620600

Day	JULY			AUGUST			SEPTEMBER		
1	12000	1350	43700	11000	890	26400	6800	555	10200
2	14000	1520	57400	15000	1390	56300	6800	1040	19100
3	13000	1260	44200	17500	1960	92600	6800	1230	22600
4	12000	1100	35600	16000	1720	74300	6800	824	15100
5	14000	990	37400	15200	1950	80000	6800	1000	18400
6	15000	1020	41300	13300	2040	73200	6800	940	17200
7	16000	790	34100	12700	1880	64500	6800	968	17800
8	17000	1550	71100	11800	1100	35000	6800	207	3800
9	17500	3600	170000	10900	980	28800	6800	582	10700
10	17800	6500	312000	12500	1710	57700	6800	651	12000
11	17300	8330	389000	12900	1600	55700	6800	572	10500
12	17700	6200	296000	11800	1320	42000	6800	758	13900
13	16600	2350	105000	11300	1010	30800	6800	704	12900
14	15000	1440	58300	10800	840	24500	6800	360	6610
15	15000	1640	66400	10600	900	25800	6800	243	4460
16	17100	1910	88200	10600	940	26900	4100	608	6730
17	18500	2280	114000	11200	1290	39000	4100	574	6350
18	17500	2300	109000	14200	2080	79700	4100	500	5540
19	14000	1800	68000	14700	2340	92900	4100	700	7750
20	12000	880	28500	12300	2240	74400	4100	494	5470
21	11000	590	17500	10800	2050	59800	4100	185	2050
22	10000	1040	28100	9720	2330	61100	4100	396	4380
23	10000	1340	36200	11500	2350	73000	4100	34	376
24	13000	1390	48800	15100	2520	103000	4100	34	376
25	13000	1540	54000	15200	2830	116000	4100	228	2520
26	12000	880	28500	18400	3010	150000	4100	271	3000
27	12000	760	24600	15300	2480	102000	4100	312	3450
28	12000	1180	38200	12000	1590	51500	4100	187	2070
29	11000	1180	35000	11000	1330	39500	4100	146	1620
30	10000	1410	38100	9200	1750	43500	4100	176	1950
31	10000	1050	28400	8600	1260	29200	---	---	---
Total	433000	--	2546600	393120	--	1909100	163500	--	248902

Total discharge for period June to September 1963 (cfs-days)..... 1286120
Total suspended sediment load for period June to September 1963 (tons)..... 5325202

YUKON RIVER BASIN--Continued

5180. NENANA RIVER NEAR HEALY--Continued

Particle-size analyses of suspended sediment water year October 1960 to September 1963
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment											Method of analysis
							Percent finer than size indicated, in millimeters											
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
July 18, 1961.....	0630		45	10500	1970	5220	17	24	34	48	60	69	78	88	97	100		SPWC
July 6, 1962.....	1720		52	14900	532		8	17	25	34	43	52	60	77	93	98		SBWC
Aug. 24.....	1555		42	9080	468		10	15	22	33	41	50	59	77	96	100		SBWC
May 16, 1963.....	1545		45	5300	874		3	4	6	11	16	34	65	95	100	--		SBWC
July 15.....	1300		58	6880	2580		28	38	50	62	74	85	92	99	100	--		SPWC
Aug. 16.....	1000		57	4640	1010		16	23	34	49	63	80	91	98	100	--		SBWC

MISCELLANEOUS ANALYSES OF STREAMS IN ALASKA

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

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (calculated)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Specific conductance (micromhos at 25°C)	pH	Color
2740. SOUTH FORK CAMPBELL CREEK NEAR ANCHORAGE																		
Oct. 25, 1960	58	8.6	0.07	12	2.1	1.2	0.3	29	15	1.0	0.0	0.7	55	38	14	85	7.3	0
Dec. 20	19	10	.00	14	5.2	1.2	.4	39	19	4.0	.0	1.3	75	56	24	95	7.4	10
Dec. 28	24	11	.00	14	3.1	1.3	.2	46	11	2.0	.0	.7	66	48	10	93	7.3	0
Jan. 24, 1961	a 41	--	.02	--	.8	--	--	--	--	--	--	--	--	42	13	89	7.1	--
Apr. 14	a 9	--	.00	--	--	--	--	46	--	--	--	--	--	48	10	105	7.5	--
July 28	83	6.8	.02	12	1.0	.8	.2	27	13	1.0	.1	.3	48	34	12	75	7.5	5
2742. NORTH FORK CAMPBELL CREEK NEAR ANCHORAGE																		
Oct. 25, 1960		--	0.09	--	--	--	--	52	--	--	--	--	--	66	28	135	7.4	--
Dec. 20		0.0	.00	23	4.3	1.9	0.6	64	24	2.5	0.0	1.7	100	75	22	151	7.3	5
Apr. 14, 1961		--	.16	--	--	--	--	63	--	--	--	--	--	71	19	149	7.5	--
2750. CHESTER CREEK AT ANCHORAGE																		
Oct. 27, 1960 Site No. 2	--	14	0.10	19	3.3	1.8	0.6	59	13	1.5	0.1	1.2	84	61	12	123	7.3	5
Oct. 27 Site No. 4	--	--	.10	--	--	--	--	63	--	--	--	--	--	68	16	131	7.4	--
Oct . 27 Site No. 4a	--	14	.07	28	5.7	3.2	.9	105	13	1.5	.1	1.2	120	94	8	193	7.6	0
Oct. 27 Site No. 6	--	--	.12	--	--	--	--	75	--	--	--	--	--	76	14	148	7.5	--
Oct. 27 Site No. 8	--	15	.18	25	5.0	2.6	.7	85	14	2.0	.1	1.5	108	83	14	170	7.6	5
Oct. 27 Site No. 10	--	--	.23	--	--	--	--	86	--	--	--	--	--	90	20	172	7.6	--
Oct. 27 Site No. 12	--	16	.23	25	5.5	3.4	.7	88	13	3.5	.1	1.5	112	85	13	180	7.4	5
Dec. 20	22	16	.00	23	9.3	3.2	.8	93	18	3.0	.0	1.9	121	96	20	181	7.8	10
Jan. 24, 1961	28	--	.05	--	--	--	--	--	81	--	--	--	--	80	14	156	7.6	--

a Ice conditions

MISCELLANEOUS ANALYSES OF STREAMS IN ALASKA--Continued

Chemical analyses in parts per million, water years October 1960 to September 1961--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (calculated)	Hardness as $CaCO_3$: Calcium, magnesium	Hardness as $CaCO_3$: Noncarbonate	Specific conductance (micromhos at 25°C)	pH	Color
2760. SHIP CREEK NEAR ANCHORAGE																		
Oct. 26, 1960 ByPass	--	7.6	0.04	20	3.3	1.7	0.3	52	22	1.0	0.1	0.5	82	64	21	130	7.5	0
Oct. 26 Site No. 6..	--	--	.05	--	--	--	--	52	--	--	--	--	--	62	19	131	7.3	0
Oct. 26 Site No. 8..	--	--	.16	--	--	--	--	52	--	--	--	--	--	61	18	130	7.3	0
Oct. 26 Site No. 10.	--	8.4	.05	23	4.0	2.1	.4	65	22	2.0	.1	.1	94	74	21	150	7.2	0
Oct. 26 Site No. 12.	--	8.6	.09	23	4.8	6.2	.6	70	23	7.0	.1	.0	107	77	20	172	7.4	0
Dec. 20.....	67	9.4	.00	21	6.7	2.1	.5	62	25	2.0	.0	.7	97	80	29	148	7.7	5
July 27, 1961.....	252	5.9	.02	20	2.4	4.6	.4	49	22	7.0	.0	.1	86	60	20	148	7.6	5
July 27 Site No. 10.	--	6.5	.03	23	2.8	2.4	.4	59	21	3.0	.1	.0	88	69	20	147	7.8	0
July 27 Site No. 10.	--	6.8	.03	23	3.3	4.8	.4	60	21	7.0	.1	.0	96	71	22	160	7.6	0
7480. OGOTORUK CREEK NEAR POINT HOPE																		
Nov. 2, 1960.....	--	3.3	0.00	12	6.0	7.0	0.4	32	30	9.0	0.0	0.1	84	54	28	146	6.8	5
May 5, 1961.....	a 34	9.7	.40	109	42	53	2.7	346	166	79	.1	.1	b 651	444	161	1010	7.0	25
May 6.....	a 34	--	--	--	--	--	--	--	--	--	--	--	b 656	--	--	1020	--	--
Sept. 21.....	96	2.9	.02	7.2	1.9	5.6	.7	20	13	5.0	.1	.3	47	26	10	76	6.9	10
COVROERUK SPRINGS NEAR KIVALINA (CAPE THOMPSON)																		
Nov. 5, 1960.....		4.6	0.00	64	42	362	13	157	108	635	0.0	0.0	1300	332	204	2390	7.4	0
May 2, 1961.....		--	--	56	36	--	--	166	60	479	--	--	b 1074	--	--	1890	7.9	--
Sept. 9.....		4.3	.00	120	130	1060	53	158	115	2075	.2	.0	3640	835	705	6720	7.6	0
CLIFF SPRING NEAR POINT HOPE																		
Sept. 8, 1961.....		4.8	0.00	144	175	1520	93	138	190	3050	0.3	0.0	5210	1080	967	9380	7.6	0

a Ice conditions
b Residue on evaporation at 180°

KUPUK RIVER NEAR POINT HOPE

May 3, 1961.....		0.0	.02	7.9	2.4	1.1	0.4	28	6.0	2.5	0.0	0.0	b 34	30	6	61	7.1	0
Aug. 8.....			.02					77		2.0				82	19	164	7.4	30

IPEWIK RIVER NEAR CAPE THOMPSON

May 3, 1961.....		0.2	0.02	7.9	2.4	1.1	0.4	28	6.0	2.5	0.0	0.0	b 34	30	6	61	7.1	0

COVROERUK SPRING NO. 1 RIGHT FORK (WEST)

May 5, 1961.....													930			1600		

COVROERUK SPRING NO. 2 LEFT FORK (EAST)

May 2, 1961.....													840			1470		

ROARING CREEK 200' UPSTREAM FROM CONFLUENCE WITH THE KOTSINA RIVER

July 5, 1961.....		4.8	0.00	19	1.1	2.3	0.0	58	9.0	0.5	0.0	0.1	66	52	4	113	7.6	0

NUKA RIVER NEAR HOMER

Jan. 7, 1961.....		3.6	0.00	15	3.3	1.6	0.2	45	9.0	6.0	0.2	0.1	61	51	14	98	7.5	10

b Residue on evaporation at 180°

MISCELLANEOUS ANALYSES OF STREAMS IN ALASKA--Continued

Chemical analyses in parts per million, water years October 1960 to September 1961--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids (calculated)	Hardness as $CaCO_3$		Specific conductance (micromhos at 25°C)	pH	Color
														Calcium, magnesium	Noncarbonate			
WILLIAM'S SPRING AT ANCHOR POINT																		
Nov. 25, 1960.....	0.0	33	0.03	7.1	2.8	6.8	1.1	38	2.0	8.0	0.0	0.7	80	29	0	92	6.1	0
DOG SALMON RIVER NEAR KODIAK																		
Dec. 17, 1960.....	295	7.0	0.03	5.2	.7	4.6	.4	17	2.0	8.0	0.0	0.2	36	16	2	56	7.4	0
CHAKACHATNA RIVER NEAR TYONEK																		
Dec. 15, 1960.....	907	6.5	.14	9.5	1.2	1.3	1.8	25	10	2.0	0.0	0.2	45	28	8	67	7.4	10
LITTLE KITOI CREEK NEAR AFOGNAK																		
Dec. 14, 1960.....	17	7.2	0.03	9.1	2.1	8.2	0.6	33	5.0	14	0.0	0.2	62	31	4	103	7.3	20
Apr. 21, 1961.....	3.3	6.9	.04	9.5	2.1	8.4	.5	34	8.0	12	.0	.2	65	32	4	104	6.9	10
SWENTNA RIVER NEAR SWENTNA																		
Jan 5, 1961.....	1330	13	0.00	28	4.3	7.7	1.7	77	24	12	0.2	0.8	130	88	24	204	7.1	10

MISCELLANEOUS ANALYSES OF STREAMS IN ALASKA--Continued

Periodic determinations of suspended sediment discharge and particle-size analyses, water years October 1961 to September 1963
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water;
P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
562. WEST CREEK NEAR SKAGWAY (Southeastern Alaska)																	
Aug. 1, 1963	1100		49	1150	72	224											
Sept. 22	1035		39	500	44	59											
2004. GULKANA RIVER AT GULKANA																	
June 5, 1961	0800		54	2730	37	272											
July 7	1150		57	4420	84	1000		7	22	34	46	60	72	83	93	100		SBWC
June 24, 1962	1635		55	5550	100	1480											
2020. TAZLINA RIVER NEAR GLENNALLEN																	
June 4, 1961	--		--	3470	61	572	--	--	--	--	--	--	--	--	--	--		--
July 7	--		--	11200	71	2150	--	--	--	--	--	--	--	--	--	--		--
May 25, 1962	1010		43	4720	576	7340	18	28	42	58	75	90	95	98	99	100		SBWC
June 24	1420		51	11700	304	9600	--	--	--	--	--	--	--	--	--	--		--
July 24	1415		54	13500	110	4010	--	--	--	--	--	--	--	--	--	--		--
May 15, 1963	1415		39	2020	398	--	31	45	62	82	94	98	99	100	--	--		SBWC
July 12	1045		55	10700	300	--	21	30	38	50	61	74	84	93	99	100		SBWC
2120. COPPER RIVER NEAR CHITINA																	
May 15, 1963	0930		48	37300	1540		11	13	23	28	39	57	73	92	99	100		SPWC
June 18	1330		50	45500	436		26	30	37	43	50	55	63	84	99	100		SBWC
June 25	1300		48	61400	694		--	6	13	21	28	38	50	79	98	100		--
July 2	1000		51	98500	3490		15	25	29	39	52	70	84	96	100	--		SPWC
July 9	1300		51	151000	3530		19	26	35	44	52	65	78	92	99	100		SPWC
July 12	2000		52	161000	3200		19	25	35	44	55	65	78	92	100	--		SPWC

MISCELLANEOUS ANALYSES OF STREAMS IN ALASKA--Continued

Periodic determinations of suspended sediment discharge and particle-size analyses, water years October 1961 to September 1963--Continued
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters											Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
2415. DEEP CREEK NEAR NINILCHIK																		
Apr. 28, 1961.....	1830		34	1480	400	1600		1	7	16	25	41	59	90	100			SBWC
May 29.....	1400		46	e 980	48	127												
June 19.....	0930		58	186	7	4												
Aug. 3.....	1730		50	150	30	12												
June 22, 1962.....	0930		56	e 192	12	6												
2439. SNOW RIVER NEAR LAWING																		
Apr. 28, 1961.....	1430		40	213	10	6						--	--	--	--	--		--
May 29.....	1300		46	d 400	47	51						--	--	--	--	--		--
June 19.....	1500		44	2440	276	1820						--	--	--	--	--		--
Aug. 3.....	1330		43	d 1750	390	1840						--	--	--	--	--		--
Sept. 25.....	1130		39	d 500	103	139						--	--	--	--	--		--
May 19, 1962.....	1700		42	1900	24	123						--	--	--	--	--		--
June 21.....	2030		44	2440	631	4160	11	18	27	37	44	55	67	83	95	100		SBWC
July 19.....	1500		44	2300	838	5200						23	26	32	53	100		S
2722. PLACER RIVER AT PORTAGE																		
Apr. 28, 1961.....	1100		38	299	35	28												
May 30.....	1100		39	2130	140	805												
Aug. 3.....	1030		44	d 5120	212	2930												
Sept. 25.....	1000		40	d 1000	95	256												
May 17, 1962.....	1215		43	819	129	285												
June 21.....	1800		45	2200	150	891												

e Estimated.
d Daily mean discharge

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2724. TWENTY MILE RIVER NEAR PORTAGE

June 5, 1963.....	1300		45	2780	65							62	66	72	91	100		S
July 11.....	2100		44	4040	151							76	83	91	97	100		S
July 19.....	1600		48	3220	81		38	49	57	64	73	90	94	97	99	100		SBWC
Aug. 16.....	1700		47	2410	53							95	96	97	100	--		S
Sept. 20.....	1750		40	1990	48							95	96	98	100	--		S

2820. CARIBOU CREEK NEAR SUTTON

June 4, 1961.....	--		--	506	74	101	--	--	--	--	--	--	--	--	--	--		--
July 7.....	--		--	414	115	128	--	--	--	--	--	--	--	--	--	--		--
Aug. 8.....	--		--	308	125	104	--	--	--	--	--	--	--	--	--	--		--
Sept. 27.....	--		--	196	61	32	--	--	--	--	--	--	--	--	--	--		--
May 25, 1962.....	1510		43	1680	1080	4900	15	27	38	49	57	64	70	77	88	98		SBWC
June 24.....	0915		41	1850	519	2590	21	35	50	64	74	81	88	94	98	100		SBWC
July 24.....	0945		45	803	148	321	--	--	--	--	--	--	--	--	--	--		--
May 14, 1963.....	1130		34	300	564	--	19	25	38	52	66	79	87	95	99	100		SBWC
July 12.....	0730		46	1510	1720	--	24	35	47	62	70	79	85	92	98	100		SBWC

2910. SUSITNA RIVER NEAR OENALI

July 5, 1961 a.....	1045		43	1980	2770	14800	3	3	5	7	9	13	18	31	69	94		SBWC
July 5 a.....	1045		43	6090	1140	8700	14	14	19	29	36	47	60	77	95	100		SBWC
Aug. 23.....	1030		40	11800	2830	90200	10	16	24	37	56	68	88	92	98	99		SPWC
July 27, 1962.....	1700		50	10600	1800	51500	5	9	18	27	39	52	64	76	87	96		SPWC
Sept. 18.....	1400		40	2280	355	2180	9	13	17	22	28	36	46	65	73	89		SBWC

a Stream divided by gravel bar and was treated as two independent streams.

MISCELLANEOUS ANALYSES OF STREAMS IN ALASKA--Continued

Periodic determinations of suspended sediment discharge and particle-size analyses, water years October 1961 to September 1963--Continued
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Sampling point	Water temperature (°F)	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment: Percent finer than size indicated, in millimeters										Method of analysis
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
2912. MACLAREN RIVER NEAR PAXSON																	
June 5, 1961	1530		52	d 1000	168	454	--	--	--	--	--	--	--	--	--	--		--
July 5	0800		40	d 2910	292	2290	12	17	28	36	42	52	63	85	98	100		SBWC
Aug. 22	0700		39	d 3640	1630	16000	23	30	42	55	70	75	87	95	99	100		SPWC
June 25, 1962	0915		40	3520	489	4650	17	24	34	43	54	66	80	95	99	100		SBWC
July 27	1945		46	3220	1190	10300	12	19	33	47	61	78	88	95	99	100		SBWC
Sept. 17	1630		40	678	74	135	--	--	--	--	--	--	--	--	--	--		
2915. SUSITNA RIVER NEAR CANTWELL																	
July 6, 1962	1600		52	36900	2590	258000	18	23	31	39	49	63	77	90	96	99		SPWC
July 16	1430		54	20000	814	44000	20	24	32	38	48	53	69	86	97	100		SBWC
Sept. 11	1515		40	12000	219	7100	4	10	17	23	30	38	57	89	98	100		SBWC
June 7, 1963	1100		42	d 15000	408	--	10	11	13	20	25	39	54	83	97	100		SBWC
July 8	1620		52	26000	2790	--	9	11	15	22	35	54	70	84	96	99		SPWC
July 25	1300		45	22000	1300	--	9	12	17	24	34	50	67	86	95	98		SPWC
Sept. 4	1330		47	12800	770	--	20	23	32	43	55	61	70	88	98	100		SPWC
Sept. 30	1300		42	d 6600	116	--	12	15	22	27	36	44	54	78	97	100		SBWC
2920. SUSITNA RIVER AT GOLD CREEK																	
June 16, 1962	1400		51	52000	1400	196000	11	13	16	25	34	60	77	92	99	100		SPWC
July 6	1525		54	25200	852	58000	30	42	56	69	77	81	86	96	100	--		SPWC
July 16	1130		54	13200	334	11900	19	27	38	52	64	77	86	95	99	100		SBWC
Sept. 11	1700		40	14400	107	4160	--	20	27	37	50	59	69	87	97	100		SBWC

d Daily mean discharge.

4700. CHISANA RIVER AT NORTHWAY JUNCTION

June 23, 1961.....	1645		52	4410	612	7290	3	5	7	14	24	55	76	96	100	--		SBWC
July 6.....	1645		52	4340	684	8020	5	8	13	21	34	64	86	97	99	100		SBWC
Aug. 7.....	1100		52	6700	1240	22400	20	26	34	45	57	70	84	97	100	--		SBWC
Sept. 28.....	1000		36	1880	358	1820	--	--	--	--	--	71	84	99	100	--		S
May 22, 1962.....	0900		42	1940	1470	7700	4	6	9	14	26	47	70	95	100	--		SPWC
June 27.....	1400		54	2250	940	2250	19	24	33	38	49	62	75	91	99	100		SBWC
July 24.....	2115		57	2230	1180	7100	19	28	37	46	55	68	80	95	100	--		SBWC
May 16, 1963.....	1545		45	5300	949	--	3	4	6	11	16	34	65	95	100	--		SBWC
July 15.....	1300		58	6880	2580	--	28	38	50	62	74	85	92	99	100	--		SPWC
Aug. 16.....	1000		--	4640	1010	--	16	23	34	49	63	80	91	98	100	--		SBWC

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