

# Quality of Surface Waters of the United States, 1967

Parts 12-16. North Pacific Slope Basins,  
Alaska, and Hawaii and Other Pacific Areas

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GEOLOGICAL SURVEY WATER-SUPPLY PAPER 2016

*Prepared in cooperation with the States  
of Alaska, Idaho, Montana, Oregon,  
Washington, Wyoming, U.S. Bureau of  
Reclamation, and with other agencies*



**UNITED STATES DEPARTMENT OF THE INTERIOR**

**ROGERS C. B. MORTON, *Secretary***

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## PREFACE

This report was prepared by the U.S. Geological Survey in cooperation with the States of Alaska, Idaho, Montana, Oregon, Washington, Wyoming, and with other agencies, by personnel of the Water Resources Division, E. L. Hendricks, chief hydrologist, G. W. Whetstone, assistant chief hydrologist for Scientific Publications and Data Management, under the general direction of G. A. Billingsley, chief, Reports Section, and B. A. Anderson, chief, Data Reports Unit.

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# QUALITY OF SURFACE WATERS OF THE UNITED STATES, 1967

Parts 12-16

## INTRODUCTION

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

The records of chemical analysis, suspended sediment, and temperature of surface waters given in this volume serve as a basis for determining the suitability of waters for various uses. The flow and water quality of a stream are related to variations in rainfall and other forms of precipitation. In general, lower concentrations of dissolved solids may be expected during periods of high flow than during periods of low flow. Conversely, the suspended solids in some streams may change materially with relatively small variations in flow, whereas for other streams the quality of the water may remain relatively uniform throughout large ranges in discharge.

The Geological Survey has published annual records of chemical quality, water temperature, and suspended sediment since 1941. The records prior to 1948 were published each year in a single volume for the entire country, and in two volumes in 1948 and in 1949. From 1950 to 1958, the records were published in 4 volumes; from 1959 to 1963 in 5 volumes; and since 1964 in 6 volumes. The drainage basins covered by the six volumes are shown in Figure 1. The shaded area in Figure 1 represents the section of the country covered in this volume for the water year 1967 (October 1, 1966 to September 30, 1967).

To meet interim requirements, water-quality records have been released by the Geological Survey in annual reports, beginning with the 1964 water year, by State. These reports are entitled, "Water Resources Data for (State), Part 2. Water Quality

Records." Distribution of these reports is limited and primarily for local needs. Any revisions or corrections found necessary to the records published in these annual State reports have been made and published in this volume without reference.

The records herein are listed by drainage basins in a downstream direction along the main stream. All stations on a tributary entering above a mainstream station are listed before that station. A station on a tributary that enters between two mainstream stations is listed between them. A similar order is followed in listing stations on first rank, second rank, and other ranks of tributaries. In the list of water-quality stations in the front of this volume, the rank of the tributaries is indicated by an indentation. Each indentation represents one rank.

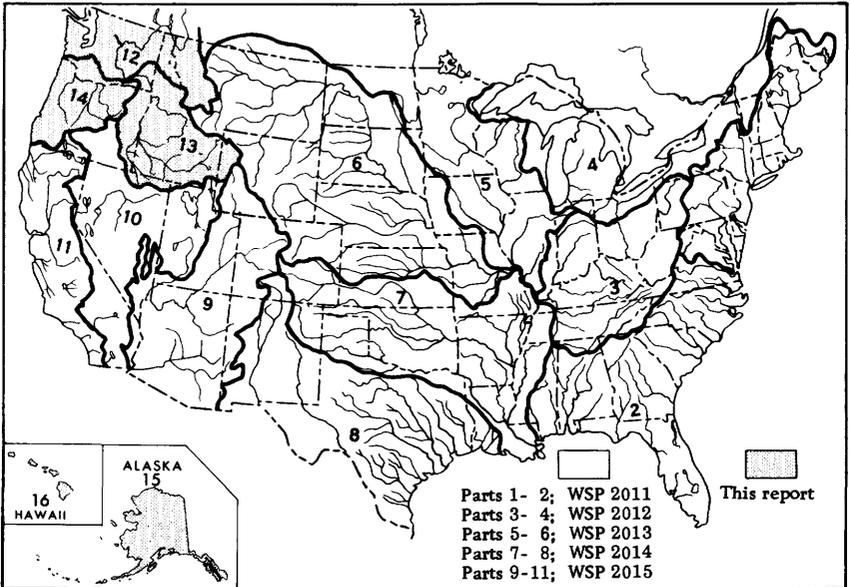


Figure 1.--Map of the United States showing basins covered by the six water-supply papers on quality of surface waters in 1967. The shaded part represents the section of the country covered by this volume; the unshaded part represents the section of the country covered by other water-supply papers.

A station number has been assigned as an added means of identification for each stream location where regular measurements of water quantity or quality have been made. The numbers have been assigned to conform with the standard downstream order of

listing gaging stations. The numbering system consists of 2 digits followed by a hyphen and a 6-digit number. The notation to the left of the hyphen identifies the Part or hydrologic region used by the Geological Survey for reporting hydrologic data. The number to the right of the hyphen represents the location of the station in the standard downstream order within each of the 16 parts (Fig. 1). The assigned numbers are in numerical order but are not consecutive. They are so selected from the complete 6-digit-number scale that intervening numbers will be available for future assignments to new locations. The identification number for each station in this report is printed to the left of the station name and contains only the essential digits. For example, the number is printed as 4-0100 for a station whose complete identification number is 04-0100.00.

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

During the water year ending September 30, 1967, the Geological Survey maintained 227 stations on 172 streams for the study of chemical and physical characteristics of surface water. Samples were collected daily and monthly at 93 of these locations for chemical-quality studies. Samples also were collected less frequently at many other points. Water temperatures were measured continuously at 144 and daily at 30 stations. All surface water samples collected and analyzed during the year have not been included. Single analyses made of daily samples before compositing have not been reported. Specific conductance is determined and reported for almost all daily samples.

At chemical-quality stations where data are continuously recorded at the stream site (monitors), the records consist of daily maximum, minimum, and mean values for each constituent measured. More detailed records (hourly values) may be obtained by writing the district office listed under Division of Work on page 28.

Quantities of suspended sediment are reported for 25 stations during the year ending September 30, 1967. Sediment samples were collected one or more times daily at most stations, depending on the rate of flow and changes in stage of the stream. Particle-size distributions of sediments were determined at 24 stations.

Some of the stations for which data are published in this volume are included in special networks and programs. These stations are identified by their title, set in parentheses, under the station name.

Hydrologic bench-mark station is one that provides hydrologic data for a basin in which the hydrologic regimen will likely be governed solely by natural conditions. Data collected at a bench-mark station may be used to separate effects of natural from manmade changes in other basins which have been developed and in which the physiography, climate, and geology are similar to those in the undeveloped bench-mark basin.

International Hydrological Decade (IHD) River Stations provide a general index of runoff and materials in the water balance (discharge of water, and dissolved and transported solids) of the world. In the United States, IHD Stations provide indices of runoff and the general distribution of water in the principal river basins of the conterminous United States and Alaska.

Irrigation network stations are water-quality stations located at or near certain streamflow gaging stations west of the main stem of the Mississippi River. Data collected at these stations are used to evaluate the chemical quality of surface waters used for irrigation and the changes resulting from the drainage of irrigated lands. Prior to water year 1966, these data were published in the annual water-supply paper series, "Quality of Surface Water for Irrigation, Western States."

Pesticide program is a network of regularly sampled water-quality stations where additional monthly samples are collected to determine the concentration and distribution of pesticides in streams whose waters are used for irrigation or in streams in areas where potential contamination could result from the application of the commonly used insecticides and herbicides.

Radiochemical program is a network of regularly sampled water-quality stations where additional samples are collected twice a year (at high and low flow) to be analyzed for radioisotopes. The streams that are sampled represent major drainage basins in the conterminous United States.

## COLLECTION AND EXAMINATION OF DATA

Quality of water stations usually are located at or near points on streams where streamflow is measured by the U.S. Geological Survey. The concentration of solutes and sediments at different locations in the stream-cross section may vary widely with dif-

ferent rates of water discharge depending on the source of the material and the turbulence and mixing of the stream. In general, the distribution of sediment in a stream section is much more variable than the distribution of solutes. It is necessary to sample some streams at several verticals across the channel and especially for sediment, to uniformly traverse the depth of flow. These measurements require special sampling equipment to adequately integrate the vertical and lateral variability of the concentration in the section. These procedures yield a velocity-weighted mean concentration for the section.

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

### CHEMICAL QUALITY

The methods of collecting and compositing water samples for chemical analysis are described 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 the method of 10-day periods or the equivalent of three composite samples per month generally is practiced, modifications usually are 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. Large streams have

a small diurnal temperature change while small, shallow streams may have a daily range of several degrees and may follow closely the changes in air temperature. Some streams may be affected by waste-heat discharges. The thermometers used for determining water temperature were accurate to plus or minus 0.5°F.

At stations where continuously recording thermographs are present, the records consist of maximum and minimum temperatures for each day, and the monthly averages.

### SEDIMENT

In general, suspended-sediment samples were collected daily with depth-integrating cable-suspended samplers (U.S. Inter-Agency, 1963, and 1952.) from a fixed sampling point at one vertical in the cross section. A hand sampler was used at many stations during periods of low flow. Depth-integrated samples were collected periodically at three or more verticals in the cross section to determine the cross-sectional distribution of the concentration of suspended sediment with respect to that at the daily sampling vertical. In streams where transverse distribution of sediment concentration ranges widely, samples were taken at two or more verticals to define more accurately the average concentration of the cross section. During periods of high or rapidly changing flow, samples generally were taken two or more times a day.

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

For some periods when no samples were collected, daily loads of suspended sediment were estimated on the basis of water discharge, sediment concentrations observed immediately before

and after the periods, and suspended-sediment loads for other periods of similar discharge. The estimates were further guided by weather conditions and sediment discharge for other stations.

In many instances where there were no observations for several days, the suspended-sediment loads for individual days are not estimated, because numerous factors influencing the quantities of transported sediment made it very difficult to make accurate estimates for individual days. However, estimated loads of suspended sediment for missing days in an otherwise continuous period of sampling have been included in monthly and annual totals in order to provide a complete record. For some streams, samples were collected weekly, monthly, or less frequently, and only rates of sediment discharge at the time of sampling are shown.

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

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

## EXPRESSION OF RESULTS

The quantities of solute concentrations analyzed in the laboratory are measured by weight-volume units (milligrams per liter) and for reporting, are converted to weight-weight units (parts per million). For most waters, this conversion is made by assuming that the liter of water sample weighs 1 kilogram; and thus milligrams per liter are equivalent to parts per million (ppm).

Equivalent per million are not reported, but they can be calculated easily from the parts per million data. 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 reciprocals of the combining weights. The table below lists the reciprocals of the combining weights of cations and anions generally reported in water analyses. The conversion factors are computed from atomic weights based on carbon-12 (International Union of Pure and Applied Chemistry, 1961).

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 quan-

Conversion factors: Parts per million to equivalents per million

Ion	Multi- ply by	Ion	Multi- ply by
Aluminum ( $\text{Al}^{+3}$ ).....	0.11119	Iodide ( $\text{I}^{-1}$ ) .....	0.00788
Ammonia as $\text{NH}_4^{+1}$ ....	.05544	Iron ( $\text{Fe}^{+3}$ ).....	.05372
Barium ( $\text{Ba}^{+2}$ ).....	.01456	Lead ( $\text{Pb}^{+2}$ ).....	.00965
Bicarbonate ( $\text{HCO}_3^{-1}$ ) .	.01639	Lithium ( $\text{Li}^{+1}$ ).....	.14411
Bromide ( $\text{Br}^{-1}$ ) .....	.01251	Magnesium ( $\text{Mg}^{+2}$ )...	.08226
Calcium ( $\text{Ca}^{+2}$ ).....	.04990	Manganese ( $\text{Mn}^{+2}$ )....	.03640
Carbonate ( $\text{CO}_3^{-2}$ ).....	.03333	Nickel ( $\text{Ni}^{+2}$ ).....	.03406
Chloride ( $\text{Cl}^{-1}$ ).....	.02821	Nitrate ( $\text{NO}_3^{-1}$ ).....	.01613
Chromium ( $\text{Cr}^{+6}$ ).....	.11539	Nitrite ( $\text{NO}_2^{-1}$ ).....	.02174
Cobalt ( $\text{Co}^{+2}$ ) .....	.03394	Phosphate ( $\text{PO}_4^{-3}$ )....	.03159
Copper ( $\text{Cu}^{+2}$ ).....	.03148	Potassium ( $\text{K}^{+1}$ ).....	.02557
Cyanide ( $\text{CN}^{-1}$ ).....	.03844	Sodium ( $\text{Na}^{+1}$ ).....	.04350
Fluoride ( $\text{F}^{-1}$ ).....	.05264	Strontium ( $\text{Sr}^{+2}$ ).....	.02283
Hydrogen ( $\text{H}^{+1}$ ).....	.99209	Sulfate ( $\text{SO}_4^{-2}$ ) .....	.02082
Hydroxide ( $\text{OH}^{-1}$ ).....	.05880	Zinc ( $\text{Zn}^{+2}$ ).....	.03060

tity is called noncarbonate hardness. Hardness or alkalinity values expressed in parts per million as calcium carbonate may be converted to equivalents per million by dividing by 50.

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

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

The discharge of the streams is reported in cubic feet per second (see Streamflow, p. 25) and the temperature in degrees Fahrenheit. Color is expressed in units of the platinum-cobalt scale proposed by Hazen (1892). 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.

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

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

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

Particle size analyses are expressed in percentages of material finer than classified sizes (in millimeters). The size classification used in this report agrees closely with recommendations made by the American Geophysical Union Subcommittee on sediment terminology (Lane and others, 1947). The particle size distributions given in this report are not necessarily representative of the particle sizes of sediment in transport in the natural stream. Most of the organic matter is removed and the sample is subjected to mechanical and chemical dispersion before analysis of the silt and clay.

## COMPOSITION OF SURFACE WATERS

All natural waters contain dissolved 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. Ground water is generally more highly mineralized than surface runoff because it remains in contact with the rocks and soils for much longer periods. Some streams are fed by both surface runoff and ground water from springs or seeps. Such streams reflect the chemical character of their concentrated underground sources during dry periods and are more dilute during periods of heavy rainfall. 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 water use. The results of analyses generally include silica, iron, calcium, magnesium, sodium, potassium (or

sodium and potassium together calculated as sodium), lithium, carbonate, bicarbonate, sulfate, chloride, fluoride, nitrate, boron, pH, dissolved solids, and specific conductance. Aluminum, manganese, color, acidity, dissolved oxygen, and other dissolved constituents and physical properties are reported for certain streams. Phenolic material and minor elements including strontium, chromium, nickel, copper, lead, zinc, cobalt, and other trace elements are determined occasionally for a few streams in connection with specific problems and the results are reported. The source and significance of the different constituents and properties of natural waters are discussed in the following paragraphs. The constituents are arranged in the order that they appear in the tables.

### MINERAL CONSTITUENTS IN SOLUTION

#### Silica ( $\text{SiO}_2$ )

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

#### Aluminum (Al)

Aluminum is usually present only in negligible quantities in natural waters except in areas where the waters have been in contact with the more soluble rocks of high aluminum content such as bauxite and certain shales. Acid waters often contain large amounts of aluminum. It may be troublesome in feed waters where it tends to be deposited as a scale on boiler tubes.

#### Iron (Fe)

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

#### Manganese (Mn)

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

behavior and in its occurrence in natural waters. However, manganese in rocks is less abundant than iron. As a result the concentration of manganese is much less than that of iron and is not regularly determined in many areas. It is especially objectionable in water used in laundry work and in textile processing. Concentrations as low as 0.2 part per million may cause a dark-brown or black stain on fabrics and porcelain fixtures. Appreciable quantities of manganese are often found in waters containing objectionable quantities of iron.

#### Calcium (Ca)

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

#### Magnesium (Mg)

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

#### Strontium (Sr)

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

#### Sodium and potassium (Na and K)

Sodium and potassium are dissolved from practically all rocks. Sodium is the predominant cation in some of the more highly mineralized waters found in the western United States. Natural waters that contain only 3 or 4 parts per million of the two together are likely to carry almost as much potassium as sodium. As the total quantity of these constituents increases, the proportion of sodium becomes much greater. Moderate quantities of sodium and potas-

sium have little effect on the usefulness of the water for most purposes, but waters that carry more than 50 to 100 parts per million of the two may require careful operation of steam boilers to prevent foaming. More highly mineralized waters that contain a large proportion of sodium salts may be unsatisfactory for irrigation.

In this report, sodium and potassium values that are calculated and reported as sodium are indicated by footnote.

#### Lithium (Li)

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

#### Bicarbonate, carbonate and hydroxide ( $\text{HCO}_3$ , $\text{CO}_3$ , OH)

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

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

#### Sulfate ( $\text{SO}_4$ )

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 in water that contains a high content of calcium and magnesium increases the water's corrosiveness.

### 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<sub>3</sub>)

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<sub>3</sub>) 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 by Faucett and Miller (1946), Waring (1949) and by the National Research Council (Maxcy, 1950) concluded that drinking water containing nitrates in excess of 44 parts per million (as NO<sub>3</sub>) should be regarded as unsafe for infant feeding. U.S. Public Health Service (1962) sets 45 ppm as the upper limit.

### Phosphate (PO<sub>4</sub>)

Phosphorus is an essential element in the growth of plants and

animals. Some sources that contribute nitrate, such as organic wastes are also important sources of phosphate. 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 often contain considerable amounts of phosphate.

#### Boron (B)

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

#### Dissolved solids

The reported quantity of dissolved solids--the residue on evaporation--consists mainly of the dissolved mineral constituents in the water. It may also contain some organic matter and water of crystallization. Waters with less than 500 parts per million of dissolved solids are usually satisfactory for domestic and some industrial uses. Water containing several thousand parts per million of dissolved solids are sometimes successfully used for irrigation where practices permit the removal of soluble salts through the application of large volumes of water on well-drained lands, but generally water containing more than about 2,000 ppm is considered to be unsuitable for long-term irrigation under average conditions.

#### Chromium (Cr)

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

#### Nickel and Cobalt (Ni, Co)

Nickel and cobalt are very similar in chemical behavior and also closely related to iron. Both are present in igneous rocks in

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

### Copper (Cu)

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

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

### Lead (Pb)

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

Traces of lead in water usually are the result of solution of lead pipe through which the water has passed. Amounts of lead of the order of 0.05 ppm are significant, as this concentration is the upper limit for drinking water in the standards adopted by the U.S. Public Health Service (1962). Higher concentrations may be added to water through industrial and mine-waste disposal. Lead in the form of sulfate is reported to be soluble in water to the extent of 31 ppm (Seidell, 1940) at 25°C. In natural water this concentration would not be approached, however, since a pH of

less than 4.5 would probably be required to prevent formation of lead hydroxide and carbonate. It is reported (Pleissner, 1907) that at 18°C water free of carbon dioxide will dissolve the equivalent of 1.4 ppm of lead and the solubility is increased nearly four fold by the presence of 2.8 ppm of carbon dioxide in the solution. Presence of other ions may increase the solubility of lead.

#### Zinc (Zn)

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

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

#### Barium (Ba)

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

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

#### Bromide (Br)

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

#### Iodide (I)

Iodide is considerably less abundant both in rocks and water than bromine. Measurable amounts may be found in some streams that receive industrial wastes, and some natural brines may con-

tain rather high concentrations. It occurs in sea water to the extent of less than 1 ppm. Rankama and Sahama (1950) report iodide present in rainwater to the extent of 0.001 to 0.003 ppm and in river water in about the same amount. Few waters will contain over 2.0 ppm.

## PROPERTIES AND CHARACTERISTICS OF WATER

### Hardness

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

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

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

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

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

report hardness of water is classified as follows:

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

Durfor and Becker, 1964, p. 23-27.

### Acidity ( $H^{+1}$ )

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

### Sodium adsorption ratio (SAR)

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

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

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

Waters are divided into four classes with respect to sodium or alkali hazard: low, medium, high, and very high, depending upon the SAR and the specific conductance. At a conductance of 100 micromhos per centimeter the dividing points are at SAR values of 10, 18, and 26, but at 5,000 micromhos the corresponding

dividing points are SAR values of approximately 2.5, 6.5, and 11. Waters range in respect to sodium hazard from those which can be used for irrigation on almost all soils to those which are generally unsatisfactory for irrigation.

Specific conductance (micromhos per centimeter at 25°C)

Specific conductance is a convenient, rapid determination used to estimate the amount of dissolved solids in water. It is a measure of the ability of water to transmit a small electrical current (see p. 9). The more dissolved solids in water that can transmit electricity the greater the specific conductance of the water. Commonly, the amount of dissolved solids (in parts per million) is about 65 percent of the specific conductance (in micromhos). This relation is not constant from stream to stream or from well to well and it may even vary in the same source with changes in the composition of the water (Durfor and Becker, 1964 p. 27-29).

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

Hydrogen-ion concentration (pH)

Hydrogen-ion concentration is expressed in terms of pH units (see p. 9). The values of pH often are used as a measure of the solvent power of water or as an indicator of the chemical behavior certain solutions may have toward rock minerals.

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

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

Color

In water analysis the term "color" refers to the appearance of water that is free from suspended solids. Many turbid waters that appear yellow, red, or brown when viewed in the stream show

very little color after the suspended matter has been removed. The yellow-to-brown color of some waters is usually caused by organic matter extracted from leaves, roots, and other organic substances in the ground. In some areas objectionable color in water results from industrial wastes and sewage. Clear deep water may appear blue as the result of a scattering of sunlight by the water molecules. Water for domestic use and some industrial uses should be free from any perceptible color. A color less than 15 units generally passes unnoticed (U.S. Public Health Service, 1962). Some swamp waters have natural color in excess of 300 units.

The extent to which a water is colored by material in solution is commonly reported as a part of a water analysis because a significant color in water may indicate the presence of organic material that may have some bearing on the dissolved solids content. Color in water is expressed in terms of units between 0 and 500 or more based on the above standard (see p. 9).

#### Oxygen consumed

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

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

#### Dissolved oxygen (DO)

Adequate dissolved oxygen is necessary for the life of fish and other aquatic organisms and is an indicator for corrosivity of water, photosynthetic activity, and septicity. It is one of the most important indicators of the condition of a water supply for biological, chemical and sanitary investigations (Rose, 1965).

#### Biochemical oxygen demand (BOD)

Biochemical oxygen demand is a measure of the oxygen required to oxidize the carbonaceous organic material usable as a source of food by aerobic organisms.

#### Chemical oxygen demand (COD)

Chemical oxygen demand indicates the quantity of oxidizable

compounds present in a water and will vary with water compositions, concentration of reagent, temperature, period of contact, and other factors.

### Organics

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

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

Coliform organisms.--A group of bacteria used as an indicator of the sanitary quality of the water. The number of coliform colonies per 100 milliliters of water is determined by the immediate or delayed incubation membrane filter method. Most probable number (MPN) is also a method of determining a direct count of coliform colonies per 100 milliliters of water.

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

### Temperature

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

Surface water temperatures tend to change seasonally and

daily with air temperatures, except for the outflow of large springs. Superimposed upon the annual temperature cycle is a daily fluctuation of temperature which is greater in warm seasons than in cold and greater in sunny periods than with a cloud cover. Natural warming is due mainly to absorption of a solar radiation by the water and secondarily to transfer of heat from the air. 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 to the stream-bed. 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 result 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 toxic 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.

#### Turbidity

Turbidity is the optical property of a suspension with reference to the extent to which the penetration of light is inhibited by the presence of insoluble material. Turbidity is a function of both

the concentration and particle size of the suspended material. Although it is reported in terms of parts per million of silica, it is only partly synonymous with the weight of sediment per unit volume of water.

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

### Sediment

Fluvial sediment is generally regarded as that sediment which is transported by, suspended in, or deposited by water. Suspended sediment is that part 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 the Geological Survey water-supply paper series, "Surface Water Supply of the United States, 1966-70." 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 obtained at the time samples were collected and computed from a stage-discharge relation or from a discharge measurement.

## PUBLICATIONS

Reports giving records of chemical quality and temperatures of surface waters and suspended-sediment loads of streams in the area covered by this volume for the water years 1941-67, are listed below:

Numbers of water-supply papers containing records for  
Parts 12-16, 1967

Year	WSP	Year	WSP	Year	WSP	Year	WSP
1941	942	1948	1133	1955	1403	1962	1945
1942	950	1949	1163	1956	1453	1963	1951
1943	970	1950	1189	1957	1523	1964	1959
1944	1022	1951	1200	1958	1574	1965	1966
1945	1030	1952	1253	1959	1645	1966	1996
1946	1050	1953	1293	1960	1745	1967	2016
1947	1102	1954	1353	1961	1885	----	----

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

## PROFESSIONAL PAPER

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

## BULLETINS

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

## WATER-SUPPLY PAPERS

- \*108. Quality of water in the Susquehanna River drainage basin, with an introductory chapter on physiographic features, 1904.
- \*161. Quality of water in the upper Ohio River basin and at Erie, Pa., 1906.
- \*193. The quality of surface waters in Minnesota, 1907.
- \*236. The quality of surface waters in the United States, Part 1, Analyses of waters east of the one hundredth meridian, 1909.
- \*237. The quality of the surface waters of California, 1910.
- \*239. The quality of surface waters of Illinois, 1910.
- \*273. Quality of the water supplies of Kansas, with a preliminary report on stream pollution by mine waters in southeastern Kansas, 1911.
- \*274. Some stream waters of the western United States, with chapters on sediment carried by the Rio Grande and the industrial application of water analyses, 1911.
- \*339. Quality of the surface waters of Washington, 1914.
- \*363. Quality of the surface waters of Oregon, 1914.
- \*418. Mineral springs of Alaska, with a chapter on the chemical character of some surface waters of Alaska, 1917.
- \*596-B. Quality of water of Colorado River in 1925-26, 1928.
- \*596-D. Quality of water of Pecos River in Texas, 1928.
- \*596-E. Quality of the surface waters of New Jersey, 1928.
- \*636-A. Quality of water of the Colorado River in 1926-28, 1930.
- \*636-B. Suspended matter in the Colorado River in 1925-28, 1930.
- \*638-D. Quality of water of the Colorado River in 1928-30, 1932.
- \*839. Quality of water of the Rio Grande basin above Fort Quitman, Tex., 1938.
- \*889-E. Chemical character of surface water of Georgia, 1944.
- \*998. Suspended sediment in the Colorado River, 1925-41, 1947.

1048. Discharge and sediment loads in the Boise River drainage basin, Idaho, 1939-40, 1948.
- 1110-C. Quality of water of Conchas Reservoir, New Mexico, 1939-49, 1952.

Many of the reports listed are available for consultation in the larger public and institutional libraries. Copies of Geological Survey publications still in print may be purchased at a nominal cost from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402, who will, upon request, furnish lists giving prices.

## COOPERATION

Many Municipal, State and Federal agencies assisted in collecting records for these quality-of-water investigations. Many of the investigations were supported by funds appropriated directly to the U.S. Geological Survey. The State, local, and Federal agencies that cooperated in these quality-of-water investigations are listed below:

Alaska--Alaska Department of Health and Welfare, J. S. McDonald, commissioner; Greater Anchorage Area Borough, J. M. Asplund, chairman; Greater Juneau Borough Assembly, M. R. Charney, chairman; City of Anchorage, R. E. Sharp, manager; City of Haines, Edward Novak, mayor; Corps of Engineers, U.S. Army; Alaska Power Administration, U.S. Department of the Interior; Forest Service, U.S. Department of Agriculture; Fish and Wildlife Service, U.S. Department of the Interior.

Hawaii--City and county of Honolulu; Corps of Engineers, U.S. Army.

Idaho--Idaho Department of Reclamation, R. K. Higginson, State reclamation engineer; Corps of Engineers, U.S. Army; Forest Service, U.S. Department of Agriculture; U.S. Department of State; Bureau of Commercial Fisheries, U.S. Department of the Interior.

Montana--Montana Fish and Game Commission, A. N. Whitney, chief of Fisheries Division.

Oregon--Oregon Board of Higher Education; Oregon State Game Commission; Counties of Douglas and Lane; Portland General Electric Company; Corps of Engineers, U.S. Army; Bureaus of Fish and Wildlife, and Reclamation, U.S. Department of the Interior; Forest Service, U.S. Department of Agriculture.

Washington--Washington State Department of Water Resources (Department of Conservation prior to July 1, 1967), H. M. Ahlquist, director; Washington State Pollution Control Commission, R. M. Harris, director; Washington State Department of Fisheries, T. C. Tollefson, director; Washington State Department of Game, J. A. Biggs, director; city of Tacoma, Department of Public Utilities, C. A. Erdahl, director; Corps of Engineers, U.S. Army; National Park Service, U.S. Department of the Interior.

Wyoming--Wyoming Department of Agriculture, G. J. Hertzler, commissioner; Wyoming State Engineer, F. A. Bishop; Wyoming Natural Resources Board, M. W. Goodson, chief water development, Bureaus of Land Management, and Reclamation, U.S. Department of the Interior.

## DIVISION OF WORK

The quality-of-water work was performed by the Water Resources Division of the Geological Survey, E. L. Hendricks, chief hydrologist, and under the direction of the district chiefs listed in the preface.

Correspondence regarding the records in this report or any additional information should be directed to the district chief of the appropriate Geological Survey-Water Resources Division office indicated in the following table.

State	District Office	Address
Alaska	Anchorage 99501	218 "E" St. Skyline Bldg.
Hawaii	Honolulu 96814	Room 337 First Insurance Bldg. 1100 Ward Ave.
Idaho	Boise 83702	Room 365, Federal Bldg. 550 West Fort St.
Montana	Helena 59601	P. O. Box 1696 421 Federal Bldg.
Oregon	Portland 97208	P. O. Box 3202 830 N. E. Holladay

State	District Office	Address
Washington	Tacoma 98402	Room 300 1305 Tacoma Ave. South
Wyoming	Cheyenne 82001	P. O. Box 2087 2nd Floor, Blue Cross Bldg. 215 East Eighth Ave.

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WATER-QUALITY STATIONS IN DOWNSTREAM ORDER  
 PART 12. PACIFIC SLOPE BASINS IN WASHINGTON AND UPPER COLUMBIA RIVER BASIN  
 NASELLE RIVER BASIN

12-0100. NASELLE RIVER NEAR NASELLE, WASH.  
 LOCATION --Lat 46°22'25", long 123°44'30", at gaging station 2.5 miles upstream from Salmon Creek and 3.5 miles east of Naselle, Pacific County.  
 DRAINAGE AREA --54.8 square miles.  
 RECORDS AVAILABLE --Chemical analyses: October 1965 to September 1967.  
 Water temperatures: August 1963 to September 1967.  
 EXTREMES, 1966-67. --Water temperatures: Maximum, 73°F Aug. 15, 17; minimum, 40°F Mar. 10.  
 EXTREMES, 1963-67. --Water temperatures: Maximum, 73°F July 30, 1965, Aug. 15, 17, 1967; minimum, 37°F Dec. 23, 1965.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Fe)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> ) (B)	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos/cm at 25°C)	pH	Color
													Parts per million	Tons per acre-foot	Tons per day	Calcium, Magnesium	Non-carbonate			
Oct. 27, 1966	266	11	4.5	1.2	4.5	0.3	20	0	2.0	4.5	0.1	1.4	A 39	0.05	28.0	16	0	57	7.1	10
Nov. 22, 1966	422	12	4.0	1.7	4.4	0.3	20	0	4.0	4.0	1.1	1.5	44	.06	50.1	17	0	55	7.2	5
Dec. 30, 1966	565	11	4.5	1.6	4.3	.2	18	0	3.0	4.0	1.1	1.4	37	.05	56.4	14	0	50	7.3	5
Jan. 26, 1967	1210	11	3.7	1.1	3.6	.4	16	0	3.0	4.0	1.1	1.0	39	.05	127	14	0	45	7.1	10
Feb. 26, 1967	325	13	4.2	1.5	4.1	.4	18	0	3.6	4.0	1.1	1.8	41	.06	36.0	16	2	54	7.2	5
Mar. 31, 1967	505	11	4.0	.9	3.9	.3	18	0	2.8	4.0	1.0	1.1	A 37	.05	50.4	14	0	48	7.2	0
Apr. 27, 1967	242	10	4.0	1.0	4.1	1.1	18	0	3.0	3.5	0	.6	42	.06	27.4	14	0	49	7.6	5
May 16, 1967	124	9	4.1	1.2	4.0	.8	20	0	3.4	4.5	1	.5	A 38	.05	12.7	15	0	55	7.4	5
June 18, 1967	154	11	4.5	1.7	4.8	.8	20	0	3.4	3.8	1.0	.5	44	.06	6.42	14	0	59	7.4	5
July 17, 1967	35	12	4.5	1.5	5.0	.4	25	0	3.6	4.2	1.1	1.1	44	.06	4.15	17	0	58	7.5	5
Aug. 24, 1967	21	12	5.0	1.2	5.7	.5	28	0	2.0	4.2	1.1	1.0	44	.06	2.49	18	0	65	7.6	5
Sept. 22, 1967	23	12	5.0	1.4	5.5	1.0	27	0	4.0	4.0	1.0	1.1	46	.06	2.86	19	0	65	7.3	5

A Calculated from determined constituents.

Additional determinations

Date of collection	Dissolved oxygen (DO)	MPN (coliform colonies per 100 ml)	Hexavalent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)	Date of collection	Dissolved oxygen (DO)	MPN (coliform colonies per 100 ml)	Hexavalent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)
Oct. 27, 1966.	11.3	230	---	---	---	---	Apr. 27, 1967.	13.2	230	---	---	---	---
Nov. 22, 1966.	12.0	150	---	---	---	---	May 16, 1967.	13.7	91	---	---	---	---
Dec. 30, 1966.	---	---	---	---	---	---	June 18, 1967.	9.6	36	---	---	---	---
Jan. 26, 1967.	---	---	---	---	---	---	July 17, 1967.	10.0	36	---	---	---	---
Feb. 26, 1967.	12.7	230	0.00	0.01	0.00	0.00	Aug. 24, 1967.	9.6	36	0.00	0.00	0.00	0.00
Mar. 31, 1967.	14.0	0	---	---	---	---	Sept. 22, 1967.	10.7	36	---	---	---	---

Temperature (°F) of water, water year October 1986 to September 1987

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



12-0135. WILLAPA RIVER NEAR WILLAPA, WASH.  
 LOCATION.--Lat 46°39'00", long 123°38'50", at county road bridge, 200 feet downstream from gage and 2.5 miles southeast of Willapa, Pacific County.  
 DRAINAGE AREA.--130 square miles.  
 RECORDS AVAILABLE.--Chemical analyses: October 1965 to September 1967.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	Color or pH		
														Parts per million	Tons per acre-foot	Calcium magnesium	Non-carbonate			Parts per million	Tons per day
Oct. 27, 1966	227	12		4.5	1.7	5.4	0.5	23	0	4.8	5.0	0.2	1.0	50	0.07	30.6	18	0	65	7.1	10
Nov. 22	462	13		4.0	1.7	5.3	0.6	20	0	5.2	4.5	0.0	1.9	47	0.06	58.6	17	1	62	7.0	10
Dec. 30, 1967	1940	12		3.0	1.0	4.7	0.5	17	0	4.0	4.0	0.1	1.5	43	0.06	96.4	14	0	55	7.0	5
Jan. 26	526	13		3.4	1.6	4.7	0.5	18	0	3.4	5.0	0.0	1.8	38	0.03	199	14	2	48	6.8	10
Feb. 26	874	13		3.6	1.2	4.5	0.4	17	0	3.6	4.5	0.1	1.6	41	0.06	98.1	14	2	57	7.0	5
Mar. 31	874	13		3.6	1.2	4.5	0.4	17	0	3.6	4.5	0.1	1.6	41	0.06	98.1	14	2	57	7.0	5
Apr. 27	403	12		3.8	1.6	5.0	0.5	18	0	4.0	4.5	0.1	3.2	44	0.06	47.9	16	1	56	7.2	5
May 16	180	11		4.5	1.1	5.3	0.9	23	0	4.0	4.2	0.0	0.5	45	0.06	21.9	16	0	59	7.5	5
June 18	68	12		5.0	1.5	5.8	0.9	26	0	4.2	4.2	0.1	0.5	50	0.07	9.18	19	0	67	6.9	5
July 13	16	13		6.0	1.7	6.2	1.0	30	0	4.4	4.0	0.0	0.2	52	0.07	5.62	20	0	69	7.3	5
Aug. 24	16	13		6.0	1.7	6.2	1.0	30	0	4.4	4.0	0.0	0.2	52	0.07	5.62	20	0	69	7.3	5
Sept. 22	22	13		6.0	1.9	7.0	1.4	34	0	4.6	4.8	0.1	0.1	58	0.08	3.43	23	0	82	7.0	5
Sept. 22	22	13		6.0	1.9	7.0	1.4	34	0	4.6	4.8	0.1	0.1	58	0.08	3.43	23	0	79	7.2	10

A Calculated from determined constituents.

Additional determinations

Date of collection	Dis-solved oxygen (DO)	MPN (coliform colonies per 100 ml)	Hexa-valent chromi-um (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)	Date of collection		Dis-solved oxygen (DO)	MPN (coliform colonies per 100 ml)	Hexa-valent chromi-um (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)
Oct. 27, 1966	10.5	930					Apr. 27, 1967	13.2	--	--				
Nov. 22	11.5	300					May 16	12.9	390					
Dec. 30	--	--	0.01	0.00	0.00	0.00	June 19	9.3	230					
Jan. 26, 1967	--	430					July 19	8.7	750					
Jan. 26	12.2	150					Aug. 24	8.7	430					
Mar. 31	12.1	150					Sept. 22	9.2	430					





## CHEHALIS RIVER BASIN--Continued

## 12-0310. CHEHALIS RIVER AT PORTER, WASH.

LOCATION--Lat 46°56'20", long 123°18'45", at gaging station at County Highway bridge at mouth of Porter Creek, 700 feet west of Porter, Grays Harbor County.

RECORDS AVAILABLE--1924 to present.

Water temperatures: July 1959 to September 1967.

Sediment records: October 1961 to September 1967.

EXTREMES, 1966-67.--Water temperatures: Maximum, 75°F July 1, 2; minimum, 40°F Dec. 21, 23.

Sediment concentrations: Maximum daily, 452 ppm Jan. 10; minimum daily, 1 ton on many days during October, July, and August.

EXTREMES, 1959-60.--Water temperatures: Maximum, 78°F July 27, 1962; July 23, 1963; minimum, 33°F Dec. 16, 1964.

Sediment concentrations: Maximum daily, 452 ppm Jan. 10, 1967; minimum daily, less than 0.50 ton on many days of most years.

Sediment loads (1961-67).--Maximum daily, 452 tons Jan. 10, 1967; minimum daily, less than 0.50 ton on many days of most years.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> ) (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH or		
														Parts per million	Tons per acre-foot	Tons per day	Calcium, Magnesium			Non-carbonate	
Oct. 28, 1966...	1380	15		6.0	2.2	4.8	0.7	29	0	4.0	4.5	0.1	1.3	56	0.08	209	24	0	74	7.1	
Nov. 22, .....	2600	15		5.5	1.8	4.4	.9	26	0	3.8	4.2	.2	1.2	64	.09	449	21	0	65	7.0	
Dec. 31, .....	6080	16		5.5	1.3	4.2	.5	24	0	2.6	3.5	.1	1.5	54	.07	886	19	0	59	7.2	
Jan. 27, 1967..	12900	15		5.6	1.9	4.9	.4	20	0	3.2	4.0	.0	1.2	43	.09	1520	18	2	53	7.0	
Feb. 27, .....	6060	15		4.8	1.6	3.8	.6	24	0	3.8	3.5	.0	.8	45	.06	732	18	0	58	7.2	
Mar. 31, .....																					
Apr. 27, .....	3170	14		5.5	1.8	4.5	.8	29	0	3.0	4.0	.0	.6	48	.07	411	21	0	64	7.2	
May 17, .....	1390	15		6.7	2.3	5.2	.8	36	0	3.6	4.0	.0	.6	60	.08	225	26	0	80	7.1	
June 18, .....	600	17		7.0	3.0	5.7	.4	42	0	3.0	4.5	.1	.1	64	.09	104	30	0	86	7.5	
July 17, .....	386	16		8.0	3.0	6.6	.4	45	0	3.0	6.0	.1	.1	71	.10	74.0	33	0	87	7.6	
Aug. 28, .....	187	16		8.0	2.6	6.9	1.4	44	0	3.6	6.8	.1	.1	70	.10	35.3	31	0	101	7.5	
Sept. 22, .....	212	20		8.6	3.4	8.3	1.8	49	0	3.4	6.0	.1	.2	78	.11	44.6	36	0	114	7.4	

A Calculated from determined constituents.

## Additional determinations

Date of collection	Dis-solved oxygen (DO)	MPN (coliform colonies per 100 ml)	Hexa-valent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)	Date of collection	Dis-solved oxygen (DO)	MPN (coliform colonies per 100 ml)	Hexa-valent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)
Oct. 28, 1966.	10.6	11000					Apr. 27, 1967.	11.3	--				
Nov. 22.....	10.5	1500					May 17.....	12.1	430				
Dec. 31.....	--	--					June 18.....	9.1	430				
Jan. 27, 1967.	--	--					July 14.....	1.0	10	0.00	0.01	0.00	
Feb. 27.....	11.2	750	0.00	0.00	0.01		Aug. 24.....	9.1	0				
Mar. 31.....	11.7	91					Sept. 22.....	9.9	--				

CHEHALIS RIVER BASIN--Continued  
 12-0310. CHEHALIS RIVER AT PORTER, WASH.--Continued  
 Temperature (°F) of water, water year October 1966 to September 1967

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.....	59	63	56	63	60	59	59	61	55	58	56	54	49	54	55	49	48	54	51	50	48	51	52	54	50	49	51	52	51	54	52	54	
November.....	58	57	54	57	54	52	51	49	48	46	46	47	48	47	48	48	48	49	48	48	48	48	48	48	48	48	48	48	48	48	48	48	
December.....	50	48	47	45	43	44	42	42	42	46	46	47	48	47	48	47	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	
January.....	45	44	45	42	42	42	43	44	44	44	42	44	46	47	47	43	45	44	42	42	42	42	42	42	42	42	42	42	42	42	42	42	
February.....	44	46	46	44	46	44	42	42	41	45	46	45	43	42	43	43	44	45	44	44	44	44	44	44	44	44	44	44	44	44	44	44	
March.....	43	46	43	42	42	44	42	45	44	43	43	42	43	42	43	46	46	45	47	46	48	47	46	46	46	46	46	46	46	46	46	46	
April.....	47	49	46	47	48	51	49	49	49	50	53	49	48	49	48	49	46	47	46	48	48	50	50	52	51	50	50	49	50	51	51	51	
May.....	50	52	52	55	55	55	55	54	54	55	55	54	53	54	52	53	51	64	60	48	51	60	60	56	58	64	60	59	57	60	60	60	
June.....	65	62	61	63	63	63	63	61	64	62	64	64	65	63	71	68	73	62	72	62	60	62	68	69	69	65	65	64	70	69	69	69	
July.....	75	70	72	70	66	70	69	62	69	72	67	72	70	73	66	65	62	61	65	70	68	62	62	68	65	68	65	68	66	69	67	68	67
August.....	65	71	70	71	67	67	66	71	69	72	67	72	71	71	72	73	70	74	70	74	70	73	70	70	70	70	70	70	70	70	70	70	70
September.....	71	68	72	69	69	68	69	63	60	60	61	59	66	62	69	63	70	69	69	66	71	65	68	60	69	69	66	65	64	60	60	60	60

CHEHALIS RIVER BASIN--Continued

12-0310. CHEHALIS RIVER AT PORTER, WASH.--Continued

Suspended sediment, water year October 1966 to September 1967

Day	OCTOBER			NOVEMBER			DECEMBER		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	295	C 1	1	990	C 5	13	10000	108	2920
2..	286	C 1	1	895	C 5	12	12000	83	2690
3..	276	C 1	1	826	C 3	7	14000	68	2570
4..	274	C 1	1	758	C 3	6	15000	54	2190
5..	274	C 1	1	731	C 3	6	15000	75	3040
6..	265	C 1	1	713	C 3	6	17700	61	2920
7..	265	C 1	1	780	C 3	6	17100	33	1520
8..	264	C 1	1	744	C 3	6	15500	24	1000
9..	266	C 1	1	718	C 3	6	13000	20	702
10..	293	C 2	2	754	C 3	6	10800	18	525
11..	304	C 2	2	772	C 3	6	11200	28	847
12..	304	C 2	2	905	C 3	7	13000	35	1230
13..	312	C 2	2	1780	14	67	21100	78	4160
14..	345	C 2	2	4540	30	368	26300	28	1990
15..	394	C 2	2	8080	70	1530	34000	26	2390
16..	352	C 2	2	7700	32	665	29300	46	3640
17..	330	C 2	2	5920	16	256	20200	44	2400
18..	310	C 2	2	4530	14	111	13800	33	1230
19..	337	C 2	2	3650	8	79	10700	28	809
20..	634	7	12	3190	7	60	10100	37	1010
21..	1630	58	272	2850	7	54	9880	110	2930
22..	3090	54	451	2600	7	49	8380	60	1360
23..	5080	62	850	2370	8	51	7130	56	1080
24..	3820	29	299	2120	5	29	6930	47	879
25..	2590	12	84	2200	8	48	7730	39	814
26..	1890	6	31	2740	12	89	8260	38	847
27..	1500	C 5	20	3140	6	51	7460	26	524
28..	1380	C 5	19	3190	6	52	6500	24	421
29..	1210	C 5	16	3140	7	59	6190	25	418
30..	1110	C 5	15	4460	55	770	6670	46	804
31..	1090	C 5	15	---	---	---	6080	43	1360
Total	30770	--	2113	77786	--	4535	410810	--	51220
	JANUARY			FEBRUARY			MARCH		
1..	6760	102	1860	19000	40	2050	4660	C 10	126
2..	8620	75	1750	14300	32	1240	4910	C 10	133
3..	8890	68	1630	11800	27	860	4610	C 10	124
4..	11500	71	2200	10200	23	633	4210	C 10	114
5..	15400	75	3120	8890	C 22	528	3870	C 6	63
6..	17000	18	826	7780	C 22	462	3580	C 6	58
7..	15400	11	457	6850	C 22	407	3340	C 6	54
8..	13200	48	1710	6120	C 22	364	3200	C 6	52
9..	11100	30	899	5550	20	300	3390	C 6	55
10..	9250	452	11300	5110	19	262	4140	17	190
11..	8970	434	10500	4820	17	221	4270	18	208
12..	10300	65	1810	4900	15	198	4020	22	239
13..	11500	30	932	7140	85	1860	3730	70	705
14..	13500	35	1280	12000	138	4470	3610	100	975
15..	13400	13	470	12400	45	1510	4120	95	1060
16..	12400	16	536	11800	47	1500	6740	81	1470
17..	11500	72	2240	11300	30	915	8410	74	1680
18..	9880	85	2270	11600	42	1320	8470	54	1230
19..	11100	28	839	11700	48	1520	8040	40	868
20..	18000	13	632	9730	35	919	7110	17	326
21..	25300	32	2190	8030	18	390	6720	16	290
22..	28300	26	1990	6860	17	315	6990	12	226
23..	24200	25	1630	6010	15	243	11200	7	212
24..	17400	32	1500	5390	12	175	14800	43	1720
25..	13200	28	998	4920	C 10	133	14800	50	2000
26..	11200	22	665	4530	C 10	122	12800	20	691
27..	12500	37	1250	4140	C 10	112	10300	9	250
28..	17100	87	4020	4120	C 10	111	8270	12	268
29..	23000	75	4660	---	---	---	7060	10	191
30..	25400	41	2810	---	---	---	6330	4	68
31..	23800	42	2700	---	---	---	6060	4	65
Total	459070	--	71674	236990	--	23140	203760	--	15711

S Computed by subdividing day.  
C Composite period.

## CHEHALIS RIVER BASIN--Continued

12-0310. CHEHALIS RIVER AT PORTER, WASH.--Continued

Suspended sediment, water year October 1966 to September 1967--Continued

Day	APRIL			MAY			JUNE		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	5630	12	182	2550	C 4	28	1070	C 6	17
2..	5090	C 7	96	2370	C 5	32	990	C 6	16
3..	4650	C 7	88	2260	C 5	31	955	C 6	15
4..	4320	C 7	82	2170	C 5	29	935	C 6	15
5..	4180	C 7	79	2070	C 5	28	885	C 3	7
6..	3960	C 7	75	1980	C 5	27	830	C 3	7
7..	3580	C 7	68	1900	C 5	26	793	C 3	6
8..	3310	C 7	63	1830	C 5	25	775	C 3	6
9..	3190	C 7	60	1800	C 5	24	753	C 3	6
10..	3180	C 7	60	1760	C 4	19	735	C 3	6
11..	3000	C 7	57	1710	C 4	18	721	C 3	6
12..	2810	C 7	53	1670	C 4	18	721	C 3	6
13..	3010	C 7	57	1600	C 4	17	721	C 3	6
14..	3930	C 7	74	1530	C 4	17	712	C 3	6
15..	3780	C 7	71	1480	C 6	24	679	C 3	5
16..	3520	C 7	67	1430	C 6	23	649	C 3	5
17..	3730	C 7	70	1390	C 6	23	620	C 3	5
18..	4330	8	94	1370	C 6	22	600	C 3	5
19..	6270	23	389	1320	C 6	21	580	C 3	5
20..	6280	20	339	1260	C 6	20	572	C 3	5
21..	5380	8	116	1210	C 6	20	608	C 3	5
22..	4700	6	76	1180	C 6	19	840	C 3	7
23..	4180	C 4	45	1140	C 6	18	1720	10	46
24..	3750	C 4	40	1100	C 6	18	1410	C 5	19
25..	3380	C 4	36	1060	C 6	17	1010	C 3	8
26..	3260	C 4	35	1010	C 6	16	825	C 3	7
27..	3170	C 4	34	970	C 6	16	730	C 3	6
28..	2960	C 4	32	955	C 6	15	676	C 3	5
29..	2800	C 4	30	975	C 6	16	628	C 3	5
30..	2710	C 4	29	1030	C 6	17	592	C 3	5
31..	--	--	--	1140	C 6	18	--	--	--
Total	118040	--	2597	47220	--	662	24335	--	268
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..	560	C 1	2	295	C 1	1	189	C 4	2
2..	536	C 1	1	287	C 1	1	196	C 4	2
3..	516	C 1	1	279	C 4	3	206	C 4	2
4..	496	C 1	1	269	C 4	3	209	C 4	2
5..	484	C 1	1	261	C 4	3	215	C 4	2
6..	470	C 1	1	259	C 4	3	222	C 4	2
7..	466	C 1	1	258	C 4	3	216	C 4	2
8..	463	C 1	1	259	C 4	3	208	C 4	2
9..	459	C 1	1	263	C 4	3	215	C 4	2
10..	452	C 1	1	264	C 4	3	231	C 4	2
11..	449	C 1	1	251	C 4	3	278	C 4	3
12..	435	C 1	1	239	C 4	3	273	C 7	5
13..	417	C 1	1	229	C 4	2	339	C 7	6
14..	410	C 1	1	222	C 4	2	331	C 7	6
15..	400	C 1	1	214	C 4	2	283	C 7	5
16..	393	C 1	1	207	C 2	1	252	C 7	5
17..	386	C 1	1	200	C 2	1	237	C 7	4
18..	379	C 1	1	197	C 2	1	228	C 7	4
19..	382	C 1	1	196	C 2	1	224	C 7	4
20..	400	C 1	1	192	C 2	1	221	C 3	2
21..	389	C 1	1	193	C 2	1	218	C 3	2
22..	386	C 1	1	191	C 2	1	212	C 3	2
23..	379	C 1	1	189	C 2	1	207	C 3	2
24..	358	C 1	1	187	C 2	1	204	C 3	2
25..	337	C 1	1	188	C 2	1	203	C 3	2
26..	328	C 1	1	188	C 2	1	202	C 3	2
27..	322	C 1	1	187	C 2	1	199	C 3	2
28..	313	C 1	1	186	C 2	1	197	C 3	2
29..	313	C 1	1	187	C 2	1	207	C 3	2
30..	307	C 1	1	187	C 2	1	225	C 3	2
31..	301	C 1	1	186	C 2	1	--	--	--
Total	12686	--	32	6910	--	54	6847	--	84
Total discharge for year (cfs-days).....									1635224
Total load for year (tons).....									172090

C Composite period.

CHEHALIS RIVER BASIN--Continued  
12-0350. SATSOP RIVER NEAR SATSOP, WASH.

LOCATION. --Lat 47°00'05", long 123°29'35", at gaging station at bridge on U.S. Highway 410, 0.8 mile west of Satsop, Grays Harbor County.  
RECORDS AVAILABLE. --Chemical analyses: October 1966 to September 1967.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F) (NO <sub>3</sub> ) (B)	Dissolved solids (residue at 180° C)			Hardness as CaCO <sub>3</sub>	Specific conductance (micro-mhos at 25° C)	pH	Color		
													Parts per million	Tons per acre-foot	Tons per day					Calcium, Magnesium	Non-carbonate
Oct. 28, 1966..	974	13		6.0	1.7	3.8	0.3	28	0	4.8	2.3	0.0	0.8	47	0.06	124	22	0	64	7.1	5
Nov. 22.....	1900	12		5.0	1.6	3.2	.6	25	0	3.6	2.2	.2	.8	41	.06	210	19	0	56	7.3	10
Dec. 31.....	3310	13		6.0	.5	3.2	.3	23	0	2.2	2.0	.1	.6	38	.05	340	17	0	50	7.5	10
Jan. 27, 1967..	6680	13		4.2	1.4	2.8	.6	20	0	2.2	2.0	.1	.8	37	.05	667	16	0	45	7.0	5
Feb. 27.....	5350	14		5.7	2.1	3.0	.4	26	0	2.4	2.0	.0	.5	43	.06	578	22	1	56	7.4	5
Mar. 31.....	2360	14		4.7	1.6	3.4	.5	24	0	2.0	2.0	.0	.5	43	.06	274	19	0	51	7.1	5
Apr. 27.....	1250	13		5.0	1.7	3.2	.5	28	0	2.0	2.0	.0	.5	43	.06	145	20	0	54	7.5	5
May 15.....	442	14		3.8	2.0	3.4	.5	31	0	2.4	2.5	.1	.2	47	.06	99.2	22	0	63	7.3	0
June 18.....	101	14		6.1	1.4	3.2	.3	23	0	2.4	2.2	.1	.3	58	.07	45.3	23	0	75	7.6	5
July 17.....	311	15		7.0	2.1	3.6	.9	36	0	2.4	2.2	.1	.1	53	.07	30.8	26	0	71	7.4	5
Aug. 24.....	215	16		6.5	2.3	4.1	.7	36	0	2.8	2.2	.1	.1	53	.07	30.8	26	0	71	7.4	5
Sept. 22.....	262	15		6.5	2.3	4.1	.6	36	0	3.4	2.0	.0	.1	55	.07	38.9	26	0	73	7.4	5

Additional determinations

Date of collection	Dis-solved oxygen (DO)	MPN (coliform com-plex per 100 ml)	Hexa-valent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)	Date of collection	Dis-solved oxygen (DO)	MPN (coliform colonies per 100 ml)	Hexa-valent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)
Oct. 28, 1966..	10.8	36					Apr. 27, 1967..	12.9	--				
Nov. 22.....	11.5	100					May 17.....	11.5	2400				
Dec. 31.....	--	--					June 18.....	10.3	530				
Jan. 27, 1967..	--	--					July 17.....	9.9	91				
Feb. 27.....	--	--		0.01	0.00		Aug. 24.....	9.6	11				
Mar. 31.....	11.8	36					Sept. 22.....	11.4	36	0.00	0.00	0.00	0.00

CHEHALIS RIVER BASIN--Continued  
12-0368. WYNOCHEE RIVER NEAR MONTESANO, WASH.

LOCATION.--Lat 47°04'45", Long 123°41'55", at county road bridge 8.5 miles northwest of Montesano, Grays Harbor County, and 9 miles northeast of Aberdeen.  
RECORDS AVAILABLE.--Chemical analyses: October 1966 to September 1967.  
REMARKS.--No discharge records available.

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> ) (B)	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Non-carbonate			
Oct. 28, 1966..		9.2		8.0	1.2	2.6	0.2	30	0	3.0	2.0	0.0	0.7	44	0.06	25	0	62	7.1	5	
Nov. 22.....		10.3		6.0	1.7	2.4	.5	24	0	2.5	2.5	.1	.9	37	.05	19	0	53	7.3	10	
Dec. 31.....		10.0		5.1	1.4	2.2	.4	20	0	2.0	2.0	.1	.6	A 33	.04	18	2	45	7.1	5	
Jan. 27, 1967..		9.0		6.3	1.9	2.2	.3	28	0	2.0	3.0	.0	.3	A 41	.06	24	0	56	7.4	5	
Feb. 27.....		11		5.8	1.4	2.4	.5	25	0	1.8	2.0	.0	.5	36	.05	20	0	52	7.5	5	
Mar. 31.....																					
Apr. 27.....		9.5		6.0	1.6	2.4	.4	29	0	2.2	2.0	.0	.6	39	.05	22	0	55	7.5	0	
May 17.....		8.5		7.1	1.6	2.3	.4	30	0	2.4	2.0	.1	.1	A 40	.05	24	0	61	7.7	0	
June 15.....		11.2		8.0	1.6	2.7	.3	36	0	2.2	1.8	.0	.3	50	.07	28	0	66	7.6	5	
July 19.....		11		7.5	1.9	2.7	.8	35	0	2.2	3.0	.1	.5	52	.07	26	0	72	7.1	5	
Aug. 24.....		14		7.5	1.7	4.0	.8	36	0	2.2	3.0	.1	.5	52	.07	26	0	72	7.1	5	
Sept. 22.....		13		6.9	2.3	4.1	1.4	37	0	2.6	3.2	.1	.2	53	.07	27	0	76	6.8	20	

A Calculated from determined constituents.

Additional determinations

Date of collection	MPN (coliform copper per 100 ml)	Hexavalent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)	Additional determinations		
						Dis-solved oxygen (DO)	Hexavalent chromium (Cr <sup>6+</sup> )	Arsenic (As)
Oct. 28, 1966..	10.9	36				13.8		
Nov. 22.....	310					11.3		
Dec. 31.....	--	--				9.7		
Jan. 27, 1967..	36	36				230	0.00	0.00
Feb. 27.....	36	36				230		
Mar. 31.....	11.7	36				6.9		

12-0381. WISHKAH RIVER NEAR WISHKAH, WASH.

LOCATION.--Lat 47°04'20", long 123°46'10", at Wishkah Road bridge, 500 feet upstream from East Fork, 2.3 miles downstream from Hamilton Canyon, and 3.2 miles south of Wishkah, Grays Harbor County.

RECORDS AVAILABLE.--Chemical analyses: October 1962 to September 1967.

REMARKS.--NO discharge records available.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Fe)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> ) (B)	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>		Specific conductance (microhm-cm at 25°C)	Color or pH
														Parts per million	Tons per acre-foot	Tons per day	Calcium-Magnesium	Non-carbonate		
Oct. 27, 1966..		12	5.0	2.1	4.0	0.3	26	0	3.4	3.5	0.1	1.2	--	48	0.07	21	0	63	7.0	10
Nov. 22.....		12	5.5	1.6	3.4	0.4	25	0	2.8	3.5	1.1	1.1	--	50	.07	20	0	57	7.2	10
Dec. 31.....		12	4.0	1.6	3.2	0.3	21	0	2.0	3.0	1.1	0.9	--	38	.05	17	0	48	7.1	5
Jan. 27, 1967..		11	3.6	1.5	3.6	0.4	18	0	2.0	3.5	0.0	0.7	--	35	.05	15	0	42	7.3	5
Feb. 20.....		16	5.0	2.1	3.2	0.6	24	0	2.2	4.0	0.0	0.02	0.02	48	.07	21	2	54	7.3	0
Mar. 31.....		13	4.1	1.8	3.2	0.1	22	0	1.6	3.5	1.1	0.5	--	43	.06	18	0	51	7.1	5
Apr. 27.....		13	5.0	1.8	3.3	0.5	28	0	1.0	3.0	0.0	0.4	--	45	.06	20	0	56	7.4	5
May 17.....		13	5.7	2.4	3.8	0.4	33	0	1.6	3.0	1.1	0.2	--	48	.07	24	0	66	7.0	5
July 17.....		17	7.5	3.4	4.5	0.4	44	0	2.0	3.8	1.1	0.1	--	67	.09	33	0	84	7.5	5
Aug. 24.....		18	8.0	3.0	5.2	0.4	46	0	2.0	3.8	1.1	0.1	0.00	67	.09	33	0	89	7.5	5
Sept. 22.....		17	7.8	3.4	4.8	0.5	45	0	2.4	4.2	0.0	0.1	--	62	.08	34	0	89	7.4	5

Additional determinations

Date of collection	MPN (coliform colonies per 100 ml)	Hexavalent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)	Date of collection	Dissolved oxygen (DO)	MPN (coliform colonies per 100 ml)	Hexavalent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)
Oct. 27, 1966..	10.7	0				Apr. 27, 1967.	13.6	--				
Nov. 22.....	11.4	200				Apr. 17.....	10.4	430				
Dec. 31.....	--	--				July 17.....	9.6	230				
Feb. 26, 1967.	12.0	36	0.00	0.01		Aug. 24.....	9.4	91	0.00	0.00	0.00	
Mar. 31.....	11.8	36				Sept. 22.....	10.1					

QUINAULT RIVER BASIN

12-0393. NORTH FORK QUINAULT RIVER NEAR AMANDA PARK, WASH.

LOCATION.---Lat 47°35'45", long 123°37'25", temperature recorder at gaging station 5.2 miles upstream from mouth and 18 miles northeast of Amanda Park, Jefferson County, Washington.

DRAINAGE AREA.---74.1 square miles.

RECORDS AVAILABLE.---Water temperatures: March 1965 to September 1967.

EXTREMES, 1966-67.---Water temperatures: Maximum, 56°F on several days during August and September; minimum, 36°F Jan. 23, 27, 28.

EXTREMES, 1965-67.---Water temperatures: Maximum, 58°F Aug. 7, 16-18, 1965; minimum, 35°F Jan. 1, 2, 5, 6, 1966.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>	Sodium sulfate ratio	Specific conductance (microhmhos at 25°C)	Color	pH
															Parts per million	Tons per acre-foot					
Mar. 15, 1967	352	6.0	13	1.3	1.7	0.2	36	0	9.8	0.5	0.1	0.1	0.1		51	0.07	38	9	86	7.5	0
Sept. 13, 1967	191	4.6	14	1.0	1.6	1.0	40	0	11	.2	.0	.1	.1		56	.08	39	6	88	7.7	5









12-0615. SKOMISH RIVER NEAR POTLATCH, WASH.

LOCATION (revised).--Lat 47°19'00" N, Long 123°11'05" W, temperature recorder 0.6 mile upstream from gaging station, 2.8 miles downstream from confluence of North Fork Skomish River, 4.7 miles southwest of Potlatch, Mason County, and 5.5 miles upstream from mouth.

RECORDS AVAILABLE.--Chemical analyses: August 1960 to September 1961.

Water temperatures: May 1965 to September 1962, October 1962, 41°F Jan. 4, 5, Feb. 15.

EXTREMES, 1966-67.--Water temperatures: Maximum, 58°F July 2, 3; minimum, 41°F Jan. 4, 5, Feb. 15.

EXTREMES, 1955-62, 1963-67.--Water temperatures: Maximum, 69°F July 13, 1961; minimum, (1955-62, 1964-67), 35°F Jan. 1, 2, 1965.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Fe)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>	Sodium-sulfate ratio	Specific conductance (micro-mhos at 25°C)			
															Parts per million	Tons per acre-foot	Tons per day						
May 18, 1967..	960	12		7.3	1.7	1.7	0.1	32	0	1.4	1.0	0.0	0.1	0.0	0	43	0.06	111	25	0	80	7.5	0

Analyses, in parts per million, of trace elements

Date of collection	Time (24 hr)	Chromium		Copper (Cu)	Zinc (Zn)	Arsenic (As)	Boron (B)
		Hexavalent (Cr <sup>6+</sup> )	Total (Cr)				
May 18, 1967....		0.00	0.00	0.00	0.00		



CHICO CREEK BASIN

12-0720. CHICO CREEK NEAR BREMERTON, WASH.

LOCATION.--Lat 47°35'25", long 122°42'30", at gaging station at State Highway 3, 0.5 mile downstream from Dickerson Creek, and 2.5 miles northwest of Bremerton, Clallam County, Wash. Drainage area, 15.3 square miles.

RECORDS AVAILABLE.--Chemical analyses: November 1964 to September 1967.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean Silica discharge (SiO <sub>2</sub> ) (cfe)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>	Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	Color or pH	
														Parts per million	Tons per acre-foot	Tons per day					
Nov. 17, 1966...	26	13	8.0	3.4	2.9	0.6	39	0	3.4	2.8	0.1	2.6	0	55	0.07	3.86	34	2	79	7.5	15
Dec. 12, 1966...	344	9.2	5.0	1.5	2.1	.3	21	0	3.2	1.5	.1	1.3	0	42	.06	39.0	19	2	48	6.8	20
Feb. 21, 1967...	45	10	5.0	2.7	2.5	.2	31	0	2.6	1.5	.1	1.7	0	46	.06	5.59	24	0	60	7.5	20
Mar. 24, 1967...	223	8.4	4.5	1.6	1.9	.2	21	0	2.2	1.5	.0	.8	0	35	.05	21.1	18	1	44	7.1	10
Apr. 11, 1967...	29	11	6.8	2.3	2.5	.5	32	0	3.2	1.5	.1	.5	0.00	45	.06	3.52	26	0	65	7.1	5
May 18, 1967...	12	12	7.0	2.6	3.0	.6	38	0	2.4	2.0	0	.5	0	50	.07	1.62	28	0	72	7.3	5
July 24, 1967...	1.0	15	7.5	3.2	3.2	1.3	42	0	2.4	2.0	0	.6	0	A	.08	.15	32	0	78	7.8	5
Aug. 25, 1967...	1.2	12	9.0	3.2	3.6	.5	46	0	2.8	2.0	0	.0	0	59	.08	.19	36	0	86	7.4	5
Sept. 18, 1967...	.66	12	9.0	3.4	3.4	.8	48	0	2.8	2.5	.1	.2	0	60	.08	.11	37	0	88	7.6	5

A Calculated from determined constituents.

Analyses, in parts per million, of trace elements

Date of collection	Time (24 hr)	Chromium		Copper	Zinc (Zn)	Arsenic (As)	Boron (B)
		Hexavalent (Cr <sup>6+</sup> )	Total (Cr)				
Apr. 11, 1967...		0.00		0.02	0.00		



NISQUALLY RIVER BASIN

12-0825. NISQUALLY RIVER NEAR NATIONAL, WASH.

LOCATION ---lat 46°48'10", long 122°05'00", temperature recorder at gaging station 100 feet downstream from railroad bridge, 1 mile west of National River, Cle Elum City, 2.5 miles west of Ashford, and 3 miles upstream from Mineral Creek.  
 DRAINAGE AREA ---133 square miles.  
 RECORDS AVAILABLE ---Water temperatures: October 1951 to September 1967.  
 EXTREMES, 1966-67 ---Water temperatures: Maximum, 62°F July 22, 23, 29, 30; minimum, 37°F Jan. 6, Feb. 13-15.  
 EXTREMES, 1951-67 ---Water temperatures: Maximum, 65°F July 13, 1961; minimum (1951-63, 1965-67), freezing point on many days during winter months.

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



12-0895. NISQUALLY RIVER AT MCKENNA, WASH.  
 LOCATION--Lat. 46°56'00", Long. 122°33'35", at bridge at gage on highway 507 at McKenna, Pierce County, and 9.0 miles downstream from Tanwax Creek.  
 DRAINAGE AREA--517 square miles.  
 RECORDS AVAILABLE--Chemical analyses: July 1959 to June 1960, October 1966 to September 1967.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH	Color	
															Parts per million	Tons per acre-foot	Tons per day	Calcium Magnesium	Non-carbonate				
Nov. 3, 1966...	1550	13		5.0	1.7	3.6	0.5	28	0	1.8	1.8	0.1	0.3		50	0.07	209	20	0		55	7.3	10
Jan. 4, 1967...	2410	14		5.0	1.4	3.1	0.6	23	0	2.8	2.5	0.2	0.9		51	0.07	332	19	0		52	7.1	30
Feb. 21.....	1830	15		5.2	1.1	2.9	0.6	23	0	2.0	2.0	0.1	0.7		43	0.06	224	18	0		50	7.4	10
Mar. 27.....	1990	15		5.1	1.5	3.2	0.4	25	0	2.2	2.0	0.1	0.4		45	0.06	242	18	0		52	7.3	10
Apr. 26.....	1450	14		5.5	1.5	3.2	0.6	29	0	1.4	1.8	0	0.3		48	0.07	188	20	0		53	7.4	10
May 17.....	862	14		5.5	1.3	3.4	0.6	29	0	2.2	2.0	0	0.2		47	0.06	109	19	0		54	7.4	10
June 12.....	370	15		5.5	1.9	3.6	0.6	31	0	2.2	2.0	0.1	0.0		50	0.07	50.0	22	0		59	7.5	5
July 24.....	205	14		5.0	1.8	3.0	0.3	28	0	2.6	1.5	0	0.1		49	0.07	27.1	25	0		57	7.3	5
Sept. 14.....	185	14		5.0	1.4	2.9	0.3	28	0	1.8	1.5	0	0.1		43	0.06	22.2	19	0		52	7.3	5
Sept. 18.....	191	13		5.0	1.4	2.9	0.8	28	0	1.8	1.9	0	0.3		43	0.06	22.2	19	0		52	7.3	5

Additional determinations

Date of collection	Dissolved oxygen (DO)	MPN (coliforms per 100 ml)	Hexavalent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)	Date of collection	Dissolved oxygen (DO)	MPN (coliforms per 100 ml)	Hexavalent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)
Nov. 3, 1966...	10.9	0					May 17, 1967..	12.7	73	0.00	0.00	0.01	
Jan. 30, 1967...	--	--					June 24.....	11.1	91				
Feb. 21.....	12.6	930					July 14.....	10.8	91				
Mar. 27.....	12.2	73					Aug. 14.....	10.8	91				
Apr. 26.....	13.7	91					Sept. 18.....	10.7	91				

CHAMBERS CREEK BASIN

12-0915. CHAMBERS CREEK BELOW LEACH CREEK, NEAR STELLACOOM, WASH.  
 LOCATION.--Lat 47°11'35", long 122°34'25", at Chambers Creek Road bridge 0.9 mile upstream from mouth, and 1.5 miles northeast of Steilacoom, Pierce County.  
 DRAINAGE AREA.--104 square miles.  
 RECORDS AVAILABLE.--Chemical analyses: October 1962 to September 1967.  
 REMARKS.--No discharge records available.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> ) (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>		Specific conductance (microhmhos at 25°C)	Col or pH	
												Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium			Non-carbonate
Nov. 1, 1966...	23		12	5.3	5.7	1.3	57	11	5.0	0.1	4.4	96	0.13	52	6	138	7.2	5
Nov. 15, .....	16		10	4.9	4.6	1.7	41	13	4.2	1.1	4.8	79	.11	45	12	115	7.2	40
Jan. 4, 1967...	13	9.0	9	4.1	4.5	1.3	38	9.4	3.8	1.1	4.5	80	.11	40	8	106	7.0	20
Jan. 30, .....	17		10	4.0	5.2	1.2	41	9.6	5.0	1.1	5.7	A 78	.11	42	8	114	7.2	15
Feb. 21, .....	10		5.0	5.0	5.0	1.3	45	0	5.0	1.1	5.8	85	.11	46	8	118	7.3	10
Apr. 3, .....	16		11	4.5	5.5	1.3	47	10	5.0	1.1	4.2	83	.11	46	7	121	7.2	5
May 18, .....	12		11	4.8	5.7	1.3	50	9.6	5.0	1.0	4.2	81	.11	47	6	127	7.8	5
June 12, .....	11		11	5.5	5.8	1.2	55	9.8	5.0	1.1	4.1	87	.12	50	5	131	7.5	5
July 19, .....	21		12	5.8	6.0	1.4	58	11	5.0	1.1	3.7	96	.13	54	7	141	7.6	5
Aug. 14, .....	22		12	5.8	6.2	2.1	58	0	5.0	1.0	4.6	99	.13	54	7	141	7.5	5
Sept. 28, .....	23		12	6.2	6.3	1.8	60	11	5.2	1.1	3.4	103	.14	56	7	144	7.5	5

A Calculated from determined constituents.

Additional determinations

Date of collection	Dis-solved oxygen (DO)	MPN (coliform per 100 ml)	Hexa-valent chromi-um (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)	Date of collection		Dis-solved oxygen (DO)	MPN (coliform per 100 ml)	Hexa-valent chromi-um (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)
							May 18, 1967..	Sept. 28, .....						
Nov. 1, 1966..	9.3	390					May 18, 1967..	10.2	430	0.00	0.00	0.00	0.00	
Nov. 15, .....	9.1	930					June 12, .....	9.6	36					
Feb. 21, 1967.	11.5	430					July 19, .....	9.4	430					
Apr. 3, .....	10.6	460					Aug. 14, .....	9.2	73					
Apr. 24, .....	12.6	460					Sept. 28, .....	9.6	73					



PUYALLUP RIVER BASIN--Continued  
12-1015. PUYALLUP RIVER AT PUYALLUP, WASH.

LOCATION.--Lat 47°12'30", long 122°19'35", at gaging station, 0.8 mile upstream from bridge at Clark Creek, 1 mile northwest of Puyallup, Pierce County, and 7 miles upstream from mouth.  
DRAINAGE AREA.--948 square miles.  
RECORDS AVAILABLE.--Chemical analyses: July 1969 to September 1961, October 1965 to September 1967.  
RECORDS AVAILABLE.--Chemical analyses: July 1969 to September 1961, October 1965 to September 1967.  
RECORDS AVAILABLE.--Temperature: July 1969 to September 1960, August 1965 to September 1967 (4 months).  
EXTREMES, 1965-66.--Water temperatures: Maximum, 65° F July 27-29, Aug. 3, 1966; minimum, 33° F Dec. 15, 1965.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180° C)			Hardness as CaCO <sub>3</sub>	Sodium adsorption ratio	Specific conductance (micro-mhos at 25° C)	Color	pH
														Parts per million	Tons per acre-foot	Tons per day					
Nov. 3, 1966...	1920	15	7.5	1.8	4.2	0.9	31	0	8.8	1.8	0.1	0.3	58	0.08	301	26	0	76	7.1		
Nov. 15.....	3860	14	8.0	2.4	3.6	1.4	31	0	8.8	2.2	0.2	2.3	61	0.08	636	30	5	79	7.0		
Jan. 4, 1967...	6260	14	6.0	1.5	3.4	1.0	25	0	5.4	1.8	0.2	1.8	48	0.07	811	21	1	62	7.0		
Jan. 30.....	5180	14	7.6	1.5	2.9	0.6	22	0	5.4	1.0	0.1	0.8	45	0.06	994	20	2	56	7.1		
Feb. 21.....	3320	16	7.6	2.5	3.4	0.6	33	0	5.8	2.0	0.1	1.0	58	0.08	520	30	2	67	7.3		
Mar. 27.....	3150	15	7.0	1.9	3.8	0.7	31	0	6.2	2.0	0.0	0.6	A 52	0.07	442	26	0	71	7.4		
Apr. 24.....	1890	16	7.7	2.0	4.1	1.0	34	0	7.2	1.5	0.1	0.9	A 41	0.06	286	27	0	77	7.7		
May 17.....	3790	12	5.2	1.3	2.9	1.0	24	0	4.6	1.0	0.1	0.3	A 41	0.06	420	18	0	55	7.5		
June 12.....	5160	12	5.5	0.9	2.7	0.6	23	0	4.6	1.0	0.1	0.3	A 41	0.06	571	17	0	50	7.2		
July 19.....	2770	12	6.0	1.1	3.2	0.7	24	0	6.2	1.0	0.1	0.1	46	0.06	344	20	0	56	7.3		
Aug. 19.....	3360	11	5.0	1.1	3.7	1.7	23	0	5.8	1.2	0.1	0.9	45	0.06	289	20	2	53	7.3		
Sept. 28.....	1360	11	5.1	1.5	3.7	1.7	23	0	5.4	1.3	0.1	0.1	45	0.06	185	22	3	65	7.0		

--A Calculated from determined constituents.

Date of collection	Dis-solved oxygen (DO)	MPN (coliform colonies per 100 ml)	Hexa-valent chromi-um (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)	Additional determinations						
							Dis-solved oxygen (DO)	Date of collection	Hexa-valent chromi-um (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)	
Nov. 3, 1966..	10.0	430					Apr. 24, 1967.	16.5	150	0.00	0.00	0.00	0.00
Nov. 15.....	10.5	2400					May 17.....	11.9	24000				
Jan. 30, 1967..	--	--					June 12.....	10.7	750				
Jan. 30.....	--	--					June 12.....	10.2	1400				
Feb. 21.....	12.2	11000					Aug. 14.....	9.9	4600				
Mar. 27.....	11.9	4600					Sept. 28.....	9.7	--				





12-1130. GREEN RIVER NEAR AUBURN, WASH.

LOCATION.--Lat 47°18'05", long 122°10'23", at bridge on State Highway 18, 0.1 mile upstream from Big Soos Creek, 1.8 miles east of Auburn, King County, and 2.1 miles upstream from gaging station.

DRAINAGE AREA.--399 square miles, excluding 3.67 square miles in the vicinity of Youngs Lake, upstream from gaging station.

RECORDS AVAILABLE.--Chemical analyses: July 1956 to September 1967.

EXTREMES, 1964-67.--Water temperatures: Maximum, 71°F June 19, Aug. 13-16; minimum, 41°F Feb. 16, 17, 19-21

EXTREMES, 1952-57.--Water temperatures: Maximum, 75°F July 28, 1958, minimum (1952-56, 1957-62, 1963-65, 1966-67), 33°F Feb. 16, 17, 1956, Dec. 18-21, 1964.

REMARKS.--Temperature recorder located at gaging station. Minor inflow between sampling point and gaging station except during periods of heavy local runoff. Temperature recorder not operating properly May 15, 16, pen failed to ink May 17 to June 6; no temperature ranges obtained.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carb. sulfate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> ) (B)	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>	Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	Color or pH
														Parts per million	Tons per acre-foot	Tons per day				
Nov. 1, 1966...	701	14	7.0	1.9	3.8	0.3	24	0	3.8	2.0	0.1	0.8	52	0.07	96.4	26	0	69	7.4	
Nov. 15, 1966...	1570	12	6.5	2.8	3.9	0.3	27	0	3.2	2.0	0.1	0.8	50	0.07	137	25	0	68	7.5	
Dec. 27, 1966...	1530	14	7.0	1.7	4.0	0.3	32	0	4.2	1.0	0.1	1.2	50	0.07	207	25	0	68	7.5	
Jan. 30, 1967...	4280	13	5.3	1.4	2.9	0.8	24	0	3.4	1.0	0.1	0.9	A 41	0.06	474	19	0	52	7.1	
Feb. 21, 1967...	2210	14	6.4	1.6	3.2	0.6	26	0	4.0	1.5	0.1	1.2	A 46	0.06	274	22	1	61	7.1	
Mar. 27, 1967...	1690	14	5.7	1.6	3.4	0.5	28	0	4.0	1.5	0.0	0.8	47	0.06	214	20	0	64	7.3	
May 17, 1967...	1960	12	4.8	1.1	2.8	0.4	22	0	2.4	2.0	0.0	0.9	36	0.05	191	16	0	46	7.2	
June 13, 1967...	275	14	9.3	1.5	3.7	0.4	42	0	3.2	2.5	0.1	1.4	65	0.06	383	32	0	64	7.6	
Aug. 14, 1967...	562	13	6.5	2.3	4.1	0.6	37	0	3.8	1.5	0.0	0.5	49	0.07	74.4	26	0	72	7.5	
Sept. 18, 1967...	235	15	10	2.7	5.2	1.0	50	0	5.2	2.0	0.1	0.7	68	0.09	43.1	36	0	101	7.2	

A Calculated from determined constituents.

Date of collection	Dis-solved oxygen (DO)	MPN (coliform per 100 ml)	Additional determinations			Dis-solved oxygen (DO)	Date of collection	Hexa-valent chromi-um (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)
			MPN (coliform per 100 ml)	Hexa-valent chromi-um (Cr <sup>6+</sup> )	Copper (Cu)						
Nov. 1, 1966...	11.3	24000	12.0	230	12.0	May 17, 1967...	0.00	0.00	0.00	0.00	
Nov. 15, 1966...	10.8	2400	10.7	91	10.7	June 12, 1967...	0.00	0.00	0.00	0.00	
Feb. 21, 1967...	12.6	230	9.7	2400	9.7	July 19, 1967...	0.00	0.00	0.00	0.00	
Mar. 27, 1967...	12.5	430	9.1	230	9.1	Aug. 14, 1967...	0.00	0.00	0.00	0.00	
Apr. 24, 1967...	14.1	91	9.5	430	9.5	Sept. 18, 1967...	0.00	0.00	0.00	0.00	



12-1134. DUWAMISH RIVER AT TUKWILA, WASH.

LOCATION.--Lat 47°28'58", long 122°16'00", at county bridge (Foster Street Bridge), in Tukwila, King County, 1.7 miles west of Renton, and 10 miles upstream from mouth.

RECORDS AVAILABLE.--Chemical analyses: July 1959 to September 1967.

Water temperatures: July 1959 to September 1962.

REMARKS.--No discharge records available.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean silica discharge (cis) (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>		Specific conductance (microhmhos at 25°C)	Color or pH	
														Parts per million	Tons per acre-foot	Calcium, magnesium	Non-carbonate			Tons per day
Nov. 1, 1966...	14		9.0	2.0	5.2	0.5	38	0	7.0	3.0	0.1	1.0		61	0.08	30	0	81	6.8	5
Nov. 15.....	13		7.0	2.3	4.2	1.1	30	0	6.0	3.2	.2	2.7		64	.09	27	3	67	6.9	15
Dec. 27.....	14		8.0	1.8	4.7	.8	35	0	5.6	3.0	.1	1.7		62	.08	28	0	80	7.1	10
Jan. 30, 1967...	14		5.7	1.6	3.1	.9	25	0	4.0	1.5	.0	1.4		47	.06	20	0	57	7.1	10
FEB. 27.....	13		6.8	2.2	4.7	.3	34	0	5.2	4.0	.1	1.3		56	.06	28	0	57	7.1	10
Mar. 27.....	14		6.6	2.0	4.7	.6	33	0	5.2	2.3	.0	1.3		A 53	.07	24	0	50	7.2	10
Apr. 24.....	15		8.7	2.7	6.5	1.0	40	0	5.4	6.0	.1	1.1		69	.09	32	0	99	7.0	5
May 18.....	14		7.5	1.9	5.3	.6	36	0	3.6	5.2	.0	.8		59	.08	27	0	82	7.0	5
June 12.....	14		8.5	2.2	7.4	.7	40	0	3.8	7.5	.0	.8	0.01	69	.09	30	0	99	7.4	5
July 19.....	17		13	4.1	14	1.3	64	0	5.6	15	.1	1.0		104	.14	50	0	168	7.4	10
Aug. 14.....	14		7.5	2.4	6.0	.9	40	0	4.4	2.8	.0	.3		59	.08	29	0	87	7.3	5
Sept. 18.....	17		12	4.3	13	1.9	66	0	5.2	14	.0	.6		102	.14	48	0	164	7.2	5

--A Calculated from determined constituents.

Additional determinations

Date of collection	Dis-solved oxygen (DO)	MPN (coliform colonies per 100 ml)	Hexa-valent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)	Date of collection	Dis-solved oxygen (DO)	MPN (coliform colonies per 100 ml)	Hexa-valent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)
Nov. 1, 1966..	8.2	24000					Apr. 24, 1967.	11.4	4600				
Dec. 5.....	10.2	46000					Apr. 24.....	11.1	4600				
Jan. 30, 1967.	--	--					July 12.....	19.5	11000	0.00	0.00	0.00	
Feb. 21.....	11.6	24000					July 19.....	7.6	11000				
Mar. 27.....	11.7	11000					Aug. 14.....	8.3	4600				
							Sept. 18.....	7.4	4600				



12-1190. CEDAR RIVER AT RENTON, WASH.

LOCATION.--Lat 47°29'00", long 122°12'10", at gaging station 125 feet downstream from bridge on Mill Avenue at Renton, King County, and 1.5 miles upstream from mouth.

DRAINAGE AREA.--186 square miles, including 3.67 square miles in vicinity of Youngs Lake in Big Scos Creek basin.

RECORDS AVAILABLE.--Chemical analyses: July 1959 to September 1961, November 1966 to September 1967.

Water temperatures: August 1965 to February 1967 (discontinued).

EXTREMES, 1965-66.--Water temperatures: Maximum, 71°F Aug. 2, 3, 1966; minimum, 36°F Dec. 24, 1965.

REMARKS.--Clock stopped Nov. 10 to Dec. 5; temperature range 44°F to 49°F.

Chemical analyses, in parts per million, November 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonyl sulfide (CO <sub>2</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	Soil adsorption ratio	Color or pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium magnesium	Non-carbonate			
Nov. 1, 1966	406	13	8.0	1.7	3.0	0.5	35	0	3.4	1.2	0.1	0.7	50	0.07	54.8	27	0	69	7.4	5		
Nov. 15	616	11	7.0	1.6	3.0	0.3	30	0	3.5	1.8	1.3	1.3	44	0.06	74.2	24	0	63	7.2	10		
Dec. 27	1010	10	6.0	1.1	2.4	0.2	24	0	3.2	1.0	1.9	1.9	41	0.06	112.2	20	0	51	7.3	5		
Feb. 21, 1967	1380	9.7	5.8	1.5	2.0	0.5	24	0	2.4	1.0	0.6	0.6	40	0.05	149	20	1	50	7.5	5		
Mar. 27	873	11	7.7	1.6	2.3	0.3	32	0	2.8	1.5	1.1	1.6	50	0.07	118	26	0	63	7.5	5		
Apr. 24	533	13	8.1	1.9	2.9	0.6	36	0	3.6	1.5	1.1	1.4	54	0.07	77.7	28	0	72	7.8	0		
May 15	321	11	6.6	1.6	2.3	0.6	49	0	3.2	1.9	1.1	1.4	A	11	0.06	87.6	23	0	90	7.1	5	
May 22	342	12	7.0	1.7	3.8	0.5	46	0	3.8	1.8	1.1	1.1	58	0.08	19.6	35	0	89	7.7	5		
July 19	135	13	11	1.7	4.7	0.6	52	0	5.0	2.2	0.1	0.1	67	0.09	13.4	39	0	99	7.6	5		
Aug. 14	174	14	11	2.7	4.7	0.6	52	0	5.0	2.2	0.1	0.1	64	0.09	15.4	39	0	95	8.0	5		
Sept. 18	89	12	11	2.8	4.4	1.4	51	0	5.4	1.8	0.1	0.1	64	0.09	15.4	39	0	95	8.0	5		

A Calculated from determined constituents.

Additional determinations

Date of collection	Dis-solved oxygen (DO)	MPN (coliform per 100 ml)	Hexa-valent chrom-ium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)	Date of collection	Dis-solved oxygen (DO)	MPN (coliform per 100 ml)	Hexa-valent chrom-ium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)
Nov. 1, 1966	11.3	91					May 18, 1967	9.9	--	0.00	0.00	0.01	
Nov. 15	10.9	210					June 12	10.3	36				
Dec. 27	12.2	36					July 19	19.6	90				
Mar. 27, 1967	11.6	150					Aug. 14	10.6	230				
Apr. 24	12.9	38					Sept. 18	10.6					







12-1265. SAMMAMISH RIVER AT BOTHELL, WASH.

LOCATION:--Lat. 47°45'52", long 122°11'35", at 102nd Street bridge at Bothell, King County, and 1 mile downstream from North Creek.  
 RECORDS AVAILABLE:--Chemical analyses: July 1959 to September 1962, October 1966 to September 1967.  
 REMARKS:--No discharge records available.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean Silica discharge (cfs)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>	Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	Color or pH	
													Parts per million	Tons per acre-foot					
Nov. 2, 1966..	14		12	5.1	6.6	1.3	58	0	13	4.2	0.1	2.6	88	0.12	51	4	136	7.3	15
Nov. 15.....	12		9.0	5.0	5.0	1.7	36	0	13	4.8	1	6.7	85	12	42	14	114	6.8	60
Dec. 27.....	9.7		10	4.3	5.1	1.1	44	0	14	2.8	1	2.8	81	11	42	6	109	7.1	20
Jan. 10.....	1.9		9.4	4.5	4.5	1.2	42	0	12	4.0	1	2.7	71	10	42	7	110	7.4	20
Jan. 24, 1967.	9.9		9.4	4.8	5.1	1.2	42	0	12	2.5	1	1.8	61	.08	41	6	111	7.0	20
Mar. 28.....	4.8		9.4	4.2	5.1	1.5	42	0	12	2.5	1	1.8	61	.08	41	6	111	7.0	20
Apr. 25.....	6.6		9.7	4.3	5.3	1.2	46	0	12	.3	0	1.6	A 97	.09	42	4	112	7.2	10
May 18.....	11		10	4.9	5.6	1.4	50	0	12	3.5	1	1.3	A 75	.10	45	4	117	7.0	10
May 13.....	12		12	5.3	6.1	1.2	56	0	15	3.5	1	1.2	A 87	.12	52	6	133	7.3	40
June 12.....	18		13	7.9	8.2	1.8	72	0	24	4.0	1	1.6	112	.16	60	18	172	7.3	10
July 19.....	17		14	7.1	7.7	1.7	68	0	19	4.0	1	2.2	112	.15	65	9	165	7.2	15
Aug. 13.....	18		14	7.2	7.7	1.7	68	0	19	4.0	1	2.2	112	.15	65	9	165	7.2	15
Sept. 18.....	20		14	7.2	7.7	1.7	68	0	19	4.0	1	2.2	112	.15	65	9	165	7.2	15

A Calculated from determined constituents.

Additional determinations

Date of collection	Dissolved solids (DS)	MPN (coliform colonies 100 ml)	Hexavalent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)	Date of collection	Dissolved solids (DS)	MPN (coliform colonies 100 ml)	Hexavalent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)
Nov. 2, 1966..	9.3	2400					Apr. 25, 1967.	12.7	430				
Nov. 15.....	9.1	4600					May 18.....	11.6	230				
Dec. 27.....	--	--					June 13.....	11.8	24000	0.00	0.00		
Jan. 24.....	--	--					July 19.....	8.1	--				
Feb. 22.....	11.3	11000					Aug. 15.....	9.3	1100				
Mar. 28.....	11.4	750					Sept. 18.....	9.3	2400				



12-1411. SKYKOMISH RIVER AT MONROE, WASH.  
 LOCATION.--Lat 47°50'48", long 121°58'10", at gaging station at State Highway 203 crossing, and at Monroe, Snohomish County.  
 0.1 mile downstream from Woods Creek and at mile 25.0.

DRAINAGE AREA.--834 square miles.  
 RECORDS AVAILABLE.--Water temperatures: October 1966 to September 1967.  
 Sediment records: October 1966 to September 1967.  
 EXTREMES, 1966-67.--Water temperatures: Maximum, 70°F Aug. 15, 16; minimum, 35°F Jan. 4.  
 Sediment concentrations: Maximum daily, 312 ppm Dec. 13; minimum daily, 1 ppm on many days during August.  
 Sediment loads: Maximum daily, 29,300 tons Dec. 13; minimum daily, 2 tons Aug. 29.  
 Remarks.--Discharge estimated on basis of daily stage readings and water discharge from nearby stations. Streamflow above 12,000 cfs gaged.

Month	Temperature (°F) of water, water year October 1966 to September 1967																															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	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	
November	44	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	
December	44	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	
January	41	39	41	35	36	38	39	40	40	42	41	45	43	42	43	43	42	43	45	41	40	40	40	40	40	40	40	39	41	43	41	41	
February	42	43	42	42	41	40	41	42	43	42	41	39	39	40	40	36	40	41	41	43	42	44	44	44	44	44	42	44	42	44	42	42	
March	42	43	43	42	41	42	41	42	42	40	42	42	42	42	40	44	43	43	44	45	44	44	44	44	42	43	43	43	42	44	42	44	
April	48	43	51	46	46	48	49	45	46	47	49	45	49	45	46	44	47	49	48	47	49	50	51	51	47	50	47	49	50	51	47	47	
May	50	49	49	52	49	50	45	46	38	40	42	50	48	48	53	51	49	52	51	50	49	47	47	47	47	47	47	47	47	47	47	47	
June	52	47	51	52	53	50	48	47	49	47	50	52	53	52	53	56	51	51	55	52	48	51	53	56	55	53	54	55	51	51	51	51	
July	60	60	61	55	58	54	57	53	55	59	58	58	57	58	59	60	60	58	57	51	53	55	57	59	61	60	60	62	64	65	65	65	
August	66	67	66	65	62	59	59	64	68	66	67	68	69	69	70	70	68	68	68	67	67	68	68	66	66	66	66	66	67	67	67	66	
September	65	64	65	65	66	65	64	62	60	59	58	58	59	61	63	65	64	64	64	64	64	64	62	61	61	62	63	63	63	66	67	67	62

## SNOHOMISH RIVER BASIN--Continued

## 12-1411. SKYKOMISH RIVER AT MONROE, WASH.--Continued

Suspended sediment, water year October 1966 to September 1967  
(Where no concentrations are reported, loads are estimated)

Day	OCTOBER			NOVEMBER			DECEMBER			
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day	
1..	900		5	3000		16	15000	22	891	
2..	1400		8	2500		14	11200	8	242	
3..	1200		6	2200		12	8000	C 3	65	
4..	1000		5	2000		11	7000	C 3	57	
5..	1000		5	2200		12	6200	C 3	50	
6..	900		5	2700		15	5200	C 3	42	
7..	1300		7	2500		12	4800	C 3	39	
8..	2700		15	2000		11	4200	C 3	34	
9..	1600		9	2700		15	3600	C 3	29	
10..	1300		9	4000		43	4800	C 3	39	
11..	1200		6	3000		32	7000	8	151	
12..	1200		6	2700		29	11600	29	908	
13..	1200		6	4000		43	34800	312 A	29300	
14..	1100		6	7000		76	22600	67 S	4680	
15..	1100		6	7200		78	13500	21	765	
16..	1000		5	6000		65	19500	107 S	6050	
17..	1300		7	5200		56	20500	50	2770	
18..	1200		6	4400		48	20500	54	2990	
19..	3500		38	4200		45	18900	64 J	3750	
20..	7000		76	4200		45	22600	68 J	4470	
21..	3900		42	4300		46	14000	19	718	
22..	5200		56	3800		41	10200	9	248	
23..	16000		2600	3400		37	6800	C 4	73	
24..	10000		540	3200		35	6400	C 4	69	
25..	7000		76	12000		810	5200	C 4	56	
26..	6000		65	10200		360	4600	C 4	50	
27..	6000		65	6400		69	4000	C 4	43	
28..	4200		46	7000		76	3800	C 4	41	
29..	4600		50	7500		81	5800	C 4	63	
30..	5000		54	13800	33	1230	5200	C 4	56	
31..	3200		35	--	--	--	5000	C 4	54	
Total	104200	--	3862	145100	--	3463	332500	--	58793	
		JANUARY			FEBRUARY			MARCH		
1..	8800	19	451	7040	4	76	3580	C 3	29	
2..	6800	4	73	6110	4	66	3540	C 3	29	
3..	13600	34	1250	7060	8	152	3670	C 3	30	
4..	11100	9	270	16500	70	3120	3410	C 3	28	
5..	7000	7	132	13200	20	713	3100	C 3	25	
6..	5500	C 3	45	8940	C 3	72	2950	C 3	24	
7..	4800	C 3	39	6880	C 3	56	2840	C 3	23	
8..	6500	C 3	53	5860	C 3	47	3060	C 3	25	
9..	7500	C 3	61	5560	C 3	45	4230	C 3	34	
10..	7200	C 3	58	5970	C 3	48	3940	C 3	32	
11..	15000	--	1600	6040	C 3	49	3300	C 3	27	
12..	11400	9	277	6130	C 3	50	3100	C 3	25	
13..	13000	18	632	10400	18	505	2840	C 3	23	
14..	11100	31	929	6920	C 5	93	2840	C 3	21	
15..	23600	180 S	12300	6240	C 5	84	2920	C 3	24	
16..	17300	27 S	1380	6280	C 5	85	4120	C 3	33	
17..	11200	7	212	6440	C 5	87	3520	C 3	29	
18..	8850	--	120	8940	C 5	121	4530	C 3	37	
19..	14100	65 S	3380	7010	C 5	95	4280	C 3	35	
20..	17100	41 S	1990	5500	C 5	74	4100	C 3	33	
21..	11600	12	376	3420	C 5	46	4230	C 3	34	
22..	8520	C 2	46	3940	C 5	53	5710	14	216	
23..	6780	C 2	37	4010	C 5	54	13200	27	962	
24..	5630	C 2	30	3750	C 5	51	8940	10	241	
25..	4920	C 2	27	3580	C 5	48	6370	C 3	52	
26..	4860	C 2	26	3500	C 5	47	3680	C 3	30	
27..	6510	C 2	35	3260	C 5	44	4080	C 3	33	
28..	15500	37	1550	3840	C 5	52	4170	C 3	34	
29..	13400	20	724	--	--	--	3680	C 3	30	
30..	11900	16	514	--	--	--	3460	C 3	28	
31..	8970	5	121	--	--	--	3140	C 3	25	
Total	320040	--	28798	182320	--	6033	130330	--	2251	

S Computed by subdividing day.

A Computed from partly estimated-concentration graph.

C Composite period.

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

SNOHOMISH RIVER BASIN--Continued

12-1411. SKYKOMISH RIVER AT MONROE, WASH.--Continued

Suspended sediment, water year October 1966 to September 1967--Continued

Day	APRIL			MAY			JUNE					
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment				
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day			
1..	2920	C	2	16	2940	C	3	24	7590	C	6	123
2..	2760	C	2	15	3020	C	3	24	11900	C	23	739
3..	2780	C	2	15	3130	C	3	25	12000	C	18	583
4..	3120	C	2	17	3190	C	3	26	10400	C	9	293
5..	3190	C	2	17	3940	C	3	32	11400	C	15	462
6..	3010	C	2	16	5500	C	7	104	13000	C	20	702
7..	2950	C	2	16	6900	C	14	261	12500	C	19	641
8..	3220	C	2	17	8040	C	14	304	10400	C	4	112
9..	3340	C	2	18	9410	C	16	407	8910	C	4	96
10..	3130	C	2	17	5800	C	6	94	8070	C	4	87
11..	2900	C	2	16	5750	C	5	78	7760	C	4	84
12..	2980	C	2	16	5710	C	3	46	7160	C	4	77
13..	3300	C	2	18	5040	C	3	41	8070	C	4	87
14..	3010	C	2	16	4960	C	3	40	9230	C	8	199
15..	2810	C	2	15	5350	C	3	43	12000	C	24	778
16..	2670	C	2	14	7540	C	13	265	13100	C	30	1060
17..	2630	C	2	14	11200	C	20	605	13900	C	30	1130
18..	2560	C	2	14	11200	C	13	393	14600	C	48	1890
19..	2630	C	2	14	10900	C	12	353	14700	C	40	1590
20..	2670	C	2	14	12400	C	20	670	15800	C	57	2430
21..	2900	C	2	16	15200	C	48	1970	14500	C	34	1330
22..	2840	C	2	15	15200	C	42	1720	12200	C	12	395
23..	2700	C	2	15	13100	C	26	920	10100	C	6	164
24..	2710	C	2	15	9820	C	12	318	9560	C	5	129
25..	3010	C	2	16	9110	C	6	148	10900	C	12	393
26..	3080	C	2	17	8630	C	6	140	11400	C	16	492
27..	3200	C	2	17	7560	C	6	122	9690	C	7	183
28..	3570	C	2	19	7790	C	6	126	8380	C	7	158
29..	3340	C	2	18	10400	C	12	337	8090	C	7	153
30..	3080	C	2	17	8940	C	9	217	8090	C	7	153
31..	--	C	2	--	7520	C	6	122	--	C	--	--
<b>Total</b>	<b>89010</b>	--	--	<b>480</b>	<b>245190</b>	--	--	<b>9975</b>	<b>325400</b>	--	--	<b>16633</b>
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..	7200	C	2	39	2040	C	1	6	1120	C	2	6
2..	7740	C	2	42	1910	C	1	5	1390	C	2	8
3..	8040	C	2	43	1780	C	1	5	1320	C	2	7
4..	7790	C	2	42	1750	C	1	5	1200	C	2	6
5..	7010	C	2	38	1730	C	1	5	1030	C	2	6
6..	6130	C	2	33	1700	C	1	5	953	C	2	5
7..	5370	C	2	29	1610	C	1	4	925	C	2	5
8..	5540	C	2	30	1580	C	1	4	904	C	2	5
9..	5100	C	2	28	1590	C	1	4	904	C	2	5
10..	4660	C	2	25	1520	C	1	4	904	C	2	5
11..	4860	C	2	26	1510	C	1	4	932	C	2	5
12..	5250	C	2	28	1430	C	1	4	1030	C	2	6
13..	5480	C	2	30	1410	C	1	4	1170	C	2	6
14..	5460	C	2	29	1400	C	1	4	1110	C	2	6
15..	5020	C	2	27	1350	C	1	4	968	C	2	5
16..	4740	C	2	26	1290	C	1	3	925	C	2	5
17..	4640	C	2	25	1220	C	1	3	897	C	2	5
18..	4470	C	2	24	1230	C	1	3	876	C	2	5
19..	4190	C	2	23	1230	C	1	3	876	C	2	5
20..	3940	C	2	21	1210	C	1	3	841	C	2	5
21..	3920	C	2	21	1160	C	1	3	834	C	2	4
22..	3940	C	2	21	1170	C	1	3	827	C	2	4
23..	3920	C	2	21	1150	C	1	3	792	C	2	4
24..	3630	C	2	20	1110	C	1	3	750	C	2	4
25..	3280	C	2	18	1040	C	1	3	738	C	2	4
26..	3130	C	2	17	1010	C	1	3	813	C	2	4
27..	3100	C	2	17	960	C	1	3	738	C	2	4
28..	2810	C	2	15	937	C	1	3	690	C	2	4
29..	2440	C	2	13	897	C	1	2	630	C	2	3
30..	2160	C	2	12	932	C	1	3	600	C	2	3
31..	2070	C	2	11	968	C	1	3	--	C	--	--
<b>Total</b>	<b>147030</b>	--	--	<b>794</b>	<b>41764</b>	--	--	<b>114</b>	<b>27687</b>	--	--	<b>149</b>
Total discharge for year (cfs-days).....											2090571	
Total load for year (tons).....											131285	

C Composite period.



## SNOHOMISH RIVER BASIN--Continued

12-1490. SNOQUALMIE RIVER NEAR CARNATION, WASH.--Continued

Suspended sediment, water year October 1966 to September 1967  
(Where no concentrations are reported, loads are estimated)

Day	OCTOBER			NOVEMBER			DECEMBER		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	614	C 2	3	2010	C 3	16	9790	57	1510
2..	717	C 2	4	1810	C 3	15	7250	24	470
3..	980	C 2	5	1690	C 3	14	5770	11	171
4..	788	C 2	4	1560	C 3	13	5110	12	166
5..	706	C 2	4	1530	C 3	12	4960	14	187
6..	671	C 2	4	1860	C 3	15	4500	6	73
7..	694	C 2	4	1720	C 3	14	4210	6	68
8..	1640	C 2	9	1580	C 3	13	3680	4	40
9..	1560	C 2	8	1710	C 3	14	3220	3	26
10..	1160	C 2	6	3890	--	60	3520	12	114
11..	934	C 2	5	2690	--	40	5700	18	277
12..	923	C 2	5	3320	--	50	8050	27	587
13..	1010	C 2	5	3330	--	50	17000	506 S	26400
14..	953	C 2	5	5300	23	329	19400	426 S	23600
15..	886	C 2	5	6000	31	502	9680	75	1960
16..	854	C 2	5	5050	16	218	9680	52	1360
17..	942	C 2	5	4740	9	115	12300	76	2520
18..	1080	C 2	6	3870	C 5	52	12300	76	2520
19..	1280	--	20	3480	C 5	47	10100	32	873
20..	5540	100	1500	3340	C 5	45	12900	58	2020
21..	3370	--	530	3130	C 5	42	8800	24	570
22..	4020	--	610	2880	C 5	39	6450	22	383
23..	9560	192	4960	2520	C 5	34	5160	11	153
24..	7750	--	3300	2390	C 5	32	4590	10	124
25..	4310	110	1280	6020	187 S	4300	4430	8	96
26..	3290	--	830	7120	52 S	1290	3820	6	62
27..	4140	--	1000	4970	11	148	3340	6	54
28..	3130	--	340	5550	11	165	3110	23	193
29..	2480	--	470	5490	10	148	4380	27	319
30..	3000	C 3	24	8810	71	1690	4740	43	550
31..	2450	C 3	20	--	--	--	4390	30	356
Total	71432	--	14976	109360	--	9522	222330	--	67802
Day	JANUARY			FEBRUARY			MARCH		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	7200	60	1170	5240	5	71	4310	C 4	47
2..	5760	129	2010	4890	6	79	3610	C 4	39
3..	8740	122	2880	4790	7	91	3120	C 4	34
4..	8120	99	2170	9780	143 S	4370	2850	C 4	31
5..	6970	87	1640	9460	82 S	2370	2620	C 4	28
6..	5480	27	399	6320	10	171	2570	C 4	28
7..	4730	27	345	5040	6	82	2420	C 11	72
8..	5400	25	364	4340	5	59	2360	C 11	70
9..	7310	27	533	4000	4	43	3010	C 11	89
10..	6130	15	248	4640	8	100	2570	C 11	76
11..	9660	16	417	4500	9	109	2290	C 11	68
12..	7550	13	265	4420	--	80	2120	C 11	63
13..	9860	16	426	6320	29	495	2070	C 11	61
14..	12900	14	488	5700	14	215	1950	C 4	21
15..	15700	13	551	4930	9	120	2080	C 4	22
16..	12600	19	646	4460	7	84	2710	C 4	29
17..	8000	24	518	5290	14	200	3550	C 4	38
18..	6280	25	424	7570	42	858	3330	C 4	36
19..	9000	22	535	5860	14	222	2990	C 4	32
20..	14200	35	1340	4780	C 5	65	2890	C 4	31
21..	9540	35	902	4180	C 5	56	3240	6	52
22..	7000	32	605	3720	C 5	50	3870	37	387
23..	5680	30	460	3320	C 5	45	7130	77	1480
24..	4840	24	314	3190	C 5	43	5510	13	193
25..	4210	22	250	3080	C 5	42	4460	C 4	48
26..	3850	--	200	2990	C 5	40	3820	C 4	41
27..	5730	19	294	2790	C 5	38	3510	C 4	38
28..	11800	82	2610	3110	C 5	42	3100	C 4	33
29..	9890	49	1310	--	--	--	3020	C 4	33
30..	8400	34	771	--	--	--	2800	C 4	30
31..	6310	13	221	--	--	--	2610	C 4	28
Total	248840	--	25306	138710	--	10240	98490	--	3278

S Computed by subdividing day.  
C Composite period.



SNOHOMISH RIVER BASIN--Continued  
12-1555. SNOHOMISH RIVER AT SNOHOMISH, WASH.

LOCATION.--Lat 47°54'40", long 122°05'50", at gaging station at bridge on State Highway 9 in Snohomish County, and 0.8 mile downstream from Pilchuck River.

DRAINAGE AREA.--1,714 square miles.

RECORDS AVAILABLE.--Chemical analyses: July 1959 to September 1967.

Water temperatures: July 1959 to September 1961.

REMARKS.--NO discharge records available.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>	Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	Color or pH
														Parts per million	Tons per acre-foot				
Nov. 2, 1966..		5.8		5.0	0.6	1.7	0.4	18	0	2.8	1.0	0.1	0.8	28	0.04	15	0	39	7.0
Nov. 15.....		6.1		4.0	1.0	1.7	0.5	14	0	3.4	1.0	0.1	2.2	A 27	.04	14	3	38	6.8
Dec. 28.....		7.9		4.7	1.3	2.0	0.4	21	0	3.4	1.2	0.1	1.6	A 35	.06	17	2	46	6.8
Jan. 24, 1967.		7.2		4.7	1.3	1.8	0.5	18	0	3.6	2.0	0.1	1.2	A 34	.05	17	2	45	7.1
Feb. 22.....		7.2		3.3	1.5	2.0	0.4	20	0	3.0	1.5	0.1	1.8	A 31	.04	16	3	44	7.5
Mar. 28.....		6.8		4.8	1.2	2.0	0.4	20	0	3.0	1.5	0.1	1.8	A 34	.05	16	0	44	7.5
Apr. 18.....		7.3		5.3	1.2	2.3	0.8	22	0	3.0	2.5	0.1	1.8	A 34	.05	18	0	49	7.1
May 18.....		4.3		2.8	0.6	1.1	0.5	12	0	1.8	0.0	0.1	1.4	A 17	.02	10	0	26	6.9
June 13.....		4.6		3.0	0.7	1.2	0.4	14	0	1.8	0.5	0.1	2.0	A 19	.03	11	0	32	7.2
July 20.....		5.1		3.5	1.0	1.3	0.4	17	0	1.8	0.5	0.1	1.2	A 25	.05	19	0	52	6.9
Aug. 15.....		7.0		5.6	1.2	2.5	0.9	25	0	2.2	2.5	0.0	1.3	A 35	.05	19	0	52	6.9
Sept. 19.....		6.8		5.8	1.4	2.8	0.8	28	0	2.4	1.5	0.0	1.3	A 36	.05	20	0	56	7.3

A Calculated from determined constituents.

Additional determinations

Date of collection	MPN (coliform colonies per 100 ml)	Hexavalent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)	Date of collection	Dissolved oxygen (DO)	MPN (coliform colonies per 100 ml)	Hexavalent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)
Nov. 2, 1966..	430					Apr. 18, 1967.	11.3	930				
Nov. 15.....	2400					Apr. 18, 1967.	12.5	931				
Dec. 28.....	--					June 13.....	12.5	931				
Jan. 24, 1967.	--					July 20.....	9.7	--	0.00	0.00	0.00	
Feb. 22.....	36					Aug. 15.....	8.4	150				
Mar. 28.....	430					Sept. 19.....	8.9	24000				









SKAGIT RIVER BASIN--Continued  
12-2005. SKAGIT RIVER NEAR MOUNT VERNON, WASH.

LOCATION (revised)---Lat 48°28'40", long 122°20'25", at U. S. Interstate Highway 5, 1,200 feet downstream from gaging station, 1 mile north of Mount Vernon, Washington, vicinity of confluence of Skagit River with Nookachamps Creek.

DRAINAGE AREA---3,093 square miles, of which 400 square miles is in Canada.

RECORDS AVAILABLE---Chemical analyses: July 1959 to September 1967.

Water temperatures: July 1962 to September 1967.

EXTREMES, 1966-67---Water temperatures: Maximum, 60°F Aug. 18-17, 27; minimum, 39°F Jan. 5-8.

EXTREMES, 1962-67---Water temperatures: Maximum, 62°F Aug. 8, 9, 30, 31, 1963; minimum, 36°F Dec. 17, 1964.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH or			
														Parts per million	Tons per acre-foot	Tons per day	Calcium, Magnesium	Non-carbonate			Sodium-sulfate ratio		
Nov. 2, 1966..	12200	6.3		6.5	1.2	1.2	0.5	25	0	4.6	0.5	0.1	0.2		34	0.05	1120	21	0	51	7.4	5	
Nov. 16.....	17200	5.3		7.0	1.1	1.1	.8	24	0	4.4	.2	.2	.5		32	.04	1490	22	3	50	7.5	10	
Dec. 27.....	17600	7.7		8.0	1.1	1.4	.5	29	0	4.6	.5	.1	.7		44	.06	2090	28	1	63	7.2	5	
Jan. 24, 1967.	18600	9.9		8.3	1.2	1.3	.7	30	0	5.2	1.0	0	.5	A	47	.06	1730	30	4	66	7.1	5	
Feb. 20.....	18600	7.0		8.0	1.5	1.4	.6	30	0	4.8	.5	.1	.4		38	.05	1600	26	2	65	7.3	5	
Mar. 25.....	15600																						
Apr. 25.....	12000	7.5		9.0	1.6	1.6	.9	34	0	4.8	1.0	.1	.4		45	.06	1460	29	1	69	7.3	0	
May 23.....	28900	5.0		4.8	.9	.9	.6	18	0	3.0	0	.1	.4		26	.04	2020	16	0	39	7.0	0	
June 13.....	28300	5.1		5.5	.9	1.2	.7	22	0	3.4	.5	0	.1	0.02	30	.04	2290	17	0	42	7.3	5	
July 20.....	18700	5.1		5.0	1.1	1.1	.6	21	0	3.4	.2	.1	.1		26	.04	1510	17	1	41	7.2	5	
Aug. 19.....	18100	6.3		5.3	1.0	1.1	.6	21	0	3.4	.5	.1	.1		36	.05	1788	21	0	41	7.2	5	
Sept. 19.....	8110	6.3		6.3	1.2	1.3	.4	26	0	4.0	.5	.1	.3		36	.05	788	21	0	52	7.2	5	

--A Calculated from determined constituents.

Additional determinations

Date of collection	Dis-solved oxygen (DO)	MPN (coliform colonies per 100 ml)	Hexa-valent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)	Date of collection	Dis-solved oxygen (DO)	MPN (coliform colonies per 100 ml)	Hexa-valent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)
Nov. 2, 1966..	11.4	200					Apr. 25, 1967.	12.6	91				
Dec. 27.....	11.5	430					May 23.....	11.8	430				
Jan. 24, 1967.	--	--					July 20.....	10.5	36	0.00	0.00	0.00	0.00
Feb. 22.....	12.4	36					Aug. 15.....	10.1	1500				
Mar. 28.....	12.2	91					Sept. 19.....	10.2	1500				



## SAMISH RIVER BASIN

12-2015. SAMISH RIVER NEAR BURLINGTON, WASH.

LOCATION --Lat 48°32'55", long 122°20'00", at Washington State Fisheries fish trap, 0.2 mile upstream from bridge on U.S. Highway 99, 4.9 mile north of Burlington, Skagit County, 0.3 mile upstream from gaging station, and 0.2 mile downstream from Friday Creek.

DRAINAGE AREA --87.8 square miles.

RECORDS AVAILABLE --Chemical analyses: July 1959 to July 1960, October 1966 to September 1967.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> ) (B)	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>	Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day					
Nov. 2, 1966..	119	8.2	9.0	2.6	3.5	0.7	38	0	5.6	3.0	0.1	2.2	2.2	56	0.08	18.0	33	2	86	7.2	15
Nov. 16.....	326	6.7	9.5	2.7	2.6	1.2	25	0	5.0	2.8	.1	3.7	4.4	47	.06	41.4	27	7	68	7.0	30
Nov. 23.....	470	6.3	6.4	1.9	3.1	.7	22	0	5.2	3.0	.1	3.9	5.8	44	.06	54.8	23	5	65	7.0	15
Jan. 24, 1967.	362	6.6	6.7	2.4	2.7	.5	26	0	5.2	3.0	.1	3.5	10	46	.06	45.0	26	5	68	7.4	10
Feb. 22.....	352	5.9	6.0	1.9	2.7	.5	24	0	4.4	2.0	.0	3.1	10	39	.05	37.1	23	4	62	7.2	10
Mar. 28.....	180	7.0	7.0	2.3	2.8	.8	30	0	5.2	2.0	.1	2.2	10	48	.07	23.3	27	2	71	7.7	5
Apr. 25.....	135	6.0	7.6	2.3	2.5	.4	30	0	4.4	3.0	.1	1.8	10	44	.06	16.0	28	4	67	7.1	5
May 23.....	98	8.5	9.5	2.6	3.0	.9	41	0	4.2	1.2	.1	2.0	0.03	53	.09	9.73	34	1	102	7.4	5
June 3.....	11	13	11	4.3	3.6	1.2	56	0	5.0	2.8	.0	2.7	10	71	.10	4.79	45	0	110	7.4	5
Aug. 15.....	25	13	11	4.3	3.6	1.2	56	0	5.0	2.8	.0	2.7	10	71	.10	4.79	45	0	110	7.4	5
Sept. 19.....	23	13	12	4.5	4.1	1.2	58	0	5.4	3.0	.1	2.5	10	77	.10	4.78	49	1	117	7.4	5

## Additional determinations

Date of collection	Dis-solved oxygen (DO)	MPN (coliform colonies per 100 ml)	Hexa-valent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)	Date of collection	Dis-solved oxygen (DO)	MPN (coliform colonies per 100 ml)	Hexa-valent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)
Nov. 2, 1966..	11.2	430					Apr. 25, 1967.	13.1	140				
Nov. 16.....	10.6	2400					May 23.....	11.6	2400				
Dec. 27.....	--	--					June 13.....	12.4	930				
Jan. 24, 1967.	--	73					July 20.....	8.8	24000				
Jan. 28.....	12.4	150					Aug. 15.....	8.8	11000				
Mar. 28.....	11.6	150					Sept. 19.....	10.8	11000				

WHATCOM CREEK BASIN

12-2025. WHATCOM LAKE NEAR BELLINGHAM, WASH.

LOCATION--Lat 48°45'45" long 122°25'10" at bridge on Electric Avenue, 2.1 miles east of Bellingham, Whatcom County.  
 RECORDS AVAILABLE--Chemical analyses: October 1964 to September 1967.  
 REMARKS--No discharge records available.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180° C)		Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25° C)	Color	pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium Magnesium			
Nov. 2, 1966..		2.1		6.0	1.3	3.1	0.4	25	0	5.0	2.0	0.1	0.2		35	0.05	21	0	58	7.0	5
Nov. 16.....		1.7		5.5	1.6	2.8	.8	23	0	5.6	2.2	.1	.2		A 32	.04	20	0	57	7.2	5
Dec. 27.....		.8		5.0	1.6	3.6	.4	22	0	5.2	2.5	.1	.5		A 35	.05	19	1	59	7.2	10
Jan. 24, 1967.		2.4		5.6	1.7	3.1	.5	22	0	5.6	3.5	.1	1.0		A 34	.04	22	4	58	7.1	5
Feb. 13.....		1.6		5.3	1.7	3.2	.5	22	0	5.2	2.5	.1	.9		A 32	.04	20	2	57	7.3	5
Mar. 28.....				5.1	1.7	3.2	.5	22	0	5.2	2.5	.1	.9		A 32	.04	20	2	57	7.3	5
Apr. 24.....		1.7		4.9	1.6	3.3	.7	22	0	5.2	2.0	.1	.1		31	.04	18	0	57	7.0	0
May 23.....		1.0		5.3	1.7	3.1	.5	21	0	5.0	2.5	.1	.4		28	.04	20	3	57	7.0	0
June 13.....		1.2		5.0	1.6	3.0	.7	24	0	5.2	2.2	.1	.2	0.03	32	.04	19	0	56	7.3	5
July 20.....		1.0		5.5	1.6	3.0	.6	24	0	5.0	2.0	.1	.1		36	.05	20	0	57	7.3	5
Aug. 19.....		1.2		5.1	1.7	2.9	.8	24	0	5.0	2.5	.1	.1		35	.05	19	0	57	7.3	5
Sept. 19.....		1.2		5.0	1.6	3.1	.8	24	0	5.0	2.0	.1	.1		35	.05	19	0	57	7.2	5

A. Calculated from determined constituents.

Additional determinations

Date of collection	Dis-solved oxygen (DO)	MPN (coliform counts per 100 ml)	Hexa-valent chromium (Cr <sup>6</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)	Date of collection	Dis-solved oxygen (DO)	MPN (coliform counts per 100 ml)	Hexa-valent chromium (Cr <sup>6</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)
Nov. 2, 1966..	9.5	0					May 23, 1967..	11.6	36	0.00	0.00	0.00	
Nov. 16.....	10.5	230					June 13.....	11.1	930	0.00			
Feb. 22, 1967.	12.7	230					July 20.....	--	--				
Mar. 28.....	11.9	36					Aug. 15.....	9.5	0				
Apr. 24.....	13.4	0					Sept. 19.....	8.6	36				

## NOOKSACK RIVER BASIN

## 12-2131. NOOKSACK RIVER AT FERDALE, WASH.

LOCATION ---Lat 48°50'45", long 122°35'15", at Main Street Bridge at Ferdale, Whatcom County, 1.3 miles downstream from Tennile Creek.  
 RECORDS AVAILABLE: October 1961 to September 1967.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Fe)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Ni-oxide (NO <sub>2</sub> ) (B)	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH or
														Parts per million	Tons per acre-foot	Tons per day	Calcium magnesium	Non-carbonate		
Nov. 2, 1966..	2100	8.8	10	3.6	2.8	0.6	41	0	10.7	1.8	0.1	0.9	A 59	0.08	335	40	1	96	7.4	5
Nov. 16.....	4600	7.4	8.0	2.9	2.4	0.8	32	0	7.6	2.2	0.2	2.5	B 63	0.09	782	32	6	78	7.2	25
Dec. 27.....	3920	9.4	12	3.0	3.0	0.7	44	0	11	2.5	1.1	1.2	77	0.10	815	42	7	102	7.4	10
Jan. 24, 1967.	4580	9.2	11	3.8	3.1	0.8	42	0	9.2	3.0	1.1	1.9	A 70	0.10	866	43	8	101	7.3	10
Feb. 22.....	2830	11	12	4.1	3.3	0.9	47	0	9.8	3.0	1.1	1.8	A 69	0.09	527	47	8	108	7.6	10
Mar. 28.....	3350	9.1	10	3.8	2.9	0.6	43	0	8.0	2.5	0	1.3	A 62	0.08	561	41	6	97	7.3	10
Apr. 25.....	2020	9.4	11	3.9	3.5	0.9	46	0	9.4	3.0	1.0	1.5	B 63	0.09	344	44	6	107	7.4	5
May 23.....	7380	6.0	6.6	2.1	1.5	0.7	26	0	5.6	1.0	1.1	0.5	37	0.09	754	25	4	58	7.7	5
June 13.....	5830	5.8	6.0	2.6	1.5	0.6	27	0	6.2	1.5	1.1	1.1	38	0.05	578	26	4	59	7.3	5
July 20.....	2910	6.7	8.5	2.4	2.0	0.5	30	0	9.4	1.5	1.1	1.1	48	0.07	377	31	7	75	7.4	5
Aug. 15.....	2180	6.7	8.1	2.3	1.9	1.0	28	0	10	1.0	0	0.2	47	0.06	277	30	7	71	7.2	5
Sept. 19.....	1380	8.1	11	2.9	2.4	0.7	36	0	11	1.8	1.1	1.1	60	0.08	224	40	10	91	7.2	5

A Calculated from determined constituents.

## Additional determinations

Date of collection	Dis-solved oxygen (DO)	MPN (coliform colonies per 100 ml)	Hexa-valent chromi-um (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)	Date of collection	Dis-solved oxygen (DO)	MPN (coliform colonies per 100 ml)	Hexa-valent chromi-um (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)
Nov. 2, 1966..	11.2	280					Apr. 25, 1967.	12.5	750				
Nov. 16.....	11.3	430					May 23.....	11.8	930				
Dec. 27.....	--	--					June 13.....	13.3	230	0.00	0.00	0.00	0.00
Jan. 24, 1967.	--	--					July 20.....	9.9	--				
Feb. 22.....	12.0	36					Aug. 15.....	9.6	24000				
Mar. 28.....	11.6	230					Sept. 19.....	10.1	11600				









12-3185. KOOTENAI RIVER NEAR COPELAND, IDAHO

LOCATION (revised).--Lat 48°54'43", long 116°24'59", at Andrews Ranch, 0.8 mile downstream from Mission Creek 1.5 miles northwest of Copeland, and at mile 123.2.

DRAINAGE AREA.--13,400 square miles, approximately, upstream from gaging station.

RECORDS AVAILABLE.--Water temperatures: May 1966 to September 1967.

Sediment records: May 1966 to September 1967.

EXTREMES, 1966-67.--Water temperatures: Maximum, 70°F Aug. 20; minimum, 34°F on several days during January.

Sediment concentrations: Maximum daily, 620 ppm May 24; minimum daily, 3 ppm on many days during August and September.

Sediment loads: Maximum daily, 4,700 tons daily, Dec. 11, 12, Sept. 30.

EXTREMES, 1967.--Water temperatures: Maximum, 70°F Aug. 20, 1966; minimum, 34°F on several days during January 1967.

Sediment concentrations: Maximum daily, 740 ppm May 30, 1966; minimum daily, 1 ppm on many days.

Sediment loads: Maximum daily, 155,000 tons May 30, 1966; minimum daily, 41 tons Dec. 11, 12, Sept. 30, 1967.

REMARKS.--This station is maintained by the United States in cooperation with Canada.

Month	Temperature (°F) of water, water year October 1966 to September 1967																														Average	
	Day																															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
October.....	--	61	--	57	--	--	54	--	54	--	54	--	54	--	50	--	46	--	45	--	45	--	45	--	45	--	45	--	45	--	45	--
November.....	--	45	--	45	--	--	41	--	39	--	39	--	39	--	36	--	36	--	36	--	37	--	37	--	37	--	37	--	37	--	37	--
December.....	37	37	37	37	37	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	
January.....	36	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	36	36	36	36	36	36	36	36	36	36	36	36	36	36	
February.....	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	
March.....	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	
April.....	43	43	43	45	45	45	45	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	
May.....	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	
June.....	48	50	50	50	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	
July.....	55	55	55	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	
August.....	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	
September.....	64	66	64	64	64	64	64	64	64	64	63	--	61	61	59	61	59	59	59	59	61	61	61	61	61	61	61	61	61	61	61	

INSTANTANEOUS SUSPENDED SEDIMENT AND PARTICLE SIZE, WATER YEAR OCTOBER 1966 TO SEPTEMBER 1967  
 (METHODS OF ANALYSIS: S, BOTTOM WITHDRAWAL TUBE; C, CHEMICALLY DISPERSED; N, IN NATIVE WATER; P, PIPE; S, SIEVE;  
 V, VISUAL ACCUMULATION TUBE; M, IN DISTILLED WATER)

DATE	TIME (C)	DISCHARGE (CFS)	CONCENTRATION (PPM)	SUSPENDED SEDIMENT TRATION (TONS/DAY)	PARTICLE SIZE			METHOD OF ANALYSIS									
					PERCENT FINER	THAN THE SIZE (IN MILLIMETERS)	INDICATED										
MAY 30, 1967	112C	10	704CC	192	36500	0	17	38	41	53	66	82	67	1CC	--	--	VPNC
JUN 5, 1968	110C	10	753CC	660	134000	6	18	31	48	69	86	97	100	--	--	--	VPNC

## QUALITY OF SURFACE WATERS, 1967

## KOOTENAI RIVER BASIN--Continued

## 12-3185. KOOTENAI RIVER NEAR COPELAND, IDAHO--Continued

## DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1966 TO SEPTEMBER 1967

DAY	OCTOBER			NOVEMBER			DECEMBER		
	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (ppm)	LOAD (TONS)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (ppm)	LOAD (TONS)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (ppm)	LOAD (TONS)
1	5250	C 4	57	4960	C 4	54	5100	C 4	55
2	5520	C 4	60	4940	C 4	53	4550	C 4	49
3	5580	C 4	60	4720	C 4	51	4500	C 4	49
4	5560	C 4	60	4720	C 4	51	4490	C 4	48
5	5460	C 4	59	4560	C 4	49	4810	C 4	52
6	5230	C 4	56	4760	C 4	51	4800	C 4	50
7	5080	C 4	55	4460	C 4	48	4670	C 4	52
8	5240	C 4	57	4650	C 4	50	4750	C 4	51
9	5150	C 4	56	4500	C 4	49	4420	C 4	48
10	5210	C 4	56	4870	C 4	53	3980	C 4	43
11	5120	C 4	55	4380	C 4	47	3770	C 4	41
12	5050	C 4	55	4290	C 4	46	3800	C 4	41
13	5210	C 4	56	4280	C 4	46	4720	C 4	51
14	5120	C 4	55	4450	C 4	48	5440	C 4	59
15	4960	C 4	54	4870	C 4	53	5480	C 4	50
16	4940	C 4	53	5570	C 4	60	5460	C 4	59
17	4860	C 4	52	5850	C 4	63	5340	C 4	58
18	4840	C 4	52	5800	C 4	63	5220	C 4	56
19	4650	C 4	50	5310	C 4	57	5570	C 4	60
20	4460	C 4	48	5320	C 4	57	6440	C 0	156
21	4640	C 4	50	5530	C 4	60	7180	C 0	174
22	4780	C 4	52	5390	C 4	58	7100	C 0	173
23	4780	C 4	52	5410	C 4	58	6510	C 0	158
24	4930	C 4	53	5110	C 4	55	5810	C 0	141
25	4760	C 4	51	4880	C 4	53	5630	C 0	137
26	4970	C 4	54	5210	C 4	56	5120	C 0	124
27	4970	C 4	54	4960	C 4	54	4720	C 0	115
28	5250	C 4	57	4810	C 4	52	4640	C 0	113
29	5240	C 4	57	4750	C 4	51	4820	C 0	117
30	5170	C 4	56	5010	C 4	54	4650	C 0	113
31	4970	C 4	54	--	--	--	4670	C 0	113
TOTAL	156950	--	1696	148340	--	1600	158160	--	2615
DAY	JANUARY			FEBRUARY			MARCH		
	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (ppm)	LOAD (TONS)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (ppm)	LOAD (TONS)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (ppm)	LOAD (TONS)
1	4410	C 9	107	7670	C 13	269	5440	C 13	191
2	4640	C 9	113	6980	C 13	245	5590	C 13	166
3	4730	C 9	115	6640	C 13	233	5710	C 13	200
4	4620	C 9	112	6730	C 13	236	5710	C 13	200
5	4680	C 9	114	7140	C 13	251	5460	C 13	192
6	5070	C 9	123	7190	C 13	252	5440	C 13	191
7	4360	C 9	106	7150	C 13	251	5300	C 13	186
8	4310	C 9	105	6770	C 13	238	5170	C 13	181
9	4360	C 9	106	6500	C 13	228	5260	C 13	185
10	4900	C 9	119	6270	C 13	220	5490	C 13	193
11	5020	C 9	122	6190	C 13	217	5400	C 13	190
12	4900	C 9	119	6080	C 13	213	5180	C 13	182
13	4890	C 9	119	5930	C 13	208	5010	C 13	176
14	4840	C 9	118	6400	C 13	225	4880	C 13	171
15	5010	C 9	122	6410	C 13	225	4940	C 13	173
16	5230	C 9	127	6060	C 13	213	5020	C 13	176
17	5200	C 9	126	6140	C 13	216	5380	C 13	189
18	5020	C 9	122	6000	C 13	211	5470	C 13	192
19	5050	C 9	123	5950	C 13	209	5510	C 13	193
20	5380	C 9	131	5740	C 13	201	5530	C 13	198
21	5770	C 9	140	5590	C 13	196	5590	C 13	196
22	5610	C 9	136	5590	C 13	196	5460	C 13	192
23	5310	C 9	129	5520	C 13	194	6490	C 12	210
24	5020	C 9	122	5470	C 13	192	7150	C 12	232
25	4850	C 9	118	5430	C 13	191	7240	C 12	235
26	4610	C 9	112	5450	C 13	191	7310	C 12	237
27	4850	C 9	118	5470	C 13	192	7200	C 12	233
28	5360	C 9	130	5550	C 13	195	7030	C 12	228
29	6590	C 13	231	--	--	--	7000	C 12	227
30	7650	C 13	269	--	--	--	6780	C 12	220
31	8150	C 13	286	--	--	--	6760	C 12	219
TOTAL	160400	--	4140	174010	--	6108	181000	--	6184
C Composite period.									

## KOOTENAI RIVER BASIN--Continued

## 12-3185. KOOTENAI RIVER NEAR COPELAND, IDAHO--Continued

DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1966 TO SEPTEMBER 1967

DAY	APRIL			MAY			JUNE		
	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (ppm)	LOAD (TONS)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (ppm)	LOAD (TONS)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (ppm)	LOAD (TONS)
1	6630	C 12	215	10800	15	437	83600	255	57600
2	6540	C 12	212	10500	16	454	87100	335	78800
3	6510	C 12	211	10800	8	233	88300	305	72700
4	6710	C 12	217	11100	7	210	92400	255	63600
5	7140	C 12	231	11300	9	275	95700	350	90400
6	7520	C 12	244	11900	10	321	93700	278	70300
7	7960	C 12	258	13900	18	676	89200	227	54700
8	8550	C 12	277	18400	35	1740	88800	202	48400
9	9190	14	347	24700	72	8	90600	192	46900
10	9720	16	420	29600	139	11100	92900	194	48700
11	10200	-- E	500	30100	140	11400	95000	235	60300
12	10800	20	583	27100	83	6070	94700	350	89500
13	11100	32	959	23800	51	3280	90200	225	54800
14	11500	46	1440	21900	34	2010	81000	182	39800
15	11900	25	803	21900	18	1060	72600	135	26500
16	11700	21	663	25300	28	1910	70900	138	26400
17	11200	22	665	32500	75	6580	75300	125	25400
18	10600	17	487	42200	162	18500	81300	185	40600
19	10300	16	445	49900	170	22900	85800	248	57500
20	9780	12	317	55000	265	39400	87600	277	65500
21	9330	14	353	60700	225	36900	88000	228	54200
22	8870	14	335	70800	425	81200	87900	206	48900
23	8680	10	234	81600	370	82000	88500	184	44000
24	8680	10	234	87900	620	147000	86900	200	46900
25	9040	-- E	220	87000	500	120000	82600	230	51300
26	9810	8	212	79200	300	64200	74300	212	42500
27	10900	20	599	69700	218	40400	67800	178	32600
28	11500	8	248	62000	180	25100	65100	159	28400
29	11600	9	282	62900	155	26300	66600	168	30200
30	11200	8	242	69200	150	28000	66300	155	27700
31	--	--	--	76200	275	56600	--	--	--
TOTAL	285260	--	12443	1288900	--	841056	2511500	--	1525100

DAY	JULY			AUGUST			SEPTEMBER		
	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (ppm)	LOAD (TONS)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (ppm)	LOAD (TONS)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (ppm)	LOAD (TONS)
1	64000	157	27100	17100	-- E	510	7980	C 3	65
2	59100	158	25200	16500	8	356	7470	C 3	61
3	53400	140	20200	15900	8	343	7480	C 3	61
4	49600	140	18700	15100	8	326	7440	C 3	60
5	49000	126	16700	14200	8	307	7380	C 3	60
6	49800	118	15900	13600	14	514	7610	C 3	62
7	48700	120	15800	13300	12	431	7250	C 3	59
8	45800	115	14200	13300	12	431	7200	C 3	58
9	41500	110	12900	13400	12	434	7130	C 3	58
10	38600	92	9590	13600	10	367	7030	C 3	57
11	36800	99	9840	13300	-- E	360	6860	C 3	56
12	34000	98	9000	12900	10	348	6810	C 3	55
13	31800	85	7300	12600	10	340	6830	C 3	55
14	31900	74	6370	12300	10	332	6780	C 3	55
15	33400	73	6580	12100	-- E	330	6560	C 3	53
16	33900	70	6410	11800	10	319	6400	C 3	52
17	32400	71	6210	11500	8	248	6250	C 3	51
18	30700	60	4970	11100	8	240	6200	C 3	50
19	29400	64	5080	10800	10	292	6070	C 3	49
20	27900	53	3990	10600	8	229	6050	C 3	49
21	26300	39	2770	10300	9	250	6090	C 3	49
22	24600	42	2790	10200	12	330	6040	C 3	49
23	23500	38	2410	10100	7	191	5940	C 3	48
24	22600	36	2200	9830	7	186	5900	C 3	48
25	21200	32	1830	9730	7	184	5540	C 3	45
26	20300	27	1480	9420	7	178	5660	C 3	46
27	19900	23	1240	9210	4	99	5660	C 3	46
28	19300	20	1040	9030	6	146	5560	C 3	45
29	18600	16	804	8610	C 3	70	5570	C 3	45
30	18000	15	729	8220	C 3	67	5090	C 3	41
31	17500	14	662	7980	C 3	65	--	--	--
TOTAL	1053500	--	259395	367630	--	8823	195830	--	1588

TOTAL DISCHARGE FOR YEAR (CFS-DAYS)

6881480

TOTAL LOAD FOR YEAR (TONS)

2870748

E Estimated.

A Computed from partly estimated-concentration graph.

B Computed from estimated-concentration graph.

C Composite period.

















PEND OREILLE RIVER BASIN--Continued  
12-3630. FLATHEAD RIVER AT COLUMBIA FALLS, MONT.

LOCATION --Lat 48°21'43", long 114°11'02", at gaging station at county road bridge at Columbia Falls, Flathead County, 5.7 miles downstream from South Fork, and at mile 143.0.

DRAINAGE AREA 1,450 miles.

RECORDS AVAILABLE--Chemical analyses: January 1949 to September 1950, August 1963 to September 1967 (discontinued).

Water temperatures: January 1949 to September 1950, August 1963 to September 1967 (discontinued).

Sediment records: July 1965 to September 1967 (discontinued).

EXTREMES: 1966-67.--Dissolved solids: Maximum, 114 ppm Mar. 1-6; minimum, 74 ppm June 20-30.

Hardness: Maximum, 106 ppm Mar. 1-6; minimum, 74 ppm June 20-30.

Specific conductance: Maximum daily, 233 microhos Sept. 17; minimum daily, 133 microhos July 4.

Water temperatures: Maximum, 69°F Sept. 4; minimum, 35°F Feb. 1. Daily, 1 ppm on several days during December to April and August.

Sediment concentrations: Maximum, 80 ppm May 21; minimum, 21 ppm Mar. 4-6.

EXTREMES: 1949-50, 1963-67.--Dissolved solids: Maximum, 150 ppm Apr. 1-7, 1966; minimum, 77 ppm July 1-10, 1950.

Hardness: Maximum, 119 ppm Jan. 11-31, 1949; minimum, 67 ppm June 1-10, 1949.

Specific conductance (1963-67): Maximum daily, 233 microhos Sept. 17, 1967; minimum daily, 133 microhos July 4, 1967.

Water temperatures: Maximum, 69°F Aug. 23, 1963; minimum, freezing point on many days during winter months.

Sediment concentrations (1965-67): Maximum daily, 980 ppm May 21, 1967; minimum daily, 1 ppm on many days.

Sediment loads (1965-67): Maximum daily, 140,000 tons May 23, 1967; minimum daily, 4 tons Mar. 4-6, 1967.

REMARKS.--Daily samples for chemical analysis composited by discharge. The sediment samples are taken from a county road bridge 12 miles downstream from the gaging station. No appreciable inflow or outflow occurs between the two points.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Fe)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> ) (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>		Sodium concentration ratio (microhos at 25°C)	Color or pH				
													Parts per million	Tons per acre-foot	Calcium, magnesium	Non-carbonate			Calcium, magnesium	Non-carbonate		
Oct. 1-31, 1966	10440	4.3	24	5.9	1.0	0.5	103	0	3.0	1.0	0.0	0.0	0.0	84	0	0.0	166	7.6	2			
Nov. 1-30, .....	9588	4.4	26	4.7	1.5	4	108	0	3.8	0.6	0.2	0.1	0.0	84	0	0.0	184	7.7	3	3		
Dec. 1-15, .....	11800	1.0	22	6.1	1.9	4	98	0	2.0	1.2	1.1	2.02	0.2	80	0	0.0	161	7.6	3	3		
Dec. 16-31, .....	8823	3.0	27	6.2	1.6	4	119	0	3.9	1.0	0.9	0.1	0.0	83	0	0.0	166	7.7	3	3		
Jan. 1-2, 1967	8822	3.6	23	6.2	1.9	4	104	0	3.8	1.0	0.9	0.1	0.0	83	0	0.0	164	7.9	3	3		
Jan. 13-20, .....	4975	4.8	25	6.2	1.3	5	104	0	5.0	0.8	1.1	2.02	0.1	100	14	1340	88	2	0	173	7.5	2
Jan. 21-31, .....	3484	4.6	26	5.6	1.0	4	108	0	4.5	0.6	1.2	0.0	0.0	102	14	958	88	0	0	176	7.4	2
Feb. 1-14, .....	3800	5.2	27	5.8	1.2	8	109	0	5.2	0.6	2.0	0.0	0.0	99	13	1020	91	1	0	175	7.8	2
Feb. 15-28, .....	5099	4.5	27	5.8	1.3	6	110	0	4.5	0.6	2.0	0.1	0.0	97	13	1340	91	0	0	175	7.7	2
Mar. 1-6, .....	1662	4.6	30	7.6	1.3	8	127	0	7.5	0.8	1.1	0.0	0.0	114	16	512	106	1	0	209	8.2	5
Mar. 7-22, .....	8565	3.5	25	5.0	0.9	6	102	0	3.5	0.6	1.1	0.0	0.1	91	12	2100	83	0	0	164	7.8	5
Mar. 23-31, .....	2677	4.1	28	6.8	1.1	6	117	0	5.8	0.8	1.1	0.0	0.0	104	14	752	98	2	0	191	7.9	48
Apr. 1-30, .....	8866	6.2	25	6.0	0.9	4	104	0	4.5	0.8	1.1	0.0	0.0	94	13	2250	87	1	0	170	8.1	5
May 1-14, .....	9605	8.6	27	6.1	0.8	3	108	0	5.2	0.4	1.1	0.0	0.2	102	14	2650	90	1	0	176	8.1	10
May 15-31, .....	34650	5.8	27	4.9	1.4	5	108	0	5.2	0.4	1.1	0.0	0.1	101	14	9450	88	0	0	172	8.0	5



## PEND OREILLE RIVER BASIN--Continued

12-3630. FLATHEAD RIVER AT COLUMBIA FALLS, MONT.--Continued

Day	Specific conductance (micromhos at 25°C), water year October 1966 to September 1967											
	October	November	December	January	February	March	April	May	June	July	August	September
1.....	171	173	158	192	188	205	202	171	164	135	159	160
2.....	177	170	161	196	190	208	173	172	162	135	157	165
3.....	159	187	156	159	187	203	164	172	164	134	157	179
4.....	159	172	155	160	188	--	199	173	163	133	163	185
5.....	161	156	164	159	187	205	198	172	163	135	161	167
6.....	168	160	155	159	160	202	199	180	163	151	167	161
7.....	160	169	155	162	163	172	198	166	163	145	165	170
8.....	163	174	160	161	167	175	159	169	155	149	159	168
9.....	160	159	157	160	196	159	159	176	162	138	159	185
10.....	157	159	156	196	195	159	160	169	159	145	168	164
11.....	161	158	157	199	195	159	161	168	160	151	171	160
12.....	159	157	158	160	195	159	171	168	156	151	167	161
13.....	156	175	157	161	161	161	172	155	156	148	170	188
14.....	158	157	158	159	195	161	160	172	154	146	170	197
15.....	159	190	166	197	159	160	164	168	154	150	170	190
16.....	159	196	206	207	169	161	162	164	154	150	164	188
17.....	159	188	196	200	166	161	162	164	153	151	168	233
18.....	160	163	206	162	195	159	168	159	153	151	167	163
19.....	157	168	195	162	161	163	162	163	150	151	175	157
20.....	162	176	191	160	159	159	164	159	145	151	177	160
21.....	159	166	186	191	160	163	161	169	142	152	163	163
22.....	159	157	195	194	196	160	162	157	147	157	176	162
23.....	163	181	180	194	201	196	182	154	142	151	178	165
24.....	160	158	192	165	201	161	161	153	141	148	178	162
25.....	161	156	192	171	201	--	161	150	140	153	178	163
26.....	164	168	195	205	203	--	160	139	142	154	177	163
27.....	162	162	201	190	203	203	170	140	138	157	167	161
28.....	162	162	201	190	204	203	170	140	138	157	167	161
29.....	158	170	196	180	--	200	174	163	134	158	180	163
30.....	159	171	198	179	--	202	173	161	145	158	181	163
31.....	158	--	198	181	--	203	--	140	--	169	165	--
Average	161	169	177	180	184	178	169	162	152	148	168	170

Periodic determinations of suspended-sediment discharge and particle size, water year October 1966 to September 1967

(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	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment						Method of analysis		
						Percent finer than size indicated, in millimeters								
						0.002	0.004	0.008	0.016	0.031	0.062		0.125	0.250
June 1, 1967.....	46		38400	392	41000		28		52	81	89	98	100	YPWC

## PEND OREILLE RIVER BASIN--Continued

12-3630. FLATHEAD RIVER AT COLUMBIA FALLS, MONT.--Continued

Suspended sediment, water year October 1966 to September 1967  
(Where no daily concentrations are reported, loads are estimated)

Day	OCTOBER			NOVEMBER			DECEMBER		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	4340	7	82	4410	7	83	11800	13	410
2..	3940	8	85	4300	5	58	11800	13	410
3..	8020	7	150	4230	7	80	11900	9	290
4..	10900	6	180	8410	4	91	12000	10	320
5..	10800	5	150	11400	5	150	11700	19	600
6..	10800	6	170	11300	6	180	12000	15	490
7..	10800	6	170	11300	7	210	12000	12	390
8..	10800	9	260	11200	4	120	12000	15	490
9..	10800	5	150	11200	4	120	12000	13	420
10..	10800	5	150	11300	6	180	11900	12	390
11..	10800	5	150	11400	7	220	12000	5	160
12..	10900	9	260	11400	5	150	12100	9	290
13..	10200	6	170	11400	7	220	12300	15	500
14..	10900	9	260	8260	8	180	12600	10	340
15..	10900	5	150	2260	3	18	8870	5	120
16..	10900	5	150	2610	8	56	2160	2	12
17..	10900	5	150	2490	11	74	2150	1	6
18..	10900	4	120	5760	4	62	2240	6	36
19..	10900	4	120	11800	--	160	2490	--	40
20..	10900	4	120	11800	6	190	3030	--	57
21..	11000	5	150	11900	5	160	3260	--	53
22..	11000	5	150	11900	6	190	2990	--	40
23..	11000	6	180	11900	8	260	2740	4	30
24..	11100	3	90	11900	6	190	2510	1	7
25..	11100	5	150	11900	6	190	2430	2	13
26..	11300	5	150	12100	6	200	2270	1	6
27..	11500	6	190	12000	5	160	2070	3	17
28..	11700	5	160	12000	14	450	2060	4	22
29..	11700	5	160	11900	13	420	2110	4	23
30..	11600	4	130	11900	9	290	2050	14	77
31..	10300	6	170	--	--	--	1960	13	69
<b>Total</b>	<b>323500</b>	<b>--</b>	<b>4877</b>	<b>287630</b>	<b>--</b>	<b>5112</b>	<b>215490</b>	<b>--</b>	<b>6128</b>
Day	JANUARY			FEBRUARY			MARCH		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	2010	--	49	2450	3	20	1690	3	14
2..	3130	--	59	2420	2	13	1720	1	5
3..	12100	6	200	2480	4	27	1700	2	9
4..	12300	5	170	2520	5	34	1620	1	4
5..	12300	7	230	2610	23	160	1600	--	4
6..	12100	9	290	10000	23	620	1640	1	4
7..	12100	--	330	11200	13	390	2050	1	6
8..	12200	11	360	6300	7	120	3290	1	9
9..	10600	7	200	2330	1	6	9570	6	160
10..	3470	3	28	2250	2	12	9230	5	120
11..	1860	3	15	2180	3	18	8680	2	47
12..	11700	7	220	2140	2	12	9070	3	73
13..	2510	13	88	2170	2	12	9470	3	77
14..	1750	6	28	2150	6	35	9580	3	78
15..	1740	3	14	9400	13	330	9730	--	79
16..	1860	4	20	10300	10	280	9690	--	78
17..	2540	7	48	6640	3	54	9710	3	79
18..	9660	8	210	4140	7	78	9760	2	53
19..	9770	5	130	10600	3	86	9750	2	53
20..	9970	7	190	10400	14	390	9750	2	53
21..	2850	3	23	7430	31	620	9100	4	98
22..	1900	3	15	1940	4	21	8610	3	70
23..	4480	6	73	1830	1	5	3110	2	17
24..	9520	4	100	1800	1	5	7840	2	42
25..	6170	3	50	1760	1	5	2770	4	30
26..	1540	2	8	1730	3	14	1810	5	24
27..	1720	3	14	1710	2	9	1760	3	14
28..	2120	1	6	1700	3	14	1780	1	5
29..	2470	4	27	--	--	--	1690	2	9
30..	2820	4	30	--	--	--	1690	7	32
31..	2730	4	29	--	--	--	1640	5	22
<b>Total</b>	<b>183990</b>	<b>--</b>	<b>3254</b>	<b>124580</b>	<b>--</b>	<b>3390</b>	<b>171100</b>	<b>--</b>	<b>1368</b>

## PEND OREILLE RIVER BASIN--Continued

## 12-3630. FLATHEAD RIVER AT COLUMBIA FALLS, MONT.--Continued

Suspended sediment, water year October 1966 to September 1967--Continued  
(Where no daily concentrations are reported, loads are estimated)

Day	APRIL			MAY			JUNE		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	1600	4	17	9080	4	98	37800	400	41000
2..	3560	--	38	6170	4	67	39800	510	55000
3..	4640	11	140	5510	6	89	38600	400	42000
4..	1870	10	30	5430	5	73	38600	370	39000
5..	1970	5	27	5530	6	90	33700	300	27000
6..	2040	4	22	4510	7	85	34300	300	28000
7..	2210	3	18	6040	14	230	35800	240	23000
8..	6620	8	180	14800	60	2400	37000	230	23000
9..	10700	11	320	15800	140	6000	39300	320	34000
10..	10900	--	350	16200	140	6100	39000	300	32000
11..	11100	11	330	14100	65	2500	38100	200	21000
12..	11500	9	280	12300	30	1000	38400	--	22000
13..	11900	10	320	9840	15	400	33600	220	20000
14..	12200	12	400	9160	10	250	30200	220	18000
15..	12200	9	300	12400	20	670	30300	200	16000
16..	12000	9	290	15200	25	1000	33900	240	22000
17..	11800	7	220	20500	140	7700	35600	270	26000
18..	11700	3	95	28800	510	40000	37500	280	28000
19..	11500	5	160	33200	660	59000	37100	250	25000
20..	11300	2	61	33500	520	47000	35100	210	20000
21..	11100	5	150	35700	980	94000	35400	200	19000
22..	11000	--	89	47200	800	100000	36700	220	22000
23..	11000	-1	30	54400	940	140000	32700	160	14000
24..	11100	2	60	52100	880	120000	26800	130	9400
25..	11400	3	92	43300	560	65000	23800	120	7700
26..	11900	2	64	33400	220	20000	23400	110	6900
27..	11300	2	61	28700	350	27000	24700	100	6700
28..	9660	2	52	29300	740	59000	25100	100	6800
29..	7410	5	100	37100	720	72000	25300	100	6800
30..	6810	6	110	43300	660	77000	25600	100	6900
31..	--	--	--	40900	--	62000	--	--	--
<b>Total</b>	<b>265990</b>	<b>--</b>	<b>4386</b>	<b>723470</b>	<b>--</b>	<b>1010752</b>	<b>1003200</b>	<b>--</b>	<b>668200</b>
	JULY			AUGUST			SEPTEMBER		
1..	23100	60	3700	6760	3	55	9510	6	150
2..	20500	50	2800	6560	13	230	7180	5	97
3..	19600	55	2900	6520	15	260	3840	4	41
4..	19000	50	2600	5700	10	150	2120	6	34
5..	18700	34	1700	5770	9	140	6430	12	210
6..	17800	27	1300	6590	9	160	7790	15	320
7..	16600	33	1500	5200	5	70	7900	11	230
8..	15400	30	1200	4540	4	49	8310	12	270
9..	14400	35	1400	7900	4	85	4310	10	120
10..	13900	28	1100	4140	6	67	2400	8	52
11..	13900	28	1100	4400	5	59	5760	13	200
12..	12200	21	690	5020	9	120	6960	10	190
13..	12800	19	660	3570	5	48	2470	7	47
14..	12000	18	580	3530	3	29	1930	8	42
15..	11200	18	540	3480	4	38	1850	8	40
16..	10500	16	450	4540	11	130	1780	9	43
17..	9920	16	430	4480	8	97	1730	12	56
18..	9450	16	410	4780	8	100	5330	15	220
19..	10200	13	360	4450	7	84	8400	7	160
20..	11100	12	360	3030	5	41	6910	6	110
21..	10600	16	460	6020	7	110	8370	11	250
22..	10100	9	250	3250	5	44	8320	12	270
23..	9390	11	280	3230	4	35	8370	11	250
24..	9560	9	230	2650	4	29	8260	11	250
25..	6990	8	150	2580	2	14	8330	11	250
26..	7420	12	240	2520	1	7	8250	13	290
27..	6640	11	200	2470	2	13	9050	13	320
28..	6740	5	91	2800	3	23	10400	11	310
29..	7090	3	57	2410	3	20	10400	14	390
30..	6820	3	55	2360	2	13	10400	12	340
31..	7520	7	140	8720	25	590	--	--	--
<b>Total</b>	<b>381140</b>	<b>--</b>	<b>27933</b>	<b>139970</b>	<b>--</b>	<b>2910</b>	<b>193060</b>	<b>--</b>	<b>5552</b>
<b>Total discharge for year (cfs-days).....</b>									<b>4013120</b>
<b>Total load for year (tons).....</b>									<b>1743862</b>

PEND OREILLE RIVER BASIN--Continued  
 12-3955. PEND OREILLE RIVER AT NEWPORT, WASH.

LOCATION.--Lat 48°11'00", long 117°02'00", at bridge on U.S. Highway 2 at Newport, Pend Oreille County, 0.2 mile downstream from gaging station, and 1.8 miles downstream from Albeni Falls Dam, and at mile 88.5.  
 DRAINAGE AREA.--24,200 square miles, approximately.  
 RECORDS AVAILABLE.--Chemical analyses: July 1959 to September 1967.  
 REMARKS.--No appreciable inflow between sampling point and gaging station.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>		Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	Color or pH
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Non-carbonate			
Oct. 30, 1966.	21600	4.9		25	6.0	2.7	0.7	98	0	8.8	1.5	0.1	0.2	--	A 99	0.13	5750	87	6	169	7.7	0
Nov. 20, 1966.	25400	5.4		23	6.2	2.7	0.6	99	0	9.4	0.9	0.1	0.3	--	103	0.14	7070	83	2	175	7.5	0
Dec. 18, 1966.	21600	6.6		23	5.8	3.0	0.7	90	2	9.4	0.5	0.1	0.2	--	94	0.13	5480	82	8	168	8.3	5
Jan. 8, 1967.	14600	7.4		22	6.0	2.8	0.9	94	0	9.2	0.5	0.1	0.3	--	98	0.13	3860	80	3	170	8.0	5
Feb. 25, 1967.	25700	6.6		24	5.8	3.0	0.6	95	0	11	0.5	0.2	0.1	0.02	98	0.13	6800	84	6	169	8.1	0
Mar. 26, 1967.	24900	7.0		22	5.8	2.8	0.9	94	0	10	0.8	0.1	0.2	--	102	0.14	6860	79	2	168	8.1	5
Apr. 23, 1967.	7800	9.1		25	6.8	3.4	1.3	108	0	9.6	1.0	0.2	0.6	--	A 110	0.15	2320	90	2	188	7.5	0
May 21, 1967.	8600	2.9		14	4.1	2.7	1.7	74	0	7.0	0.2	0.1	0.1	--	78	0.10	1260	80	3	124	7.7	10
July 15, 1967.	26400	6.5		20	5.1	2.7	0.7	70	0	8.8	0.5	0.1	0.1	--	91	0.12	6490	71	3	148	8.1	5
July 16, 1967.	26400	6.5		20	5.1	2.3	1.1	87	0	8.4	0.0	0.0	0.2	-0.1	92	0.13	1990	73	2	156	8.0	5
Aug. 19, 1967.	8010	6.0		20	5.6	2.3	1.1	87	0	8.4	0.0	0.0	0.2	-0.1	90	0.12	1750	79	4	165	7.9	5
Sept. 17, 1967.	7200	3.7		22	5.8	2.5	0.9	92	0	9.4	0.2	0.1	0.0	--	90	0.12	1750	79	4	165	7.9	5

A Calculated from determined constituents.

Additional determinations

Date of collection	Dis-solved oxygen (DO)	MPY (coliform colonies per 100 ml)	Hexa-valent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)	Date of collection	Dis-solved oxygen (DO)	MPY (coliform colonies per 100 ml)	Hexa-valent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)
Oct. 30, 1966.	9.6	380					Apr. 23, 1967.	10.4	36				
Nov. 20, 1966.	12.9	230					May 21, 1967.	10.6	62				
Dec. 18, 1966.	11.5	36					June 23, 1967.	9.9	40				
Jan. 8, 1967.	11.5	36					July 15, 1967.	8.7	240				
Feb. 25, 1967.	12.1	36		0.00	0.02		Aug. 19, 1967.	--	--	0.00	0.00	0.00	0.00
Mar. 26, 1967.	11.6	91					Sept. 17, 1967.	9.5	36				

COLUMBIA RIVER MAIN STEM  
12-3995. COLUMBIA RIVER AT INTERNATIONAL BOUNDARY, WASH.  
(Irrigation network station)

LOCATION --Lat. 48°55'00", long 117°47'40", at bridge on State Highway 25 at Northport, Stevens County, 12 miles downstream from gaging station at international boundary and at mile 734.1

DRAINAGE AREA --59,700 square miles, approximately, upstream from gaging station.

RECORDS AVAILABLE --Chemical analyses: February 1910 to January 1967.

Water temperatures: November 1951 to September 1967.

EXTREMES, 1966-67 --Dissolved solids: Maximum, 110 ppm July 12 to Aug. 1, Aug. 16 to Sept. 8.

Hardness: Maximum, 85 ppm Mar. 1-29; minimum, 62 ppm July 12 to Aug. 1.

Specific conductance: Maximum daily, 205 micromhos Apr. 15; minimum daily, 125 micromhos July 27, 29, 30.

Temperature: Minimum, 66° on several days during September, 71° minimum, 3-25-1964, on several days during January and February.

EXTREMES, 1958-67 --Dissolved solids: Maximum, 128 ppm Feb. 23, 1963; minimum, 62 ppm July 16-31, Aug. 16-31, Aug. 16-31, 1959, July 1-31, 1961, July 26 to Aug. 15, 1964, July 12 to Aug. 1, 1967.

Hardness: Maximum, 128 ppm Feb. 23, 1963; minimum, 62 ppm July 16-31, Aug. 16-31, Aug. 16-31, 1959, July 1-31, 1961, July 26 to Aug. 15, 1964, July 12 to Aug. 1, 1967.

Specific conductance: Maximum daily, 257 micromhos Feb. 23, 1963; minimum daily, 123 micromhos Aug. 2, 1960, Aug. 12, 1963.

Water temperatures: Maximum, 70° F May 14, 19, 1959; minimum, freezing point on several days during January in 1960, 1962, and 1963.

REMARKS --No appreciable inflow between sampling point and gaging station except during periods of heavy local runoff.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Ca)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> ) (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>	Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	pH or Col.						
													Parts per million	Tons per acre-foot										
Oct. 1-14, 1966..	65000	3.7	21		4.6	1.6	0.8	74	0	14	1.0	0.2	0.5	0.03	84	0.11	14740	72	11	0.1	152	7.5	0	
Oct. 15-31.....	63260	4.6	22	5.0	2.1	1.7	81	0	14	1.0	0.2	0.6	--	89	0.12	15200	76	9	0.1	163	7.5	0	0	
Nov. 1-30.....	58830	4.2	23	5.0	2.2	1.7	80	0	16	1.0	0.2	0.5	--	95	0.13	14320	73	7	0.1	166	7.5	5	5	
Dec. 1-31.....	47020	4.8	23	5.1	2.3	1.8	82	0	16	1.0	0.2	0.6	--	A 94	0.13	11930	78	11	0.1	169	7.7	5	5	
Jan. 1-31, 1967..	44920	5.2	24	5.5	2.4	1.2	82	0	18	1.0	0.2	0.3	0.00	A 99	0.13	12010	82	16	0.1	178	7.9	5	5	
Feb. 1-28.....	54200	6.0	24	5.6	2.6	1.4	84	0	18	1.0	0.2	0.5	--	110	0.15	16100	83	14	0.1	178	7.8	5	5	
Mar. 1-29.....	47855	6.2	23	6.7	2.6	1.1	88	0	17	1.0	0.2	0.3	--	110	0.15	14210	85	13	0.1	181	8.0	5	5	
Mar. 30-Apr. 12..	50410	5.9	24	5.5	2.6	1.0	84	0	18	1.0	0.2	0.6	--	A 100	0.14	13610	82	14	0.1	176	7.9	0	5	
Apr. 13-30.....	52400	6.6	24	5.7	2.4	1.7	84	0	18	0.8	0.3	0.4	--	104	0.14	14710	84	15	0.1	173	7.9	5	5	
May 1-27.....	121000	5.5	22	5.2	2.2	2.7	79	0	16	0.5	0.2	0.5	--	91	0.12	29730	77	12	0.1	160	7.8	5	5	
Mar. 28-June 11..	303500	5.4	21	4.4	1.8	0.8	75	0	14	0.2	0.2	0.4	--	87	0.12	7590	71	9	0.1	146	7.9	5	5	
June 12-July 11..	389000	5.0	20	4.3	1.3	0.8	77	0	10	0.2	0.2	0.4	--	78	0.10	8270	61	10	0.1	139	7.8	5	5	
July 12-Aug. 11..	227700	4.4	18	4.4	1.3	0.9	67	0	10	0.1	0.4	0.00	77	0.10	46720	62	9	0.1	129	7.8	5	5		
Aug. 12-Aug. 15..	140500	4.6	20	3.4	1.3	0.9	67	0	10	0.5	0.1	0.4	--	78	0.11	29590	64	9	0.1	135	7.8	5	5	
Aug. 16-Sept. 8..	99920	3.9	19	3.8	1.2	0.8	66	0	12	0.5	0.1	0.3	--	77	0.10	20500	63	9	0.1	133	7.9	5	5	
Sept. 9-30.....	77700	3.4	20	4.1	1.3	0.7	68	0	13	0.4	0.2	0.6	--	76	0.10	16150	67	12	0.1	139	7.8	5	5	
Weighted average.....	--	5.0	21	4.7	1.8	0.9	75	--	14	0.5	0.2	0.5	--	87	0.11	26830	71	10	0.1	149	7.8	--	--	
Time-weighted average.....	114232	5.0	22	5.0	2.0	0.9	78	--	15	0.7	0.2	0.5	--	92	--	--	75	11	0.1	159	7.8	--	--	
Tons per day....	--	1540	6480	1450	555	278	23130	--	4320	154	62	154	--	--	--	--	--	--	--	--	--	--	--	--

A Calculated from determined constituents.

Specific conductance (micromhos at 25°C), water year October 1966 to September 1967

Day	October	November	December	January	February	March	April	May	June	July	August	September
1.....	--	164	--	--	--	181	177	174	150	136	129	138
2.....	149	163	174	174	175	181	180	171	151	135	131	136
3.....	150	161	174	164	173	182	178	170	149	135	131	135
4.....	130	162	173	179	176	182	170	168	144	134	132	128
5.....	148	160	174	176	180	180	181	171	144	136	132	131
6.....	153	165	174	180	175	184	176	168	143	135	131	134
7.....	155	166	174	179	177	184	172	167	142	134	130	133
8.....	155	166	176	180	178	185	176	164	144	133	130	129
9.....	155	166	176	179	179	186	172	159	145	130	132	131
10.....	156	165	176	179	179	183	168	161	139	132	132	132
11.....	154	163	176	174	177	183	168	162	146	130	132	134
12.....	158	175	174	179	181	181	176	162	145	129	136	132
13.....	158	171	175	180	181	183	168	162	145	129	136	132
14.....	155	167	173	180	174	182	201	162	145	128	137	132
15.....	161	--	175	181	179	181	175	162	142	128	141	132
16.....	160	169	175	179	181	179	170	156	142	128	134	132
17.....	163	168	173	179	173	179	170	156	145	128	133	135
18.....	163	168	177	181	177	178	170	169	155	140	129	133
19.....	164	171	167	182	178	174	171	151	--	128	132	134
20.....	163	168	166	182	180	180	170	154	139	126	132	135
21.....	162	169	167	180	180	182	177	148	136	126	127	141
22.....	160	166	167	180	179	183	173	148	136	127	127	139
23.....	163	168	157	179	176	177	178	147	139	128	130	138
24.....	161	169	157	179	181	179	170	151	140	135	130	137
25.....	162	169	157	181	181	178	171	155	139	127	131	139
26.....	163	176	160	179	180	177	170	155	140	126	132	139
27.....	161	172	167	178	180	177	170	155	140	126	132	139
28.....	161	172	167	178	182	175	167	155	139	125	134	142
29.....	164	165	175	178	--	175	171	155	138	125	134	146
30.....	163	163	177	168	--	170	171	151	136	125	134	147
31.....	161	--	172	178	--	179	--	150	--	128	133	--
Average	157	166	170	178	177	180	174	159	142	130	131	135

Temperature (°F) of water, water year October 1966 to September 1967

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

## SPOKANE RIVER BASIN

12-4195. SPOKANE RIVER ABOVE LIBERTY BRIDGE, NEAR OTIS ORCHARDS, WASH.

LOCATION--Lat 47°41'55", long 117°02'35", at bridge on U.S. Highway 10 at state line, 3 miles upstream from gaging station, and 3.5 miles east of Otis Orchards, Spokane County, 880 square miles, approximately, upstream from gaging station.

DETAILED RECORD AVAILABLE--July 1955 to September 1965, October 1966 to September 1967.

Water temperatures: December 1963 to September 1965

REMARKS--No appreciable inflow between sampling point and gaging station except during period of heavy local runoff.

Chemical analyses, in parts per million, water year October 1966 to September 1967.

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>		Specific conductance (microhmhos at 25°C)	pH or color	
															Parts per million	Tons per acre-foot	Calcium, magnesium	Non-carbonate			Tons per day
Oct. 18, 1966.	1900	8.5		7.5	1.3	1.9	0.6	23	0	10	0.5	0.3	0.5	--	42	0.06	215	24	6	62	6.8
Nov. 20.....	2040	7.7		6.7	1.8	1.5	.6	22	0	9.6	.0	.4	.5	--	A 40	.05	220	24	6	62	6.8
Dec. 18.....	4500	8.5		7.5	1.3	1.9	.6	23	0	10	.5	.3	.3	--	A 42	.06	510	24	5	63	7.1
Jan. 6, 1967..	6180	8.5		7.5	1.6	1.8	.6	22	0	11	.0	.2	.5	--	A 43	.06	717	25	7	69	7.2
Feb. 22.....	9200	18.0		7.0	2.2	2.3	.5	22	0	12	.0	.3	.02	A 47	.06	1052	25	7	65	7.2	
Mar. 23.....	9200	9.3		6.9	2.0	1.8	.9	22	0	11	.0	.4	.0	--	A 44	.06	1090	25	7	63	7.1
Apr. 23.....	9800	8.8		6.8	2.0	1.9	1.0	22	0	10	.0	.5	.4	--	44	.06	1160	25	7	65	7.4
May 21.....	21000	9.6		5.8	1.8	1.6	.9	22	0	8.0	.0	.3	.2	--	41	.06	2320	22	4	57	7.2
June 25.....	11400	7.6		4.5	1.5	1.2	1.0	19	0	5.4	.2	.2	.2	--	34	.05	1050	17	2	44	7.2
July 16.....	2090	7.9		4.5	1.6	1.2	.6	20	0	5.6	.0	.2	.1	--	36	.05	203	18	1	45	7.4
Aug. 19.....	658	7.9		5.5	1.2	1.6	1.2	20	0	5.6	.0	.2	.8	.02	38	.05	67.5	19	2	48	7.1
Sept. 17.....	440	7.5		5.3	1.6	2.0	1.3	22	0	6.0	.0	.1	.2	--	38	.05	45.1	20	2	50	7.3

A Calculated from determined constituents.

## Additional determinations

Date of collection	Dissolved oxygen (DO)	MPN (coliform colonies 100 ml)	Hexavalent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)	Date of collection		Dissolved oxygen (DO)	MPN (coliform colonies 100 ml)	Hexavalent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)
							June 25, 1967.	July 16.....						
Feb. 22, 1967.	--	--	0.00	0.02	0.50		June 25, 1967.	9.0	40					
Mar. 26.....	12.9	36					July 16.....	8.4	730					
Apr. 23.....	12.0	91					Aug. 19.....	--	--					
May 21.....	10.9	73					Sept. 19.....	9.9	150	0.00	0.00	0.12		

12-4245. SPOKANE RIVER AT 7-MILE BRIDGE, NEAR SPOKANE, WASH.

LOCATION.--Lat 47°44'25", long 117°31'10", at bridge on 7-Mile Road, and 7.3 miles northwest of Spokane, Spokane County.  
 RECORDS AVAILABLE.--Chemical analyses: November 1966 to September 1967.  
 REMARKS.--No discharge records available.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carb. sulfate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Ni- trate iron (NO <sub>3</sub> ) (B)	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>		So- dium ad- sorp- tion ratio	Specific con- duct- ivity (micro- mhos at 25°C)	Col- or or pH
														Parts per million	Tons per acre-foot	Tons per day	Cal- cium Mag- nes- ium	Non- bor- onate			
Nov. 20, 1966.	8.2	15	5.3	3.4	1.1	61	0	13	3.0	0.3	1.2	---	---	86	0.12	60	10	137	7.0		
Dec. 8, 1967.	10	10	3.2	3.0	1.4	37	0	11	2.8	.3	1.6	---	---	62	.08	38	8	193	7.2		
Feb. 23.	9.1	11	3.5	3.0	1.0	38	0	12	2.0	.4	1.1	0.02	---	A 62	.08	42	11	98	7.2		
Mar. 26.	9.5	8.7	2.8	2.8	1.3	31	0	11	1.0	.4	1.4	---	---	A 54	.07	33	8	87	7.0		
Apr. 23.	9.4	9.0	2.9	2.9	1.6	32	0	12	2.5	.5	1.7	---	---	A 58	.08	34	8	89	7.1		
May 21.	9.3	6.5	1.9	1.9	.7	25	0	8.6	.2	.2	.3	---	---	48	.07	24	4	62	7.1		
June 25.	8.2	7.0	1.1	1.8	1.1	25	0	6.2	1.8	.2	1.4	---	---	40	.05	22	2	66	7.4		
July 19.	10.4	5	3.5	2.6	1.0	100	0	9.0	4	.2	3.7	---	---	124	.11	52	8	166	7.2		
Aug. 19.	8.2	20	7.5	5.6	2.0	93	0	11	3.8	.2	3.7	---	---	110	.15	82	6	209	7.2		
Sept. 17.																			181	7.1	

A Calculated from determined constituents.

Additional determinations

Date of collection	Dis- solved oxygen (DO)	MPN (coliform colonies per 100 ml)	Hexa- valent chro- mium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)	Date of collection	Dis- solved oxygen (DO)	MPN (coliform colonies per 100 ml)	Hexa- valent chro- mium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)
Nov. 20, 1966.	12.1	---	0.00	0.01	0.48		June 25, 1967.	10.3	930				
Feb. 22, 1967.	12.1	430					July 16.	8.4	4300				
Apr. 23.	12.0	930					Aug. 19.	4.9	2100	0.00	0.00	0.11	
May 21.	11.4	430					Sept. 17.						

## SPOKANE RIVER BASIN--Continued

12-4330. SPOKANE RIVER AT LONG LAKE, WASH.

LOCATION.--Lat 47°50'20", long 117°51'05", at bridge 0.2 mile downstream from gaging station, 1.2 miles upstream from Chamokane Creek, and 12 miles north of Reardon, Lincoln County.

DRAINAGE AREA.--6,020 square miles, approximately.

RECORDS AVAILABLE.--Chemical analyses: July 1959 to September 1967.

Water temperatures: July 1959 to September 1962, October 1966 to September 1967.

EXTREMES, 1966-67.--Water temperatures: Maximum, 72°F Sept. 5; minimum, 39°F Jan. 18, 19, Feb. 1-3.

EXTREMES, 1965-62.--Water temperatures: Maximum, 76°F Aug. 18, 1959; minimum, freezing point Jan. 21, Feb. 26, 1960.

REMARKS.--No inflow between sampling point and gaging station.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Fe)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> ) (B)	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH	Color
													Parts per million	Tons per acre-foot	Tons per day	Calcium magnesium	Non-carbonate			
Nov. 20, 1966	2850	8.0	20	7.7	4.1	1.5	90	0	12	2.5	0.2	2.1	106	0.14	816	82	8	183	7.1	0
Dec. 18, 1966	6330	10	18	5.6	3.4	1.2	73	0	12	1.8	2.1	1.8	95	0.13	1620	68	8	152	7.3	10
Jan. 8, 1967	7160	11	13	4.4	3.2	1.7	50	0	12	2.0	3.2	2.3	76	0.10	1470	50	10	121	7.1	5
Feb. 22, 1967	9640	9.6	10	3.4	2.6	1.4	38	0	12	1.0	4.8	0.02	81	0.08	1540	39	8	96	7.3	0
Mar. 26, 1967	10700	12	13	4.7	3.6	1.6	55	0	12	1.5	4.1	1.9	81	0.11	2340	52	7	128	7.1	5
Apr. 23, 1967	11200	10	10	3.4	2.9	1.7	40	0	12	1.5	4.1	1.0	63	0.09	1910	39	6	104	7.4	5
May 21, 1967	22200	9.9	8.1	2.8	2.5	1.9	33	0	16.4	1.0	3.8	1.8	A	0.07	3120	30	6	76	7.2	5
June 25, 1967	13300	8.3	7.5	2.8	2.1	1.9	33	0	16.4	1.0	3.8	1.8	36	0.08	1520	30	3	79	7.2	5
July 16, 1967	13360	7.7	10.5	3.9	2.3	1.1	46	0	7.2	1.2	2.1	1.1	62	0.08	1520	41	4	95	7.3	5
Aug. 19, 1967	1650	9.6	18	7.4	4.1	2.4	87	0	9.0	3.8	1.2	2.7	102	0.14	484	76	4	172	7.3	5
Sept. 17, 1967	995	8.4	22	8.8	4.4	2.2	107	0	8.6	4.0	2.2	2.3	113	0.15	304	91	4	204	7.2	5

A Calculated from determined constituents.

## Additional determinations

Date of collection	Dis-solved oxygen (DO)	MPN (coliform colonies per 100 ml)	Hexa-valent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)	Date of collection	Dis-solved oxygen (DO)	MPN (coliform colonies per 100 ml)	Hexa-valent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)
Nov. 20, 1966	8.9	---	---	---	---	---	May 21, 1967	11.6	91	---	---	---	---
Dec. 18, 1966	8.4	36	0.00	0.00	0.41	---	June 21, 1967	9.9	150	0.00	0.00	0.03	---
Jan. 8, 1967	10.8	36	---	---	---	---	July 16, 1967	7.4	360	---	---	---	---
Feb. 22, 1967	12.5	36	---	---	---	---	Aug. 19, 1967	---	---	---	---	---	---
Mar. 26, 1967	12.3	430	---	---	---	---	Sept. 17, 1967	8.5	36	---	---	---	---
Apr. 23, 1967	11.8	91	---	---	---	---							

Temperature (°F) of water, water year October 1966 to September 1967

Month	Day																															Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
October.....	61	61	61	61	61	61	61	61	59	59	59	57	57	57	55	55	55	55	55	55	55	54	54	54	54	54	54	54	54	54	54	54
November.....	54	54	52	52	52	52	52	52	50	50	50	50	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	
December.....	46	46	45	45	45	45	45	45	45	45	45	45	45	45	45	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	
January.....	43	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	39	39	39	41	41	41	41	41	41	41	41	41	41	41	
February.....	39	39	39	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	
March.....	41	41	41	41	41	41	41	41	43	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	
April.....	45	43	43	43	43	43	43	45	45	45	45	45	45	45	46	46	46	46	46	46	46	45	45	45	45	45	45	45	45	45	45	
May.....	46	46	48	48	48	48	46	46	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	
June.....	55	57	57	55	55	55	57	57	59	59	59	59	59	59	59	61	61	61	61	61	61	61	60	60	60	60	60	60	60	60	60	
July.....	66	70	68	68	64	64	68	66	66	66	64	68	64	64	64	64	64	64	66	66	66	66	66	66	66	66	66	66	66	66	66	
August.....	66	66	66	64	64	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	
September.....	64	64	66	68	72	66	70	66	66	64	63	63	63	63	64	64	64	64	64	64	64	63	63	63	63	64	64	64	64	64	64	

OKANOGAN RIVER BASIN

12-4425. SIMILKAMEN RIVER NEAR NIGHTHAWK, WASH.

LOCATION.--Lat. 48°56'05", long 119°26'25", at 12th Avenue bridge at Oroville, 10 miles east of Nighthawk, Okanogan County, 1.4 miles upstream from mouth, and 10.2 miles downstream from gaging station.

DRAINAGE AREA.--3,550 square miles, approximately, upstream from gaging station.

RECORDS AVAILABLE.--Chemical analyses: January 1949 to September 1950, October 1963 to September 1967.

Water temperatures: January 1949 to September 1967.

EXTREMES, 1949-50.--Water temperatures: Maximum, 79° F Aug. 15, minimum, freezing point Dec. 10, 23.

EXTREMES, 1966-67.--Water temperatures: Maximum, 72° F Aug. 2, 3, 1949, Aug. 1950; minimum, freezing point on many days during winter months. Relative humidity: Maximum, 86% Oct. 26, 1949, 86% Oct. 1950; minimum, 40% Oct. 1949, 40% Oct. 1950. Wind speed: Maximum, 18 mph Oct. 1949, 18 mph Oct. 1950. Chemical analyses: for period October 1963 to September 1966 published as a miscellaneous station. Temperature records obtained at county bridge at Nighthawk, 1.7 miles upstream from gaging station.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	Color	pH	
														Parts per million	Tons per acre-foot	Tons per day	Calcium	Magnesium				
Nov. 17, 1966.	640	9.1	26	4.4	4.0	0.8	0	0	15	0.0	0.2	0.2	--	113	0.15	195	83	9	178	7.3	0	
Nov. 22, 1967.	564	11	27	5.2	4.1	1.0	98	0	17	0.0	0.2	0.5	0.01	116	0.16	177	89	8	192	8.1	5	
May 24, 1967.	13300	9.4	10	2.0	1.8	1.6	41	0	4.4	0.0	1.1	5.5	--	50	0.07	1800	33	0	79	7.2	10	
Aug. 16, 1967.	732	12	26	4.5	3.9	1.6	96	0	15	0.0	1.1	1.1	0.03	112	0.15	221	84	5	181	7.9	5	

Additional determinations

Date of collection	Dis-solved oxygen (DO)	MPN (coliform colonies 100 ml)	Hexa-valent chro-mium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)	Date of collection	Dis-solved oxygen (DO)	MPN (coliform colonies 100 ml)	Hexa-valent chro-mium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)
Nov. 17, 1966.	12.3	36	0	0.00	0.01	--	May 24, 1967.	12.0	72	0	0.00	0.00	0.00
Feb. 23, 1967.	12.8	0	0	0.00	0.00	--	Aug. 16, 1967.	7.9	0	0.00	0.00	0.00	0.00

Temperature (°F) of water, water year October 1966 to September 1967

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

WENATCHEE RIVER BASIN

12-4625.2. WENATCHEE RIVER AT WENATCHEE, WASH.

LOCATION - Lat. 47°27'30", long 120°20'10", at bridge on U.S. Highway 97, 0.8 mile northwest of Wenatchee, Chelan County, and 0.9 mile upstream from mouth.  
 CONDITIONS AVAILABLE - Chemical analyses: July, 1960. September, 1967.  
 REMARKS - No discharge records available. Published as a miscellaneous station for period October 1963 to September 1967.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> ) (B)	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>	Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	Color or pH
													Parts per million	Tons per acre-foot	Tons per day				
Oct. 25, 1966..		6.6	4.5	2.2	1.6	1.3	26	0	2.4	2.0	0.0	0.2	35	0.05	20	0	48	7.2	5
Nov. 18, .....		8.3	6.6	3.7	2.7	1.1	42	0	4.0	1.0	1.1	1.3	A49	.07	32	0	77	7.3	5
Dec. 28, .....		8.8	5.5	2.3	2.0	.8	32	0	3.0	.8	1.1	1.4	A40	.05	23	0	56	7.4	5
Dec. 30, .....		8.6	5.0	2.7	2.0	.9	32	0	3.0	1.2	1.1	1.6	39	.05	24	0	58	7.5	5
Jan. 25, 1967..		8.7	5.9	3.0	2.0	1.1	36	0	3.6	1.0	1.1	1.1	47	.06	27	0	65	7.6	0
Feb. 23, .....		9.7	7.0	3.8	2.1	1.2	48	0	3.4	1.5	1.1	1.5	A48	.07	33	0	73	7.4	0
Mar. 24, .....		12	6.7	3.6	2.7	1.3	42	0	3.2	.5	1.1	1.2	53	.07	32	0	76	7.5	5
Apr. 20, .....		12	6.8	3.5	2.3	1.6	41	0	3.6	1.0	1.1	1.3	A51	.07	32	0	76	7.4	5
May 23, .....		7.4	4.0	1.1	1.2	1.1	20	0	1.8	.2	0.0	1.3	31	.04	15	0	37	7.1	10
May 24, .....		7.3	3.7	1.6	1.1	.9	20	0	2.0	.0	0.0	1.3	30	.04	16	0	39	7.0	5
June 15, .....		6.5	3.0	1.1	1.0	1.1	16	0	2.6	.0	0.0	1.2	24	.03	12	0	30	7.2	5
Aug. 3, .....		6.7	5.0	2.2	1.9	1.9	29	0	2.6	.2	1.1	1.1	36	.05	22	0	51	7.6	5
Aug. 1, .....		6.7	7.0	3.4	2.6	1.3	42	0	2.6	.4	0.0	1.1	43	.06	22	0	51	7.6	5
Sept. 21, .....		5.5	7.0	3.4	2.6	1.3	42	0	4.0	.5	0.0	1.1	45	.06	32	0	77	8.1	5

A Calculated from determined constituents.

Additional determinations

Date of collection	Dis-acid oxides (DO)	MPN (coliform colonies 100 ml)	Hexa-valent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)	Date of collection	Dis-acid oxides (DO)	MPN (coliform colonies 100 ml)	Hexa-valent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)
Oct. 25, 1966.	11.2	2400	0.00	0.01	0.00		May 24, 1967..	12.1	230	0.00	0.00	0.00	
Feb. 23, 1967..	13.0	430					Aug. 17, .....	12.2	1500				

## CRAB CREEK BASIN

12-4726. CRAB CREEK NEAR BEVERLY, WASH.

LOCATION.--Lat 46°49'55", long 119°48'55", at county bridge 4.8 miles east of Beverly, Grant County, 0.7 miles upstream from gaging station, and 5.2 miles upstream from mouth.

DRAINAGE AREA.--4,842 square miles, of which 665 square miles in the vicinity of Soap Lake is noncontributing.

RECORDS AVAILABLE.--Chemical analyses: August 1959 to September 1967.

Water temperatures: August 1959 to September 1962.

REMARKS.--No appreciable inflow between sampling point and gaging station except during periods of heavy local runoff.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Fe)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> ) (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>		Specific conductance (microhm-cm at 25°C)	Col- or pH			
													Parts per million	Tons per acre-foot	Calcium-Magnesium	Non-carbonate			Tons per day	So-dium adsorp-tion ratio	
Oct. 25, 1966.	183	22	51	34	34	192	24	444	198	67	1.0	1.8	A 837	1.14	414	267	0	1970	8.6	5	
May 25, .....	228	13	57	37	38	256	24	475	289	91	1.0	7.7	A 1771	1.41	564	286	0	1544	8.8	10	
Dec. 2, .....	148	13	57	37	38	256	24	475	289	91	1.0	7.7	A 1771	1.41	564	286	0	1544	8.8	10	
Jan. 25, 1967.	126	34	55	35	35	149	17	410	182	65	1.0	8.2	751	1.05	308	286	0	1200	8.3	10	
Feb. 24, .....	112	30	54	32	32	150	16	404	2	63	1.9	8.2	739	1.02	95	281	0	1130	8.3	5	
Mar. 29, .....	126	22	42	30	30	138	15	340	0	65	1.1	5.1	654	1.01	223	266	0	1080	8.0	10	
Apr. 19, .....	136	20	43	30	30	162	18	374	14	63	1.0	4.8	A 713	.97	262	231	0	1100	8.5	10	
May 25, .....	109	20	40	26	103	13	304	0	126	45	1.9	3.2	A 537	.72	155	207	0	812	8.2	5	
June 8, .....	164	25	48	27	181	13	266	4	126	40	1.7	2.8	A 500	.68	140	206	0	747	8.4	10	
July 26, .....	106	28	38	27	84	13	294	0	124	47	.9	1.5	526	.72	131	216	0	816	8.1	5	
Aug. 17, .....	123	28	44	29	104	16	304	12	132	40	.8	3.6	563	.77	181	230	0	896	8.5	20	
Sept. 20, .....																					

A Calculated from determined constituents.

## Additional determinations

Date of collection	Dissolved oxygen (DO)	Hexavalent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)	Date of collection	Dissolved oxygen (DO)	Hexavalent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)
Oct. 25, 1966.	9.3	30	0.00	0.01		May 25, 1967..	11.9	36			
Nov. 17, .....	12.6	430				June 14, .....	8.6	150			
Feb. 24, 1967.	11.6	430				July 20, .....	10.4	--			
Mar. 28, .....	12.4	0				Aug. 17, .....	9.2	230			
Apr. 19, .....	11.0	930				Sept. 20, .....	10.1	36			

YAKIMA RIVER BASIN

12-4840, WILSON CREEK AT THRALL, WASH.

LOCATION.--Lat 46°55'00", long 120°30'25", at bridge on Highway 97, 1.0 mile south of Thrall, Kittitas County, and approximately 100 feet upstream from mouth. RECORDS AVAILABLE.--Chemical analyses: October 1965 to September 1967.

REMARKS.--No discharge records available.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean Silica (SiO <sub>2</sub> ) (cfs)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH or Col- or	
													Parts per million	Tons per acre-foot	Tons per day	Calcium-Magnesium			Non-carbonate
Oct. 26, 1966...	42		35	17	25	4.9	228	0	12	11.0	0.4	3.4	--	A 263	0.36	186	0	395	7.5
Nov. 25, .....	43		35	17	25	3.6	196	0	13	8.0	3.0	3.6	--	231	0.37	180	0	358	7.6
Dec. 25, .....	38		30	16	21	3.6	196	0	11	8.0	3.0	3.6	--	231	0.37	180	0	358	7.6
Jan. 25, 1967...	44		31	15	22	4.0	196	0	13	9.0	3.4	4.0	--	242	0.33	139	0	367	7.4
Feb. 24, .....	40		29	14	20	4.0	182	0	11	6.0	4.4	2.7	0.02	217	0.30	130	0	359	7.6
Mar. 29, .....	40		29	16	22	4.0	195	0	12	9.0	3.2	2.9	--	233	0.32	139	0	356	8.0
Apr. 19, .....	23		18	8.0		9.8		0	7.6	3.0	2.3	3.1	--	130	0.18	78	0	198	7.3
May 25, .....	29		21	12	13	3.5	150	0	7.8	3.0	3.1	3.3	--	167	0.23	102	0	271	7.3
June 24, .....	37		30	15	14	3.5	188	0	7.6	4.3	2.1	1.7	--	182	0.25	109	0	265	7.7
July 20, .....	35		30	13	15	4.8	189	0	8.0	4.2	2.1	1.6	0.0	A 268	0.28	127	0	316	7.6
Aug. 17, .....	36		30	13	17	4.8	189	0	8.0	4.2	2.1	1.6	0.0	208	0.28	127	0	316	7.6
Sept. 20, .....	32		26	12	16	4.4	166	0	8.8	4.0	3.1	1.1	--	191	0.26	115	0	287	7.6

A Calculated from determined constituents.

Additional determinations

Date of collection	Dis-solved oxygen (DO)	MPN (coliform colonies per 100 ml)	Hexa-valent chromi- um (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)	Date of collection	Dis-solved oxygen (DO)	MPN (coliform colonies per 100 ml)	Hexa-valent chromi- um (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)
Oct. 26, 1966...	8.2	110000					May 25, 1967...	11.7	2400				
Nov. 18, .....	8.8	24000					June 14, .....	11.7	24000				
Feb. 24, 1967...	12.3	11000	0.00	0.04	0.02		July 20, .....	9.1	--				
Mar. 29, .....	13.0	4600					Aug. 17, .....	10.1	4600				
Apr. 19, .....	10.6	4600					Sept. 20, .....	11.1	2400		0.00	0.00	0.00

## YAKIMA RIVER BASIN--Continued

12-4849. YAKIMA RIVER AT ROZA DAM, WASH.

LOCATION.--Lat 46°46'50", long 120°27'10", at Roza diversion dam, 8.0 miles downstream from Umtanum Creek, 12.3 miles north of Yakima, Yakima County, and at mile 127.9.

DRAINAGE AREA.--1,802 square miles.

RECORDS AVAILABLE.--Chemical analyses: October 1965 to September 1967.

EXTREMES, 1966-67.--Dissolved solids: Maximum, 131 ppm Nov. 16-26; minimum, 54 ppm July 4-31.

Hardness: Maximum, 84 ppm Oct. 22; minimum, 3 ppm July 4 to Aug. 31.

Water temperatures: Maximum, 67°F July 5, 17, 18; minimum, 34°F Dec. 28, 29.

Water turbidities: Maximum, 67 NTU July 5, 17, 18; minimum, 1 NTU July 15, 16, 18.

Water color: Maximum, 67 pcu July 5, 17, 18; minimum, 1 pcu July 15, 16, 18.

EXTREMES, 1965-67.--Dissolved solids: Maximum, 138 ppm Oct. 24 to Nov. 15, 1965; minimum, 54 ppm July 5-26, 1966, July 4-31, 1967.

Hardness: Maximum, 88 ppm Oct. 24 to Nov. 15, 1965; minimum, 34 ppm July 27 to Aug. 31, 1966.

Specific conductance: Maximum daily, 224 micromhos Nov. 15, 1965; minimum daily, 76 micromhos July 31, 1966.

Water temperatures: Maximum, 67°F July 5, 17, 18, 1967; minimum, freezing point on several days during January 1966.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (C <sub>4</sub> )	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> ) (B)	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>	Specific conductance (micro-mhos at 25°C)	Color		
													Parts per million	Tons per acre-foot	Tons per day					
Oct. 1-21, 1966..	17	14	5.4	5.4	6.2	1.4	76	0	3.6	2.0	0.1	0.6	92	0.13	57	0	4	134	7.5	0
Oct. 22-Nov. 15..	21	20	8.4	9.9	2.0	116	0	5.4	4.0	5.4	4.0	2.8	A 129	.18	84	0	5	208	7.5	5
Nov. 16-26..	22	18	8.9	11.5	2.2	116	0	5.6	5.0	5.0	2.2	1.4	A 131	.18	82	0	5	208	7.5	5
Nov. 27-Dec. 14..	18	15	6.7	7.6	1.5	90	0	4.4	3.0	3.0	1.1	1.3	65	0	65	0	.4	159	7.5	5
Dec. 15-26..	17	12	4.9	5.3	.9	70	0	3.4	2.0	2.0	1.1	.9	81	.11	50	0	.3	124	7.3	0
Dec. 27-Jan. 1, 1967..	17	13	5.7	6.1	1.0	78	0	3.8	2.0	2.0	1.1	1.1	A 88	.12	56	0	.4	141	7.4	0
Jan. 2-14..	18	14	5.6	6.0	1.8	78	0	4.0	3.0	3.0	1.1	1.0	95	.13	58	0	.3	139	7.9	5
Jan. 15-22..	16	12	4.4	5.0	1.2	66	0	3.2	3.2	3.2	1.0	.8	A 75	.12	54	0	.3	135	7.9	5
Jan. 23-Feb. 4..	18	13	5.3	5.7	1.6	76	0	3.6	3.6	3.6	1.1	.8	A 86	.12	58	0	.3	135	7.9	5
Feb. 5-Mar. 3..	15	12	4.2	4.6	1.4	64	0	3.2	2.0	2.0	1.1	.6	A 74	.10	48	0	.3	110	7.7	5
Mar. 4-24..	16	14	5.6	5.8	1.6	82	0	3.6	2.0	2.0	1.1	.6	A 89	.12	58	0	.3	140	7.8	5
Mar. 25-31..	16	13	4.5	5.1	1.3	68	0	3.2	2.0	2.0	1.1	.5	A 80	.11	51	0	.3	120	7.5	0
Apr. 1-22..	12	9.9	3.5	3.7	1.3	52	0	2.8	2.0	2.0	1.1	.6	65	.09	39	0	.3	94	7.6	5
Apr. 23-May 12..	15	19	5.2	4.1	1.0	64	0	3.0	3.0	3.0	1.1	.6	A 71	.10	47	0	.3	108	7.7	5
May 13-22..	12	19	5.2	4.1	1.0	64	0	3.2	3.2	3.2	1.2	1.1	69	.09	46	0	.3	108	7.7	5
June 5-July 3..	12	19.5	4.4	3.5	.9	56	0	2.8	1.8	1.8	1.0	.3	54	.07	36	0	.2	87	7.7	5
July 4-31..	11	8.5	3.6	3.1	.9	51	0	2.8	1.8	1.8	1.0	.3	54	.08	36	0	.2	86	7.7	5
Aug. 1-31..	12	8.5	3.5	3.3	.9	51	0	1.0	.8	.8	1.0	.4	58	.08	36	0	.2	86	7.7	5
Sept. 1-30..	13	10	4.5	4.2	1.1	61	0	1.6	1.3	1.3	1.1	.4	67	.09	44	0	.3	105	7.7	5
Time-weighted average.....	15	12	5.0	5.2	1.3	70	--	3.0	1.9	1.9	0.1	0.6	79	--	51	0	0.3	121	7.7	--

A Calculated from determined constituents.



## YAKIMA RIVER BASIN--Continued

12-4987. NACHES RIVER NEAR YAKIMA, WASH.

LOCATION--lat 46°37'48" N, long 120°35'10" W, at bridge on old U.S. Highway 410, 1.8 miles north of Yakima, Yakima County, and 3.8 miles upstream from mouth.  
 RECORDS AVAILABLE: Chemical analyses: July 1960 to September 1967.

REMARKS--No discharge records available.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Fe)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F) (NO <sub>3</sub> ) (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>		Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	pH	Color	
													Parts per million	Tons per acre-foot	Calcium magnesium	Non-carbonate					Tons per day
Oct. 26, 1966..		16		10	3.4	5.2	0.9	56	0	4.0	2.0	0.1	0.3	69	0.09	39	0		99	7.7	5
Nov. 18.....		13		10	2.6	4.6	.6	50	0	4.2	1.5	.1	.2	67	.09	36	0		92	7.4	0
Dec. 29.....		12		8.0	1.7	3.4	.6	36	0	3.0	1.0	.0	.1	52	.07	27	0		68	7.7	5
Jan. 25, 1967..		15		9.4	2.2	4.2	1.3	44	0	3.6	2.0	.0	.3	51	.08	32	0		83	7.9	5
Feb. 28.....		17		9.4	2.5	4.0	.8	44	0	3.2	2.0	.1	1.0	61	.08	34	0		82	7.8	5
Mar. 29.....		19		9.2	2.6	4.3	.8	45	0	3.8	1.5	.1	.7	64	.09	34	0		86	7.8	5
Apr. 19.....		20		9.2	2.4	4.6	1.2	48	0	3.0	1.0	.1	.2	67	.09	33	0		87	7.7	5
May 25.....		16		6.6	1.4	2.8	.8	32	0	2.0	.5	1.1	.2	45	.06	22	0		58	7.2	5
June 14.....		14		5.5	1.8	2.5	.6	30	0	2.2	.2	1.1	.1	A	.42	21	0		53	7.7	5
July 21.....		15		7.0	2.1	2.9	1.0	38	0	2.8	.2	1.1	.1	56	.08	26	0		66	7.7	5
Aug. 17.....		17		7.4	2.2	3.2	1.2	40	0	2.6	.5	1.0	.1	54	.07	28	0		72	7.7	5
Sept. 20.....		14		7.3	2.3	3.2	1.2	40	0	3.2	1.0	.1	.0	52	.07	28	0		72	7.5	5

A Calculated from determined constituents.

## Additional determinations

Date of collection	Dissolved oxygen (DO)	MPM (Coliform colonies per 100 ml)	Hexavalent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)	Date of collection	Dissolved oxygen (DO)	MPM (Coliform colonies per 100 ml)	Hexavalent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)
Oct. 26, 1966..	11.9	36					May 25, 1967..	11.8	110				
Nov. 18.....	11.0	36					June 14.....	12.1	2900				
Feb. 28.....	11.9	36					July 21.....	10.3	--				
Mar. 29.....	12.5	91		0.00	0.01		Sept. 19.....	11.0	0	0.00	0.01	0.00	
Apr. 19.....	12.5	91		0.00	0.01		Sept. 20.....	11.0	0	0.00	0.01	0.00	

12-5050. YAKIMA RIVER NEAR PARKER, WASH.

LOCATION.--Lat 46°29'50", Long 120°26'35", at Sunnyside diversion dam, 700 feet upstream from gaging station, 1.5 miles east of Parker, Yakima County, 3 miles downstream from Ahtanum Creek, and at river mile 103.7.

DRAINAGE AREA (revised).--3,660 square miles.

RECORDS AVAILABLE.--Chemical analyses: August 1959 to September 1967.

Water temperatures: August 1959 to September 1967. EXTREMES, 1966-67.--Dissolved solids: Maximum, 136 ppm Oct. 16 to Nov. 15; minimum, 59 ppm June 1-19.

Specific conductance: Maximum, 233 micromhos daily, 33 ppm Oct. 1-19. Specific conductance: Maximum daily, 233 micromhos Nov. 9, 10; minimum daily, 71 micromhos June 19.

Water temperatures: Maximum, 72°F July 13; minimum, 35°F Dec. 26, Jan. 7. EXTREMES, 1959-67.--Dissolved solids: Maximum, 204 ppm Nov. 29, 30, 1962; minimum, 44 ppm Jan. 1-13, 1960.

Hardness: Maximum, 122 ppm Nov. 29, 30, 1963; minimum, 27 ppm Jan. 1-13, 1960. Specific conductance: Maximum daily, 317 micromhos Nov. 29, 1963; minimum daily, 69 micromhos June 4, 1961, May 22, 1963.

Water temperatures: Maximum, 72°F on several days during July or August of most years; minimum, freezing point on many days during most years. REMARKS.--Approximately 15 percent of yearly flow is diverted at Sunnyside Diversion Dam. No inflow between sampling point and gaging station.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Fe)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F) (NO <sub>3</sub> )	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos/cm at 25°C)	Color		
												Parts per million	Tons per acre-foot	Tons per day	Calcium Magnesium	Non-carbonate			Sorption ratio	
Oct. 1-15, 1966.	251	19	16	5.8	10	1.6	88	0	7.6	3.0	0.1	1.0	A 107	0.15	72.5	64	0	0.5	167	7.6
Oct. 16-Nov. 15.	1120	21	20	7.7	14	2.2	114	0	9.2	6.0	0.2	1.4	A 138	0.19	417	82	0	0.7	214	7.7
Nov. 16-26.	1350	21	18	7.9	13	2.1	112	0	9.0	5.0	0.2	1.6	136	0.18	496	78	0	0.6	212	7.4
Nov. 27-Dec. 13.	2060	18	15	5.9	9.3	1.5	87	0	7.0	4.0	0.1	1.5	105	0.14	584	62	0	0.5	164	7.3
Dec. 14-Dec. 29.	3360	16	13	4.4	6.9	0.9	67	0	5.2	2.0	0.1	1.0	81	0.11	735	50	0	0.4	126	7.3
Dec. 30-Jan. 14, 1967.	2040	19	14	5.5	7.7	1.7	78	0	6.0	4.0	0.1	1.0	98	0.13	540	58	0	0.4	149	7.9
Jan. 15-Feb. 4.	2730	19	13	4.9	6.9	1.2	72	0	5.2	3.0	0.1	0.9	94	0.13	693	52	0	0.4	134	7.7
Feb. 5-Mar. 2.	3100	17	12	4.5	6.2	1.2	66	0	4.4	3.0	0.3	0.6	81	0.11	678	48	0	0.4	123	7.6
Mar. 3-10.	1850	14	11	4.1	5.2	1.1	52	0	4.5	2.5	0.1	0.8	66	0.10	474	43	0	0.5	148	8.1
Mar. 20-30.	554	20	14	4.9	8.0	1.3	76	0	5.6	3.0	0.1	0.8	96	0.13	443	55	0	0.5	144	8.1
Mar. 31-Apr. 17.	559	16	12	3.9	6.2	1.2	64	0	4.8	3.0	0.1	0.7	79	0.11	419	46	0	0.4	113	7.7
Apr. 18-27.	1600	17	12	3.6	6.1	1.1	64	0	4.6	1.2	0.1	0.7	87	0.11	379	45	0	0.4	122	7.7
May 1-10.	1800	18	12	3.6	5.2	1.1	58	0	4.2	1.2	0.1	0.7	78	0.11	379	45	0	0.4	114	7.7
May 11-22.	2860	18	10	3.6	5.2	1.1	58	0	3.8	1.2	0.1	0.6	73	0.10	564	40	0	0.4	102	7.7
May 23-31.	4080	16	9	3.0	4.4	0.9	50	0	3.6	0.8	0.1	0.5	62	0.08	683	35	0	0.3	89	7.7
June 1-19.	4890	15	8.5	2.8	4.1	1.0	47	0	3.2	1.2	0.1	0.3	59	0.08	779	33	0	0.3	84	7.7
June 20-July 13.	2970	14	8.5	3.2	4.4	1.0	48	0	3.6	1.2	0.1	0.4	60	0.08	481	34	0	0.3	89	7.7
July 14-31.	364	15	3.6	5.7	1.3	57	0	4.0	2.0	1.1	0.7	1.1	A 110	0.10	69.7	39	0	0.4	103	7.7
Aug. 1-31.	350	15	10	3.8	5.9	1.4	60	0	4.4	2.0	0.1	0.8	73	0.11	69.0	41	0	0.4	109	7.7
Sept. 1-9.	313	12	3.6	6.8	1.6	67	0	4.8	2.2	2.2	0.8	1.1	81	0.11	68.5	45	0	0.4	124	7.9
Sept. 10-30.	277	17	12	4.4	7.1	1.4	67	0	5.0	2.1	0.1	0.5	84	0.11	62.7	48	0	0.4	126	7.8
Weighted average.....	--	17	12	4.4	6.6	1.2	67	--	4.9	2.5	0.1	0.7	83	0.11	390	48	0	0.4	123	7.6
Time-weighted average.....	1752	17	13	4.7	7.4	1.4	72	--	5.4	2.7	0.1	0.8	88	--	--	51	0	0.4	133	7.6
Tons per day....	--	80	96	21	31	5.8	315	--	23	12	0.6	3.4	--	--	--	--	--	--	--	--

A Calculated from determined constituents.

YAKIMA RIVER BASIN--Continued  
 12-5050. YAKIMA RIVER NEAR PARKER, WASH.--Continued

Specific conductance (micromhos at 25°C), water year October 1966 to September 1967

Day	October	November	December	January	February	March	April	May	June	July	August	September
1.....	152	163	133	148	131	126	125	125	94	86	103	119
2.....	216	148	148	146	146	146	146	146	82	80	105	121
3.....	158	221	148	146	135	145	128	116	87	80	105	142
4.....	159	225	150	148	133	145	123	116	87	80	105	142
5.....	161	224	145	145	119	149	119	121	89	81	101	145
6.....	163	225	154	147	113	150	119	121	86	81	102	146
7.....	164	226	155	147	122	152	107	114	82	84	101	143
8.....	166	225	163	154	120	157	106	106	80	82	107	141
9.....	163	233	164	154	119	157	106	108	80	82	107	141
10.....	163	233	163	154	117	153	107	108	81	84	106	140
11.....	163	233	170	155	121	157	107	108	83	84	108	140
12.....	163	231	169	154	123	153	124	124	83	87	108	140
13.....	190	229	170	150	122	152	118	117	82	88	108	143
14.....	192	226	143	151	122	158	116	117	82	103	108	142
15.....	202	220	125	124	121	158	119	113	80	108	108	123
16.....	207	220	127	123	124	158	117	111	79	104	108	126
17.....	200	219	126	114	125	159	117	101	74	103	110	124
18.....	196	223	122	128	122	159	110	99	72	98	108	124
19.....	205	222	117	127	120	157	116	85	71	100	109	125
20.....	205	222	117	131	120	157	116	85	71	100	109	125
21.....	204	223	113	132	126	146	110	85	76	106	110	127
22.....	209	223	113	139	128	146	119	79	76	102	109	126
23.....	206	210	117	140	125	148	120	79	75	104	112	124
24.....	207	210	118	143	127	146	125	81	82	103	108	123
25.....	200	192	129	149	128	138	125	87	83	103	109	125
26.....	202	191	129	153	128	137	125	86	83	103	109	125
27.....	207	172	138	140	132	131	126	92	70	104	110	127
28.....	207	172	138	140	132	131	126	92	70	104	110	127
29.....	210	179	144	139	142	142	128	95	81	104	112	126
30.....	201	179	146	140	145	142	128	90	81	103	114	129
31.....	217	--	145	125	--	127	123	90	--	104	114	--
Average	187	214	141	142	124	148	118	121	81	94	107	123

Temperature (°F) of water, water year October 1966 to September 1967

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

12-5105. YAKIMA RIVER AT KIONA, WASH.  
(Irrigation network station)

LOCATION.--Lat 46°15'10", long 119°28'35", at highway bridge downstream from gaging station at Kiona, Benton County, 3.5 miles downstream from intake of Kiona Canal, and at mile 29.8.  
DRAINAGE AREA (revised).--5615 square miles.  
RECORDS AVAILABLE.--Chemical analyses: December 1952 to September 1967.  
EXTREMES 1966-67.--Dissolved solids: Maximum, 246 ppm Oct. 1-16; minimum, 103 ppm June 24-30.  
Hardness: Maximum, 142 ppm Oct. 1-16; minimum, 99 ppm June 24-30.  
Water temperatures: Maximum, 17.7° F. Aug. 22; minimum, 38° F. on several days during December and January.  
Water concentrations: Maximum, 77.9 mg/l. Aug. 22; minimum, 38° F. on several days during December and January.  
EXTREMES 1952-67.--Dissolved solids: Maximum, 246 ppm Oct. 1-16, 1966; minimum, 76 ppm May 1-23, 1957, Dec. 16-31, 1959.  
Hardness: Maximum, 148 ppm Oct. 1-11, 1958; minimum, 42 ppm May 1-23, 1957, Dec. 16-31, 1959.  
Specific conductance: Maximum daily, 410 microhos Oct. 13, 1966; minimum daily, 99 microhos Dec. 17, 1959.  
Water temperatures: Maximum, 84° F. July 16, 1960, July 21, 1963; minimum, freezing point on several days during winter months.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> ) (B)	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>	Sodium concentration ratio	Specific conductance (microhos at 25°C)	Color or pH			
											Parts per million	Tons per acre-foot	Tons per day							
Oct. 1-16, 1966..	1750	29	37	25	4.0	200	0	25	7.0	0.3	4.5	246	0.33	1160	142	0	0.9	387	7.9	5
Oct. 17-Nov. 15..	2210	27	32	24	3.5	160	0	23	8.0	0.3	4.7	224	0.30	1340	130	0	0.9	361	7.9	0
Nov. 16-Dec. 15..	3120	24	25	16	3.4	135	2	18	7.0	0.2	3.7	175	0.32	1480	128	0	1.0	375	8.2	5
Dec. 16-28.....	4460	21	20	7.1	13	2.1	105	0	4.5	0.2	2.8	136	0.18	1640	79	0	0.6	210	8.2	5
Dec. 29-Jan. 16, 1967..	2960	22	23	9.2	16	2.6	128	0	6.0	0.2	3.4	166	0.23	1330	96	0	0.7	255	8.2	5
Jan. 17-27.....	3390	20	20	7.6	14	2.4	112	0	5.0	0.2	2.6	140	0.19	1280	82	0	0.7	221	8.1	5
Jan. 28-Feb. 15..	4660	23	19	5.8	11	2.1	98	0	4.0	0.2	2.0	134	0.18	1690	72	0	0.6	193	8.0	5
Feb. 16-Mar. 5..	3460	21	18	7.1	12	2.1	104	0	3.0	0.1	1.7	132	0.18	1230	74	0	0.6	205	8.0	5
Mar. 6-13.....	2490	23	22	8.3	15	2.5	134	0	5.0	0.2	2.1	153	0.21	1030	89	0	0.7	243	8.0	0
Mar. 14-Apr. 10..	2020	25	23	8.6	16	2.5	128	0	6.0	0.2	2.4	163	0.22	889	93	0	0.7	252	8.2	0
Apr. 11-29.....	1640	23	25	9.5	17	2.7	134	0	5.8	0.3	3.5	171	0.23	850	102	0	0.8	268	8.0	5
Apr. 30-May 8.....	3760	24	20	16	18	2.9	165	0	5.2	0.2	3.1	175	0.24	1090	106	0	0.7	279	8.0	5
May 9-17.....	2660	25	23	10.9	16	2.6	135	0	4.5	0.3	2.8	168	0.23	1210	104	0	0.7	266	7.9	5
May 18-25.....	6170	21	16	5.8	10	1.8	87	0	9.6	0.5	3.2	113	0.15	1880	64	0	0.5	169	7.8	5
May 26-June 23..	6510	20	16	8.6	1.8	82	0	8.4	2.5	0.1	2.1	105	0.14	1850	61	0	0.5	160	7.8	5
June 24-30.....	6550	19	15	5.1	8.4	1.8	78	0	8.0	2.8	2.1	103	0.14	1820	59	0	0.5	153	8.0	10
July 1-20.....	1900	25	28	10	17	3.5	149	0	18	6.0	3.3	190	0.26	975	111	0	0.7	293	8.2	5
July 21-Aug. 8..	1440	33	34	11	21	3.9	176	0	22	7.0	3.6	223	0.30	867	129	0	0.8	345	8.2	5
Aug. 9-20.....	1390	33	34	12	22	4.1	181	0	22	7.2	3.6	226	0.31	848	133	0	0.8	354	8.1	5
Aug. 21-Sept. 8..	1640	30	34	11	21	4.2	174	1	22	6.5	3.3	223	0.30	967	131	0	0.8	368	8.3	5
Sept. 9-30.....	1320	29	34	12	24	4.4	189	0	23	7.7	4.1	243	0.33	1010	135	0	0.9	388	8.2	5
Weighted average.....	--	23	23	8.1	15	2.7	123	--	15	5.0	0.2	158	0.21	1250	91	0	0.7	244	7.4	--
Time-weighted average.....	2938	25	26	9.3	17	3.0	140	--	17	5.8	0.2	178	--	--	103	0	0.7	277	7.5	--
Tons per day....	--	186	181	65	119	21	976	--	117	39	1.7	23	--	--	--	--	--	--	--	--

A Calculated from determined constituents.



MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN PACIFIC SLOPE BASINS IN WASHINGTON AND UPPER COLUMBIA RIVER BASIN IN WASHINGTON  
CHEHALIS RIVER BASIN

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Fe)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> ) (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>	Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	Color or pH		
													Parts per million	Tons per acre-foot						
Feb. 27, 1967.	438	15	5.3	1.9	3.9	0.5	24	0	2.6	4.0	0.1	0.5	0.01	A 46	0.06	54.4	21	2	58	7.2
May 16, .....	164	14	5.6	1.8	4.7	.7	28	0	2.8	5.0	.1	.3	--	49	.07	21.7	22	0	64	7.3
Aug. 24, .....	22	16	7.0	2.2	6.8	.6	36	0	3.2	6.0	.1	.1	-.04	60	.08	3.56	27	0	85	7.3

12-0200. CHEHALIS RIVER NEAR DOTY, WASH. (Lat 46°38'05", Long 123°15'20")

Additional determinations

Date of collection	Time (24 hr)	Cross section	Temperature (°F)	Turbidity (ppm)	Color	D.O. (dissolved oxygen ppm)	B.O.D. (biochemical demand ppm)	P. B. I. (Pearl-Benson Index)	Slime solids		Chromium	Copper (Cu)	Zinc (Zn)	Arsenic (As)	Boron (B)	Total phosphate as PO <sub>4</sub>	Total ammonia as N (NH <sub>4</sub> )
									Total (mg/l)	Settleable (ml/l)							
Nov. 14, 1966...						11.0	930										
Feb. 27, 1967...						12.3	36										
May 16, .....						13.8	2400										
Aug. 24, .....						8.8	0										

A Calculated from determined constituents.

Chemical analyses, in parts per million, water year October 1966 to September 1967--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Fe)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> ) (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>	Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	Color or pH		
													Parts per million	Tons per acre-foot						
Nov. 14, 1966.	1140	13	4.5	1.5	3.8	0.9	18	0	2.2	4.2	0.1	2.4	--	51	0.07	157	17	1	52	6.9
Feb. 27, 1967.	447	16	4.8	1.9	3.4	.4	25	0	1.2	4.0	.1	.6	0.01	A 43	.07	51.9	20	0	55	7.3
May 16, .....	171	14	6.5	1.6	4.2	.6	33	0	1.4	4.0	.0	.2	--	54	.07	24.9	23	0	67	7.2
Aug. 24, .....	20	16	9.5	3.0	6.4	.6	44	0	1.2	8.5	.0	.1	-.02	66	.09	3.56	34	0	101	7.5

12-0250. NEWAUKUM RIVER NEAR CHEHALIS, WASH. (Lat 46°37'10", Long 122°56'35")



HUMPTULIPS RIVER BASIN

Chemical analyses, in parts per million, water year October 1966 to September 1967--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Fe)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> ) (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>	Specific conductance (micro-mhos at 25°C)					
														Parts per million	Tons per acre-foot			Calcium, Magnesium	Non-carbonate			
May 18, 1967...	659	7.9	5.8	1.5	2.6	0.4	27	0	2.4	2.0	0.1	0.1	0.1	0.02	37	0.05	65.8	20	0	55	7.3	0

12-0390. HUMPTULIPS RIVER NEAR HUMPTULIPS, WASH. (Lat 47°13'45", Long 123°57'40")

Additional determinations

Date of collection	Time (24 hr)	Chromium		Copper (Cu)	Zinc (Zn)	Arsenic (As)	Boron (B)
		Hexavalent (Cr <sup>6+</sup> )	Total (Cr)				
May 18, 1967.....		0.00	0.00	0.00	0.01		

QUINAULT RIVER BASIN

Chemical analyses, in parts per million, water year October 1966 to September 1967--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Fe)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> ) (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>	Specific conductance (micro-mhos at 25°C)				
														Parts per million	Tons per acre-foot			Calcium, Magnesium	Non-carbonate		
May 18, 1967...	2910	4.7	8.8	0.7	1.6	0.2	26	0	5.8	1.5	0.1	0.1	0.01	41	0.07	322	25	4	61	7.2	0

12-0395. QUINAULT RIVER AT QUINAULT LAKE, WASH. (Lat 47°27'30", Long 123°53'15")

Additional determinations

Date of collection	Time (24 hr)	Chromium		Copper (Cu)	Zinc (Zn)	Arsenic (As)	Boron (B)
		Hexavalent (Cr <sup>6+</sup> )	Total (Cr)				
May 18, 1967...		0.00	0.00	0.00	0.00		

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN PACIFIC SLOPE BASINS IN WASHINGTON AND UPPER COLUMBIA RIVER BASIN IN WASHINGTON--Continued  
 QUEETS RIVER BASIN

Chemical analyses, in parts per million, water year October 1966 to September 1967--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Fe)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> ) (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH or color	
														Parts per million	Tons per acre-foot day	Calcium, magnesium	Non-carbonate			
May 18, 1967..	4.2	8.2	0.9	2.2	0.7	26	0	6.2	1.5	0.1	0.1	0.1	0.01	37	0.05	24	2	63	7.2	5

12-0406. QUEETS RIVER AT QUEETS, WASH. (Lat 47°32'30", Long 124°20'00")

Additional determinations

Date of collection	Time (24 hr)	Chromium		Copper (Cu)	Zinc (Zn)	Arsenic (As)	Boron (B)
		Hexavalent (Cr <sup>6+</sup> )	Total (Cr)				
May 18, 1967....		0.00	0.00	0.00	0.00		

HOH RIVER BASIN

Chemical analyses, in parts per million, water year October 1966 to September 1967--Continued

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> ) (Fe)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> ) (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH or color	
														Parts per million	Tons per acre-foot day	Calcium, magnesium	Non-carbonate			
May 18, 1967..	2800	5.8	12	1.0	1.7	0.3	32	0	9.2	1.0	0.1	0.3	0.01	51	0.07	34	8	75	7.3	0

12-0412. HOH RIVER NEAR FORKS, WASH. (Lat 47°48'25", Long 124°15'00")

Additional determinations

Date of collection	Time (24 hr)	Chromium		Copper (Cu)	Zinc (Zn)	Arsenic (As)	Boron (B)
		Hexavalent (Cr <sup>6+</sup> )	Total (Cr)				
May 18, 1967....		0.00	0.00	0.00	0.01		

QUILLAYUTE RIVER BASIN

Chemical analyses, in parts per million, water year October 1966 to September 1967--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (cfs)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (calculated)		Hardness as CaCO <sub>3</sub>		Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	Color
														Parts per million	Tons per acre-foot	Calcium, Magnesium	Non-carbonate			
May 18, 1967...	8.0	8.8	1.3	2.0	0.3	33	0	4.4	1.5	0.1	0.1	0.1	0.04	43	0.06	28	0	68	7.7	5

12-0420. SOLEDUCK RIVER ABOVE KUGEL CREEK, NEAR FAIRHOLM, WASH. (Lat 48°04'00", Long 124°05'50")

Additional determinations

Date of collection	Chromium		Copper (Cu)	Zinc (Zn)	Arsenic (As)	Boron (B)
	Time (24 hr)	Hexavalent (Cr <sup>6+</sup> )				
May 18, 1967....		0.00	0.00	0.00	0.02	

ELWHA RIVER BASIN

Chemical analyses, in parts per million, water year October 1966 to September 1967--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (cfs)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>		Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	Color	
														Parts per million	Tons per acre-foot	Calcium, Magnesium	Non-carbonate				
May 17, 1967..	2680	6.3	1.5	2.1	0.4	47	0	8.2	0.5	0.1	0.1	0.04	60	0.08	44	5	44	5	96	8.1	0

12-0455. ELWHA RIVER AT McDONALD BRIDGE, NEAR PORT ANGELES, WASH. (Lat 48°03'55", Long 123°34'35")

Additional determinations

Date of collection	Chromium		Copper (Cu)	Zinc (Zn)	Arsenic (As)	Boron (B)
	Time (24 hr)	Hexavalent (Cr <sup>6+</sup> )				
May 17, 1967....		0.00	0.00	0.00		

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN PACIFIC SLOPE BASINS IN WASHINGTON AND UPPER COLUMBIA RIVER BASIN IN WASHINGTON--Continued

DUNGENESS RIVER BASIN

Chemical analyses, in parts per million, water year October 1966 to September 1967--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>	Sodium adsorption ratio (micro-mhos at 25°C)	Color or pH			
															Parts per million	Tons per acre-foot day				Calcium, magnesium	Non-carbonate	
12-0480. DUNGENESS RIVER NEAR SEQUIM, WASH. (Lat 48°04'35", long 123°09'00")																						
May 17, 1967..	918	5.9	14	2.2	2.3	0.6	52	0	6.0	0.0	0.1	0.1	0.1	0.02	57	0.08	141	44	2	99	7.6	5

Additional determinations

Date of collection	Chromium		Copper (Cu)	Zinc (Zn)	Arsenic (As)	Boron (B)
	Hexavalent (Cr <sup>6+</sup> )	Total (Cr)				
May 17, 1967.....	0.00	0.00	0.00	0.01		

BIG QUILCENE RIVER BASIN

Chemical analyses, in parts per million, water year October 1966 to September 1967--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>	Sodium adsorption ratio (micro-mhos at 25°C)	Color or pH
															Parts per million	Tons per acre-foot day			
12-0523. BIG QUILCENE RIVER NEAR QUILCENE, WASH. (Lat 47°48'40", long 122°54'35")																			
May 18, 1967...	7.7	10	1.9	2.0	0.5	40	0	1.8	3.0	0.0	0.2	0.02	47	0.06	33	0	75	7.9	5

Additional determinations

Date of collection	Chromium		Copper (Cu)	Zinc (Zn)	Arsenic (As)	Boron (B)
	Hexavalent (Cr <sup>6+</sup> )	Total (Cr)				
May 18, 1967.....	0.00	0.00	0.00	0.02		

DOSEWALLIPS RIVER BASIN  
 Chemical analyses, in parts per million, water year October 1966 to September 1967--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Fe)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>	Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	Coliform or pH	
															Parts per million	Tons per acre-foot					Calcium magnesium
12-0535. DOSEWALLIPS RIVER AT BRINNON, WASH. (Lat 47°41'25", long 122°53'50")																					
May 18, 1967...	5.5			11	1.1	1.4	0.4	37	0	5.2	0.5	0.1	0.2	0.01	45	0.06	32	2	73	7.4	0

Additional determinations

Date of collection	Time (24 hr)	Chromium		Copper (Cu)	Zinc (Zn)	Arsenic (As)	Boron (B)
		Hexavalent (Cr <sup>6+</sup> )	Total (Cr)				
May 18, 1967....		0.00	0.00	0.00	0.01		

DUCKABUSH RIVER BASIN

Chemical analyses, in parts per million, water year October 1966 to September 1967--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Fe)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>	Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	Coliform or pH	
															Parts per million	Tons per acre-foot					Calcium magnesium
12-0541. DUCKABUSH RIVER AT U.S. HIGHWAY 101 BRIDGE, NEAR BRINNON, WASH. (Lat 47°38'55", long 122°56'00")																					
May 18, 1967...	4.1			8.0	0.8	1.1	0.5	28	0	3.6	0.5	0.1	0.2	0.00	32	0.04	24	0	54	7.7	5

Additional determinations

Date of collection	Time (24 hr)	Chromium		Copper (Cu)	Zinc (Zn)	Arsenic (As)	Boron (B)
		Hexavalent (Cr <sup>6+</sup> )	Total (Cr)				
May 18, 1967...		0.00	0.00	0.00	0.02		

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN PACIFIC SLOPE BASINS IN WASHINGTON AND UPPER COLUMBIA RIVER BASIN IN WASHINGTON--Continued

HAMMA HAMMA RIVER BASIN

Chemical analyses, in parts per million, water year October 1966 to September 1967--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonates (HCO <sub>3</sub> )	Carbonates (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)
															Parts per million	Tons per acre-foot	Calcium-Magnesium	Non-carbonate	
May 18, 1967..	8.4	9.6	1.0	1.3	0.4	34	0	2.8	0.0	0.1	0.2	0.00	41	0.06	28	0	62	7.7	0

12-0550. HAMMA HAMMA RIVER AT ELDON, WASH. (Lat 47°32'55", long 123°02'25")

Additional determinations

Date of collection	Chromium		Copper (Cu)	Zinc (Zn)	Arsenic (As)	Boron (B)
	Time (24 hr)	Hexavalent (Cr <sup>6+</sup> )				
May 18, 1967....	0.00	0.02	0.02	0.02		

GOLDSBOROUGH RIVER BASIN

Chemical analyses, in parts per million, water year October 1966 to September 1967--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonates (HCO <sub>3</sub> )	Carbonates (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)
															Parts per million	Tons per acre-foot	Calcium-Magnesium	Non-carbonate	
Apr. 13, 1967..	14	11	4.6	2.8	0.6	56	0	4.0	2.0	0.1	0.5	0.02	71	0.10	46	0	102	7.2	25

12-0770. GOLDSBOROUGH CREEK AT SHELTON (Lat 47°12'30", long 123°06'00")

Additional determinations

Date of collection	Chromium		Copper (Cu)	Zinc (Zn)	Arsenic (As)	Boron (B)
	Time (24 hr)	Hexavalent (Cr <sup>6+</sup> )				
Apr. 13, 1967....	0.00	0.00	0.00	0.00		

PUYALLUP RIVER BASIN

Chemical analyses, in parts per million, water year October 1966 to September 1967--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>		Specific conductance (microhmios at 25°C)	Color or pH	
															Parts per million	Tons per acre-foot	Calcium, Magnesium	Non-carbonate			
12-0935. PUYALLUP RIVER NEAR ORTING, WASH. (Lat. 47°02'20", Long. 122°12'15")																					
Jan. 4, 1967..	1150	11		5.0	1.9	2.8	0.6	22	0	2.8	1.5	0.1	0.4		48	0.07	149	21	3	49	7.3
Mar. 27.....	540	16		4.5	1.3	3.4	0.4	20	0	3.6	1.5				50	0.07	72.9	19	0	56	7.6
June 12.....	504	16		4.5	1.3	2.4	0.4	20	0	6.0	1.8				42	0.08	86.3	17	0	46	7.5
Sept. 18.....	504	9.4		6.5	2.0	2.6	1.3	14	0	1.6	2.0	0	.1		51	.07	69.4	24	13	65	7.2

Additional determinations

Date of collection	Time (24 hr)	Cross section	Temperature (°F)	Turbidity (ppm)	Color	D. O. (dissolved oxygen ppm)	B. O. D. (biochemical demand ppm)	M. P. N. (most probable number coliform groups per 100 ml)	P. B. I. (Pearl-Benson Index)	Slime solids			Chromium		Copper (Cu)	Zinc (Zn)	Arsenic (As)	Boron (B)	Total phosphate as PO <sub>4</sub>	Total Ammonium as N (NH <sub>4</sub> )	
										Settleable (ml/l)	Total (mg/l)	Volume (ml/l)	Hexavalent (Cr <sup>6+</sup> )	Total (Cr)							
Mar. 27, 1967.....						11.9		36													
June 12.....						11.8		36													
Sept. 18.....						10.6		36		0.00					0.00	0.01					







Chemical analyses, in parts per million, water year October 1966 to September 1967--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>	Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	Color or pH		
															Tons per acre-foot	Tons per day						
12-1485, TOLT RIVER NEAR CARNATION, WASH. (Lat 47°38'15", Long 121°54'55")																						
Dec. 27, 1966..	590	7.4		6.0	1.0	2.0	0.3	22	0	4.2	1.0	0.1	0.8		38	0.05	60.5	19	1	48	7.3	10
Mar. 29, 1967..	430	8.4		5.9	1.4	2.0	0.5	24	0	4.0	1.0	0.0	0.7		A 36	0.05	41.8	20	1	53	7.4	5
June 14, .....	525	5.4		4.5	1.7	1.4	0.6	17	0	2.8	0.5	0.0	0.0	0.00	26	0.04	36.9	14	0	33	7.3	5
Sept. 19, .....	113	7.4		7.2	1.7	2.1	0.5	30	0	4.0	0.8	0.0	0.1		39	0.05	11.9	25	1	60	7.4	5

Additional determinations

Date of collection	Time (24 hr)	Cross section	Temperature (F)	Turbidity (ppm)	Color (Mg)	D.O. (dissolved oxygen ppm)	B.O.D. (biochemical demand ppm)	M.P.N. (most probable coliform groups per 100 ml)	Slime solids			Chromium		Zinc (Zn)	Copper (Cu)	Arsenic (As)	Boron (B)	Total phosphate as PO <sub>4</sub>	Total ammonium as N (NH <sub>4</sub> )	
									Total (mg/l)	Settleable (ml/l)	P.B.I. (Pearlman Index)	Hexavalent (Cr <sup>6+</sup> )	Total (Cr)							
Feb. 27, 1967....						11.8		36												
Mar. 29, .....						13.0		0					0.00		0.00	0.00				
June 14, .....						12.9		72												
Sept. 19, .....						9.6														

A Calculated from determined constituents.

STILLAGUAMISH RIVER BASIN

Chemical analyses, in parts per million, water year October 1966 to September 1967--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>	Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	Color or pH		
															Tons per acre-foot	Tons per day						
12-1670, NORTH FORK STILLAGUAMISH RIVER NEAR ARLINGTON, WASH. (Lat 48°16'05", Long 122°00'43")																						
Dec. 28, 1966.	1640	8.0		6.5	2.2	2.0	0.4	30	0	2.6	1.2	0.1	1.1		44	0.06	195	25	1	59	7.3	10
Mar. 28, 1967.	2210	7.1		5.7	2.0	1.8	0.4	26	0	3.6	1.5	0.1	0.7		A 36	0.05	192	22	0	54	7.3	5
June 13, .....	311	4.1		4.0	1.7	1.2	0.6	18	0	1.8	0.5	0.0	0.03		A 23	0.03	137	13	0	33	7.3	5
Sept. 19, .....	311	9.5		9.1	2.6	2.9	0.8	44	0	2.6	2.8	0.0	0.2		57	0.08	47.9	33	0	81	8.2	5

## MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN PACIFIC SLOPE BASINS IN WASHINGTON AND UPPER COLUMBIA RIVER BASIN IN WASHINGTON--Continued

## STILLAGUAMISH RIVER BASIN--Continued

12-1670. NORTH FORK STILLAGUAMISH RIVER NEAR ARLINGTON, WASH.--Continued

## Additional determinations

Date of collection	Time (24 hr)	Cross section	Temperature (°F)	Turbidity (ppm)	Color	D.O. (dissolved oxygen ppm)	B.O.D. (biochemical demand ppm)	M.P.N. (most probable number coliform per 100 ml)	Slime solids			Chromium		Zinc (Zn)	Arsenic (As)	Boron (B)	Total phosphate as P <sub>2</sub> O <sub>5</sub>	Total ammonium as N (NH <sub>4</sub> )	
									P. B. I. (Pearl-Benson Index)	Settleable (ml/l)	Total (mg/l)	Volume (ml/l)	Hexavalent (Cr <sup>6+</sup> )						Total (Cr)
Mar. 28, 1967...						12.7		430					0.00						
June 13, .....						12.2		91											
Sept. 19, .....						11.0		36											

A Calculated from determined constituents.

## SKAGIT RIVER BASIN

Chemical analyses, in parts per million, water year October 1966 to September 1967--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonyl sulfide (CO <sub>2</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>	Sodium carbonate ratio	Specific conductance (microhmhos at 25°C)		
															Parts per million	Tons per acre-foot	Tons per day				Calcium Magnesium	Non-carbonate
Dec. 28, 1966..		5.0	8.0	0.9	1.1	0.4	28	0	5.0	0.0	0.0	0.4	0.4			A	35	0.05	24	1	55	7.5
Mar. 28, 1967..		5.6	9.7	1.5	1.0	0.7	34	0	4.8	0	1.1	0.3	0.3			A	42	0.06	30	2	67	7.4
June 13, .....		4.0	6.0	0.5	0.9	0.6	22	0	3.0	0	0.0	0.1	0.05			A	28	0.04	17	0	40	7.4
Sept. 19, .....		4.2	7.1	0.9	0.8	0.6	26	0	3.4	0	0.0	0.1	0.1			A	30	0.04	21	0	48	7.3

12-1810. SKAGIT RIVER AT MARBLEMOUNT, WASH. (Lat 48°31'35", long 121°25'40")

## Additional determinations

Date of collection	Time (24 hr)	Cross section	Temperature (°F)	Turbidity (ppm)	Color	D.O. (dissolved oxygen ppm)	B.O.D. (biochemical demand ppm)	M.P.N. (most probable number coliform per 100 ml)	Slime solids			Zinc (Zn)	Arsenic (As)	Boron (B)	Total phosphate as P <sub>2</sub> O <sub>5</sub>	Total ammonium as N (NH <sub>4</sub> )								
									P. B. I. (Pearl-Benson Index)	Settleable (ml/l)	Total (mg/l)						Volume (ml/l)	Hexavalent (Cr <sup>6+</sup> )	Total (Cr)					
Mar. 28, 1967..						12.6		0																
June 13, .....						12.5		36																
Sept. 19, .....						11.8		0																

A Calculated from determined constituents.





SPOKANE RIVER BASIN

Chemical analyses, in parts per million, water year October 1966 to September 1967--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	Color or pH	
															Parts per million	Tons per acre-foot	Tons per day	Calcium			Non-carbonate
12-4310. LITTLE SPOKANE RIVER AT DARTFORD, WASH. (Lat 47°47'05", Long 117°24'10")																					
Oct. 31, 1966.	138	17	36	8.2	5.8	2.2	153	0	7.0	2.5	0.2	1.8	--	--	156	0.21	58.1	124	0	252	7.9
Dec. 18, .....	346	17	22	6.3	5.0	2.1	101	0	6.6	2.0	.2	2.1	--	--	121	.16	113	81	0	180	7.8
Feb. 22, 1967.	415	23	20	5.0	5.0	1.1	87	0	7.4	1.0	.2	1.6	0.01	--	108	.15	121	70	0	157	7.7
May 21, .....	437	20	17	4.3	4.3	2.0	77	0	4.8	.5	.3	1.0	--	--	91	.12	107	60	0	139	7.4
Aug. 19, .....	114	76	32	9.0	5.3	2.4	144	0	7.2	2.5	.2	1.7	.00	--	151	.21	46.5	117	0	248	8.1

Additional determinations

Date of collection	Time (24 hr)	Cross section	Temperature (°F)	Turbidity (gpm)	Color	D.O. (dissolved oxygen ppm)	B.O.D. (biochemical demand ppm)	M.P.N. (most probable coliform groups per 100 ml)	F.B.I. (Pearlman Index)	Slime solids		Chromium		Copper (Cu)	Zinc (Zn)	Arsenic (As)	Boron (B)	Total phosphate as PO <sub>4</sub>	Total nitrogen as N	
										Settleable (ml/l)	Volume (mi/l)	Hexavalent (Cr <sup>6+</sup> )	Total (Cr <sup>3+</sup> )							
Oct. 31, 1966	.....					12.5		930		--	--	--	--	--	--	--	--	--	--	--
Nov. 20, .....	.....					12.5		71		--	--	--	--	--	--	--	--	--	--	--
Dec. 18, .....	.....					11.2		430		--	--	--	--	0.00	0.01	--	--	--	--	--
Feb. 22, 1967	.....					10.7		230		0.01	--	--	--	--	--	--	--	--	--	--
May 21, .....	.....					8.7		150		--	--	--	--	--	--	--	--	--	--	--
Aug. 19, .....	.....					--		--		.00	--	--	--	.00	.02	--	--	--	--	--

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN PACIFIC SLOPE BASINS IN WASHINGTON AND UPPER COLUMBIA RIVER BASIN IN WASHINGTON--Continued  
OKANOGAN RIVER BASIN

Chemical analyses, in parts per million, water year October 1966 to September 1967--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>	Sodium-sulfate ratio	Specific conductance (micro-mhos at 25°C)	Color or pH	
															Parts per million	Tons per acre-foot					Tons per day
12-4395. OKANOGAN RIVER AT OROVILLE, WASH. (Lat 48°55'55", long 119°25'05")																					
Nov. 17, 1966.	220	5.4		36	10	12	2.5	150	0	32	2.0	0.4	0.2	--	182	0.25	108	8	301	7.5	0
Feb. 23, 1967.	324	4.6		38	10	10	2.3	142	6	32	1.5	.3	.3	0.02	176	.24	136	10	304	8.3	5
May 24, .....	180	5.6		55	9.7	11	2.4	148	0	30	1.0	.4	.6	--	168	.23	128	6	296	8.1	0
Aug. 16, .....	238	5.3		32	8.5	9.4	2.4	123	4	27	1.0	.2	.1	.01	131	.21	115	8	260	8.4	5

Additional determinations

Date of collection	Time (24 hr)	Cross section	Temperature (°F)	Turbidity (ppm)	Color	D.O. (dissolved oxygen ppm)	B.O.D. (biological demand ppm)	M.P.N. (most probable number coliform groups per 100 ml)	P. B. I. (Pearl-Benson Index)	Slime solids			Chromium		Copper (Cu)	Zinc (Zn)	Arsenic (As)	Boron (B)	Total phosphate as PO <sub>4</sub>	Total ammonium as N (NH <sub>4</sub> )	
										Settleable (ml/l)	Total (mg/l)	Volume (ml/l)	Hexavalent (Cr <sup>6+</sup> )	Total (Cr)							
Nov. 17, 1966....						10.8		0													
Feb. 23, 1967....						13.7		36													
May 24, .....						11.3		0													
Aug. 16, .....						12.1		0													

A Calculated from determined constituents.

Chemical analyses, in parts per million, water year October 1966 to September 1967--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>	Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)		
														Tons per acre-foot	Parts per million	Tons per day				Calcium	Magnesium
12-4472. OKANOGAN RIVER AT MALOTT, WASH. (Lat 48°16'55" Long 119°42'15") (Formerly published as 12-4475. Okanogan River near Malott, Wash.)																					
Nov. 17, 1966.	990	8.7	33	9.2	8.4	1.8	130	0	30	1.0	0.2	0.2	--	156	0.21	417	120	14	263	7.5	0
Feb. 23, 1967.	990	9.0	34	9.8	8.5	1.9	136	0	30	2.0	0.2	2.0	0.02	A 163	0.22	436	126	14	276	7.9	5
May 24, .....	14600	9.3	12	2.8	2.8	1.0	50	0	7.4	0.0	0.2	0.5	--	A 61	0.08	2400	42	0	100	7.1	10
Aug. 16, .....	874	1.0	32	5.0	8.3	2.1	132	0	29	1.2	0.1	0.0	0.0	163	0.22	385	117	9	264	8.2	5

Additional determinations

Date of collection	Time (24 hr)	Cross section	Temperature (°F)	Turbidity (ppm)	Color	D.O. (dissolved oxygen ppm)	B.O.D. (biochemical demand ppm)	M.P.N. (most probable number per 100 ml)	Slime solids			Chromium		Zinc (Zn)	Arsenic (As)	Boron (B)	Total phosphate as PO <sub>4</sub>	Total ammonium as N (NH <sub>4</sub> )	
									Pearl-Benson Index	Settleable (ml/l)	Total (mg/l)	Volume (ml/l)	Hexavalent (Cr <sup>6+</sup> )						Total (Cr <sup>3+</sup> )
Nov. 17, 1966....			11.8				230												
Feb. 23, 1967....			12.8				0						0.00						
May 24, .....			12.0				750												
Aug. 16, .....			13.3				36						0.00						

A Calculated from determined constituents.

METHOW RIVER BASIN

Chemical analyses, in parts per million, water year October 1966 to September 1967--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>	Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)		
														Tons per acre-foot	Parts per million	Tons per day				Calcium	Magnesium
12-4499.5. METHOW RIVER NEAR PATEROS, WASH. (Lat 48°03'00" Long 119°54'10")																					
Nov. 17, 1966.	452	11	25	4.4	4.0	0.7	98	0	8.4	0.0	0.3	0.8	--	106	0.14	129	80	0	174	7.4	0
Feb. 23, 1967.	352	12	26	5.0	4.0	0.9	102	0	8.4	0.0	0.2	0.8	0.00	A 107	0.15	102	86	2	180	8.0	5
May 24, .....	950	8.9	10	1.6	1.6	0.6	40	0	2.8	0.0	0.1	0.4	--	A 46	0.06	1160	32	0	72	7.2	5
Aug. 16, .....	550	1.2	25	4.5	3.7	1.0	100	0	8.0	0.0	0.2	0.5	0.02	106	0.14	157	81	0	173	8.2	5

## MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN PACIFIC SLOPE BASINS IN WASHINGTON AND UPPER COLUMBIA RIVER BASIN IN WASHINGTON--Continued

METHOW RIVER BASIN--Continued  
12-4499.5. METHOW RIVER NEAR PATEROS, WASH.--Continued

Date of collection	Time (24 hr)	Cross section	Temperature (°F)	Turbidity (ppm)	Color	D.O. (dissolved oxygen ppm)	B.O.D. (biochemical demand ppm)	Slime solids			Chromium		Copper (Cu)	Zinc (Zn)	Arsenic (As)	Boron (B)	Total phosphate as N (NH <sub>4</sub> )
								M. P. N. (most probable number coliform groups per 100 ml)	P. B. I. (Pearl-Benson Index)	Settleable (ml/l)	Total (mg/l)	Volume (ml/l)					
Nov. 17, 1966	....					12.4	360	--	--	--	0.00	0.02	--	--	--	--	
Feb. 23, 1967	....					13.8	73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
May 24, .....						13.2	91										
Aug. 16, .....						11.4											

A Calculated from determined constituents.

## CHELAN RIVER BASIN

Chemical analyses, in parts per million, water year October 1966 to September 1967--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>	Specific conductance (microhmhos at 25°C)	pH or Col or	
															Parts per million	Tons per acre-foot	Tons per day				
Nov. 17, 1966	2090	4.2	4.2	6.5	0.9	1.7	0.5	24	0	4.2	0.0	0.1	0.1	--	26	0.04	147	0	50	7.0	5
Feb. 23, 1967	2060	5.5	6.5	1.2	1.6	1.2	0.6	24	0	4.8	0.0	1.1	2.0	0.01	36	0.05	200	2	50	7.4	0
May 24, .....	20	6.2	6.8	1.0	1.4	0.7	0.6	26	0	4.2	0.0	1.1	1.2	--	35	0.05	1.89	21	52	7.3	0
Aug. 16, .....	1870	4.6	7.0	0.6	1.8	1.8	0.8	26	0	4.4	0.0	0.0	1.1	0.01	33	0.04	167	20	49	7.6	5

12-4525. CHELAN RIVER AT CHELAN, WASH. (Lat 47°50'05" N, Long 120°00'40" W)

## Additional determinations

Date of collection	Time (24 hr)	Cross section	Temperature (°F)	Turbidity (ppm)	Color	D.O. (dissolved oxygen ppm)	B.O.D. (biochemical demand ppm)	Slime solids			Copper (Cu)	Zinc (Zn)	Arsenic (As)	Boron (B)	Total phosphate as N (NH <sub>4</sub> )
								M. P. N. (most probable number coliform groups per 100 ml)	P. B. I. (Pearl-Benson Index)	Settleable (ml/l)					
Nov. 17, 1966	....					10.1	36	--	--	--	0.00	0.02	--	--	
Feb. 23, 1967	....					11.5	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
May 24, .....						10.9	36								
Aug. 16, .....						13.4	--								

A Calculated from determined constituents.

ENTIAT RIVER BASIN

Chemical analyses, in parts per million, water year October 1966 to September 1967--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (calculated)		Hardness as CaCO <sub>3</sub>	Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	Color or pH
															Parts per million	Tons per acre-foot				
12-4530. ENTIAT RIVER NEAR ENTIAT, WASH. (Lat 47°40'00", Long 120°16'55")																				
Nov. 17, 1966.	13			12	2.6	2.9	1.1	50	0	5.6	0.5	0.1	0.2	--	63	0.09	40	0	83	7.1
Feb. 23, 1967.	15			14	3.0	2.9	1.5	56	0	5.6	1.0	0.1	0.2	0.00	71	.10	48	2	102	7.7
May 24, .....	13			5.4	1.0	1.5	.8	23	0	2.2	.0	.0	.2	--	35	.05	18	0	45	7.4
Aug. 16, .....	12			8.5	2.2	2.1	1.3	39	0	3.4	.2	.1	.2	.02	50	.07	30	0	70	7.4

Additional determinations

Date of collection	Time (24 hr)	Cross section	Temperature (°F)	Turbidity (ppm)	Color	D.O. (dissolved oxygen ppm)	B.O.D. (biochemical demand ppm)	M.P.N. (most probable number coliform groups per 100 ml)	Slime solids		Hexavalent (Cr <sup>6+</sup> )	Total Chromium	Copper (Cu)	Zinc (Zn)	Arsenic (As)	Boron (B)	Total phosphate as PO <sub>4</sub>	Total ammonium as NH <sub>4</sub>
									Settleable (ml/l)	Volume (ml/l)								
Nov. 17, 1966, ...						13.0	210				0.00	--	--	--				
Feb. 23, 1967, ...						12.5	150				0.01	0.00	0.00	0.00				
May 24, .....						12.1	91				.00	.00	.00	.00				
Aug. 16, .....						10.1	930				.00	.00	.00	.00				

A Residue at 180°C.

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN PACIFIC SLOPE BASINS IN WASHINGTON AND UPPER COLUMBIA RIVER BASIN IN WASHINGTON--Continued  
WENATCHEE RIVER BASIN

Chemical analyses, in parts per million, water year October 1966 to September 1967--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH or Col	
															Parts per million	Tons per acre-foot	Tons per day	Calcium-Magnesium	Non-carbonate			
12-4578. WENATCHEE RIVER NEAR LEAVENWORTH, WASH. (Lat 47°40'25", long 120°34'00")																						
Nov. 28, 1966.	7.0			3.5	1.5	1.4	0.9	17	0	2.0	0.2	0.1	0.1			26	0.04		15	1	33	7.2
Jan. 28, 1967.	11.0			3.4	1.3	1.0	1.2	22	0	2.6	1.1	.1	.3			28	.05		6	0	43	7.2
July 20, 1967.	6.3			3.0	1.4	1.0	1.5	14	0	2.2	.2	.0	.1	0.02		A 22	.03		9	0	24	7.4

Additional determinations

Date of collection	Time (24 hr)	Cross section	Temperature (F)	Turbidity (ppm)	Color	D.O. (dissolved oxygen ppm)	B.O.D. (biochemical demand ppm)	M.P.N. (most probable number coliform groups per 100 ml)	Slime solids			Chromium		Zinc (Zn)	Arsenic (As)	Total phosphate as PO <sub>4</sub>	Total ammonium as N (NH <sub>4</sub> )	
									P. B. I. (Parl. Benson Index)	Settleable (ml/l)	Total (mg/l)	Volume (ml/l)	Hexavalent (Cr <sup>+6</sup> )					Total (Cr)
Apr. 18, 1967.....						11.6		0						0.00				
July 20, 1967.....						9.9		--						0.00	0.00			

A Calculated from determined constituents.

YAKIMA RIVER BASIN

Chemical analyses, in parts per million, water year October 1966 to September 1967--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Fe)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>	Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	Color or pH		
															Tons per acre-foot	Tons per day						
12-4795, YAKIMA RIVER AT CLE ELUM, WASH. (Lat 47°11'35", long 120°56'55")																						
Oct. 25, 1966.	294	14	9.0	1.6	2.6	0.3	42	0	0.0	0.0	1.8	0.1	0.2	--	A	51	0.07	40.5	29	0	72	7.7
Jan. 24, 1967.	602	11	8.3	2.1	3.3	0.8	42	0	1.0	1.5	1.1	2.0	0.01	A	48	0.07	78.0	29	0	71	7.6	
Mar. 29, .....	883	8.5	7.2	1.8	3.1	0.5	35	0	1.8	0.0	1.1	1.1	--	--	42	0.06	100	26	0	63	7.5	
June 14, .....	1750	6.3	5.5	2.3	1.6	0.6	32	0	1.6	0.2	0.0	0.0	0.0	0.01	35	0.05	165	23	0	53	7.8	

Additional determinations

Date of collection	Time (24 hr)	Cross section	Temperature (°F)	Turbidity (ppm)	Color	D.O. (dissolved oxygen ppm)	B.O.D. (biochemical demand ppm)	M.P.N. (most probable number coliform groups per 100 ml)	P.B.I. (Pearl-Benson Index)	Slime solids		Chromium		Zinc (Zn)	Arsenic (As)	Boron (B)	Total phosphate as PO <sub>4</sub>	Ammonium (NH <sub>4</sub> )	
										Settleable (ml/l)	Total (mg/l)	Hexavalent (Cr <sup>6+</sup> )	Total (Cr)						
Oct. 25, 1966....						11.6		36											
Jan. 24, 1967....						12.7		0				0.01		0.02	0.01				
Mar. 29, .....						13.9		0				0.00		0.00	0.00				
June 14, .....						--		0				--		--	--				
Sept. 20, .....																			

A Calculated from determined constituents.

## MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN PACIFIC SLOPE BASINS IN WASHINGTON AND UPPER COLUMBIA RIVER BASIN IN MONTANA

Chemical analyses, in parts per million, water year October 1966 to September 1967.—Continued

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Fossum (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Borate (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)		
																Parts per million	Tons per acre-foot	Calcium Magnesium	Non-carbonate		Total	
KOOTENAI RIVER BASIN																						
12-3015. KOOTENAI RIVER NEAR REXFORD (lat 48°52'28", long 115°13'37")																						
June 29, 1967..	56200	4.6	---	34	6.4	1.1	0.6	109	0	16	0.4	0.3	0.0	0.0	0.0	0.0	123	0.17	18660	111	22	210
July 27.....	17300	3.0	0.02	37	8.6	1.8	1.4	112	0	74	1.8	1.3	0.0	0.0	0.0	0.0	219	0.30	3930	174	68	249
Sept. 8.....	6680	6.1	0.00	52	11	2.8	1.3	132	0	71	1.2	1.3	0.3	0.01	0.01	0.01	219	0.30	3930	174	68	249
12-3019.33. KOOTENAI RIVER BELOW LIBBY DAM, NEAR LIBBY (lat 48°22'00", long 115°19'20")																						
June 29, 1967..	56900	4.3	---	32	6.6	1.4	0.5	108	0	17	0.9	0.5	0.0	0.0	0.0	0.0	122	0.17	18710	107	18	208
July 26.....	18200	5.2	0.02	37	8.7	1.6	1.6	114	0	38	1.4	0.7	0.0	0.01	0.01	0.01	158	0.21	7760	128	34	266
Sept. 7.....	6930	5.8	0.01	53	11	2.8	1.7	136	0	68	1.8	1.3	0.0	0.01	0.01	0.01	216	0.29	4040	177	65	356
12-3019.9. FISHER RIVER ABOVE WOLF CREEK, NEAR LIBBY (lat 48°13'00", long 115°16'20")																						
June 27, 1967..	760	8.8	---	10	3.6	1.4	0.4	49	0	1.8	0.4	0.0	0.2	0.0	0.0	0.0	65	0.09	133	40	0	86
July 25.....	205	11	0.04	20	7.5	2.3	1.5	98	0	3.5	1.3	0.1	0.0	0.0	0.0	0.0	104	0.14	57.5	81	0	159
Sept. 6.....	95	12	0.01	25	10	3.0	1.1	130	0	1.5	1.6	0.2	0.0	0.0	0.0	0.0	118	0.16	30.2	104	0	204
12-3019.99. WOLF CREEK NEAR LIBBY (lat 48°14'00", long 115°16'20")																						
June 27, 1967..	120	16	---	22	5.0	5.4	2.0	92	0	8.0	0.9	0.1	0.2	0.0	0.0	0.0	112	0.15	36.2	75	0	158
July 25.....	20	15	0.04	29	7.4	7.4	2.0	132	0	9.0	1.8	1.1	0.0	0.02	0.02	0.02	150	0.20	8.10	103	0	226
Sept. 6.....	8.8	12	0.03	32	8.4	9.0	2.6	146	0	10	1.6	2.0	0.0	0.0	0.0	0.0	148	0.20	3.50	114	0	259
12-3020.55. FISHER RIVER NEAR LIBBY (lat 48°21'20", long 115°18'50")																						
June 27, 1967..	880	9.6	---	15	5.0	2.2	0.6	71	0	2.0	1.0	0.0	0.0	0.0	0.0	0.0	72	0.10	171	58	0	120
July 25.....	256	11	0.05	25	8.4	3.0	1.8	114	0	3.0	1.2	0.0	0.0	0.01	0.01	0.01	108	0.15	74.6	97	3	189
Sept. 6.....	110	12	0.00	25	10	3.6	1.3	144	0	4.8	1.4	1.1	0.0	0.0	0.0	0.0	129	0.18	38.2	104	0	235

MISCELLANEOUS ANALYSES OF LAKES AND STREAMS IN PACIFIC SLOPE BASINS IN WASHINGTON AND UPPER COLUMBIA RIVER BASIN IN IDAHO

Chemical analyses, in parts per million, water year October 1966 to September 1967--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>		Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	
														Parts per million	Tons per acre-foot	Calcium magnesium	Non-carbonate			
Nov. 1, 1966.....	3.2	11	0.02	10	3.5	1.5	0.4	48	0	2.8	0.5	0.1	0.0	0.02	53	0.07	40	0	0.1	81
Jan. 30, 1967....	229	13	--	4.0	1.4	1.1	.7	20	0	2.4	.5	.0	.1	.1	34	.05	16	0	0	38
May 3.....	54	13	.07	6.1	2.0	1.3	.5	30	0	1.8	.0	.1	.2	.2	42	.06	23	0	0	53
Sept. 20.....	3.5	13	.03	7.0	2.7	1.6	.6	46	0	3.2	1.0	.0	.2	.2	51	.07	36	0	0	79

SPOKANE RIVER BASIN

12-4160. HAYDEN CREEK BELOW NORTH FORK, NEAR HAYDEN LAKE, IDAHO (Lat 47°49'22", long 116°39'10")

PART 13. SNAKE RIVER BASIN

FLAT CREEK BASIN

13-0183. CACHE CREEK NEAR JACKSON, WYO.  
(Hydrologic bench-mark station)

LOCATION.--Lat 43°26'50", long 110°41'50", at gaging station, 1.8 miles upstream from town of Jackson water-supply intakes, 4.5 miles southeast of Jackson, Teton County, and 5 miles upstream from mouth.  
DRAINAGE AREA.--10 square miles, approximately.  
RECORDS AVAILABLE.--Chemical analyses: July 1965 to September 1967.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonyl Sulfate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH	
															Parts per million	Tons per acre-foot	Tons per day	Calcium	Non-carbonate			
Oct. 3, 1966	6.0	5.4	0.23	46	15	2.6	0.5	214	0	4.3	7.1	0.1	0.1	0.02	198	0.27	3.18	176	2	0.1	332	8.2
Oct. 31	5.0	3.1	0.00	55	7.7	2.9	0.3	188	7	7.7	4.6	1.1	3.3	0.03	194	0.26	2.66	169	0	-1	353	8.3
May 2, 1967	3.8	5.7	0.00	47	16	4.0	0.2	221	0	6.7	2.8	2.4	0.4	0.01	202	0.27	2.06	182	0	-1	297	8.2
June 10	60	4.8	0.01	43	12	2.2	3.7	181	7	4.8	0	0	1.5	0.04	180	0.24	29.1	158	0	-1	293	8.0
July 14	34	5.0	0.05	46	10	1.9	2.2	190	0	7.8	0	0	1.0	0.01	162	0.22	14.8	156	0	-1	293	8.0
Aug. 7	17	4.9	0.13	42	14	2.0	4.4	198	0	5.8	0	0	1.0	0.02	160	0.22	7.33	164	1	-1	314	7.8
Sept. 12	11	4.8	0.02	44	14	1.9	4.4	204	0	4.4	0	0	0	0.01	176	0.24	5.21	166	0	-1	308	8.1

SNAKE RIVER MAIN STEM

13-0225. SNAKE RIVER ABOVE RESERVOIR, NEAR ALPINE, WYO.

LOCATION.--Lat 43°18'06", long 110°46'33", at bridge at Astoria Springs, Teton County, 3 miles downstream from Hoback River, 13 miles upstream from gaging station, 15 miles northeast of Alpine, Lincoln County, Idaho.  
DRAINAGE AREA.--3,465 square miles, including gaging station.  
RECORDS AVAILABLE.--Chemical analyses: October 1965 to September 1967.  
Water temperatures: October 1965 to September 1966.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonyl Sulfate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH	
															Parts per million	Tons per acre-foot	Tons per day	Calcium	Non-carbonate			
Oct. 3, 1966	4060	14	0.02	33	5.4	11	1.3	98	0	35	9.9	0.7	0.8	0.10	162	0.22	1780	104	23	0.5	257	7.4
Oct. 31	1700	13	0.02	46	10	9.4	1.3	143	0	61	11	4.4	2.0	0.03	244	0.33	949	180	54	0.3	376	8.1
Jan. 2, 1967	1230	17	0.03	46	8.8	8.2	2.0	143	0	54	3.5	4.0	0.04	0.04	208	0.28	955	157	40	0.3	346	8.1
Feb. 6	1450	14	0.16	46	8.5	9.3	1.8	141	0	46	5.3	5.0	0.04	0.04	202	0.27	725	152	35	0.3	338	8.3
Mar. 6	1300	13	0.07	45	9.6	9.1	1.3	143	0	51	3.2	5.0	0.04	0.04	214	0.29	838	150	34	0.3	343	8.0
Apr. 3	1800	13	0.07	51	7.8	8.6	1.9	146	0	50	4.3	5.0	0.04	0.04	212	0.29	744	154	37	0.3	344	7.8
May 2	3740	15	0.00	36	8.9	12	1.4	117	0	37	8.5	8.0	0.04	0.04	222	0.30	959	158	38	0.3	341	8.0
June 10	12100	12	0.13	36	3.6	5.2	1.3	110	0	23	4.4	3.1	0.02	0.02	150	0.20	4900	126	30	0.5	319	7.7
July 11	12200	11	0.17	27	6.1	5.1	1.3	95	0	19	2.1	4.1	0.00	0.00	126	0.17	4150	104	14	0.2	238	7.8
Aug. 7	7220	13	0.08	26	6.1	7.4	1.4	98	0	25	3.5	5.0	0.03	0.06	150	0.20	2820	90	9	0.3	222	7.4
Sept. 12	44560	13	0.09	29	6.3	7.4	2.2	103	0	29	3.7	6.0	0.04	0.04	164	0.22	2020	99	15	0.3	239	7.8

A Daily mean discharge.

SALT RIVER BASIN  
13-0275. SALT RIVER ABOVE RESERVOIR, NEAR ETNA, WYO.

LOCATION: --Lat 43°04'50", long 111°02'15", at gaging station, 3.5 miles northwest of Etna, Lincoln County, and 8 miles upstream from mouth.  
DRAINAGE AREA: --829 square miles.  
RECORDS AVAILABLE: --Chemical analyses: October 1965 to September 1967.  
Water temperatures: October 1965 to September 1966.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)		
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Non-carbonate			
Oct. 1-31, 1966.....	A501	6.8	--	55	18	15	1.1	219	0	36	16	0.2	3.2	0.06	260	0.35	352	210	30	0.4	454
Dec. 5.....	A485	9.8	0.07	63	18	19	.9	244	0	39	28	.2	3.1	.04	280	.39	380	232	32	.5	489
Jan. 2, 1967.....	A362	11	.00	42	32	11	7.2	256	0	21	11	.2	8.1	.01	260	.35	254	238	28	.2	478
Feb. 6.....	385	9.4	.04	63	18	19	1.0	241	0	38	25	.3	3.7	.01	308	.42	320	230	32	.5	512
Mar. 6.....	369	8.6	.04	62	19	17	1.1	241	0	38	22	.2	3.7	.00	294	.40	293	232	34	.5	509
Apr. 3.....	A435	9.1	.02	48	27	25	1.0	238	0	39	36	.3	1.9	.00	320	.44	376	230	35	.7	547
May 2.....	A652	5.8	.00	61	16	24	1.0	235	0	28	29	.2	2.0	.05	308	.42	542	218	25	.7	518
June 10.....	1640	9.9	.41	60	12	13	1.1	220	0	22	18	.2	.9	.07	258	.35	1140	200	20	.4	436
July 11.....	1380	7.9	.10	63	16	16	1.8	242	0	29	13	.2	3.4	.01	270	.37	1010	225	26	.3	464
Aug. 13.....	666	7.5	.16	58	20	11	1.0	217	0	42	13	.1	2.9	.06	264	.36	475	226	48	.3	478
Sept. 13.....	A740	8.5	.04	64	19	11	1.4	248	0	35	12	.1	2.4	.03	282	.38	563	236	33	.3	490

Analyses of additional samples

Oct. 3, 1966.....	A522	8.0	0.03	58	19	14	0.9	226	0	37	19	0.1	3.1	0.08	278	0.38	392	222	37	0.4	467
Oct. 31.....	473	6.6	.05	61	14	14	.9	211	0	30	22	.1	2.8	.03	264	.36	337	210	37	.4	450

A Daily mean discharge.









PORTNEUF RIVER BASIN  
13-0755. PORTNEUF RIVER AT POCATELLO, IDAHO

LOCATION --Lat 42°51'40", long 112°27'25", at Fremont Street Bridge at Pocatello, Bannock County, 30 feet downstream from gaging station, 2.5 miles upstream from Pocatello Creek, and at mile 16.8, DRAINAGE AREA --1,250 square miles, approximately. RECORDS AVAILABLE --October 1965 to September 1967.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> ) (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH				
													Parts per million	Tons per acre-foot	Calcium, magnesium	Non-carbonate			Tons per acre-foot	Calcium, magnesium	Non-carbonate	
Dec. 9, 1966.....	223	23		70	35	43	9.0	372	0	51	44	0.3	3.6	0.99	457	0.62	275	318	14	1.0	775	8.1
Jan. 13, 1967.....	235	24		71	32	45	8.5	356	0	43	52	3.4	4.2	0.83	453	.62	287	308	17	1.1	746	7.9
Feb. 10, 1967.....	228	26	0.18	77	44	43	8.5	366	0	44	43	2.3	3.7	0.84	445	.61	307	307	18	1.1	742	8.3
Mar. 16, 1967.....	277	26		74	32	39	9.2	352	0	42	41	2.3	3.7	0.94	449	.61	336	316	18	1.3	731	8.3
Apr. 24, 1967.....	A368	24		64	29	29	7.8	314	0	39	36	3.3	3.4	0.99	376	.51	365	279	22	0.8	652	8.1
June 14, 1967.....	452	19		53	16	21	8.1	233	0	24	24	3.3	2.7	0.7	292	.40	336	198	7	0.6	483	7.5
June 29, 1967.....	545	21		62	21	24	7.1	288	0	27	26	3.3	2.7	0.4	338	.46	497	241	5	0.7	567	8.0
July 27, 1967.....	A 76	32		60	28	41	8.2	295	12	38	43	4.4	3.2	1.5	404	.55	82.9	364	2	1.1	671	8.5
AUG. 31, 1967.....	79	30		63	31	43	19	350	4	45	41	4.4	2.1	1.8	436	.59	93.0	284	0	1.1	716	8.3

A Daily mean discharge.

RAFT RIVER BASIN

13-0780. RAFT RIVER AT PETERSON RANCH, NEAR BRIDGE, IDAHO

LOCATION --Lat 42°04'00", long 113°27'00", at gaging station 100 feet upstream from Onemle Creek, 7.5 miles southwest of Bridge Post Office, Cassia County, 16 miles south of Malia, and at mile 45.6.

DRAINAGE AREA --412 square miles.

RECORDS AVAILABLE --Chemical analyses: August 1965 to September 1967.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> ) (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH				
													Parts per million	Tons per acre-foot	Calcium, magnesium	Non-carbonate			Tons per acre-foot	Calcium, magnesium	Non-carbonate	
Nov. 7, 1966.....	6.3	30		122	29	96	6.5	240	0	95	245	0.7	0.6	1.0	758	1.03	12.9	424	228	2.0	1300	8.0
Dec. 10, 1966.....	6.7	31		121	26	92	8.0	254	0	86	222	0.7	2.2	0.9	734	1.00	13.3	409	201	2.0	1210	7.9
Feb. 11, 1967.....	8.8	36		102	21	75	6.1	242	0	70	170	0.5	2.8	1.2	643	.87	15.3	341	142	1.8	1020	8.2
Mar. 28, 1967.....	6.5	33		120	27	81	7.7	235	0	89	220	0.8	2.6	1.0	704	.96	12.4	410	218	1.7	1200	8.2
Apr. 29, 1967.....	12	34		112	26	110	8.2	265	0	91	232	0.7	3.9	1.4	749	1.02	24.3	386	170	2.4	1280	8.1
May 24, 1967.....	8.1	33		116	26	94	7.5	252	0	82	225	0.7	3.3	1.3	729	1.01	23.9	390	154	2.1	1270	8.0
June 14, 1967.....	A12	33		111	25	118	8.7	251	0	72	240	1.0	5.4	1.6	746	1.01	30.2	365	102	2.7	1230	8.0
July 20, 1967.....	13.6	34		117	27	95	7.9	265	3	85	228	1.0	1.5	1.9	727	.99	15.7	403	188	2.1	1250	8.3
AUG. 21, 1967.....	A8.0	34		117	27	95	7.9	265	3	85	228	1.0	1.5	1.9	727	.99	15.7	403	188	2.1	1250	8.3

A Daily mean discharge.

13-0789. RAFT RIVER AT YALE, IDAHO

LOCATION.--Lat 42°34'11", long 113°13'42", at county road bridge 0.5 mile south of Yale, Cassia County, 1.5 miles downstream from Calder Creek, and at approximately mile 2.  
 DRAINAGE AREA.--1,510 square miles.  
 RECORDS AVAILABLE.--Chemical analyses: August 1965 to September 1967.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)				
													Parts per million	Tons per acre-foot	Tons per day	Calcium, Mg-nestum	Non-carbonate		So-dium ad-sorp-tion ratio			
Nov. 5, 1966.....	1.5	49	--	75	41	142	18	458	0	66	168	0.6	1.2	0.28	790	1.06	3.16	0	3.3	1310	7.9	
Dec. 12.....	2.8	47	--	81	35	133	14	368	0	79	185	.6	4.9	1.2	756	1.03	5.72	346	44	3.1	1250	7.7
Feb. 13, 1967.....	3.5	50	--	74	35	132	16	344	0	77	185	.5	4.1	21	739	1.01	6.16	328	46	3.2	1180	7.9
Feb. 14.....	3.2	50	--	73	35	130	15	342	0	80	190	.5	2.4	.54	747	1.02	6.45	326	46	3.1	1220	8.0
Mar. 24.....	2.0	50	--	76	37	142	20	420	0	64	180	.6	3.4	1.2	777	1.10	4.20	342	0	3.3	1280	7.9
Apr. 29.....	2.6	54	--	75	40	159	19	442	0	77	202	.6	3.9	.28	829	1.13	5.82	352	0	3.7	1400	7.9
June 3.....	1.8	50	0.04	70	34	125	18	387	0	65	152	.6	3.4	.25	706	.96	3.43	314	0	3.1	1180	8.0
June 18.....	.7	51	.03	61	37	152	20	402	0	75	175	.6	4.1	.35	775	1.05	1.46	304	0	3.8	1290	8.2
July 21.....	.7	47	--	70	34	106	17	365	0	57	145	.5	3.9	.23	668	.91	1.26	314	1.6	2.6	1120	7.7

SALMON FALLS CREEK BASIN

13-1081.5. SALMON FALLS CREEK NEAR BANBURY HOT SPRINGS, IDAHO

LOCATION.--Lat 42°41'47", long 114°51'14", at bridge on new U.S. Highway 30, 1.5 miles northwest of Banbury Hot Springs, Twin Falls County, 2.1 miles upstream from mouth and 8 miles northwest of Huhl.  
 RECORDS AVAILABLE.--Chemical analyses: October 1965 to September 1967.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)				
													Parts per million	Tons per acre-foot	Tons per day	Calcium, Mg-nestum	Non-carbonate		So-dium ad-sorp-tion ratio			
Oct. 31, 1966.....	--	44	78	29	29	75	8.8	276	0	164	58	0.9	11	0.14	616	0.84	--	314	88	1.8	917	8.0
Dec. 5.....	A 100	45	86	29	31	79	9.6	294	0	172	58	.9	13	--	B 638	--	172	334	93	1.9	946	7.9
Jan. 9, 1967.....	A 100	47	85	31	30	80	9.3	280	0	187	60	.9	13	--	666	.91	180	340	110	1.9	944	7.9
Feb. 6.....	55	50	85	30	30	82	9.0	272	0	184	66	.8	13	--	677	.92	--	336	112	1.9	966	8.2
Mar. 20.....	A 100	50	85	30	30	76	9.8	264	0	182	66	.9	12	--	642	.87	173	336	119	1.8	959	8.0
Apr. 24.....	A 125	41	74	26	26	84	8.4	268	0	131	53	1.0	8	1.4	542	.74	183	292	75	1.6	831	8.2
June 15.....	--	43	72	23	23	65	9.1	268	0	148	56	1.3	7	1.6	581	.79	--	304	84	1.6	878	8.1
July 7.....	--	50	72	23	23	55	7.8	232	10	120	44	1.2	6	2.1	489	.68	--	274	68	1.4	759	8.5
July 17.....	--	50	78	29	29	74	9.9	267	5	155	58	1.3	11	1.4	605	.82	--	314	86	1.8	931	8.4
AUG. 22.....	--	47	77	29	29	69	8.5	249	10	153	58	1.1	9	1.7	605	.82	--	312	91	1.7	867	8.4

A Estimated.  
 B Calculated from determined constituents.

## MUD LAKE-LOST RIVER BASIN

13-1325. BIG LOST RIVER NEAR ARCO, IDAHO

LOCATION.--Lat 43°35'16", long 113°16'13", at bridge on county road, 4 (revised) miles southeast of Arco, Batta County.  
 DRAINAGE AREA.--1,410 square miles, approximately.  
 RECORDS AVAILABLE.--Chemical analyses: October 1965 to September 1967.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Calcium carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Borate (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>		Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	pH	
															Parts per million	Tons per acre-foot	Calcium, Magnesium	Non-carbonate				
Nov. 1, 1966.....	8.4	14	0.05	62	19	12	1.5	270	0	25	7.0	0	3	0.1	0.00	276	0.38	232	11	0.3	471	7.7
Dec. 5, 1966.....	A13	13	0.10	56	18	11	1.5	255	0	24	6.0	0	3	0.8	0.03	246	0.34	213	8	0.3	440	7.7
Jan. 4, 1967.....	A11	14	0.07	70	16	11	1.6	285	0	24	5.5	3	1.5	0.6	0.06	270	0.37	240	7	0.3	481	7.9
Feb. 6, 1967.....	A12	15	0.12	64	16	11	1.5	268	0	24	6.0	3	1.2	0.6	0.06	264	0.36	226	6	0.3	447	8.0
Mar. 15, 1967.....	6.4	13	0.11	70	17	10	1.8	282	0	22	6.5	3	1.8	0.6	0.06	285	0.39	244	14	0.3	488	8.1
Apr. 17, 1967.....	7.0	14	--	68	17	11	1.9	277	0	28	8.5	3	1.6	0.4	0.04	286	0.39	240	12	0.3	485	8.1
May 25, 1967.....	37	13	--	52	14	8	1.9	214	0	23	5.5	3	1.5	0.2	0.02	229	0.31	187	12	0.3	393	8.1
June 14, 1967.....	306	13	--	44	10	6	2.2	170	0	16	3.0	3	1.6	0.6	0.06	192	0.26	151	4	0.2	323	8.0
July 1, 1967.....	159	13	--	44	10	6	2.2	170	0	16	3.0	3	1.6	0.6	0.06	192	0.26	151	4	0.2	323	8.1
Aug. 24, 1967.....	134	16	--	64	15	9	1.5	211	0	19	6.0	4	1.1	0.3	0.03	259	0.35	221	12	0.3	420	8.1
Sept. 26, 1967.....	280	14	--	55	15	8	1.5	230	0	19	6.0	3	1.8	0.6	0.06	239	0.33	198	10	0.3	393	8.2

A Daily mean discharge.

BIG WOOD RIVER BASIN  
 13-1525. BIG WOOD RIVER NEAR GOODING, IDAHO

LOCATION --lat 42°53'10", long 114°48'10", at gaging station at Hudson Ranch, 3.1 miles downstream from bridge on Bliss-Gooding highway, 4.2 miles downstream from Little Wood River, 5.5 miles upstream from diversion dam from King Hill project, 6 miles southwest of Gooding, Gooding County, and at mile 7.8. DRAINAGE AREA --2,990 square miles, approximately. 1965 to September 1967. RECORDS AVAILABLE. --Chemical analyses: September 1965 to September 1967.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>		Specific conductance (microhmhos at 25°C)			
															Parts per million	Tons per acre-foot	Tons per day	Calcium Magnesium		Non-carbonate		
Oct. 2, 1966.....	162	19		58	16	23	4.6	222	0	49	20	0.8	1.2	0.09	285	0.39	125	210	28	0.7	494	8.2
Nov. 2.....	A73	15		52	20	29	3.6	239	0	47	22	0.7	2.2	0.10	311	.42	61.3	212	16	0.9	529	7.5
Dec. 13.....	137	10		54	15	7.4	1.7	212	6	23	3.5	0.4	3.5	0.05	240	.33	88.8	196	12	2.2	377	8.3
Jan. 4, 1967.....	48	13	0.06	61	16	6.1	1.8	248	0	21	2.0	0.3	4.8	0.00	245	.33	31.8	218	14	2.2	315	7.2
Feb. 1.....	180	13		53	14	6.7	2.8	222	0	16	2.0	0.3	2.1	0.03	216	.29	70.6	190	8	2.2	383	8.1
Mar. 16.....	89	8		53	14	6.7	1.6	222	0	16	2.0	0.3	2.1	0.03	216	.29	70.6	190	8	2.2	383	8.1
Apr. 18.....	207	19		50	16	18	3.9	206	0	36	20	0.6	1.8	0.08	266	.36	149	191	22	0.6	453	7.9
May 28.....	162	17		55	17	26	5.3	229	0	45	24	1.4	1.0	0.09	311	.42	136	207	20	0.8	520	7.9
June 16.....	A1820	12		38	16	16	3.2	152	0	23	8.5	0.7	0.9	0.20	185	.25	90.9	134	9	0.4	309	8.1
July 16.....	44	9.5		49	15	20	4.1	202	0	40	18	0.9	1.7	0.25	287	.35	30.5	184	18	0.6	448	8.2
Aug. 24.....	113	16		48	15	19	4.0	197	0	37	18	0.9	1.7	0.05	287	.36	81.5	182	20	0.6	436	7.9
Sept. 26.....	72	13		48	17	23	4.8	208	0	40	21	0.8	1.5	0.08	273	.37	53.5	190	20	0.7	463	7.8

A Daily mean discharge.



Nutrient analyses, in milligrams per liter,  
July to September 1967

Date of Collection	Total Nitrogen as NO <sub>3</sub>	Total Phosphorous as PO <sub>4</sub>
July 1, 1967.....	4.3	0.40
Aug. 1, .....	5.0	.12
Sept. 1, .....		.20

Specific conductance (micromhos at 25°C), water year October 1966 to September 1967

Day	October	November	December	January	February	March	April	May	June	July	August	September
1.....	557	557	571	544	511	522	522	517	514	486	476	530
2.....	557	549	549	546	512	519	552	522	506	496	522	530
3.....	561	536	560	549	512	527	538	518	511	496	524	527
4.....	562	557	560	546	512	512	530	520	500	489	525	527
5.....	564	560	571	546	520	512	530	520	500	489	525	527
6.....	561	563	571	545	520	516	524	518	485	483	526	532
7.....	532	553	566	548	524	514	524	517	496	467	500	524
8.....	562	561	563	550	521	512	524	515	493	501	527	523
9.....	553	563	563	546	517	509	526	513	509	504	532	530
10.....	553	563	562	545	516	510	526	513	504	519	511	531
11.....	547	564	561	546	525	509	527	515	495	519	530	520
12.....	546	559	561	553	523	516	525	519	506	517	525	542
13.....	558	560	559	551	520	514	519	515	501	506	531	535
14.....	555	559	559	551	519	512	517	508	498	478	529	537
15.....	553	557	553	549	516	513	519	520	500	489	528	530
16.....	560	557	549	542	514	514	520	510	499	486	521	536
17.....	555	560	554	547	511	514	517	517	504	498	520	538
18.....	560	560	557	547	511	413	518	512	504	501	519	538
19.....	569	557	553	545	511	508	522	519	550	504	525	533
20.....	567	551	551	543	519	492	520	510	502	494	528	525
21.....	564	552	550	540	522	508	509	514	498	517	527	533
22.....	564	550	547	546	515	503	514	506	487	517	529	530
23.....	569	567	567	547	516	516	516	516	483	517	529	545
24.....	569	567	564	527	515	516	516	516	483	517	529	545
25.....	568	559	548	531	519	506	514	536	459	495	518	534
26.....	563	558	546	532	518	510	513	535	481	522	519	542
27.....	559	559	547	530	519	505	512	541	487	511	520	542
28.....	560	561	560	551	530	520	498	515	493	527	530	544
29.....	559	560	548	485	511	508	511	519	497	529	527	536
30.....	556	556	556	548	517	519	519	522	500	518	534	541
31.....	563	550	550	508	521	521	521	524	500	518	534	541
Average	557	557	556	535	517	504	519	518	498	504	525	534

BIG WOOD RIVER BASIN--Continued  
 13-1545. SNAKE RIVER AT KING HILL, IDAHO--Continued  
 Temperature (°F) of water, water year October 1966 to September 1967

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.....	62	63	64	63	63	62	60	59	57	58	57	56	54	54	54	54	54	54	55	55	54	53	54	54	56	56	56	56	55	56	55	56	55	56			
November.....	56	55	56	55	53	54	53	52	52	51	52	53	54	54	55	54	55	55	54	55	56	53	53	53	52	51	51	51	50	52	53	53	53	53			
December.....	53	53	53	52	51	50	52	50	49	48	50	49	49	51	50	51	52	50	51	50	49	47	48	49	48	46	44	42	42	43	46	48	48				
January.....	46	47	48	49	49	50	49	47	47	47	49	49	51	51	51	50	49	49	50	51	50	49	47	48	49	50	51	50	50	51	50	51	49				
February.....	51	52	52	52	51	51	52	51	52	49	52	53	51	49	51	52	51	50	51	52	51	53	51	52	52	53	53	--	--	--	--	--	51				
March.....	54	53	54	52	52	53	54	53	52	53	52	54	53	52	54	55	55	54	55	54	55	56	55	56	56	55	57	56	54	53	50	53	53				
April.....	51	49	51	53	52	54	55	54	55	53	53	54	55	52	51	51	52	51	50	51	53	53	54	53	54	53	54	53	54	52	51	50	52				
May.....	51	52	54	53	55	55	57	58	58	58	55	54	56	55	57	58	58	59	59	59	60	58	61	53	62	69	59	61	60	60	58	57	57				
June.....	60	59	60	61	62	61	61	62	64	63	61	63	64	64	63	65	67	66	67	68	67	65	64	66	67	68	67	68	67	68	67	66	67	66			
July.....	--	68	69	67	68	70	69	67	69	68	70	68	68	70	68	66	66	66	68	66	66	66	67	66	67	66	67	66	68	68	69	68	69	68			
August.....	--	70	69	67	68	67	66	64	65	64	65	65	67	68	68	67	66	67	67	68	66	67	67	67	67	67	67	67	66	--	65	66	66	65	65		
September.....	--	66	67	67	66	65	64	65	64	65	63	61	60	59	60	61	62	61	62	63	62	63	63	63	64	63	64	63	63	61	60	--	63	63	61	60	--



BOISE RIVER BASIN--Continued  
 13-2020. BOISE RIVER NEAR BOISE, IDAHO

LOCATION--Lat 43°31'33", long 116°04'02", at cableway below gaging station, 0.3 mile downstream from Lydie Gulch, 1.5 miles upstream from diversion dam for New York Canal, and 9 miles southeast of Boise, Ada County.  
 DRAINAGE AREA--2,680 square miles, approximately, Ada County.  
 RECORDS AVAILABLE--Chemical analyses: October 1965 to September 1967.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)		
															Parts per million	Tons per acre-foot	Tons per day	Calcium		Non-carbonate	
Oct. 25, 1966.....	4166	12		12	2.1	5.2	0.9	56	0	3.6	0.0	0.4	1.2	0.05	67	0.09	30.0	38	0	0.4	103
Dec. 2.....	163	13		14	2.8	5.8	.9	66	0	4.2	.0	.4	1.3	.05	82	.11	36.1	46	0	.4	117
Jan. 27, 1967.....	1230	13		12	1.7	5.0	.8	54	0	4.0	.0	.4	.5	.02	66	.09	21.9	37	0	.4	97
Mar. 7.....	143	11	0.07	12	2.0	5.2	1.0	53	0	4.0	.0	.4	.6	.00	64	.09	24.7	38	0	.4	99
Apr. 12.....	2390	14		13	2.0	5.5	1.0	54	0	5.4	.5	.3	.6	.01	76	1.0	49.0	40	0	.4	104
May 17.....	5040	13		11	1.4	5.0	1.0	50	0	3.6	.0	.4	.6	.02	56	.08	76.2	34	0	.4	93
June 30.....	5110	9.3		7.5	.9	3.0	1.4	33	0	2.0	.0	.3	.5	.00	43	.06	59.3	22	0	.3	60
Aug. 10.....	4550	9.2		8.3	1.0	3.1	.9	35	0	2.4	.5	.3	.5	.03	49	.07	60.2	24	0	.3	65

A Daily mean discharges.

13-2125. BOISE RIVER AT NOTUS, IDAHO  
(irrigation network station)

LOCATION.--Lat. 43°43'21", long 116°47'34" at highway bridge 1,100 feet downstream from gaging station, 0.2 mile southeast of Notus, Canyon County, and 7 miles northwest of Caldwell, and at mile 14.0.

DRAINAGE AREA.--3,820 square miles, approximately.

RECORDS AVAILABLE.--Chemical analyses: January 1939 to January 1940, November 1950 to September 1967.

Water temperatures: November 1950 to September 1967.

Sediment records: January 1939 to June 1940.

EXTREMES: 1968-67.--Dissolved solids: Maximum, 384 ppm Oct. 17 to Nov. 15; minimum, 210 ppm June 22-28.

Specific conductance: Maximum, 13,000 micromhos Oct. 20 to Feb. 20, 1968; minimum, 20,000 micromhos Oct. 20, 1968.

Specific conductance: Maximum daily, 630 micromhos Oct. 20, minimum daily, 330 micromhos Apr. 20.

Water temperatures: Maximum, 79°F July 3, Aug. 17; minimum, 38°F Dec. 27, 28.

EXTREMES, 1939-40, 1950-67.--Dissolved solids: Maximum, 914 ppm Aug. 21-31, 1939; minimum, 77 ppm May 1-10, 1952, June 11-20, 1953.

Hardness: Maximum, 284 ppm July 21-31, 1939; minimum, 35 ppm June 11-26, 1953.

Specific conductance: Maximum daily, 1,470 micromhos July 30, Aug. 26, 1939; minimum daily, 82 micromhos Apr. 27, 1952.

Water temperatures: Maximum, 85°F on several days during summer months in 1951, 1952, 1954; minimum (1939-40, 1950-64, 1966-67), freezing point Jan. 31, 1956, Jan. 11-14, 1963.

REMARKS.--No appreciable inflow between gaging station and sampling point except during periods of heavy local runoff.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Iron (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>		Specific conductance (microhm-cm at 25°C)	
														Parts per million	Tons per acre-foot	Calcium Magnesium	Non-carbonate		
Oct. 1-16, 1966..	532	29		40	12	60	4.4	240	0	60	0.6	6.1	0.08	362	0.49	150	0	2.1	547
Oct. 17-Nov. 15..	848			44	13	62		252	0					384	.52	164	0	2.1	579
Nov. 16-Dec. 3...	868			43	12	60		244	0					371	.50	157	0	2.1	565
Dec. 4-28.....	795			43	12	60		234	0					361	.49	157	0	2.1	554
Dec. 29-Jan. 28, 1967.....	743	32		44	11	57	4.6	230	0	17	.5	6.9	.12	348	.47	185	0	2.0	530
Jan. 29-Feb. 11...	770			42	11	56		220	0					337	.46	150	0	2.0	519
Feb. 12-Mar. 13..	646			46	13	62		244	0					366	.50	168	0	2.1	565
Mar. 14-Apr. 6...	450			41	10	62		232	0					336	.46	144	0	2.3	552
Apr. 7-19.....	260	25		37	8.8	48	4.9	190	0	15	.6	4.7	.10	288	.39	121	0	1.9	459
Apr. 20.....	733			27	6.3	32		136	0					211	.29	121	0	1.4	330
Apr. 21-May 2....	516			30	7.4	38		162	0					249	.34	106	0	1.6	390
May 3-5.....	218			34	8.9	49		208	0					282	.38	122	0	1.9	476
May 6-10.....	72			38	10	60		216	0					314	.43	136	0	2.7	577
May 11-19.....	445			33	7.5	41		168	0					233	.30	108	0	1.7	402
May 20-26.....	281			33	8.8	47		188	0					257	.35	161	0	1.9	451
May 27-June 14...	854			30	8.0	38		162	0					223	.30	118	0	1.6	390
June 15-21.....	194			36	10	49		196	0					280	.39	152	0	1.9	487
June 22-28.....	840			29	7.6	35		154	0					210	.29	104	0	1.5	369

BOISE RIVER BASIN--Continued  
13-2125, BOISE RIVER AT NOTUS, IDAHO--Continued

Chemical analyses, in parts per million, water year October 1966 to September 1967--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH		
															Parts per million	Tons per acre-foot	Tons per day	Calcium	Non-carbonate				
June 29-July 11..	272	--	--	33	9.0	46	--	184	0	--	--	--	--	--	--	.36	195	120	0	1.8	444	8.0	
July 12-Aug. 1...	357	30	36	10	10	52	4.2	192	4	53	15	.6	4.6	.08	287	.41	287	131	0	2.0	475	8.3	
Aug. 2-10.....	504	--	41	12	62	62	--	212	6	--	--	--	--	--	330	.45	445	152	0	2.1	530	8.3	
Sept. 10-20.....	774	--	47	11	52	52	--	210	2	--	--	--	--	--	307	.42	642	138	0	1.9	477	8.3	
Sept. 21-30.....	501	--	40	12	62	62	--	230	4	--	--	--	--	--	349	.47	472	150	0	2.2	536	8.3	
Weighted average.....	--	--	40	11	55	--	220	--	--	--	--	--	--	--	329	0.44	516	145	0	2.0	516	7.8	
Time-weighted average.....	580	--	39	11	55	--	215	--	--	--	--	--	--	--	324	--	--	143	0	2.0	512	7.8	
Tons per day...	--	--	63	17	87	--	344	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Temperature (°F) of water, water year October 1966 to September 1967

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

Specific conductance (microhos at 25°C), water year October 1966 to September 1967

Day	October	November	December	January	February	March	April	May	June	July	August	September
1.....	557	548	540	531	507	573	566	378	346	495	512	546
2.....	555	574	563	525	517	571	555	495	345	495	532	592
3.....	543	573	566	531	525	570	561	445	345	437	538	545
4.....	542	570	545	530	515	577	573	473	373	447	537	544
5.....	534	568	558	528	520	561	574	510	377	447	559	539
6.....	536	572	556	525	523	554	512	570	372	440	545	495
7.....	546	563	556	530	524	565	429	571	358	444	538	493
8.....	546	563	556	530	524	565	429	571	358	444	538	493
9.....	582	580	581	581	573	573	425	582	491	422	520	583
10.....	574	565	557	524	524	569	454	567	440	426	524	494
11.....	600	---	550	523	523	566	457	417	394	428	529	503
12.....	582	573	547	541	549	568	471	361	397	469	533	459
13.....	569	572	553	527	608	571	504	377	394	473	546	469
14.....	543	562	535	560	551	576	523	373	450	485	541	515
15.....	481	568	541	526	546	577	497	388	450	452	543	484
16.....	507	576	543	518	560	583	487	416	499	475	535	463
17.....	590	575	551	528	575	569	449	429	490	468	546	487
18.....	613	576	555	538	570	560	442	427	463	451	557	516
19.....	617	573	545	551	570	541	443	417	459	466	562	513
20.....	630	583	565	545	570	535	330	440	553	455	568	500
21.....	623	576	553	547	571	544	373	442	492	457	545	521
22.....	573	573	559	513	571	540	402	447	345	466	521	524
23.....	573	573	559	513	571	540	402	447	345	466	521	524
24.....	582	567	564	537	577	539	414	465	344	465	546	556
25.....	581	558	554	526	574	534	423	450	356	458	547	554
26.....	582	563	553	533	576	519	407	430	369	480	553	555
27.....	581	564	554	534	577	523	394	412	391	501	532	550
28.....	586	551	545	530	577	539	362	406	405	480	506	551
29.....	574	552	531	524	539	524	370	480	380	505	504	558
30.....	574	552	531	524	539	524	370	480	380	505	504	558
31.....	578	---	527	520	---	563	---	366	---	469	552	---
Average	570	565	552	530	551	556	451	444	407	463	539	520









SALMON RIVER BASIN  
13-3170. SALMON RIVER AT WHITE BIRD, IDAHO

LOCATION.--Lat 45°45'04", long 116°19'22", temperature recorder at gaging station, on left bank just upstream from White Bird Creek, 0.5 mile downstream from Canfield-Joseph highway bridge, 1 mile southwest of White Bird, Idaho County, and at mile 53.7.  
DRAINAGE AREA.--13,550 square miles, approximately, including White Bird Creek basin.  
RECORDS AVAILABLE.--water temperatures: October 1966 to September 1967.  
REMARKS.--Observations made at approximately 0800 and 1700 on alternate days.  
TEMPERATURES: 23° F to 21° F minimum, 34° F Dec. 23, 25, 31.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH	
														Parts per million	Tons per acre-foot	Tons per day	Calcium magnesium			Non-carbonate
May 22, 1967.....	54700	12		7.3	1.2	2.8	1.2	30	0	3.2	0.5	0.2	0.8	0.01	46	0.06	23	0	62	7.0
July 26.....	9410	14		15	2.8	5.5	9	63	0	7.4	1.0	.3	.4	.09	74	.10	49	0	122	7.9
Sept. 30.....	A3860	14		23	3.7	8.9	1.5	94	0	14	2.0	.4	.3	.06	111	.15	72	0	182	7.9

A Discharge at time of sampling.



## GRANDE RONDE RIVER BASIN

13-3315. MINAM RIVER AT MINAM, OREG.  
(Hydrologic bench-mark station)

LOCATION (revised) --Lat 45°37'12", long 117°43'32", at gaging station on left bank, 2.3 miles downstream from Squaw Creek, 0.3 mile west of Minam, Wallowa County and mile 0.3.

DRAINAGE AREA --240 square miles, approximately.

RECORDS AVAILABLE --Chemical analyses: January 1966 to September 1967.

Water temperatures: October 1965 to September 1967.

EXTREMES, 1966-67. --Water temperatures: Maximum, 79°F Aug. 17, 18; minimum, freezing point on many days from December to March.

EXTREMES, 1965-67. --Water temperatures: Maximum, 79°F Aug. 17, 18, 1967; minimum, freezing point on many days during winter months.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)		
															Parts per million	Tons per acre-foot	Tons per day	Calcium-Magnesium	Non-carbonate			
Dec. 1, 1966	177	16		6.8	1.4	2.4	0.9	32	0	0.8	0.5	0.1	0.2			40	0.05	19.1	23	0	55	7.0
Jan. 24, 1967	120	24		7.6	2.0	2.9	1.3	39	0	1.4	0	0	0			59	.08	19.1	27	0	68	7.0
Apr. 12, 1967	271	23		6.4	1.7	2.6	1.3	36	0	.4	1.0	1.1	1.1			55	.07	40.2	23	0	59	7.6
July 6, .....	1140	9.1		2.7	.6	1.2	.6	15	0	.0	.0	.0	.1			22	.03	67.7	9	0	26	7.3
Aug. 31, .....	72	17	0.03	5.7	1.3	2.5	1.4	34	0	.0	.0	.1	.2			44	.06	8.55	20	0	55	8.1
Sept. 21, .....	58	17		6.4	1.7	2.6	1.2	34	0	.4	1.0	.0	.2			50	.07	7.83	23	0	58	7.7

Temperature (°F) of water, water year October 1966 to September 1967

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

## SNAKE RIVER MAIN STEM

13-3343. SNAKE RIVER NEAR ANATONE, WASH.

LOCATION --Lat 46°05'55", Long 116°58'30", temperature recorder at gaging station on left bank 1.5 miles downstream from Grande Ronde River, 7.8 miles east of Anatone, Asotin County, 22 miles south of Clarkston, and at Mile 167.2.

DRAINAGE AREA --92,960 square miles approximately.

RECORDS AVAILABLE --Water temperatures: September 1959 to September 1967.

EXTREMES, 1966-67 --Water temperatures: Maximum, 76°F on several days during August; minimum, 39°F Jan. 24, 25.

EXTREMES, 1969-67 --Water temperatures: Maximum, 77°F Aug. 11, 1960, Aug. 13, 1963; minimum, freezing point Jan. 25, 26, 1962,

Dec. 22, 1964.

Temperature (°F) of water, water year October 1966 to September 1967

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	64	63	62	62	63	63	63	62	61	60	60	59	59	57	56	56	57	57	57	56	56	55	54	55	55	55	55	55	55	55	58			
Maximum	64	63	62	62	63	63	63	62	61	60	60	59	59	57	56	56	57	57	57	56	56	55	54	55	55	55	55	55	55	58				
Minimum	63	62	61	61	62	62	62	61	60	60	59	59	57	56	56	57	57	57	56	56	55	54	55	55	55	55	55	55	54	55	57			
November	55	54	54	53	53	52	51	51	50	49	49	49	49	49	50	50	50	49	49	49	49	49	49	48	47	47	47	47	47	49				
Maximum	55	54	54	53	53	52	51	51	50	49	49	49	49	49	50	50	50	49	49	49	49	49	49	48	47	47	47	47	47	49				
Minimum	54	54	53	53	52	51	51	50	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	48	47	47	47	46	46	47				
December	48	47	47	47	46	46	46	45	45	45	45	45	45	45	44	44	44	44	44	44	44	44	42	42	42	42	42	42	43	44				
Maximum	48	47	47	47	46	46	46	45	45	45	45	45	45	45	44	44	44	44	44	44	44	44	42	42	42	42	42	42	42	43	44			
Minimum	47	47	47	47	46	46	45	45	45	45	45	45	45	45	44	44	44	44	44	44	44	42	42	42	42	42	42	42	42	43	44			
January	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	42	42	42	42	42	42	41	40	39	40	41	42	42	42	42			
Maximum	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	42	42	42	42	42	42	42	41	40	39	40	41	42	42	42	42			
Minimum	43	43	43	43	43	42	42	42	42	42	42	42	42	42	42	41	41	41	41	41	41	41	40	39	39	40	40	41	42	42	42			
February	41	41	41	41	41	41	41	40	40	41	41	41	41	41	41	41	41	41	41	41	41	40	40	40	40	41	41	41	41	41	41			
Maximum	41	41	41	41	41	41	41	40	40	41	41	41	41	41	41	41	41	41	41	41	41	40	40	40	40	41	41	41	41	41	41			
Minimum	41	41	41	41	41	41	41	40	40	40	41	41	41	41	41	41	41	41	41	41	41	40	40	40	40	41	41	41	41	41	41			
March	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42			
Maximum	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42			
Minimum	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42			
April	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48			
Maximum	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48			
Minimum	47	47	48	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49	49			
May	50	52	54	54	54	55	56	56	56	55	52	51	51	52	55	55	55	55	55	55	55	56	56	56	56	56	56	56	56	56	56			
Maximum	50	52	54	54	54	55	56	56	56	55	52	51	51	52	55	55	55	55	55	55	55	56	56	56	56	56	56	56	56	56	56			
Minimum	48	50	52	52	52	54	54	55	55	52	50	50	51	52	54	55	55	55	55	55	55	56	56	56	56	56	56	56	56	56	56			
June	54	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55			
Maximum	54	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55			
Minimum	53	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54			
July	64	64	65	65	66	65	66	66	66	67	68	70	71	71	71	71	71	72	72	72	71	71	72	74	74	74	74	74	74	74	74			
Maximum	64	64	65	65	66	65	66	66	66	67	68	70	71	71	71	71	71	72	72	72	71	71	72	74	74	74	74	74	74	74	74			
Minimum	63	63	64	64	65	65	65	65	65	66	67	68	70	70	70	70	70	70	70	70	69	69	70	71	72	72	72	72	72	72	72			
August	74	74	73	74	75	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74			
Maximum	74	74	73	74	75	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74			
Minimum	72	72	72	73	73	73	72	72	72	72	72	73	73	74	74	74	74	74	74	74	73	73	72	71	70	70	70	70	70	70	70	70		
September	75	74	74	74	74	74	73	73	73	74	72	70	70	70	71	71	71	71	71	71	71	71	72	73	72	70	70	70	69	69	71			
Maximum	75	74	74	74	74	74	73	73	73	74	72	70	70	70	71	71	71	71	71	71	71	71	72	73	72	70	70	70	69	69	71			
Minimum	73	73	73	71	73	73	72	72	72	72	70	69	69	69	69	70	70	70	70	70	70	70	71	71	69	69	69	69	69	67	70			

13-3353. SNAKE RIVER ABOVE CLEARWATER RIVER AT CLARKSTON, WASH.  
 LOCATION--Lat 46°25'15", long 117°02'05", at bridge on U. S. Highway 410 at Clarkston, Asotin County, 0.2 mile upstream from Clearwater River, and 4.2 miles down-  
 stream from the Clearwater Creek.  
 DRAINAGE AREA--93 400 square miles, approximately.  
 RECORDS AVAILABLE--Chemical analyses: October 1961 to September 1967.  
 REMARKS--No discharge records available.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carborate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	Col- or pH	
															Parts per million	Tons per acre-foot	Tons per day	Calcium Magnesium	Non-carbonate			
Nov. 1, 1966..		19		33	16	36	3.8	176	0	58	17	0.6	1.0	--		271	0.37		148	4	437	7.9
Dec. 14.....		25		34	14	32	3.8	173	0	46	15	.5	2.6	--		263	.36		141	0	419	8.0
Jan. 5, 1967..		25		35	13	31	3.5	175	0	46	12	.5	2.6	--		266	.37		143	4	428	8.1
Jan. 25.....		25		25	14	52	3.9	172	0	38	17	.3	2.8	--		227	.37		145	4	438	8.1
Mar. 7.....		25		22	16	25	3.1	148	0	38	12	.4	2.8	--		223	.30		122	0	350	8.0
Apr. 18.....		21		18	6.4	16	2.4	90	0	21	8.0	.4	1.0	0.03	142	.19	.10	72	0	214	7.6	
May 25.....		11		9.8	2.9	6.4	1.4	46	0	9.6	3.0	.3	.6	.01	75	.10	.10	36	0	103	7.2	
June 22.....		11		10	1.9	8.4	1.9	43	0	13	3.5	.3	.4	--	74	.10	.10	33	0	124	7.7	
July 10.....		12		10	7.5	10	1.6	72	0	15	4.2	.3	.2	--	97	.13	.13	56	0	160	7.8	
Aug. 30.....		14		25	11	25	3.9	136	0	35	12	.6	.7	--	198	.27	.27	107	0	323	8.0	

Additional determinations

Date of collection	Dissolved oxygen (DO)	MPN (coliform colonies per 100 ml)	Hexavalent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)	Date of collection	Dissolved oxygen (DO)	MPN (coliform colonies per 100 ml)	Hexavalent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)
Jan. 5, 1967..	11.4	--	--	--	--	--	May 25, 1967..	--	--	0.00	0.00	0.00	--
Feb. 20.....	12.6	0	70	--	--	--	June 22.....	8.8	210	--	--	--	--
Apr. 18.....	--	--	0.00	0.01	0.01	--	Aug. 24.....	7.5	210	--	--	--	--

CLEARWATER RIVER BASIN  
13-3361. MEADOW CREEK NEAR LOWELL, IDAHO

LOCATION.--Lat 46°01'51". long 115°17'23". temperature recorder at gaging station on right bank, 16.5 miles southeast of Lowell, Idaho County, and at mile i.1 (revised).

DRAINAGE AREA.--241 square miles.

RECORDS AVAILABLE.--August 1964 to September 1967.

EXTREMES, 1964-67.--water temperatures: Maximum, 67°F July 25, Aug. 5; minimum, freezing point Dec. 9-11.

EXTREMES, 1964-67.--water temperatures: Maximum, 69°F Aug. 1, 2, 1965, and sometime during period July 17 to Aug. 29, 1966; minimum, freezing point on many days during winter months.

Temperature (°F) of water, water year October 1966 to September 1967

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



## QUALITY OF SURFACE WATERS, 1967

## CLEARWATER RIVER BASIN--Continued

## 13-3410. NORTH FORK CLEARWATER RIVER AT AHSARKA, IDAHO--Continued

## DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1966 TO SEPTEMBER 1967

DAY	OCTOBER			NOVEMBER			DECEMBER		
	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (ppm)	LOAD (TONS)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (ppm)	LOAD (TONS)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (ppm)	LOAD (TONS)
1	850	3	7	1350	9	33	3320	58	520
2	1000	6	16	1230	6	20	4210	87	989
3	1720	29 S	145	1170	5	16	3910	36	380
4	1310	21	74	1120	4	12	3720	22	221
5	1050	20	57	1110	4	12	3440	55	511
6	910	C 15	37	1320	6	21	3420	69	637
7	880	C 15	36	1520	8	33	3060	47	388
8	900	C 15	36	1390	10	38	2770	11	82
9	890	C 15	36	1330	4	14	2440	6	40
10	890	C 15	36	1230	9	30	2190	5	30
11	840	C 15	34	1300	8	28	2130	5	29
12	1000	C 15	41	1320	10	36	2170	6	35
13	1340	C 15	54	2070	22	123	4170	147 S	2080
14	1170	C 15	47	2750	42	312	7680	223	4620
15	1000	C 15	41	3010	41	333	6130	63	1040
16	950	C 15	38	3900	100	1050	4650	19	239
17	960	C 15	39	5440	115	1890	4050	12	131
18	950	C 15	38	3530	64	610	3530	9	86
19	930	C 15	38	2600	20	140	3400	6	55
20	930	C 15	38	2240	10	60	3240	3	26
21	1080	C 15	45	2350	12	76	3610	10	97
22	1300	C 22	77	2720	28	206	3980	7	66
23	1530	C 23	103	2260	18	110	2930	5	40
24	2300	C 56	348	2050	8	44	2480	C 4	27
25	2110	C 28	160	1960	7	37	2560	C 4	28
26	1780	C 20	96	2420	19	124	2430	C 4	26
27	1620	C 9	39	2220	14	84	2360	C 4	25
28	1780	C 14	67	1870	8	40	2220	C 4	24
29	1540	C 6	33	2010	6	33	2950	C 4	24
30	1330	C 7	25	2320	15	94	2320	C 4	25
31	1350	C 4	15	--	--	--	2250	C 4	24
TOTAL	38190	--	1887	63110	--	5459	102420	--	12543
DAY	JANUARY			FEBRUARY			MARCH		
	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (ppm)	LOAD (TONS)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (ppm)	LOAD (TONS)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (ppm)	LOAD (TONS)
1	2330	C 4	25	7910	38	812	3450	6	56
2	2380	C 4	26	6700	26	470	3820	7	72
3	2210	C 4	24	6050	19	310	3760	11	112
4	2210	C 4	24	5920	17	272	3480	6	56
5	2390	C 4	26	6200	15	251	3190	5	43
6	2350	C 4	25	5850	11	174	3220	5	43
7	2180	C 4	24	5310	12	172	3040	4	33
8	2030	C 4	22	4990	10	135	2970	13	104
9	1970	C 4	21	4620	10	125	3630	6	59
10	1980	C 4	21	4510	6	73	3690	9	90
11	2010	C 4	22	4380	6	71	3520	13	124
12	2290	C 4	25	4130	4	45	3270	5	44
13	2820	C 110	838	4200	5	57	3020	4	33
14	3640	C 56	570	4630	10	125	3130	4	34
15	6020	C 187	3040	4250	6	69	3040	4	33
16	10900	C 180	5300	4090	5	55	3140	5	42
17	7560	C 74	1510	4030	7	76	4800	40 A	520
18	5490	C 25	371	3920	8	85	5980	37	597
19	4960	C 23	308	3760	7	71	6210	27	453
20	6330	C 87	1490	3320	5	45	5490	14	208
21	6770	C 45	823	3210	3	26	5170	10	140
22	5760	C 21	327	3150	7	60	5490	15	222
23	4810	C 12	156	3110	6	50	7510	50	1010
24	4010	C 12	130	3090	3	25	8600	50	1160
25	3590	C 6	58	3060	4	33	7560	25	510
26	3730	C 12	121	3070	3	25	6470	15	270
27	3960	C 36	406	3060	5	41	6050	12	196
28	6490	C 124 S	2890	3120	4	34	5990	11	178
29	11700	C 165	5210	--	--	--	5990	29	469
30	12800	C 159	5500	--	--	--	5540	10	150
31	10200	C 51	1400	--	--	--	5200	8	112
TOTAL	147870	--	30733	123640	--	3787	145620	--	7173

S Computed by subdividing day.

A Computed from partly estimated-concentration graph.

C Composite period.

CLEARWATER RIVER BASIN---Continued

13-3410. NORTH FORK CLEARWATER RIVER AT AHSARKA, IDAHO--Continued  
 DAILY SUSPENDED SEDIMENT, WATER YEAR OCTOBER 1966 TO SEPTEMBER 1967

DAY	APRIL			MAY			JUNE		
	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (ppm)	LOAD (TONS)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (ppm)	LOAD (TONS)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (ppm)	LOAD (TONS)
1	4910	7	93	6900	10	186	18300	25	1240
2	4740	6	77	6540	17	300	21000	37	2100
3	4820	7	91	6370	19	327	21700	31	1820
4	5600	12	181	7170	19	368	20700	22	1230
5	6500	14	246	7500	19	385	19500	18	948
6	6430	12	208	8900	45	1080	19200	26	1350
7	6450	14	244	10400	82	2300	21200	34	1950
8	7220	21	409	13900	178	6680	20400	23	1270
9	7270	16	314	17100	235	10800	20000	19	972
10	7570	20	409	18600	143	7180	18900	15	765
11	8140	30	659	19100	126	6500	18700	17	858
12	7910	20	427	17800	86	4130	17400	16	752
13	8410	32	727	15700	64	2710	17100	25	1150
14	8840	32	764	13700	42	1550	16000	24	1040
15	8080	18	393	13300	28	1010	16100	18	782
16	7300	12	237	15000	45	1820	16100	16	696
17	6740	10	182	17720	85	4060	17200	20	929
18	6800	10	184	21100	156	8890	17100	15	693
19	7380	18	359	22700	106	6500	16600	15	672
20	7700	20	416	23200	84	5260	15900	18	773
21	6970	15	282	24300	89	5840	15800	15	640
22	6440	6	104	26400	149	10600	15100	14	571
23	6240	2	34	27300	169	12500	14200	24	920
24	6910	2	37	25400	100	6860	12700	22	754
25	7470	6	121	23200	59	3700	11500	22	683
26	8400	18	408	20800	39	2190	10700	16	462
27	8700	18	423	19500	34	1790	10300	18	501
28	8700	18	423	19100	30	1550	9600	18	467
29	8300	34 A	760	20500	34	1880	9200	22	546
30	7900	18	384	20600	27	1500	8700	26	611
31	--	--	--	18500	23	1150	--	--	--
TOTAL	214840	--	9596	528280	--	121596	486900	--	28145

DAY	JULY			AUGUST			SEPTEMBER				
	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (ppm)	LOAD (TONS)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (ppm)	LOAD (TONS)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (ppm)	LOAD (TONS)		
1	8200	21	465	2030	C	5	1120	C	3	9	
2	7700	28	592	2010	C	5	1090	C	3	9	
3	7200	56	1090	1870	C	5	25	1060	C	3	9
4	6900	20	373	1860	C	5	25	1080	C	3	9
5	6200	28	469	1790	C	5	24	1080	C	3	9
6	6100	20	329	1760	C	5	24	1080	C	3	9
7	5700	14	215	1700	C	5	23	1100	C	3	9
8	5110	15	207	1670	C	5	23	1110	C	3	9
9	4740	9	115	1690	C	5	23	1110	C	3	9
10	4490	8	97	1590	C	4	17	1070	C	3	9
11	4190	4	45	1550	C	4	17	1250	C	3	10
12	4030	5	54	1490	C	4	16	2120	C	8	46
13	3940	C	64	1470	C	4	16	1790	C	12	58
14	3700	C	50	1430	C	4	15	1300	C	3	11
15	3600	C	49	1420	C	4	15	1160	C	2	6
16	3350	C	45	1410	C	4	15	1180	C	2	6
17	3370	C	45	1400	C	4	15	1120	C	2	6
18	3220	C	43	1310	C	3	11	1120	C	2	6
19	3290	C	44	1300	C	3	11	1110	C	2	6
20	3030	C	41	1260	C	3	10	1070	C	2	6
21	2920	C	39	1260	C	3	10	1060	C	2	6
22	2950	C	40	1250	C	3	10	1050	C	2	6
23	2850	C	38	1280	C	3	10	1030	C	2	6
24	2710	C	37	1280	C	3	10	995	C	2	5
25	2560	C	35	1260	C	3	10	1010	C	2	5
26	2400	C	32	1250	C	3	10	996	C	2	5
27	2320	C	31	1230	C	3	10	982	C	2	5
28	2270	C	31	1230	C	3	10	997	C	2	5
29	2200	C	30	1220	C	3	10	967	C	2	5
30	2140	C	29	1190	C	3	10	1010	C	2	5
31	2040	C	28	1150	C	3	9	--	--	--	
TOTAL	125420	--	4792	45610	--	488	34227	--	304		

TOTAL DISCHARGE FOR YEAR (CFS-DAYS)  
 TOTAL LOAD FOR YEAR (TONS)

2056127  
 226503

A Computed from partly estimated-concentration graph.  
 C Composite period.





CLEARWATER RIVER BASIN--Continued  
 13-3425. CLEARWATER RIVER AT SPALDING, IDAHO--Continued  
 Temperature (°F) of water, water year October 1966 to September 1967--Continued

Month	Day																															Average		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31			
July	59	59	60	61	62	62	62	63	63	64	65	66	67	68	68	68	68	68	68	69	68	69	68	69	70	71	71	72	71	72	73	72	66	
Maximum	58	58	58	59	60	60	60	60	60	61	62	63	65	66	66	66	66	66	67	67	67	67	68	69	69	69	69	69	69	69	69	69	64	
August	72	73	73	73	74	73	72	73	73	74	75	75	76	75	76	76	76	76	76	77	75	75	74	74	72	72	73	74	74	74	74	74		
Maximum	70	70	70	70	71	71	70	70	70	71	72	72	73	73	73	73	73	74	74	74	74	73	72	72	70	70	70	71	71	72	71	71	71	
September	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74		
Maximum	72	72	70	70	71	71	70	70	69	68	65	63	61	60	61	61	63	63	64	65	66	67	67	65	64	64	64	64	63	63	63	63	67	
Minimum	72	72	70	70	71	71	70	70	69	68	65	63	61	60	61	61	63	63	64	65	66	67	67	65	64	64	64	64	63	63	63	63	67	

SLAKE RIVER MAIN STEM

13-3435. SLAKE RIVER NEAR CLARKSTON, WASH.  
 (International Hydrological Decade River Station)

LOCATION.--Lat 46°25'15", long 117°10'50", at left bank 8 miles downstream from Clarkston, Asotin County, and 1 mile downstream from gaging station.  
 DRAINAGE AREA.--103,200 square miles, approximately, upstream from gaging station.  
 RECORDS AVAILABLE.--Chemical analyses: November 1951 to February 1956, October 1961 to September 1967.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Bo-tons from (B)	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	Color		
															Parts per million	Tons per acre-foot	Tons per day	Calcium-Magnesium	Non-carbonate				
Nov. 2, 1966..	24400	30	35	13	13	33	3.5	171	0	48	17	0.5	1.1	1.1	A	265	0.33	17460	141	1	498	7.7	5
Dec. 13.....	2800	21	29	12	12	28	3.5	140	0	40	14	.2	2.2	2.2	B	222	.30	20060	117	0	378	7.6	16
Jan. 24, 1967.	28800	22	27	11	11	26	3.5	140	0	40	14	.2	2.2	2.2	B	222	.30	20060	117	0	363	8.0	5
Mar. 7.....	27000	22	16	13	13	20	2.6	116	0	26	9.5	.3	2.1	2.1	C	174	---	19880	93	0	277	7.8	10
Apr. 18.....	42000	25	25	8.7	21	2.8	121	0	29	10	10	.5	1.2	1.2	D	182	---	20640	98	0	289	7.6	5
May 26.....	166000	9.7	6.8	2.0	4.8	1.2	32	0	6.6	1.5	2.0	1.5	1.4	1.4	E	52	.08	23310	25	0	211	7.0	5
July 11.....	51900	12	12	3.6	8.8	1.4	59	0	12	3.8	3.8	.2	1.1	1.1	F	83	---	11630	45	0	131	7.7	10
Aug. 30.....	17600	13	0.09	23	8.4	24	3.8	118	0	31	12	.5	.7	.7	G	175	---	8310	92	0	281	7.9	5

A Calculated from determined constituents.

TUCANWON RIVER BASIN

13-3445. TUCANWON RIVER NEAR STARBUCK, WASH.

LOCATION.--Lat 46°30'20", long 118°03'55", at county road bridge 180 feet upstream from gaging station, 3 miles east of Starbuck, Columbia County, and 3.5 miles downstream from Pataha Creek.

DRAINAGE AREA.--431 square miles.

RECORDS AVAILABLE.--Water temperatures: October 1962 to September 1967.

Sediment records: October 1962 to September 1967.

EXTREMES, 1966-67.--Water temperatures: Minimum, 36°F Feb. 19.

Sediment concentrations: Minimum, 890 mg/l, 2,700 ppm, and 1.1 ton per acre daily, 1 to 2 tons per acre during August and September.

EXTREMES, 1962-67.--Water temperatures: Maximum (1962-65), 82°F Aug. 1, 1965; minimum, freezing point Dec. 11, 12, 1963.

Sediment concentrations: Maximum daily, 99,800 ppm Dec. 22, 1964; minimum daily, 4 ppm Oct. 29, 30, 1965.

Sediment loads: Maximum daily, 1,600,000 tons Dec. 22, 1964; minimum daily, 1 ton on many days in 1966 and 1967.

REMARKS.--Maximum observed during water year: Sediment concentration, 4,460 ppm Jan. 20.

Temperature (°F) of water, water year October 1966 to September 1967

Month	Day																															Average		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31			
October	60	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	
November	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	
December	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	
January	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	
February	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	
March	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	
April	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	
May	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	
June	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	
July	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	
August	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82
September	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73	73

Particle-size analyses of suspended sediment, water year October 1966 to September 1967  
 (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	Water temperature per-ature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment										Method of analysis
						Percent finer than size indicated, in millimeters										
Jan. 29, 1967	46		289	513	400	0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	YPWC
May 23	61		484	847	1130	0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	YPWC

TUCANNON RIVER BASIN--Continued

13-3445. TUCANNON RIVER NEAR STARBUCK, WASH.--Continued

Suspended sediment, water year October 1966 to September 1967

Day	OCTOBER			NOVEMBER			DECEMBER		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	70	C 17	3	81	C 10	2	102	C 26	7
2..	76	C 17	3	79	C 10	2	106	C 26	7
3..	85	C 17	4	79	C 10	2	112	C 26	8
4..	83	C 17	4	79	C 10	2	114	C 26	8
5..	81	C 17	4	79	C 10	2	121	C 26	8
6..	77	C 17	4	83	C 10	2	114	C 26	8
7..	74	C 17	3	81	C 10	2	114	C 26	8
8..	72	C 17	3	79	C 10	2	110	C 26	8
9..	72	C 17	3	79	C 10	2	104	C 26	7
10..	72	C 17	3	79	-- E	3	106	C 26	7
11..	74	C 17	3	81	-- E	3	104	C 26	7
12..	72	C 17	3	86	-- E	3	106	120 A	34
13..	76	C 17	3	88	-- E	3	132	273	97
14..	72	C 17	3	92	20	5	185	270	135
15..	70	C 17	3	106	280 A	80	177	135	65
16..	70	C 17	3	154	610 A	250	163	90	40
17..	72	C 17	3	137	270 A	100	152	52	21
18..	70	C 17	3	112	50	15	142	49	19
19..	70	C 17	3	102	37	10	132	40 B	14
20..	70	C 17	3	106	40	11	130	35	12
21..	80	C 17	4	106	40	11	130	C 20	7
22..	80	C 17	4	100	32	9	123	C 20	7
23..	90	C 17	4	96	25	6	114	C 20	6
24..	90	C 17	4	92	23	6	112	C 20	6
25..	86	C 17	4	94	72 A	18	112	C 20	6
26..	85	C 17	4	119	100 A	32	108	C 20	6
27..	88	C 17	4	106	25	7	104	C 20	6
28..	85	C 17	4	102	28	8	102	C 20	6
29..	81	C 17	4	100	23	6	100	C 20	5
30..	79	C 17	4	98	100 A	26	104	C 20	6
31..	81	C 17	4	--	--	--	98	C 20	5
Total	2403	--	102	2875	--	630	3733	--	586
JANUARY									
1..	104	C 16	4	337	250	227	128	C 10	3
2..	102	C 16	4	282	170	129	132	C 10	4
3..	100	C 16	4	250	120	81	132	C 10	4
4..	108	68 A	20	229	97	60	128	C 10	3
5..	110	48	14	212	50	29	125	C 10	3
6..	114	33	10	200	41	22	128	C 10	3
7..	114	17	5	191	31	16	125	C 10	3
8..	112	34	10	179	36	17	130	C 10	4
9..	112	-- E	8	174	31	15	130	C 10	4
10..	117	-- E	8	163	34	15	128	C 10	3
11..	119	24	8	163	28	12	130	C 10	4
12..	121	24	8	154	C 21	9	120	C 10	3
13..	128	37	13	150	C 21	9	123	C 10	3
14..	140	72	27	147	C 21	8	123	C 10	3
15..	171	200 B	92	140	C 21	8	121	C 10	3
16..	212	300 A	170	140	C 21	8	130	C 10	4
17..	215	170	99	134	C 21	8	177	86	41
18..	203	92	50	142	C 21	8	206	43 B	24
19..	191	90	46	134	C 21	8	215	66	38
20..	287	2200 A	1700	132	C 21	7	215	58	34
21..	274	870	644	130	C 21	7	206	34	19
22..	257	200	139	128	C 21	7	200	28	15
23..	236	100	64	125	85 A	29	218	44	26
24..	215	68	39	125	C 14	5	222	45	27
25..	209	55	31	125	C 14	5	212	34	19
26..	215	63 A	37	125	C 14	5	203	33 B	18
27..	218	100 A	59	125	C 14	5	191	90 A	46
28..	246	210 A	140	123	C 14	5	188	140 B	71
29..	307	700	580	--	--	--	203	550 A	300
30..	420	1700	1930	--	--	--	177	90	43
31..	392	530	561	--	--	--	168	24	11
Total	5869	--	6524	4659	--	764	5034	--	786
FEBRUARY									
MARCH									

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

TUCANNON RIVER BASIN--Continued

13-3445. TUCANNON RIVER NEAR STARBUCK, WASH.--Continued

Suspended sediment, water year October 1966 to September 1967--Continued

Day	APRIL			MAY			JUNE		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	163	C 26	11	177	C 27	13	254	56	38
2..	157	C 26	11	165	C 27	12	254	53	36
3..	152	C 26	11	163	C 27	12	257	53 B	37
4..	150	C 26	11	165	C 27	12	250	53	36
5..	157	C 26	11	168	C 27	12	243	46	30
6..	152	C 26	11	174	C 27	13	243	36	24
7..	150	C 26	11	197	110 A	59	246	C 48	32
8..	152	C 26	11	240	180 B	120	243	C 48	31
9..	152	C 26	11	288	250 A	190	240	C 48	31
10..	154	C 26	11	315	270 A	230	222	C 48	29
11..	160	C 26	11	311	170 A	140	215	C 48	28
12..	157	C 26	11	289	240 A	190	215	C 48	28
13..	160	C 26	11	260	80	56	215	C 48	28
14..	171	C 26	12	240	58	38	200	C 48	26
15..	160	C 26	11	236	55	35	194	C 42	22
16..	154	C 26	11	257	130 A	90	185	C 42	21
17..	150	C 26	11	315	210 A	180	179	C 42	20
18..	154	C 26	11	388	410 A	430	174	C 42	20
19..	157	C 26	11	384	420 B	440	165	C 42	19
20..	174	C 26	12	372	380 A	380	154	C 42	17
21..	168	C 26	12	404	460 A	500	179	C 42	20
22..	157	C 26	11	458	640 A	790	185	C 42	21
23..	154	C 26	11	485	780	1020	165	C 42	19
24..	154	C 26	11	449	620	752	150	C 42	17
25..	165	C 26	12	400	370	400	134	C 22	8
26..	174	C 26	12	349	210	198	123	C 22	7
27..	182	C 26	13	322	140	122	114	C 22	7
28..	188	C 26	13	315	120	102	106	C 22	6
29..	188	C 26	13	307	110	91	100	C 22	6
30..	182	C 26	13	289	73	57	94	C 22	6
31..	--	--	--	274	66	49	--	--	--
Total	4848	--	343	9156	--	6733	5698	--	670
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..	92	C 12	3	53	C 12	2	42	C 7	1
2..	88	C 12	3	55	C 12	2	42	C 7	1
3..	86	C 12	3	53	C 12	2	46	C 7	1
4..	81	C 12	3	52	C 12	2	48	C 7	1
5..	76	C 12	2	50	C 12	2	48	C 7	1
6..	74	C 12	2	55	C 12	2	46	C 7	1
7..	74	C 12	2	58	C 12	2	49	C 7	1
8..	72	C 12	2	56	C 12	2	48	C 7	1
9..	74	C 12	2	52	C 12	2	46	C 7	1
10..	74	C 12	2	50	C 12	2	48	C 7	1
11..	69	C 12	2	49	C 12	2	55	C 7	1
12..	64	C 12	2	53	C 12	2	64	C 7	1
13..	62	C 12	2	52	C 12	2	64	C 7	1
14..	61	C 12	2	52	C 12	2	61	C 7	1
15..	59	C 12	2	49	C 12	2	59	C 7	1
16..	59	C 12	2	48	C 12	2	58	C 7	1
17..	62	C 12	2	46	C 12	1	56	C 7	1
18..	59	C 12	2	46	C 12	1	56	C 7	1
19..	59	C 12	2	46	C 12	1	53	C 7	1
20..	61	C 12	2	48	C 12	2	56	C 7	1
21..	62	C 12	2	48	C 12	2	55	C 7	1
22..	62	C 12	2	46	C 12	1	53	C 7	1
23..	61	C 12	2	45	C 12	1	55	C 7	1
24..	59	C 12	2	42	C 12	1	53	C 7	1
25..	58	C 12	2	45	C 12	1	53	C 7	1
26..	56	C 12	2	42	C 12	1	56	C 7	1
27..	56	C 12	2	43	C 12	1	55	C 7	1
28..	56	C 12	2	46	C 12	1	56	C 7	1
29..	53	C 12	2	43	C 12	1	59	C 7	1
30..	53	C 12	2	42	C 12	1	61	C 7	1
31..	56	C 12	2	42	C 12	1	--	--	--
Total	2038	--	66	1507	--	49	1601	--	30
Total discharge for year (cfs-days).....									49421
Total load for year (tons).....									17289

A Computed from partly estimated-concentration graph.

B Computed from estimated-concentration graph,

C Composite period.

## PALOUSE RIVER BASIN

13-3510, PALOUSE RIVER AT HOOPER, WASH.

LOCATION.--Lat 46°45'30", long 118°08'50", at bridge on State Highway 26 at Hooper, Whitman County, 150 feet upstream from gaging station, and 0.4 mile upstream from Cow Creek.

DRAINAGE AREA.--2,500 square miles.

RECORDS AVAILABLE.--Chemical analyses: July 1959 to September 1967.

Water temperatures: October 1961 to September 1967.

SP. GR.:--October 1961 to September 1967.

EXTREMES, 1966-67.--Water temperatures: Minimum, 34°F Dec. 30, Jan. 25.

Sediment concentrations: Maximum daily, 2,400 ppm Jan. 29; minimum daily, 6 ppm on several days during November.

Sediment loads: Maximum daily, 24,300 tons Jan. 29; minimum daily, less than 0.50 ton on many days during October, August, and September.

EXTREMES, 1961-67.--Water temperatures (1961-64, 1965-67): Maximum (1961-64), 86°F July 12, 1964; minimum (1961-64, 1965-67), freezing point on several days during December 1961, January 1962, January and February 1963, December 1964.

Sediment concentrations: Maximum daily, 45,100 ppm Feb. 5, 1963; minimum daily, 6 ppm on several days during November 1961 and November 1966.

Sediment loads: Maximum daily, 2,110,000 tons Feb. 5, 1963; minimum daily, less than 0.50 ton on many days during July, August, September, and October 1966, and October 1966, and October 1966.

REMARKS.--Maximum observed during water year: Sediment concentration, 3,580 ppm Jan. 29.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Fe)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> ) (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>	Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	Color or pH	
														Parts per million	Tons per acre-foot					Calcium Magnesium
Oct. 31, 1966..	49	9.0	31	14	32	4.6	209	0	12	16	5	0.4	0.9	0.30	39.5	135	0	390	8.2	5
Nov. 1, 1966..	785	8.4	16	6.6	11	3.3	175	0	9.2	3.2	2	2	8.5	0.20	366	67	6	192	7.6	60
Dec. 25, 1967..	574	25	17	6.7	13	2.8	95	0	7.6	3.8	2	2	9.1	0.21	242	67	6	192	7.6	60
Mar. 8, 1967..	475	25	17	6.7	13	2.8	95	0	7.6	3.8	2	2	9.1	0.21	242	67	6	192	7.6	60
Apr. 19, 1967..	586	21	14	4.7	9.6	2.6	80	0	6.2	3.0	2	3.1	0.02	105	178	70	0	153	7.4	10
May 23, 1967..	650	23	13	3.8	8.6	2.8	72	0	5.2	2.0	2	3.0	.01	102	179	48	0	134	7.5	5
July 13, 1967..	45	22	27	9.1	19	4.6	156	4	9.6	5.0	3	.2	.2	186	22.6	105	0	281	8.4	10

A. Calculated from determined constituents.

Analyses, in parts per million, of trace elements

Date of collection	Time (24 hr)	Chromium		Copper (Cu)	Zinc (Zn)	Arsenic (As)	Boron (B)
		Hexavalent (Cr <sup>6+</sup> )	Total (Cr)				
Apr. 19, 1967....		0.00	0.00	0.00	0.00	.02	
May 23, 1967....		.00	.00	.00	.00	.02	





PALOUSE RIVER BASIN--Continued

13-3510. PALOUSE RIVER AT HOOPER, WASH.--Continued

Suspended sediment, water year October 1966 to September 1967--Continued

Day	APRIL			MAY			JUNE		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	978	80	211	1270	102	350	315	C 34	29
2..	892	90 B	220	1030	86	239	292	C 34	27
3..	826	120 A	270	902	120 A	290	260	C 34	24
4..	870	83 B	190	826	90	201	281	C 34	26
5..	760	80 B	160	804	60	130	300	C 34	28
6..	765	76	157	782	92	194	281	C 34	26
7..	738	68 B	140	738	110 B	220	265	C 34	24
8..	680	62 B	110	680	114	209	398	--	210
9..	675	57 B	100	700	120 B	230	407	102	112
10..	670	54	98	738	106	211	330	100 B	89
11..	660	--	85	892	100	241	339	350	320
12..	670	C 41	74	2400	665 S	4720	318	453	389
13..	680	C 41	75	2790	660	4970	289	175	137
14..	685	C 41	76	2030	242	1330	372	230 A	230
15..	754	C 41	83	1590	160	687	318	145	124
16..	704	C 41	78	1350	122	445	278	160 B	120
17..	625	C 41	69	1190	102	328	240	390 A	250
18..	570	32	49	1080	100 B	290	211	140 B	80
19..	556	34	51	1010	72	196	193	120 B	63
20..	864	48 B	110	919	50 B	120	180	180 B	87
21..	1170	58 B	180	836	80 B	180	174	255	120
22..	1100	140 A	420	710	100	192	172	158	73
23..	908	118	289	650	68	119	184	110 B	53
24..	765	88	182	596	60 B	97	232	110	69
25..	660	70	125	592	74	118	202	80 B	44
26..	625	61 B	100	436	60 B	71	174	80 B	38
27..	700	60 B	110	429	44 A	51	145	65	25
28..	776	64 B	130	392	27 B	29	127	--	18
29..	908	58	142	362	30 B	29	115	42	13
30..	1090	88	259	339	32	29	103	--	13
31..	--	--	--	333	--	--	--	--	--
Total	23324	--	4343	29396	--	16945	7495	--	2863
Day	JULY			AUGUST			SEPTEMBER		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	100	C 47	13	10	C 17	T	2.7	--	T
2..	92	C 47	12	8.4	C 17	T	2.7	--	T
3..	86	C 47	11	7.0	C 17	T	2.9	28	T
4..	79	C 47	10	6.3	C 17	T	3.1	--	T
5..	74	C 47	9	5.9	C 17	T	3.6	--	T
6..	66	C 47	8	6.3	C 17	T	4.4	24	T
7..	58	C 47	7	6.6	C 17	T	4.9	--	T
8..	54	C 47	7	8.1	C 17	T	4.6	--	T
9..	49	C 47	6	6.3	C 17	T	5.2	--	T
10..	52	C 47	7	4.1	C 17	T	4.9	--	T
11..	51	C 47	6	4.9	80 A	1	5.2	--	T
12..	47	C 47	6	5.6	80 B	1	4.9	--	T
13..	45	C 47	6	4.6	C 33	T	5.2	--	T
14..	47	C 47	6	3.6	C 33	T	5.6	--	T
15..	40	C 47	5	4.4	C 33	T	5.2	18	T
16..	36	C 28	3	2.5	C 33	T	4.6	--	T
17..	35	C 28	3	1.9	C 33	T	3.3	--	T
18..	30	C 28	2	1.6	C 33	T	2.5	--	T
19..	31	C 28	2	1.5	C 33	T	2.3	--	T
20..	30	C 28	2	1.5	C 33	T	2.3	--	T
21..	28	C 28	2	1.5	C 33	T	2.7	--	T
22..	29	C 28	2	1.5	C 33	T	2.5	38	T
23..	27	C 28	2	1.9	C 33	T	2.1	--	T
24..	26	C 28	2	2.3	160 A	1	2.3	--	T
25..	26	C 28	2	2.1	100 B	1	2.5	--	T
26..	24	C 28	2	2.3	--	T	3.1	--	T
27..	21	C 28	2	3.1	--	T	3.8	--	T
28..	20	C 28	2	3.1	--	T	4.6	27	T
29..	17	C 28	1	3.1	--	T	5.6	--	T
30..	13	C 28	1	3.3	--	T	7.7	--	T
31..	11	C 28	1	3.3	--	T	--	--	--
Total	1344	--	150	128.6	--	12	117.0	--	8
Total discharge for year (cfs-days).....									145277.3
Total load for year (tons).....									107408

S Computed by subdividing day.

T Less than 0.50 ton.

A Computed from partly estimated-concentration graph.

B Computed from estimated-concentration graph.

C Composite period.

## SNAKE RIVER MAIN STEM

13-3530. SNAKE RIVER BELOW ICE HARBOR DAM, WASH.

LOCATION.--Lat 46°14'45", long 118°52'40", at south fishladder at Ice Harbor Dam, 1.1 mile upstream from gaging station, 10.5 miles east of Pasco, Franklin County, and at river mile 9.7.

DRAINAGE AREA.--108,500 square miles, approximately, upstream from gaging station.

RECORDS AVAILABLE.--Chemical analyses: July 1960 to September 1967.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean Silica discharge (cfs)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>		Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	pH or color
														Parts per million	Tons per acre-foot	Tons per day	Calcium Magnesium	Non-carbonate			
Oct. 12, 1966.	24400	16	29	13	35	3.8	156	0	49	17	0.5	1.3	242	0.33	15940	126	0	384	8.0	5	
Nov. 1	28100	19	33	16	36	3.8	176	0	58	17	0.5	1.0	271	0.33	20560	148	0	437	7.9	10	
Nov. 15	26600	17	30	13	35	4.0	162	0	48	17	.4	1.9	245	.33	17870	128	4	406	8.0	5	
Dec. 8	32500	20	29	12	29	3.3	150	0	40	13	.3	1.5	222	.30	19480	122	0	369	7.9	10	
Dec. 29	25300	22	26	11	24	2.8	129	0	34	12	.2	2.5	A 198	.27	13530	109	4	328	8.0	10	
Jan. 9, 1967.	32600	24	31	12	28	3.5	153	0	42	14	.2	2.8	238	.32	20950	127	2	385	8.0	10	
Feb. 25	30600	23	24	9.6	21	2.7	118	0	29	11	.4	2.3	185	.25	15280	100	3	287	7.9	10	
Mar. 30	44900	25	21	6.6	16	2.3	98	0	24	8.5	.4	1.8	155	.21	18790	80	0	241	7.6	10	
Apr. 20	45500	24	18	6.2	14	1.8	80	0	20	7.0	.3	1.7	136	.16	17260	73	0	233	7.2	5	
May 20	188000	12	14	3	1.3	30	0	5.8	2.0	2.0	.2	.3	56	.07	27260	23	0	269	7.2	5	
June 17	139000	11	6.5	2.4	4.4	4.4	34	0	5.6	5.6	.2	.3	A 100	.14	21020	26	0	72	7.5	5	
July 21	35000	12	14	4.9	11	2.5	71	0	15	5.2	.3	.0	A 100	.14	9450	55	0	163	7.8	5	
Aug. 18	21300	13	18	6.8	16	2.8	94	0	20	7.8	.4	.5	134	.18	7710	73	0	216	8.0	5	
Sept. 21	22400	13	25	9.7	25	3.4	128	0	34	12	.5	.3	196	.27	6230	103	0	315	8.1	5	

A Calculated from determined constituents.

Date of collection	Additional determinations												
	Dis-solved oxygen (DO)	MPN (coliform colonies per 100 ml)	Hexa-valent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)	Date of collection	Dis-solved oxygen (DO)	MPN (coliform colonies per 100 ml)	Hexa-valent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)
Feb. 25, 1967.	13.3	230	0.01	0.10	0.01		June 17, 1967.	10.8	2400				
Mar. 30	11.4	91					July 21	9.0					
Apr. 20	11.8	230					Aug. 18	10.6	0				
May 25	11.9	2400					Sept. 21	10.3	36				

MISCELLANEOUS ANALYSES OF STREAMS IN SNAKE RIVER BASIN  
IN WYOMING

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> ) (Al)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> ) (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub> (Calcium, Magnesium)	Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	Color or pH	
Oct. 31, 1966	66	10	0.10	69	1.5	3.3	0.9	200	0	13	6.4	0.2	0.2	0.2	216	178	14	0.1	354	7.8

FLAT CREEK BASIN

13-0180. FLAT CREEK NEAR JACKSON, WYO. (Lat 42°33', long 110°37')

IN IDAHO

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> ) (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> ) (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub> (Calcium, Magnesium)	Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)			
													Parts per million	Tons per acre-foot						
Aug. 7, 1967	A	6.0	6.4	0.00	42	20	4.0	224	0	6.2	4.4	0.7	200	0.27	3.24	188	4	0.1	348	7.7

PORTRUFF RIVER BASIN

13-0739.5. BIRCH CREEK ABOVE DIVERSION, NEAR DOWNEY, IDAHO (Lat 42°21'00", long 112°16'30")

RAFT RIVER BASIN

13-0790. CLEAR CREEK NEAR NAF, IDAHO (Lat 41°58'00", long 113°17'05")

May 31, 1967	63	8.0	0.42	11	2.9	8.9	1.4	38	0	6.8	15	0.2	1.5	0.02	71	0.10	12.1	40	8	0.6	125	7.4
July 25, 1967	19	9.0	0.10	17	4.5	16	1.4	68	0	9.2	24	0.7	0.02	120	0.16	61.6	61	6	0.9	208	7.8	

13-0792. CASSIA CREEK NEAR ELBA, IDAHO (Lat 42°17', long 113°31')

Nov. 8, 1966	5.9	29	43	12	25	5.0	188	0	16	30	0.5	1.4	0.00	252	0.34	4.01	157	3	0.9	420	7.5
June 2, 1967	11.0	17	21	5.0	9.6	2.3	90	0	5.2	10	3	1.1	0.04	112	0.15	33.3	73	0	0.5	184	7.6
July 27, 1967	13	30	40	9.6	19	4.3	178	0	8.8	20	4	2.1	0.07	215	0.29	7.59	140	0	0.7	361	8.0

13-0796. SUBLETT CREEK AT SUBLETT CAMPGROUND, NEAR SUBLETT, IDAHO (Lat 42°19'36", long 113°00'13")

May 30, 1967	18	0.01	53	26	20	2.1	276	0	16	28	0.3	0.6	0.06	282	0.38	239	13	0.6	523	8.0
July 21, 1967	15	0.04	47	26	16	1.7	258	0	14	26	0.2	0.8	0.04	273	0.37	224	13	0.3	495	8.2

ROCK CREEK BASIN

13-0927. ROCK CREEK AT TWIN FALLS, IDAHO (Lat 42°32'57", long 114°28'27")

Aug. 20, 1967	A	43	82	29	51	5.8	306	0	126	35	1.0	5.7	0.38	530	0.72	394	73	1.2	802	8.2
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A Estimated.

MISCELLANEOUS ANALYSES OF STREAMS IN SNAKE RIVER BASIN--Continued  
IN IDAHO--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Fe)	Iron (Fe) (Ca)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonyl sulfide (CO <sub>2</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Iron (Fe)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>	Sodium adsorption ratio	Specific conductance (microhmhos at 25°C)	pH	
															Parts per million	Tons per acre-foot					Tons per day
SALMON FALLS CREEK BASIN																					
13-0935. CEDAR DRAW NEAR FILER, IDAHO (Lat 42°37'25", long 114°39'05")																					
Aug. 17, 1967....	45	38	74	31	63	5.5	326	0	117	42	1.1	9.4	0.19	585	0.75	67.4	312	45	1.0	824	8.2
13-0850. DEEP CREEK NEAR BUHL, IDAHO (Lat 42°37'05", long 114°50'40")																					
Aug. 17, 1967....	A 40	33	75.	26	46	5.3	305	0	90	36	1.0	7.3	0.12	482	0.66	52.1	294	44	1.2	733	8.0
MUD LAKE-LOST RIVER BASINS																					
13-1190. LITTLE LOST RIVER NEAR HOWE, IDAHO (Lat 43°53', long 113°06')																					
Sept. 28, 1967....	72	13	42	16	8.5	1.1	194	0	18	10	0.1	0.8	0.04	202	0.27	39.2	171	12	0.3	352	8.0
13-1210. BIG LOST RIVER BELOW CHILLY CREEK, NEAR CHILLY, IDAHO (Lat 44°02'45", long 113°55'07")																					
Sept. 20, 1967....	112	11	27	5.5	3.8	0.8	101	0	12	2.0	0.2	0.1	0.00	116	0.16	35.1	90	7	0.2	190	7.9
13-1220. THOUSAND SPRINGS CREEK NEAR CHILLY, IDAHO (Lat 44°04'00", long 113°50'15")																					
Aug. 9, 1967....	32	13	58	20	5.8	1.3	266	0	15	1.0	0.6	0.6	0.00	250	0.34	21.6	227	9	0.2	424	7.9
13-1270. BIG LOST RIVER BELOW MACKAY RESERVOIR, NEAR MACKAY, IDAHO (Lat 43°56'20", long 113°38'50")																					
July 17, 1967....	1100	9.9	28	7.2	3.7	1.2	114	0	11	3.0	0.3	0.2	0.04	121	0.16	359	100	6	0.2	212	7.8
Sept. 21, 1967....	513	12	39	10	5.2	1.3	160	0	16	4.0	0.2	0.5	0.08	163	0.22	226	138	8	0.2	283	8.0
13-1308. BIG LOST RIVER BELOW BLAINE CANAL, NEAR LESLIE, IDAHO (Lat 43°18', long 113°25')																					
Sept. 19, 1967....	282	13	43	10	5.6	1.5	172	0	16	4.0	0.3	0.9	0.06	181	0.25	138	148	8	0.2	302	8.0
13-1310. ANTELOPE CREEK BELOW CHERRY CREEK, NEAR DARLINGTON, IDAHO (Lat 43°44'01", long 113°26'48")																					
Sept. 18, 1967....	39	15	32	7.1	5.3	1.2	123	0	17	2.0	0.3	0.2	0.06	144	0.20	15.2	109	8	0.2	233	8.2
13-1315. PASS CREEK NEAR LESLIE, IDAHO (Lat 43°56'00", long 113°26'45")																					
Sept. 22, 1967....	8.1	12	50	6.2	5.6	0.6	180	0	9.2	3.0	0.2	0.4	0.04	173	0.24	3.78	150	3	0.2	294	8.1
BIG WOOD RIVER BASIN																					
13-1410. BIG WOOD RIVER NEAR BELLEVUE, IDAHO (Lat 43°19'40", long 114°20'25")																					
Aug. 21, 1967....	114	18	57	10	5.0	1.6	210	3	14	1.5	0.4	0.3	0.04	224	0.30	68.9	183	6	0.2	362	8.3
BRUNEAU RIVER BASIN																					
13-1695. WICKAHONEY CREEK NEAR BRUNEAU, IDAHO (Lat 42°47'06", long 115°59'00")																					
Jan. 31, 1967....	0.15	33	11	3.1	12	4.4	58	0	11	5.5	0.6	3.2	0.02	122	0.17	0.05	40	0	0.8	142	7.4
June 22, 1967....	2.7	36	13	2.5	12	6.2	77	0	7.2	3.5	0.7	0.5	0.02	122	0.17	0.89	43	0	0.8	152	7.5

A Estimated.

PAYETTE RIVER BASIN  
13-2510. PAYETTE RIVER NEAR PAYETTE, IDAHO (Lat 44°02'30", Long 116°55'30")

Oct. 24, 1966.....	1970	15	0.25	13	2.8	16	1.0	80	0	8.2	2.0	0.5	0.8	0.08	99	0.13	527	44	0	1.1	155	7.2
May 26, 1967.....	7450	13	6.3	1.1	5.2	34	0	3.0	0	3.0	0	0	0.6	0.4	47	0.06	945	20	0	1.5	87	7.2
July 27.....	1670	17	15	3.2	18	1.7	92	0	10	3.5	0.5	0.9	0.8	116	1.16	523	50	0	1.1	181	7.6	
Aug. 23.....	1650	18	15	3.4	20	2.2	99	0	11	4.0	0.5	0.8	0.3	126	0.17		52	0	1.2	190	7.6	

WEISER RIVER BASIN  
13-2674. WEISER RIVER AT WEISER, IDAHO (Lat 44°14'35", Long 116°57'26")

May 22, 1967.....	24	6.3	2.5	3.3	1.4	39	0	1.0	0.0	0.1	0.8	0.04	66	0.08	561	26	0	0.3	69	7.1	
July 27.....	26	23	8.8	25	4.9	144	5	22	5.0	4.3	1.3	196	0.26	94	0	0.1	286	0	1.1	286	8.6
Aug. 21.....	26	12	5.2	8.2	3.8	75	0	6.2	1.0	0.3	2.2	1.06	96	0.13		52	0	0.5	139	7.9	

SALMON CREEK BASIN  
13-3020. PAHSIMEROI RIVER NEAR MAY, IDAHO (Lat 44°41'31", Long 114°02'52")

June 3, 1967.....	18	0.11	45	16	13	2.4	210	0	24	10	0.4	1.2	0.02	224	0.30	178	6	0.4	391	8.2
July 12.....	21	47	17	13	2.2	204	8	22	9.0	0.3	4.4	0.06	241	0.33	188	7	0.4	389	8.5	
Sept. 25.....	22	50	17	14	2.1	226	0	24	10	0.2	1.2	1.0	246	0.33	195	10	0.4	411	7.9	

LEWIS RIVER NEAR SALMON, IDAHO (Lat 45°07'47", Long 113°47'47")

June 1, 1967.....	18	28	9.3	18	3.1	130	0	32	7.0	0.4	0.8	0.06	183	0.25	108	2	0.7	288	7.6
July 13.....	22	44	13	26	3.4	210	0	43	10	0.4	2.1	1.0	271	0.37	172	0	0.9	438	8.1
Sept. 25.....	28	64	22	45	4.8	296	0	77	17	0.3	0.7	1.14	402	0.55	230	6	1.2	627	8.2

## IN UTAH

RAFT RIVER BASIN  
13-0777. GEORGE CREEK NEAR YOST, UTAH (Lat 41°55'10", Long 113°28'50")

Nov. 6, 1966.....	2.2	12	0.11	34	9.1	23	1.8	150	0	14	26	0.2	0.2	0.07	191	0.26	1.13	122	0	0.9	336	7.8
June 1, 1967.....	37	7.9	.65	11	2.8	6.8	1.2	40	0	6.8	10	0.2	2.1	0.00	63	0.09	6.29	39	6	.5	113	7.4
July 26.....	8.9	8.7	--	17	4.0	9.9	1.1	69	0	6.4	12	0.1	1.1	0.05	88	0.12	2.11	59	2	.6	161	7.4

## MISCELLANEOUS ANALYSES OF STREAMS IN SNAKE RIVER BASIN--Continued

## DEADMAN CREEK BASIN

13-3436.8. DEADMAN CREEK NEAR CENTRAL FERRY, WASH.

Monthly and annual summary of suspended-sediment discharge,  
water year October 1966 to September 1967

Month	Suspended sediment (tons)	
October 1966.....	A	1
November.....	E	40
December.....	A	140
January 1967.....	E	2,100
February.....	E	30
March.....	E	370
April.....	E	20
May.....	E	10
June.....	A	1
July.....	T	--
August.....	T	--
September.....	T	--
Total for year.....	E	2,700

E Estimated.

A Partly estimated.

T Less than 0.50 ton.

Drainage area 135 square miles.

Discharge weighted mean concentration for year (ppm), 1,000 (estimated).

Sediment yield (tons/square mile), 20.

Maximum daily load, 900 tons (estimated) Jan. 26.

Minimum daily load, less than 0.50 ton on many days.

Maximum daily concentration not determined.

Maximum observed concentration, 3,180 ppm Dec. 13.

Minimum observed concentration, 4 ppm Apr. 4, Sept. 6.

Estimated runoff, 2,000 acre-feet.



## QUALITY OF SURFACE WATERS, 1967

## MISCELLANEOUS ANALYSES OF STREAMS IN SNAKE RIVER BASIN--Continued

## DEADMAN CREEK BASIN--Continued

13-3438. MEADOW CREEK NEAR CENTRAL FERRY, WASH.

Monthly and yearly summary of water and suspended-sediment discharge, water year October 1966 to September 1967

Month	Total discharge (cfs)	Total suspended sediment (tons)	
October 1966.....	56.2	E	1
November.....	71.8	E	30
December.....	80.0	A	270
January 1967.....	118.5	E	1,600
February.....	84.2	A	7
March.....	82.3	E	250
April.....	79.1	E	7
May.....	64.2	E	6
June.....	37.00	T	--
July.....	18.50	T	--
August.....	14.30	T	--
September.....	12.50	T	--
Total for year.....	718.60	E	2,200

E Estimated.

A Partly estimated.

T Less than 0.50 ton.

Drainage area 66.2 square miles.

Discharge weighted mean concentration for year (ppm), 1,100.

Sediment yield (tons/square mile), 33.

Maximum daily load, 800 tons (estimated) Jan. 26.

Minimum daily load, less than 0.50 ton on many days.

Maximum daily concentration not determined.

Maximum observed concentration, 10,800 ppm Dec. 13.

Minimum observed concentration, 2 ppm June 28.

Runoff, 1,420 acre-feet.



## PART 14. PACIFIC SLOPE BASINS IN OREGON AND LOWER COLUMBIA RIVER BASIN

## WALLA WALLA RIVER BASIN

14-0136. MILL CREEK BELOW BLUE CREEK, NEAR WALLA WALLA, WASH.

LOCATION --Lat. 46°04'55", long. 118°11'25", at county road bridge 2 miles downstream from Blue Creek, 6.0 miles downstream from gaging station near Walla Walla, and 5.5 miles east of Walla Walla, Walla Walla County.

DRAINAGE AREA.--91 square miles, approximately.

RECORDS AVAILABLE.--Water temperatures: October 1962 to September 1967.

Sediment records: October 1962 to September 1967.

EXTREMES, 1966-67.--Water temperatures: Maximum, 80°F Aug. 17; minimum, 34°F Mar. 11.

Sediment concentrations: Maximum daily, 1,340 ppm Jan. 28; minimum daily, 2 ppm on several days during October.

Sediment loads: Maximum daily, 2,460 tons Jan. 28; minimum daily, less than 0.50 ton on many days.

EXTREMES, 1962-64.--Water temperatures: Maximum, 86°F Aug. 23; minimum, 34°F Mar. 11, on many days each year.

Sediment concentrations: Maximum daily, 8,000 ppm Dec. 23, 1964; minimum daily, 2 ppm on many days each year.

Sediment loads: Maximum daily, 59,300 tons Dec. 23, 1964; minimum daily, less than 0.50 ton on many days each year.

REMARKS.--Maximum observed during water year: Sediment concentration, 2,550 ppm Jan. 28. Records of discharge given are the combined discharge of Blue Creek near Walla Walla and Mill Creek near Walla Walla. No appreciable inflow between gaging stations and sampling point except during periods of high flows.

Temperature (°F) of water, water year October 1966 to September 1967

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

Particle-size analyses of suspended sediment, water year October 1966 to September 1967

(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water;

P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sam-pling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment										Method of analysis
							Percent finer than size indicated, in millimeters										
Jan. 28, 1967.....	21:45	44		765	774	1800	7	11	19	31	46	79	88	94	98	99	VFPC
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000

## WALLA WALLA RIVER BASIN--Continued

14-0136. MILL CREEK BELOW BLUE CREEK, NEAR WALLA WALLA, WASH.--Continued

Suspended sediment, water year October 1966 to September 1967

Day	OCTOBER			NOVEMBER			DECEMBER					
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment				
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day			
1..	27	C	2	T	29	C	4	T	70	26	A	5
2..	38	C	2	T	28	C	4	T	82	16		4
3..	28	C	2	T	28	C	4	T	101	18		5
4..	28	C	2	T	29	C	4	T	108	12		3
5..	28	C	2	T	33	C	4	T	105	13		4
6..	28	C	2	T	34	C	4	T	93	8		2
7..	28	C	2	T	32	C	4	T	88	8		2
8..	28	C	2	T	30	C	4	T	76	8		2
9..	28	C	2	T	29	C	4	T	64	4		1
10..	28	C	2	T	29	C	4	T	59	8		1
11..	28	C	2	T	30	C	4	T	60	8		1
12..	29	C	2	T	51	20	A	3	89	20		5
13..	31	C	2	T	44	6	1	1	405	768	A	840
14..	29	C	2	T	43	4	1	1	376	90	A	91
15..	29	C	2	T	67	36	7	7	233	23	A	14
16..	29	C	2	T	141	81	S	35	167	12		5
17..	29	C	2	T	95	16	4	1	136	4		1
18..	29	C	2	T	64	7	1	1	112	4		1
19..	29	C	2	T	50	5	1	1	99	4		1
20..	36	C	10	1	61	20	A	3	97	4		1
21..	33	C	10	1	57	6	1	1	91	4		1
22..	56	C	10	2	53	6	1	1	81	4		1
23..	43	C	10	1	44	6	1	1	76	4		1
24..	34	C	4	T	42	6	1	1	72	4		1
25..	30	C	4	T	46	18	A	2	67	4		1
26..	30	C	4	T	95	15	4	2	62	4		1
27..	33	C	4	T	82	8	2	2	58	4		1
28..	30	C	4	T	76	8	1	1	56	4		1
29..	28	C	4	T	64	8	1	1	62	4		1
30..	32	C	4	T	54	8	1	1	57	4		1
31..	30	C	4	T	--	--	--	--	55	4		1
Total	966	--	--	11	1560	--	--	75	3357	--	--	1000
JANUARY			FEBRUARY			MARCH						
1..	68	C	5	1	228	C	15	9	91	C	6	1
2..	67	C	5	1	180	C	15	7	97	C	6	2
3..	72	C	5	1	153	C	15	6	90	C	6	1
4..	81	C	5	1	137	C	15	6	87	C	6	1
5..	94	C	5	1	125	C	6	2	88	C	6	1
6..	92	C	5	1	114	C	6	2	93	C	6	2
7..	84	C	5	1	106	C	6	2	93	C	6	2
8..	76	C	5	1	99	C	6	2	94	C	6	2
9..	76	C	5	1	93	C	6	2	107	C	11	3
10..	78	C	5	1	87	C	6	1	106	C	11	3
11..	108	12	3	3	84	C	6	1	105	C	11	3
12..	139	25	9	9	78	C	6	1	102	C	11	3
13..	198	18	10	10	83	C	6	1	104	C	11	3
14..	265	44	31	31	77	C	6	1	100	C	11	3
15..	386	69	72	72	75	C	6	1	98	C	11	3
16..	353	30	29	29	73	C	6	1	138	46		17
17..	250	22	15	15	83	C	6	1	229	82	A	51
18..	198	8	4	4	102	C	6	2	243	50		33
19..	184	10	5	5	104	C	6	2	214	21		12
20..	332	74	66	66	100	C	6	2	193	23		12
21..	348	34	32	32	98	C	6	2	168	17		8
22..	261	15	11	11	96	C	6	2	160	34		15
23..	209	14	8	8	94	C	6	2	168	18		8
24..	175	15	7	7	93	C	6	2	161	10		4
25..	152	18	7	7	95	C	6	2	142	8		3
26..	156	239	S	107	92	C	6	1	124	6		2
27..	321	794		688	88	C	6	1	108	6		2
28..	679	1340		2480	87	C	6	1	104	10		3
29..	682	500		921	--	--	--	--	105	26		7
30..	476	104		134	--	--	--	--	103	42	A	12
31..	308	32		27	--	--	--	--	107	16		5
Total	6968	--	--	4656	2924	--	--	65	3922	--	--	227

S Computed by subdividing day.

T Less than 0.50 ton.

A Computed by partly-estimated concentration graph.

C Composite period.

## WALLA WALLA RIVER BASIN--Continued

14-0136. MILL CREEK BELOW BLUE CREEK, NEAR WALLA WALLA, WASH.--Continued

Suspended sediment, water year October 1966 to September 1967--Continued

Day	APRIL			MAY			JUNE				
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment			
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		
1..	110	13	4	138	12	4	81	C	7	2	
2..	109	7	2	133	10	4	80	C	7	2	
3..	110	8	2	133	16	6	78	C	7	1	
4..	118	13	4	136	18	7	73	C	7	1	
5..	126	15	5	160	30	13	70	C	7	1	
6..	124	12	4	160	22	10	70	C	7	1	
7..	117	10	3	162	35	17	69	C	7	1	
8..	116	12	4	196	52	28	67	C	7	1	
9..	112	7	2	199	93	50	63	C	7	1	
10..	109	14	4	173	35	16	62	C	7	1	
11..	108	6	2	150	38	15	60	C	7	1	
12..	102	6	2	221	372	222	60	C	7	1	
13..	109	17	5	287	176	136	58	C	7	1	
14..	107	11	3	290	98	45	54	C	7	1	
15..	100	8	2	257	91	35	52	C	7	1	
16..	95	6	2	250	46	31	51	C	7	1	
17..	90	6	1	269	47	34	51	C	7	1	
18..	98	180 A	48	245	43	28	48	C	7	1	
19..	106	872	250	210	27	15	47	C	7	1	
20..	154	172	72	202	30 B	16	45	C	7	1	
21..	152	118 A	48	203	34	19	50	C	7	1	
22..	181	130 A	64	198	24 B	13	48	C	7	1	
23..	212	144 A	82	173	18	8	45	C	7	1	
24..	229	54	33	146	15	6	41	C	7	1	
25..	224	42	25	125	16	5	39	C	7	1	
26..	207	27	15	112	C	10	38	C	7	1	
27..	194	22	12	105	C	10	3	C	7	1	
28..	167	19	9	108	C	10	3	34	C	7	1
29..	159	14	6	101	C	10	3	33	C	7	1
30..	145	12	5	90	C	10	2	33	C	7	1
31..	--	--	--	82	C	10	2	--	--	--	--
Total	4090	--	720	5434	--	799	1636	--	--	32	
JULY			AUGUST			SEPTEMBER					
1..	32	C	5	23	C	5	25	C	5		
2..	31	C	5	22	C	5	26	C	5		
3..	31	C	5	22	C	5	28	C	5		
4..	29	C	5	22	C	5	28	C	5		
5..	29	C	5	22	C	5	28	C	5		
6..	28	C	5	24	C	5	29	C	5		
7..	29	C	5	24	C	5	29	C	5		
8..	29	C	5	24	C	5	29	C	5		
9..	28	C	5	24	C	5	28	C	5		
10..	28	C	5	23	C	5	29	C	5		
11..	28	C	5	23	C	5	36	C	5		
12..	27	C	5	23	C	5	32	C	5		
13..	26	C	5	24	C	5	29	C	5		
14..	26	C	5	24	C	5	28	C	5		
15..	25	C	5	24	C	5	28	C	5		
16..	26	C	5	24	C	5	28	C	5		
17..	26	C	5	23	C	5	28	C	5		
18..	25	C	5	24	C	5	28	C	5		
19..	25	C	5	24	C	5	28	C	5		
20..	25	C	5	24	C	5	27	C	5		
21..	25	C	5	24	C	5	27	C	5		
22..	24	C	5	25	C	5	27	C	5		
23..	24	C	5	25	C	5	27	C	5		
24..	24	C	5	25	C	5	27	C	5		
25..	24	C	5	25	C	5	27	C	5		
26..	23	C	5	25	C	5	27	C	5		
27..	24	C	5	26	C	5	27	C	5		
28..	24	C	5	26	C	5	27	C	5		
29..	24	C	5	26	C	5	27	C	5		
30..	24	C	5	26	C	5	28	C	5		
31..	24	C	5	26	C	5	--	--	--		
Total	817	--	11	746	--	10	842	--	--	11	
Total discharge for year (cfs-days).....										33262	
Total load for year (tons).....										7617	

A Computed by partly-estimated concentration graph.

B Computed from estimated concentration graph.

C Composite period.



WALLA WALLA RIVER BASIN--Continued  
 14-0185. WALLA WALLA RIVER NEAR TOUCHET, WASH.--Continued

Temperature (°F) of water, water year October 1966 to September 1967

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.....	--	62	--	63	--	61	--	--	58	56	50	--	52	--	55	--	50	--	59	--	56	--	54	--	54	--	52	--	55	--		
November.....	49	50	46	47	48	48	44	44	--	43	--	45	47	48	46	45	46	49	--	48	--	45	--	44	45	46	47	--	46	--		
December.....	49	48	47	48	46	44	44	40	37	39	38	42	47	46	42	43	41	45	46	46	43	39	39	38	39	40	38	39	43	42		
January.....	42	40	45	44	40	41	39	40	43	42	44	46	48	44	40	39	42	44	42	40	37	37	38	39	45	48	48	44	42	42		
February.....	41	43	44	45	43	42	41	39	43	43	44	43	44	39	40	40	42	38	39	40	41	42	43	47	--	46	47	--	42	42		
March.....	45	44	40	40	43	46	44	44	44	46	45	42	44	43	44	52	47	47	45	48	50	52	49	49	46	45	46	50	45	48		
April.....	51	50	52	53	56	52	54	53	52	54	54	51	51	54	50	48	46	42	49	52	48	47	51	47	46	48	--	50	50			
May.....	48	58	55	58	57	57	57	53	56	49	50	59	54	55	58	53	57	59	68	62	66	65	59	63	61	67	63	61	59	63		
June.....	67	65	64	62	66	73	68	63	62	66	65	71	67	69	80	83	72	79	76	75	69	66	70	81	79	73	69	74	75	74		
July.....	81	77	75	78	77	72	76	72	73	74	75	84	76	79	81	77	79	73	69	76	76	74	--	73	--	--	74	--	77	75		
August.....	--	75	--	72	--	66	--	69	--	73	--	81	--	74	--	79	--	78	80	71	--	75	--	--	69	--	69	--	70	--		
September.....	72	--	72	--	68	--	66	--	66	--	65	--	53	56	60	61	57	53	75	70	63	--	60	--	58	--	58	--	69	--		

Particle-size analyses of suspended sediment, water year October 1966 to September 1967  
 (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	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment						Method of analysis		
						Percent finer than size indicated, in millimeters								
						0.002	0.004	0.008	0.016	0.031	0.062		0.125	0.250
Dec. 14, 1966.....	44		1870	1410	7500	20	36	40	52	72	94	100		PRC
Jan. 29, 1967.....	48		3890	4250	44600	11	17	27	39	54	87	100		VPWC
Sept. 13.....	63		63	10800	1840	67	94	100	--	--	--	--		PWC

## WALLA WALLA RIVER BASIN--Continued

14-0185. WALLA WALLA RIVER NEAR TOUCHET, WASH.--Continued

Suspended sediment, water year October 1966 to September 1967

Day	OCTOBER			NOVEMBER			DECEMBER		
	Suspended sediment			Suspended sediment			Suspended sediment		
	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day	Mean discharge (cfs)	Mean concentration (ppm)	Tons per day
1..	11	C 14	T	43	C 6	1	223	32	19
2..	12	C 14	T	41	C 6	1	284	37	28
3..	17	C 14	1	41	C 6	1	335	43	39
4..	22	C 14	1	40	C 6	1	399	82	88
5..	26	C 14	1	41	C 6	1	508	114	156
6..	26	C 14	1	44	C 6	1	460	59	73
7..	26	C 14	1	54	C 8	1	452	78	95
8..	26	C 14	1	61	C 8	1	399	45	48
9..	26	C 14	1	56	C 8	1	364	28	28
10..	28	C 14	1	54	C 8	1	344	23	21
11..	33	C 14	1	60	C 8	1	338	24	22
12..	36	C 14	1	74	--	E 2	347	22	21
13..	37	C 14	1	100	--	E 4	870	950	A 2200
14..	37	C 14	1	121	17	6	1940	1820	9530
15..	44	C 14	2	136	21	8	1330	520	1870
16..	40	C 9	1	198	43	23	948	250	640
17..	38	C 9	1	432	149	174	760	170	349
18..	28	C 9	1	287	76	59	620	123	206
19..	24	C 9	1	205	46	25	552	98	146
20..	15	C 9	7	200	33	18	528	87	124
21..	14	C 9	T	217	39	23	556	85	128
22..	29	C 9	1	200	26	14	332	72	103
23..	39	C 9	1	174	21	10	492	102	135
24..	55	C 9	1	157	17	7	488	72	95
25..	48	C 9	1	179	35	17	460	49	61
26..	42	C 9	1	200	64	A 35	432	C 54	63
27..	40	C 9	1	323	110	A 96	416	C 54	61
28..	43	C 9	1	264	83	59	392	C 54	57
29..	48	C 9	1	244	51	34	396	C 54	58
30..	46	C 9	1	239	38	25	399	C 54	58
31..	41	C 9	1	--	--	--	392	C 54	57
Total	997	--	30	4485	--	650	16956	--	16579
	JANUARY			FEBRUARY			MARCH		
1..	385	C 64	67	1680	820	3720	572	150	A 230
2..	416	C 64	72	1380	510	1900	580	111	174
3..	416	C 64	72	1160	430	1350	576	98	152
4..	452	C 64	78	1040	310	870	540	75	109
5..	500	C 64	86	948	270	691	524	63	89
6..	540	C 64	93	876	202	478	520	67	90
7..	524	C 64	91	815	212	466	508	67	92
8..	492	C 64	85	765	177	366	496	120	161
9..	472	C 64	82	715	147	284	500	84	113
10..	460	C 64	79	665	176	316	560	88	133
11..	484	C 64	84	630	126	214	564	92	140
12..	576	105	163	612	109	180	564	61	93
13..	725	275	538	588	108	171	540	47	69
14..	930	420	1050	588	104	165	532	57	82
15..	1320	726	2590	572	84	130	516	63	88
16..	1630	845	3720	564	81	123	520	51	72
17..	1360	395	1450	560	95	144	1210	1350	S 4990
18..	1060	225	644	675	320	A 580	1340	1060	3840
19..	936	185	468	720	320	622	1320	710	2530
20..	1260	675	S 2800	655	115	203	1120	360	1090
21..	1750	970	4580	630	99	168	990	265	708
22..	1550	500	2090	625	91	154	882	287	683
23..	1260	255	868	616	90	150	972	275	722
24..	1070	155	448	616	90	150	960	205	531
25..	936	130	329	612	93	154	865	155	362
26..	860	125	290	604	76	124	775	125	262
27..	1210	2030	S 7620	576	77	120	680	100	184
28..	2740	4740	35200	564	78	119	592	93	149
29..	3940	4220	44900	--	--	--	710	390	A 750
30..	3240	2330	20400	--	--	--	640	510	881
31..	2230	1400	8430	--	--	--	608	425	698
Total	35724	--	139667	21051	--	14112	22276	--	20267

E Estimated.

S Computed by subdividing day.

T Less than 0.50 ton.

A Computed from partly estimated-concentration graph.

B Computed from estimated concentration graph.

C Composite period.



COLUMBIA RIVER MAIN STEM

14-0192. COLUMBIA RIVER AT McNARY DAM, NEAR UMATILLA, OREG.

(Formerly published as Columbia River below McNary Dam, near Umatilla, Oreg.)

LOCATION (revised).--Lat 45°56'05", long 119°17'45", at gaging station at McNary Dam, Benton County, 2.5 miles northeast of Umatilla, 3.0 miles upstream from Umatilla River, and at mile 292.0.

DRAINAGE AREA.--214,000 square miles.

RECORDS AVAILABLE.--Chemical analyses: July 1959 to September 1967.

Water temperatures: October 1962.

Remarks.--Sediment samples collected at former gaging station site, lat 45°56'15", long 119°17'48", 1.2 miles downstream from McNary Dam, 2 miles northeast of Umatilla, 2.3 miles upstream from Umatilla River, and at mile 290.8.

Remarks.--Sediment samples collected at former gaging station site, lat 45°56'15", long 119°17'48", 1.2 miles downstream from McNary Dam, 2 miles northeast of Umatilla, 2.3 miles upstream from Umatilla River, and at mile 290.8.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>		Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	Color
															Parts per million	Tons per acre-foot	Tons per day	Calcium magnesium	Non-carbonate			
Nov. 9, 1966.....	86.6	6.5	24	6.2	9.3	1.3	92	0	22	3.5	0.3	0.9	--	--	125	0.17	29.2	86	10	204	7.9	10
Dec. 7.....	123	9.2	24	6.4	10	1.6	98	0	21	4.5	.2	.9	--	--	128	.17	42.5	87	6	220	7.8	5
Dec. 29.....	9.4	9.4	22	6.1	7.9	1.5	89	0	18	3.2	.1	1.4	--	--	118	.16	36.6	80	7	196	7.8	5
Jan 15, 1967.....	112	8.9	22	5.1	6.5	1.3	91	0	18	2.8	.2	1.1	--	--	117	.16	35.4	80	6	193	7.9	5
Feb. 1.....	126	17	22	5.2	9.4	1.4	86	0	21	5.5	.3	1.2	0.02	0.02	135	.18	40.1	92	12	216	7.9	5
Mar. 30.....	126	17	22	6.2	11	1.9	89	0	22	6.0	.3	1.8	--	--	134	.18	45.6	80	8	205	8.0	5
Apr. 20.....	165	14	21	5.8	9.3	1.7	84	0	20	4.5	.3	.9	--	--	118	.16	52.6	76	8	194	7.6	5
May 26.....	434	5.2	12	3.1	4.1	1.0	50	0	8.0	2.0	.2	.4	--	A	61	.08	71.5	43	2	107	7.3	5
June 17.....	583	9.1	11	2.2	3.7	.9	46	0	8.2	1.2	.2	.4	--	--	63	.09	99.2	37	0	94	7.5	10
July 21.....	262	5.2	18	4.3	3.0	1.5	69	0	12	1.0	.2	.1	.01	78	.11	55.2	63	6	136	7.9	5	
Aug. 18.....	131	4.3	20	4.0	4.1	1.0	74	0	12	1.5	.1	.4	--	--	85	.12	34.7	67	6	180	7.9	5
Sept. 21.....	139	4.8	20	5.4	6.8	1.4	86	0	16	2.5	.2	.2	--	--	105	.14	39.4	72	2	150	7.9	5

A. Calculated from determined constituents.

Additional determinations

Date of collection	Dis-solved oxygen (DO)	MPN (coliform colonies/100 ml)	Hexa-valent chromate (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)	Date of collection	Dis-solved oxygen (DO)	MPN (coliform colonies/100 ml)	Hexa-valent chromate (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)
Feb. 25, 1967.	12.2	390	0.00	0.00	0.08		June 17, 1967.	12.3	2100	0.00	--	--	--
Mar. 30.....	11.8	0	--	--	--		July 21.....	10.8	--	0.00	0.00	0.01	--
Apr. 20.....	11.9	0	--	--	--		Aug. 18.....	10.8	0	--	--	--	--
May 26.....	--	430	--	--	--		Sept. 21.....	9.9	36	--	--	--	--



Periodic determinations of suspended-sediment discharge, water year October 1966 to September 1967  
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water;  
P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water tem- per- ature (°F)	Sam- pling point	Discharge (cfs)	Sediment concen- tration (ppm)	Sediment discharge (tons per day)	Suspended sediment						Method of analysis	
							Percent finer than size indicated, in millimeters							
Oct. 18, 1966.....	0615	40		43	4	T								
Dec. 17.....	0935	40		247	4	3								
Jan. 24, 1967.....	1120	37		241	2	1								
Jan. 29.....	0935	42		1250	122	412								
Feb. 17.....	1150	42		175	2	1								
Mar. 24.....	1300	43		348	3	3								
Apr. 21.....	0900	41		268	2	1								
May 14.....	0955	45		708	11	21								
May 23.....	1620	54		550	11	16								
June 23.....	0820	52		136	2	1								
Aug. 23.....	1630	69		41	6	1								
Sept. 26.....	0845	--		46	< 1	T								

T Less than 0.50 ton.

UMATILLA RIVER BASIN--Continued

14-0335. UMATILLA RIVER NEAR UMATILLA, OREG.

LOCATION (revised).--Lat 45°54'11", long 119°19'33", at gaging station on left bank, 1.6 miles downstream from West Division main canal of Umatilla project, 1.2 miles southeast of Umatilla, Umatilla County, and at mile 2.1.

DRAINAGE AREA.--2,290 square miles, approximately.

RECORDS AVAILABLE.--Chemical analyses: August 1941, to August 1942; August 1960 to July 1962.

Water temperature records: September 1965, October 1966 to September 1967.

Sediment records: October 1962 to September 1967.

EXTREMES, 1966-67.--Sediment concentrations: Maximum daily, 4.720 ppm Dec. 14; minimum daily, 5 ppm June 1.

Sediment loads: Maximum daily, 47,100 tons Dec. 14; minimum daily, less than 0.05 ton on several days during October and September.

EXTREMES, 1962-67.--Water temperatures (1962-65): Minimum, freezing point Jan. 29, 1963, Dec. 16-20, 1964.

Sediment concentrations: Maximum daily, 39,000 ppm July 27, 1965; minimum daily, 2 ppm Aug. 16, Dec. 17, 1963.

Sediment loads: Maximum daily, 438,000 tons Jan. 30, 1966; minimum daily, less than 0.05 ton on several days in 1964-67.

Temperature (°F) of water, water year October 1966 to September 1967

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

Particle-size analyses of suspended sediment, water year October 1966 to September 1967 (Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment						Method of analysis					
							Percent finer than size indicated, in millimeters											
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	
Dec. 14, 1966	1545	45		3900	2720	28600	17	30	41	60	83	89	97	100	--	--	--	VPWC
Dec. 28	2055	43		3430	1780	19500	13	22	33	55	77	89	95	99	100	--	--	VPWC
Jan. 19, 1967	1040	47		3420	2240	27000	18	34	56	80	87	96	96	100	--	--	--	VPWC
Jan. 29	1500	50		3460	1820	17000	15	25	29	49	70	85	92	98	100	--	--	VPWC
Jan. 31	1020	43		2340	602	3800	12	15	25	41	53	82	93	99	100	--	--	VPWC

## UMATILLA RIVER BASIN--Continued

## 14-0335. UMATILLA RIVER NEAR UMATILLA, OREG.--Continued

Suspended sediment, water year October 1966 to September 1967

Day	OCTOBER			NOVEMBER			DECEMBER					
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment				
Mean concentration (ppm)		Tons per day	Mean concentration (ppm)		Tons per day	Mean concentration (ppm)		Tons per day				
1..	1.2	C	17	0.1	42	25	A	2.8	148	C	11	4.4
2..	1.0	C	17	T	129	46	B	16	180	13	A	6.3
3..	1.8	C	17	.1	140	C	11	4.2	389	51	B	54
4..	2.4	C	17	.1	135	C	11	4.0	417	C	17	19
5..	2.2	C	17	.1	135	C	11	4.0	466	C	17	21
6..	1.9	C	17	.1	140	C	11	4.2	431	C	17	20
7..	1.3	C	17	.1	144	C	11	4.3	375	C	17	17
8..	1.2	C	17	.1	102	C	11	3.0	340	C	17	16
9..	1.2	C	17	.1	95	C	11	2.8	304	C	17	14
10..	1.2	C	17	.1	90	C	11	2.7	270	C	17	12
11..	1.3	C	17	.1	88	C	11	2.6	245	C	17	11
12..	1.1	C	17	.1	88	C	11	2.6	220	C	17	10
13..	1.0	C	17	T	90	C	11	2.7	389	--	E	1200
14..	.9	C	17	T	95	C	11	2.8	3630	4720	S	47100
15..	.9	C	17	T	100	C	11	3.0	2070	719	S	4510
16..	.9	C	17	T	100	C	11	3.0	1270	200		686
17..	.9	C	17	T	105	C	11	3.1	932	120	B	300
18..	1.1	C	17	.1	148	C	11	4.4	728	71	B	140
19..	2.2	C	17	.1	129	C	11	3.8	585	C	12	19
20..	1.2	C	17	.1	123	C	11	3.7	484	C	12	16
21..	1.8	C	17	.1	114	C	11	3.4	439	C	12	14
22..	3.3	C	17	.2	108	C	11	3.2	390	C	12	13
23..	5.8	C	22	A	105	C	11	3.1	341	C	12	11
24..	27	C	20	1.5	105	C	11	3.1	296	C	12	9.6
25..	39	C	20	2.1	105	C	11	3.1	266	C	12	8.6
26..	39	C	20	2.1	105	C	11	3.1	240	C	12	7.8
27..	36	C	20	1.9	105	C	11	3.1	215	C	12	7.0
28..	32	C	20	1.7	129	C	11	3.8	174	C	12	5.6
29..	33	C	20	1.8	132	C	11	3.9	162	C	12	5.2
30..	43	C	20	2.3	135	C	11	4.0	158	C	12	5.1
31..	47	C	20	2.5	--	--	--	--	158	C	12	5.1
Total	333.8	--	18.2		3361	--		113.5	16722	--		54267.7
JANUARY												
1..	151	C	12	4.9	1640	320		1420	278	--	E	17
2..	154	C	12	5.0	1290	147		512	296	--	E	18
3..	165	C	12	5.3	1040	105		295	302	--	E	18
4..	178	C	12	5.8	880	--	E	140	201	--	E	12
5..	255	C	12	8.3	830	--	E	120	165	--	E	9.8
6..	320	C	12	10	820	--	E	100	148	--	E	8.8
7..	314	C	12	10	783	C	23	4.9	124	--	E	7.4
8..	266	C	12	8.6	738	C	23	4.6	100	--	E	5.9
9..	235	C	12	7.6	702	C	23	4.4	95	--	E	5.6
10..	220	C	12	7.1	648	C	23	4.0	91	--	E	5.4
11..	215	C	12	7.0	594	C	23	3.7	93	--	E	5.5
12..	225	C	12	7.3	558	C	23	3.5	91	--	E	5.4
13..	320	C	12	36	508	C	23	3.2	93	--	E	5.5
14..	666	140	B	250	484	C	23	3.0	84	--	E	5.0
15..	1300	--	E	2400	432	C	23	2.7	77	15	B	3.1
16..	1650	690	A	3100	453	C	23	2.8	130	26	B	9.1
17..	1430	290	A	1100	418	C	23	2.6	92	17	B	4.2
18..	1080	140	B	410	439	C	23	2.7	296	52	B	4.2
19..	880	--	E	180	567	C	23	3.5	516	52	B	7.2
20..	783	C	31	66	576	C	23	3.6	524	27	B	3.8
21..	921	C	31	77	612	C	23	3.8	411	19	B	2.7
22..	987	C	31	83	630	C	23	3.9	278	12	B	9.0
23..	860	C	31	72	594	C	23	3.7	286	17	A	1.3
24..	758	C	31	62	524	C	23	3.3	621	28	B	4.7
25..	639	C	31	53	508	C	23	3.2	648	--	E	4.0
26..	558	C	31	47	500	C	23	3.1	500	--	E	2.5
27..	585	C	31	49	432	C	23	2.7	390	--	E	1.8
28..	1540	1200	J	6500	290	--	E	1.7	284	13		1.0
29..	3280	2320		20500	--	--	--	--	210	19		1.1
30..	3390	1390		12700	--	--	--	--	151	14		5.7
31..	2340	630		3980	--	--	--	--	127	14		4.8
Total	26645	--	51751.9		18490	--		3333	7703	--		508.2

E Estimated.

S Computed by subdividing day.

T Less than 0.05 ton.

A Computed from partly estimated-concentration graph.

B Computed from estimated-concentration graph.

C Composite period.

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

## UMATILLA RIVER BASIN--Continued

14-0335. UMATILLA RIVER NEAR UMATILLA, OREG.--Continued

Suspended sediment, water year October 1966 to September 1967--Continued

Day	APRIL			MAY			JUNE		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	137	7	2.6	397	12	13	44	5	0.6
2..	109	10	2.9	341	12	11	21	7	.4
3..	95	12	3.1	334	12	11	10	C	.2
4..	61	12	2.0	341	18	17	7.9	C	.2
5..	59	7	1.1	397	16	17	7.6	C	.2
6..	112	14	4.2	404	12	13	7.2	C	.2
7..	118	10	3.2	508	20	27	9.0	C	.2
8..	115	6	1.9	774	47	98	7.2	C	.2
9..	250	12	8.1	900	82	199	6.8	C	.2
10..	230	8	5.0	932	86	216	7.6	C	.2
11..	225	12	7.3	792	57	122	7.2	C	.2
12..	245	12	7.9	630	31	53	7.2	C	.2
13..	225	8	4.9	976	127	356	8.6	C	.2
14..	230	10	6.2	1220	226	744	9.3	C	.2
15..	154	6	2.5	1260	201	684	7.6	C	.2
16..	121	6	2.0	1140	149	459	8.7	C	.2
17..	109	6	1.8	1180	163	519	8.6	C	.2
18..	59	6	1.0	1250	172	581	6.8	C	.2
19..	42	8	.9	1090	128	377	6.8	C	.2
20..	11	36	1.1	870	78	183	6.8	C	.2
21..	44	14	1.7	783	67	142	7.6	C	.2
22..	121	14	4.6	756	60	122	6.2	C	.2
23..	178	20	9.6	639	44	76	6.0	C	.1
24..	278	22	17	484	35	46	5.8	C	.1
25..	272	17	12	314	28	24	5.0	C	.1
26..	334	31	28	174	13	6.1	5.0	C	.1
27..	460	27	34	95	11	2.8	5.2	C	.2
28..	468	19	24	63	7	1.2	7.9	C	.2
29..	376	14	14	33	12	1.1	7.9	C	.2
30..	390	12	13	56	8	1.2	7.9	C	.2
31..	--	--	--	48	6	.8	--	--	--
Total	5628	--	227.6	19181	--	5123.2	270.4	--	6.1
JULY									
1..	12	C	9	0.3	5.5	C	15	0.2	0.2
2..	7.9	C	9	.2	5.8	C	15	.2	.2
3..	7.2	C	9	.2	5.8	C	15	.2	.2
4..	16	23	B	1.0	6.0	C	15	.2	.2
5..	12	14	B	.5	6.2	C	15	.3	.2
6..	8.6	C	15	.3	6.2	C	15	.3	.2
7..	6.5	C	15	.3	26	23	A	1.6	.2
8..	6.5	C	15	.3	7.6	12	B	.2	.2
9..	6.2	C	15	.3	6.0	C	11	.2	.1
10..	6.5	C	15	.3	5.2	C	11	.2	.1
11..	6.2	C	15	.3	5.5	C	11	.2	.1
12..	6.2	C	15	.3	5.2	C	11	.2	.1
13..	5.8	C	15	.2	5.2	C	11	.2	.1
14..	6.0	C	15	.2	5.2	C	11	.2	.2
15..	6.5	C	15	.3	5.2	C	11	.2	.2
16..	5.8	C	15	.2	5.5	C	11	.2	.2
17..	5.0	C	15	.2	5.2	C	11	.2	.2
18..	4.2	C	15	.2	5.5	C	11	.2	.2
19..	5.0	C	15	.2	5.8	C	11	.2	.2
20..	3.2	C	15	.1	5.2	C	11	.2	.2
21..	3.0	C	15	.1	4.8	C	11	.1	.2
22..	3.2	C	15	.1	5.5	C	11	.2	.2
23..	3.2	C	15	.1	5.5	C	11	.2	.2
24..	4.0	C	15	.2	5.2	C	11	.2	.2
25..	3.8	C	15	.2	5.8	C	11	.2	.2
26..	3.8	C	15	.2	6.2	C	11	.2	.2
27..	3.4	C	15	.1	5.8	C	11	.2	.2
28..	4.5	C	15	.2	5.8	C	11	.2	.2
29..	5.8	C	15	.2	7.2	C	11	.2	.1
30..	5.5	C	15	.2	8.6	C	11	.3	T
31..	5.8	C	15	.2	6.2	C	11	.2	--
Total	189.3	--	7.7	200.4	--	7.8	152.1	--	5.2
Total discharge for year (cfs-days).....									98876.05
Total load for year (tons).....									115370.1

S Computed by subdividing day.

T Less than 0.05 ton.

A Computed from partly estimated-concentration graph.

B Computed from estimated-concentration graph.

C Composite period.

## ALDER CREEK BASIN

14-0343.5, ALDER CREEK AT ALDERDALE, WASH.

LOCATION.--Lat 45°51'27", long 119°55'15", at county road bridge 1 mile upstream from gaging station, 0.8 mile downstream from Six Prong Creek, and 1.8 miles north of Alderdale, Klickitat County.

DRAINAGE AREA.--196 square miles.

RECORDS AVAILABLE.--Water temperatures: October 1962 to September 1966.

Sediment records: October 1962 to September 1967.

EXTREMES, 1966-67.--Sediment concentrations: Maximum daily, 361 ppm Dec. 13; minimum daily, 1 ppm Jan. 12, Aug. 14.

Sediment loads: Maximum daily, 94 tons Jan. 28; minimum daily, less than 0.05 ton on many days.

EXTREMES, 1962-67.--Water temperatures (1962-66): Minimum, freezing point on several days during January and December 1963, Dec. 23, 1965.

Sediment concentrations: Maximum daily, (revised) not determined. minimum daily, 0 ppm on many days.

Sediment loads: Maximum daily, (estimated) 180,000 tons Dec. 22, 1964; minimum daily, less than 0.05 ton on many days.

REMARKS.--Maximum observed during water year: Sediment concentration, 2,900 ppm Dec. 13.

Suspended sediment, water year October 1966 to September 1967  
(Where no daily concentrations are reported, loads are estimated)

Day	OCTOBER			NOVEMBER			DECEMBER		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	0.80			0.80	--		1.0	--	T
2..	.80			.80	--		1.0	--	T
3..	.80			.80	--		1.0	--	T
4..	.80	4	T	.80	--		1.0	--	T
5..	.80			.80	--		1.0	--	T
6..	.80			.90	--		1.0	--	T
7..	.80			.90	--		.90	2	T
8..	.80			.90	--		.90	--	T
9..	.80			.90	3		.90	--	T
10..	.80			.90	--		1.2	--	T
11..	.80			.90	--		1.2	--	T
12..	.80			.90	--		1.2	--	T
13..	.90			1.0	--		59	361	84
14..	.90			1.2	--		40	33	3.6
15..	.90			1.0	2		13	10	.4
16..	.90			1.0	--		7.4	8	.2
17..	.90			.90	--		6.5	--	.2
18..	.90			.80	--		6.0	--	.1
19..	.90			.90	--		5.5	4	.1
20..	.90			1.5	3		5.0	--	.1
21..	.90			1.2	--		4.4	--	T
22..	.90			1.0	--		3.8	--	T
23..	.90			.90	--		3.4	--	T
24..	.90			.90	--		3.0	--	T
25..	.90			.90	--		2.8	--	T
26..	.90			.90	--		2.6	--	T
27..	.80			.90	--		2.4	--	T
28..	.80			.90	--		2.2	--	T
29..	.80			.90	--		2.2	--	T
30..	.80			.90	--		2.2	--	T
31..	.80			--	--	--	2.2	--	T
Total	26.20	--	0.3	28.00	--	0.2	185.90	--	89.1

T Less than 0.05 ton.

## ALDER CREEK BASIN--Continued

## 14-0343.5. ALDER CREEK AT ALDERDALE, WASH.--Continued

## Suspended sediment, water year October 1966 to September 1967--Continued

Day	JANUARY			FEBRUARY			MARCH		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	2.2	--	T	15	6	0.2	3.4		0.1
2..	2.2	--	T	12	--	.2	3.4		.1
3..	2.2	--	T	11	--	.2	3.0		.1
4..	2.4	--	T	9.1	--	.1	2.8		.1
5..	2.6	--	T	8.0	--	.1	2.8		.1
6..	2.4	--	T	6.5	--	.1	2.5		.1
7..	2.2	--	T	5.6	--	.1	2.5		.1
8..	2.2	--	T	5.2	--	.1	2.8		.1
9..	2.4	--	T	4.8	--	.1	3.0		.1
10..	2.4	--	T	4.8	--	.1	2.8		.1
11..	2.5	4	T	4.0	--	T	2.8		.1
12..	2.5	1	T	3.7	--	T	2.5		.1
13..	2.5	--	T	3.7	--	T	2.5		.1
14..	2.3	--	T	3.7	--	T	2.5		.1
15..	2.3	--	T	4.0	--	T	2.5		.1
16..	2.0	--	T	4.0	--	T	2.5		.1
17..	2.0	--	T	4.0	4	T	2.5		.1
18..	2.0	--	T	4.0	--	T	2.5		.1
19..	1.8	--	T	3.7	--	T	2.3		T
20..	1.8	--	T	3.7	--	T	2.3		T
21..	2.0	--	T	3.7	--	T	2.3		T
22..	2.2	--	T	3.7	--	T	2.3		T
23..	2.2	--	T	3.7	--	T	2.8		.1
24..	2.2	--	T	3.7	--	T	2.5	8	.1
25..	2.0	--	T	3.7	--	T	2.5		.1
26..	2.0	--	T	3.4	--	T	2.5		.1
27..	2.0	2	T	3.4	--	T	2.5		.1
28..	33	290 J	94	3.4	--	T	2.5		.1
29..	58	280 J	72	--	--	--	2.5		.1
30..	44	--	27	--	--	--	2.5		.1
31..	21	15 B	.9	--	--	--	2.5		.1
Total	215.5	--	194.2	149.2	--	2.0	81.3	--	2.9
Day	APRIL			MAY			JUNE		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	2.3			1.8			0.90		
2..	2.0			1.7			.80		
3..	2.0			1.7			.90		
4..	2.0			1.7			.90		
5..	2.0			1.7			.90		
6..	2.0			1.5			.90		
7..	2.0			1.5			.90		
8..	2.0			1.5			.90		
9..	2.0			1.5			.80		
10..	2.0			1.7			.80		
11..	2.3			1.7			.80		
12..	2.3			1.7			.80		
13..	2.3			1.7			.90		
14..	2.3			1.5			.90		
15..	2.3			1.3			.80		
16..	2.0			1.3			.70		
17..	2.3			1.3			.70		
18..	2.5			1.3			.70		
19..	2.5			1.3			.60		
20..	2.3	4	T	1.2			.80		
21..	2.3			1.0			1.2		
22..	2.0			1.0			1.2		
23..	2.0			1.0			1.0		
24..	1.8			1.0			1.0		
25..	1.8			1.0			.90		
26..	1.8			1.0			.90		
27..	1.7			1.0			.90		
28..	1.8			1.0			.60		
29..	1.8			.90	4	T	.60	2	T
30..	1.8			.90			.60		
31..	--			.90			--		
Total	62.2	--	0.7	41.30	--	0.4	25.30	--	0.1

T Less than 0.05 ton.

B Computed from estimated concentration graph.

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

## ALDER CREEK BASIN--Continued

14-0343.5. ALDER CREEK AT ALDERDALE, WASH.--Continued

Suspended sediment, water year October 1966 to September 1967--Continued

Day	JULY			AUGUST			SEPTEMBER		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	0.60			0.50			0.50		
2..	.70			.50			.50		
3..	.60			.50			.60		
4..	.60			.40			.60		
5..	.60			.40			.60		
6..	.60			.50			.70		
7..	.60			.40			.70		
8..	.60			.40			.70		
9..	.70			.40			.70		
10..	.70			.40			.70		
11..	.60			.40			.90		
12..	.50			.40			.90		
13..	.90			.40			.90		
14..	.50			.40	1	T	.80		
15..	.50			.40			.70		
16..	.50			.40			.60		
17..	.50			.50			.60		
18..	.50			.50			.60		
19..	.50			.50			.60		
20..	.50			.60			.60		
21..	.50			.60			.60		
22..	.50			.70			.60		
23..	.50			.70			.60		
24..	.60			.70			.60		
25..	.60	2	T	.70			.70		
26..	.60			.70			.70		
27..	.60			.70			.70		
28..	.50			.60			.70		
29..	.50			.60			.70		
30..	.50			.50			.80		
31..	.50			.50			--		
Total	17.30	--	0.1	15.90	--	T	20.20	--	0.1
Total discharge for year (cfs-days).....									868.3
Total load for year (tons).....									290.1

T Less than 0.05 ton.



## WILLOW CREEK BASIN--Continued

14-0345. WILLOW CREEK AT HEPPNER, OREG.--Continued

Suspended sediment, water year October 1966 to September 1967

Day	OCTOBER			NOVEMBER			DECEMBER		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	0.04	C 30	T	0.58	27	T	17	310	J 15
2..	.07	C 30	T	.58	66	A	0.1	24	290 A 19
3..	.04	C 30	T	.58	17	T	23	110	6.8
4..	.04	C 30	T	.58	18	T	20	100	5.4
5..	.04	C 30	T	.69	14	T	20	68	3.7
6..	.04	C 30	T	1.2	30	.1	16	39	1.7
7..	.04	C 30	T	1.5	44	.2	15	41	1.7
8..	.04	C 30	T	1.4	25	.1	13	26	.9
9..	.04	C 30	T	1.4	34	.1	11	15	.4
10..	.04	C 30	T	1.8	10	T	17	95	J 4.8
11..	.04	C 30	T	2.0	37	.2	28	193	15
12..	.04	C 30	T	3.0	40	.3	32	214	18
13..	.07	C 30	T	3.0	22	.2	45	683	83
14..	.04	C 30	T	2.8	130	A	1.0	48	341 44
15..	.04	C 30	T	7.5	680	J	16	40	147 16
16..	.02	C 30	T	14	370	14	32	116	10
17..	.02	C 30	T	11	120	3.6	27	74	5.4
18..	.02	C 30	T	7.9	40	.9	27	64	4.7
19..	.02	C 30	T	9.1	535	S	14	23	60 3.7
20..	.04	C 30	T	19	2000	A	103	21	50 2.8
21..	.17	35	T	17	228	S	11	19	37 1.9
22..	.48	63	A	13	72	2.5	15	C	36 1.5
23..	.81	120	A	11	46	1.4	14	C	36 1.4
24..	.81	140	B	9.9	33	.9	14	C	36 1.4
25..	.69	95	.2	9.5	34	.9	12	C	36 1.2
26..	.48	54	.1	12	59	1.9	11	C	36 1.1
27..	.39	--	E	10	42	1.1	10	C	36 1.0
28..	.39	42	T	9.9	46	1.2	9.9	C	36 1.0
29..	.39	36	T	12	54	1.7	12	C	36 1.2
30..	.39	32	T	12	54	1.8	12	C	36 1.2
31..	.58	28	T	--	--	--	12	C	36 1.2
Total	6.36	--	1.3	205.91	--	178.4	639.9	--	276.1
JANUARY									
1..	11	22	0.7	56	230	35	14	18	0.7
2..	11	22	.7	48	152	20	15	14	.6
3..	11	22	.7	42	115	13	15	14	.6
4..	12	28	.9	39	100	11	12	12	.4
5..	17	64	2.9	36	78	7.6	14	12	.5
6..	17	45	2.1	32	64	5.5	14	16	.6
7..	17	34	1.6	30	66	5.3	14	20	.8
8..	16	26	1.1	28	59	4.5	14	10	.4
9..	14	23	.9	26	51	3.6	13	16	.6
10..	14	35	1.3	24	45	2.9	13	12	.4
11..	22	140	A	8.3	23	44	2.7	12	11 .4
12..	27	164	12	22	34	2.0	11	22	.7
13..	29	115	9.0	21	35	2.0	14	29	1.1
14..	36	187	18	19	28	1.4	12	17	.6
15..	38	194	20	18	30	1.5	13	23	.8
16..	38	140	14	18	24	1.2	14	32	1.2
17..	36	87	8.5	18	30	1.5	22	150	8.9
18..	32	69	6.0	19	27	1.4	24	111	7.2
19..	28	66	5.0	16	26	1.1	25	66	4.5
20..	29	172	13	13	24	.8	26	73	5.1
21..	29	78	6.1	16	28	1.2	26	63	4.4
22..	23	48	3.0	16	18	.8	26	58	4.1
23..	20	35	1.9	15	20	.8	27	64	4.7
24..	18	32	1.6	15	18	.7	28	67	5.1
25..	20	29	1.6	15	17	.7	28	44	3.3
26..	19	75	S	3.8	15	14	.6	26	38 2.7
27..	32	511	53	15	18	.7	24	30	1.9
28..	64	1340	232	14	20	.8	23	44	2.7
29..	79	1150	245	--	--	--	24	32	2.1
30..	78	470	99	--	--	--	22	26	1.5
31..	66	290	52	--	--	--	22	46	2.7
Total	903	--	825.7	669	--	130.3	587	--	71.3

E Estimated.

S Computed by subdividing day.

T Less than 0.05 ton.

A Computed from partly estimated-concentration graph.

B Computed from estimated-concentration graph.

C Composite period

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



14-0360. WILLOW CREEK BASIN--Continued  
WILLOW CREEK NEAR ARLINGTON, OREG.

LOCATION (revised).--Lat 45°45'12" long 120°00'35" at gaging station on right bank at bridge on discontinued highway, 3.8 miles downstream from Eighth Mile Canyon, 10 miles east of Arlington, Gilliam County, and at mile 3.7.

DRAINAGE AREA.--850 square miles.

RECORDS AVAILABLE.--Water temperatures: October 1962 to September 1967.

Sediment records: October 1962 to September 1967.

EXTREMES, 1966-67.--Water temperatures: Maximum, 84°F June 19; minimum, 34°F Dec. 10, 24.

Sediment concentrations: Maximum daily, 18,900 ppm June 2; minimum daily, no flow on many days.

EXTREMES, 1962-67.--Water temperatures: Maximum (1963-67), 84°F June 19, 1967; minimum (1962-64, 1966-67), freezing point on several days during winter months.

Sediment concentrations: Maximum daily, 67,000 ppm Aug. 23, 1965; minimum daily, no flow on many days.

Sediment loads: Maximum daily, (estimated) 980,000 tons Dec. 22, 1964; minimum daily, 0 tons on many days.

REMARKS.--No flow Oct. 1 to Nov. 1, Nov. 4, June 17, 18, July 26, 29-31, Aug. 1, 2, 5-11, 14-31, Sept. 1, 2, 5-11, 14-31.

Temperature (°F) of water, water year October 1966 to September 1967

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

Particle-size analyses of suspended sediment, water year October 1966 to September 1967

(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	Water temperature (°F)	Time (24 hour)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment										Method of analysis					
							Percent finer than size indicated, in millimeters															
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000		2.000				
Nov. 21, 1966	46	0630		80	11500	2480	66	89	96	99	100	--	--	--	--	--	--	--	--	--	--	PWC
Nov. 21	46	0930	46	90	1780	433	--	62	--	90	100	--	100	--	100	--	--	--	--	--	--	PWC
Nov. 21	48	1200	46	83	2160	484	--	63	--	96	100	--	100	--	100	--	--	--	--	--	--	PWC
Nov. 21	47	1330	47	75	5520	1120	52	75	96	100	100	--	--	--	--	--	--	--	--	--	--	PWC
Nov. 21	--	1710	--	70	7710	1460	48	75	93	99	100	--	--	--	--	--	--	--	--	--	--	PWC
Jan. 29, 1967	48	1655	48	137	3470	1280	26	43	67	90	100	--	100	--	100	--	--	--	--	--	--	PWC
Jan. 30	43	0730	43	186	4540	2280	19	26	49	77	94	100	100	--	100	--	--	--	--	--	--	PWC
Jan. 31	43	1230	43	120	366	41	42	52	79	93	100	--	--	--	100	--	--	--	--	--	--	PWC
June 2	59	0045	59	260	39800	27900	1.4	30	50	75	97	100	100	--	100	--	--	--	--	--	--	PWC

## WILLOW CREEK BASIN--Continued

## 14-0360. WILLOW CREEK NEAR ARLINGTON, OREG.--Continued

## Suspended sediment, water year October 1966 to September 1967

Day	OCTOBER			NOVEMBER			DECEMBER		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..				0	--	0	3.4	40	0.4
2..				.13	11	T	2.3	34	.2
3..				.05	26	T	4.5	34	.4
4..				--	--	0	11	93	3.9
5..				.03	42	T	24	1260	90
6..				.47	C 41	.1	22	288	S 19
7..				.31	C 41	T	23	430	27
8..				.47	C 41	.1	23	138	8.6
9..				.86	C 41	.1	19	90	4.6
10..				.31	C 41	T	21	77	4.4
11..				.47	C 41	.1	33	163	S 17
12..				.74	C 41	.1	67	616	111
13..				.86	C 41	.1	85	810	186
14..				2.1	C 28	.2	122	1550	511
15..				2.8	C 28	.2	98	810	214
16..				2.8	C 28	.2	75	360	73
17..				1.8	C 28	.1	56	248	37
18..				1.4	C 28	.1	45	187	23
19..				1.8	C 28	.1	41	123	14
20..				4.1	409	S 7.4	34	92	8.4
21..				48	3200	S 527	36	84	8.2
22..				39	1550	S 183	36	74	7.2
23..				22	240	14	33	54	4.8
24..				14	205	7.7	32	55	4.8
25..				11	97	2.9	29	--	E 3.4
26..				8.5	70	1.6	29	38	3.0
27..				11	62	1.8	28	36	2.7
28..				9.1	42	1.0	26	34	2.4
29..				7.3	44	.9	27	41	3.0
30..				3.1	35	.3	27	45	3.4
31..				--	--	--	27	52	3.8
Total	0	--	0	194.5	--	749.2	1140.2	--	1399.6
JANUARY									
1..	23	145	9.0	93	690	173	3.7	C 22	0.2
2..	22	--	E 4.5	78	580	122	4.5	C 22	.3
3..	21	40	2.3	56	350	53	4.5	C 22	.3
4..	23	67	4.2	42	252	29	3.4	C 22	.2
5..	29	110	J 10	46	152	19	3.4	C 22	.2
6..	46	251	31	38	100	10	4.1	C 22	.2
7..	42	236	27	28	75	5.7	3.4	C 22	.2
8..	39	94	9.9	30	90	7.3	3.1	C 22	.2
9..	36	70	6.8	19	103	5.3	.86	C 29	.1
10..	29	55	4.3	16	62	2.7	1.6	C 29	.1
11..	28	60	4.5	6.7	C 45	.8	1.6	C 29	.1
12..	28	58	4.4	6.2	C 45	.8	1.8	C 29	.1
13..	30	130	A 11	6.2	C 45	.8	2.8	C 29	.2
14..	7.9	93	2.0	7.3	C 45	.9	2.1	C 29	.2
15..	24	130	J 9.2	6.2	C 45	.8	2.1	C 29	.2
16..	66	296	53	6.7	C 45	.8	1.8	C 29	.1
17..	45	240	29	6.2	C 45	.8	2.8	C 29	.2
18..	17	140	A 6.4	7.3	C 45	.9	2.6	C 29	.2
19..	4.9	105	1.4	8.5	C 45	1.0	7.3	57	1.1
20..	6.7	83	1.5	7.3	C 45	.9	12	34	1.1
21..	9.4	50	1.3	6.2	C 45	.8	5.8	24	.4
22..	6.7	48	.9	6.2	C 45	.8	5.1	42	1.0
23..	2.8	37	.3	6.2	C 45	.8	17	65	3.0
24..	3.7	40	.4	6.7	C 45	.8	18	42	2.0
25..	2.3	62	.4	7.3	C 45	.9	15	44	1.8
26..	2.6	46	.3	4.9	C 22	.3	14	34	1.3
27..	4.9	31	.4	5.4	C 22	.3	16	47	2.0
28..	28	234	S 4.0	4.5	C 22	.3	15	29	1.2
29..	129	3530	1230	--	--	--	12	42	1.4
30..	166	3510	1570	--	--	--	13	54	1.9
31..	124	1250	419	--	--	--	16	41	1.8
Total	1046.9	--	3494.4	562	--	440.5	220.36	--	23.3

E Estimated.

S Computed by subdividing day.

T Less than 0.05 ton.

A Computed from partly estimated-concentration

graph.

C Composite period.

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







## QUALITY OF SURFACE WATERS, 1967

## ROCK CREEK BASIN--Continued

## 14-0366. ROCK CREEK NEAR ROOSEVELT, WASH.--Continued

## Suspended sediment, water year October 1966 to September 1967--Continued

Day	APRIL			MAY			JUNE					
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment				
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day			
1..	27	C	3	0.2	28	C	3	0.2	8.6	C	2	T
2..	26	C	3	.2	27	C	3	.2	8.2	C	2	T
3..	26	C	3	.2	26	C	3	.2	7.8	C	2	T
4..	26	C	3	.2	25	C	3	.2	7.4	C	2	T
5..	26	C	3	.2	25	C	3	.2	6.8	C	2	T
6..	26	C	3	.2	23	C	3	.2	6.2	C	2	T
7..	25	C	3	.2	22	C	3	.2	5.6	C	2	T
8..	25	C	3	.2	21	C	3	.2	5.3	C	2	T
9..	25	C	3	.2	21	C	3	.2	5.3	C	2	T
10..	26	C	3	.2	21	C	3	.2	4.7	C	2	T
11..	25	C	3	.2	20	C	3	.2	4.7	C	2	T
12..	24	C	3	.2	19	C	3	.2	5.3	C	2	T
13..	24	C	3	.2	18	C	3	.1	5.3	C	2	T
14..	24	C	3	.2	17	C	3	.1	4.5	C	2	T
15..	23	C	3	.2	16	C	3	.1	3.5	C	2	T
16..	23	C	3	.2	15	C	3	.1	3.1	C	2	T
17..	24	C	3	.2	15	C	3	.1	2.4	C	2	T
18..	26	C	3	.2	14	C	3	.1	2.1	C	2	T
19..	28	C	3	.2	13	C	3	.1	1.8	C	2	T
20..	27	C	3	.2	13	C	3	.1	1.6	C	2	T
21..	29	C	3	.2	11	C	3	.1	1.8	C	2	T
22..	30	C	3	.2	11	C	3	.1	2.1	C	2	T
23..	29	C	3	.2	11	C	3	.1	2.1	C	2	T
24..	29	C	3	.2	10	C	3	.1	1.8	C	2	T
25..	29	C	3	.2	10	C	3	.1	1.6	C	2	T
26..	28	C	3	.2	9.7	C	3	.1	1.3	C	2	T
27..	30	C	3	.2	9.3	C	3	.1	1.2	C	2	T
28..	30	C	3	.2	9.3	C	3	.1	1.1	C	2	T
29..	29	C	3	.2	9.3	C	3	.1	.9	C	2	T
30..	28	C	3	.2	8.9	C	3	.1	.8	C	2	T
31..	--	--	--	--	8.9	C	3	.1	--	--	--	--
Total	797	--	--	6.0	507.4	--	--	4.3	114.9	--	--	0.6
JULY												
1..	0.7	C	2	T								
2..	.6	C	2	T								
3..	.4	C	2	T								
4..	.3	C	2	T								
5..	.3	C	2	T								
6..	.2	C	2	T								
7..	.2	C	2	T								
8..	.1	C	2	T								
9..	.1	C	2	T								
10..	.1	C	2	T								
11..	.1	C	2	T								
12..	.1	C	2	T								
13..	.1	C	2	T								
14..	.1	C	2	T								
15..	.1	C	2	T								
16..	.1	C	2	T								
17..	.1	C	2	T								
18..	.1	C	2	T								
19..	0	--	--	0								
20..	0	--	--	0								
21..	0	--	--	0								
22..	0	--	--	0								
23..	0	--	--	0								
24..	0	--	--	0								
25..	0	--	--	0								
26..	0	--	--	0								
27..	0	--	--	0								
28..	0	--	--	0								
29..	0	--	--	0								
30..	0	--	--	0								
31..	0	--	--	0								
Total	3.8	--	--	T	0	--	--	0	0	--	--	0
AUGUST												
SEPTEMBER												
Total discharge for year (cfs-days).....											12160.7	
Total load for year (tons).....											2397.0	

T Less than 0.05 ton.

C Composite period.



JOHN DAY RIVER BASIN--Continued  
 14-0440. MIDDLE FORK JOHN DAY RIVER AT RITTER, OREG.--Continued

Periodic determinations of suspended-sediment discharge, water year October 1966 to September 1967  
 (Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water;  
 P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water tem- per- ature (°F)	Sam- pling point	Discharge (cfs)	Sediment concentra- tion (ppm)	Sediment discharge (tons per day)	Suspended sediment					Method of analysis							
							Percent finer than size indicated, in millimeters												
							0.002	0.004	0.008	0.016	0.031		0.062	0.125	0.250	0.500	1.000	2.000	
Oct. 18, 1966.....	1920	--		34	5	T													
Dec. 15.....	1155	37		300	28	23													
Jan. 29, 1967.....	1335	38		1190	602	1870													
Jan. 31.....	1355	37		576	39	61													
Feb. 20.....	1000	33		142	9	3													
Mar. 23.....	1200	41		460	30	37													
Apr. 19.....	1020	43		289	11	9													
May 8.....	1210	54		814	190	418													
May 19.....	1135	48		1080	72	210													
June 29.....	1300	68		185	10	5													

T Less than 0.50 ton.







## JOHN DAY RIVER BASIN--Continued

14-0480. JOHN DAY RIVER AT McDONALD FERRY, OREG.--Continued

Suspended sediment, water year October 1966 to September 1967

Day	OCTOBER			NOVEMBER			DECEMBER		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	67	C 24	4.3	299	C 24	19	742	59	118
2..	67	C 24	4.3	299	C 24	19	920	70	174
3..	77	C 24	5.0	299	C 24	19	1000	---	260
4..	82	C 24	5.3	292	C 24	19	1580	690	2900
5..	114	C 24	7.4	285	C 24	18	1560	432	1820
6..	114	C 24	7.4	292	C 24	19	1510	142	579
7..	111	C 24	7.2	306	C 24	20	1480	119	476
8..	98	C 24	6.4	313	C 24	20	1580	106	452
9..	104	C 24	6.7	327	C 24	21	1560	71	259
10..	126	C 24	8.2	334	C 24	22	1290	64	223
11..	126	C 24	8.2	342	C 24	22	1240	49	144
12..	130	C 24	8.4	364	C 24	24	1290	42	146
13..	130	C 24	8.4	372	C 24	24	1410	84	320
14..	169	C 24	11	410	C 24	27	2220	850	3260
15..	169	C 24	11	499	C 24	28	6820	1740	34100
16..	174	C 24	11	589	40	64	4380	642	7590
17..	184	C 24	12	580	40	63	3180	240	2060
18..	222	C 24	14	598	42	68	2600	120	842
19..	246	C 24	16	751	69	140	2200	70	416
20..	252	C 24	16	880	110	261	1960	51	270
21..	240	C 24	16	860	339	787	1800	43	209
22..	264	C 24	17	778	48	101	1690	91	141
23..	264	C 24	17	1160	166	559	1610	24	104
24..	264	C 24	17	1100	242	719	1410	20	76
25..	264	C 24	17	930	105	264	1290	C 16	56
26..	292	C 24	19	832	112	252	1190	C 16	51
27..	313	C 24	20	787	106	225	1230	C 16	53
28..	313	C 24	20	733	79	156	1220	C 16	53
29..	327	C 24	21	733	83	184	1170	C 16	51
30..	327	C 24	21	733	66	24	1090	C 16	47
31..	313	C 24	20	---	---	---	1070	C 16	46
Total	5943	---	389.2	17097	---	4285	55082	---	62316
JANUARY									
1..	1090	C 16	47	6650	515	9250	1500	C 13	53
2..	1050	C 16	45	5250	155	2200	1600	C 13	56
3..	1040	C 16	45	4360	100	1180	1700	C 13	60
4..	1030	C 16	44	3820	69	712	1600	C 13	56
5..	990	C 16	43	3420	50	462	1500	C 13	53
6..	1020	C 16	44	3140	39	331	1500	C 13	53
7..	1030	C 16	44	2900	34	266	1410	C 13	49
8..	1020	C 16	44	2580	30	209	1450	C 13	51
9..	960	C 16	41	2490	27	182	1470	C 13	52
10..	950	C 16	41	2280	26	160	1440	C 13	51
11..	940	C 16	41	2230	21	126	1480	C 13	52
12..	950	C 16	41	2120	22	126	1550	C 13	54
13..	990	C 16	43	1970	C 13	69	1560	C 13	55
14..	1000	C 16	43	1850	C 13	65	1450	C 13	51
15..	1110	C 16	48	1820	C 13	64	1390	C 13	49
16..	1390	---	83	1750	C 13	61	1370	C 13	48
17..	1800	C 11	150	1630	C 13	57	1310	C 13	46
18..	2280	127	782	1560	C 13	55	2640	86	1020
19..	1940	48	251	1630	C 13	57	3640	163	1600
20..	1690	34	155	1800	C 13	63	3400	182	1670
21..	1630	32	141	1600	C 13	56	3050	76	626
22..	1910	26	134	1400	C 13	49	3030	45	368
23..	2020	30	164	1400	C 13	49	3090	40	334
24..	1830	30	148	1500	C 13	53	3340	48	433
25..	1540	22	91	1480	C 13	52	3670	56	555
26..	1340	17	62	1600	C 13	56	3560	49	471
27..	1520	16	66	1600	C 13	56	3160	34	290
28..	2360	190	1210	1500	C 13	53	2880	25	194
29..	4280	1900	33000	---	---	---	2690	26	189
30..	10300	2630	73100	---	---	---	2650	19	136
31..	9460	1470	40400	---	---	---	2650	16	114
Total	62460	---	150591	67330	---	16119	68730	---	8889

E Estimated.

S Computed by subdividing day.

B Computed from estimated-concentration graph.

C Composite period.

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

JOHN DAY RIVER BASIN--Continued

14-0480. JOHN DAY RIVER AT McDONALD FERRY, OREG.--Continued

Suspended sediment, water year October 1966 to September 1967--Continued

Day	APRIL			MAY			JUNE					
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment				
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day			
1..	2470	15	100	2850	27	208	4960	72	964			
2..	2410	14	91	2880	28	218	4450	1920	23100			
3..	2360	14	89	2970	29	233	4260	1760	20200			
4..	2440	15	99	2870	31	240	3930	23	244			
5..	2290	16	99	2880	32	249	3670	25	248			
6..	2390	16	103	3050	40	329	3620	42	411			
7..	2540	19	130	3280	46	407	3580	22	213			
8..	2610	21	148	4000	75	810	3560	20	192			
9..	2700	26	190	5150	186	2610	3380	23	210			
10..	2970	28	225	6540	382	6750	3280	18	159			
11..	3100	32	268	9040	893	21800	3200	14	121			
12..	3200	34	294	8570	584	13500	3030	15	123			
13..	3220	29	252	7220	246	4800	2940	14	111			
14..	3120	30	253	6740	145	2640	2790	13	98			
15..	3030	23	188	6210	117	1960	2650	12	86			
16..	3030	22	180	5950	102	1640	2600	10	70			
17..	2850	20	154	6290	110	1870	2500	10	68			
18..	2690	16	116	7700	185	3850	2440	11	72			
19..	2520	14	95	9500	351	9000	2420	11	72			
20..	2420	13	85	9640	371	9660	2470	16	107			
21..	2310	11	69	9250	319	7970	2810	35	266			
22..	2170	14	82	9320	283	7120	2810	5600	42500			
23..	2090	12	68	10100	338	9220	4080	1200	13200			
24..	2010	10	54	10200	350	9640	3600	700	6800			
25..	2120	10	57	9040	262	6390	3010	250	2030			
26..	2560	19	131	7640	160	3300	2560	123	850			
27..	2970	49	417	6400	125	2160	2210	77	459			
28..	3120	121	1020	5660	91	1390	1990	51	274			
29..	3030	56	458	5270	105	1490	1790	29	140			
30..	2960	37	296	5450	91	1340	1830	17	75			
31..	--	--	--	5320	76	1090	--	--	--			
Total	79700	--	5811	196980	--	133884	92220	--	113463			
JULY												
1..	1440	13	51	161	C	8	3.5	66	C	8	1.4	
2..	1310	13	46	153	C	8	3.3	62	C	8	1.3	
3..	1180	17	54	145	C	8	3.1	58	C	8	1.3	
4..	1050	16	45	141	C	8	3.0	62	C	8	1.3	
5..	960	C	12	137	C	8	3.0	55	C	8	1.2	
6..	900	C	12	29	123	C	8	2.7	55	C	8	1.2
7..	841	C	12	27	113	C	8	2.4	55	C	8	1.2
8..	787	C	12	25	110	C	8	2.4	58	C	8	1.3
9..	733	C	12	24	103	C	8	2.2	55	C	8	1.2
10..	670	C	12	22	110	C	8	2.4	58	C	8	1.3
11..	625	C	12	20	107	C	8	2.3	58	C	8	1.3
12..	589	C	12	19	103	C	8	2.2	62	C	8	1.3
13..	562	C	12	18	100	C	8	2.2	62	C	8	1.3
14..	517	C	12	17	97	C	8	2.1	58	C	8	1.3
15..	474	C	12	15	97	C	8	2.1	53	C	8	1.1
16..	418	C	12	14	95	C	8	2.1	71	C	8	1.5
17..	403	C	12	13	81	C	8	1.7	71	C	8	1.5
18..	375	C	12	12	76	C	8	1.6	88	C	8	1.9
19..	347	C	8	7.5	76	C	8	1.6	103	C	8	2.2
20..	340	C	8	7.3	71	C	8	1.5	120	C	8	2.6
21..	327	C	8	7.1	69	C	8	1.5	110	C	8	2.4
22..	334	C	8	7.2	73	C	8	1.6	100	C	8	2.2
23..	301	C	8	6.5	69	C	8	1.5	95	C	8	2.1
24..	275	C	8	5.9	66	C	8	1.4	97	C	8	2.1
25..	242	C	8	5.2	58	C	8	1.3	89	C	8	1.9
26..	226	C	8	4.9	47	C	8	1.0	89	C	8	1.9
27..	220	C	8	4.8	51	C	8	1.1	89	C	8	1.9
28..	206	C	8	4.4	53	C	8	1.1	97	C	8	2.1
29..	182	C	8	3.9	44	C	8	1.0	97	C	8	2.1
30..	169	C	8	3.7	47	C	8	1.0	97	C	8	2.1
31..	169	C	8	3.7	53	C	8	1.1	--	--	--	
Total	17172	--	554.1	2829	--	61.0	2290	--	--	--	49.5	
Total discharge for year (cfs-days).....										667833		
Total load for year (tons).....										496405.8		

S Computed by subdividing day.  
C Composite period.

JOHN DAY RIVER BASIN--Continued  
 14-0480. JOHN DAY RIVER AT McDONALD FERRY, OREG.--Continued

Particle-size analyses of suspended sediment, water year October 1966 to September 1967  
 (Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water;  
 P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water tem- per- ature (°F)	Sam- pling point	Discharge (cfs)	Sediment concent- ration (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	
Dec. 14, 1966.....	1620	44		1770	756	3610	27	29	43	59	87	93	98	100	--		VPWC
Jan. 30, 1967.....	0930	43		10100	1910	52100	19	22	31	43	58	76	88	97	100		VPWC
Mar. 31.....	0930	43		9430	1820	29000	23	26	38	49	64	78	88	98	100		VPWC
May 1.....	0950	53		9420	5922	25000	25	26	39	51	64	76	86	96	100		VPWC
May 12.....	1120	52		8630	509	11900	22	30	32	51	64	69	75	93	100		VPWC











COLUMBIA RIVER MAIN STEM--Continued  
14-1057. COLUMBIA RIVER AT THE DALLES, OREG.--Continued

Nutrient analyses, in parts per million

Date of collection	Total Nitrogen as NO <sub>3</sub>	Total Phosphorous as PO <sub>4</sub>
July 1, 1967...	1.0	0.16
Aug. 1.....	1.7	.10
Sept. 1.....	1.4	.08

Pesticide analyses, in parts per billion

Date of collection	Insecticide									Herbicide		
	Aldrin	DDD	DDE	DDT	Dieldrin	Endrin	Heptachlor	Heptachlor Epoxide	Lindane	2, 4-D	2, 4, 5-T	Silvex
Oct. 16, 1966.	a	0.01	a	a	a	a	a	a	a	a	a	0.03
Nov. 21.....	a	a	a	a	a	a	a	a	a	a	a	a
Dec. 19.....	a	a	a	a	a	a	a	a	a	a	a	a
Jan. 26, 1967.	a	a	a	a	a	a	a	a	a	a	a	a
Feb. 8.....	0.01	a	a	a	a	a	a	a	a	a	a	a
Mar. 21.....	a	a	a	a	a	a	0.02	a	a	a	a	a
May 3.....	a	a	a	a	a	a	a	a	a	a	a	a
June 14.....	a	a	a	0.01	a	a	.01	a	a	a	a	a
Aug. 29.....	a	a	a	a	a	a	a	a	a	a	a	a
Sept. 19.....	a	a	a	a	a	a	a	a	a	a	a	a

a Not detected.

COLUMBIA RIVER MAIN STEM--Continued  
 14-1057. COLUMBIA RIVER AT THE DALLES, OREG.--Continued

Day	Specific conductance (micromhos at 25°C), water year October 1966 to September 1967											
	October	November	December	January	February	March	April	May	June	July	August	September
1.....	207	216	206	198	--	200	191	178	--	132	143	156
2.....	204	216	208	206	195	198	190	177	131	137	145	156
3.....	205	220	218	201	202	198	192	178	130	131	147	156
4.....	194	217	216	193	215	208	188	179	130	129	144	157
5.....	196	214	214	191	226	205	184	180	128	133	144	157
6.....	188	214	212	195	224	204	184	180	127	133	148	155
7.....	188	214	206	198	230	201	184	176	126	136	144	156
8.....	188	214	211	202	227	206	187	176	125	137	145	156
9.....	189	220	211	200	227	197	193	174	121	137	145	156
10.....	196	213	216	200	218	201	187	174	118	130	145	165
11.....	204	210	223	194	202	209	189	173	117	134	146	170
12.....	198	211	221	195	204	203	189	170	121	135	147	171
13.....	207	201	211	200	198	196	195	174	119	136	148	170
14.....	202	202	204	204	198	198	200	171	--	140	148	167
15.....	206	212	207	219	201	192	201	170	122	138	152	164
16.....	203	210	216	224	204	189	194	163	123	139	152	163
17.....	198	203	216	214	207	195	189	158	123	141	152	171
18.....	198	202	214	201	212	214	201	153	123	140	156	173
19.....	200	204	214	211	214	200	188	149	122	140	162	173
20.....	202	211	206	210	204	191	190	153	124	137	155	174
21.....	195	218	200	216	204	190	189	159	118	140	153	172
22.....	195	224	207	226	216	199	187	150	118	141	156	172
23.....	204	223	219	230	210	193	184	150	120	141	156	183
24.....	219	215	225	230	210	195	184	135	122	141	155	188
25.....	224	220	228	233	209	206	184	127	119	143	154	182
26.....	214	218	226	223	210	200	186	123	126	145	159	177
27.....	209	221	212	217	206	199	187	120	119	142	156	181
28.....	208	228	206	205	202	206	186	122	124	144	156	175
29.....	207	214	208	204	204	196	184	116	120	143	154	189
30.....	207	212	189	192	--	193	182	132	132	143	154	182
31.....	212	--	188	188	--	193	--	127	--	146	153	--
Average	202	214	211	207	209	198	188	157	123	138	150	168

COLUMBIA RIVER MAIN STEM--Continued  
14-1057. COLUMBIA RIVER AT THE DALLES, OREG.--Continued

Temperature (°F) of water, water year October 1966 to September 1967

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.....	67	66	65	65	64	65	65	65	65	63	62	62	61	59	59	59	59	58	57	57	57	56	55	55	56	57	57	56	56	55	55	
November.....	55	56	55	56	56	55	54	54	54	53	53	52	52	52	52	52	52	52	52	52	51	51	51	51	50	50	50	49	50	50		
December.....	50	50	49	49	49	49	48	47	47	46	46	46	46	46	46	46	46	46	46	46	46	46	45	45	45	45	45	45	44	44		
January.....	44	44	44	44	44	44	43	43	43	43	44	44	44	44	44	44	44	44	43	43	43	43	43	43	43	43	43	43	43	43		
February.....	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43		
March.....	43	44	44	44	44	44	45	45	44	44	44	44	44	44	44	44	44	44	45	45	46	46	46	46	46	46	46	46	46	45		
April.....	45	46	47	47	48	48	48	48	50	49	49	49	49	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50		
May.....	50	50	50	51	52	53	54	54	55	55	54	54	54	55	56	57	56	57	58	58	59	58	59	58	59	58	57	56	56	55		
June.....	55	57	56	57	57	57	57	57	57	57	57	58	58	58	58	58	58	58	59	59	60	60	60	60	60	60	60	60	61	61		
July.....	61	62	62	63	64	64	64	64	63	63	63	64	64	64	64	64	64	65	65	65	65	66	66	66	66	66	66	66	67	67		
August.....	68	68	68	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69		
September.....	73	74	72	71	71	71	71	71	71	71	70	69	68	67	68	68	68	68	68	68	68	68	68	68	68	68	68	67	67	67		

KLICKITAT RIVER BASIN

14-1130. KLICKITAT RIVER NEAR PITT, WASH.

LOCATION:--Lat 45°45'30", long 121°12'30", temperature recorder at gaging station 3.5 miles south of Pitt, Klickitat County, 5 miles upstream from Silvas Creek, and at mile 7.0.

DRAINAGE AREA.--1,297 square miles.  
 RECORDS AVAILABLE.--Chemical analyses: October 1968 to September 1959, October 1966 to September 1967.  
 Water temperature: September 1967: Maximum, 65°F; July 13, 24; minimum, 37°F Dec. 9, 10.  
 Maximum, 65°F; July 28, 29, 1958, July 18, 1960; minimum, freezing point Jan. 31 to Feb. 4, 1956, Jan. 3-7, 1959, Dec. 11, 12, 1961, Dec. 21, 22, 1964.  
 EXTREMES, 1950-67.--Water temperatures: Maximum, 69°F July 28, 29, 1958, July 18, 1960; minimum, freezing point Jan. 31 to Feb. 4, 1956, Jan. 3-7, 1959, Dec. 11, 12, 1961, Dec. 21, 22, 1964.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> ) (B)	Boiron	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>		Sulphate adsorption ratio	Specific conductance (microhmhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Non-carbonate				
Oct. 26, 1966.	726	26	7.8	4.3	4.5	1.5	48	0	5.2	1.0	0.1	0.6	--	75	0.10	147	37	0	83	7.2	5	
Nov. 18.....	844	39	7.0	3.6	4.2	1.2	48	0	2.0	1.0	0.1	0.2	--	A 82	.11	187	32	0	82	7.3	0	
Dec. 29.....	1210	26	7.0	3.5	3.9	1.3	45	0	1.6	1.5	0.0	0.9	--	71	.10	233	32	0	78	7.5	10	
Jan. 25, 1967.	1390	29	6.8	3.5	3.8	1.2	44	0	1.8	1.0	0.1	0.4	0.00	70	.10	262	32	0	79	7.5	13	
Feb. 25.....	1310	28	6.8	3.4	3.8	1.4	45	0	1.0	1.0	0.1	0.2	--	A 68	.09	241	21	0	76	7.6	5	
Mar. 30.....	1400	28	5.7	3.0	3.8	1.3	44	0	1.4	1.0	0.0	0.1	--	A 66	.09	249	26	0	76	7.6	5	
Apr. 20.....	1180	29	6.6	3.4	3.9	1.5	48	0	0	1.0	0.1	0.2	--	73	.10	233	30	0	78	7.5	5	
May 26.....	2700	22	4.3	2.0	2.9	1.2	30	0	0	1.0	0.0	0.3	--	A 49	.07	357	18	0	52	7.4	5	
June 17.....	2760	19	3.5	2.1	2.5	0.9	28	0	1.6	0.2	0.1	0.1	--	A 44	.06	328	17	0	46	7.3	10	
July 21.....	1020	26	5.5	2.8	3.6	2.2	39	0	2.4	0.5	0.1	0.02	0.02	A 62	.08	171	25	0	68	7.8	5	
Aug. 18.....	804	27	6.0	2.7	4.0	1.5	39	0	3.2	0.2	0.1	0.4	--	70	.10	152	26	0	72	7.7	5	
Sept. 21.....	698	28	6.3	3.4	4.1	1.8	46	0	2.6	0.8	0.1	0.1	--	74	.10	139	30	0	78	7.6	5	

A Calculated from determined constituents.

Additional determinations

Date of collection	Dis-solved oxygen (DO)	MPN (coliform colonies per 100 ml)	Hexa-valent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)	Date of collection	Dis-solved oxygen (DO)	MPN (coliform colonies per 100 ml)	Hexa-valent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)
Oct. 26, 1966.	11.7	36	--	--	--	--	May 26, 1967..	11.8	430	--	--	--	--
Nov. 18.....	13.4	930	0.01	0.00	0.00	0.00	June 17.....	11.4	230	--	--	0.00	0.00
Feb. 25.....	12.4	930	--	--	--	--	July 21.....	11.4	0	--	--	--	--
Mar. 30.....	12.2	36	--	--	--	--	Aug. 18.....	10.8	36	--	--	--	--
Apr. 20.....	11.9	0	--	--	--	--	Sept. 21.....	10.8	0	--	--	--	--



WHITE SALMON RIVER BASIN

14-1235. WHITE SALMON RIVER NEAR UNDERWOOD, WASH.

LOCATION --Lat 45°45'10", long 121°31'35", at gaging station 1,000 feet downstream from Pacific Power and Light Co.'s. conduit powerplant, 2 miles north of Underwood, Shamaania County, and at mile 1.9.

DRAINAGE AREA.--386 square miles.

RECORDS AVAILABLE.--Chemical analyses: October 1966 to September 1967.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean Silica discharge (cfs)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180° C)		Hardness as CaCO <sub>3</sub>		Specific conductivity (micro-mhos at 25° C)	pH	Color	
														Parts per million	Tons per acre-foot	Tons per day	Calcium Magnesium				Non-carbonate
Dec. 29, 1966.	921	25	5.5	1.8	3.3	1.1	33	0	2.2	0.5	0.1	0.3	--	57	0.08	142	21	0	60	7.4	5
Jan. 25, 1967.	1410	27	5.1	2.3	3.2	1.4	34	0	2.0	0.5	1.1	0.2	0.08	61	0.08	232	22	0	60	7.5	5
Feb. 25, .....	1290	32	5.8	2.6	3.4	1.1	34	0	2.8	1.0	1.1	0.1	--	A	0.09	230	25	0	61	7.5	5
Mar. 30, .....	1280	25	4.5	2.6	3.4	1.1	35	0	1.4	1.0	0.2	0.2	--	A	0.08	194	22	0	60	7.5	5
Apr. 20, .....	1040	27	4.9	2.4	3.4	1.4	35	0	2.2	0.5	2.1	1.1	--	A	0.08	166	22	0	62	7.3	0
May 26, .....	1360	27	4.0	1.8	2.7	1.0	28	0	1.6	1.0	1.1	0.1	0.02	47	0.06	173	18	0	49	7.3	0
July 21, .....	783	27	5.0	2.7	3.3	1.5	36	0	2.6	1.8	1.1	0.1	--	67	0.09	138	24	0	65	7.7	5
Sept. 21, .....	573	26	5.1	2.8	3.7	1.8	38	0	4.2	0.5	1.1	0.1	--	64	0.09	99.0	24	0	70	7.3	5

A Calculated from determined constituents.

Additional determinations

Date of collection	Dis-solved oxygen (DO)	MPN (coliform colonies 100 ml)	Hexa-valent chromi-um (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)	Date of collection	Dis-solved oxygen (DO)	MPN (coliform colonies 100 ml)	Hexa-valent chromi-um (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)
Jan. 25, 1967.	--	--	0.00	0.02	0.00		May 26, 1967..	12.3	210	--	--	--	--
Feb. 25, .....	12.2	0	--	--	--		June 17, .....	11.2	430	--	--	--	--
Mar. 30, .....	11.9	36	--	--	--		July 21, .....	10.4	36	0.00	0.00	0.00	--
Apr. 20, .....	11.6	91	--	--	--		Sept. 21, .....	11.5	--	--	--	--	--



## SANDY RIVER BASIN

14-1388.5. BULL RUN RIVER NEAR MULTNOMAH FALLS, OREG.

LOCATION.--Lat 45°29'50", long 122°00'50", at gaging station on right bank, 1.2 miles above North Fork, 7.0 miles southeast of Multnomah Falls, and at mile 14.8.

DRAINAGE AREA.--47.9 square miles.

RECORDS AVAILABLE.--Sediment records: October 1966 to September 1967.

EXTREMES, 1966-67.--Sediment concentrations: Maximum daily, (estimated) 56 ppm Jan. 13; minimum daily, less than 1 ppm on several days during December.

Sediment loads: Maximum daily, (estimated) 510 tons Jan. 13; minimum daily, less than 0.05 ton on several days during December.

Suspended sediment, water year October 1966 to September 1967

Day	OCTOBER			NOVEMBER			DECEMBER		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	81	C 1	0.2	232	C 2	1.3	360	C 1	1.0
2..	116	C 1	.3	197	C 2	1.1	329	C 1	.9
3..	89	C 1	.2	173	C 2	.9	305	C 1	.8
4..	82	C 1	.2	151	C 2	.8	413	C 1	1.1
5..	76	C 1	.2	191	C 2	1.0	447	C 1	1.2
6..	75	C 1	.2	228	C 2	1.2	472	C 1	1.3
7..	110	C 1	.3	189	C 2	1.0	403	C 1	1.1
8..	148	C 1	.4	173	C 2	.9	320	C 1	.9
9..	110	C 1	.3	240	C 2	1.3	274	C 1	.7
10..	94	C 1	.3	444	5 B	6.0	716	4 B	7.7
11..	88	C 1	.2	880	9 A	21	930	5 B	13
12..	140	C 1	.4	1520	9 A	37	1790	13	63
13..	150	C 1	.4	1000	2 A	5.4	3420	44 A	410
14..	130	C 1	.4	2050	15 A	83	1810	10	49
15..	110	C 1	.3	1460	3 B	12	880	-- E	2.4
16..	100	C 1	.3	1220	3	9.9	605	-- E	1.6
17..	95	C 1	.3	930	1	2.5	469	C 1	T
18..	90	C 1	.2	553	-- E	1.5	412	C 1	T
19..	95	C 1	.3	442	-- E	1.2	396	C 1	T
20..	400	5 B	5.4	390	-- E	1.1	508	C 1	T
21..	700	1	1.9	329	1	.9	407	C 1	T
22..	2000	2 B	11	268	1	.7	343	C 1	T
23..	1200	2 B	6.5	232	5	3.1	301	C 1	T
24..	700	2 B	3.8	203	-- E	.5	297	C 1	T
25..	500	3 B	4.1	582	4 A	6.3	294	C 1	T
26..	420	C 2	2.3	551	C 1	1.5	252	C 1	T
27..	360	C 2	1.9	407	1	1.1	225	C 1	T
28..	286	C 2	1.5	332	1	.9	218	C 1	T
29..	265	C 2	1.4	282	1	.8	385	3 B	3.1
30..	367	2	2.0	316	1	.9	403	3 B	3.3
31..	274	C 2	1.5	--	--	--	549	4 B	5.9
Total	9451	--	48.7	16165	--	206.8	18933	--	568.0

E Estimated.

T Less than 0.05 ton.

A Computed from partly estimated-concentration graph.

B Computed from estimated-concentration graph.

C Composite period.

## SANDY RIVER BASIN--Continued

14-1388.5. BULL RUN RIVER NEAR MULTNOMAH FALLS, OREG.--Continued

Suspended sediment, water year October 1966 to September 1967--Continued

Day	JANUARY			FEBRUARY			MARCH		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	1040	7 B	20	519	-- E	2.8	438	-- E	3.5
2..	637	2 B	3.4	579	-- E	4.7	388	-- E	2.1
3..	1570	10	42	507	-- E	2.7	326	-- E	1.8
4..	1080	-- E	5.8	517	-- E	2.8	288	-- E	1.6
5..	726	-- E	2.0	496	-- E	2.7	262	-- E	1.4
6..	497	-- E	1.3	422	-- E	2.3	245	-- E	1.3
7..	393	-- E	1.1	363	-- E	2.0	228	4	2.5
8..	343	-- E	.9	321	-- E	1.7	252	-- E	3.1
9..	322	-- E	.9	300	-- E	1.6	372	11 A	11
10..	325	4	3.5	339	4	3.7	289	-- E	3.9
11..	639	4 B	6.9	327	-- E	1.8	245	C 2	1.3
12..	940	7 B	18	323	-- E	1.7	217	C 2	1.2
13..	3340	56 B	510	437	-- E	3.5	205	C 2	1.1
14..	2080	18 B	100	367	-- E	2.0	189	C 2	1.0
15..	1760	10 B	48	328	-- E	1.8	206	C 2	1.1
16..	1210	4 B	13	493	2 B	2.7	286	C 2	1.5
17..	758	7 A	14	2020	13 A	71	391	C 2	2.1
18..	523	-- E	4.2	1390	11 B	41	465	C 2	2.5
19..	872	4 A	9.4	694	-- E	13	375	C 2	2.0
20..	1120	2	6.0	493	-- E	8.0	443	C 2	2.4
21..	676	-- E	1.8	405	5	5.5	449	C 2	2.4
22..	482	1	1.3	348	-- E	1.9	525	C 2	2.8
23..	397	-- E	1.1	312	-- E	1.7	735	C 2	4.0
24..	337	-- E	.9	290	-- E	1.6	561	C 2	3.0
25..	302	-- E	.8	313	-- E	1.7	452	C 2	2.4
26..	894	9 B	22	295	-- E	1.6	392	C 2	2.1
27..	2680	21 A	150	280	-- E	1.5	343	C 2	1.9
28..	2670	15 B	140	358	C 4	3.9	313	C 2	1.7
29..	1670	11 B	50	--	--	--	283	C 2	1.5
30..	1100	6	18	--	--	--	253	C 2	1.4
31..	668	-- E	5.4	--	--	--	230	C 2	1.2
Total	32051	--	1201.7	13836	--	192.9	10626	--	72.8
APRIL									
1..	218	C 2	1.2	203	C 2	1.1	325	C 2	1.8
2..	215	C 2	1.2	199	C 2	1.1	328	C 2	1.8
3..	225	C 2	1.2	211	C 2	1.1	304	C 2	1.6
4..	245	C 2	1.3	230	C 2	1.2	292	C 2	1.6
5..	250	C 2	1.3	253	C 2	1.4	284	C 2	1.5
6..	238	C 2	1.3	310	C 2	1.7	261	C 2	1.4
7..	252	C 2	1.4	376	C 2	2.0	233	C 2	1.3
8..	271	C 2	1.5	455	C 2	2.5	213	C 2	1.2
9..	258	C 2	1.4	487	C 2	2.6	196	C 2	1.1
10..	248	C 2	1.3	396	C 2	2.1	185	C 2	1.0
11..	240	C 2	1.3	369	C 2	2.0	180	C 2	1.0
12..	245	C 2	1.3	350	C 2	1.8	173	C 2	.9
13..	399	C 2	2.2	300	C 2	1.6	165	C 2	.9
14..	337	C 2	1.8	310	C 2	1.7	163	C 2	.9
15..	286	C 2	1.5	373	C 2	2.0	163	C 2	.9
16..	258	C 2	1.4	483	C 2	2.6	163	C 2	.9
17..	235	C 2	1.3	544	C 2	2.9	161	C 2	.9
18..	240	C 2	1.3	498	C 2	2.7	153	C 2	.8
19..	220	C 2	1.2	486	C 2	2.6	146	C 2	.8
20..	207	C 2	1.1	528	C 2	2.9	163	C 2	.9
21..	195	C 2	1.1	538	C 2	2.9	160	C 2	.9
22..	193	C 2	1.0	501	C 2	2.7	283	C 2	1.5
23..	197	C 2	1.1	425	C 2	2.3	203	C 2	1.1
24..	209	C 2	1.1	346	C 2	1.9	170	C 2	.9
25..	242	C 2	1.3	293	C 2	1.6	150	C 2	.8
26..	250	C 2	1.3	277	C 2	1.5	137	C 2	.7
27..	252	C 2	1.4	268	C 2	1.4	128	C 2	.7
28..	230	C 2	1.2	295	C 2	1.6	118	C 2	.6
29..	209	C 2	1.1	362	C 2	2.0	110	C 2	.6
30..	207	C 2	1.1	434	C 2	2.3	104	C 2	.6
31..	--	--	--	353	C 2	1.9	--	--	--
Total	7271	--	39.2	11433	--	61.7	5814	--	31.6

E Estimated.

A Computed from partly estimated-concentration graph.

B Computed from estimated-concentration graph.

C Composite period.

SANDY RIVER BASIN--Continued

14-1388.5. BULL RUN RIVER NEAR MULTNOMAH FALLS, OREG.--Continued

Suspended sediment, water year October 1966 to September 1967--Continued

Day	JULY			AUGUST			SEPTEMBER					
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment				
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day			
1..	96	C	1	0.3	50	C	1	0.1	42	C	1	0.1
2..	90	C	1	.2	49	C	1	.1	42	C	1	.1
3..	88	C	1	.2	49	C	1	.1	42	C	1	.1
4..	82	C	1	.2	48	C	1	.1	42	C	1	.1
5..	79	C	1	.2	47	C	1	.1	42	C	1	.1
6..	77	C	1	.2	47	C	1	.1	42	C	1	.1
7..	75	C	1	.2	48	C	1	.1	42	C	1	.1
8..	73	C	1	.2	48	C	1	.1	42	C	1	.1
9..	71	C	1	.2	47	C	1	.1	42	C	1	.1
10..	69	C	1	.2	46	C	1	.1	50	C	1	.1
11..	68	C	1	.2	46	C	1	.1	100	C	1	.3
12..	67	C	1	.2	45	C	1	.1	60	C	1	.2
13..	64	C	1	.2	45	C	1	.1	50	C	1	.1
14..	63	C	1	.2	43	C	1	.1	44	C	1	.1
15..	62	C	1	.2	43	C	1	.1	40	C	1	.1
16..	61	C	1	.2	43	C	1	.1	38	C	1	.1
17..	60	C	1	.2	43	C	1	.1	38	C	1	.1
18..	58	C	1	.2	42	C	1	.1	36	C	1	.1
19..	58	C	1	.2	42	C	1	.1	36	C	1	.1
20..	58	C	1	.2	42	C	1	.1	36	C	1	.1
21..	56	C	1	.2	41	C	1	.1	36	C	1	.1
22..	55	C	1	.1	41	C	1	.1	40	C	1	.1
23..	54	C	1	.1	41	C	1	.1	36	C	1	.1
24..	54	C	1	.1	41	C	1	.1	35	C	1	.1
25..	52	C	1	.1	40	C	1	.1	35	C	1	.1
26..	52	C	1	.1	38	C	1	.1	34	C	1	.1
27..	52	C	1	.1	39	C	1	.1	34	C	1	.1
28..	51	C	1	.1	40	C	1	.1	34	C	1	.1
29..	51	C	1	.1	40	C	1	.1	38	C	1	.1
30..	51	C	1	.1	40	C	1	.1	49	C	1	.1
31..	51	C	1	.1	40	C	1	.1	--	--	--	--
Total	1998		--	5.3	1354		--	3.1	1277		--	3.3
Total discharge for year (cfs-days).....										130209		
Total load for year (tons).....										2435.1		

C Composite period.

## WASHOUGAL RIVER BASIN

14-1435. WASHOUGAL RIVER NEAR WASHOUGAL, WASH.

LOCATION--Lat 45°37'30", Long 122°16'58", at county road bridge, 4.4 miles northeast of Washougal, Clark County, and 0.5 miles downstream from gage.  
 DRAINAGE AREA.--108 square miles, approximately, upstream from gaging station.  
 RECORDS AVAILABLE.--Chemical analyses: October 1966 to September 1967.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Fe)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> ) (B)	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>	Sodium adsorption ratio	Specific conductance (microhmhos at 25°C)	Color		
														Parts per million	Tons per acre-foot	Tons per day						
Nov. 18, 1966.	1360	9.4		2.0	0.4	1.6	0.2	11	0	0.2	1.0	0.0	0.3	20	0.03	73.4	7	0	22	7.0	5	
Dec. 25, 1966.	1170	7.9		2.0	.6	1.6	.2	11	0	.0	1.0	.0	.3	24	.03	75.8	8	0	23	7.1	5	
Jan. 25, 1967.	975	11		2.7	.8	1.6	.6	12	0	.8	1.0	.0	.6	24	.03	63.2	10	0	25	7.1	5	
Feb. 25, 1967.	664	8.5		2.7	1.0	1.5	.3	12	0	.0	2.0	.0	.2	A	23	.03	47.4	16	0	24	7.1	5
Mar. 30, 1967.	777	8.8		2.0	.7	1.8	.2	13	0	.2	1.0	.0	.3	A	21	.03	44.1	8	0	24	7.1	5
Apr. 20, 1967.	785	10		2.2	.6	1.7	.4	12	0	.2	1.0	.1	.3	21	.03	44.5	8	0	24	7.0	5	
May 26, 1967.	244	9.5		2.0	.7	1.8	.4	14	0	.4	1.0	.0	.1	27	.04	17.8	8	0	25	7.1	5	
July 21, 1967.	77	13		3.5	1.1	2.4	.7	21	0	.2	1.2	.0	.4	A	38	.05	7.90	13	0	42	7.6	5
Aug. 18, 1967.	53	13		3.5	.9	2.6	.6	20	0	.2	1.0	.0	.4	A	32	.04	4.58	12	0	39	7.3	5
Sept. 21, 1967.	47	11		3.3	1.0	2.6	.6	22	0	.2	1.2	.1	.2	31	.04	3.93	12	0	40	7.1	5	

A Calculated from determined constituents.

## Additional determinations

Date of collection	Dis-solved oxygen (DO)	MPN (coliform colonies per 100 ml)	Hexa-valent chromi-um (Cr <sup>6+</sup> )	Additional determinations		Dis-solved oxygen (DO)	MPN (coliform colonies per 100 ml)	Hexa-valent chromi-um (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)	Date of collection	Dis-solved oxygen (DO)	MPN (coliform colonies per 100 ml)	Hexa-valent chromi-um (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)
				Copper (Cu)	Zinc (Zn)													
Jan. 25, 1967.	12.2	91	0.01	0.01	0.00	9.2	930	0.00	0.00	0.01	June 17, 1967.	9.2	930	0.00	0.00	0.00	0.01	
Feb. 20, 1967.	12.7	430	---	---	---	8.6	0	---	---	---	July 21, 1967.	11.4	0	---	---	---	---	
Apr. 20, 1967.	12.3	91	---	---	---	11.4	230	---	---	---	Aug. 18, 1967.	10.0	230	---	---	---	---	
May 26, 1967.	6.4	930	---	---	---	10.0	---	---	---	---	Sept. 21, 1967.	10.0	---	---	---	---	---	



## COLUMBIA RIVER MAIN STEM--Continued

14-1447. COLUMBIA RIVER AT VANCOUVER, WASH.--Continued

Suspended sediment, water year October 1966 to September 1967

Day	OCTOBER			NOVEMBER			DECEMBER		
	Mean discharge (K cfs)	Suspended sediment		Mean discharge (K cfs)	Suspended sediment		Mean discharge (K cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	102	17	4680	99.0	C 10	2670	107	C 6	1730
2..	104	16	4490	96.9	C 10	2620	105	C 6	1700
3..	96.1	16	4150	97.9	C 10	2640	105	C 6	1700
4..	92.3	15	3740	106	C 10	2860	107	C 7	2020
5..	87.1	15	3530	103	C 8	2220	121	C 7	2290
6..	98.4	14	3720	109	C 8	2350	134	C 7	2530
7..	104	14	3930	103	C 6	1670	137	C 7	2590
8..	102	13	3580	105	C 6	1700	141	C 7	2660
9..	111	13	3900	101	C 6	1640	136	C 7	2570
10..	107	C 12	3470	104	C 6	1680	115	C 8	2480
11..	105	C 12	3400	99.6	9	2420	117	C 10	3160
12..	109	C 12	3530	110	7	2080	123	C 12	3990
13..	117	C 12	3790	107	8	2310	128	C 12	4150
14..	129	C 12	4180	112	C 10	3020	156	C 12	5050
15..	125	10	3370	126	C 10	3400	155	C 12	5020
16..	109	10	2940	125	C 10	3370	158	C 12	5120
17..	102	C 8	2200	118	C 10	3190	142	13	4980
18..	101	C 8	2180	136	C 10	3670	138	14	5220
19..	99.7	C 8	2150	123	9	2990	128	15	5180
20..	89.7	C 8	1940	124	9	3010	130	C 17	5970
21..	106	C 8	2290	109	C 8	2350	133	C 17	6100
22..	102	C 8	2200	107	C 8	2310	131	C 17	6010
23..	113	8	2440	114	C 8	2460	128	C 17	5880
24..	105	C 8	2270	125	C 8	2700	140	15	5670
25..	96.6	C 8	2090	115	C 8	2480	136	13	4770
26..	95.1	C 8	2050	109	7	2060	119	11	3530
27..	96.6	C 8	2090	97.8	7	1850	105	C 10	2830
28..	97.1	C 8	2100	93.3	C 6	1510	111	C 10	3000
29..	93.1	9	2260	96.9	C 6	1570	110	C 10	2970
30..	94.6	9	2300	96.5	C 6	1560	127	C 10	3430
31..	100	C 10	2700	--	--	--	125	9	3040
Total	3189.4	--	93660	3268.9	--	72360	3948	--	117340
	JANUARY			FEBRUARY			MARCH		
1..	114	9	2770	215	C 20	11600	146	C 8	3150
2..	115	9	2790	194	C 20	10500	144	C 8	3110
3..	113	C 8	2440	170	C 20	9180	155	C 8	3350
4..	138	C 8	2980	160	C 21	9070	154	8	3330
5..	150	C 8	3240	160	21	9070	149	9	3620
6..	154	C 8	3330	160	C 22	9500	135	C 9	3280
7..	152	10	4100	160	C 22	9500	136	C 9	3300
8..	149	12	4830	160	C 22	9500	136	C 9	3300
9..	149	C 14	5630	144	C 22	8550	147	C 9	3570
10..	138	C 14	5220	148	C 22	8790	148	C 9	3600
11..	132	C 14	4990	154	20	8320	153	9	3720
12..	137	C 14	5180	147	20	7940	118	8	2550
13..	155	C 14	5860	146	C 18	7100	138	C 8	2980
14..	150	12	4860	147	C 18	7140	130	C 8	2810
15..	150	10	4050	150	C 18	7290	148	C 8	3200
16..	164	C 9	3990	160	C 18	7780	145	C 8	3130
17..	162	C 9	3940	160	C 18	7780	149	C 8	3220
18..	158	C 9	3840	155	16	6700	152	8	3280
19..	148	C 9	3600	145	14	5480	138	9	3350
20..	168	C 9	4080	147	C 12	4760	140	C 9	3400
21..	158	9	3840	137	C 12	4440	145	C 9	3520
22..	149	8	3220	136	C 12	4410	143	C 9	3470
23..	148	C 8	3200	138	C 12	4470	147	C 9	3570
24..	139	C 8	3000	140	11	4160	167	C 9	4060
25..	148	C 8	3200	146	10	3940	179	9	4350
26..	146	C 8	3150	148	9	3600	161	10	4350
27..	155	C 8	3350	132	C 8	2850	159	C 10	4290
28..	168	12	5440	133	C 8	2870	156	C 10	4210
29..	165	16	7130	--	--	--	157	C 10	4240
30..	185	C 20	9990	--	--	--	164	C 10	4430
31..	212	C 20	11400	--	--	--	162	C 10	4370
Total	4669	--	138640	4292	--	196290	4601	--	110110

C Composite period.

K Expressed in thousands.

COLUMBIA RIVER MAIN STEM--Continued

14-1447. COLUMBIA RIVER AT VANCOUVER, WASH.--Continued

Suspended sediment, water year October 1966 to September 1967--Continued

Day	APRIL			MAY			JUNE		
	Mean discharge (K cfs)	Suspended sediment		Mean discharge (K cfs)	Suspended sediment		Mean discharge (K cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	173	12	5610	145	C 15	5870	463	85	106000
2..	171	12	5540	145	C 15	5870	487	94	119000
3..	154	C 14	5820	148	C 15	5990	483	95	124000
4..	150	C 14	5670	142	16	6130	517	96	134000
5..	148	C 14	5590	146	17	6700	539	96	140000
6..	145	C 14	5480	137	17	6290	551	97	144000
7..	149	C 14	5650	147	18	7140	572	109	188000
8..	153	15	6200	142	C 19	7280	608	120	197000
9..	162	15	6560	152	19	7800	620	132	221000
10..	151	C 15	6120	175	C 19	8980	640	138	238000
11..	155	C 15	6280	182	C 19	9340	640	144	249000
12..	146	C 15	5910	230	C 19	11800	630	150	255000
13..	164	C 15	6640	222	22	13200	630	118	201000
14..	171	C 15	6930	217	25	14600	630	85	145000
15..	154	16	6650	199	28	15000	637	102	175000
16..	135	17	6200	189	27	13800	638	118	203000
17..	144	C 18	7000	212	26	14900	630	105	179000
18..	146	C 18	7100	227	30	18400	630	92	156000
19..	190	C 18	9230	239	34	21900	630	80	136000
20..	186	C 18	9040	252	44	29900	640	84	145000
21..	181	C 18	8800	288	56	43500	640	86	149000
22..	166	18	8070	311	66	55400	630	90	153000
23..	136	19	6980	340	74	67900	630	90	153000
24..	143	C 19	7340	400	82	88600	620	90	151000
25..	163	C 19	8360	456	93	115000	620	90	151000
26..	189	C 19	9700	467	104	131000	630	91	155000
27..	164	C 19	8410	464	91	114000	630	91	155000
28..	169	C 19	8670	422	78	88900	630	91	155000
29..	166	17	7620	445	65	78100	620	91	152000
30..	159	17	7300	453	70	85600	610	93	153000
31..	--	--	--	462	76	94800	--	--	--
Total	4783	--	210450	8156	--	1193690	18055	--	4962000
Day	JULY			AUGUST			SEPTEMBER		
	Mean discharge (K cfs)	Suspended sediment		Mean discharge (K cfs)	Suspended sediment		Mean discharge (K cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	590	83	132000	198	C 17	9090	151	8	3260
2..	577	73	114000	224	C 17	10300	128	8	2760
3..	563	62	94200	242	C 17	11100	117	8	2530
4..	537	51	73900	237	C 17	10900	110	C 8	2380
5..	529	40	57100	248	15	10000	116	C 8	2510
6..	495	44	58800	235	14	8880	120	C 8	2590
7..	488	48	63200	210	13	7370	108	C 8	2330
8..	494	40	53400	201	C 12	6510	108	C 8	2330
9..	461	32	39800	201	C 12	6510	129	9	3130
10..	448	24	29000	194	C 12	6290	126	9	3060
11..	431	24	27900	177	C 12	5730	130	C 10	3510
12..	408	25	27500	153	12	4960	118	C 10	3190
13..	385	25	26000	152	12	4920	130	C 10	3510
14..	370	25	25000	160	12	5180	129	C 10	3480
15..	360	25	24300	171	11	5080	128	C 10	3460
16..	362	24	23500	158	C 10	4270	131	10	3540
17..	344	C 23	21400	180	C 10	4860	130	10	3510
18..	324	C 23	20100	176	C 10	4750	114	C 10	3080
19..	314	C 23	19500	192	10	5180	111	C 10	3000
20..	319	C 23	19800	158	10	4270	139	C 10	3750
21..	306	C 23	19000	172	C 10	4640	134	C 10	3620
22..	293	21	16600	184	C 10	4970	139	C 10	3750
23..	286	19	14700	177	C 10	4780	140	10	3780
24..	272	C 18	13200	161	C 10	4350	120	10	3240
25..	269	C 18	13100	119	C 10	3210	123	C 10	3320
26..	265	C 18	12900	140	10	3780	126	C 10	3400
27..	277	C 18	13500	140	10	3780	134	C 10	3620
28..	267	C 18	13000	150	C 10	4050	99.0	C 10	2670
29..	270	18	13100	150	C 10	4050	120	C 10	3240
30..	265	17	12200	174	C 10	4700	120	10	3240
31..	231	C 17	10600	177	C 10	4780	--	--	--
Total	11800	--	1102300	5611	--	183240	3728	--	94790
Total discharge for year (K cfs-days)..... 76101.3									
Total load for year (tons)..... 8474870									

C Composite period.  
K Expressed in thousands.

## WILLAMETTE RIVER BASIN

14-1448. MIDDLE FORK WILLAMETTE RIVER NEAR OAKRIDGE, OREG.

LOCATION (revised).--Lat 43°35'50", long 122°27'20", temperature recorder at gaging station on right bank, 0.2 mile upstream from Windfall Creek, 8.3 miles upstream from Hills Creek Dam, 10 miles south of Oakridge, Lane County, and at mile 240.8. Prior to June 1967, at site 0.5 mile upstream.

DRAINAGE AREA.--258 square miles, including those of Gold and Buck Creeks.

RECORDS AVAILABLE.--Water temperatures: October 1958 to January 1959, September 1959 to September 1967.

EXTREMES, 1966-67.--Water temperatures: Maximum, 70° F on several days during July and August; minimum, 36° F Jan. 5, Mar. 4, 12.

EXTREMES, 1965-66.--Water temperatures: Maximum, 70° F Aug. 1-3, 1966, on several days during July and August 1967; minimum, 39° F Dec. 19, 1965, during January and February.

REMARKS.--Recorder stopped May 1-19; temperature range, 39° F to 85° F.

Temperature (°F) of water, water year October 1966 to September 1967

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



## WILLAMETTE RIVER BASIN--Continued

14-1455. MIDDLE FORK WILLAMETTE RIVER ABOVE SALT CREEK, NEAR OAKRIDGE, OREG.

LOCATION.--Lat 43°43'20", long 122°26'15", temperature recorder at gaging station on right bank, 90 feet upstream from highway bridge, 0.4 mile upstream from Salt Creek, 1.1 miles downstream from Hills Creek Dam, 2.3 miles southeast of Oakridge, Lane County, and at mile 231.4.

DRAINAGE AREA.--382 square miles.

TEMPERATURES.--Water temperatures: Maximum, 59°F Oct. 3, 9.10.

EXTREMES, 1966-67.--Water temperatures: Maximum, 77°F Sept. 4, 1966; minimum (1960-61, 1962-66), 35°F Jan. 4, 1961.

EXTREMES, 1960-67.--Water temperatures: Maximum, 77°F Sept. 4, 1966; minimum (1960-61, 1962-66), 35°F Jan. 4, 1961.

Temperature (°F) of water, water year October 1966 to September 1967

Month	Day																															Average		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31			
October	58	59	59	58	58	58	58	59	57	57	57	58	58	57	57	57	56	56	56	56	55	55	55	55	55	55	55	55	55	55	55	56		
Maximum	57	57	58	58	58	58	58	59	57	57	57	58	58	57	57	57	56	56	56	56	55	55	55	55	55	55	55	55	55	55	56			
Minimum	55	55	55	54	54	54	53	52	52	52	52	52	52	52	51	51	51	51	51	51	51	51	50	50	50	50	49	49	49	49	51			
November	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
Maximum	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
Minimum	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
December	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
Maximum	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
Minimum	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
January	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
Maximum	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
Minimum	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
February	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
Maximum	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
Minimum	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
March	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
Maximum	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
Minimum	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
April	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
Maximum	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
Minimum	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
May	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
Maximum	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
Minimum	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
June	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
Maximum	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
Minimum	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
July	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
Maximum	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
Minimum	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
August	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
Maximum	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
Minimum	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
September	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
Maximum	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
Minimum	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
October	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
Maximum	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
Minimum	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
November	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
Maximum	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
Minimum	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
December	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
Maximum	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
Minimum	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
January	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
Maximum	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
Minimum	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
February	49	49	49	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47			
Maximum	49	49	49	48	48	48	48	4																										

































14-1655. MCKENZIE RIVER NEAR COBURG, OREG.  
 LOCATION (revised).--Lat 44°06'45", long 123°02'45", temperature recorder at gaging station on left bank, at downstream side of  
 Bridge 200 feet upstream of Coburg, Lane County, and at mile 7.1.  
 DRAINAGE AREA 337 square miles.  
 RECORDS AVAILABLE.--Water temperatures: October 1963 to September 1967.  
 EXTREMES AVAILABLE.--Water temperatures: Maximum, 67°F July 3, 4; minimum, 43°F on several days during December to March.  
 EXTREMES, 1963-67.--Water temperatures: Maximum (1963-65, 1966-67), 67°F on several days during July of most years; minimum,  
 35°F Dec. 17, 18, 1964.  
 REMARKS.--Prior to October 1966, temperature recorder at site on right bank 200 feet downstream from gaging station.

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

## WILLAMETTE RIVER BASIN--Continued

14-1660. WILLAMETTE RIVER AT HARRISEBURG, OREG.

LOCATION--Lat 44°16'05" N, Long 123°10'20" W; temperature recorder on right bank, 600 feet downstream from gaging station at bridge on U. S. Highway 99 at Harriessburg, Linn County, and at mile 161.2.

DRAINAGE AREA--3,420 square miles, approximately.

RECORDS AVAILABLE--Water temperatures: June 1961 to September 1967.

EXTREMES, 1966-67.--Water temperatures: Maximum, 67°F on several days during August and September; minimum, 42°F Mar. 12, 13.

EXTREMES, 1961-67.--Water temperatures: Maximum, 69°F July 12, 13, 1961, July 16, 17, 1965; minimum, 36°F Jan. 21-24, 1962, Jan. 12, 13, 1963.

REMARKS.--Recorder stopped Apr. 25 to June 9; temperature range, 48°F to 61°F.

Temperature (°F) of water, water year October 1966 to September 1967

Month	Day																															Average		
	Temperature (°F)																															Average		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31			
October	60	59	59	59	58	58	58	57	57	56	56	56	56	55	55	55	55	55	53	53	53	52	54	54	55	55	55	54	54	55				
Maximum	60	59	59	59	58	58	58	57	57	56	56	56	56	55	55	55	55	55	53	53	53	52	54	54	55	55	55	54	54	55				
Minimum	59	59	59	59	58	58	57	56	56	56	56	56	55	55	55	55	55	55	53	53	53	51	51	52	53	54	54	54	55					
November	55	55	55	54	53	52	52	52	52	51	50	51	51	51	51	50	50	50	50	50	50	50	49	49	48	48	48	48	48					
Maximum	55	55	55	54	53	52	52	52	52	51	50	51	51	51	51	50	50	50	50	50	50	50	49	49	48	48	48	48	48					
Minimum	55	55	53	53	52	52	52	52	51	50	50	51	51	51	50	50	50	50	50	50	50	49	49	48	48	48	48	48	48					
December	47	47	47	47	46	45	45	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44					
Maximum	47	47	47	47	46	45	45	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44					
Minimum	47	47	47	47	46	45	45	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44					
January	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44					
Maximum	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44					
Minimum	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44					
February	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44					
Maximum	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44					
Minimum	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44					
March	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44					
Maximum	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44					
Minimum	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44					
April	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44					
Maximum	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44					
Minimum	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44					
May	46	48	49	50	50	49	50	50	50	50	50	50	49	47	48	46	46	46	46	46	46	46	47	47	47	47	47	47	47					
Maximum	46	48	49	50	50	49	50	50	50	50	50	50	49	47	48	46	46	46	46	46	46	47	47	47	47	47	47	47	47					
Minimum	46	48	49	50	50	49	50	50	50	50	50	50	49	47	48	46	46	46	46	46	46	47	47	47	47	47	47	47	47					
June	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44					
Maximum	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44					
Minimum	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44					
July	64	65	66	66	65	64	62	62	62	62	63	64	64	64	64	63	63	63	62	62	63	63	63	63	63	63	63	63	63					
Maximum	64	65	66	66	65	64	62	62	62	62	63	64	64	64	64	63	63	63	62	62	63	63	63	63	63	63	63	63	63					
Minimum	63	64	65	64	63	62	61	61	62	62	63	63	63	62	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61					
August	65	65	65	65	65	65	65	65	65	65	65	66	67	67	67	67	67	67	67	67	67	67	66	66	66	66	66	66	66					
Maximum	65	65	65	65	65	65	65	65	65	65	65	66	67	67	67	67	67	67	67	67	67	67	66	66	66	66	66	66	66					
Minimum	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64					
September	67	65	64	64	63	63	63	62	61	61	61	61	61	61	61	61	61	61	61	61	61	61	60	60	60	60	60	60						
Maximum	67	65	64	64	63	63	63	62	61	61	61	61	61	61	61	61	61	61	61	61	61	61	60	60	60	60	60	60	60					
Minimum	65	64	64	63	63	63	62	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	60	60	60	60	60	60	60					



WILLAMETTE RIVER BASIN--Continued  
14-1720. CALAPOOIA RIVER AT HOLLEY, OREG.

LOCATION.--Lat 44°21'05". Long 122°47'10". Temperature recorder at gaging station on right bank, 0.3 mile southwest of Holley, Linn County, 5.0 miles upstream from Brush Creek, and at mile 45.4.  
DRAINAGE AREA.--105 square miles.  
RECORDS AVAILABLE.--Water temperatures: October 1963 to September 1967.  
EXTREMES, 1966-67.--Water temperatures: Maximum, 83°F July 3, 1967; minimum, freezing point Dec. 19, 20, 1965.  
REMARKS.--Recorder stopped Jan. 25, 26; temperature range, 43°F to 45°F.

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













14-1859. QUARTZVILLE CREEK NEAR CASCADIA, OREG.  
 LOCATION.--Lat 44°32'25", long 122°26'05", temperature recorder at gaging station on right bank, 80 feet downstream from Panther  
 Creek, 0 mile 68 north of Cascadia, Linn County, and at mile 6.6.  
 DRAINAGE AREA, 2,000 acres.  
 RECORDS AVAILABLE.--Water temperatures: August 1963 to November 1964, October 1965 to September 1967.  
 EXTREMES, 1963-67.--Water temperatures: Maximum, 74°F on several days during July and August; minimum, 35°F Feb. 15.  
 EXTREMES, 1963-64, 1965-67.--Water temperatures: Maximum, 74°F on several days during July and August 1967; minimum, 33°F Dec. 17,  
 18, 20, 1965.

Month	Day																															Average			
	Temperature (°F) of water, water year October 1966 to September 1967																																		
	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	1	2	3	
October	57	59	57	57	58	57	56	59	55	54	52	50	50	47	48	49	50	48	47	46	43	47	48	49	49	49	50	49	50	49	51	51	49	50	49
Maximum	53	55	52	52	53	53	53	50	49	50	47	45	43	43	44	43	42	43	42	43	42	43	42	43	43	43	44	45	46	45	47	46	47	45	
Minimum	50	49	48	47	46	46	44	45	47	47	47	47	45	44	44	45	46	46	44	43	42	42	43	43	43	44	45	46	45	46	45	44	45	44	
November	48	47	45	44	45	45	45	42	42	43	45	45	45	45	44	43	43	43	45	44	43	42	41	40	41	42	41	42	43	45	45	42	43	45	
Maximum	46	45	44	44	44	41	40	39	39	41	41	42	42	42	42	41	41	42	42	41	40	41	40	41	42	42	42	41	41	41	41	41	41	41	
Minimum	43	44	44	40	39	40	38	36	39	40	41	42	41	40	39	40	41	41	40	39	39	41	41	40	40	40	40	40	40	40	40	40	40	40	
December	41	41	42	43	38	39	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	
Maximum	41	40	41	39	38	38	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	
Minimum	42	44	44	43	44	44	43	44	43	44	43	44	43	39	38	39	41	41	43	42	42	43	43	43	42	43	44	43	44	43	43	43	42	43	
January	41	42	41	41	42	40	40	40	40	42	42	41	41	39	36	35	37	39	40	39	38	38	39	39	42	40	41	41	41	41	41	41	41	41	
Maximum	40	38	37	37	37	38	38	40	38	37	38	37	38	39	39	41	41	40	40	41	42	43	41	41	41	41	42	41	42	42	42	42	42	42	
Minimum	39	39	40	42	42	42	42	42	43	43	41	41	41	42	42	40	39	41	40	39	40	39	40	40	40	40	40	40	40	40	40	40	40	40	
February	42	44	44	43	44	43	44	43	44	43	44	43	39	38	39	41	41	43	42	42	43	43	43	43	42	43	44	43	44	43	43	43	42	43	
Maximum	42	40	41	41	42	43	43	44	43	44	41	40	41	40	42	43	42	43	42	43	42	45	45	45	44	45	45	44	42	42	42	42	42	42	
Minimum	40	38	37	37	37	38	38	40	38	37	38	37	38	39	39	41	41	40	40	41	42	43	41	41	41	42	41	42	41	41	41	41	41	41	
March	54	58	46	46	46	45	47	45	45	46	45	46	41	43	42	42	42	42	45	46	46	47	45	46	47	45	46	45	44	44	44	44	44	44	
Maximum	39	39	40	42	42	42	42	42	42	43	41	43	40	39	39	39	40	39	41	42	41	42	41	43	42	40	40	41	42	42	42	42	42	42	
Minimum	46	48	49	49	50	49	51	48	44	44	45	49	50	51	51	50	49	51	52	53	53	50	50	51	52	51	50	48	46	46	46	46	46	46	
Maximum	43	41	43	44	43	45	44	44	44	44	42	41	42	41	43	44	45	44	45	46	46	47	46	46	45	46	47	46	43	42	44	44	44	44	
Minimum	49	51	53	54	53	52	52	50	50	50	50	52	55	58	59	60	61	62	64	63	60	57	64	66	69	69	70	70	70	70	70	70	70	70	
Maximum	44	45	47	48	49	50	50	49	49	48	50	50	49	49	49	50	52	54	56	57	59	60	57	55	52	50	48	47	46	43	42	44	44	44	
Minimum	72	73	74	74	74	71	70	68	70	72	73	72	71	70	70	69	67	67	69	71	71	72	72	70	66	69	70	69	69	70	70	70	70	70	
Maximum	62	65	66	65	64	62	61	61	59	60	62	65	64	61	62	61	61	62	60	62	63	64	64	62	62	63	63	63	63	63	62	62	62	62	
Minimum	68	69	69	68	70	69	70	72	73	73	74	74	74	74	74	74	74	74	74	74	72	72	71	69	70	71	72	72	72	73	73	73	73	73	
Maximum	63	63	62	63	62	64	63	62	64	67	66	65	64	65	65	66	67	66	66	64	64	62	61	63	62	62	62	62	62	62	62	62	62	62	
Minimum	73	73	72	71	68	70	68	67	64	62	62	62	66	67	66	65	65	62	64	65	66	67	64	63	63	63	63	63	63	63	63	63	63	63	
Maximum	64	63	63	63	64	64	64	60	61	60	61	60	61	60	59	59	59	59	59	59	59	58	57	58	57	58	58	58	58	58	58	58	58	58	
Minimum	64	63	63	63	64	64	64	60	61	60	61	60	61	60	59	59	59	59	59	59	59	58	57	58	57	58	58	58	58	58	58	58	58	58	









## WILLAMETTE RIVER BASIN--Continued

14-1900. LUCKIAMUTE RIVER AT PEDEE, OREG.

LOCATION.--Lat 44°44'35", long 123°25'25", temperature recorder at gaging station on left bank, 0.5 mile downstream from Pedee Creek, 1.0 mile southwest of Pedee, Polk County, and at mile 29.7.

DRAINAGE AREA.--115 square miles.

RECORDS AVAILABLE.--Water temperatures: March 1964 to September 1967.

EXTREMES, 1966-67.--Water temperatures: Minimum, 40°F Mar. 11.

EXTREMES, 1964-67.--Water temperatures: Maximum (1964-66), 73°F July 29, Aug. 1-3, 1966; minimum, 38°F Dec. 20, 21, 1965.

Month	Temperature (°F) of water, water year October 1966 to September 1967																															Average			
	Day																																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31				
October																																			
Maximum	61	60	59	57	57	58	59	58	54	53	53	52	50	50	50	50	50	50	48	49	47	47	48	48	51	53	54	56	53	53	52	53	54		
Minimum	57	58	56	55	56	56	58	53	54	53	52	50	49	49	48	49	48	49	47	47	48	48	48	51	53	53	53	53	52	52	52	53	52		
November																																			
Maximum	54	52	51	48	48	48	48	45	46	47	48	48	49	49	49	49	49	49	49	49	49	49	49	46	46	45	45	45	46	46	46	46	46		
Minimum	52	51	48	47	48	48	45	45	45	46	47	48	48	49	49	49	49	49	49	49	49	49	46	46	45	45	45	45	45	45	45	45	45		
December																																			
Maximum	46	46	46	46	46	46	46	45	45	46	47	47	48	48	48	48	48	48	48	48	48	48	46	44	44	44	44	44	44	44	44	44	44		
Minimum	46	46	46	46	46	46	45	45	45	46	47	47	48	48	48	48	48	48	48	48	48	48	46	44	44	44	44	44	44	44	44	44	44		
January																																			
Maximum	45	45	46	46	46	46	44	44	44	45	45	46	46	46	46	46	46	46	46	46	46	45	44	44	44	44	44	44	44	44	44	44	44		
Minimum	45	45	46	46	46	46	44	44	44	45	45	46	46	46	46	46	46	46	46	46	46	45	44	44	44	44	44	44	44	44	44	44	44		
February																																			
Maximum	45	45	45	45	45	44	43	43	44	45	45	45	46	46	46	46	46	46	46	46	46	45	44	44	44	44	44	44	44	44	44	44	44		
Minimum	45	45	44	44	44	43	43	43	43	44	45	45	45	46	46	46	46	46	46	46	46	45	44	44	44	44	44	44	44	44	44	44	44		
March																																			
Maximum	44	44	43	42	42	43	43	43	43	42	41	41	42	42	42	43	44	44	44	44	44	44	45	45	45	45	45	45	45	45	45	45	45	45	
Minimum	44	43	42	41	41	42	42	42	42	41	40	41	41	42	42	43	44	44	44	44	44	43	43	43	43	43	43	43	43	43	43	43	43	43	
April																																			
Maximum	45	45	45	45	45	46	48	48	48	48	48	48	48	47	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	
Minimum	43	43	44	45	45	44	46	48	48	47	46	47	47	45	44	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	
May																																			
Maximum	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Minimum	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
June																																			
Maximum	56	59	60	62	63	63	61	59	58	57	57	59	63	66	68	69	70	71	69	65	65	66	66	69	68	69	71	72	72	72	72	72	72		
Minimum	55	55	56	58	59	61	59	58	56	55	56	57	58	61	63	64	65	66	67	64	63	62	62	63	63	63	63	63	63	63	63	63	63		
July																																			
Maximum	72	74	76	75	73	72	71	71	70	70	71	70	70	69	69	70	70	70	69	67	66	66	67	67	67	67	67	67	67	67	67	67	67		
Minimum	65	68	68	68	67	66	64	66	63	64	63	65	62	62	62	62	63	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	
August																																			
Maximum	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Minimum	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
September																																			
Maximum	66	68	68	67	68	70	68	66	66	63	64	63	62	62	63	63	62	64	63	62	64	65	65	62	61	61	62	61	62	61	62	60	59		
Minimum	62	63	62	61	60	64	59	58	61	61	58	56	56	56	58	58	56	58	60	59	60	60	60	56	55	57	56	56	56	56	56	56	56		

14-1910. WILLAMETTE RIVER AT SALEM, OREG.  
(Irrigation network station)

LOCATION ---Lat 44°56'40", long 123°02'30", at bridge on State Highway 22, 300 feet downstream from gaging station at Salem, Marion County.  
RECORDS ---28 sq. miles, approximately December 1910, August 1911 to August 1912, February 1951 to September 1967.

RECORDS WILLAMETTE Channel  
Water temperatures: February 1951 to September 1967

EXTREMES 1956-67. ---Dissolved solids: maximum, 78 ppm Dec. 29-31; minimum, 38 ppm May 18 to June 2.

Hardness: Maximum, 24 ppm Dec. 29-31, Feb. 7-17, June 3; minimum, 16 ppm Nov. 12-21.

Specific conductance: Maximum daily, 116 microhos June 3; minimum daily, 44 microhos Nov. 16.

Water temperatures: Maximum, 75°F July 3, 4, Aug. 16, 17; minimum, 43°F Jan. 8-10, 24, 25.

EXTREMES 1951-67. ---Dissolved solids: maximum, 124 ppm Dec. 10, 1965; minimum, 36 ppm Sept. 15, 1966.

Hardness: Maximum, 36 ppm Dec. 10, 1965; minimum, 12 ppm Dec. 1966-28, 1964.

Specific conductance: Maximum, 144 microhos Sept. 15, 1966; minimum, 44 microhos daily, 30 microhos Jan. 29, 1965.

Water temperatures: Maximum, 78°F July 22, 1959; minimum, freezing point on several days during February 1956.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> ) (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>		Sodium adsorption ratio	Specific conductance (microhos at 25°C)	
													Parts per million	Tons per acre-foot	Calcium, Magnesium	Non-carbonate			Tons per day
Oct. 1-31, 1966.	11010	14		5.4	1.8	4.4	0.7	30	3.2	3.0	0.2	1.6	0.01	56	0.08	21	0	0.4	64
Nov. 1-11, .....	11090	---		5.7	1.9	4.3	---	28	---	---	---	---	---	65	.09	22	0	.4	68
Nov. 12-21, .....	50220	---		4.3	3.0	---	---	22	---	---	---	---	---	59	.08	16	0	.3	49
Nov. 22-Dec. 4, .....	34160	---		5.1	1.7	3.4	---	20	---	---	---	---	---	51	.07	20	3	.3	58
Dec. 5-15, .....	66640	---		4.7	1.7	3.1	---	20	---	---	---	---	---	53	.07	18	1	.3	55
Dec. 16-28, .....	36820	---		5.8	2.0	3.5	---	18	---	---	---	---	---	54	.07	22	7	.3	63
Dec. 29-31, .....	19630	---		6.0	2.1	3.7	---	23	---	---	---	---	---	78	.11	24	5	.3	73
Jan. 1-11, 1967.	26590	---		5.4	1.8	3.6	---	18	---	---	---	---	---	63	.09	21	6	.3	64
Jan. 12-31, .....	60930	12		4.7	1.6	3.1	1.7	20	4.8	3.0	1.1	1.0	.01	46	.06	18	1	.3	53
Feb. 1-6, .....	63030	---		4.6	1.6	3.1	---	20	---	---	---	---	---	41	.06	18	1	.3	52
Feb. 7-17, .....	23040	---		5.9	2.2	3.8	---	18	---	---	---	---	---	65	.09	24	9	.3	70
Feb. 18-30, .....	40830	---		4.5	1.5	3.2	---	18	---	---	---	---	---	42	.06	17	2	.3	53
Feb. 21-Mar. 20, .....	19860	---		5.7	2.0	3.7	---	18	---	---	---	---	---	52	.07	22	7	.3	68
Mar. 21-Apr. 17, .....	17160	14		5.5	1.8	3.9	1.9	18	6.0	4.0	1.1	1.6	.00	45	.06	20	6	.4	69
Apr. 18-May 8, .....	15200	---		5.7	1.9	4.0	---	20	---	---	---	---	---	58	.08	22	5	.4	67
May 9, .....	14850	---		5.8	1.9	4.0	---	12	---	---	---	---	---	76	.10	24	12	.4	89
May 10-17, .....	14250	---		5.3	1.8	3.9	---	22	---	---	---	---	---	66	.09	20	2	.4	67
May 18-June 2, .....	14040	---		4.9	1.6	3.6	---	26	---	---	---	---	---	38	.05	18	0	.4	56
June 3, .....	12600	---		6.5	2.0	4.0	---	50	---	---	---	---	---	73	.10	24	0	.4	113
June 4-28, .....	8775	---		5.8	1.9	4.3	---	26	---	---	---	---	---	47	.06	22	0	.4	69
Sept. 22-30, .....	7247	---		5.7	1.9	4.4	---	28	---	---	---	---	---	45	.06	22	0	.4	66
Weighted average.....	---	---		5.1	1.8	3.5	---	21	---	---	---	---	---	52	0.07	20	3	0.3	60
Time-weighted average.....	A20450	---		5.4	1.8	3.8	---	22	---	---	---	---	---	53	---	21	3	0.4	64
Tons per day....	---	---		344	117	234	---	1380	---	---	---	---	---	---	---	---	---	---	---

A Mean discharge based on 365 days; mean discharge for 281 days of chemical analyses, 24,737 cfs.

WILLAMETTE RIVER BASIN—Continued  
 14-1910. WILLAMETTE RIVER AT SALEM, OREG.—Continued  
 Specific conductance (micromhos at 25°C), water year October 1965 to September 1966

Day	October	November	December	January	February	March	April	May	June	July	August	September
1.....	70	66	63	64	50	70	68	65	57			
2.....	69	65	63	74	49	70	--	65	56			
3.....	66	67	66	74	50	69	70	65	116			
4.....	63	67	65	68	52	69	70	71	64			
5.....	63	80	57	60	55	69	70	73	66			
6.....	64	71	56	58	57	70	67	68	64			
7.....	64	68	59	61	61	70	67	67	63			
8.....	63	68	57	61	62	73	69	66	62			
9.....	62	67	62	54	67	77	69	89	63			
10.....	63	67	62	63	72	68	69	61	63			
11.....	64	65	55	63	75	67	72	61	69			
12.....	66	50	55	56	72	71	73	65	69			
13.....	65	46	49	56	76	75	84	65	69			
14.....	64	47	49	49	76	73	70	66	70			
15.....	64	47	48	48	75	68	75	70	72			
16.....	65	44	--	49	78	71	77	75	71			
17.....	49	49	62	54	71	71	76	69	71			
18.....	65	51	62	54	72	65	65	58	72			
19.....	61	58	61	58	48	63	66	58	72			
20.....	66	53	51	56	57	63	66	56	72			
21.....	64	55	61	52	63	64	72	56	72			
22.....	65	51	65	51	64	64	69	56	75			65
23.....	56	57	67	54	65	68	71	55	65			67
24.....	57	56	69	55	66	64	63	53	63			61
25.....	58	54	61	63	66	80	66	53	63			65
26.....	66	55	61	59	65	65	66	54	66			65
27.....	63	52	65	57	49	67	65	56	69			67
28.....	66	53	69	50	71	66	62	58	71			72
29.....	61	58	82	29	48	--	71	64	58			67
30.....	65	--	73	49	69	69	69	57	57			71
31.....	66	--	80	50	--	69	--	57	--			--
Average	64	58	62	56	63	68	69	62	68			--











## WILLAMETTE RIVER BASIN--Continued

LOCATION --Lat 45°14'40", long 122°41'10", temperature recorder at gaging station on left bank at upstream side of Good's Bridge, 1.5 miles south of Canby, Clackamas County, and at mile 6.01.

DRAINAGE AREA --323 square miles.

RECORDS AVAILABLE --water temperatures: January 1964 to September 1967.  
 EXTREMES, 1964-67 --water temperatures: Maximum, 81°F sometime during period Aug. 10 to Sept. 20; minimum, 39°F Mar. 12.  
 EXTREMES, 1964-67 --water temperatures: Maximum, 81°F sometime during period Aug. 10 to Sept. 20, 1967; minimum, 34°F Dec. 17-19, 1964.

REMARKS --Recorder stopped Aug. 10 to Sept. 20; temperature range, 95°F to 81°F.

Month	Day																															Average		
	Temperature (°F) of water, water year October 1966 to September 1967																																	
	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	67	65	65	66	65	65	64	64	61	61	60	58	56	55	55	56	56	55	54	53	54	56	56	54	54	54	55	55	55	57	58			
Maximum	63	64	62	61	62	62	63	60	58	60	58	54	54	53	54	53	52	53	50	52	54	54	54	54	54	54	54	54	54	55	56			
Minimum	57	55	54	53	52	51	50	50	49	50	49	50	49	49	49	49	49	49	49	49	47	47	47	47	47	47	47	47	47	49				
November	54	54	52	51	52	51	50	49	49	49	49	49	49	49	49	48	49	49	49	47	47	45	46	47	46	46	47	47	47	48				
Maximum	49	49	49	47	46	46	45	45	46	46	47	47	47	46	46	45	46	46	46	46	44	43	44	44	44	44	44	44	44	45				
Minimum	49	49	47	46	46	45	44	44	43	46	46	46	45	45	44	43	43	43	43	43	42	42	43	44	43	43	43	43	43	44				
December	43	43	43	43	42	41	41	41	42	43	43	43	44	44	44	43	43	43	43	43	42	42	42	42	42	42	42	42	42	42				
Maximum	44	45	45	44	44	43	43	44	44	44	44	44	44	44	44	44	44	44	44	44	43	43	43	43	43	43	43	43	43	43				
Minimum	43	44	43	44	43	41	42	42	43	44	43	43	43	43	42	42	42	42	42	42	41	41	41	41	41	41	41	41	41	42				
January	45	46	43	42	43	44	44	44	43	42	43	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44				
Maximum	43	42	41	40	40	40	40	41	40	41	42	43	43	43	43	43	42	42	42	42	42	42	42	42	42	42	42	42	42	42				
Minimum	44	44	43	44	43	41	42	42	43	44	43	43	43	43	43	43	42	42	42	42	42	42	42	42	42	42	42	42	42	42				
February	44	45	45	44	44	43	43	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44				
Maximum	43	44	43	44	43	41	42	42	43	44	43	43	43	43	43	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42				
Minimum	44	44	43	44	43	41	42	42	43	44	43	43	43	43	43	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42				
March	45	46	43	42	43	44	44	44	43	42	43	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44				
Maximum	43	42	41	40	40	41	40	41	40	39	42	42	42	42	42	42	42	42	42	42	41	41	41	41	41	41	41	41	41	42				
Minimum	46	48	50	48	47	50	47	50	48	47	50	48	47	45	48	47	45	49	50	52	52	52	53	54	52	49	48	50	51	49				
April	42	43	44	46	45	44	45	47	46	46	44	46	45	42	44	43	45	44	45	46	47	47	49	49	46	46	46	46	47	45				
Maximum	51	52	53	53	56	56	57	56	55	50	51	52	56	57	60	60	58	56	59	61	61	60	58	58	60	59	57	56	54	53				
Minimum	48	49	49	50	51	52	51	52	49	47	48	50	52	54	52	54	52	55	55	54	54	55	55	54	55	55	54	51	50	51				
May	58	62	63	65	66	65	62	61	60	60	66	66	68	71	73	74	75	76	74	66	66	67	66	67	64	67	73	74	74	67				
June	50	55	56	57	59	60	59	58	57	58	57	58	60	62	64	66	67	68	68	66	64	61	59	64	67	68	67	66	66	61				
Maximum	76	79	80	79	78	76	75	72	74	76	78	76	74	76	76	74	76	74	77	77	77	77	75	77	77	75	77	77	75	76				
Minimum	67	70	70	69	68	66	67	65	66	68	70	69	68	68	68	68	68	68	68	67	66	66	66	66	66	65	67	65	67	69	67			
August	76	77	78	77	74	72	72	75	78																									
Maximum	67	67	68	67	67	67	65	67																										
Minimum	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
September	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
Maximum	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---			
Minimum	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---			

14-2003. SILVER CREEK AT SILVERTON, OREG.

LOCATION.--Lat 45°00'34", Long 122°47'15", temperature recorder at gaging station on right bank, 300 feet downstream from railroad bridge in Silvertown, Marion County, and at mile 3.4.

DRAINAGE AREA.--47.9 square miles.

RECORDS AVAILABLE.--Water temperatures: October 1963 to September 1967.

EXTREMES, 1966-67.--Water temperatures: Maximum, 82°F Aug. 16; minimum, 37°F Feb. 20, Mar. 4, 11, 12.

REMARKS.--Water temperatures: Maximum, 82°F Aug. 16, 1967; minimum, 35°F Dec. 17, 18, 1964, and on several days during December 1965.--Recorder stopped Nov. 10 to Dec. 8; temperature range, 43°F to 52°F.

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

WILLAMETTE RIVER BASIN--Continued  
14--2035. TUALATIN RIVER NEAR DILLEY, OREG.

LOCATION--Lat 45°28'30", long 123°07'23", temperature recorder at gaging station on left bank, 5 feet upstream from highway bridge, 1.0 mile south of Dilley, Washington County, and at mile 58.81.

DRAINAGE AREA--125 square miles.

WATER TEMPERATURES--Water temperatures: November 1963 to September 1967.

EXTREMES, 1964-67.--Water temperatures: Maximum, 41°; Minimum, 41°; W. Y.

EXTREMES, 1963-67.--Water temperatures: Maximum (1963-66), 83°; Minimum, 36°; Nov. 21, 22, Dec. 21, 22, 1964.

Temperature (°F) of water, water year October 1966 to September 1967

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	62	64	64	66	64	58	60	62	60	60	54	52	53	50	54	50	53	54	50	50	48	49	52	53	52	53	51	52	51	51	53	55		
Maximum	55	57	50	54	52	54	58	51	48	48	50	48	46	46	46	44	46	44	46	46	46	48	49	51	50	50	50	49	50	51	49			
Minimum	50	50	51	51	49	48	46	45	44	45	47	47	47	48	48	48	48	48	48	48	48	48	48	46	46	46	46	46	46	47	47			
November	46	49	47	46	47	46	44	41	43	44	45	46	46	47	48	48	48	48	48	48	48	48	46	46	46	46	46	46	47	47				
Maximum	48	48	47	47	47	46	46	45	44	44	44	45	47	47	47	47	47	47	47	47	47	47	47	46	46	46	46	46	46	46	46			
Minimum	46	47	47	47	46	46	45	44	43	44	44	45	47	47	47	47	47	47	47	47	47	47	46	46	46	46	46	46	46	46	46			
December	45	45	45	45	45	43	43	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	43	43	43	43	43	43	43	43	43			
Maximum	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44		
Minimum	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44		
January	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44		
February	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44		
Maximum	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	
Minimum	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	
March	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	
Maximum	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43
Minimum	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43
April	45	45	47	47	45	46	47	47	45	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47
Maximum	42	43	44	45	45	43	45	45	45	45	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44
Minimum	48	48	46	49	51	53	53	54	54	54	53	54	55	57	60	61	60	62	62	61	60	62	61	57	55	55	58	57	58	58	56	56	55	54
Maximum	47	48	48	48	49	51	53	53	54	52	52	53	54	55	57	58	58	58	59	57	55	54	52	54	52	54	52	54	55	56	56	55	54	53
Minimum	48	48	48	48	49	51	53	53	54	52	52	53	54	55	57	60	61	60	62	61	60	62	61	57	55	55	58	57	58	58	56	56	55	54
June	48	48	48	48	49	51	53	53	54	52	52	53	54	55	57	58	58	58	59	57	55	54	52	54	52	54	52	54	55	56	56	55	54	
Maximum	48	48	48	48	49	51	53	53	54	52	52	53	54	55	57	58	58	58	59	57	55	54	52	54	52	54	52	54	55	56	56	55	54	
Minimum	48	48	48	48	49	51	53	53	54	52	52	53	54	55	57	58	58	58	59	57	55	54	52	54	52	54	52	54	55	56	56	55	54	
July	48	48	48	48	49	51	53	53	54	52	52	53	54	55	57	58	58	58	59	57	55	54	52	54	52	54	52	54	55	56	56	55	54	
Maximum	48	48	48	48	49	51	53	53	54	52	52	53	54	55	57	58	58	58	59	57	55	54	52	54	52	54	52	54	55	56	56	55	54	
Minimum	48	48	48	48	49	51	53	53	54	52	52	53	54	55	57	58	58	58	59	57	55	54	52	54	52	54	52	54	55	56	56	55	54	
August	48	48	48	48	49	51	53	53	54	52	52	53	54	55	57	58	58	58	59	57	55	54	52	54	52	54	52	54	55	56	56	55	54	
Maximum	48	48	48	48	49	51	53	53	54	52	52	53	54	55	57	58	58	58	59	57	55	54	52	54	52	54	52	54	55	56	56	55	54	
Minimum	48	48	48	48	49	51	53	53	54	52	52	53	54	55	57	58	58	58	59	57	55	54	52	54	52	54	52	54	55	56	56	55	54	
September	78	78	83	72	70	75	73	72	66	66	65	62	63	67	70	68	65	67	70	72	72	68	66	64	66	67	68	67	61	60	60	68	68	
Maximum	62	65	58	62	61	64	59	60	58	62	60	58	58	58	58	60	59	59	58	60	60	58	58	56	57	58	56	55	56	55	56	55	58	
Minimum	62	65	58	62	61	64	59	60	58	62	60	58	58	58	58	60	59	59	58	60	60	58	58	56	57	58	56	55	56	55	58	58		









LEWIS RIVER BASIN  
LEWIS RIVER AT WOODLAND, WASH.

14-2217. Lewis River at Woodland, Wash.  
LOCATION.--Lat 45°53'25", long 122°44'00", at bridge on U.S. Highway 99, 1 mile southeast of Woodland, Cowlitz County, and 2 miles upstream from East Fork.  
RECORDS AVAILABLE.--Chemical analyses: October 1962 to September 1967.  
REMARKS.--No discharge records available.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Calcium bicarbonate (CaCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	Color	pH
														Parts per million	Tons per acre-foot	Calcium, Magnesium	Non-carbonate			
Oct. 27, 1966.		13		4.0	1.0	3.1	0.4	22	0	0.4	1.8	0.1	0.1	38	0.05	14	0	42	7.1	5
Nov. 23.....		12		3.5	.9	2.5	.6	21	0	.4	1.5	.1	.2	39	.05	12	0	43	7.2	5
Dec. 30.....		13		3.0	1.6	2.7	.5	20	0	.6	1.5	.0	.2	36	.05	14	0	38	7.3	5
Jan. 26, 1967.		14		3.7	1.0	2.6	.3	20	0	1.2	2.0	.0	.3	38	.05	13	0	38	7.1	5
Feb. 26.....		14		3.8	1.0	3.1	.5	18	0	1.2	2.0	.0	.2	36	.05	14	0	36	7.1	0
Mar. 31.....		14		3.8	.8	2.9	.5	18	0	.8	1.5	.1	.2	A 33	.04	13	0	37	7.5	5
Apr. 21.....		14		3.5	.9	2.7	1.0	20	0	.6	2.5	.1	.2	A 35	.05	12	0	39	7.0	0
May 27.....		14		3.0	1.2	3.0	.5	20	0	1.8	1.8	.0	.2	A 39	.05	13	0	39	7.4	5
June 17.....		14		3.5	1.1	2.7	.6	21	0	.2	1.5	.0	.0	35	.05	13	0	39	7.2	5
July 22.....		14		4.0	.7	2.8	.7	21	0	.4	1.8	.1	.1	38	.05	13	0	41	7.3	5
Aug. 19.....		14		4.0	.7	2.9	.6	21	0	.2	1.8	.0	.2	35	.05	13	0	40	7.2	5
Sept. 22.....		12		3.5	1.0	2.8	.7	22	0	.2	1.8	.0	.2	34	.05	13	0	42	7.1	5

A Calculated from determined constituents.

Additional determinations

Date of collection	Dis-solved oxygen (DO)	MPN (coliform colonies per 100 ml)	Hexa-valent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)	Date of collection	Dis-solved oxygen (DO)	MPN (coliform colonies per 100 ml)	Hexa-valent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)
Oct. 27, 1966.	9.7	430	--	--	--	--	May 27, 1967..	12.5	36	--	--	--	--
Nov. 23.....	10.2	36	0.01	0.02	0.00	--	June 17.....	11.5	430	--	--	--	--
Jan. 26, 1967.	--	230	--	--	--	--	July 22.....	10.2	36	0.00	0.00	0.00	--
Feb. 26.....	12.4	0	--	--	--	--	Aug. 19.....	10.8	30	--	--	--	--
Mar. 31.....	11.9	0	--	--	--	--	Sept. 22.....	10.6	36	--	--	--	--
Apr. 21.....	11.7	0	--	--	--	--							



KALAMA RIVER BASIN

14-2235. KALAMA RIVER BELOW ITALIAN CREEK, NEAR KALAMA, WASH.

LOCATION. --Lat 46°02'40", long 122°48'50"; temperature recorder at gaging station 2.5 miles northeast of Kalama, Cowlitz County, 4.2 miles (revised) upstream from mouth, and 5 miles downstream from Italian Creek.

RECORDS AVAILABLE. --Chemical analyses: July 1960 to September 1962.

Water temperatures: 1966-67. --Water temperatures: Maximum, 62°F June 30 to July 3; minimum, 39°F Mar. 12.

EXTREMES, 1954-67. --Water temperatures: Maximum, 69°F July 28, 1958; minimum, freezing point Nov. 19, 20, 1958.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> ) (B)	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>		Sodium adsorption ratio	Specific conductance (microhm-cm at 25°C)	Color or pH	
													Parts per million	Tons per acre-foot	Tons per day	Calcium Magnesium	Non-carbonate				
Oct. 27, 1966.	800	13	4.5	0.7	3.0	0.3	21	0	0.5	2.5	0.0	0.5	40	0.05	86.4	14	0	0	44	7.1	10
Jan. 2, 1967.	200	15	4.8	1.1	2.7	.6	19	0	0.8	1.5	1.1	0.02	38	0.05	207	14	0	0	40	7.2	5
Apr. 21, 1967.	1400	15	3.8	1.1	2.7	.6	22	0	1.2	1.5	.1	.8	38	0.05	144	14	0	0	43	7.6	0
July 22, 1967.	315	19	4.5	1.5	3.8	.6	27	0	.2	3.2	.1	.1	47	.06	40.0	17	0	0	66	7.5	5

A Calculated from determined constituents.

Additional determinations

Date of collection	MPN (coliform colonies per 100 ml)	Hexavalent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)	Date of collection	Dissolved oxygen (DO)	MPN (coliform colonies per 100 ml)	Hexavalent chromium (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)
Oct. 27, 1966.	11.2	--	0.00	0.01	--	Apr. 21, 1967.	12.2	30	--	--	--	--
Jan. 26, 1967.	--	0.00	--	--	--	July 22, 1967.	9.6	36	0.00	0.00	0.00	0.00





## COWLITZ RIVER BASIN--Continued

14-2335. COWLITZ RIVER NEAR KOSMOS, WASH.

LOCATION --Lat: 46°28'00", long 123°07'20", temperature recorder at gaging station 0.5 mile downstream from Tumwater Creek, 1.5 miles downstream from Cispus River, 4 miles southeast of Kosmos, Lewis County, and at mile 87.9.

DRAINAGE AREA --1,042 square miles.

RECORDS AVAILABLE --Chemical analyses: July 1959 to June 1960, November 1966 to September 1967.

Water temperatures: November 1952 to September 1967.

EXTREMES, 1966-67 --Water temperatures: Maximum, 61°F Aug. 30 to Sept. 2; minimum, 39°F on several days during February.

EXTREMES, 1962-67 --Water temperatures: Maximum (1962-64, 1962-67), 65°F July 11, 12, 1958; minimum, freezing point Jan. 20, 1962.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Fe)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F) (NO <sub>3</sub> ) (B)	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>		Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	Color or pH	
												Parts per million	Tons per acre-foot	Tons per day	Calcium Magnesium	Non-carbonate				
Nov. 16, 1966.	5730	11		5.0	1.1	2.4	0.5	24	0	0.2	0.1	0.3	40	0.05	619	17	0	45	7.3	5
Jan. 5, 1967	6260	12		6.5	1.7	3.0	0.3	29	0	1.8	1.0	1.1	44	0.06	744	19	0	55	7.3	5
Feb. 7, .....	7130	13		5.5	1.5	2.8	0.3	28	0	1.6	1.0	1.1	49	0.07	943	20	0	49	7.2	10
Mar. 16, .....	2800	15		6.5	1.7	3.3	0.4	34	0	2.8	1.2	0.2	A 48	0.07	363	23	0	62	7.5	5
May 12, .....	5700	12		5.5	1.3	2.6	0.3	26	0	1.8	0.8	0.2	A 38	0.05	585	19	0	45	7.2	5
June 16, .....	11600	8.6		3.5	0.6	2.1	0.6	19	0	1.0	0.5	0.0	A 28	0.04	877	11	0	31	7.2	5
Aug. 4, .....	2080	14		5.5	1.2	3.0	0.6	28	0	2.8	1.8	0.1	44	0.06	247	29	0	52	7.2	5
Sept. 20, .....	1240	15		7.5	1.3	3.3	0.7	31	0	3.8	1.5	0.1	52	0.07	174	24	0	72	7.6	5

A Calculated from determined constituents.







COWLITZ RIVER BASIN--Continued  
 14-2375. WINSTON CREEK NEAR SILVER CREEK, WASH.

LOCATION.--Lat 46°29'00", long 122°31'15", temperature recorder at gaging station 100 feet downstream from bridge, 3.2 miles upstream from mouth, and 4.5 miles southeast of town of Silver Creek, Lewis County.  
 DRAINAGE AREA.--77.8 square miles.  
 RECORD PERIOD.--April 1965 to September 1967.  
 EXTREMES, 1966-67.--Water temperatures: Maximum, 73°F on several days during June to August; minimum, 36°F Mar. 12, 13 on several days during December 1965 and January 1966.  
 EXTREMES, 1965-67.--Water temperatures: Maximum, 73°F July 30, 1965, and on several days during June to August 1967; minimum, 36°F on several days during December 1965 and January 1966.

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





14-2430. COWLITZ RIVER AT CASTLE ROCK, WASH.

LOCATION --Lat 46°16'30", long 122°54'50", at gaging station 15 feet downstream from highway bridge in Castle Rock, Cowlitz County, 2.5 miles downstream from Toule River, and at mile 17.3  
 DRAINAGE AREA --2,238 square miles.  
 RECORDS AVAILABLE --Chemical analyses: October 1958 to September 1959, August 1966 to September 1967.  
 Water temperatures: August 1950 to September 1967.  
 EXTREMES, 1966-67 --Water temperatures: Maximum, 72°F Aug. 16, 17; minimum, 41°F on several days during March.  
 EXTREMES, 1950-67 --Water temperatures: Maximum (1950-62, 1963-67), 75°F July 28-30, 1968; minimum, freezing point Jan. 29, 30, 1951.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Fe)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonyl (CO <sub>2</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F) (NO <sub>3</sub> ) (B)	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>	Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	pH	Col- or	
													Parts per million	Tons per acre-foot	Tons per day						
Nov. 3, 1966..	2730	13		7.0	1.6	4.3	0.7	31	0	2.6	3.5	0.1	0.3	53	0.07	391	24	0	64	7.2	5
Jan. 3, 1967..	14900	14		5.5	.9	3.3	.4	25	0	1.6	1.8	.1	.4	46	.06	180	17	0	50	7.3	10
Feb. ....	11700	14		4.0	1.5	3.0	.5	26	0	1.2	1.5	.0	.3	47	.07	180	17	0	50	7.3	10
Mar. 22.....	8940	14		3.0	1.6	3.5	.5	28	0	1.4	2.2	.0	.3	49	.07	1180	19	0	56	7.3	9
May 16.....	9990	13		6.0	1.0	3.7	.4	26	0	2.0	2.0	.0	.2	43	.06	1160	19	0	55	7.2	5
June 27.....	12200	10		3.5	1.2	2.4	.7	20	0	.8	2.0	.0	.1	32	.04	1050	14	0	40	7.3	5
Aug. 17.....	2470	15	0.02	8.0	1.1	5.5	1.3	29	0	1.6	8.8	.0	.1	58	.08	387	25	1	81	7.3	5
Sept. 26.....	1600	16		1.0	2.1	9.7	.7	34	0	3.0	1.8	.1	.1	77	.10	324	34	6	124	7.4	5

COWLITZ RIVER BASIN--Continued  
14-2430. COWLITZ RIVER AT CASTLE ROCK, WASH.--Continued

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	62	61	61	61	62	60	60	61	59	58	57	57	56	54	55	54	54	54	54	53	53	53	53	54	53	53	53	52	51	51	51	55
Maximum	61	60	60	59	60	60	60	59	58	57	57	56	54	54	54	54	53	53	53	52	52	53	53	53	53	53	53	52	51	51	51	55
Minimum	51	50	49	48	48	48	48	48	48	48	47	47	47	48	46	47	47	47	47	48	47	47	45	45	45	45	45	44	44	44	47	
November	50	49	48	48	48	48	48	48	48	48	47	47	47	47	47	47	47	47	47	47	47	45	45	45	45	45	44	44	44	44	46	
Maximum	44	44	44	44	44	43	43	43	42	42	42	43	43	44	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	
Minimum	44	44	44	44	44	43	43	42	42	42	42	43	43	43	43	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	
December	44	44	44	44	44	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	
Maximum	44	44	44	44	44	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	
Minimum	44	44	44	44	44	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	
January	44	44	44	44	44	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	
Maximum	44	44	44	44	44	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	
Minimum	44	44	44	44	44	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	
February	44	44	44	44	44	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	
Maximum	44	44	44	44	44	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	
Minimum	44	44	44	44	44	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	
March	44	44	44	44	44	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	
Maximum	44	44	44	44	44	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	
Minimum	44	44	44	44	44	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	
April	44	44	44	44	44	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	
Maximum	44	44	44	44	44	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	
Minimum	44	44	44	44	44	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43	
May	45	46	46	45	47	46	45	48	47	47	48	46	45	45	45	45	45	45	46	47	47	49	49	49	49	49	49	47	47	48	46	
Maximum	43	44	45	45	44	44	46	46	46	46	46	46	45	44	44	44	44	44	44	46	46	48	48	48	48	48	47	46	46	46	45	
Minimum	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	
June	48	48	47	48	50	51	53	53	51	51	50	50	51	53	53	53	53	53	53	52	52	51	50	50	51	51	51	52	52	51	50	
Maximum	50	52	50	51	52	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	51	
Minimum	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	
July	63	63	63	63	63	63	63	63	62	63	64	63	63	64	64	64	64	64	64	63	64	65	66	66	66	66	66	66	66	66	64	
Maximum	56	59	60	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	
Minimum	68	68	69	69	68	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	
August	66	68	67	68	66	66	66	65	66	69	69	69	70	70	70	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	69	
Maximum	68	68	69	69	68	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66	
Minimum	66	68	67	68	66	66	66	65	66	69	69	69	70	70	70	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	69	
September	68	68	67	69	68	68	67	67	66	65	65	64	64	65	66	65	65	65	64	65	66	65	64	63	63	63	63	62	61	61	65	
Maximum	68	67	66	67	67	66	65	65	64	65	64	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	62	61	61	65	
Minimum	68	67	66	67	67	66	65	65	64	65	64	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63	62	61	61	65	

14-2450. COWEMAN RIVER NEAR KELSO, WASH.

LOCATION:--Lat 46°08'15", long 122°53'45", at bridge on U.S. Highway 99, 0.3 mile east of Kelso, Covilts County, 2.6 miles upstream from mouth, and 4.6 miles downstream from gaging station.  
 DRAINAGE:--11.5 sq. miles, upstream from gaging station.  
 RECORDS AVAILABLE: Chemical analyses: October 1961 to September 1967.  
 WATER TEMPERATURES: July 1950 to September 1967.  
 EXTREMES, 1966-67:--Water temperatures: Maximum, 77°F Aug. 12-15, 17; minimum, 39°F Mar. 4, 5, 12, 13.  
 EXTREMES, 1950-67:--Water temperatures: Maximum, 82°F July 27, 28, 1958; minimum, freezing point on several days during winter months.  
 REMARKS:--Temperature recorder located at gaging station. Clock stopped Dec. 14-19, Dec. 30 to Jan. 16, Jan. 20-26; temperature ranges, 45°F to 46°F, 42°F to 45°F, and 40°F to 43°F, respectively. Some inflow between gaging station and sampling point.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Borates (B)	Dissolved solids (-residue at 180°C)			Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)		
														Parts per million	Tons per acre-foot	Tons per day	Calcium, Magnesium	Non-carbonate			
Oct. 27, 1966..	184	14	6.0	1.7	3.8	0.4	28	0	0.0	4.2	0.1	0.9	--	54	0.07	28.8	22	0	61	7.1	25
Nov. 23.....	220	14	5.0	1.6	3.2	.6	23	0	.2	2.8	.2	.9	--	45	.06	25.7	19	0	42	7.2	10
Dec. 30.....	650	14	5.0	1.7	3.0	.2	20	0	.0	2.2	.1	1.5	--	44	.05	21.8	16	0	46	7.3	10
Jan. 26, 1967..	650	13	3.9	1.4	3.0	.3	20	0	1.4	2.5	.0	1.5	0.00	A	.05	64.4	15	0	48	7.1	5
Mar. 31.....	650	13	3.9	1.3	3.0	.3	20	0	.4	2.5	.0	1.5	--	A	.05	64.4	15	0	48	7.1	5
Apr. 21.....	645	15	4.4	1.2	3.2	.8	22	0	1.0	3.0	.1	1.8	--	A	.06	73.1	16	0	49	7.1	5
May 27.....	145	14	5.5	1.3	3.5	.4	27	0	.4	3.0	.0	.4	--	49	.07	19.2	19	0	55	7.3	5
June 17.....	92	14	6.0	1.7	3.9	.7	32	0	.2	3.5	.1	.5	--	51	.07	12.7	22	0	63	6.9	5
July 22.....	48	17	7.5	2.3	4.6	.5	38	0	.4	5.8	.0	1.0	.01	61	.08	7.91	28	0	81	7.1	5
Aug. 19.....	30	15	8.8	2.6	5.6	.9	40	0	.4	8.0	.0	.5	--	64	.09	5.18	33	0	82	6.9	5
Sept. 22.....	28	15	8.1	2.6	6.2	1.0	40	0	.0	9.0	.0	.1	--	69	.09	5.22	31	0	100	6.9	5

A Calculated from determined constituents.

Additional determinations

Date of collection	Dis-solved oxygen (DO)	MPN (coliform colonies per 100 ml)	Hexa-valent chromi-um (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)	Date of collection	Dis-solved oxygen (DO)	MPN (coliform colonies per 100 ml)	Hexa-valent chromi-um (Cr <sup>6+</sup> )	Copper (Cu)	Zinc (Zn)	Arsenic (As)
Oct. 27, 1966.	10.4	4600	--	--	--	--	May 27, 1967..	10.3	4600	--	--	--	--
Nov. 23.....	11.8	91	0.00	0.00	0.00	0.00	June 17.....	9.0	230	--	--	--	--
Jan. 26, 1967.	--	--	--	--	--	--	July 22.....	7.7	24000	0.00	0.00	0.00	0.00
Mar. 31.....	12.0	91	--	--	--	--	Aug. 19.....	7.3	24000	--	--	--	--
Apr. 21.....	11.5	91	--	--	--	--	Sept. 22.....	7.0	11000	--	--	--	--









## ELOCHOMAN RIVER BASIN

14--2475. ELOCHOMAN RIVER NEAR CATHLAMET, WASH.

LOCATION.--Lat 46°13'10", long 123°20'30", temperature recorder at gaging station 125 feet upstream from railroad bridge, 2.5 miles northeast of Cathlamet, Waukiakum County, and 4.5 miles upstream from mouth.

DRAINAGE AREA.--65.8 square miles.

RECORDS AVAILABLE.--Water temperatures: June 1950 to September 1967.

EXTREMES, 1966-67.--Water temperatures: Maximum, 72°F Aug. 12, 15; minimum, 40°F Mar. 3-5, 12, 13.

EXTREMES, 1960-67.--Water temperatures: Maximum, 75°F July 11, 12, 1961; minimum, freezing point Feb. 17, 1966.

REMARKS.--Clock stopped Dec. 5 to Jan. 8; temperature range, 43°F to 47°F.

Temperature (°F) of water, water year October 1966 to September 1967

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













14-3066. DRIFT CREEK NEAR SALADO, OREG.

LOCATION--Lat 44°30'50", long 123°50'50", temperature recorder at gaging station on right bank, 0.3 mile downstream from Cape Horn Creek, 4.1 miles southwest of Salado, Lincoln County, and 8.5 miles southeast of Toledo.

DRAINAGE AREA--20.5 square miles (revised).

RECORDS AVAILABLE--Water temperatures: October 1958 to September 1963, August 1965 to September 1967.

EXTREMES, 1958-67.--Water temperatures: Maximum, 73°F on several days during July and August; minimum, 39°F Mar. 4. EXTREMES, 1958-63, 1965-67.--Water temperatures: Maximum, 74°F July 12, 1961; minimum (1958-63, 1966-67), 34°F Jan. 21, 22, 1962, Jan. 11-13, 30, 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	1	2	3
	October	61	62	60	60	60	59	61	61	57	56	54	53	52	51	51	49	49	46	48	46	48	51	53	53	53	53	52	51	55	54	54	54	54
Minimum	54	57	55	52	55	56	57	57	51	50	52	50	48	45	48	45	43	43	47	45	48	51	51	51	51	52	51	49	48	51	50	50	50	50
November	52	52	51	51	50	49	48	47	47	20	50	50	49	49	49	48	48	49	50	46	46	45	45	46	47	47	47	48	48	50	49	49	49	
Maximum	49	49	47	46	47	48	47	45	45	47	47	49	49	49	49	48	48	49	50	46	46	45	45	46	47	47	46	46	47	45	47	47	47	
Minimum	49	48	47	47	47	46	47	46	47	48	48	48	48	48	47	47	47	47	48	46	46	44	44	45	46	45	44	45	44	45	46	46	46	
Maximum	48	48	47	47	46	47	46	47	46	47	48	47	47	47	47	47	47	48	46	46	44	44	45	46	45	46	45	44	45	44	45	45	45	
Minimum	45	44	46	44	44	45	45	45	45	46	46	46	47	46	45	45	44	46	46	45	44	44	44	45	46	45	46	47	48	46	46	46	46	
February	47	47	47	48	47	46	47	47	48	48	48	46	46	43	43	45	45	45	45	45	45	46	46	46	46	46	47	47	45	45	45	45		
Maximum	45	46	45	46	45	44	44	44	46	47	45	44	43	41	40	43	44	44	42	42	42	43	42	43	43	43	41	42	44	44	44	44		
Minimum	44	42	43	44	45	46	45	46	45	44	45	44	45	44	45	46	45	46	45	48	48	49	48	47	47	48	47	46	45	46	46	46		
Maximum	42	40	40	39	40	41	41	43	42	41	41	42	40	40	44	44	44	44	44	44	44	45	47	45	44	44	44	42	43	42	42	42		
Minimum	40	42	43	45	44	43	44	45	45	45	44	45	43	42	42	42	42	43	42	43	43	43	43	43	44	45	43	42	43	42	42	42		
May	40	51	50	51	55	56	57	57	52	50	51	53	55	56	59	61	61	60	62	63	62	61	56	56	57	59	56	56	55	55	55	55		
Maximum	43	44	45	46	46	48	47	49	47	46	47	47	47	47	49	52	54	53	54	54	56	52	50	49	51	52	51	51	50	49	49	49		
Minimum	59	62	63	66	66	66	68	67	68	67	69	69	69	69	69	69	70	71	69	62	62	58	67	69	70	68	71	72	71	64	64	64		
Maximum	51	54	54	57	57	57	55	55	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54		
Minimum	60	60	60	60	60	59	59	59	56	56	57	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58	58		
August	72	71	71	70	68	67	68	71	71	68	72	73	73	73	73	72	72	71	72	67	67	61	69	67	68	63	69	66	67	68	68	68		
Maximum	59	58	59	57	60	59	57	59	62	61	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60		
Minimum	65	66	67	67	65	67	67	64	63	61	64	62	63	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64		
Maximum	60	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61	61		
Minimum	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93		



## ALSEA RIVER BASIN--Continued

14-3067. NEEDLE BRANCH NEAR SALADO, OREG.--Continued

Suspended sediment, water year October 1966 to September 1967

Day	OCTOBER			NOVEMBER			DECEMBER		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	0.04	C 2	T	0.57	C 3	T	1.9	15	0.1
2..	.06	C 2	T	.53	C 3	T	5.6	53	.8
3..	.05	C 2	T	.50	C 3	T	6.1	65	1.1
4..	.04	C 2	T	.47	C 3	T	20	615	33
5..	.04	C 2	T	.51	C 3	T	13	220	7.7
6..	.04	C 2	T	.53	C 3	T	5.6	140	3.6
7..	.05	C 2	T	.46	C 3	T	8.3	88	2.0
8..	.05	C 2	T	.42	C 3	T	5.9	39	.6
9..	.04	C 2	T	.59	C 3	T	4.5	33	.4
10..	.04	C 2	T	.95	C 3	T	4.0	21	.2
11..	.04	C 2	T	10	532	14	3.8	48	S .6
12..	.16	C 2	T	9.6	190	S 5.8	5.2	98	S 1.8
13..	.11	C 2	T	5.5	36	.5	13	671	24
14..	.08	C 2	T	6.7	68	A 1.2	7.4	70	1.4
15..	.07	C 2	T	4.9	22	.3	4.5	49	.6
16..	.06	C 2	T	4.1	17	.2	3.1	25	.2
17..	.05	C 2	T	3.5	12	.1	2.2	11	.1
18..	.05	C 2	T	2.8	--	E .1	1.7	6	T
19..	.17	C 2	T	2.7	6	T	1.5	4	T
20..	1.1	34	0.1	2.5	3	T	1.3	C 3	T
21..	1.1	37	S .2	2.8	5	T	1.0	C 3	T
22..	4.5	205	B 2.5	2.5	4	T	1.0	C 3	T
23..	2.8	14	.1	2.1	4	T	1.1	C 3	T
24..	1.8	6	T	1.7	4	T	1.1	C 3	T
25..	1.3	4	T	2.0	25	.1	1.5	C 3	T
26..	1.1	4	T	1.9	5	T	1.7	C 3	T
27..	.89	C 3	T	1.7	5	T	1.4	C 3	T
28..	.78	C 3	T	1.5	3	T	1.3	C 3	T
29..	.74	C 3	T	1.3	2	T	1.3	C 3	T
30..	.69	C 3	T	1.3	3	T	1.2	C 3	T
31..	.61	C 3	T	--	--	--	1.3	C 3	T
Total	18.65	--	3.0	76.63	--	22.6	136.6	--	78.4
Day	JANUARY			FEBRUARY			MARCH		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	2.1	10	0.1	3.4	9	0.1	1.1	17	A 0.1
2..	2.2	4	T	2.6	4	T	2.0	8	T
3..	3.4	25	A .2	2.2	4	T	2.2	8	T
4..	4.7	134	S 1.9	1.8	4	T	1.7	8	T
5..	5.9	50	A .8	1.4	4	T	1.4	3	T
6..	5.0	40	A .5	1.2	2	T	1.2	2	T
7..	4.1	14	.2	1.1	--	T	1.0	2	T
8..	3.0	13	.1	.95	1	T	.98	2	T
9..	2.3	9	.1	.87	1	T	1.3	2	T
10..	2.0	15	A .1	.77	2	T	2.2	2	T
11..	1.8	6	T	.71	2	T	2.1	3	T
12..	3.1	141	S 2.0	.65	1	T	1.8	3	T
13..	7.6	170	3.5	2.1	58	J .5	1.7	3	T
14..	5.3	36	.5	2.3	23	J .2	5.7	380	12
15..	4.0	31	.3	5.9	110	J 1.7	18	458	S 25
16..	3.1	10	.1	6.0	53	.9	7.6	45	.9
17..	2.6	6	T	7.9	89	1.9	6.0	24	.4
18..	2.2	6	T	6.0	50	.8	5.5	19	.3
19..	2.7	242	S 2.7	4.1	9	.1	4.2	10	.1
20..	3.7	55	.5	2.9	20	.2	3.4	4	T
21..	4.5	52	.6	2.2	16	.2	2.6	2	T
22..	4.4	46	.5	1.7	12	.1	2.4	6	T
23..	4.2	18	.2	1.3	7	T	3.2	13	.1
24..	3.6	13	.1	1.1	3	T	4.4	12	.1
25..	3.7	25	.2	.98	3	T	3.7	4	T
26..	5.7	130	J 2.4	.84	3	T	2.9	4	T
27..	19	802	41	.74	5	T	2.2	C 3	T
28..	16	290	13	.98	24	A .1	1.8	C 3	T
29..	15	396	16	--	--	--	1.8	C 3	T
30..	9.3	145	3.6	--	--	--	1.7	C 3	T
31..	4.6	26	.3	--	--	--	1.6	C 3	T
Total	160.8	--	91.6	64.69	--	6.9	99.38	--	39.5

E Estimated.

S Computed by subdividing day.

T Less than 0.05 ton.

A Computed from partly estimated-concentration graph.

B Computed from estimated-concentration graph.

C Composite period.

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

## ALSEA RIVER BASIN--Continued

14-3067. NEEDLE BRANCH NEAR SALADO, OREG.--Continued

Suspended sediment, water year October 1966 to September 1967--Continued

Day	APRIL			MAY			JUNE			
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day	
1..	1.5	C	3	T	0.74	C	1	0.27	C	2
2..	1.3	C	3	T	.71	C	1	.24	C	2
3..	1.1	C	3	T	.65	C	1	.24	C	2
4..	1.2	C	3	T	.62	C	1	.22	C	2
5..	1.3	C	3	T	.56	C	1	.22	C	2
6..	1.2	C	3	T	.54	C	1	.22	C	2
7..	1.2	C	3	T	.51	C	1	.24	C	2
8..	1.1	C	3	T	.48	C	1	.22	C	2
9..	1.2	C	3	T	.51	C	1	.22	C	2
10..	1.0	C	3	T	.46	C	1	.22	C	2
11..	.98	C	3	T	.43	C	1	.22	C	2
12..	1.1	18	A	0.1	.41	C	1	.20	C	2
13..	5.2	78	A	1.1	.39	C	1	.19	C	2
14..	4.4	13		.2	.37	C	1	.17	C	2
15..	3.5	4		T	.37	C	1	.17	C	2
16..	3.7	14	A	.1	.37	C	1	.16	C	2
17..	3.6	6		.1	.35	C	1	.16	C	2
18..	2.9	4		T	.35	C	1	.16	C	2
19..	2.2	2		T	.33	C	1	.16	C	2
20..	1.8	4		T	.31	C	1	.16	C	2
21..	1.4	C	3	T	.31	C	1	.19	C	2
22..	1.2	C	3	T	.29	C	2	.27	C	2
23..	1.1	C	3	T	.29	C	2	.17	C	2
24..	.91	C	3	T	.27	C	2	.16	C	2
25..	1.1	C	3	T	.25	C	2	.14	C	2
26..	.91	C	3	T	.25	C	2	.14	C	2
27..	.87	C	3	T	.25	C	2	.14	C	2
28..	.84	C	3	T	.29	C	2	.13	C	2
29..	.80	C	3	T	.35	C	2	.12	C	2
30..	.77	C	1	T	.46	C	2	.12	C	2
31..	--	--	--	--	.29	C	2	--	--	--
Total	51.36	--	1.9		12.76	--	T	5.64	--	T
JULY										
1..	0.10	C	2		0.05	C	2	0.03	C	2
2..	.10	C	2		.05	C	2	.04	C	2
3..	.10	C	2		.05	C	2	.03	C	2
4..	.10	C	2		.05	C	2	.03	C	2
5..	.09	C	2		.05	C	2	.03	C	2
6..	.09	C	2		.05	C	2	.03	C	2
7..	.09	C	2		.05	C	2	.03	C	2
8..	.09	C	2		.04	C	2	.03	C	2
9..	.09	C	2		.04	C	2	.03	C	2
10..	.09	C	2		.04	C	2	.06	C	2
11..	.09	C	2		.05	C	2	.06	C	2
12..	.09	C	2		.04	C	2	.04	C	2
13..	.09	C	2		.04	C	2	.03	C	2
14..	.08	C	2		.04	C	2	.02	C	2
15..	.08	C	2		.03	C	2	.02	C	2
16..	.08	C	2		.03	C	2	.03	C	2
17..	.08	C	2		.03	C	2	.04	C	2
18..	.08	C	2		.03	C	2	.03	C	2
19..	.08	C	2		.03	C	2	.03	C	2
20..	.08	C	2		.03	C	2	.03	C	2
21..	.07	C	2		.03	C	2	.03	C	2
22..	.07	C	2		.03	C	2	.03	C	2
23..	.07	C	2		.03	C	2	.02	C	2
24..	.07	C	2		.03	C	2	.02	C	2
25..	.07	C	2		.03	C	2	.02	C	2
26..	.08	C	2		.03	C	2	.02	C	2
27..	.07	C	2		.03	C	2	.02	C	2
28..	.06	C	2		.03	C	2	.02	C	2
29..	.06	C	2		.03	C	2	.09	16	T
30..	.06	C	2		.03	C	2	.39	220	B
31..	.05	C	2		.03	C	2	--	--	--
Total	2.50	--	T		1.15	--	T	1.33	--	0.2
AUGUST										
SEPTEMBER										
Total discharge for year (cfs-days)..... 631.51										
Total load for year (tons)..... 244.1										

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

B Computed from estimated-concentration graph.  
C Composite period.





ALSEA RIVER BASIN--Continued

14-3068. FLYNN CREEK NEAR SALADO, OREG.--Continued

Suspended sediment, water year October 1966 to September 1967

Day	OCTOBER			NOVEMBER			DECEMBER				
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment			
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		
1..	0.11	C	2	T	0.38	C	4	T	3.1	2	T
2..	.18	C	2	T	.36	C	4	T	7.1	8	0.2
3..	.12	C	2	T	.34	C	4	T	8.7	11	.3
4..	.11	C	2	T	.32	C	4	T	28	125	9.4
5..	.10	C	2	T	.40	C	4	T	29	48	3.8
6..	.11	C	2	T	.55	C	4	T	24	22	1.4
7..	.15	C	2	T	.41	C	4	T	23	18	1.1
8..	.14	C	2	T	.38	C	4	T	17	12	.6
9..	.11	C	2	T	.52	C	4	T	13	--	.4
10..	.11	C	2	T	.93	C	5	T	11	12	.4
11..	.10	C	2	T	11	40	1.2	9.7	10	10	.3
12..	.32	C	2	T	12	16	S	.6	12	12	.4
13..	.22	C	2	T	6.2	6	.1	.1	27	34	2.5
14..	.16	C	2	T	8.7	6	.1	.1	25	24	1.5
15..	.15	C	2	T	7.2	2	T	15	10	10	.4
16..	.13	C	2	T	6.8	4	.1	11	9	9	.3
17..	.12	C	2	T	6.1	4	.1	8.5	9	9	.2
18..	.11	C	2	T	4.9	C	3	T	6.8	4	.1
19..	.24	5	T	T	4.7	C	3	T	5.8	4	.1
20..	1.3	8	T	T	4.1	C	3	T	5.2	4	.1
21..	.95	4	T	T	4.0	C	3	T	4.3	4	T
22..	2.6	10	0.1	T	3.5	C	3	T	3.9	C	2
23..	1.5	--	T	T	3.2	C	3	T	3.7	C	2
24..	.83	9	T	T	3.0	C	3	T	3.6	C	2
25..	.59	C	4	T	3.2	C	3	T	3.7	C	2
26..	.66	C	4	T	3.0	C	3	T	3.5	C	2
27..	.59	C	4	T	2.9	C	3	T	3.4	C	2
28..	.50	C	4	T	2.7	C	3	T	3.2	C	2
29..	.48	C	4	T	2.5	C	3	T	3.4	C	2
30..	.50	C	4	T	2.6	C	3	T	3.1	C	2
31..	.43	C	4	T	--	--	--	--	3.2	C	2
Total	13.72	--	0.2	106.89	--	2.6	326.9	--	23.8		
JANUARY			FEBRUARY			MARCH					
1..	3.7	C	2	T	14	6	0.2	4.0	C	2	T
2..	3.8	C	2	T	11	4	.4	4.9	C	2	T
3..	5.7	8	A	0.1	8.9	C	3	.1	5.2	C	2
4..	9.2	11	A	.3	7.6	C	3	.1	5.0	C	2
5..	13	10		.4	6.5	C	3	.1	4.6	C	2
6..	12	--	E	.3	5.6	C	3	T	4.2	C	2
7..	10	6		.2	4.9	C	3	T	3.9	C	2
8..	8.8	7		.1	4.3	C	3	T	3.8	C	2
9..	7.4	4		.1	3.9	C	3	T	4.4	C	2
10..	6.5	6		.1	3.6	C	3	T	5.2	C	2
11..	5.6	5		.1	3.2	C	3	T	5.2	C	2
12..	6.8	21		.4	3.0	C	3	T	5.1	C	2
13..	17	35		1.6	4.6	C	3	T	5.0	C	2
14..	16	13	B	.6	5.0	C	3	T	7.6	13	S
15..	13	8		.3	13	15	.5	28	77	77	0.4
16..	10	6		.2	16	10	.4	19	22	22	1.1
17..	8.5	5		.1	22	27	1.6	15	4	4	.2
18..	7.5	10		.2	20	49	2.6	13	4	4	.1
19..	8.1	12		.3	15	6	.2	12	10	10	.3
20..	9.8	10		.3	11	2	.1	9.9	C	3	.1
21..	11	8		.2	8.8	C	2	T	8.1	C	3
22..	11	6		.2	7.4	C	2	T	7.2	C	3
23..	11	5		.1	6.4	C	2	T	7.8	C	3
24..	9.7	4		.1	5.5	C	2	T	8.8	C	3
25..	9.2	4		.1	4.9	C	2	T	8.8	C	3
26..	11	8		.2	4.1	C	2	T	8.1	C	3
27..	43	219	S	29	3.7	C	2	T	7.1	C	3
28..	51	116	S	18	4.2	C	2	T	6.3	C	3
29..	39	46		4.8	--	--	--	--	5.8	C	3
30..	32	27		2.3	--	--	--	--	5.2	C	3
31..	19	14		.7	--	--	--	--	4.9	C	3
Total	429.3	--	61.5	228.1	--	6.6	243.1	--	9.3		

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

B Computed from estimated-concentration graph.  
 C Composite period.

## ALSEA RIVER BASIN--Continued

11-3068. FLYNN CREEK NEAR SALADO, OREG.--Continued

Suspended sediment, water year October 1966 to September 1967--Continued

Day	APRIL			MAY			JUNE			
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day	
1..	4.5	C	3	T	2.6	C	4	0.91	C	2
2..	4.1	C	3	T	2.6	C	4	.82	C	2
3..	3.8	C	3	T	2.4	C	4	.80	C	2
4..	3.8	C	3	T	2.3	C	4	.78	C	2
5..	4.1	C	3	T	2.2	C	4	.74	C	2
6..	3.8	C	3	T	2.1	C	4	.73	C	2
7..	3.7	C	3	T	2.0	C	4	.74	C	2
8..	3.6	C	3	T	2.0	C	4	.72	C	2
9..	3.7	C	3	T	1.9	C	2	.69	C	2
10..	3.4	C	3	T	1.8	C	2	.69	C	2
11..	3.3	C	3	T	1.7	C	2	.69	C	2
12..	3.3	C	3	T	1.7	C	2	.66	C	2
13..	10	9	A	0.2	1.6	C	2	.63	C	2
14..	11	10		.3	1.5	C	2	.62	C	2
15..	9.7	4		.1	1.4	C	2	.60	C	2
16..	9.9	3		.1	1.4	C	2	.57	C	2
17..	9.7	5		.1	1.3	C	2	.56	C	2
18..	8.6	2		T	1.3	C	2	.54	C	2
19..	7.4	2		T	1.2	C	2	.54	C	2
20..	6.3	2		T	1.2	C	2	.54	C	2
21..	5.5	C	4	.1	1.1	C	2	.61	C	2
22..	4.7	C	4	1	1.1	C	2	.86	C	1
23..	4.2	C	4	T	1.1	C	2	.63	C	1
24..	3.7	C	4	T	1.0	C	2	.56	C	1
25..	3.9	C	4	T	.99	C	2	.53	C	1
26..	3.5	C	4	T	.96	C	2	.50	C	1
27..	3.2	C	4	T	.94	C	2	.49	C	1
28..	3.1	C	4	T	.98	C	2	.47	C	1
29..	3.0	C	4	T	1.0	C	2	.46	C	1
30..	2.8	C	4	T	1.3	C	2	.44	C	1
31..	--	--	--	--	1.0	C	2	--	--	--
Total	155.3	--	--	1.8	47.67	--	0.4	19.12	--	0.1
Day	JULY			AUGUST			SEPTEMBER			
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day	
1..	0.42	C	1		0.21	C	1	0.12	C	1
2..	.41	C	1		.20	C	1	.14	C	1
3..	.40	C	1		.20	C	1	.12	C	1
4..	.38	C	1		.20	C	1	.12	C	1
5..	.37	C	1		.19	C	1	.11	C	1
6..	.36	C	1		.19	C	1	.12	C	1
7..	.36	C	1		.19	C	1	.11	C	1
8..	.36	C	1		.18	C	1	.11	C	1
9..	.35	C	1		.17	C	1	.11	C	1
10..	.34	C	1		.17	C	1	.23		6
11..	.33	C	1		.17	C	1	.21		4
12..	.33	C	1		.15	C	1	.14	C	2
13..	.33	C	1		.15	C	1	.12	C	2
14..	.31	C	1		.14	C	1	.11	C	2
15..	.30	C	1		.14	C	1	.11	C	2
16..	.30	C	1		.14	C	1	.11	C	2
17..	.30	C	1		.14	C	1	.12	C	2
18..	.29	C	1		.14	C	1	.12	C	2
19..	.29	C	1		.12	C	1	.11	C	2
20..	.29	C	1		.12	C	1	.11	C	2
21..	.28	C	1		.12	C	1	.11	C	2
22..	.26	C	1		.12	C	1	.11	C	2
23..	.26	C	1		.12	C	1	.10	C	2
24..	.26	C	1		.12	C	1	.09	C	2
25..	.25	C	1		.12	C	1	.09	C	2
26..	.26	C	1		.12	C	1	.09	C	2
27..	.24	C	1		.13	C	1	.09	C	2
28..	.23	C	1		.12	C	1	.09	C	2
29..	.23	C	1		.12	C	1	.21		6
30..	.22	C	1		.12	C	1	.65		13
31..	.22	C	1		.12	C	1	--	--	--
Total	9.53	--	--	T	4.64	--	T	4.18	--	T
Total discharge for year (cfs-days).....										1588.45
Total load for year (tons).....										106.3

T Less than 0.05 ton.

A Computed from partly estimated-concentration graph.

C Composite period.

ALSEA RIVER BASIN--Continued

14-3068. FLYNN CREEK NEAR SALADO, OREG.--Continued

Particle-size analyses of suspended sediment, water year October 1966 to September 1967

(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water;

P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment										Method of analysis	
							Percent finer than size indicated, in millimeters											
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000		2.000
Dec. 4, 1966.....	1540	48		35	166	16	1	10	16	32	63	65	81	100	SYPWC			
Jan. 27, 1967.....	2000	48		66	371	66	9	12	15	20	26	30	47	75	94	95	100	VPWC



## ALSEA RIVER BASIN--Continued

14-3068.1. DEER CREEK NEAR SALADO, OREG.--Continued

Suspended sediment, water year October 1966 to September 1967

Day	OCTOBER				NOVEMBER				DECEMBER			
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment				
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day			
1..	0.26	C	2	T	1.4	C	4	T	5.2	18	A	0.3
2..	.34	C	2	T	1.2	C	4	T	12	20		.6
3..	.28	C	2	T	1.2	C	4	T	14	18		.7
4..	.26	C	2	T	1.1	C	4	T	42	125	S	15
5..	.24	C	2	T	1.2	C	4	T	41	39		4.3
6..	.24	C	2	T	1.5	C	4	T	34	27		2.5
7..	.30	C	2	T	1.2	C	4	T	31	15		1.3
8..	.30	C	2	T	1.1	C	4	T	22	18		1.1
9..	.26	C	2	T	1.3	C	4	T	17	20		.9
10..	.26	C	2	T	2.1	C	4	T	15	17		.7
11..	.24	C	2	T	22	196	S	11	15	25		1.0
12..	.45	C	2	T	31	54		4.5	18	25		1.2
13..	.40	C	2	T	15	12		.5	43	127		15
14..	.34	C	2	T	17	11		.5	30	36		2.9
15..	.34	C	2	T	14	7		.3	19	13		.7
16..	.30	C	2	T	11	11		.3	13	--	E	.9
17..	.28	C	2	T	9.6	C	5		10	36		1.0
18..	.28	C	2	T	7.8	C	5		8.7	42		1.0
19..	.40	C	2	T	7.4	C	5		7.6	40		.8
20..	2.0	16		0.1	6.5	C	5		7.1	38		.7
21..	1.9	9			6.6	C	5		6.2	44		.7
22..	5.7	37		.6	5.9	C	5		5.7	42		.6
23..	4.9	5	B	.1	5.3	C	5		5.6	42		.6
24..	3.4	C	4	T	4.6	C	5		5.5	38		.6
25..	2.5	C	4	T	5.1	C	5		5.9	42		.7
26..	2.4	C	4	T	4.9	C	5		5.8	52		.8
27..	2.3	C	4	T	4.7	C	5		5.5	37		.5
28..	1.9	C	4	T	4.4	C	5		5.2	50		.7
29..	1.7	C	4	T	3.9	C	5		5.3	--	E	.6
30..	1.7	C	4	T	4.1	C	5		4.8	35		.5
31..	1.5	C	4	T	--	--	--		4.8	10		.1
Total	37.67	--		1.1	204.1	--		18.6	464.9	--		59.0
JANUARY												
1..	6.0	9		0.1	18	14		0.7	5.7	C	4	0.1
2..	6.2	6		.1	14	8		.3	6.9	C	4	.1
3..	9.9	10		.3	11	14		.4	7.4	C	4	.1
4..	16	22		1.0	9.7	C	8		7.0	C	4	.1
5..	20	18		1.0	8.2	C	8		6.2	C	4	.1
6..	16	12		.5	7.2	C	8		5.6	C	4	.1
7..	13	8		.3	6.4	C	8		4.8	C	4	.1
8..	11	7		.2	5.7	C	8		4.6	C	4	T
9..	8.8	5		.1	5.1	C	8		5.4	C	4	.1
10..	8.0	5		.1	4.6	C	8		7.0	C	4	.1
11..	7.4	3		.1	4.2	C	8		7.5	C	4	.1
12..	9.4	15	S	.7	3.8	C	8		7.1	C	4	.1
13..	29	54		4.2	5.8	C	8		6.8	C	4	.1
14..	24	27		1.7	7.7	C	8		10	35	S	1.8
15..	17	14		.6	20	39		2.1	47	124		16
16..	14	6		.2	25	39		2.6	26	17		1.2
17..	12	5		.2	34	33		3.0	19	8		.4
18..	9.9	9		.2	26	26		1.8	18	11		.5
19..	11	14	A	.4	17	14		.6	15	7		.3
20..	15	13		.5	13	9		.3	12	8		.3
21..	16	13		.6	10	6		.2	10	5		.1
22..	16	7		.3	8.6	C	4		9.4	8		.2
23..	15	9		.4	7.5	C	4		11	--	E	.2
24..	13	14		.5	6.6	C	4		12	9		.3
25..	12	7		.2	6.0	C	4		12	14		.5
26..	15	14		.6	5.2	C	4		10	2		.1
27..	69	327	S	68	4.7	C	4		8.8	C	4	.1
28..	66	119	S	24	5.5	C	4		7.8	C	4	.1
29..	53	71		10	--	--	--		7.6	C	4	.1
30..	39	46		4.8	--	--	--		7.2	C	4	.1
31..	23	35		2.2	--	--	--		6.9	C	4	.1
Total	600.6	--		124.1	301.5	--		14.2	331.7	--		23.6

E Estimated.

S Computed by subdividing day.

T Less than 0.05 ton.

A Computed from partly estimated-concentration graph.

B Computed from estimated-concentration

graph.

C Composite period.

## ALSEA RIVER BASIN--Continued

14-3068.1. DEER CREEK NEAR SALADO, OREG.--Continued

Suspended sediment, water year October 1966 to September 1967--Continued

Day	APRIL			MAY			JUNE				
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment			
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		
1..	6.5	C	4	0.1	3.9	C	5	0.1	1.3	C	3
2..	5.9	C	4	.1	3.8	C	5	.1	1.2	C	3
3..	5.4	C	4	.1	3.5	C	5	T	1.2	C	3
4..	5.4	C	4	.1	3.4	C	5	T	1.1	C	3
5..	6.1	C	4	.1	3.1	C	5	T	1.1	C	3
6..	6.1	C	4	.1	3.0	C	5	T	1.1	C	3
7..	6.0	C	4	.1	2.9	C	5	T	1.1	C	3
8..	5.7	C	4	.1	2.7	C	5	T	1.1	C	3
9..	5.9	C	4	.1	2.7	C	5	T	1.0	C	3
10..	5.2	C	4	.1	2.4	C	5	T	1.0	C	3
11..	4.9	C	4	.1	2.4	C	5	T	1.0	C	3
12..	4.9	C	4	.1	2.3	C	5	T	.96	C	3
13..	16	31	A	1.3	2.1	C	5	T	.92	C	3
14..	17	22		1.0	2.1	C	5	T	.88	C	3
15..	14	12		.5	2.0	C	5	T	.84	C	3
16..	14	18		.7	1.9	C	3	T	.84	C	3
17..	13	6		.2	1.8	C	3	T	.81	C	3
18..	11	7		.2	1.7	C	3	T	.78	C	3
19..	9.4	5		.1	1.7	C	3	T	.78	C	3
20..	8.0	10		.2	1.6	C	3	T	.81	C	3
21..	7.0	9		.2	1.6	C	3	T	.88	C	3
22..	6.1	4		.1	1.5	C	3	T	1.3	C	--
23..	5.5	22	A	.3	1.5	C	3	T	1.0	C	3
24..	4.9	21	A	.3	1.4	C	3	T	.88	C	3
25..	5.5	28	A	.4	1.4	C	3	T	.81	C	3
26..	4.9	C	5	.1	1.3	C	3	T	.78	C	3
27..	4.7	C	5	.1	1.3	C	3	T	.78	C	3
28..	4.5	C	5	.1	1.4	C	3	T	.72	C	3
29..	4.4	C	5	.1	1.5	C	3	T	.72	C	3
30..	4.2	C	5	.1	1.8	C	3	T	.68	C	3
31..	--	--	--	--	1.4	C	3	T	--	--	--
Total	222.1	--	--	7.2	67.1	--	--	0.9	28.37	--	0.2
Day	JULY			AUGUST			SEPTEMBER				
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment			
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		
1..	0.65	C	3	0.36	C	6	0.26	C	4		
2..	.62	C	3	.36	C	6	.28	C	4		
3..	.62	C	3	.34	C	6	.26	C	4		
4..	.59	C	3	.34	C	6	.24	C	4		
5..	.59	C	3	.34	C	6	.24	C	4		
6..	.56	C	3	.34	C	6	.26	C	4		
7..	.56	C	3	.34	C	6	.24	C	4		
8..	.56	C	3	.34	C	6	.22	C	4		
9..	.56	C	3	.32	C	6	.24	C	4		
10..	.53	C	3	.34	C	6	.36	C	4		
11..	.51	C	3	.32	C	6	.36	C	4		
12..	.53	C	3	.30	C	6	.28	C	4		
13..	.51	C	3	.30	C	6	.26	C	4		
14..	.48	C	6	.30	C	6	.24	C	4		
15..	.48	C	6	.28	C	4	.22	C	4		
16..	.48	C	6	.28	C	4	.24	C	4		
17..	.48	C	6	.28	C	4	.26	C	4		
18..	.45	C	6	.28	C	4	.24	C	4		
19..	.45	C	6	.26	C	4	.22	C	4		
20..	.45	C	6	.26	C	4	.21	C	4		
21..	.45	C	6	.28	C	4	.25	C	4		
22..	.43	C	6	.26	C	4	.21	C	4		
23..	.43	C	6	.26	C	4	.21	C	4		
24..	.43	C	6	.26	C	4	.19	C	4		
25..	.45	C	6	.24	C	4	.19	C	4		
26..	.43	C	6	.24	C	4	.18	C	4		
27..	.40	C	6	.26	C	4	.18	C	4		
28..	.40	C	6	.24	C	4	.18	C	4		
29..	.38	C	6	.24	C	4	.32	C	8		
30..	.38	C	6	.24	C	4	.75	C	18		
31..	.36	C	6	.26	C	4	--	--	--		
Total	15.20	--	0.2	9.06	--	0.1	7.75	--	0.1		
Total discharge for year (cfs-days).....										2280.0	
Total load for year (tons).....										249.3	

T Less than 0.05 ton.

A Computed from partly estimated-concentration graph.

C Composite period.

ALSEA RIVER BASIN--Continued  
 14-3068.1. DEER CREEK NEAR SALADO, OREG.--Continued

Particle-size analyses of suspended sediment, water year October 1966 to September 1967

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

Date of collection	Time (24 hour)	Water temperature (°F)	Sum-pling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment										Method of analysis		
							Percent finer than size indicated, in millimeters					95	100	100	95	100		95	100
							0.002	0.004	0.008	0.016	0.031								
Dec. 4, 1966.....	1320	46		55	263	39	8	10	14	19	26	32	44	64	95	100	--	VPWC	
Dec. 5.....	0040	46		44	56	25	--	9	--	--	44	58	77	100	100	95	100	VPWC	
Dec. 13.....	1520	49		51	183	109	6	6	--	17	26	33	44	82	94	94	96	SVFPC	
Jan. 27, 1967.....	1915	48		97	416		6	10	15	20	26	37	61	83	94	96	96	SVFPC	

UMPQUA RIVER BASIN

14-3100. COW CREEK NEAR RIDGLE, OREG.

LOCATION.--Lat 42°55'25", long 123°25'40", at gaging station 1,500 feet upstream from Council Creek, and 3.8 miles southwest of Riddle, Douglas County. DRAINAGE AREA.--456 square miles. RECORDS AVAILABLE.--Chemical analyses: August to September 1967.

Chemical analyses, in parts per million, August to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Borate (B)	Dissolved solids (residue at 180°)		Hardness as CaCO <sub>3</sub>	Specific conductance (microhmhos at 25°C)	pH			
															Tons per acre-foot	Tons per million						
Aug. 15, 1967....	29	9.6	0.04	12	8.0	7.8	1.1	66	3	5.8	11	0.1	0.3	0.01	95	0.13	7.44	63	4	0.4	160	8.6



14-3195. NORTH UMPQUA RIVER AT WINCHESTER, OREG.

LOCATION.--Lat 43°16'20", long 123°24'40", at gaging station 400 feet downstream from Brown's Bridge, 1.8 miles downstream from confluence with South Umpqua River, and 3 miles west of Winchester, Douglas County.  
 DRAINAGE AREA.--1,344 square miles.  
 RECORDS AVAILABLE.--Chemical analyses: August to September 1967.

Chemical analyses, in parts per million, August to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Fe)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F) (NO <sub>3</sub> ) (B)	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	
													Calcium, magnesium	Non-carbonate		Tons per acre-foot
Aug. 16, 1967.....	854	23	0.06	5.3	1.9	5.0	1.2	37	0	1.8	0.1	0.2	58	21	0	69
Sept. 13.....	953	24	.02	6.7	2.4	3.9	1.0	38	0	2.4	.1	.2	58	26	0	72

14-3209.5. UMPQUA RIVER NEAR TYEE, OREG.

LOCATION.--Lat 43°25'55", long 123°33'55", on Tyee access road bridge, southeast of Tyee, Douglas County.  
 RECORDS AVAILABLE.--Chemical analyses: August to September 1967.

Chemical analyses, in parts per million, August to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Fe)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F) (NO <sub>3</sub> ) (B)	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)
													Calcium, magnesium	Non-carbonate	
Aug. 17, 1967.....	846			6.1	2.6	5.4		39	0			62	26	0	79
Sept. 20.....				6.8	3.0	5.7		42	0			68	30	0	84

UMRQUA RIVER BASIN--Continued  
14-3210. UMRQUA RIVER NEAR ELKTON, OREG.

LOCATION.--Lat 43°35'10", long 123°33'30", at gaging station on right bank, 3.5 miles south of Elkton, 8.2 miles (revised) upstream from Elk Creek, Douglas County, and at mile 56.8.  
DRAINAGE AREA.--3,683 square miles.  
RECORDS AVAILABLE.--Chemical analyses: December 1965 to September 1967.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Phosphate (PO <sub>4</sub> )	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	Color	
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium	Non-carbonate			
Oct. 27, 1966	1990	14		10	3.6	5.3	1.0	44	0	6.0	6.0	0.1	0.5	0.16	73	0.10	292	40	4	105	7.0	10
Dec. 26	5220	16		7.8	3.9	3.0	1.4	30	0	4.0	2.0	.1	.4	.06	60	.08	1328	30	2	70	7.0	5
Dec. 29	5110	16		7.1	3.1	4.1	.4	40	0	4.0	2.0	.1	.4	.06	60	.08	1328	30	2	80	7.0	10
Jan. 27, 1967	33900	14		6.1	2.9	3.8	1.3	34	0	3.2	3.0	.0	.2	.10	50	.07	4580	27	0	68	7.3	25
Feb. 27	7730	17		7.1	2.8	3.9	.6	38	0	3.0	3.0	.0	.2	.09	60	.08	1250	29	0	74	7.5	15
Mar. 29	8140	17		6.7	2.7	3.8	.9	36	0	2.8	4.0	.1	.1	.05	58	.08	1270	28	0	74	7.5	5
Apr. 27	7920	17		6.9	2.7	4.0	.9	38	0	3.2	3.0	.1	.1	.09	60	.08	1280	28	0	77	7.5	5
May 29	4720	16		5.5	2.0	3.1	.8	32	0	2.2	1.5	.1	.1	.06	52	.07	663	22	0	61	7.5	0
June 29	2260	16		6.9	2.1	4.9	1.1	38	0	2.4	3.0	.1	.2	.05	62	.07	350	24	0	72	7.4	0
July 29	1604	16		6.0	2.5	5.5	1.4	39	0	2.4	3.0	.1	.7	.11	60	.08	146	26	0	78	7.0	5
Sept. 20	1000	19		6.7	2.7	5.6	1.4	41	0	4.0	4.0	.2	.1	.14	61	.08	165	28	0	81	7.9	5

COOS RIVER BASIN

14-3245. WEST FORK MILLICOMA RIVER NEAR ALLEGANY, OREG.

LOCATION.—Lat 43°28'35", Long 124°03'20", at gaging station on left bank at highway bridge, 40 feet upstream from Daggett Creek, and 3.8 miles north of Allegany, Coos County.

DRAINAGE AREA.—46.5 square miles.

RECORDS AVAILABLE.—Chemical analyses: October 1963 to September 1967.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Borate (B)	Dissolved solids (residue at 180°C)			Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH	Color
														Parts per million	Tons per acre-foot	Tons per day	Calcium	Non-Calcium			
Oct. 19, 1966.....	8.0	5.7	0.16	4.0	1.4	5.3	0.7	25	0	0.2	6.5	0.2	0.2	35	0.05	0.76	16	0	57	7.0	15
Nov. 16.....	1940	6.4	--	2.9	.9	3.7	.5	19	0	1.2	2.0	1.0	1.3	27	.04	92.7	10	2	43	6.8	10
Dec. 1.....	140	6.4	--	2.9	.9	3.7	.5	19	0	1.2	2.0	1.0	1.3	27	.04	92.7	10	2	43	6.8	10
Dec. 25, 1967.....	720	7.5	--	1.7	.9	3.6	.8	10	0	1.6	4.0	0.2	2.2	50	.04	58.3	8	0	37	6.9	10
Jan. 15.....	521	7.7	--	2.9	.9	3.3	.4	11	0	1.2	4.0	0.1	1.3	31	.04	43.6	10	2	36	6.9	10
Mar. 15.....	935	7.4	--	2.2	1.0	3.1	.7	11	0	.6	3.0	1.1	1.6	23	.03	58.1	10	0	35	6.8	10
Apr. 21.....	251	8.1	.03	2.2	.8	3.6	.4	12	0	1.6	4.0	1.1	1.1	26	.04	17.6	9	0	39	7.0	5
May 18.....	67	8.9	.11	2.4	.9	4.4	1.0	16	0	1.2	4.0	1.1	.8	36	.05	6.51	10	0	44	7.0	5
June 22.....	23	7.2	--	2.8	1.0	4.3	.8	8	0	.0	5.0	1.7	.3	32	.04	1.29	11	0	53	7.0	5
July 18.....	4.5	4.9	.11	3.6	1.3	5.8	1.1	22	0	.8	6.5	1.1	.4	38	.05	.43	12	0	58	7.4	5
Aug. 18.....	4.2	4.9	.11	3.6	1.3	5.8	1.1	22	0	.8	6.5	1.1	.4	38	.05	.43	12	0	58	7.4	5
Sept. 22.....	3.0	4.5	.04	3.7	1.5	5.5	.8	22	0	1.6	6.0	1.1	.4	32	.04	.26	15	0	59	6.9	5

## COOS RIVER BASIN--Continued

14-3245. WEST FORK MILLICOMA RIVER NEAR ALLEGANY, OREG.

Water temperature, turbidity, and color, water year October 1966 to September 1967

Date	Time	Water temperature (°F)	Discharge (cfs)	Turbidity	Color
Oct. 5, 1966.....	1500	58		0	10
Oct. 13.....	1630	52		0	15
Oct. 19.....	1300	47		0	15
Oct. 26.....	0945	53		0	15
Nov. 2.....	1630	54		0	15
Nov. 11.....	1330	51		0	30
Nov. 16.....	1610	50		0	10
Nov. 23.....	1450	47		0	5
Nov. 30.....	1625	53		15	20
Dec. 7.....	1330	46		5	10
Dec. 14.....	1645	--		5	5
Dec. 21.....	1500	45		0	5
Dec. 28.....	1525	43		0	10
Jan. 4, 1967.....	1515	48		0	10
Jan. 12.....	1530	45		0	10
Jan. 18.....	1215	44		0	10
Jan. 25.....	1725	46		70	10
Feb. 1.....	1800	47		0	5
Feb. 9.....	--	44		0	5
Feb. 15.....	1340	42		0	10
Feb. 22.....	1500	47		0	5
Mar. 2.....	1430	45		0	10
Mar. 8.....	1340	47		0	5
Mar. 15.....	1620	45		0	10
Mar. 22.....	1025	49		0	5
Mar. 29.....	1300	42		0	5
Apr. 5.....	1700	47		0	5
Apr. 14.....	1645	44		0	20
Apr. 21.....	1030	47		0	5
Apr. 27.....	1600	47		5	15
May 4.....	1545	52		0	5
May 9.....	1315	50		0	5
May 18.....	1620	62		0	5
May 25.....	1030	54		0	5
June 1.....	1530	62		0	15
June 8.....	1615	62		0	10
June 15.....	1630	65		0	10
June 22.....	1200	60		0	5
June 30.....	2115	76		0	10
July 12.....	1510	66		0	5
July 20.....	1540	69		0	5
July 27.....	1600	68		0	5
Aug. 4.....	1500	70		0	5
Aug. 10.....	1645	68		0	5
Aug. 18.....	1700	70		0	5
Aug. 24.....	1500	68		0	5
Aug. 30.....	1930	67		0	5
Sept. 7.....	1530	68		0	10
Sept. 13.....	1400	62		0	15
Sept. 22.....	1700	66		0	10



## ROGUE RIVER BASIN

## 14-3723. ROGUE RIVER NEAR AGNESS, OREG.

LOCATION.--Lat 42°34'50", long 124°03'30", temperature recorder at gaging station on left bank, 0.8 mile upstream from Shasta Costa Creek, 1.5 miles north of Agness, Curry County, 2.6 miles upstream from Illinois River, and at mile 29.7.

DRAINAGE AREA--3,939 square miles.

Water Chemistry: January 1966 to September 1967.

Water temperatures: October 1960 to September 1967.

EXTREMES, 1966-67.--Water temperatures: Maximum, 78°F on several days during August; minimum, 43°F on several days during January.

EXTREMES, 1960-67.--Water temperatures: Maximum, 80°F on several days during July 1962; minimum (1960-64, 1965-67), 34°F Jan. 22-25, 1962.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Fe)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonyl Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F) (NO <sub>3</sub> ) (PO <sub>4</sub> )	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>	Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	pH	Color		
												Tons per acre-foot	Tons per day							
Oct. 15, 1966....	1300	23	11	11	4.4	5.0	1.2	63	0	3.2	0.0	0.26	82	0.11	288	46	0	112	7.2	5
Oct. 15, 1966....	1300	25	11	11	4.4	5.0	1.2	63	0	3.2	0.0	0.26	82	0.11	288	46	0	112	7.0	15
Oct. 13, 1967....	16550	19	12	12	5.7	4.9	1.0	68	0	7.2	2.0	1.16	87	1.08	2340	38	1	127	7.2	20
Feb. 28, 1967....	5660	21	13	13	7.3	4.4	1.1	74	0	6.8	3.0	1.11	91	1.12	1390	62	2	138	7.8	25
Mar. 29, 1967....	7650	20	10	10	4.6	3.9	1.1	58	0	3.2	2.0	1.3	76	1.10	1570	44	0	108	7.9	5
Apr. 20, 1967....	7300	20	12	12	5.2	4.4	1.1	66	0	4.8	2.0	1.3	76	1.10	1500	52	0	120	7.5	5
May 24, 1967....	8650	18	11	11	3.9	3.2	1.0	48	0	2.8	1.0	1.2	71	0.99	1660	36	0	89	7.4	5
June 22, 1967....	3790	21	12	12	4.8	4.2	1.2	64	0	4.4	2.0	1.2	80	1.0	332	50	0	102	7.6	5
July 16, 1967....	1520	23	13	13	3.6	3.4	1.3	79	0	5.2	2.0	1.3	101	1.14	286	52	0	131	7.5	0
Aug. 27, 1967....	1320	25	10	10	4.1	6.2	1.5	59	1	3.4	3.0	1.1	81	1.11	289	42	0	112	8.3	5
Sept. 19, 1967....	1320	25	10	10	4.1	6.2	1.5	59	1	3.4	3.0	1.1	81	1.11	289	42	0	112	8.3	5



ROGUE RIVER BASIN--Continued

14-3780. ILLINOIS RIVER NEAR SELMA, OREG.

LOCATION.--Lat 42°22'45", long 123°48'40", temperature recorder at gaging station on right bank, 0.1 mile upstream from Panther Creek, 2.4 miles downstream from Biggs Creek, 4.2 miles northeast of Selma, Josephine County, and at mile 32.3. DRAIAGE AREA.--6685 acres. Drainage basin includes the Rogue River and Panther Creek. RECORDS AVAILABLE.--Water temperatures: October 1961 to September 1967. EXTREMES, 1966-67.--Water temperatures: Maximum, 79°F Aug. 18, 19; minimum, 49°F Dec. 29, Jan. 8-10. EXTREMES, 1961-64, 1965-67.--Water temperatures: Maximum, 80°F Aug. 2, 3, 1966; minimum (1961-64, 1966-67), 38°F Jan. 12-15, 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																																		
Maximum	66	66	65	64	63	63	65	64	62	61	60	59	57	56	55	54	53	52	52	52	52	52	52	55	56	56	56	56	56	56	56			
Minimum	65	63	61	60	60	60	61	61	60	58	59	57	56	55	54	52	52	51	51	52	52	52	52	55	55	56	56	55	55	55	55			
November																																		
Maximum	55	52	54	53	52	53	51	50	48	47	49	50	51	52	51	50	50	50	50	50	48	47	47	47	47	47	47	47	47	47	47			
Minimum	55	54	53	52	52	51	50	48	47	47	49	50	51	50	50	50	50	50	50	50	48	47	47	47	47	47	47	47	47	47	47			
December																																		
Maximum	48	49	50	48	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44			
Minimum	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44			
January																																		
Maximum	43	43	43	43	43	43	43	43	42	43	43	44	44	44	44	44	44	43	43	44	44	44	44	44	44	44	44	44	44	44	44			
Minimum	43	43	43	43	43	43	42	42	42	43	44	44	44	44	44	44	43	43	43	44	44	44	44	44	44	44	44	44	44	44	44			
February																																		
Maximum	45	45	44	44	44	44	44	44	44	45	45	45	45	44	44	44	45	47	47	45	45	45	45	45	45	45	45	45	45	45	45			
Minimum	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	45	45	44	45	45	45	45	45	45	45	45	45	45	45			
March																																		
Maximum	48	47	45	45	45	46	46	46	46	44	45	44	45	45	45	45	45	45	45	47	48	48	48	47	46	47	47	47	47	47	47			
Minimum	46	45	44	44	44	45	45	45	45	43	43	44	44	44	44	44	45	45	45	45	47	48	47	45	45	45	45	45	45	45	45			
April																																		
Maximum	46	47	48	48	48	48	48	48	48	48	47	47	47	46	46	46	46	46	46	46	47	47	47	47	47	47	46	46	46	46	46			
Minimum	45	46	47	47	47	47	47	47	47	47	47	47	47	46	45	45	45	45	45	45	46	46	47	47	47	46	45	45	45	45	45			
May																																		
Maximum	48	49	50	50	50	52	53	54	53	50	48	49	51	53	54	56	57	56	57	57	57	57	59	57	58	57	57	57	57	57	57			
Minimum	46	48	49	50	50	50	52	52	50	47	48	49	51	53	54	54	54	56	57	57	57	57	57	56	56	57	56	56	55	54	53			
June																																		
Maximum	54	58	60	62	63	63	62	63	63	63	63	62	63	66	68	69	70	72	70	68	66	67	70	68	66	67	71	72	73	74	75			
Minimum	53	54	56	57	60	60	59	60	59	60	59	61	62	64	65	67	67	66	65	63	62	63	66	67	67	67	67	67	68	69	69			
July																																		
Maximum	76	77	78	77	76	74	74	74	75	76	77	77	76	75	74	73	74	73	74	75	76	75	76	75	75	76	76	76	76	76	75			
Minimum	70	71	72	71	71	70	68	70	69	70	71	72	71	71	71	70	68	69	71	71	71	71	71	71	71	71	69	70	71	71	71			
August																																		
Maximum	77	77	77	76	75	75	75	75	75	75	75	76	77	78	77	78	79	79	77	77	77	77	77	77	75	74	73	74	74	73	75			
Minimum	71	71	72	71	71	71	71	71	71	71	71	71	71	71	71	71	71	72	72	71	71	71	71	71	71	69	70	68	69	68	70			
September																																		
Maximum	72	73	72	71	71	71	70	69	68	67	67	67	67	67	67	67	66	67	68	69	70	69	68	68	67	68	67	67	67	64	68			
Minimum	67	68	68	67	67	66	66	65	65	65	62	62	62	62	63	63	63	65	66	66	64	63	63	63	63	63	63	63	64	63	64			

MISCELLANEOUS ANALYSES OF STREAMS IN PACIFIC SLOPE BASINS IN OREGON AND LOWER COLUMBIA RIVER BASIN  
IN WASHINGTON

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	Col- or pH	
															Parts per million	Tons per acre-foot	Tons per day	Calcium, magnesium			Non-carbonate
Oct. 27, 1966.	15			5.0	1.1	4.7	0.5	28	0	0.6	3.5	0.1	0.3	--	A	45	0.06	17	0	57	7.3
Jan. 26, 1967.	16			3.2	1.3	3.3	.7	20	0	1.4	2.5	.1	.4	0.02		43	.06	16	0	43	7.1
Apr. 21, .....	16			5.0	1.2	5.2	1.5	22	0	2.0	3.5	.1	.0	.04		48	.06	18	0	48	7.2
July 22, .....	16							29	0								.07			59	7.3

COWLITZ RIVER BASIN

14-2427. TOUPE RIVER NEAR CASTLE ROCK, WASH. (Lat 46°19'10", Long 122°54'30")

Additional determinations

Date of collection	Cross section (24 hr)	Temperature (°F)	Turbidity (ppm)	Color	D.O. (dissolved oxygen ppm)	B.O.D. (biochemical demand ppm)	M.P.N. (most probable number coliform groups per 100 ml)	P. B. I. (Pearl-Benson Index)	Slime solids		Chromium		Zinc (Zn)	Arsenic (As)	Boron (B)	Total phosphate as PO <sub>4</sub>	Ammonium as N (NH <sub>4</sub> )
									Total (mg/l)	Settleable (ml/l)	Hexavalent (Cr <sup>6+</sup> )	Total (Cr)					
Oct. 27, 1966....					11.5		0						--				
Jan. 26, 1967....					11.6		10				0.00		0.01				
Apr. 21, .....					9.4		530				.00		.00				
July 22, .....																	

A Calculated from determined constituents.

## MISCELLANEOUS ANALYSES OF STREAMS IN PACIFIC SLOPE BASINS IN OREGON AND LOWER COLUMBIA RIVER BASIN--Continued

IN OREGON

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonylate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Boron (B)	Dissolved solids (residue at 180°C)		Hardness as CaCO <sub>3</sub>		Specific conductance (microhmhos at 25°C)			
															Parts per million	Tons per acre-foot	Tons per day	Calcium-Magnesium		Non-carbonate		
UMPUQA RIVER BASIN																						
14-3080. SOUTH UMPQUA RIVER AT TILLER, OREG. (Lat 42°55'50", long 122°56'50")																						
Aug. 16, 1967.....	59	13	0.05	14	2.9	7.6	0.9	49	0	10	9.0	0.1	0.2	0.06	84	0.11	13.4	47	7	0.5	134	7.7
14-3085. ELK CREEK NEAR DREW, OREG. (Lat 42°53'25", long 122°55'00")																						
Aug. 16, 1967.....	0.4		0.06	11	7.2	23		112	0	44					193	0.26	0.21	57	0		326	7.4
SOUTH UMPQUA RIVER AT DAVIS CREEK, OREG. (Lat 42°58'23", long 123°10'13")																						
Aug. 16, 1967.....					1.4	3.9	8.2								92	0.13		51	4		151	7.3
14-3090. COW CREEK NEAR AZALIA, OREG. (Lat 42°49'30", long 123°10'40")																						
Aug. 15, 1967.....	8.5			11	6.8	6.2		77	0						85	0.12	1.95	56	0		136	8.0
14-3095. WEST FORK COW CREEK NEAR GLENDALE, OREG. (Lat 42°48'15", long 123°36'35")																						
Aug. 15, 1967.....	11			10	3.7	6.3		51	1						77	0.10	2.29	40	0		114	8.3
14-3107. SOUTH MYRTLE CREEK NEAR MYRTLE, OREG. (Lat 43°01'55", long 123°11'30")																						
Aug. 15, 1967.....	1.7			28	8.4	8.1	126	0		11					153	0.21	0.70	104	1		248	7.8
14-3110. NORTH MYRTLE CREEK NEAR MYRTLE CREEK, OREG. (Lat 43°02'30", long 123°15'30")																						
Aug. 15, 1967.....	1.9			22	9.8	11	95	0		26					158	0.21	0.81	96	18		253	7.9
SOUTH UMPQUA RIVER NEAR DILLARD, OREG. (Lat 43°04'52", long 123°23'08")																						
Aug. 15, 1967.....				14	6.4	8.4	70	0							93	0.13		62	4		168	7.4
GLALLA CREEK NEAR BROCKWAY, OREG. (Lat 43°06'48", long 123°30'24")																						
Aug. 15, 1967.....				11	7.1	7.2	77	0							86	0.12		56	0		148	7.0
SOUTH UMPQUA RIVER NEAR ROSSBURG, OREG. (Lat 43°09'38", long 123°23'40")																						
Aug. 15, 1967.....				15	6.8	9.3	72	0							102	0.14		66	6		179	7.3
14-3176. ROCK CREEK NEAR GLIDE, OREG. (Lat 43°20'35", long 122°59'30")																						
Aug. 16, 1967.....	22	14	0.04	7.8	2.1	3.7	0.5	36	0	7.2	1.0	0.1	0.2	0.00	59	0.08	3.50	28	0	0.3	78	7.9
NORTH UMPQUA RIVER NEAR GLIDE, OREG. (Lat 43°18'35", long 123°04'21")																						
Aug. 16, 1967.....				5.5	2.0	4.9	36	0							64	0.09		22	0		68	7.4
CALAPOOYA CREEK NEAR UMPQUA, OREG. (Lat 43°22'02", long 123°27'35")																						
Aug. 17, 1967.....				8.2	4.4	8.4	54	0							76	0.10		38	0		117	7.5

14-3209. UMPQUA RIVER AT UMPQUA, OREG. (Lat 43°21'58", Long 123°28'03")																						
Date	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment		Method of analysis													
							Percent finer than size indicated, in millimeters															
Aug. 17, 1967	.....	22	0.04	5.9	5.2	1.1	40	0	2.2	2.0	0.1	0.2	0.04	68	0.09	24	0	0.5	77	7.7		
14-3220. ELK CREEK AT DRAIN, OREG. (Lat 43°38'30", Long 123°17'50")																						
Aug. 14, 1967	.....	1.5		32	6.4	20	72	0	46	178	0.24	0.64	106	48		271	7.8					
ELK CREEK ON STATE HIGHWAY 38, EAST OF ELKTON, OREG. (Lat 43°38'48", Long 123°31'22")																						
Aug. 14, 1967A	.....	2.6		8.3	3.2	9.4	1.7	40	0	1.2	16	0.1	0.3	0.02	68	0.09	34	0	0.7	123	7.5	
14-3229. UMPQUA RIVER AT SCOTTSBURG, OREG. (Lat 43°39'15", Long 123°49'25")																						
Aug. 14, 1967	.....	1080		5.8	2.6	5.3	38	0		60	0.08	170	25	0		77	7.8					
SMITH RIVER NEAR SCOTTSBURG, OREG. (Lat 43°47'36", Long 123°46'32")																						
Aug. 14, 1967A	.....		9.4	0.12	4.1	1.6	5.8	1.1	25	0	0.2	6.0	0.1	0.3	0.05	44	0.06	16	0	0.6	66	7.5

A Includes 5 units of color.

Periodic determinations of suspended-sediment discharge and particle size, water year October 1966 to September 1967

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

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment		Method of analysis											
							Percent finer than size indicated, in millimeters													
							0.002	0.002												
WALLA WALLA RIVER BASIN																				
14-0120. WALLA WALLA RIVER AT MILTON, OREG. (Lat 45°55'25", Long 118°22'40")																				
Oct. 18, 1966	.....	41		130		2														
Dec. 17	.....	44		370		20														
Jan. 29, 1967	.....	45		966		1090														
Mar. 24	.....	1045		363		6														
Apr. 18	.....	1625		E		5														
May 22	.....	1800		604		44														
June 21	.....	1735		152		20														
Aug. 22	.....	1830		50		2														
Sept. 25	.....	1740		64		1														

UMATILLA RIVER BASIN

14-0203. MEACHAM CREEK NEAR GIBSON, OREG. (Lat 45°42'15", Long 118°21'20")

Oct. 18, 1966	.....	38		16		5														
Dec. 17	.....	0950		302		4														
Jan. 28, 1967	.....	40		271		2														
Jan. 28	.....	0955		486		108														
Feb. 17	.....	1205		152		3														
Mar. 24	.....	1405		438		6														
Apr. 21	.....	0915		221		2														
May 14	.....	1090		670		14														
May 23	.....	1750		323		6														
June 3	.....	0930		47		2														
June 23	.....	1730		76		2														
Sept. 26	.....	0945		6.8		1														
Sept. 26	.....	0945		9.0		1														

E Estimated.  
T Less than 0.50 ton.

MISCELLANEOUS ANALYSES OF STREAMS IN PACIFIC SLOPE BASINS IN OREGON AND LOWER COLUMBIA RIVER BASIN--Continued  
IN OREGON--Continued

Periodic determinations of suspended-sediment discharge and particle size, water year October 1966 to September 1967--Continued  
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water;  
P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water tem- per- ature (F)	Sam- pling point	Discharge (cfs)	Sediment concen- tration (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
JOHN DAY RIVER BASIN																	
14-0385. JOHN DAY RIVER AT PRAIRIE CITY, OREG. (Lat 44°27'15", Long 118°43'00")																	
Oct. 19, 1966.....	0645	--		64	4	0.7											
Dec. 18, 1966.....	0940	36		130	12	1.9											
Jan. 3, 1967.....	0940	34		223	32	20											
Feb. 20, 1967.....	1405	34		81	16	3.9											
Mar. 21, 1967.....	0930	42		143	13	5.0											
Apr. 19, 1967.....	1805	43		112	10	3.0											
May 8, 1967.....	1940	53		205	130	72											
May 19, 1967.....	1335	51		358	120	116											
June 26, 1967.....	1510	68		171	14	6.5											
14-0395. SOUTH FORK JOHN DAY RIVER NEAR DAYVILLE, OREG. (Lat 44°25'40", Long 119°32'20")																	
Oct. 19, 1966.....	0815	--		56	3	0.5											
Dec. 1, 1966.....	1635	41		291	99	79											
Jan. 29, 1967.....	1730	41		1300	484	1700											
Jan. 30, 1967.....	1220	37		558	330	497											
Feb. 20, 1967.....	1820	41		121	28	9.1											
Mar. 21, 1967.....	1215	44		318	68	58											
Apr. 19, 1967.....	1405	47		268	44	32											
May 8, 1967.....	1730	61		658	300	1300											
May 19, 1967.....	1025	55		766	219	146											
May 20, 1967.....	1025	55		766	219	146											
June 27, 1967.....	0845	62		100	57	35											
14-0405. JOHN DAY RIVER AT PICTURE GORGE, NEAR DAYVILLE, OREG. (Lat 44°31'15", Long 119°37'30")																	
Oct. 19, 1966.....	1000	--		133	24	9											
Dec. 16, 1966.....	0825	38		813	72	158											
Jan. 29, 1967.....	1650	41		2490	672	4520											
Jan. 30, 1967.....	1450	39		1780	303	1460											
Feb. 20, 1967.....	1650	42		404	16	17											
Mar. 21, 1967.....	1450	44		825	51	114											
Apr. 19, 1967.....	1320	47		648	38	66											
May 8, 1967.....	1640	61		1390	407	1530											
May 9, 1967.....	0915	52		1590	507	2180											
May 20, 1967.....	1280	53		2240	280	1690											
June 27, 1967.....	1040	64		500	76	103											

VPWC







SOUTHEASTERN ALASKA--Continued  
15-0540. AUNE CREEK AT AUNE BAY--Continued  
Temperature (°F) of water, water year October 1966 to September 1967--Continued

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																																
Maximum ....					36	36	35	36	36	36	36	36	36	37	37	37	37	37	37	37	36	36	36	36	36	36	37	37	37	37	37	36
Minimum ....					36	35	35	36	36	36	36	36	36	36	37	37	37	37	37	36	36	36	36	36	36	36	36	37	37	37	37	37
May																																
Maximum ....					37	38	38	38	39	39	40	40	39	40	40	40	41	40	40	41	41	42	42	42	42	42	42	42	42	42	42	42
Minimum ....					37	37	38	38	38	39	39	39	39	40	40	40	40	40	40	39	40	40	40	40	40	40	40	40	40	40	40	40
June																																
Maximum ....					50	49	50	51	51	52	54	54	54	56	56	55	55	55	55	58	61	61	61	61	61	61	61	61	61	61	61	61
Minimum ....					47	46	47	50	50	49	51	54	55	55	52	52	55	58	61	61	61	61	61	61	61	61	61	61	61	61	61	61
July																																
Maximum ....					57	58	60	59	59	60	59	58	59	59	60	61	61	61	61	60	60	60	60	60	60	60	60	60	60	60	60	60
Minimum ....					57	57	58	58	59	59	58	58	59	60	60	61	61	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
August																																
Maximum ....					60	60	60	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62
Minimum ....					60	59	59	60	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62
September																																
Maximum ....					60	59	59	60	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62
Minimum ....					60	59	59	60	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62

Periodic determinations of suspended-sediment discharge, water year October 1966 to September 1967

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

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment				Method of analysis	
							Percent finer than size indicated, in millimeters					
Apr. 18, 1967.....	1500	37		4.1	4	T						

T Less than 0.50 ton.

























## 15-2480. TRAIL RIVER NEAR LAWING

LOCATION--Lat 60°26'00", Long 149°22'20", at gaging station near center of stream on downstream end of pier at bridge site on Seward-Anchorage Highway, 2.1 miles 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 1967.

Water temperatures: April 1959 to September 1967.

Sediment records: August and September 1967 (periodic).

EXTREMES, 1959-66.--Water temperatures: Maximum, 55°F July 22, 1965, July 23-25, 1966.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH	Color
														Calcium	Non-carbonate			
Oct. 1-11, 1966.....	1180	3.9	0.00	1.2	0.9	1.8	0.1	32	11	0.0	0.0	0.2	46	35	9	77	6.6	10
Oct. 12-22.....	726	4.3	0.03	1.3	0.9	1.5	0.6	34	11	0.7	0.0	0.3	50	37	9	84	7.5	7
Oct. 23-31.....	432	3.8	0.00	1.4	0.9	1.5	0.7	34	12	4.4	0.0	0.9	51	39	10	82	7.4	7
Nov. 1-11.....	513	4.1	0.00	1.4	1.0	1.5	0.8	34	14	4.4	0.0	0.3	53	40	12	91	7.3	6
Nov. 12-21.....	316	4.5	0.00	1.5	1.1	1.7	0.7	39	13	4.4	0.1	0.3	56	42	10	97	7.5	8
Nov. 22-30.....	280	4.8	0.00	1.7	1.1	2.1	0.5	44	16	0.0	0.0	0.3	66	47	11	102	7.4	5
Dec. 1-11.....	197	5.4	0.00	2.0	1.2	2.2	0.6	48	15	4.4	0.0	0.9	75	55	16	110	7.6	5
Jan. 1-15, 1967.....	100	5.2	0.00	1.9	1.2	2.4	0.2	52	15	4.4	0.0	0.6	70	53	11	115	7.6	5
Jan. 16-31.....	100	5.3	0.00	2.0	1.3	2.3	0.4	52	14	4.4	0.1	0.3	70	55	12	122	7.6	0
Feb. 4-15.....	95	5.4	0.00	2.0	1.3	2.1	0.3	53	16	7.0	0.0	0.2	72	54	11	123	7.3	0
Feb. 16-28.....	90	4.8	0.04	1.9	1.3	2.0	0.3	53	16	0.0	0.3	0.5	70	54	11	123	7.2	5
Mar. 1-18.....	85	4.6	0.00	1.6	1.3	2.1	0.4	54	14	0.0	0.0	0.4	66	42	10	169	7.0	5
Mar. 19-31.....	1810	4.0	0.00	1.4	1.0	1.8	0.1	56	12	0.0	0.0	0.0	38	28	16	66	7.1	10
June 15.....	1700	4.0	0.00	1.4	1.0	1.9	0.1	56	12	0.0	0.0	0.0	38	28	16	66	7.1	10
Aug. 4.....	4100	2.1	0.31	1.9	1.3	1.9	0.9	27	9.0	0.7	0.1	0.4	41	32	10	67	7.0	0
Sept. 8.....	1700	4.1	0.38	1.9	1.3	1.9	0.9	27	9.0	0.7	0.1	0.4	41	32	10	67	7.0	0

Periodic determinations of suspended-sediment discharge, water year October 1966 to September 1967

(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water;

P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Percent finer than size indicated, in millimeters		Method of analysis
							0.075	0.075	
Aug. 4, 1967.....	1056	54		1700	16	73			
Sept. 8.....	1230	47		4100	40	440			



## 15-2751. CHESTER CREEK AT ARCTIC BOULEVARD, AT ANCHORAGE

LOCATION.--Lat 61°12'20", long 149°53'45", at gaging station on right bank at downstream end of bridge at Artic Boulevard., and 1 mile upstream from mouth.

DRAINAGE AREA.--29.3 square miles.

RECORDS AVAILABLE.--Chemical analyses: May to September 1967 (periodic).

Sediment records: June to September 1967.

EXTREMES, June to September 1967.--Sediment concentrations: Maximum daily, 882 ppm Aug. 13.

Sediment loads: Maximum daily, 155 tons Aug. 13.

REMARKS.--periodic fluctuation in sediment concentration and discharge relation due to washing of streets and road construction near the stream.

## Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH	Color
														Calcium	Non-carbonate			
May 3, 1967.....	22.4	10	0.98	26	4.6	4.8	0.9	88	19	1.8	0.1	1.7	113	84	12	195	7.6	20
May 13.....	20.4	8.5	1.13	25	6.2	5.8	1.0	97	16	5.3	.1	2.5	120	88	8	204	7.3	10
May 31.....	23.2	12	.68	26	6.8	5.0	1.5	99	19	5.3	.1	1.1	123	93	12	208	7.4	17
Aug. 16.....	66.2	11	.42	23	5.3	4.4	1.2	93	18	3.9	.0	2.2	119	88	12	187	7.2	25
Sept. 6.....	66.2	11	.42	21	5.3	4.4	1.0	83	21	5.7	.1	.8	102	78	26	159	6.9	60

## Periodic determinations of suspended-sediment discharge and particle-size, water year October 1966 to September 1967

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

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment					Method of analysis							
							Percent finer than size indicated, in millimeters												
							0.002	0.004	0.008	0.016	0.031		0.062	0.125	0.250	0.500	1.000	2.000	
May 3, 1967.....	1130	45		22.4	44	3	--	--	--	--	--	--	--	--	--				
May 15.....	0850	44		20.4	13	.7	--	--	--	--	--	--	--	--	--				
May 31.....	1200	46		16.4	18	.8	--	--	--	--	--	--	--	--	--				
July 20.....	1415	52		25.6	365	25	60	76	88	84	89	90	86	86	94	98	100		BMC
Aug. 16.....	1100	32		23.2	17	6	39	43	53	66	75	79	86	86	94	98	100		BMC
Sept. 6.....	1300	45		66.2	94	17	35	41	53	66	75	79	86	86	94	98	100		VBMC

## ALASKA WEST OF LONGITUDE 141°--Continued

15-2751. CHESTER CREEK AT ARCTIC BOULEVARD, AT ANCHORAGE--Continued

Suspended sediment, June to September 1967

Day	APRIL			MAY			JUNE		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..							--	--	--
2..							--	--	--
3..							--	--	--
4..							--	--	--
5..							--	--	--
6..							--	--	--
7..							--	--	--
8..							--	--	--
9..							--	--	--
10..							--	--	--
11..							--	--	--
12..							--	--	--
13..							--	--	--
14..							--	--	--
15..							19	140	7
16..							18	55	3
17..							18	110	5
18..							18	58	3
19..							19	68	3
20..							20	200	11
21..							20	200	11
22..							19	150	8
23..							19	190	10
24..							19	130	7
25..							20	420	23
26..							20	380	20
27..							19	510	26
28..							19	180	9
29..							19	210	11
30..							20	290	16
31..							--	--	--
Total							306	--	173
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..	19	130	7	24	88	6	25	190	13
2..	18	51	2	23	80	5	25	300	20
3..	18	80	4	22	220	13	31	280	23
4..	18	60	3	21	390	22	45	490	60
5..	18	230	11	30	360	29	67	380	69
6..	18	100	5	26	114	S 5	65	160	28
7..	19	67	3	22	352	S 20	55	85	13
8..	22	80	5	22	210	S 12	47	68	9
9..	21	78	4	22	470	28	40	62	7
10..	19	70	4	23	470	29	36	37	4
11..	18	74	4	26	220	15	36	40	4
12..	17	100	4	25	350	24	34	110	10
13..	17	150	7	41	882	S 155	37	220	22
14..	17	190	9	41	380	S 61	35	160	15
15..	17	210	10	26	140	10	34	140	13
16..	18	80	4	23	120	7	31	160	13
17..	19	80	4	30	84	7	34	110	10
18..	19	90	5	26	220	15	34	330	30
19..	20	290	16	24	390	25	34	320	29
20..	24	410	26	23	150	9	32	590	51
21..	23	410	25	23	75	5	30	480	39
22..	24	190	12	23	40	2	29	640	50
23..	24	88	6	22	120	7	31	470	39
24..	21	300	17	22	120	7	32	140	12
25..	21	250	14	25	180	12	32	250	22
26..	21	590	33	26	280	20	31	310	26
27..	22	280	17	23	110	7	31	410	34
28..	22	55	3	23	65	4	30	430	35
29..	21	40	2	27	180	13	29	410	32
30..	21	34	2	27	120	9	29	270	21
31..	23	100	6	25	60	4	--	--	--
Total	619	--	274	786	--	587	1081	--	753
Total discharge for period June 15 to Sept. 30, 1967 (cfs-days)..... 2792									
Total load for period June 15 to Sept. 30, 1967 (tons)..... 1787									

S Computed by subdividing day.



ALASKA WEST OF LONGITUDE 141°--Continued  
 15-3040. KUSKOKWIM RIVER AT CROOKED CREEK--Continued  
 Specific conductance (micromhos at 25°C), water year October 1966 to September 1967

Day	October	November	December	January	February	March	April	May	June	July	August	September
1.....	200							--	110	194		
2.....	200							--	138	198		
3.....	197							--	137	198		
4.....	--							--	134	194		
5.....	--							--	134	--		
6.....	161							--	129	189		
7.....	161							--	127	185		
8.....	163							--	130	184		
9.....	161							--	133	186		
10.....	161							108	136	--		
11.....	161							105	138	--		
12.....	158							101	136	--		
13.....	158							99	135	--		
14.....	162							100	142	--		
15.....	165							100	153	--		
16.....	160							95	185	--		
17.....	163							95	206	--		
18.....	--							100	182	--		
19.....	--							104	182	--		
20.....	--							104	193	--		
21.....	--							103	194	--		
22.....	--							104	--	--		
23.....	--							108	194	--		
24.....	--							107	202	--		
25.....	--							110	200	--		
26.....	--							113	201	--		
27.....	--							115	206	--		
28.....	--							124	203	--		
29.....	--							127	197	--		
30.....	--							131	203	--		
31.....	--							129	--	--		
Average	--							--	165	--		



## ALASKA WEST OF LONGITUDE 141°--Continued

## 15-5140. CHENA RIVER AT FAIRBANKS--Continued

Suspended sediment, water year October 1966 to September 1967  
(Where no concentrations are reported, loads are estimated)

Day	OCTOBER			NOVEMBER			DECEMBER		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	604	39	64	310		25	310		25
2..	597	32	52	320		26	310		25
3..	590	24	38	330		27	310		25
4..	597	24	39	330		27	310		25
5..	597	56	90	330		27	310		25
6..	597	40	A 64	340		28	300		24
7..	604	27	44	340		28	300		24
8..	604	47	77	330		27	300		24
9..	590	40	A 64	320		26	300		24
10..	590	30	48	320		26	300		24
11..	576	50	78	310		25	300		24
12..	562	48	73	300		24	300		24
13..	548	24	36	300		24	300		24
14..	555	23	34	290		23	290		23
15..	541	18	26	290		23	290		23
16..	500	50	A 68	290		23	290		23
17..	480	26	34	300		24	280		23
18..	460	32	40	300		24	280		23
19..	440	22	26	300		24	270		22
20..	410	28	31	300		24	270		22
21..	380	60	A 62	300		24	270		22
22..	359	70	A 68	300		24	270		22
23..	326	54	48	310		25	260		21
24..	272	20	15	310		25	260		21
25..	260	29	20	310		25	260		21
26..	260	60	A 42	310		25	250		17
27..	260	--	21	310		25	250		17
28..	270	--	22	310		25	250		17
29..	280	--	23	310		25	250		17
30..	290	--	23	310		25	250		17
31..	300	--	24	--	--	--	250		17
<b>Total</b>	<b>14299</b>	<b>--</b>	<b>1394</b>	<b>9330</b>	<b>--</b>	<b>753</b>	<b>8740</b>	<b>--</b>	<b>685</b>
	JANUARY			FEBRUARY			MARCH		
1..	250		17	230		12	210		11
2..	250		17	230		12	210		11
3..	250		17	230		12	200	21	11
4..	250		17	230		12	200		11
5..	250		17	230		12	200		11
6..	250		17	230		12	200		11
7..	250		17	230		12	200		11
8..	250		17	230		12	200		11
9..	250		17	230		12	200		11
10..	250		17	230		12	200		11
11..	250		17	230		12	200		11
12..	250		17	230		12	200		11
13..	250		17	230		12	200		11
14..	250		17	220		12	200		11
15..	260		21	220		12	200		11
16..	260		21	220		12	200		11
17..	260		21	220		12	210		11
18..	260		21	220		12	210		11
19..	260		21	220		12	210		11
20..	250		17	220		12	210		11
21..	250		17	220		12	210		11
22..	250		17	220		12	210		11
23..	250		17	220		12	210		11
24..	240		16	220		12	210		11
25..	240		16	220		12	210		11
26..	240		16	210		11	210		11
27..	240		16	210		11	210		11
28..	240		16	210		11	210		11
29..	240		16	--		--	200		11
30..	240		16	--		--	200		11
31..	240		16	--		--	200		11
<b>Total</b>	<b>7720</b>	<b>--</b>	<b>539</b>	<b>6260</b>	<b>--</b>	<b>333</b>	<b>6340</b>	<b>--</b>	<b>341</b>

A Computed from partly estimated-concentration graph.



## ALASKA WEST OF LONGITUDE 141°--Continued

## 15-5648. YUKON RIVER AT RUBY

LOCATION.--Lat 64°44'25", long 155°29'55", at gaging station on left bank at Ruby, 300 feet downstream from Ruby Creek, 2 miles downstream from Melozitna River, and 2.2 miles upstream from Ruby Slough.  
 DRAINAGE AREA.--259,000 square miles, approximately.  
 RECORDS AVAILABLE.--Chemical analyses: June 1966 to September 1967.  
 Water temperatures: June 1966 to September 1967.  
 EXTREMES, 1966-67.--Water temperatures: Maximum, 64°F July 24, 26, 1966, June 24, July 11, 13, 1967.  
 EXTREMES, June 1966 to September 1967.--Water temperatures: Maximum, 64°F July 24, 26, 1966, June 24, July 11, 13, 1967.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH	Color
														Calcium	Non-carbonate			
Oct. 1-15, 1966.....	149000	8.5	0.00	39	8.4	4.1	1.9	140	24	0.4	0.1	1.1	157	131	16	260	7.9	10
Oct. 16-30, 1966.....	125000	8.4	0.00	32	8.4	3.1	2.4	114	23	0.4	0.1	1.1	132	108	15	218	7.2	20
Nov. 1-15, 1967.....	415000	4.7	1.13	23	4.3	1.9	1.2	78	12	0.0	0.5	1.1	187	75	11	150	7.4	100
May 22-31, 1967.....	415000	4.7	1.13	23	4.3	1.9	1.2	78	12	0.0	0.5	1.1	187	75	11	150	7.4	100
May 25-31, 1967.....	406500	5.1	3.1	30	3.8	1.8	1.6	88	20	0.7	0.3	1.2	106	88	16	172	7.3	40
June 1-5, 1967.....	498000	4.9	1.5	25	4.4	1.9	1.2	83	13	0.0	0.5	1.0	93	80	12	157	7.6	100
June 6-18, 1967.....	666000	4.9	1.1	24	4.0	1.7	2.0	90	16	0.4	0.1	0.7	98	83	9	165	7.4	20
June 19-30, 1967.....	506000	6.2	0.8	30	5.0	2.3	2.2	100	18	0.0	0.0	0.8	114	96	14	190	7.3	15
July 1-15, 1967.....	391000	6.9	0.8	33	6.0	3.1	2.4	114	23	0.4	0.1	1.1	132	108	15	218	7.2	20
July 16-31, 1967.....	373000	6.7	1.06	34	5.2	2.9	2.6	120	20	0.0	0.0	1.4	121	108	13	202	7.7	15
Aug. 1-16, 1967.....	397000	7.2	0.9	41	4.0	2.1	2.5	124	26	2.1	0.2	0.5	146	119	17	315	7.8	15
Aug. 17-31, 1967.....	564000	7.0	1.4	28	5.5	2.1	1.7	99	20	0.0	0.1	1.5	115	92	11	182	7.5	35
Aug. 17-31, 1966.....	553000	7.0	1.3	36	1.7	1.5	1.3	74	14	1.4	0.2	0.4	99	97	36	194	7.5	15
Sept. 1-5, 1966.....	371000	7.2	0.8	42	1.7	1.8	1.4	104	30	1.4	0.2	0.4	136	108	23	207	7.6	15
Sept. 6-17, 1966.....	318000	7.6	0.4	40	2.4	2.8	1.4	117	21	0.0	0.1	0.7	135	110	14	206	7.7	15
Sept. 18-27, 1966.....	237000	7.9	0.04	36	4.4	2.8	1.3	114	24	0.0	0.1	0.6	135	108	15	204	7.7	20
Sept. 28-30, 1966.....	257000	8.2	1.0	32	4.0	3.1	1.6	120	23	0.4	0.1	0.7	140	113	15	207	7.7	20



## MISCELLANEOUS ANALYSES OF STREAMS IN ALASKA

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (µmole at 180°C)	Hardness as CaCO <sub>3</sub> Calcium, Non-magnesium	Specific conductance (micro-mhos at 25°C)	pH	Color	
SOUTHEASTERN ALASKA																		
15-0080. SALMON RIVER NEAR HYDER (lat 56°01'34", long 130°03'55")																		
Apr. 13, 1967	.....	A33.7	2.6	0.03	30	1.2	0.8	1.0	60	26	0.0	0.6	0.0	92	80	31	171	7.8
15-0105. HALIBUT BAY TRIBUTARY NEAR HYDER (lat 55°15'00", long 130°06'00")																		
Apr. 13, 1967	.....	A18.8															23	6.9
15-0115. RED RIVER NEAR METLAKATLA (lat 55°25'00", long 130°52'06")																		
Apr. 14, 1967	.....	121															23	6.9
15-0119. CABIN CREEK NEAR KETCHIKAN (lat 55°19'19", long 130°47'00")																		
Apr. 15, 1967	.....	23.0															29	7.0
15-0120. WINSTANLEY CREEK NEAR KETCHIKAN (lat 55°25'00", long 130°52'05")																		
Apr. 15, 1967	.....	A29.5															17	6.8
15-0201. TYEE CREEK AT MOUTH, NEAR WRANGELL (lat 56°12'54", long 131°30'25")																		
Apr. 10, 1967	.....	13.8															12	6.7
15-0220. HARDING RIVER NEAR WRANGELL (lat 56°12'50", long 131°38'15")																		
Apr. 10, 1967	.....	98	6.2	3.8	0.4	3.2	15	1.0	3.5	0.1	25	11	0	34	0	34	6.7	
15-0260. CASCADE CREEK NEAR PETERSBURG (lat 57°00'21", long 132°46'45")																		
Apr. 9, 1967	.....	A35.3															25	7.2
15-0400. DOROTHY CREEK NEAR JUNEAU (lat 58°13'40", long 134°02'25")																		
Mar. 31, 1967	.....	A13	1.3	1.8	0.6	1.4	6	2.0	2.1	0.3	12	7	2	19	2	19	6.9	
15-0479. RHINE CREEK NEAR JUNEAU (lat 58°12'27", long 134°09'54")																		
Mar. 29, 1967	.....	20	2.7	0.04	9.8	1.6	26	16	15	41	104	31	18	182	7.1			
15-0479.2. DUPONT CREEK NEAR DOUGLAS (lat 58°13'44", long 134°15'49")																		
Mar. 30, 1967	.....	0.1	3.7	0.03	11	0.5	3.2	32	7.2	2.4	44	30	4	77	4	77	7.4	

A Discharge at time of sampling.

15-0480.1. SHEEP CREEK AT MOUTH, NEAR DOUGLAS (lat 58°15'40", long 134°19'23")															
Nov. 22, 1966	20.9	3.1	0.04	15	1.0	1.2	37	12	1.6	0.1	52	42	12	92	7.7
15-0480.4. CROSS BAY CREEK NEAR JUNEAU (lat 58°16'32", long 134°21'17")															
Nov. 22, 1966	3.4	2.7	0.04	17	0.7	1.6	43	12	1.6	0.2	57	46	11	100	7.7
15-0480.5. SNOWSLIDE CREEK NEAR JUNEAU (lat 58°16'57", long 134°22'16")															
Nov. 22, 1966	1.4	3.7	0.06	22	0.7	1.4	52	15	2.0	0.2	71	58	15	128	7.7
15-0510. SALMON CREEK AT FLUME NEAR JUNEAU (lat 58°19'55", long 134°28'03")															
Nov. 22, 1966	2.0	0.04	7.2	1.2	0.9	20	6.7	1.4	0.1	30	23	7	48	7.4	
15-0519.5. UNNAMED CREEK AT 5.2 MILE, NEAR JUNEAU (lat 58°20'43", long 134°29'48")															
Mar. 10, 1967	1.1	5.9	0.13	9.4	0.8	6.0	29	11	4.0	0.2	52	27	3	75	7.3
15-0520.2. LEMON CREEK AT BRIDGE, NEAR JUNEAU (lat 58°21'28", long 134°29'56")															
Nov. 22, 1966	54.6	6.3	0.03	10	1.0	3.0	27	9.6	3.2	0.1	47	30	8	75	7.3
15-0521.9. SWITZER CREEK NEAR JUNEAU (lat 58°21'45", long 134°30'10")															
Nov. 22, 1966	1.1	4.3	0.02	29	2.8	5.1	89	12	7.4	105	85	12	190	8.0	
15-0524.8. JORDAN CREEK NEAR AUKE BAY (lat 58°21'47", long 134°34'42")															
Nov. 28, 1966	4.0	4.2	0.05	14	1.3	8.5	40	8.2	12	0.0	68	40	7	120	7.7
15-0524.9. DUCK CREEK NEAR AUKE BAY (lat 58°21'47", long 134°34'42")															
Dec. 2, 1966	0.5	2.2	0.01	26	2.2	4.1	83	9.6	5.0	0.1	91	75	7	162	8.1
15-0525. MENDEHALL RIVER NEAR AUKE BAY (lat 58°25'05", long 134°32'40")															
Mar. 15, 1967	33	2.5	8.8	1.1	1.4	28	3.8	1.8	0.1	34	27	4	65	7.4	
15-0525.1. MENDEHALL RIVER TRIBUTARY NEAR AUKE BAY (lat 58°25'44", long 134°33'28")															
Nov. 28, 1966	2.0	2.7	0.08	2.6	0.2	3.4	9	4.3	2.5	0.2	20	8	1	25	7.1
15-0525.21. MENDEHALL RIVER TRIBUTARY NEAR AUKE BAY (lat 58°26'03", long 134°34'00")															
Nov. 28, 1966	0.1	4.5	0.02	40	3.8	2.1	1112	10	3.2	0.5	125	115	15	235	8.5
15-0525.31. MENDEHALL RIVER TRIBUTARY NEAR AUKE BAY (lat 58°25'54", long 134°34'01")															
Nov. 28, 1966	0.5	6.8	0.01	25	2.2	3.2	67	13	4.2	0.7	88	72	17	160	8.1
15-0525.41. MENDEHALL RIVER TRIBUTARY NEAR AUKE BAY (lat 58°25'41", long 134°34'35")															
Nov. 28, 1966	0.4	3.0	0.06	22	1.5	1.4	56	12	5.3	0.1	73	62	16	135	7.8

A Includes 5 ppm of carbonate (CO<sub>2</sub>).

## MISCELLANEOUS ANALYSES OF STREAMS IN ALASKA--Continued

Chemical analyses, in parts per million, water year October 1966 to September 1967--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH	Color
														Calcium	Non-carbonate			
SOUTHEASTERN ALASKA--Continued																		
15-0525.5. STEEP CREEK NEAR AUKE BAY (lat 58°24'53", long 134°32'37")																		
Dec. 2, 1966, .....	2.6	2.2	0.04	12	0.4	1.8		35	3.8	2.1		0.0	40	32	3	70	7.5	
15-0525.51. MENDENHALL RIVER TRIBUTARY NEAR AUKE BAY (lat 58°25'21", long 134°35'09")																		
Mar. 10, 1967, .....	0.6	3.2		23	1.0	1.8		70	4.8	2.1		0.1	70	61	4	135	8.0	
15-0525.8. MENDENHALL RIVER ABOVE MONTANA CREEK NEAR AUKE BAY (lat 58°23'32", long 134°35'00")																		
Mar. 15, 1967, .....	42	3.8		11	1.6	3.9		38	3.8	6.0		0.1	49	35	4	93	7.3	
15-0525.9. MENDENHALL RIVER AT MONTANA CREEK NEAR AUKE BAY (lat 58°22'53", long 134°33'45")																		
Mar. 15, 1967, .....	48	4.3		14	2.4	15		50	4.8	22		0.2	88	46	5	165	7.4	
15-0528.1. MCGINNIS CREEK NEAR AUKE BAY (lat 58°26'28", long 134°38'39")																		
Nov. 17, 1966, .....	12.9	1.5	0.04	9.8	0.7	1.6		20	12	21		0.0	37	28	12	63	7.3	
15-0540.1. BAY CREEK AT AUKE BAY (lat 58°23'16", long 134°38'50")																		
Mar. 10, 1967, .....	0.8	3.5	0.16	4.0	0.5	3.7		11	8.2	2.0		0.1	27	12	3	35	7.0	
15-0540.2. WAYDELICH CREEK NEAR AUKE BAY (lat 58°23'09", long 134°39'16")																		
Nov. 17, 1966, .....	0.4	2.8	0.10	3.2	2.4	36		7	9.6	56		0.6	114	18	12	195	6.9	
15-0540.3. AUKE NU CREEK AT AUKE BAY (lat 58°23'00", long 134°39'57")																		
Nov. 17, 1966, .....	0.6	2.8	0.10	3.2	2.4	36		7	8.6	21			56	9	2	95	6.6	
15-0540.5. LENA CREEK NEAR AUKE BAY (lat 58°23'45", long 134°44'48")																		
Nov. 17, 1966, .....	0.3	0.2	0.11	5.4	0.9	3.9		15	6.2	4.6		0.0	29	17	5	50	7.3	
15-0540.7. INSPIRATION CREEK NEAR AUKE BAY (lat 58°25'13", long 135°45'20")																		
Mar. 10, 1967, .....	0.8	3.3		2.0	0.4	1.4		7	0.5	2.1		0.2	13	7	1	22	6.6	

Nov. 17, 1966.....	0.6	2.7	0.24	2.0	0.5	2.8	11	30	1.5	0.7	19	8	0	25	6.8	
15-0540.8. SHRINE CREEK NEAR AUIKE BAY (lat 58°28'16", long 134°46'58")																
15-0541. PETERSON CREEK NEAR AUIKE BAY (lat 58°29'41", long 134°46'46")																
Nov. 16, 1966.....	5.6	1.5	0.03	2.4	0.5	5.3	10	2.5	6.0	0.1	23	8	0	38	7.8	
15-0541.5. EAGLE RIVER NEAR AUIKE BAY (lat 58°31'36", long 134°48'10")																
Nov. 16, 1966.....	70.4	3.4	0.02	6.8	1.7	3.9	23	7.2	5.0	0.1	40	24	5	60	7.3	
15-0541.9. UNNAMED CREEK AT MILE 27, NEAR AUIKE BAY (lat 58°31'12", long 134°47'50")																
Nov. 17, 1966.....	0.8	2.2	0.45	7.8	1.5	31	28	3.8	4.6	0.6	107	26	2	182	7.9	
15-0542. HERBERT RIVER NEAR AUIKE BAY (lat 58°31'26", long 134°47'40")																
Nov. 16, 1966.....	80	2.5	0.15	7.8	0.6	3.4	18	7.2	5.0	0.1	36	22	7	60	7.4	
15-0543.9. UNNAMED CREEK AT MILE 29.5, NEAR AUIKE BAY (lat 58°32'10", long 134°49'53")																
Nov. 16, 1966.....	0.1	3.5	0.01	2.4	2.2	2.5	11	5.8	4.6	0.1	26	15	6	40	7.2	
15-0544. UNNAMED CREEK AT MILE 30.2, NEAR AUIKE BAY (lat 58°32'26", long 134°50'48")																
Nov. 16, 1966.....	1.3	2.8	0.01	14	0.7	1.6	35	8.6	2.5	0.1	47	38	9	85	7.7	
15-0544.1. DEAD END CREEK AT MILE 33, NEAR AUIKE BAY (lat 58°34'30", long 134°53'19")																
Nov. 16, 1966.....	1.5	3.8	0.01	18	2.7	0.9	40	19	4.2	0.2	69	56	23	110	8.1	
15-0563.3. SAWMILL CREEK NEAR HAINES (lat 59°14", long 135°29")																
Apr. 13, 1967.....	12	6.0	0.47	18	2.4	4.6	40	19	8.0	0.2	0.2	79	55	22	140	6.9
15-0563.9. JOHNSON CREEK NEAR HAINES (lat 59°15'39", long 135°28'26")																
Apr. 21, 1967.....	5.5	0.02	24	2.4	2.3	65	14	5.0	0.1	1.1	86	70	17	160	7.6	
15-0565. HASKA CREEK NEAR HAINES (lat 59°12'56", long 135°32'00")																
Apr. 21, 1967.....	3.1	7.6	0.03	22	3.6	6.2	63	28	2.0	0.1	0.2	101	70	18	170	7.3
15-0577.1. SANDY COVE CREEK NEAR GUSTAVUS (lat 58°42'25", long 135°58'55")																
Sept. 16, 1967.....	0.1	4.8	36	2.9	2.8	113	6.0	6.4	0.1	115	102	9	202	8.0		
15-0600. PERSEVERANCE CREEK NEAR KETCHIKAN (lat 55°24'40", long 131°40'05")																
Apr. 17, 1967.....	8.8													13	5.8	
15-0640. KETCHIKAN CREEK AT KETCHIKAN (lat 55°20'40", long 131°38'05")																
Apr. 17, 1967.....	A104													15	6.4	

A Discharge at time of sampling.

## MISCELLANEOUS ANALYSES OF STREAMS IN ALASKA--Continued

Chemical analyses, in parts per million, water year October 1966 to September 1967--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub> , Calcium, magnesium sulfate	Specific conductance (micro-mhos at 25°C)	pH	Color
Apr. 13, 1967.....	82.8														21	6.8	
SOUTHEASTERN ALASKA--Continued																	
15-0722. SEA LEVEL CREEK NEAR KETCHIKAN (lat 55°22'05", long 131°11'03")																	
Apr. 15, 1967.....	A135														15	6.8	
15-0760. MANZANITA CREEK NEAR KETCHIKAN (lat 55°35'45", long 130°58'49")																	
Apr. 16, 1967.....	8.1														15	6.7	
15-0798. KIU CREEK NEAR BELL ISLAND (lat 55°50'30", long 131°25'20")																	
Apr. 12, 1967.....	57.2														27	6.9	
15-0852. DOG SALMON CREEK NEAR HOLLIS (lat 55°20'42", long 132°30'24")																	
Apr. 18, 1967.....	A66	2.5	1.2	7.1	38	5.0	11	0.1	59	36	5	106	7.6				
15-0940. DEER LAKE OUTLET NEAR PORT ALEXANDER (lat 56°31'10", long 134°40'10")																	
Aug. 6, 1967.....	A111		1.6	0.2	3.0	5	1.5	4	0.1	14	5	1	19	6.6			
15-0980. BARANOF RIVER AT BARANOF (lat 57°05'15", long 134°50'30")																	
Apr. 20, 1967.....	59	3.0	1.6	0.2	3.0	5	3.0	3.2	0.1	16	5	1	23	6.7			
15-1000. TAKATZ CREEK NEAR BARANOF (lat 57°08'35", long 134°51'50")																	
Aug. 4, 1967.....	A375	1.9	1.6	0.7	2.5	4	1.5	5.7	0.1	14	7	4	21	6.6			
15-1020. HASSELBOEG CREEK NEAR ANGOON (lat 57°39'40", long 134°14'55")																	
May 26, 1967.....	A525	2.9	4.6	1.9	2.1	16	3.0	3.5	0.3	26	20	7	40	7.3			
15-1069.2. KADASHAN RIVER ABOVE HOOK CREEK NEAR, TENAKEE (lat 57°40'07", long 135°11'37")																	
Apr. 6, 1967.....		7.1	8.6	1.5	5.5	26	6.2	8.5	51	28	7	85	7.4				
15-1069.4. HOOK CREEK ABOVE TRIBUTARY, NEAR TENAKEE (lat 57°40'32", long 135°10'05")																	
Apr. 6, 1967.....			12	1.0	2.8	37	3.4	4.3	49	34	4	78	7.6				

15-1070. KADASHAN RIVER NEAR TENAKEE (lat 57°41'43", long 135°12'58")																
Apr. 21, 1967	A143	6.1	8.0	0.7	3.7	24	2.5	5.7	0.1	39	22	2	61	7.4		
15-1080. PAVLOV RIVER NEAR TENAKEE (lat 57°50'30", long 135°02'10")																
Apr. 21, 1967	A108	4.5	9.8	1.2	4.4	30	3.0	7.1	0.2	45	30	5	78	7.4		
Aug. 3, 1967	A63	6.1	17	1.2	2.5	50	2.5	6.4	.2	61	47	6	105	7.5		
15-1085.5. MIDDLE POINT CREEK NEAR JUNEAU (lat 58°14'59", long 134°37'30")																
Mar. 29, 1967		0.9	0.04	9.6	1.5	1.6	28	7.7	2.6	0.1	42	30	7	64	7.5	
15-1086. HILDA CREEK NEAR DOUGLAS (lat 58°13'36", long 134°29'51")																
Apr. 22, 1967	A10.3	4.4	4.6	0.8	2.5	12	6.2	3.0	0.2	28	15	5	41	7.1		
Aug. 2, 1967	A67.0	3.5	.12	3.2	.7	1.8	10	6.2	1.6	.1	22	11	3	30	6.7	
15-1087. NEVADA CREEK NEAR DOUGLAS (lat 58°13'49", long 134°18'15")																
Mar. 30, 1967		1.8	8.6	0.06	49	3.2	4.6	101	9.2	0.0	199	148	110	325	7.9	
15-1087.1. BULLION CREEK NEAR DOUGLAS (lat 58°14'49", long 134°20'07")																
Mar. 30, 1967		1.2	7.6	0.03	16	0.5	3.9	33	13	6.0	63	41	41	99	7.8	
15-1087.2. READY BULLION CREEK NEAR DOUGLAS (lat 58°15'08", long 134°20'39")																
Mar. 30, 1967		1.7	4.0	0.01	18	1.1	3.4	39	16	5.3	67	49	17	116	7.4	
15-1087.9. BEAR CREEK AT DOUGLAS (lat 58°16'45", long 134°23'37")																
Dec. 9, 1966		3.0	4.2	0.04	12	0.7	5.3	32	9.6	8.2	0.1	56	36	10	97	7.4
15-1088. LAWSON CREEK AT DOUGLAS (lat 58°17'07", long 134°24'32")																
Dec. 9, 1966		2.1	5.0	0.03	7.0	0.6	2.5	20	4.8	3.9	0.0	34	20	4	50	7.0
15-1089. NIELSON CREEK NEAR JUNEAU (lat 58°19'53", long 134°28'51")																
Nov. 23, 1966		2.0	2.9	0.13	4.8	1.0	1.8	15	4.8	2.0	0.1	25	16	4	37	7.2
15-1090. FISH CREEK NEAR AUKE BAY (lat 58°19'50", long 134°35'30")																
Dec. 8, 1966	A109	2.4	0.03	5.2	3.4	1.6	11	4.2	0.1	36	27	14	62	7.4		
15-1090.1. COVE CREEK NEAR AUKE BAY (lat 58°19'42", long 134°36'56")																
Mar. 10, 1967		0.2	3.9	0.05	9.8	1.1	3.2	29	9.1	2.0	0.0	44	29	5	70	7.6
15-1091.2. ELEVEN MILE CREEK NEAR AUKE BAY (lat 58°19'11", long 134°38'35")																
Mar. 10, 1967		0.4	4.7	0.21	5.2	1.9	1.6	16	5.8	2.4	0.1	30	21	8	46	7.3

A Discharge at time of sampling.

## MISCELLANEOUS ANALYSES OF STREAMS IN ALASKA--Continued

Chemical analyses, in parts per million, water year October 1966 to September 1967--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub> Calcium, Non-magnesium	Specific conductance (micro-mhos at 25°C)	pH	Color
ALASKA WEST OF LONGITUDE 141°																	
15-2000. GAKONA RIVER AT GAKONA (lat 62°18'05", long 145°18'20")																	
Aug. 22, 1967.....	A2730	5.6	2.2	28	4.0	2.7	1.8	87	20	1.8	0.0	0.5	110	87	16	182	7.9
Sept. 17.....	A852	8.3	.10	31	5.4	3.7	1.0	110	17	5.0	.1	.8	129	100	10	211	7.8
15-2020. TAZLINA RIVER NEAR GLENDALE (lat 62°03'20", long 145°25'35")																	
Aug. 24, 1967.....	A14600	2.9	0.85	21	2.1	2.6	0.2	59	14	0.0	0.0	1.0	74	61	13	121	7.6
Sept. 17.....	6200	3.0	.12	18	2.9	2.7	.3	56	11	4.3	.0	.4	71	58	12	116	7.6
15-2080. TONSINA RIVER AT TONSINA (lat 61°39'50", long 145°10'30")																	
Oct. 9-21, 1966.....	500	5.4	0.04	9.4	1.5	2.4	0.5	40	7.0	0.4	0.0	2.1	49	24	0	83	7.5
Oct. 22-31.....	400	5.3	.00	13	1.8	2.5	.3	44	8.0	1.1	1.1	.9	55	41	5	93	7.6
Nov. 1-12.....	260	5.5	.04	13	1.8	2.4	.7	45	8.0	1.4	.0	.7	56	41	4	93	7.7
Aug. 23, 1967.....	A2290	3.8	.57	9.2	1.2	1.8	.2	29	6.5	.7	.0	1.1	39	28	4	66	7.3
Sept. 18.....	A347	4.2	1.1	10	1.4	1.4	.3	34	6.0	.7	.0	.7	43	32	4	69	7.0
15-2081. SQUIRREL CREEK AT TONSINA (lat 61°40'05", long 145°10'30")																	
July 23, 1967.....	18.0	13	0.11	27	5.4	5.5	0.1	114	6.0	3.2	0.0	0.3	117	90	0	192	7.0
Sept. 18.....	20.6	13	.06	27	6.1	5.0	.7	114	5.0	5.0	.1	.8	69	93	0	187	8.0
15-2120. COPPER RIVER NEAR CHITNA (lat 61°28'00", long 144°27'20")																	
Aug. 2, 1967.....	125000	6.4	0.94	25	2.9	4.6	0.8	71	17	3.5	0.1	1.1	97	75	17	150	7.8
15-2160. POWER CREEK NEAR CORDOVA (lat 60°35'15", long 145°37'05")																	
Sept. 2, 1967.....	A507	2.9	0.45	3.6	1.2	1.0	0.0	14	0.0	0.4	0.1	0.8	17	13	2	34	6.6
15-2383. RESURRECTION RIVER NEAR SEWARD (lat 60°08'30", long 149°25'00")																	
Aug. 3, 1967.....	2650	2.2	0.63	14	1.0	1.5	0.3	38	8.0	0.4	0.1	1.4	49	38	7	83	7.2
Sept. 9.....	2800	4.0	.26	17	1.3	1.5	.7	49	9.0	2.8	.1	.7	52	50	10	101	7.2
15-2388. SELDOVIA LAGOON TRIBUTARY NEAR SELDOVIA (lat 59°26'30", long 151°41'05")																	
Mar. 28, 1967.....	0.72	11	0.21	5.7	2.3	3.8	0.4	20	5.0	5.3	0.0	6.0	50	23	7	71	6.7
July 26.....	.38	11	.00	5.6	1.9	3.8	.0	24	4.0	3.9	.3	4.9	47	22	2	64	6.5

15-2388.5. FISH CREEK NEAR SELDOVIA (lat 59°26'10", long 151°42'05")																	
Mar. 28, 1967.....	2.68	9.8	0.13	5.8	1.5	4.5	0.4	22	6.0	6.0	0.0	2.5	48	23	6	73	7.0
July 26.....	1.49	8.9	.00	8.0	1.4	4.2	0.4	21	5.0	3.9	.3	4.4	46	26	8	68	6.8
15-2399. ANCHOR RIVER NEAR ANCHOR POINT (lat 59°44'50", long 151°45'10")																	
Oct. 1-12, 1966.....	309	25	0.05	5.5	2.1	3.6	0.9	25	1.0	2.5	0.0	2.1	56	22	1	56	7.4
Oct. 16-29.....	214	25	.00	4.8	2.0	3.3	3.8	22	1.0	2.8	0.0	2.5	53	20	2	51	7.2
Nov. 2-8.....	140	22	.03	3.9	2.1	4.3	.1	24	1.5	3.2	.0	.7	50	18	0	57	6.8
15-2400. ANCHOR RIVER AT ANCHOR POINT (lat 59°46'10", long 151°50'00")																	
Mar. 27, 1967.....	54.5	36	1.00	8.8	6.1	6.0	2.4	66	5.0	3.2	0.3	1.5	102	5	0	124	7.3
Apr. 1.....	287	37	.32	3.0	4.9	4.3	1.7	75	1.5	2.1	.3	.6	65	25	0	62	20
July 27.....	180.0	52	.15	11	4.9	5.3	1.7	72	1.5	2.1	.3	.6	97	52	0	107	6.6
Sept. 3.....	184	25	.78	6.4	4.4	4.9	1.0	44	.0	4.6	.0	.8	70	34	0	82	7.3
15-2416. NINILCHIK RIVER AT NINILCHIK (lat 60°02'56", long 151°39'48")																	
Mar. 29, 1967.....	51.4	36	0.80	10	4.6	9.7	2.7	80	0.0	2.1	0.1	0.6	106	44	0	131	6.8
15-2420. KASLOF RIVER NEAR KASLOF (lat 60°19'08", long 151°45'33")																	
Sept. 3, 1967.....	10300	4.7	0.49	4.0	1.9	1.3	1.0	16	5.0	2.1	0.1	1.3	30	18	5	41	6.9
15-2580. KENAI RIVER AT COOPER LANDING (lat 60°29'35", long 149°48'25")																	
Mar. 30, 1967.....	4354	3.9	0.30	13	1.0	0.9	0.7	33	11	0.0	0.6	0.0	47	34	6	84	7.1
June 19.....	4530	4.5	.04	11	1.9	.3	3.3	33	9.0	.0	1.1	.4	44	34	8	71	6.7
Sept. 4.....	10800	4.8	.10	11	2.3	.9	.7	30	10	1.7	.1	.9	48	37	12	71	7.0
15-2663. KENAI RIVER AT SOLDOTNA (lat 60°28'50", long 151°05'15")																	
Mar. 29, 1967.....	A1080	7.0	0.30	11	2.3	1.7	1.1	38	6.0	2.5	0.4	0.0	51	37	6	40	7.2
June 4.....	A7350	3.9	--	7.7	.9	.8	.6	26	1.5	.4	.0	1.3	31	22	1	63	6.7
July 28.....	16000	3.7	.13	11	1.9	1.3	.6	28	7.0	.4	.2	.5	40	31	8	65	6.7
Sept. 2.....	A21900	3.3	.38	9.6	1.4	1.2	.3	30	4.0	3.5	.0	.5	39	30	5	68	7.0
15-2725.5. GLACIER CREEK NEAR GIRWOOD (lat 60°56'29", long 149°09'44")																	
May 4, 1967.....	A228	4.4	0.21	16	1.9	2.2	0.3	46	10	0.7	0.4	0.0	62	48	10	103	7.5

A Discharge at time of sampling.

## MISCELLANEOUS ANALYSES OF STREAMS IN ALASKA--Continued

Chemical analyses, in parts per million, water year October 1966 to September 1967--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos/cm at 25°C)	pH	Color
														Calcium	Non-carbonate			
ALASKA WEST OF LONGITUDE 141°--Continued																		
15-2731. LITTLE RABBIT CREEK NEAR ANCHORAGE (lat 61°04'40", long 149°48'40")																		
May 15, 1967.....	210	8.3	0.79	14	2.5	1.7	0.5	40	12	0.0	0.5	4.6	65	45	12	95	7.1	10
15-2739. SOUTH FORK CAMPBELL CREEK AT CANYON MOUTH, NEAR ANCHORAGE (lat 60°08'55", long 149°43'10")																		
May 1, 1967.....	11.5	8.3	0.04	14	3.6	1.6	0.4	48	12	1.4	0.1	0.0	66	50	11	106	7.5	5
June 5.....	79.9	4.5	.11	7.1	1.8	.9	.4	20	7.0	.0	.0	.4	32	25	9	58	7.1	5
Aug. 15.....	108	5.1	.08	9.4	1.2	1.0	.0	23	10	.0	.0	.5	38	28	9	66	7.2	5
Sept. 6.....	179	3.0	.06	11	1.3	.4	.3	19	16	1.4	.1	.1	45	28	12	65	7.1	10
15-2740. SOUTH FORK CAMPBELL CREEK NEAR ANCHORAGE (lat 61°10'00", long 149°46'30")																		
May 1, 1967.....	8.21	7.7	0.00	14	2.4	1.4	0.4	45	11	0.0	0.1	1.2	60	45	8	100	7.5	10
May 15.....	38	5.9	.26	10	1.8	1.2	.5	30	8.0	.0	.6	1.8	45	32	7	76	7.4	10
July 10.....	A73.4	4.8	.00	8.6	1.2	1.7	.0	11	14	.0	.0	1.0	36	26	17	62	6.8	15
Aug. 15.....	91.5	4.5	.04	10	1.2	1.0	.0	24	12	.8	.0	.6	42	30	10	64	7.0	0
15-2743. NORTH FORK CAMPBELL CREEK NEAR ANCHORAGE (lat 61°10'10", long 149°45'40")																		
May 1, 1967.....	7.56	8.9	0.09	17	4.2	1.8	0.7	60	15	0.0	0.1	1.3	79	60	11	129	7.3	15
15-2746. CAMPBELL CREEK NEAR SPENARD (lat 61°08'20", long 149°55'20")																		
May 1, 1967.....	48.7	7.5	0.08	15	2.8	1.9	0.8	50	11	1.1	0.1	1.2	66	49	8	109	7.1	15
May 15.....	95.9	7.1	.70	15	3.0	1.9	.6	50	10	.0	.1	1.6	63	50	9	105	7.6	10
June 11.....	123.0	5.6	.05	12	2.3	1.2	.0	32	10	.0	.0	1.0	49	38	12	88	6.9	15
Aug. 15.....	A165	5.7	.06	12	1.9	1.3	.0	33	13	.0	.0	.9	51	38	11	82	7.0	5
Sept. 7.....	A232	8.0	.34	12	2.9	1.9	.6	34	13	2.1	.2	.4	43	40	12	89	7.1	100
15-2748. CHESTER CREEK AT MULDON ROAD, NEAR ANCHORAGE (lat 61°12'22", long 149°44'02")																		
May 31, 1967.....	6.32	9.3	0.00	18	3.6	1.8	0.7	64	12	0.8	0.5	0.8	78	60	8	130	7.1	15
Sept. 6.....	26.5	10	.50	14	2.9	1.4	.4	35	18	.7	.3	.3	66	50	21	79	6.8	120
15-2749. RUSSIAN JACK SPRINGS AT ANCHORAGE (lat 61°12'25", long 149°46'55")																		
May 3, 1967.....	4.51	11	0.08	31	6.2	4.1	0.4	112	14	3.2	0.1	5.1	130	103	11	217	7.6	5
June 6.....	3.93	11	.00	28	6.8	4.3	.7	114	16	3.5	0.0	5.0	131	103	15	213	7.8	3
Sept. 20.....	--12	.19	.45	45	1.8	3.8	.7	133	14	3.5	.1	7.4	153	120	11	248	7.1	5

15-2750. CHESTER CREEK AT ANCHORAGE (lat 61°12'00", long 149°50'10")																	
May 3, 1967.....	17.5	9.8	0.22	23	5.5	3.1	0.8	82	15	1.8	0.1	1.9	101	80	13	173	7.4
May 31.....	14	9.3	.05	24	5.6	1.4	1.4	86	21	1.1	6.2	114	83	12	183	8.0	15
Sept. 7.....	A50.2	10	.00	27	4.4	2.0	1.2	60	21	1.4	2.1	94	69	20	152	7.5	40
15-2760. SHIP CREEK NEAR ANCHORAGE (lat 61°13'25", long 149°38'00")																	
May 3, 1967.....	A38.1	7.7	0.09	19	3.2	2.0	0.6	60	16	0.0	0.0	0.8	79	60	11	133	7.4
May 31.....	332	5.1	.02	16	1.9	1.6	1.0	42	13	1.7	.1	.6	61	48	14	100	7.4
July 5.....	A309	4.7	.83	16	2.4	2.0	.4	46	16	1.1	.0	1.0	76	50	12	114	7.3
Aug. 16.....	A387	5.1	.00	17	2.5	1.9	.0	49	19	.0	1.1	.1	58	18	113	7.3	0
15-2762. SHIP CREEK AT GLENN HIGHWAY, NEAR ANCHORAGE (lat 61°14'20", long 149°41'45")																	
May 16, 1967.....	172	6.2	0.12	16	2.7	1.8	0.6	46	16	0.0	0.1	1.4	68	5	13	105	7.6
15-2763. SHIP CREEK BELOW POWER PLANT DIVERSION, AT FORT RICHARDSON (lat 61°14'35", long 149°42'30")																	
May 16, 1967.....	133	6.2	0.12	16	2.5	1.7	0.2	46	12	0.0	0.3	3.0	65	50	12	104	7.3
15-2765. SHIP CREEK AT ELMENDORF AIR FORCE BASE (lat 61°14'20", long 149°47'25")																	
May 3, 1967.....	A26.7	7.3	0.17	20	2.7	4.3	0.7	58	14	5.0	0.1	0.8	84	61	13	145	7.4
June 1.....	285	5.4	.02	15	2.3	1.7	1.3	44	14	.0	1.1	1.4	63	47	11	104	7.3
July 5.....	297	4.9	.92	17	2.5	2.1	.6	48	19	.4	.0	.7	72	52	13	118	7.2
Aug. 16.....	A348	5.3	.00	17	2.5	1.9	.0	49	19	.0	.0	.5	70	58	18	118	7.2
15-2767. SHIP CREEK AT RAILROAD BRIDGE AT MOUTH, AT ANCHORAGE (lat 61°13'25", long 149°53'25")																	
May 16, 1967.....	191	7.4	0.25	23	5.0	12	1.0	66	24	18	0.2	1.2	124	78	24	203	7.2
15-2771. EAGLE RIVER AT EAGLE RIVER (lat 61°18'30", long 149°33'35")																	
Mar. 20, 1967.....	A53.5	7.2	0.32	45	5.2	3.1	0.8	114	31	17	0.0	1.1	167	134	41	286	7.5
May 4.....	A155	4.4	1.3	32	3.4	3.2	.5	90	26	3.1	.3	1.0	118	54	0	197	7.6
May 12.....	A193	4.5	1.40	31	5.2	3.8	.3	100	25	1.1	.4	1.1	122	99	17	206	7.7
June 5.....	A162	3.2	2.2	19	2.6	2.7	.6	68	16	.4	.0	.3	80	63	7	131	7.7
Aug. 16.....	A450	5.0	1.0	14	2.8	1.4	.0	54	14	.0	1.0	.7	64	11	10	114	7.5
Sept. 19.....	A4090	7.3	1.7	17	3.5	1.6	1.4	59	14	.7	.0	1.0	77	58	10	124	7.2

A Discharge at time of sampling.

## MISCELLANEOUS ANALYSES OF STREAMS IN ALASKA--Continued

Chemical analyses, in parts per million, water year October 1966 to September 1967--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH	Color
														Calcium	Non-carbonate			
ALASKA WEST OF LONGITUDE 141°--Continued																		
15-2810. KNIK RIVER NEAR PALMER (lat 61°30'15", long 149°01'50")																		
May 29, 1967.....	A6900	2.5	1.63	24	3.1	1.7	1.2	61	18	0.4	0.1	3.2	87	73	21	133	7.8	5
15-2820. CARIBOU CREEK NEAR SUTTON (lat 61°48'10", long 147°41'00")																		
July 25, 1967.....	278	8.4	0.20	36	5.1	17	0.0	104	54	3.5	0.1	0.6	176	111	25	299	7.7	20
Sept. 23.....	A329	8.4	.45	43	6.6	19	.3	120	66	4.3	.1	.5	208	150	37	342	8.1	10
15-2840. MATANUSKA RIVER AT PALMER (lat 61°36'35", long 149°04'15")																		
Oct. 3-17, 1966.....	1888	5.8	0.00	36	3.4	5.9	0.6	83	40	4.3	0.0	0.3	137	104	36	236	8.0	5
May 29, 1967.....	5380	5.0	3.4	26	2.6	3.4	1.4	68	23	2.8	.0	.2	111	76	6	170	7.4	5
June 20.....	A310	4.1	2.5	24	2.8	3.3	1.1	63	23	1.1	.0	.2	95	70	0	154	7.4	5
Aug. 24.....	A10100	4.9	.26	24	2.8	4.1	1.2	66	25	1.8	.2	.8	97	72	18	180	7.6	5
15-2912. MACLAREN RIVER NEAR PAXSON (lat 63°07'10", long 146°31'45")																		
July 22, 1967.....	4030	4.2	5.39	4.0	2.3	1.7	2.2	41	17	0.4	0.0	1.5	69	44	10	101	7.7	10
Aug. 17.....	A5320	4.8	.12	11	2.2	1.1	1.7	34	13	3.7	.1	.9	53	36	8	84	7.6	5
Sept. 20.....	936	5.3	.14	19	3.4	2.1	1.4	54	20	3.2	.0	.7	82	62	18	141	7.8	10
15-2915. SUSITNA RIVER NEAR CANTWELL (lat 62°42'00", long 147°32'50")																		
Aug. 23, 1967.....	A16100	6.1	0.10	20	2.6	3.2	2.8	63	16	2.5	0.2	0.7	85	61	9	142	7.7	10
Sept. 21.....	A7480	6.8	.87	20	3.2	4.8	1.4	64	10	7.4	.0	1.1	87	63	10	147	7.6	10
Sept. 29.....	A5750	7.6	.90	27	1.1	5.7	1.8	67	16	8.5	.3	3.9	106	70	15	174	7.2	10
15-2920. SUSITNA RIVER AT GOLD CREEK (lat 62°46'10", long 149°41'40")																		
Aug. 22, 1967.....	A29400	7.1	0.06	19	3.5	3.4	2.4	67	15	2.8	0.1	0.9	87	63	8	147	7.6	5
15-2924. CHULITNA RIVER NEAR TALLEKETA (lat 62°34'40", long 150°14'30")																		
July 24, 1967.....	A32000	4.3	0.00	18	2.5	1.3	1.8	58	14	0.0	0.2	0.7	72	56	8	118	7.6	10
Aug. 22.....	A30400	5.4	4.3	18	3.1	1.6	1.8	59	14	.0	.0	.8	78	58	10	123	7.5	10
Sept. 19.....	10500	4.9	.59	17	4.1	1.5	.7	56	10	2.5	.1	1.4	71	59	13	121	7.5	10
15-2927. TALLEKETA RIVER NEAR TALLEKETA (lat 62°20'50", long 150°00'45")																		
Aug. 21, 1967.....	A25200	6.9	0.16	9.0	1.1	2.7	1.2	28	10	1.4	0.2	2.0	49	27	4	67	7.3	15
Sept. 20.....	4920	7.5	.05	10	3.9	5.1	.7	44	6.0	9.2	.1	1.5	66	42	6	110	7.6	10

15-3020. NUYAKUK RIVER NEAR DILLINGHAM (lat 59°56', long 158°12')																		
June 16, 1967.....	A13700	3.0	0.16	8.2	1.5	1.0	0.2	23	8.0	0.0	0.5	0.8	26	7	56	7.1	5	
Sept. 30.....	A8070	4.1	.50	9.2	1.4	1.0	.1	29	4.0	.7	.0	.5	36	29	5	64	7.1	
15-3030. WOOD RIVER NEAR ALENAGIK (lat 59°17', long 158°35')																		
June 16, 1967.....	12800	3.4	0.23	5.0	0.7	1.1	0.1	13	6.0	0.0	0.0	0.9	23	16	5	41	7.3	0
15-3036. KUSKOWIM RIVER AT McGRATH (lat 62°57'10", long 158°35'10")																		
May 28, 1967.....	A30300	6.2	0.31	35	6.6	1.5	1.2	114	22	0.4	0.3	1.0	130	112	19	218	7.6	25
Sept. 29.....	A15800	9.7	1.36	47	11	2.4	1.1	166	32	1.1	.1	6.0	194	163	27	308	7.7	5
15-3560. YUKON RIVER AT EAGLE (lat 64°47'30", long 141°12'00")																		
Sept. 22, 1967.....	A128000	6.2	0.16	33	4.4	2.0	0.7	100	22	0.3	0.1	0.7	119	100	18	202	7.7	10
15-3890. PORCUPINE RIVER NEAR FORT YUKON (lat 66°59'35", long 143°07'45")																		
May 24, 1967.....	20600	2.4	0.23	16	2.8	1.0	1.5	56	7.0	0.0	0.3	0.2	59	52	6	106	7.1	50
Sept. 23.....	30200	4.4	.74	21	4.0	1.5	.3	72	10	.7	.1	.9	79	69	10	141	7.2	35
15-3895. CHANDALAR RIVER NEAR VENETIE (lat 67°06'00", long 147°10'30")																		
May 24, 1967.....	6100	2.4	0.11	23	4.5	0.7	1.2	78	15	0.0	0.3	1.0	86	76	12	151	7.7	30
Sept. 23.....	4800	27	.02	53	1.4	.9	.4	146	22	.0	.1	1.0	177	138	18	244	7.8	20
15-4680. YUKON RIVER AT RAMPART (lat 65°30'25", long 150°10'15")																		
May 25, 1967.....	280000	4.8	0.52	30	5.2	1.7	1.6	98	25	0.4	0.4	0.9	119	97	17	188	7.4	40
Sept. 24.....	A207000	6.2	.24	27	6.3	2.0	.7	93	20	1.1	.0	.8	110	95	19	188	7.7	10
15-4700. CHISANA RIVER AT NORTHWAY JUNCTION (lat 63°00'25", long 141°48'20")																		
Sept. 16, 1967.....	3370	10	0.57	24	10	3.6	0.5	118	20	0.7	0.1	1.4	113	106	9	206	7.9	10
15-4760. TANANA RIVER NEAR TANACROSS (lat 63°23'20", long 143°44'45")																		
Oct. 2, 1966.....	5143	12	0.06	50	3.4	6.7	1.3	161	26	3.2	0.0	3.4	187	147	15	296	8.2	8
Apr. 15, 1967.....	2240	17	.06	59	6.6	5.5	1.3	173	24	4.4	.4	4.4	201	169	20	329	8.0	0
Aug. 20.....	27600	8.5	.04	22	4.2	5.1	1.3	89	12	1.1	.2	.8	99	72	0	162	7.8	5

A Discharge at time of sampling.

## MISCELLANEOUS ANALYSES OF STREAMS IN ALASKA--Continued

Chemical analyses, in parts per million, water year October 1966 to September 1967.--Continued

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (residue at 180°C)	Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH	Color	
													Calcium	Non-carbonate				
ALASKA WEST OF LONGITUDE 141°--Continued																		
15-4840. SALCHA RIVER NEAR SALCHET (lat 64°28'15", long 146°55'45")																		
Aug. 19, 1967.....	9870	8.1	0.08	11	3.5	1.3	0.8	40	11	0.7	0.1	1.0	58	42	9	95	7.0	25
Sept. 9.....	3070	8.5	.26	15	4.5	1.5	.7	57	13	.7	.0	.9	72	60	13	124	7.2	5
15-5110. LITTLE CHENA RIVER NEAR FAIRBANKS (lat 64°53'10", long 147°14'25")																		
Sept. 18, 1967.....	A413	8.7	1.72	15	3.4	1.8	0.7	52	13	0.4	0.0	0.5	71	53	10	117	6.9	5
15-5155. TANANA RIVER AT NENANA (lat 64°34'05", long 149°04'45")																		
Sept. 11, 1967.....	43600	10	9.2	34	6.5	3.7	1.8	117	22	0.7	0.0	0.6	146	111	15	231	7.4	5
15-5158. SEATTLE CREEK NEAR CANTWELL (lat 63°20'00", long 148°14'30")																		
July 21, 1967.....	94.5	8.0	0.24	10	1.6	1.8	0.0	38	5.5	0.0	0.0	0.0	47	32	1	73	7.5	25
Aug. 17.....	A111	8.3	.06	11	1.9	1.9	.6	40	6.0	.0	1.1	.1	57	36	3	77	7.6	10
Sept. 20.....	40.7	9.5	.90	11	2.7	2.3	.3	48	2.0	1.8	1.1	.9	56	39	0	86	7.6	20
15-5160. NENANA RIVER NEAR WINDY (lat 63°27'15", long 148°48'10")																		
July 21, 1967.....	5330	4.4	1.4	13	2.3	1.6	1.2	40	13	0.4	0.1	0.8	58	42	9	96	6.7	10
Sept. 21.....	1320	6.8	.41	25	4.9	2.4	.5	80	14	2.8	.1	1.0	98	84	18	154	7.8	10
15-5180. NENANA RIVER NEAR HEALY (lat 63°50'40", long 148°56'35")																		
Oct. 6-18, 1966.....	2897	6.7	0.00	33	7.2	3.7	0.6	86	40	1.4	0.0	0.8	140	111	32	235	7.6	10
Sept. 11, 1967.....	A5010	6.2	.54	30	7.3	3.0	1.2	89	33	.4	.0	.6	128	104	31	219	7.5	10
15-5183.5. TEKLANIKA RIVER NEAR LIGNITE (lat 64°55'10", long 149°29'50")																		
Aug. 9, 1967.....	2480	5.5	44	6.4	4.2	4.2	0.7	128	48	0.0	0.1	1.4	133	138	35	276	7.6	10
15-5646. MELOZITNA RIVER NEAR RUBY (lat 64°47'35", long 155°33'20")																		
July 19, 1967.....	A1400	6.5	0.32	9.0	2.5	0.8	0.0	35	6.0	0.0	0.1	1.4	46	33	4	74	7.3	15
Aug. 17.....	A25500	5.7	.80	4.8	.0	9.0	.0	6	.0	3.9	.2	1.8	22	12	0	33	6.5	10

15-5649. KOYUKUK RIVER AT HUGHES (lat 66°02'50", long 154°15'30")																		
May 26, 1967.....	A87000	6.7	0.47	11	2.0	0.5	1.2	32	4.0	1.1	0.2	0.2	37	36	10	66	6.7	55
July 10.....	A61000	3.3	.44	12	8.0	1.6	1.4	14	27	4.4	.0	1.3	30	180	19	135	7.7	20
Sept. 19.....	A48700	4.3	.43	22	8.3	1.6	.3	94	22	4.3	.0	1.1	100	140	11	135	7.7	-
Sept. 24.....	A63000	3.9	1.3	32	8.3	1.6	.3	114	22	1.1	.0	1.0	128	115	22	218	7.7	5
15-6210. SNAKE RIVER NEAR NOME (lat 64°33'50", long 165°30'15")																		
Sept. 26, 1967.....	111	4.4	0.30	31	5.0	2.9	0.3	98	13	5.7	0.0	0.9	112	97	17	198	7.9	10
15-7120. KOZITRIN RIVER NEAR NOME (lat 65°13'15", long 164°37'15")																		
May 27, 1967.....	A9840	2.5	0.17	8.0	1.3	1.8	1.2	27	4.0	1.4	0.1	0.2	34	26	4	62	6.7	50
July 11.....	1870	6.4	.19	8.6	1.5	2.3	2.8	5.0	1.4	1.4	0.0	0.9	40	28	5	62	7.2	15
Sept. 27.....	587	9.7	.30	16	3.8	4.7	.5	68	4.0	3.9	.0	.6	77	56	0	133	7.3	5
15-7430. JUNE CREEK NEAR KOTZEBUE (lat 66°51'37", long 162°36'13")																		
May 26, 1967.....	A50	0.8	0.56	5.8	1.0	1.6	1.6	8	11	2.1	0.2	0.7	30	18	11	36	6.2	55
Sept. 26.....	A1.0	.7	.34	8.6	2.1	1.9	.4	34	.0	3.5	.0	1.6	36	30	2	69	7.0	30
15-7440. KOBUK RIVER AT AMBLER (lat 67°05'30", long 157°50'30")																		
Sept. 25, 1967.....	9060	4.0	0.26	22	3.3	0.8	0.3	76	6.0	0.7	0.0	1.1	74	69	7	135	7.7	10
15-7460. NOATAK RIVER AT NOATAK (lat 67°34'20", long 162°56'40")																		
July 10, 1967.....	A31200	1.9	0.06	32	7.4	1.4	0.0	124	12	0.4	0.1	1.2	117	110	8	210	7.8	5
Sept. 25.....	A8930	3.1	.22	39	6.3	1.3	.3	121	30	.7	.1	.8	142	123	24	236	7.7	5

A Discharge at time of sampling.



15-0562. WEST CREEK NEAR SKAGWAY (Lat 59°31'35", long 135°21'10")												
Oct. 7, 1966.....	1330	38										
Apr. 22, 1967.....	1315	35	607	6	10							
			21.1	6	T							
15-0564. CHILKAT RIVER AT GORGE, NEAR KLUKWAN (Lat 59°37'40", long 135°55'55")												
Apr. 21, 1967.....			49.1	10	1.3							
Aug. 30.....	6690		1130	20400	8	13	19	29	38	53	65	71 81 98 100
15-0940. DEER LAKE OUTLET NEAR PORT ALEXANDER (Lat 56°31'10", long 134°40'10")												
Aug. 6, 1967.....	0900	55	111	1	T							
15-1000. TAKATZ CREEK NEAR BARANOF (Lat 57°08'35", long 134°51'50")												
Aug. 4, 1967.....	1930	44	375	1	1							
15-1080. PAULOF RIVER NEAR TENAKEE (Lat 57°50'30", long 135°02'10")												
Aug. 3, 1967.....	1915	54	83.2	7	1							
15-1086. HILDA CREEK NEAR DOUGLAS (Lat 58°13'38", long 134°29'50")												
Aug. 2, 1967.....	1330	50	83.6	7	1							
15-1088. LAWSON CREEK AT DOUGLAS (Lat 58°17'05", long 134°24'40")												
Apr. 18, 1967.....	1450	32	1.9	8	T							
15-1090. FISH CREEK NEAR AUKE BAY (Lat 58°19'50", long 134°35'20")												
Apr. 18, 1967.....	0945	33	7.54	2	T							
ALASKA WEST OF LONGITUDE 141°												
15-2000. GAKONA RIVER AT GAKONA (Lat 62°18'05", long 145°18'20")												
June 16, 1966.....	1430	58	2190	1830	11000	14	26	35	47	62	72	84 95 100
July 22.....	1970	48	2730	4090	30000	17	26	37	53	64	75	85 95 99 100
15-2020. TAZLINA RIVER NEAR GLENNVALLEN (Lat 62°03'20", long 145°25'35")												
Oct. 2, 1966.....	1500	44	3610	61	590							
May 18, 1967.....	1230	--	3520	428	4100							
June 16.....	1100	50	6170	166	2800							
July 25.....	1400	53	14600	210	8300							
15-2080. TONSINA RIVER AT TONSINA (Lat 61°39'50", long 145°10'50")												
Oct. 4, 1966.....	1300	43	708	52	99							
May 16, 1967.....	1500	--	490	31	41							
July 25.....	1430	53	2290	33	200							
Sept. 18.....	0950	55	947	60	150							
15-2081. SQUIRREL CREEK AT TONSINA (Lat 61°40'05", long 145°10'30")												
July 23, 1967.....	1590	55	18	14	0.7							
Sept. 18.....	1130	44	20.6	13	.7							

T Less than 0.50 ton.



15-2725.5. GLACIER CREEK AT GIRWOOD (Lat 60°56'29", Long 149°09'44")										
Nov. 12, 1966.....	1255	34	110	8	2					
Jan. 20, 1967.....	1145	32	29.8	8	0.6					
Apr. 17.....	1440	38	20.4	6	T					
May 4.....	1420	38	228	26	16					
Sept. 19.....	1330	44	1540	1360	5600	13	22	30	37	45 52 62 79 95 100
15-2739. SOUTH FORK CAMPBELL CREEK AT CANYON MOUTH, NEAR ANCHORAGE (Lat 61°08'53", Long 149°43'10")										
Mar. 20, 1967.....	1415	33	12.8	5	0.2					
May 1.....	1030	41	11.5	4	1.1					
June 5.....	1415	42	37.8	14	2.9					
Aug. 15.....	1200	50	108	10	3.0					
15-2746. CAMPBELL CREEK NEAR SPERARD (Lat 61°08'20", Long 149°55'20")										
May 1, 1967.....	1615	33	48.7	150	20	--	--	--	--	--
May 15.....	1100	43	55.9	39	6	5	18	28	45	68 77 90 92 100
June 1.....	1415	51	92.0	29	7	--	--	--	--	--
Aug. 15.....	1500	55	165	39	17	--	--	--	--	--
Sept. 7.....	1000	45	232	139	87	3	5	9	14	23 30 53 77 90 100
15-2750. CHESTER CREEK AT ANCHORAGE (Lat 61°12'00", Long 149°50'10")										
May 31, 1967.....	1010	40	17.6	26	1					
May 3.....	1030	44	14.2	25	1.6					
July 10.....	1420	58	16.7	25	1					
Aug. 16.....	1000	50	19.6	34	2					
Sept. 7.....	1130	45	50.2	55	7					60 91 100
15-2765. SHIP CREEK AT ELMENDORF AIR FORCE BASE (Lat 61°14'20", Long 149°47'25")										
June 1, 1967.....	1130	43	285	17	13					
July 5.....	1340	49	297	15	12					
Aug. 16.....	1530	50	348	10	9					
15-2771. EAGLE RIVER AT EAGLE RIVER (Lat 61°18'30", Long 149°33'35")										
Nov. 16, 1966.....	1200	32	85	16	4					
Mar. 20, 1967.....	1130	32	53.5	13	2					
May 4.....	1100	39	155	50	21					
May 12.....	1330	49	193	33	17					
June 5.....	1045	45	742	176	350					68 77 85 99 100
June 29.....	1400	44	1650	145	640					68 76 91 100

T Less than 0.50 ton.

MISCELLANEOUS ANALYSES OF STREAMS IN ALASKA--Continued  
 Periodic determinations of suspended-sediment discharge and particle size, water year October 1966 to September 1967--Continued  
 (Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water; P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended-sediment			Method of analysis	
							Percent finer than size indicated, in millimeters				
							0.002	0.004	0.016		
ALASKA WEST OF LONGITUDE 141°--Continued											
15-2771. EAGLE RIVER AT EAGLE RIVER (Lat 61°18'30", Long 149°33'35")--Continued											
June 29, 1967	1715	44		2000	255	1400	--	--	--	--	--
June 30	1730	45		2140	532	3100	--	--	--	--	--
July 1	1745	48		1500	152	620	--	--	--	--	--
July 4	1730	46		1670	132	600	--	--	--	--	--
July 5	1730	46		1450	92	360	--	--	--	--	--
July 6	1800	47		1580	212	900	--	--	--	--	--
July 8	1745	47		1470	72	280	--	--	--	--	--
July 9	1745	47		1410	85	230	--	--	--	--	--
July 10	1730	53		1510	93	360	--	--	--	--	--
July 11	1730	54		1860	192	960	--	--	--	--	--
July 12	1730	54		2180	160	940	--	--	--	--	--
July 13	1800	53		2130	149	860	--	--	--	--	--
July 14	1800	54		2410	236	1500	--	--	--	--	--
July 15	1730	45		2580	152	1000	--	--	--	--	--
July 16	1800	47		1700	107	600	--	--	--	--	--
July 20	1800	44		2480	1200	9600	--	--	--	--	--
July 21	1800	50		2830	393	3000	--	--	--	--	--
July 22	1800	49		2310	283	1800	--	--	--	--	--
July 23	1730	47		2180	139	820	--	--	--	--	--
July 24	1800	47		2300	282	1800	--	--	--	--	--
July 25	1830	48		2510	282	2000	--	--	--	--	--
July 26	1800	44		1800	100	1000	--	--	--	--	--
July 27	1730	51		1480	200	1000	--	--	--	--	--
July 28	1830	50		1890	150	760	--	--	--	--	--
July 29	1800	50		1860	172	860	--	--	--	--	--
July 30	1800	45		1900	870	870	--	--	--	--	--
July 31	1830	47		2000	158	850	--	--	--	--	--
Aug. 1	1830	40		2770	775	5800	--	--	--	--	--
Aug. 2	1800	47		2280	173	1100	--	--	--	--	--
Aug. 3	1850	49		2090	179	1000	--	--	--	--	--
Aug. 4	1830	59		2170	198	1200	--	--	--	--	--
Aug. 5	1800	47		2410	232	1500	--	--	--	--	--
Aug. 6	1830	49		2370	215	1400	--	--	--	--	--
Aug. 7	1800	45		2910	280	2200	--	--	--	--	--
Aug. 8	1800	46		2970	337	2700	--	--	--	--	--
Aug. 9	1900	46		2280	233	1400	--	--	--	--	--





15-3036. KUSKOWIN RIVER AT MCGRATH (Lat 62°57'10", Long 155°35'10")																
May 28, 1967.....	1830	53	30300	270	22000							66	96	100	VW	
Sept., 29.....	1740	40	15800	334	14000							12	31	91	VW	
15-3560. YUKON RIVER AT EAGLE (Lat 64°47'30", Long 141°12'00")																
Oct. 2, 1966.....	--	44	79600	37	8000							--	--	--		
June 19, 1967.....	1300	54	250000	538	360000	16	22	30	39	45	53	74	99	100	VBWC	
Sept., 22.....	1230	47	126000	75	26000							56	75	98	VW	
15-3890. PORCUPINE RIVER NEAR FORT YUKON (Lat 66°59'35", Long 143°07'45")																
May 24, 1967.....	1730	36	20600	27	1500											
July 7.....	1645	55	32900	69	6100											
Aug. 15.....	1030	49	59800	442	71000	21	38	52	66	78	84	93	96	100	VBWC	
Sept., 23.....	0630	34	30200	33	2700											
15-3895. CHANDALAR RIVER NEAR VENETIE (Lat 67°06'00", Long 147°10'30")																
May 29, 1967.....	2080	36	6100	174	2900											
Sept., 23.....	1410	35	4600	13	170								57	75	90	VW
15-4388. BOULDER CREEK NEAR CENTRAL (Lat 65°34'10", Long 144°52'50")																
July 27, 1967.....	1030	45	20.6	9	0.5											
15-4680. YUKON RIVER AT RAMPART (Lat 65°30'25", Long 150°10'15")																
May 25, 1967.....	1330	42	280000	590	390000	11	17	27	41	60	69	83	99	100	VBWC	
July 8.....	1600	56	300000	344	230000								87	100	VBWC	
Aug. 16.....	1300	41	283000	446	340000	24	37	49	64	72	80	89	100		VBWC	
15-4700. CHISANA RIVER AT NORTHWAY JUNCTION (Lat 63°00'25", Long 141°48'20")																
Oct. 4, 1966.....	1330	37	1490	113	450											
May 19, 1967.....	1125	41	5350	844	12000	5	8	12	17	25	42	64	90	100	VW	
June 17.....	1700	61	5210	1920	27000	28	36	48	65	76	84	91	98	100	VBWC	
July 21.....	1400	55	6430	2290	40000	28	44	58	72	82	89	94	98	100	VBWC	
15-4760. TANANA RIVER NEAR TANACROSS (Lat 63°23'20", Long 143°44'45")																
Oct. 1, 1966.....	1700	40	5580	318	4600											
Oct. 2.....	1700	39	5200	192	2400											
Oct. 3.....	1700	39	5200	192	2400											
Oct. 4.....	1600	39	5160	139	1900											
Oct. 6.....	1600	36	5140	197	2700											

A Daily mean discharge.

B Sample taken at outlet of Tikchik Lake when lake was calm.

C Sample taken at outlet of Tikchik Lake during 30-40 mph winds.



15-5180. NEMANA RIVER NEAR HEALY (Lat 63°50'40", Long 148°56'35")																
Oct. 1, 1966.....	1515	41	3670	48	350	---	---	---	---	---	---	---				
Oct. 2.....	1616	40	3610	36	350	---	---	---	---	---	---	---				
Oct. 3.....	1708	39	3650	44	430	---	---	---	---	---	---	---				
Oct. 4.....	1645	37	3670	68	670	---	---	---	---	---	---	---				
Oct. 5.....	1645	38	3530	38	360	---	---	---	---	---	---	---				
Oct. 6.....	1645	35	3440	25	230	---	---	---	---	---	---	---				
Oct. 7.....	1710	30	3240	29	230	---	---	---	---	---	---	---				
Oct. 8.....	1646	34	3140	29	250	---	---	---	---	---	---	---				
Oct. 9.....	1645	34	3140	29	250	---	---	---	---	---	---	---				
Oct. 10.....	1645	34	3070	26	220	---	---	---	---	---	---	---				
Oct. 11.....	1600	31	2920	23	180	---	---	---	---	---	---	---				
Oct. 12.....	1615	33	2780	40	300	---	---	---	---	---	---	---				
Oct. 13.....	1635	33	2770	30	220	---	---	---	---	---	---	---				
Oct. 14.....	1415	34	2760	16	120	---	---	---	---	---	---	---				
Oct. 15.....	1620	32	2730	16	120	---	---	---	---	---	---	---				
Oct. 16.....	1618	32	2730	14	110	---	---	---	---	---	---	---				
Oct. 17.....	1608	32	2580	19	130	---	---	---	---	---	---	---				
May 24, 1967.....	1037	36	7820	635	13000	4	7	11	16	25	38	54	71	83	100	YBWC
July 11.....	2000	52	10400	452	13000	14	17	25	32	38	44	51	62	82	100	YBWC
July 22.....	1630	43	19400	1680	88000	7	10	15	22	29	40	50	62	80	93	SBWC
Aug. 3.....	1100	45	11500	1642	20000	8	14	22	32	40	48	59	79	94	100	YBWC
Aug. 18.....	1500	43	17700	1560	75000	11	15	22	32	40	49	59	71	78	89	YBWC
Sept. 11.....	0930	39	3010	82	1100	---	---	---	---	---	---	---	---	---	---	YBWC
15-5183. NEMANA RIVER NEAR BEZ (Lat 64°13'05", Long 149°16'40")																
May 25, 1967.....	1600	39	10700	994	29000	5	9	14	21	27	36	52	76	98	100	YBWC
July 13.....	1610	57	12400	1400	87000	19	32	45	60	68	74	86	99	100	100	YBWC
Aug. 2.....	1700	---	13700	2340	87000	---	---	---	---	---	---	---	---	---	---	YBWC
15-5183. 5. TEKLANIKA RIVER NEAR LIGNITE (Lat 64°55'10", Long 149°29'50")																
Aug. 9, 1967.....	1200	46	2480	1630	11000	9	14	21	30	41	52	63	76	86	96	YBWC
Aug. 22.....	1630	48	1830	215	1100	15	19	27	37	46	52	62	76	96	100	YBWC
15-5646. MELOZITNA RIVER NEAR RUBY (Lat 64°47'35", Long 155°33'20")																
July 9, 1967.....	1115	49	1400	3	11	---	---	---	---	---	---	---	---	---	---	YBWC
Aug. 17.....	1230	48	25500	306	21000	5	10	19	29	43	51	61	74	95	100	YBWC



MISCELLANEOUS ANALYSES OF STREAMS IN HAWAII

Periodic determinations of suspended-sediment discharge and particle size, water year October 1966 to September 1967  
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water;  
P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment			Method of analysis
							Percent finer than size indicated, in millimeters			
							0.002	0.004	0.008	
ISLAND OF OAHU										
16-2129. KIPAPA STREAM NEAR WAIPAHU (Lat 21°24'33", Long 158°01'14")										
Feb. 17, 1967	1030	68		14	8	0.3				
May 18	1400	78		5.3	16	.2				
June 30	1045	76		7.1	13	.2				
July 1	0945	76		4.3	16	1				
Aug. 8	1145	76		39	24	2.5				
16-2130. WAIKELE STREAM AT WAIPAHU (Lat 21°23'09", Long 158°00'48")										
Jan. 4, 1967	1290	72		67	18	3.3				
Feb. 1	0945	72		31	52	4.4				
Feb. 17	1335	73		49	17	2.2				
Mar. 21	1030	71		38	183	19	80	91	100	
Mar. 22	1010	70		41	37	4.1				99 100
Mar. 22	1250	73		116	150	47				
Mar. 22	1250	71		280	83	44	52	71	68	69 100
Mar. 22	1410	71		280	1300	983	48	61	75	92 100
Mar. 22	1445	71		620	2430	4070	38	49	64	81 92 98 100
Mar. 23	1100	68		357	418	403	48	61	77	90 94 98 99 100
Mar. 24	0925	70		86	55	13				
Apr. 4	1300	71		52	21	2.9				
May 16	1105	75		27	25	1.8				
June 9	1045	5	D	9	9	1.8				
July 27	1345	77		26	23	1.8				
Aug. 8	0940	75		64	47	8.1				
Aug. 9	1030	72		606	952	1560	40	52	80	95 99 100
Aug. 9	1045	72		890	2050	3820	24	30	39	49 54 57 62 75 96 100
Aug. 9	1130	72		1800	3430	16700	29	38	49	62 76 84 93 98 100
Aug. 9	1345	73		2070	2830	14100	30	40	52	68 80 87 93 97 100
Aug. 9	1500	73		1220	2050	6750	35	47	61	77 88 93 96 98 100

D Daily mean discharge.









## ISLAND OF OKINAWA--Continued

16-8755. YONA-GAWA AT YONA, OKINAWA--Continued

Suspended sediment, October 1966 to June 1967

Day	OCTOBER			NOVEMBER			DECEMBER		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	8.3	C 2	T	4.3	2	T	3.4	C 1	T
2..	7.6	C 2	T	3.4	C 1	T	3.2	C 1	T
3..	6.8	C 2	T	2.8	C 1	T	3.2	C 1	T
4..	6.5	C 2	T	2.8	C 1	T	3.0	C 1	T
5..	6.2	C 2	T	5.0	4	0.1	13	23	S 1.7
6..	6.2	C 3	0.1	25	15	S 3.0	10	14	.4
7..	5.6	C 2	T	9.3	4	.1	7.2	7	.1
8..	5.4	C 2	T	4.1	2	T	13	11	.4
9..	5.4	C 2	T	3.6	1	T	9.1	3	.1
10..	5.1	C 2	T	4.8	4	.1	7.6	3	.1
11..	4.8	C 2	T	3.6	C 1	T	6.2	2	T
12..	4.6	C 2	T	3.4	C 1	T	18	16	S 1.4
13..	4.4	C 2	T	3.2	C 1	T	8.7	2	T
14..	4.4	C 2	T	3.6	3	T	7.2	C 1	T
15..	4.6	C 2	T	3.0	C 1	T	6.2	C 1	T
16..	4.1	C 2	T	3.0	C 1	T	8.3	8	.2
17..	3.8	C 2	T	3.4	4	T	5.9	2	T
18..	3.6	C 1	T	3.0	C 2	T	5.9	C 1	T
19..	3.6	C 1	T	3.0	C 2	T	5.6	C 1	T
20..	3.6	C 1	T	3.6	C 2	T	5.4	C 2	T
21..	3.4	C 1	T	3.2	C 2	T	5.6	C 2	T
22..	3.4	C 1	T	2.8	C 1	T	4.8	C 2	T
23..	3.2	C 1	T	2.6	C 1	T	5.4	3	T
24..	3.2	C 1	T	2.6	3	T	5.4	2	T
25..	3.2	C 1	T	24	17	S 1.9	42	38	S 7.3
26..	3.0	C 1	T	7.6	3	.1	21	4	.2
27..	3.0	C 1	T	4.6	C 1	T	13	2	.1
28..	3.0	C 1	T	4.1	C 1	T	10	C 1	T
29..	3.0	C 1	T	3.6	C 1	T	9.1	C 1	T
30..	3.0	C 1	T	4.1	C 2	T	7.9	C 1	T
31..	2.8	C 1	T	--	--	--	7.9	2	T
Total	138.8	--	0.7	157.1	--	5.7	282.2	--	12.5
JANUARY									
1..	56	36	S 10	3.2	C 1	T	2.8	C 1	T
2..	16	3	.1	23	25	S 7.1	2.8	C 1	T
3..	12	2	.1	11	8	.2	2.6	C 1	T
4..	10	C 1	T	5.1	2	T	2.6	C 1	T
5..	9.1	C 1	T	4.4	C 1	T	12	15	0.5
6..	7.9	C 1	T	4.1	C 1	T	6.5	4	.1
7..	7.9	C 2	T	3.8	C 1	T	4.4	C 2	T
8..	6.8	C 1	T	4.1	C 2	T	3.8	C 2	T
9..	6.2	C 1	T	3.6	1	T	3.6	C 2	T
10..	5.9	C 1	T	3.6	1	T	3.4	C 2	T
11..	6.4	6	.1	4.4	2	T	3.4	C 2	T
12..	10	7	.2	3.6	C 1	T	3.2	C 1	T
13..	6.2	C 1	T	3.4	C 1	T	3.2	C 1	T
14..	5.6	C 1	T	6.4	6	.1	3.0	C 1	T
15..	5.4	C 1	T	4.8	2	T	3.0	C 1	T
16..	5.1	C 1	T	3.8	C 1	T	2.8	C 1	T
17..	4.8	C 1	T	3.6	C 1	T	2.8	C 1	T
18..	4.6	C 1	T	3.4	C 1	T	3.4	2	T
19..	4.6	C 1	T	3.4	C 1	T	2.8	C 1	T
20..	4.4	C 1	T	3.2	C 1	T	2.8	C 1	T
21..	4.4	C 1	T	3.2	C 1	T	3.3	2	T
22..	4.1	C 1	T	3.2	C 1	T	2.8	C 1	T
23..	4.1	C 1	T	3.4	2	T	2.6	C 1	T
24..	3.8	C 1	T	3.4	2	T	2.4	C 1	T
25..	3.8	C 1	T	4.4	3	T	2.4	C 1	T
26..	3.6	C 1	T	3.4	2	T	2.4	C 1	T
27..	3.6	C 1	T	3.2	C 1	T	2.4	C 1	T
28..	3.4	C 1	T	3.0	C 1	T	2.6	2	T
29..	3.8	2	T	--	--	--	2.6	C 1	T
30..	3.4	C 1	T	--	--	--	2.4	C 1	T
31..	3.2	C 1	T	--	--	--	2.2	C 1	T
Total	236.1	--	10.9	133.1	--	7.8	103.0	--	1.0

S Computed by subdividing day.

T Less than 0.05 ton.

C Composite period.

## ISLAND OF OKINAWA--Continued

16-8755. YONA-GAWA AT YONA, OKINAWA--Continued

Suspended sediment, October 1966 to June 1967--Continued

Day	APRIL			MAY			JUNE					
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment				
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day			
1..	2.2	C	1	T	3.6	3	T	11	7	0.2		
2..	2.2	C	1	T	3.2	C	2	T	8.3	5	.1	
3..	2.1	C	1	T	3.4	C	2	T	10	6	.2	
4..	2.4	C	2	T	3.4	C	2	T	49	87	S	24
5..	2.2	C	1	T	2.8	C	2	T	117	75	S	42
6..	2.4	C	1	T	2.8	C	2	T	112	130	B	40
7..	2.4	C	1	T	2.8	3	T	85	12	S	3.6	
8..	4.4	3	T	3.8	7	0.1	52	29	S	7.3		
9..	6.2	5	0.1	3.4	4	T	36	4		4		
10..	3.0	C	2	T	2.8	2	T	22	2		.1	
11..	2.6	C	2	T	2.6	2	T	17	2		.1	
12..	2.4	C	2	T	2.4	2	T	20	6	S	.5	
13..	2.8	C	2	T	2.4	3	T	126	470	S	960	
14..	2.6	C	1	T	3.4	5	T	30	4		.3	
15..	2.4	C	1	T	10	33	S	2.2	21		.1	
16..	2.4	C	1	T	3.8	5	.1	50	300	B	40	
17..	2.2	C	1	T	3.0	3	T	27	3		.2	
18	2.2	C	1	T	2.6	2	T	20	2		.1	
19..	3.2	4	T	2.6	2	T	16	1		T		
20..	13	10	.4	5.6	6	S	.2	14	1	T		
21..	4.1	2	T	39	51	S	17	12	1	T		
22..	3.2	C	1	T	12	4	.1	11	1	T		
23..	3.0	C	1	T	7.9	2	T	10	C	2	.1	
24..	3.2	C	2	T	6.8	2	T	9.1	C	2	T	
25..	3.6	C	2	T	15	15	S	.7	8.3	C	2	T
26..	2.8	C	2	T	10	5	.1	7.6	C	2	T	
27..	2.6	C	2	T	8.3	3	.1	7.2	C	1	T	
28..	2.8	4	T	6.8	C	2	T	6.8	C	1	T	
29..	12	18	S	1.6	6.2	C	2	T	6.5	C	1	T
30..	4.1	3	T	5.6	3	T	6.2	C	1	T		
31..	--	--	--	16	90	B	4	--	--	--	--	
Total	106.7	--	2.5	204.0	--	25.1	928.0	--	1119.6			
Total discharge for period Oct. 1, 1966 to June 30, 1967 (cfs-days).....										2289.0		
Total load for period Oct. 1, 1966 to June 30, 1967 (tons).....										1185.8		

S Computed by subdividing day.

T Less than 0.05 ton.

B Computed from estimated-concentration graph.

C Composite period.

## ISLAND OF OKINAWA--Continued

## 16-8755. YOKA-GAWA AT YOKA, OKINAWA--Continued

## Particle-size analyses of suspended sediment, October 1966 to June 1967

(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	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment					Method of analysis						
						Percent finer than size indicated, in millimeters											
June 13, 1967.....	71		358	1690	1630	0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000	VPWC
						13	22		54		69	75	82	90	100		

## Particle-size analyses of bed material, October 1966 to June 1967

(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	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Bed material					Method of analysis						
						Percent finer than size indicated, in millimeters											
June 23, 1967.....		3	10			0.062	0.125	0.250	0.500	1.000	2.000	4.000	8.000	16.000	32.000	64.000	S
						3	5	8	11	19	32	56	79	84	100		

16-8782. HANECHI-OKAWA AT KAWAKAMI, OKINAWA

LOCATION.--Lat 26°36'28" N., long 128°01'16" E., at gaging station 0.4 mile south of Kawakami, 0.7 mile southeast of Taira School, and 1.0 mile southwest of Nakaoshi.

DRAINAGE AREA.--4.4 square miles, approximately.

RECORDS AVAILABLE.--Water temperatures: October 1966 to September 1967.

Sediment records: October 1966 to September 1967.

Extremes: Maximum temperature 29.9°F Aug. 14; minimum 53°F Jan. 16, Mar. 7.

Sediment concentrations: Maximum daily 718 ppm June 13; minimum daily 1 ppm on many days.

Sediment loads: Maximum daily, 1,950 tons June 4; minimum daily, less than 0.05 ton on many days.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Mean discharge (cfs)	Silica (SiO <sub>2</sub> ) (Fe)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (K) (HCO <sub>3</sub> )	Carbonate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F) (NO <sub>3</sub> ) (B)	Dissolved solids (calculated)		Hardness as CaCO <sub>3</sub>		Specific conductance (micro-mhos at 25°C)	pH	Color		
												Parts per million	Tons per acre-foot	Calcium, magnesium	Non-carbonate					
Oct. 10, 1966..	8.4	14	0.60	4.8	3.2	14	0.0	24	0	5.8	21	0.0	80	0.11	1.81	20	5	95	7.0	50
Jan. 20, 1967..	7.6	15	.04	6.8	3.8	15	.3	27	0	9.5	24	.0	99	.12	2.03	22	11	120	8.0	5
Mar. 17, .....	3.6	14	.04	7.2	4.4	16	.7	32	0	11	24	.1	88	.12	.86	26	10	122	8.0	20
June 23, .....	24	14	.10	5.2	2.9	16	--	24	0	9.0	24	.0	94	.13	6.09	20	5	110	7.8	15

Temperature (°F) of water, water year October 1966 to September 1967

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.....	76	78	70	79	76	78	73	75	80	80	73	80	72	73	--	--	--	--	--	--	--	--	--	--	--	69	78	76	66	65	71	--	
November.....	68	71	67	71	71	71	75	72	75	73	69	71	74	72	70	68	70	72	70	68	70	68	70	68	70	72	68	71	65	63	65	69	
December.....	60	63	67	67	67	67	68	67	66	68	63	62	65	64	67	70	71	69	70	68	70	68	70	64	64	63	65	62	64	65	64	66	
January.....	64	61	54	54	52	58	63	57	57	58	62	60	58	63	60	53	56	60	63	64	64	65	64	64	65	65	68	68	62	58	62	61	
February.....	64	61	58	60	65	60	57	68	67	68	59	62	64	58	55	56	64	58	63	67	65	66	65	63	58	57	59	58	--	--	61	--	
March.....	64	64	65	65	62	58	53	62	62	61	59	71	61	65	69	71	58	59	67	64	65	58	56	67	72	69	67	75	69	67	64	--	
April.....	74	78	79	64	74	76	72	74	74	74	73	73	77	81	76	79	79	65	71	68	61	81	78	75	64	65	66	73	70	78	--	73	
May.....	77	82	78	77	78	82	80	76	80	81	75	81	75	75	70	68	77	74	70	71	71	75	78	75	75	75	75	75	75	75	75	75	75
June.....	74	71	81	78	72	70	73	70	71	76	73	78	73	73	73	73	70	71	72	75	76	78	77	84	83	78	71	79	78	80	--	75	
July.....	80	82	80	82	85	88	83	83	82	85	85	82	84	86	86	82	82	83	83	86	83	84	83	82	85	86	82	83	80	83	83	83	
August.....	83	83	84	83	79	78	75	80	80	78	78	77	75	89	85	82	86	83	83	86	87	85	83	86	87	85	85	86	85	82	82	75	82
September.....	--	--	--	--	--	--	77	82	87	86	86	83	78	73	75	75	73	83	78	73	78	75	76	75	76	75	78	75	73	75	74	76	--

## ISLAND OF OKINAWA--Continued

16-8782. HANECHI-OKAWA AT KAWAKAMI OKINAWA--Continued

Suspended sediment, water year October 1966 to September 1967

Day	OCTOBER			NOVEMBER			DECEMBER		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	12	C 3	0.1	9.3	13	0.3	7.1	C 3	0.1
2..	11	C 3	.1	7.2	4	.1	6.9	C 3	.1
3..	10	C 3	.1	5.0	2	T	6.5	C 3	.1
4..	9.7	C 3	.1	4.3	2	T	6.2	C 3	.1
5..	9.4	C 2	.1	6.1	7	.1	16	11	S .8
6..	9.2	C 2	T	64	170	B 30	25	11	.7
7..	9.0	C 2	T	38	8	.8	14	7	.3
8..	8.7	C 2	T	12	4	.1	54	52	S 8.4
9..	8.7	C 2	T	9.0	3	.1	35	10	.9
10..	8.4	C 2	T	19	9	S .5	25	5	.3
11..	8.2	C 2	T	12	3	.1	16	4	.2
12..	8.2	C 2	T	9.7	2	.1	14	4	.2
13..	8.0	C 2	T	8.4	2	T	12	C 3	.1
14..	7.6	C 2	T	9.2	2	T	12	C 3	.1
15..	8.7	4	.1	7.6	C 1	T	11	C 3	.1
16..	7.2	C 3	.1	7.1	C 1	T	16	7	.3
17..	6.9	C 3	.1	7.6	2	T	12	2	.1
18..	6.7	C 3	.1	7.1	C 1	T	11	1	T
19..	6.3	C 2	T	6.5	C 1	T	10	1	T
20..	6.2	C 2	T	10	3	.1	10	2	.1
21..	5.8	C 2	T	9.8	2	.1	11	3	.1
22..	5.6	C 2	T	7.1	C 1	T	10	2	.1
23..	5.4	C 2	T	6.5	C 1	T	10	2	.1
24..	6.8	8	.1	6.2	C 1	T	9.7	1	T
25..	5.7	4	.1	52	70	B 10	65	100	S 22
26..	5.1	C 2	T	16	4	.2	46	11	1.4
27..	4.8	C 2	T	11	C 3	.1	24	5	.3
28..	4.7	C 2	T	9.0	C 3	.1	16	C 2	.1
29..	4.4	C 1	T	8.0	C 3	.1	14	C 2	.1
30..	4.2	C 1	T	8.7	4	.1	12	C 2	.1
31..	4.2	C 1	T	--	--	--	12	C 2	.1
Total	226.8	--	1.8	393.4	--	43.3	549.4	--	37.5
Day	JANUARY			FEBRUARY			MARCH		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	97	228	S 118	5.4	C 2	T	4.6	C 1	T
2..	44	14	1.7	18	24	S 2.6	4.4	C 1	T
3..	31	5	.4	21	11	S 1.0	4.3	C 1	T
4..	24	3	.2	8.2	4	.1	4.2	C 1	T
5..	20	2	.1	6.9	3	.1	12	9	0.3
6..	18	C 2	.1	6.0	2	T	9.2	5	.1
7..	15	C 2	.1	5.8	C 1	T	6.0	2	T
8..	14	C 2	.1	5.8	C 1	T	5.1	C 2	T
9..	12	C 2	.1	5.6	C 1	T	4.6	C 2	T
10..	12	C 2	.1	5.4	C 1	T	4.3	C 2	T
11..	12	C 3	.1	7.6	4	.1	4.2	C 2	T
12..	15	C 3	.1	5.6	2	T	4.1	C 2	T
13..	12	C 3	.1	5.2	2	T	3.8	C 1	T
14..	10	C 3	.1	7.6	6	.1	3.7	C 1	T
15..	9.4	C 3	.1	8.0	3	.1	3.7	C 1	T
16..	9.2	C 3	.1	5.8	1	T	3.6	C 1	T
17..	8.7	C 3	.1	5.4	1	T	3.6	C 1	T
18..	8.4	C 2	T	5.7	2	T	4.0	C 1	T
19..	8.0	C 2	T	5.2	C 1	T	3.6	C 1	T
20..	7.6	C 2	T	5.0	C 1	T	3.5	C 1	T
21..	7.4	C 2	T	5.0	C 1	T	4.9	4	.1
22..	7.2	C 2	T	4.8	C 1	T	4.2	3	T
23..	7.1	C 2	T	5.1	2	T	3.5	C 2	T
24..	6.9	C 2	T	5.2	1	T	3.2	C 2	T
25..	6.7	C 2	T	6.8	2	T	3.2	C 2	T
26..	6.3	C 2	T	5.4	C 1	T	3.2	C 2	T
27..	6.0	C 2	T	4.8	C 1	T	3.2	C 2	T
28..	5.8	C 2	T	4.6	C 1	T	3.5	3	T
29..	6.9	3	.1	--	--	--	4.1	5	.1
30..	5.7	C 2	T	--	--	--	3.2	4	T
31..	5.4	C 2	T	--	--	--	3.1	3	T
Total	458.7	--	122.2	190.9	--	4.5	135.8	--	1.1

S Computed by subdividing day.

T Less than 0.05 ton.

B Computed from estimated-concentration graph.

C Composite period.

## ISLAND OF OKINAWA--Continued

16-8782. HANECHI-OKAWA AT KAWAKAMI, OKINAWA--Continued

Suspended sediment, water year October 1966 to September 1967--Continued

Day	APRIL				MAY			JUNE				
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment				
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day			
1..	3.1	C	3	T	5.8	5	0.1	39	9	1.0		
2..	3.0	C	2	T	5.1	4	.1	24	3	.2		
3..	2.9	C	2	T	7.5	10	.2	18	2	.1		
4..	4.1	C	4	T	9.0	8	.2	298	522	S 1950		
5..	3.3	C	2	T	5.8	4	.1	271	338	S 354		
6..	3.2	C	2	T	5.1	3	T	311	380	S 553		
7..	3.0	C	2	T	4.7	3	T	270	224	S 218		
8..	3.4	C	3	T	4.8	4	.1	100	50	S 14		
9..	4.7	3	T	T	4.6	4	T	73	25	4.9		
10..	3.5	2	T	T	4.1	C	3	55	20	3.0		
11..	4.2	4	T	T	4.0	C	3	T	46	12	1.5	
12..	7.7	7	0.1	T	3.7	C	3	T	44	10	1.2	
13..	5.7	3	T	T	28	106	S	17	261	718	S 1820	
14..	4.0	2	T	T	48	51	S	8.2	79	25	5.3	
15..	3.4	C	1	T	24	12	T	.8	55	16	2.4	
16..	3.0	C	1	T	10	7	.2	180	340	S 512		
17..	2.7	C	1	T	10	5	.1	98	75	20		
18..	2.7	2	T	T	8.2	3	.1	58	15	2.3		
19..	4.6	11	S	.4	7.2	2	T	46	5	.6		
20..	29	24	S	2.6	22	34	S	4.8	37	4	.4	
21..	6.2	3	T	.1	227	615	S	991	31	C	3	.3
22..	4.7	3	T	T	74	20	S	3.8	27	C	3	.2
23..	4.1	2	T	T	35	8	.8	24	C	3	.2	
24..	5.3	7	.1	T	25	5	.3	20	C	3	.2	
25..	7.8	10	.2	T	22	3	.2	18	C	3	.1	
26..	4.7	4	.1	T	28	9	.7	15	C	2	.1	
27..	4.1	3	T	T	20	4	.2	14	C	2	.1	
28..	4.4	14	S	1.2	14	3	.1	12	C	2	.1	
29..	30	44	S	6.6	12	2	.1	12	C	2	.1	
30..	7.8	6	.1	T	12	2	.1	11	C	2	.1	
31..	--	--	--	--	42	18	S	4.3	--	--	--	
Total	180.3	--	12.0		732.6	--	1033.9	2547	--	5465.4		
JULY												
1..	10	C	2	0.1	3.6	3	T	11	49	S	1.9	
2..	9.7	C	2	.1	3.4	2	T	32	63	S	13	
3..	9.0	C	2	T	3.2	C	2	T	9.5	8	.2	
4..	8.7	C	2	T	3.0	C	2	T	5.4	4	.1	
5..	8.2	C	2	T	2.8	C	2	T	4.3	3	T	
6..	7.8	C	2	T	2.7	C	2	T	4.0	2	T	
7..	7.4	2	T	T	2.7	C	2	T	3.8	2	T	
8..	7.8	4	.1	T	2.6	C	2	T	4.5	5	.1	
9..	7.1	2	T	T	2.5	C	2	T	3.8	3	T	
10..	6.5	2	T	T	2.8	2	T	3.3	2	T		
11..	6.3	C	1	T	7.5	60	S	2.2	3.3	2	T	
12..	6.0	C	1	T	56	139	S	33	3.5	4	T	
13..	6.0	C	1	T	9.8	8	.2	3.0	2	T	T	
14..	5.2	C	1	T	5.4	4	.1	2.5	1	T	T	
15..	5.1	C	1	T	4.3	4	T	2.3	1	T	T	
16..	5.0	C	1	T	3.7	C	3	T	2.3	2	T	
17..	4.8	C	1	T	3.4	C	3	T	2.2	2	T	
18..	5.1	2	T	T	3.2	C	3	T	2.1	2	T	
19..	5.7	5	.1	T	3.1	C	3	T	2.0	2	T	
20..	5.6	4	.1	T	3.0	C	2	T	1.9	2	T	
21..	4.8	2	T	T	2.9	C	2	T	1.8	1	T	
22..	4.4	2	T	T	2.8	C	2	T	1.6	C	1	T
23..	5.1	8	.1	T	2.7	C	2	T	1.5	C	1	T
24..	4.2	C	2	T	2.5	2	T	1.4	C	1	T	
25..	4.1	C	2	T	2.3	2	T	1.4	C	1	T	
26..	4.0	C	2	T	2.2	C	2	T	2.0	1	T	
27..	4.1	4	T	T	2.6	C	2	T	2.7	1	T	
28..	3.8	C	2	T	2.6	2	T	2.4	1	T	T	
29..	3.6	C	2	T	5.1	20	S	.5	2.1	1	T	
30..	9.3	55	S	1.8	6.7	10	.2	2.6	2	T	T	
31..	4.3	5	.1	T	9.7	47	S	2.0	--	--	--	
Total	188.7	--	3.1		170.8	--	38.7	126.2	--	15.7		
Total discharge for year (cfs-days).....										5900.6		
Total load for year (tons).....										6779.2		

S Computed by subdividing day.

T Less than 0.05 ton.

C Composite period.

## ISLAND OF OKINAWA--Continued

## 16-8782. HANECHI-OKAWA AT KAWAKAMI, OKINAWA--Continued

Particle-size analyses of suspended sediment, water year October 1966 to September 1967  
 (Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water;  
 P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water tem- per- ature (°F)	Sam- pling point	Discharge (cfs)	Sediment concen- tration (ppm)	Sediment discharge (tons per day)	Suspended sediment					Method of analysis					
							Percent finer than size indicated, in millimeters		Suspended sediment								
							0.002	0.004	0.008	0.016	0.031	0.062	0.125	0.250	0.500	1.000	2.000
June 6, 1967.....	1707	70		562	835	1270	--	--	--	--	79	89	99	100			V
June 10, 1967.....	1905	72		1030	2910	8080	11	24		50	69	81	91	97			VPWC
June 16, 1967.....	1920	72		1130	2750	8380	18	28		55	75	88	97	100			VPWC

Particle-size analyses of bed material, water year October 1966 to September 1967  
 (Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water;  
 P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water tem- per- ature (°F)	Sam- pling point	Discharge (cfs)	Sediment concen- tration (ppm)	Sediment discharge (tons per day)	Bed material					Method of analysis						
							Percent finer than size indicated, in millimeters		Bed material									
							0.062	0.125	0.250	0.500	1.000	2.000	4.000	8.000	16.000	32.000	64.000	
June 12, 1967.....	1300		3	34			1	4	11	17	19	29	52	82	95	96	100	S
June 29, 1967.....	1300		3	12				3	5	20	39	57	72	81	90	100	100	S

16-3842. FUKUJI-GAWA AT FUKUJI, OKINAWA

LOCATION.--Lat 26°38'16" N, long 128°10'13" E., at gaging station at Fukuji, 0.9 mile north of Kawata, and 1.3 miles northeast of Taira.

DRAINAGE AREA.--12 square miles, approximately.

RECORDS AVAILABLE.--Water temperatures: May 1964 to September 1967.

Sediment records: May 1964 to September 1967.

EXTREMES, 1960-67.--Water temperatures: Maximum, 88°F Aug. 16; minimum, 51°F Feb. 17.

Sediment: Maximum daily, 848 ppm June 15; minimum daily, 1 ppm on many days.

Sediment loads: Maximum daily (estimated) 20,000 tons Aug. 12; minimum daily, less than 0.05 ton on many days.

EXTREMES, 1964-67.--Water temperatures: Maximum, 88°F Aug. 16, 1967; minimum, 51°F Jan. 16, 1965, Feb. 17, 1967.

Sediment concentrations: Maximum daily, 4,500 ppm June 23, 1965; minimum daily, 1 ppm on many days each year.

Sediment loads: Maximum daily, 64,000 tons Aug. 5, 1965; minimum daily, less than 0.05 ton on many days each year.

Chemical analyses, in parts per million, water year October 1966 to September 1967

Date of collection	Discharge (cfs)	Silica (SiO <sub>2</sub> )	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO <sub>3</sub> )	Carbonate (CO <sub>3</sub> )	Sulfate (SO <sub>4</sub> )	Chloride (Cl)	Fluoride (F)	Nitrate (NO <sub>3</sub> )	Dissolved solids (calculated)			Hardness as CaCO <sub>3</sub>	Sodium adsorption ratio	Specific conductance (micro-mhos at 25°C)	Color or pH	
														Parts per million	Tons per acre-foot	Tons per day					
Jan. 20, 1967..	17	18	0.04	5.6	3.3	19	0.5	23	0	6.5	29	0.0	0.0	94	0.13	4.31	19	9	120	7.7	5
Mar. 28.....	10	14	0.04	5.2	3.2	20	1.0	29	0	8.0	29	0.0	0.0	96	0.13	2.59	24	3	130	7.9	5
June 23.....	42	16	1.0	3.6	2.7	18	--	17	0	7.5	28	0.2	0.2	91	0.12	10.3	14	6	110	7.6	10

Temperature (°F) of water, water year October 1966 to September 1967

Month	Day												Average																			
	1	2	3	4	5	6	7	8	9	10	11	12		13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
October.....	70	70	70	70	70	71	70	71	70	71	70	71	71	71	71	71	69	67	67	66	67	68	68	70	69	69	70	70	68	67	68	
November.....	71	68	66	68	68	69	69	70	71	70	71	73	72	69	69	69	69	70	65	63	63	63	63	63	63	63	62	62	63	65	67	
December.....	61	60	61	61	66	65	64	66	63	63	62	63	62	61	62	63	63	63	67	67	66	66	66	64	61	60	58	66	67	60	63	
January.....	63	60	58	56	56	58	59	57	57	57	57	57	57	52	52	53	53	53	52	54	58	58	59	57	58	61	63	58	57	56		
February.....	56	58	58	55	52	54	56	57	61	61	60	63	57	54	52	51	56	54	56	57	60	63	64	61	61	61	59	67	--	--	57	
March.....	66	55	68	70	62	58	56	57	58	56	57	56	57	58	60	60	61	65	64	63	64	63	61	58	62	67	69	69	70	70	62	
April.....	71	72	72	74	66	66	69	69	72	73	73	73	73	73	72	70	68	72	72	67	67	67	67	64	66	69	71	69	71	--	69	
May.....	71	75	75	71	70	75	78	74	74	75	72	72	73	72	72	72	73	74	72	72	72	73	73	73	73	72	73	73	74	73	74	
June.....	72	73	73	73	73	72	71	70	70	71	73	73	70	71	71	71	71	71	71	74	77	77	78	78	80	80	79	79	81	81	74	74
July.....	82	82	81	79	79	81	82	82	83	82	82	82	82	82	82	82	83	82	83	82	81	79	80	80	81	81	80	81	81	81	81	
August.....	80	80	79	79	80	79	78	78	79	80	82	77	76	--	88	80	82	82	83	82	81	80	80	81	81	82	82	82	82	82	80	
September.....	80	79	80	82	82	80	80	80	81	81	79	77	77	76	76	76	76	75	74	74	74	75	75	74	74	74	73	74	75	--	77	

## ISLAND OF OKINAWA--Continued

16-8842. FUKUJI-GAWA AT FUKUJI, OKINAWA--Continued

Suspended sediment, water year October 1966 to September 1967

Day	OCTOBER			NOVEMBER			DECEMBER		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	38	C 1	0.1	17	5	0.2	14	C 1	T
2..	34	C 1	.1	19	2	.1	13	C 1	T
3..	30	C 1	.1	12	C 1	T	12	C 1	T
4..	28	C 1	.1	12	C 1	T	12	C 1	T
5..	26	C 1	.1	19	4	.2	12	2	.1
6..	25	C 1	.1	178	390	A 190	26	2	.1
7..	24	C 1	.1	95	16	S 7.2	19	2	.1
8..	23	C 1	.1	24	3	.2	115	19	S 9.1
9..	22	C 1	.1	19	2	.1	55	5	.7
10..	21	C 1	.1	52	13	S 2.2	30	3	.2
11..	20	C 1	.1	27	3	.2	22	2	.1
12..	19	C 1	.1	20	2	.1	23	2	.1
13..	18	C 1	T	18	C 1	T	20	C 1	T
14..	18	C 1	T	19	C 1	.1	17	C 1	T
15..	21	C 1	.1	18	C 1	T	16	C 1	T
16..	19	C 1	.1	15	C 1	T	37	9	S 1.3
17..	18	C 1	T	14	C 1	T	23	2	.1
18..	17	C 1	T	14	C 1	T	19	C 1	.1
19..	17	C 1	T	13	C 1	T	19	C 1	.1
20..	16	C 1	T	18	2	.1	18	C 1	T
21..	16	C 1	T	15	C 1	T	21	1	.1
22..	15	C 1	T	13	C 1	T	16	1	T
23..	15	C 1	T	12	C 1	T	19	C 1	.1
24..	18	C 1	T	12	C 1	T	19	C 1	.1
25..	16	C 1	T	88	26	S 12	249	94	S 135
26..	15	C 1	T	39	11	1.2	79	6	1.3
27..	14	C 1	T	18	3	.1	43	2	.2
28..	14	C 1	T	14	C 1	T	34	1	.1
29..	13	C 1	T	13	C 1	T	26	1	.1
30..	12	C 1	T	16	C 1	T	22	1	.1
31..	12	C 1	T	--	--	--	22	1	.1
Total	614	--	2.1	863	--	214.6	1072	--	149.7
Day	JANUARY			FEBRUARY			MARCH		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	510	284	S 877	13	1	T	10	C 2	0.1
2..	93	6	1.5	47	470	A 60	9.2	C 2	T
3..	56	3	.5	67	43	S 15	9.2	C 2	T
4..	44	2	.2	19	4	.2	9.2	C 2	T
5..	39	C 1	.1	15	2	.1	44	9	1.1
6..	32	C 1	.1	13	C 1	T	31	4	.3
7..	28	C 1	.1	12	C 1	T	20	2	.1
8..	25	1	.1	14	1	T	16	C 1	T
9..	24	C 2	.1	14	1	T	15	C 1	T
10..	24	C 2	.1	12	1	T	14	C 1	T
11..	24	C 2	.1	15	3	.1	13	C 1	T
12..	34	C 2	.2	13	2	.1	13	C 1	T
13..	25	C 1	.1	11	2	.1	12	C 1	T
14..	22	C 1	.1	39	16	S 3.1	12	C 1	T
15..	21	C 1	.1	43	5	.6	11	C 1	T
16..	21	C 1	.1	18	2	.1	11	C 1	T
17..	20	C 1	.1	14	2	.1	11	C 1	T
18..	19	C 1	.1	13	C 2	.1	12	1	T
19..	18	C 1	T	13	C 2	.1	-11	1	T
20..	17	C 1	T	12	C 2	.1	11	1	T
21..	17	C 1	T	12	C 1	T	12	2	.1
22..	16	C 1	T	11	C 1	T	13	2	.1
23..	16	C 1	T	11	C 1	T	11	2	.1
24..	16	C 1	T	11	C 1	T	11	1	T
25..	15	C 1	T	13	3	.1	10	1	T
26..	15	C 2	.1	12	2	.1	10	2	.1
27..	15	C 2	.1	11	2	.1	10	1	T
28..	15	C 2	.1	10	2	.1	10	C 1	T
29..	16	2	.1	--	--	--	10	C 1	T
30..	14	2	.1	--	--	--	9.8	C 1	T
31..	13	1	T	--	--	--	9.5	C 1	T
Total	1264	--	881.6	508	--	80.5	410.9	--	2.8

S Computed by subdividing day.

T Less than 0.05 ton.

A Computed from partly-estimated concentration graph.

C Composite period.

## ISLAND OF OKINAWA--Continued

16-8842. FUKUJI-GAWA AT FUKUJI, OKINAWA--Continued

Suspended sediment, water year October 1966 to September 1967--Continued

Day	APRIL			MAY			JUNE		
	Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment		Mean discharge (cfs)	Suspended sediment	
		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day		Mean concentration (ppm)	Tons per day
1..	9.5	C 1	T	15	4	0.2	103	20	5.6
2..	10	C 1	T	13	3	.1	42	3	.3
3..	11	C 1	T	28	10	S 2.0	89	330	A 80
4..	10	C 1	T	47	12	S 2.2	236	227	S 290
5..	10	C 1	T	17	3	.1	700	281	S 1540
6..	9.7	C 1	T	14	C 2	.1	1020	453	S 3130
7..	10	1	T	13	C 2	.1	621	86	S 315
8..	11	1	T	23	7	S .7	171	13	S 9.6
9..	12	1	T	26	5	.4	129	7	2.4
10..	11	1	T	15	2	.1	85	2	.5
11..	13	1	T	13	C 2	.1	69	2	.4
12..	14	1	T	13	C 2	.1	71	55	S 13
13..	11	1	T	17	5	.2	926	858	S 9130
14..	9.4	C 1	T	21	3	.2	101	6	1.6
15..	8.2	C 1	T	15	2	.1	61	3	.5
16..	7.8	C 1	T	13	2	.1	563	483	S 2260
17..	7.6	C 1	T	12	C 2	.1	187	18	9.1
18..	7.6	C 1	T	10	C 2	.1	99	5	1.3
19..	8.6	2	T	10	C 2	.1	75	3	.6
20..	53	7	1.0	19	10	S 1.1	61	3	.5
21..	15	2	.1	377	310	S 570	53	3	.4
22..	10	C 1	T	92	12	3.0	48	2	.3
23..	9.8	C 1	T	39	4	.4	44	2	.2
24..	9.8	2	.1	29	3	.2	40	2	.2
25..	16	2	.1	35	5	.5	39	2	.2
26..	10	C 1	T	74	21	6.4	36	2	.2
27..	9.2	C 1	T	45	6	.7	33	2	.2
28..	10	7	.2	28	3	.2	31	2	.2
29..	112	300	90	24	3	.2	29	C 2	.2
30..	18	6	.3	23	3	.2	28	C 2	.2
31..	--	--	--	190	780	A 400	--	--	--
Total	464.2	--	92.5	1310	--	990.0	5790	--	16792.7
JULY									
1..	26	C 2	0.1	12	2	0.1	22	6	0.4
2..	25	C 2	.1	12	2	.1	14	5	.2
3..	24	C 2	.1	11	2	.1	11	4	.1
4..	23	2	.1	11	2	.1	11	3	.1
5..	22	2	.1	11	2	.1	10	2	.1
6..	21	2	.1	10	2	.1	9.8	2	.1
7..	21	C 2	.1	10	2	.1	9.2	2	T
8..	20	C 2	.1	9.8	1	T	9.2	2	T
9..	20	C 2	.1	9.8	1	T	10	4	.1
10..	19	C 1	.1	9.2	1	T	8.6	4	.1
11..	18	C 1	T	41	89	S 18	8.6	3	.1
12..	17	C 1	T	1750	--	E 20000	16	15	.6
13..	17	C 1	T	116	16	5.0	9.8	5	.1
14..	16	C 1	T	38	10	1.0	8.6	4	.1
15..	16	C 1	T	23	7	.4	8.1	C 3	.1
16..	15	C 1	T	21	4	.2	7.6	C 3	.1
17..	15	C 1	T	18	C 3	.1	7.6	C 3	.1
18..	16	2	.1	19	C 3	.2	7.2	2	T
19..	66	86	S 31	16	2	.1	7.2	2	T
20..	24	7	.5	16	2	.1	7.2	2	T
21..	16	2	.1	14	2	.1	7.2	2	T
22..	23	32	S 3.4	13	2	.1	7.2	2	T
23..	28	62	S 5.6	13	C 2	.1	6.7	2	T
24..	16	4	.2	13	C 2	.1	6.7	2	T
25..	15	3	.1	12	C 2	.1	6.2	2	T
26..	14	C 2	.1	12	C 2	.1	6.7	2	T
27..	13	C 2	.1	12	C 2	.1	7.6	2	T
28..	14	C 2	.1	11	C 2	.1	8.1	2	T
29..	13	C 2	.1	12	4	.1	8.6	2	T
30..	14	C 2	.1	21	8	.5	10	4	.1
31..	13	C 2	.1	18	8	.4	--	--	--
Total	620	--	42.9	2314.8	--	20027.7	277.7	--	3.1

Total discharge for year (cfs-days)..... 15508.6

Total load for year (tons)..... 39280.2

E Estimated.

S Computed by subdividing day.

T Less than 0.05 ton.

A Computed from partly-estimated concentration graph.

C Composite period.

ISLAND OF OKINAWA--Continued  
16-8842. FUKUJI-GAWA AT FUKUJI, OKINAWA--Continued

Particle-size analyses of suspended sediment, water year October 1966 to September 1967  
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water;  
P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Suspended sediment						Method of analysis		
							Percent finer than size indicated, in millimeters								
							0.002	0.004	0.008	0.016	0.031	0.062		0.125	0.250
May 31, 1967.....	1515	76		172	661	1380	48	67	96		98	99	100	--	SPWC
June 13.....	1090	73		8340	3700	83320	15	23	43		60	76	90	100	VPWC
June 13.....	1140	73		8620	2500	56180	14	24	43		61	80	97	100	VPWC

Particle-size analyses of bed material, water year October 1966 to September 1967  
(Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water;  
P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water temperature (°F)	Sampling point	Discharge (cfs)	Sediment concentration (ppm)	Sediment discharge (tons per day)	Bed material						Method of analysis				
							Percent finer than size indicated, in millimeters										
							0.062	0.125	0.250	0.500	1.000	2.000		4.000	8.000	16.000	64.000
June 7, 1967.....	1400		3	290				2	14	25	36	54	76	91	87	100	S
June 14.....	1130		3	96				2	6	16	26	50	77	93	96	100	S
June 21.....	1100		3	53			1	2	6	14	29	49	60	76	94	100	S

MISCELLANEOUS ANALYSES OF STREAMS IN RYUKYU ISLANDS  
 Periodic determinations of suspended-sediment discharge and particle size, water year October 1966 to September 1967.—Continued  
 (Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water;  
 P, pipet; S, sieve; V, visual accumulation tube; W, in distilled water)

Date of collection	Time (24 hour)	Water tem- per- ature (°F)	Sam- pling point	Discharge (cfs)	Sediment concentra- tion (ppm)	Sediment discharge (tons per day)	Suspended sediment		Method of analysis
							Percent finer than size indicated, in millimeters		
ISLAND OF OKINAWA									
16-8752. BENOKI-GAWA AT BENOKI (Lat 26°47'06"N., long 128°14'59"E.)									
Feb. 15, 1967.....	1440	53		13	1	T			
Apr. 12.....	1310	70		16.7	2	T			
June 1.....	1310	72		16	1	T			
16-8755. YONA-GAWA AT YONA (Lat 26°45'10"N., long 128°13'18"E.)									
July 6, 1967.....	0915	78		4.6	1	T			
July 7.....	1130	80		4.6	1	T			
July 8.....	0900	79		4.6	1	T			
July 9.....	0940	80		4.6	1	T			
July 10.....	0920	80		4.4	1	T			
July 11.....	0930	79		4.1	1	T			
July 12.....	0930	79		3.8	1	T			
July 13.....	0920	79		3.8	1	T			
July 25.....	1635	79		2.8	3	T			
Aug. 2.....	1655	82		2.2	2	T			
Aug. 3.....	1020	81		2.4	2	T			
Aug. 9.....	1600	82		1.9	2	T			
Aug. 12.....	0630	--		3.58	G 2120				
Aug. 29.....	1155	90		3.6	4				
Aug. 31.....	1325	78		27	48				
Aug. 31.....	1330	78		31	15				
Aug. 31.....	1340	78		30	58				
Aug. 31.....	1400	78		28	35				
Aug. 31.....	1420	78		21	124				
Sept. 22.....	1030	73		1.7	1	T			
16-8762. TAKAZATO-GAWA NEAR HAMA (Lat 26°41'10"N., long 128°10'48"E.)									
Jan. 18, 1967.....	1500	54		2.5	2	T			
Feb. 13.....	0815	63		2.5	1	T			
Feb. 13.....	0815	66		7.6	2	T			
June 20.....	1155	--		7.6	2	T			
16-8765. TAIHO-OKAWA AT TAIHO (Lat 26°39'01"N., long 128°08'37"E.)									
Apr. 14, 1967.....	1010	70		5.2	5	O.1			
16-8770. RIGHT BRANCH OF SOUTH FORK HENAN-GAWA NEAR TSUBA (Lat 26°37'42"N., long 128°05'52"E.)									
Feb. 20, 1967.....	1305	58		0.88	4	T			
Apr. 6.....	1120	64		2.4	3	T			
May 23.....	1410	73		2.4	2	T			
June 9.....	1210	71		6.2	3	.1			

T Less than 0.05 ton.  
 G Sample collected with single-stage sampler.

MISCELLANEOUS ANALYSES OF STREAMS IN RYUKYU ISLANDS--Continued  
 Periodic determinations of suspended-sediment discharge and particle size, water year October 1966 to September 1967--Continued  
 (Methods of analysis: B, bottom withdrawal tube; C, chemically dispersed; D, decantation; N, in native water;  
 P, pipet; S, sieve; V, visual accumulation tubes; W, in distilled water)

Date of collection	Time (24 hour)	Water tem- per- ature (°F)	Sam- pling point	Discharge (cfs)	Sediment concentra- tion (ppm)	Sediment discharge (tons per day)	Suspended sediment		Method of analysis
							Percent finer than size indicated, in millimeters		
ISLAND OF OKINAWA--Continued									
16-8775. GENKA-KAWA NEAR GENMA (Lat 26°36'43"N., long 128°03'47"E.)									
Jan. 5, 1967	1140	51		18	2	0.1			
16-8785. OI-KAWA AT JINGUSUKU (Lat 26°39'07"N., long 127°57'24"E.)									
Feb. 21, 1967	1123	58		0.76	12	T			
June 9	1505	72		26	103	7.2			
16-8805. NAGATA-GAWA AT KADENA (Lat 26°23'23"N., long 127°45'50"E.)									
Feb. 20, 1967	1655	62		3.9	21	0.2			
16-8809. MACHINATO-GAWA NEAR OJAWA (Lat 26°14'43"N., long 127°44'16"E.)									
Apr. 20, 1967	1410			6.5	145	2.5			
16-8824. TENGAN-GAWA AT TENGAN (Lat 26°22'54"N., long 127°51'39"E.)									
Feb. 20, 1967	1510	63		5.8	25	0.4			
16-8828. KANNA-GAWA NEAR KANNA (Lat 26°39'20"N., long 127°56'46"E.)									
Feb. 18, 1967	1100	54		1.6	2	T			
May 27	1110	77		1.6	16	T			
June 3	1025	73		1.9	7	T			
Aug. 13	1100	76		26	57	4.0			
16-8830. UFU-KAWA NEAR GINOZA (Lat 26°29'36"N., long 127°58'08"E.)									
Feb. 18, 1967	1210	52		1.4	42	0.2			
May 27	1210	79		5.2	275	3.9			
June 3	1205	73		2.3	164	1.0			
16-8833. LEFT FORK O-KAWA NEAR KUSHI (Lat 26°31'18"N., long 127°59'50"E.)									
Feb. 18, 1967	1400	55		0.39	4	T			
May 27	1425	72		.43	3	T			
June 3	1500	73		.55	3	T			
Aug. 13	1610	76		2.3	13	.1			
16-8835.S. OURA-GAWA AT OKAWA (Lat 26°34'10"N., long 128°02'23"E.)									
Feb. 20, 1967	1120	58		0.65	1	T			
May 23	1115	72		16	2	.1			

16-8841. FUKUJI-GAWA NEAR YUBARU (Lat 26°38'32"N., Long 128°13'00"E.)

Date	1230	60	8-8	1	T
Jan. 20, 1967	1230	60	8.8	1	T
Feb. 17	1315	50	7.0	2	T
Mar. 7	1130	55	8.5	4	T .1
Apr. 17	1145	72	149.3	188	68
May 26	1305	78	117	33	10
May 26	1420	76	89	13	3.1

16-8846. AHA-GAWA AT AHA (Lat 26°42'41"N., Long 128°16'55"E.)

Nov. 6, 1966	1610	--	690	G 275	512
Dec. 25	1410	--	690	G 242	451
Jan. 1, 1967	0600	--	1730	G 205	958
Jan. 19	1055	54	23	1	.1
Feb. 2	2030	--	700	G 201	380
Feb. 16	1050	52	20	2	.1
Apr. 13	1650	74	18	1	T
Apr. 10	1650	78	18	1	T
May 21	1300	--	810	G 361	789
May 21	1310	--	1830	G 462	2280
May 24	1255	74	38	2	.2
May 25	1115	72	144	20	7.8
May 25	1200	72	122	19	6.2
May 25	1250	72	105	18	5.1
May 25	1410	72	90	22	5.4
May 31	1535	74	37	5	.5
June 3	1930	--	810	G 728	1590
June 3	1935	--	1520	G 234	1160
June 6	1810	71	810	G 1540	3370
June 13	1000	--	1730	G 3110	14500
June 13	1005	--	3300	G 3360	29900
June 14	1150	71	119	3	1.0
June 16	1830	--	700	G 287	5610
Aug. 12	0750	--	5410	G 1460	21300
Aug. 25	1240	--	16	4	.2

16-8848. FUN-GAWA NEAR AHA (Lat 26°44'33"N., Long 128°16'53"E.)

Jan. 19, 1967	1310	--	8.4	1	T
Feb. 16	1320	52	5.1	1	T
Apr. 13	1205	71	5.4	3	T
May 24	1200	71	12	2	.1

T Less than 0.05 ton.

G Samples collected with single-stage sampler.

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