Water Quality Status Report

Palouse River

1975-1976

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Idaho Department of Health and Welfare
Division of Environment

WATER QUALITY REPORT

PALOUSE RIVER

1975-1976

Study Conducted By
Division of Environment

Region I

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ABSTRACT

The Palouse River was surveyed during low and high stream flow conditions of September 1975 and April 1976, respectively.

The purpose of the study was to assist in the development of effluent limitations for point sources and to identify and evaluate nonpoint sources.

While water quality of the main river segment above Princeton was high, the main river segment below Princeton, the South Fork and Paradise Creek were considerably lower in quality.

Bacteria, sediment, and nutrients from dryland farming, livestock grazing, and inadequate sewage disposal systems impacted the above segments significantly.

Point sources, with the exception of the Potlatch STP on April 20, 1976, and the Moscow STP, do not contribute significantly to basin pollutant loadings. The City of Potlatch was illegally bypassing raw sewage to the Palouse River on that date. The Moscow facility contributes nutrients to Paradise Creek.

High ammonia concentrations were observed in the S.F. Palouse River and Paradise Creek during September of 1975, however, the concentrations were not toxic.

Because of the superficial nature of this study, the applicability of specific water quality standards was not attempted and a more definitive study is needed.

INTRODUCTION

The Palouse River originates in the mountains of Northcentral Idaho, approximately 40 miles northeast of the City of Moscow, Idaho. The river basin encompasses 3283 (USGS, 1975) square miles of which 317 (USGS, 1975) square miles lay within Idaho. The North Fork and main stem originate in the vicinity of Hoodoo and Sand Mountains along the Palouse Divide which separates the Palouse River, Potlatch River, and St. Maries River drainages.

From its headwaters the Palouse River runs southward through forested areas until reaching Tom Laird Park. Below the park the river proceeds westerly through agricultural lands and adjacent to the Idaho communities of Harvard, Princeton, and Potlatch. From there it crosses into eastern Washington and drains into the Snake River. (Figure A).

Land use patterns in the upper Palouse River area are characterized as moderate to densely forested with exception of the North Fork where extensive dredge mining activities approximately 40 years ago have significantly reduced riparian vegetation. Although the upper river segment is relatively uninhabited, cattle grazing was observed during the September 19, 1975, survey.

From Tom Laird Park (RM 155) downstream land uses vary from agricultural (consisting of cattle grazing and dryland farming of winter and spring wheat, barley, lentils and peas) to uses associated with two lumber mills located between Harvard and Princeton. Residential development in the communities of Potlatch (RM 136), Princeton (RM 141) and Harvard (RM 148) also characterize land use patterns.

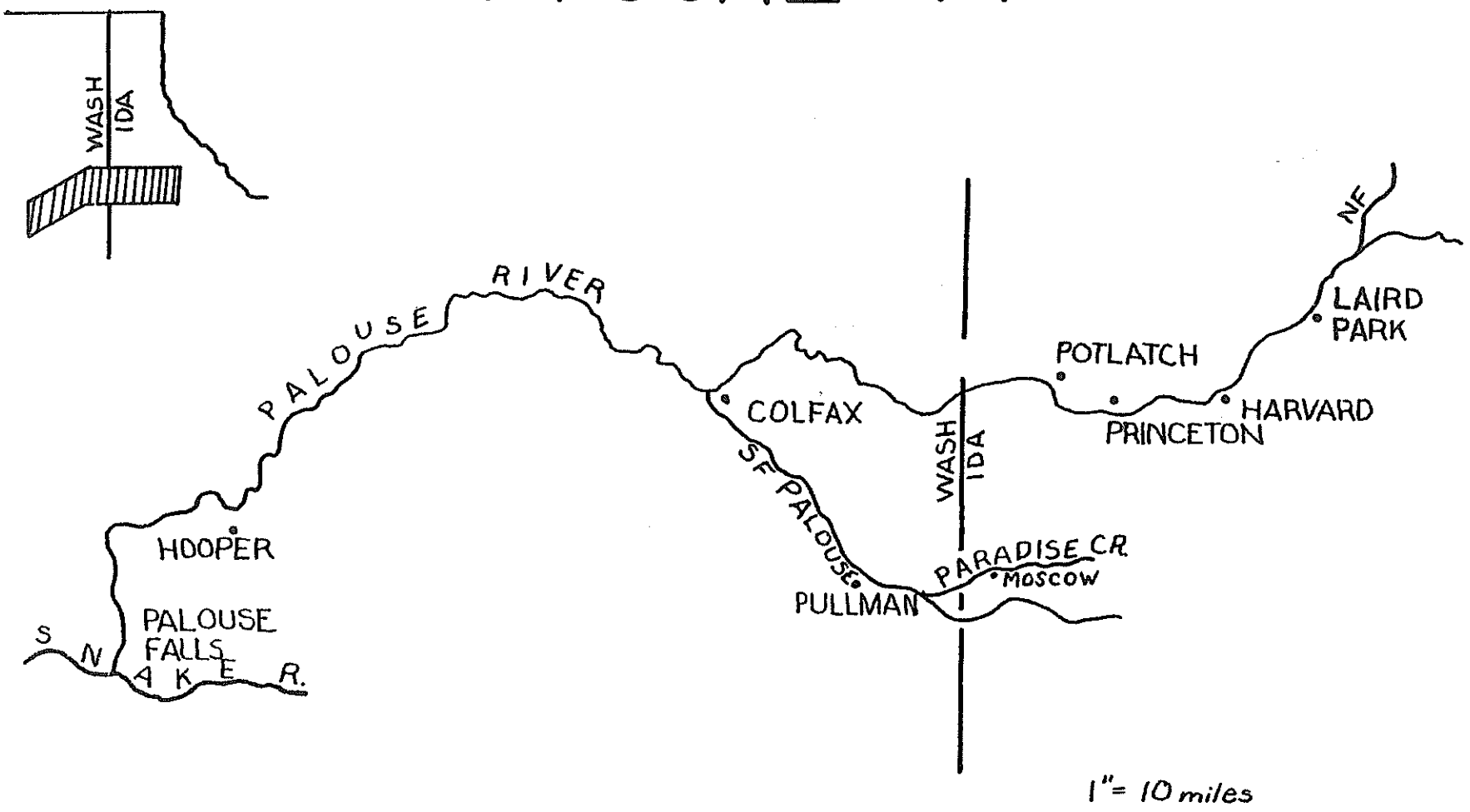
The South Fork Palouse River, of which Paradise Creek is a significant tributary, originates in the mountains east of Moscow, Idaho, and transcends dryland farming areas in a westerly direction before flowing through the Cities of Moscow and Pullman, Washington. Industrial, municipal, and residential land use patterns predominate near these two cities.

Geologically, Clark et al (1971) states that the study area above Laird Park (RM 155) consists of forest soils based upon decomposed granite and basalt. These generally loamy soils are lower in organic matter, nitrogen and phosphorus levels than the silt loam soils found in the lower river segment below Princeton (RM 141). The more productive Palouse silt loam, occurring in deep layers from Laird Park downstream, is a wind deposited (loess), silty material. Both the forest soil and the silt loam soil are moderately to highly erosive.

Land ownership in the upper Palouse River area above Laird Park is primarily federal and from the park downstream to the Idaho-Washington border is mostly private (RM 155) land with some state and federal ownership in the headwaters of the downstream tributaries.

According to Clark et al (1971), population in the study area has been quite stable during the census period of 1960 to 1970. A population increase has occurred in the City of Moscow which can be attributed to increased

FIGURE A



PALOUSE RIVER AND MAJOR TRIBUTARIES

enrollment at the University of Idaho and annexation of areas adjacent to Moscow during the same period. The small communities along the Palouse River demonstrated little population change, probably due to the unavailability of employment opportunities in the area. Barring the influx of major employment opportunities, population growth should remain consistent with the previous trend.

Agriculture and forestry are the principal economies of the Palouse River region in Idaho. Because of productive soils and suitable amounts of annual precipitation dryland farming of winter wheat, barley, oats, peas and lentils is usually prosperous in this area.

The Palouse area of eastern Washington and northern Idaho is renown as one of the major grain producing areas of the world. Successful grain production is economically cyclic and is a function of meteorological conditions and market pricings.

The forestry based economy of the region consists of silvicultural operations and several sawmills, which produce saw and veneer logs, finished lumber, firewood, and posts. Economic growth is a function of demand in the building industry and the availability of merchantable timber.

The Idaho Department of Health and Welfare, Division of Environment (IDHW-DOE) has designated the Palouse River headwaters to Princeton as a Class A stream. State water quality standards (IDECS, 1973) require that under any Class A designated water that the following uses of water be protected: domestic water supply, industrial water supply, irrigation, livestock water, salmonid fish spawning and rearing, other fishing and aquatic life, hunting and wildlife, swimming and aesthetics.

The Palouse River from Princeton to the Idaho-Washington border was designated Class B with the following uses to be protected: irrigation, livestock watering, industrial water supply, other fishing and aquatic life, hunting and wildlife and aesthetics.

Although the South Fork Palouse River was not specifically classified, one of its major tributaries, Paradise Creek, was designated Class E and protected for the following uses: industrial water supply, irrigation, livestock watering, hunting and wildlife and aesthetics.

Purpose of Study

The main purpose of the study undertaken by IDHW-DOE in 1975-1976 was to assist in the development of effluent limitations for municipal and industrial waste discharges and to identify and evaluate nonpoint sources.

POINT SOURCES

Three major point source discharges have been identified along the Palouse River in Idaho as follows:

Bennett Lumber Company. This company operates a sawmill-planer located at RM 145 between Harvard and Princeton. The mill's log storage capabilities are about 12 million board feet with approximately 3 million board feet of that total being water sprinkled to prevent checking.

Until July 1974 the log sprinkling runoff was discharged directly to the Palouse River. A National Pollutant Discharge Elimination System (NPDES) permit issued to the Bennett Lumber Company by EPA required elimination of the log sprinkling discharge as well as effective treatment of edger saw cooling water, non-contact cooling water, and boiler blowdown by July 1, 1975. During the IDHW-DOE water quality study the log sprinkling effluent was not observed to be discharging. The other mill sources were sampled, measured, and found to be discharging in compliance with NPDES limitations on September 9, 1975.

Permit effluent limitations for the period beginning July 1, 1975, are as follows:

		Daily Average	Daily Maximum
1)	Edger Cooling Water (001A)		
	Suspended Solids mg/l (lbs/day)		30(3.4)
	Flow (gpd)		13,500
	Temperature ^{o}C		$27^{o}C$
2)	Non-contaminated cooling water & storm water (001B)		
	Flow	51,000	
	Temperature ^{o}C		$27^{o}C$

The IDHW-DOE monitoring results (Table 1) demonstrate that a flow of 12,900 gallons per day (gpd) and suspended solids concentration of 33 milligrams per liter (mg/l) were observed on April 20, 1976, slightly exceeding the permit limit of 30 mg/l daily maximum.

Although no suspended solids value was available for the September 9, 1975, sampling run, NPDES data reported by Bennett Lumber Company during the three month period from July 1, 1975, to September 30, 1975, averaged 29.3 mg/l at an average flow of 12,500 gpd. Pollutant loadings from the Bennett Lumber Company were found to be insignificant (Tables 2 & 4) comprising less than 1% of the basin loading for each pollutant.

Potlatch Corporation - Potlatch. Potlatch Corporation operates a sawmill-planer adjacent to the City of Potlatch at RM 135. Until June 1975, wastewater discharge of boiler blowdown, pump cooling water, and yard drainage reached the Palouse River. However, in that year, the dam located at RM 135 was removed and a dual purpose fire pond/wastewater treatment pond constructed adjacent to the river. Although the NPDES permit issued for this facility required elimination of all discharges by 1975, one discharge was permitted if it became necessary for fire pond overflow. During the September 1975 and April 1976 sampling runs the facility was not discharging.

NPDES permit effluent limitations during the survey period were as follows:

	Daily Average	Daily Maximum
Flow (mgd)	0.23	0.691
Temperature	--	27°
BOD_5 lbs/day	14	40
Suspended Solids lbs/day	90	250

City of Potlatch. The City operates a two celled domestic wastewater treatment lagoon which also discharges into the Palouse River at RM 135. A NPDES permit issued to the City by EPA requires that the discharge meet secondary treatment by July 1, 1977. Secondary treatment effluent limits for a municipal treatment facility require an 85% reduction in BOD_5 and suspended solids, and the average monthly concentration of BOD_5 and suspended solids in the effluent shall not exceed 30 mg/l each. However, between March 27, 1974, and December 31, 1976, interim NPDES permit effluent limitations were as follows:

	Daily Average	Daily Maximum
BOD_5 mg/l (lbs/day)	60 (60)	90 (90)
Suspended Solids mg/l (lbs/day)	70 (70)	105 (105)

During the past several years the City of Potlatch has intermittently bypassed the waste treatment system and discharged raw sewage to the Palouse River. These bypasses have usually resulted from loss of pumping capabilities at the lift station located across the river from the treatment lagoon. These occurrences have been well documented by both Buettner (1973) and IDHW-DOE files as having a major environmental impact on the Palouse River. The United States Environmental Protection Agency filed an enforcement action against the City of Potlatch for a documented permit violation...i.e., illegal and unauthorized bypassing, in 1976. The City was fined $750.00 as a result of that action.

City of Moscow. The City of Moscow operates a trickling filter wastewater treatment plant which serves the City as well as the University of Idaho campus. The plant discharges into Paradise Creek one mile east of the Idaho-Washington border. During seasonal low flow periods the plant discharge comprises almost the total flow of Paradise Creek. This plant is presently meeting secondary treatment requirements as specified in the following NPDES permit effluent limitations:

	Monthly Average	Weekly Average
Flow (mgd)	3.0	---
BOD_5 mg/l (lbs/day)	30 (525)	45 (788)
Suspended Solids mg/l (lbs/day)	30 (525)	45 (788)
Fecal Coliform Bacteria (#/100 ml)	200	400
Dissolved Oxygen (% saturation)	---	$\geq$75

NONPOINT SOURCES

The impact of nonpoint sources above the Palouse River at Laird Park (RM 155) appeared to be insignificant during the IDHW-DOE study.

Although sediment runoff from silvicultural activities and soil erosion from livestock grazing may, at times, cause water quality degradation in this segment, no such problems were observed during the IDHW-DOE study. Sediments affect the water quality by causing high turbidities, thus affecting the fishery by interfering with respiration.

In the South Fork drainage and to a lesser extent in the Palouse River between Laird Park (RM 155) and the Idaho-Washington border (RM 123), soil erosion resulting from dryland farming activities is the major nonpoint source pollutant. Sediment runoff from dryland farming contains nutrients derived from the soil and fertilizers, which in sufficient concentrations, and under proper conditions, may cause nuisance algal blooms in a watercourse.

Paradise Creek, as it runs through the City of Moscow, receives drainage from the City's storm water collection system and other undefined nonpoint sources. In 1974, IDHW-DOE investigated spillages of agricultural chemicals into the storm sewer system for possible violations of state water quality standards. At that time it was concluded that many different types of waste of unknown origin were discharged via the storm sewer system.

A potential nonpoint source problem was found to be inadequate septic tank and drainfield systems in the areas of Deep Creek near Potlatch Highway 95-95A junction, Harvard, Princeton and Southeast Moscow. Factors such as significant concentrations of residential dwellings, high water table and poorly drained or tight clay soils found in the above areas make the potential great for subsurface disposal system failure. If concentrations of subsurface sewage saturate the soil and water table, the adjacent stream may be adversely impacted. Further study is needed to determine the adequacy of the existing subsurface systems.

RESULTS AND DISCUSSION

The IDHW-DOE survey was conducted during low flow conditions of September 1975 and under high flow conditions of April 1976. Although data collected during these two periods does not depict year round conditions, trend analysis data was collected at RM 141 and 132 between 1968 and 1975 and is referenced in the Appendix.

Stream flows measured at the Highway 95 Bridge near Potlatch (RM 132) were 1100 cubic feet per second (cfs) on April 20, 1976, and 22 cfs on September 12, 1975. IDHW-DOE stream flow data is contained in the Appendix.

U.S. Geological Survey (USGS, 1977) stream flow records for RM 132 indicate a maximum flow of 10,000 cfs occurred in January 1974 and minimum flow was recorded September 1973 of 0.07 cfs. The latter extreme was observed as a result of flow retention, while repair of a dam and bridge was completed at the Potlatch Corporation mill (RM 135).

Samples collected for laboratory analysis were preserved and submitted to the IDHW laboratories at Lewiston and Boise for analysis. Preservation and analytical procedures contained in Standard Methods 13th Edition were used.

Field analyses included measurements of dissolved oxygen (D.O.) and temperature using a Yellow Springs Instrument D.O. Meter Model 54. The pH was measured using an Orion Specific Ion Meter Model 404. Flow measurements were obtained using cross-sectional area-velocity method with the exception of the Highway 95 Bridge (RM 132) where USGS measurement equipment (bubble gage) was used.

Dissolved Oxygen (D.O.). According to State Water Quality Standards and Wastewater Treatment Requirements (IDECS, 1973), "no activity or combination of activities shall cause the D.O. concentration to be less than 6 mg/l or 90% of saturation which ever is greater. In addition, no activities shall cause the D.O. concentrations of Paradise Creek upper reaches to the Idaho-Washington border to be less than 75% of saturation."

During the IDHW-DOE study there were no D.O. standards violations measured on the main Palouse River. There were, however, standards violations observed at the following sites on September 10, 1975:

Deep Creek at Highway 95 Bridge - 3.3 mg/l
S. Fork Palouse River at Ida-Wash border - 4.5 mg/l

Temperature. The State Water Quality Standards and Wastewater Treatment Requirements (IDECS, 1973) state that, "no activity or combination of activities shall cause any measurable increase when the water temperatures are 66°F (18.9°C) or above, or more than 2°F (1.1°C) increase other than from natural causes when water temperatures are 64°F or less."

Also, "any measurable increase when water temperatures are 68°F or above, or more than 2°F increase other than from natural causes when the water temperatures are 66°F or less shall cause a violation of these standards in the Palouse River from Princeton to the Idaho-Washington border."

During the IDHW-DOE study temperature extremes were measured from 11°C at Palouse River above North Fork mouth (RM 161) to 21.5° at the Palouse River at Princeton (RM 141) on September 10, 1975. There was no known reason for the 21.5°C observed at RM 141 on that date.

A temperature increase was noted on September 10, 1975, from Harvard to Princeton of 3.5°C, a decrease from Princeton to Potlatch of 3.0°C, an increase of 2.6° from Potlatch to Flannigan Creek Road Bridge, and a decrease of 5.1°C from Flannigan Creek Bridge to the Highway 95 Bridge.

Because the Bennett Lumber Company discharge then represented only 0.1% of the Palouse River flow at the point of discharge, it appears that the Bennett effluent temperature of 27°C does not in itself account for the observed 3°C increase between Harvard and Princeton. Also, because the City of Potlatch and Potlatch Corporation were not discharging on the September 10,

1975, date the temperature increase observed in the Palouse River from Potlatch (RM 136) to the Flannigan Creek Road Bridge (RM 134) could not be attributed to those point sources.

Although the IDHW-DOE study did not find an answer for the fluctuations in temperature observed between Harvard (RM 147) and the Highway 95 Road Bridge west of Potlatch (RM 132), such factors as lack of "shading" due to absence of riparian vegetation, slower stream velocities, and shallow depths - either singly or in combination, allowed warming due to sunlight penetration.

Hydrogen Ion Concentration (pH). The State Water Quality Standards and Wastewater Treatment Requirements (IDECS, 1973) state that "no activity or combination of activities shall cause the pH values to be outside the range of 6.5 to 9.0 nor shall the induced variation be more than 0.5 pH units."

The pH values ranged from 7.8 on the Palouse River above the North Fork mouth (RM 161) on April 19, 1976, to a low of 6.9 at the Laird Park Dam (RM 155) on the same day. (Figures 2A and 2B)

There were no standards violations observed during the IDHW-DOE study.

Turbidity. State Water Quality Standards and Wastewater Treatment Requirements (IDECS, 1973) state that "no activity or combination of activities shall cause an increase of 5 JTU (Jackson Turbidity Units) other than from natural origin."

In September 1975 turbidities ranged from 1.6 JTU above the North Fork mouth to 3.8 JTU at the Flannigan Creek Road Bridge. During the April 1976 study, however, turbidities ranged from a low of 2.0 JTU above the North Fork mouth to a high of 270 JTU at the Highway 95 Bridge near Potlatch. Both sampling runs demonstrated increases in turbidity proceeding downstream from the Palouse headwaters to the stateline. On April 20, 1976, significant turbidities were measured in Flannigan (260 JTU) and Deep Creeks (280 JTU). Also, South Fork Palouse River at the stateline was measured at 180 JTU on April 20, 1976.

In general, higher turbidities were observed in the tributaries entering the main river below Potlatch than the tributaries entering upstream. Because dryland farming predominates in the Deep Creek, Flannigan Creek, and the South Fork Palouse River drainages, sediment from soil erosion appeared to cause the high turbidities.

Biochemical Oxygen Demand (BOD_5). BOD_5 is a measurement of the amount of oxygen necessary to satisfy the demand of organic material being oxidized by microorganisms usually in a five day test period. Although State Water Quality Standards and Wastewater Treatment Requirements (IDECS, 1973) have no instream BOD_5 standard, all wastewater treatment facilities are required to have 85% BOD_5 removal as determined from influent and effluent BOD_5 concentrations. In addition, NPDES permit limitations stipulate maximum BOD_5 concentration allowable in the various wastewater effluents.

BOD_5 concentrations were relatively low (5 mg/l)(Figures 7-10) with the exception of the Palouse River at Flannigan Creek Bridge (RM 133) below where a slight increase was observed on April 20, 1976. This increase, although

slight, coincides with the raw sewage discharge from the Potlatch City treatment works observed by IDHW-DOE on April 20, 1976.

Since no BOD_5 analyses were performed for the September 10, 1975, run, assessing pollutant loads during low flow conditions was not possible. The City of Potlatch (RM 135) and Potlatch Corporation mill (RM 135) were not discharging to the Palouse River on that date and typically do not discharge during low stream flow periods.

Bacteriological Quality. The presence of the coliform group of bacteria in water where derived from fecal sources is indicative of pollution. The presence of fecal coliform bacteria specifically represents contamination from the gut or feces of warm-blooded animals. State Water Quality Standards and Wastewater Treatment Requirements (IDECS, 1973) state that the following shall not be exceeded:

Palouse River

	Source to Princeton Class A_2	Princeton to Idaho Border Class B
Total Coliform -		
Geometric Mean	240	1000
20% of Samples	1000	2400
Fecal Coliform -		
Geometric Mean	50	200
10% of Samples	200	400
Single Sample	500	800

Paradise Creek

	Source to Ida-Wash Border Class E
Total Coliform -	
Geometric Mean	240
20% of Samples	1000
Single Sample	2400
Fecal Coliform -	
Geometric Mean	50
10% of Sample	200
Single Sample	500

During the IDHW-DOE study there were no total fecal coliform standards violations from the Palouse headwaters to Princeton. (Figure 9A, 10A) In addition, STORET (Storage and Retrieval Data System) data collected on the Palouse River at Princeton (RM 141) between December 1968 and April 1975 indicates geometric means of 630/100 ml and 11/100 ml for total and fecal coliforms respectively. The STORET total coliform geometric mean violates the state standard of 240/100 ml. The STORET fecal coliform geometric mean is below the state standard of 50/100 ml.

In the Princeton (RM 141) to Idaho-Washington border (RM 123) river segment the following violations were observed during the IDHW-DOE study: (Figure 9B, 10B)

	Date	Fecal Coliform Concentration
Palouse Rv. @ Flannigan Cr. Rd. Br.	4-20-76	800/100 ml
Flannigan Creek	4-20-76	800/100 ml
Deep Creek	9-12-75	800/100 ml
Deep Creek	4-20-76	1200/100 ml
Palouse Rv. @ Hwy. 95 Br.	9-12-75	800/100 ml
Palouse Rv. @ Hwy. 95 Br.	4-20-76	1200/100 ml

The April 20, 1976, violations of the state fecal coliform standard for this segment were, in part, attributed to a raw sewage bypass from the Potlatch sewage treatment plant and the tributaries of Deep and Flannigan Creeks. Although fecal sources along Deep and Flannigan Creeks were not identified during the IDHW-DOE study, livestock grazing and inadequate subsurface sewage disposal systems have been observed along those tributaries (North Central Health District, Personal Communication).

A violation of the Class E total coliform standard was observed on April 21, 1976, at Paradise Creek at the Idaho-Washington border. The reported value was 8000/100 ml compared to the standard of 2400/100 ml. Cause of the violation was unknown.

Although the South Fork Palouse River segment was not classified under state water quality standards, the following coliform levels were observed. South Fork Palouse River at Stateline -

Total Coliform	>8000/100 ml	9-12-75
	>8000/100 ml	4-21-76
Fecal Coliform	>600/100 ml	9-12-75
	>120/100 ml	4-21-76

Nutrients. Nitrogen and phosphorus compounds when found in excessive concentrations in streams and lakes, stimulate algal production to the extent that nuisance algal blooms may result.

Sawyer (1954) reported that concentrations in excess of the following may cause algal blooms:

Total Phosphorus (P)	0.05 mg/l
Orthophosphate ($O\text{-}PO_4$)	0.01 mg/l
Nitrite + Nitrate ($NO_2 + NO_3$)	0.32 mg/l

Nutrient concentrations (Figures 1, 5, 6, 7, 8) in the Palouse River system in Idaho generally showed progressive increases from the headwaters downstream to the border.

The headwaters (RM 161) to Princeton (RM 141) segment demonstrated no increases in total phosphorus (T-P), and nitrates (NO_3) and a slight increase in orthophosphate ($O\text{-}PO_4$) during the September 1975 sampling run. Those values were below the recommended algal bloom potential.

T-P, NO_3 and $O\text{-}PO_4$ concentrations were higher in this segment during the April 1976 run with T-P and $O\text{-}PO_4$ levels slightly exceeding the levels known to stimulate algal blooms.

In the Princeton to Idaho-Washington border segment, $O\text{-}PO_4$, T-P, and NO_3 concentrations increase significantly above those of the upstream segment. Specifically, below Princeton (RM 141) increases in nutrient concentrations appear to come from Hatter, Gold, Flannigan and Deep Creeks. Also, the sewage bypass being discharged by the City of Potlatch contributed nutrient concentrations to the Palouse River although the load imposed on the stream constituted only 0.3% of the total segment load (Table 5).

During the September 1975 sampling run the North Fork Palouse River contributed the highest percentage of total nitrogen (N) 38% to the Palouse headwaters to Princeton segment (Figures 2, 4). The North Fork also contributed the highest percentage of the total segments for both total nitrogen and total phosphorus during the April 1976 run. There were no point and nonpoint sources identified along the North Fork which could explain the significant N & P contributions.

During low flow conditions of the September 1975 sampling run the tributaries, the single known point source, Bennett Lumber Company and the Palouse River loading above the North Fork mouth accounted for 99+% of the total nitrogen loading to that river segment. The April 1976 sampling demonstrated that only 58% of the total nitrogen was contributed by the above sources and the remainder contributed by nonpoint sources adjacent to the main Palouse River above Princeton.

Total phosphorus loadings from the same sources, i.e., the main river above the North Fork mouth, Bennett Lumber Company and the tributaries, comprised only 58% of the total segment loading during the September 1975 run and 89% during the high river flow conditions of April 1976. Conversely, nonpoint sources adjacent to the main Palouse River contributed more total phosphorus during September 1975 than in April 1976.

In the river segment from Princeton to the Idaho-Washington border the total nitrogen generated from the tributaries, the main river at Princeton, and point sources was greater (98% of total river load) in September 1975 than the load (49%) attributed to the same sources during the April 1976 run.

As in the upstream segment the total phosphorus loadings attributed to the main rivers, tributaries and point sources comprised a higher percentage of the total segment loading (60%) during the April 1976 sampling run than the (40.5%) derived from the same sources during September 1975.

The most significant source of total nitrogen and total phosphorus, particularly during the April 1976 high river flow conditions, was Deep Creek. The high nutrient loading from Deep Creek explains in part the previously mentioned inadequate subsurface sewage disposal systems located near U.S. Highway 95-95A junction.

For freshwater aquatic life, EPA (1976) sets 0.02 mg/l as the chronic toxicity level for unionized ammonia. The concentration of 0.02 mg/l unionized

ammonia could occur at total ammonia concentrations ranging from below 0.1 mg/l to over 70 mg/l depending on pH and temperature.

Since during the IDHW-DOE Palouse River study the pH was never recorded over 8.0, the toxic level for total ammonia would be well over 1.0 mg/l. The data for total ammonia (Figures 8A, 8B) on the mainstem of the Palouse River shows concentrations seldom exceeding 0.4 mg/l. Therefore, no toxic conditions were found on the main Palouse River. Ammonia concentrations were very high in Paradise Creek and South Fork Palouse River both at the Idaho-Washington border on September 12, 1975 (Table 9). Buettner (1973) reported "nitrates, phosphates, and ammonia were high enough on the South Fork to be in a different range from the rest of the drainage." However, the total ammonia concentrations on September 12 were still not toxic because the pH was near 7.0.

Total Solids. Total solids or total residue refers to the concentration of solid material being transported by a stream, be it dissolved, suspended or settleable.

Meadow Creek and the North Fork comprise the greatest total solids loadings of the above Princeton segment. As seen in Table 3, actual loads imposed on the river segment were substantially lower in September 1975 than in April 1976. Nonpoint sources adjacent to the main river contributed more significantly during high stream flow conditions than during low flow conditions of September 1975. Sediment generated from snowmelt, runoff, and stream bank scour from increased volume and velocities typically contributes significantly to increased total solid concentrations.

Total solids contributed by the segments only point source, Bennett Lumber Company, were negligible.

The segment from Princeton to the state line received a significant total solids loading from Deep Creek during the April 1976 sampling run. During the September 1975 run the Palouse River at Princeton contributed 88% of the total segment load.

Although the City of Potlatch's raw sewage bypass sampled on April 20, 1976, was high in total solids concentration (466 mg/l), the total load imposed on the stream constituted less than 0.1% of the total nine segment load.

Deep, Flannigan, and Paradise Creeks and the South Fork Palouse River all demonstrated high total solids concentrations during the April 1976 sampling run. Field observations made by IDHW-DOE during the study indicated that soil erosion from dryland farming areas in those drainages accounted for the high total solids concentrations being generated.

Biological Community. IDHW-DOE attempted to qualitatively assess the Palouse River benthic community during 1976, however, vandalism of deployed rock basket samplers (EPA 1973) precluded a successful evaluation. Because of this Buettner et al (unpublished report, 1973) is referenced to discuss Palouse River benthos as recent as 1972.

The Buettner study team reported species diversity as measured by the Shannon-Wiener function and related species diversity indices to the following classifications:

Species Diversity Index (SDI)	>3	Unpolluted waters
Species Diversity Index	1-3	Mildly polluted waters
Species Diversity Index	<1	Heavily polluted

The above classification applies only if the aquatic habitat is found to be chemically and physically suitable for aquatic life.

The following SDI's were reported:

Location	SDI
North Fork Palouse River - RM 160	3.31
Palouse River at Laird Park - RM 155	2.81
Palouse River below Harvard - RM 147	3.15
Palouse River above Potlatch - RM 156	--
Palouse River below Potlatch - RM 132	.875

The sampling sites at and above Laird Park demonstrated good water quality while the site below Potlatch was of poor quality, due primarily to the raw sewage discharges from the City of Potlatch in 1972 and 1973.

Insects from the Order Ephemeroptera (mayfly) were found at all sampling sites except the Palouse River above Potlatch RM 136 while Plecoptera (stonefly) were found only at Laird Park RM 155 and the North Fork RM 160. Both organisms are extremely sensitive to pollution (Usinger, 1956) and the absence of one or both usually indicates some degree of pollution.

The Order Trichoptera was represented at all sampling sites with greater numbers being evident at those sites with the heaviest periphytic growths. The Trichoptera are relatively tolerant to pollution so their presence in great numbers below Potlatch substantiated the heavy organic enrichment from the City of Potlatch.

CONCLUSIONS

Water quality of the Palouse River segment - headwaters to Princeton was high and was attributed to a minimal amount of land disturbing activity and the absence of known point source discharges in that segment of the Palouse River system.

Water quality of the Princeton to Washington border segment and in the South Fork and Paradise Creek was lower than that of the segment above Princeton. Increases in sediment, bacteria, and nutrients were measured in Deep Creek, Flannigan Creek, the Palouse River below Princeton, and the South Fork Palouse River during high stream flow conditions.

The IDHW-DOE study examined the Palouse River under high and low streamflow conditions during one calendar year (1975-1976) only and, therefore, an

insufficient data base exists to adequately evaluate each segment on the basis of the coliform bacteria standard.

Regardless of the inadequate data base, the Palouse River below Potlatch, Deep Creek, Flannigan Creek and the South Fork Palouse River demonstrated significant total and fecal coliform concentrations during the IDHW-DOE study.

The point sources, with the exception of the Moscow and Potlatch sewage treatment plants, did not significantly affect Palouse River water quality. The Moscow facility contributed nutrients to an already nutrient-laden Paradise Creek. The City of Potlatch was observed bypassing raw sewage from its treatment works on April 20, 1976, causing violations of state water quality standards and NPDES permit requirements.

Based upon the high total solids and turbidities measured in the Palouse River below Potlatch and the South Fork Palouse River, sediment transport is a significant problem affecting water quality as well as impairing the aesthetic quality of the lower Palouse River.

RECOMMENDATIONS

Because this study encompassed only high and low stream flow conditions, more intensive year-round monitoring is needed to further define water-quality problems alluded to in this report.

Additional monitoring is also necessary to identify specific nonpoint source problem areas related to dryland farming, livestock grazing, and silvicultural practices currently in use in the Palouse River system in Idaho.

Strong emphasis should be placed on nonpoint source pollution abatement programs. Implementation of best management practices (BMP) and resource management systems (RMS) is essential if sediment discharge to a watercourse from soil erosion is to be reduced.

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APPENDIX A

FINAL STUDY PLAN

Background

At present little water quality data exists on the Palouse River - from its source to the Idaho-Washington border - other than routine network monitoring data, collected from stations near Tom Laird Park, Princeton, and Potlatch since 1969. The river is classified (IDHW) Class A water quality limiting because of insufficient data from its source to Princeton and Class B downstream to the stateline.

Washington DOE presently has an ongoing monitoring program designed to identify point and non-point pollution loads along the river system from the Idaho line to the mouth, however, further studies are not planned until 1978.

Purpose

Because insufficient supportive water quality data exists to accurately classify this stream and the need exists to identify both point and non-point pollution loads additional monitoring in the form of intensive monitoring surveys need to be accomplished. Evaluation of three NPDES dischargers will also be done to better understand point source impact on receiving water quality and at the same time validate permitee monitoring and reporting methods.

It is also important that our studies coincide with Washington DOE monitoring program to better assess the entire river system as well as cooperatively tackle pollution problems in the Palouse drainage basin.

Plan

1)Receiving Water Quality Monitoring

The following stations will be established, flow measurements taken and sampled chemically, bacteriologically and biologically when possible during the weeks of September 8th, 1975 and April 15, 1976:

Palouse River	above No. Fork mouth	R.M. - 161.0
	Tom Laird Park	155.0
	Hwy. 95A Bridge	150.3
	Hwy. 9 Bridge	146.8
	Princeton Rd. Bridge	140.9
	USGS Gauge near Potlatch	132.4
Tributaries-		
	North Fork at mouth	159.0
	Big Sand Creek at mouth	157.5
	Strychnine Creek at mouth	156.1
	Meadow Creek at mouth	153.7
	Jerome Creek at mouth	150.5
	Hatter Creek at mouth	139.3
	Gold Creek at mouth	137.5
	Rock Creek at mouth	136.0
	Flannigan Creek at mouth	134.4
	Deep Creek at mouth	133.2

2) Point Source Discharge Monitoring

Samples will be collected and flow measurements taken on the following NPDES dischargers.

Bennett Lumber Company - a sawmill
Potlatch Corporation
(Potlatch Unit) - a sawmill
City of Potlatch - domestic wastewater treatment lagoons.

Laboratory Analyses -

Point source discharges
- Temp.
- D.O
- pH
- BOD
- Suspended Solids
- NH_3
- NO_2
- NO_3
- TKN
- ortho-PO_4
- T-P
- Tot. Inorg. PO_4
- Total Coliform
- Fecal Coliform
- Sp. Cond.

Receiving water quality
- Temp.
- D.O.
- pH
- BOD
- Suspended Solids
- NH_3
- NO_2
- NO_3
- TKN
- ortho-PO_4
- T-P
- Tot. Inorg. PO_4
- Total Coliform
- Fecal Coliform
- Alkalinity
- Sp. Cond.

Estimated Manpower Requirements

1) Monitoring
   Three people x 6 days each = 18 man days

2) Report Preparation
   One person x 10 days = 10 man days

28 man days

Equipment

2 Gurley meters
2 Hydragard composite samplers
1 ISCO composite sampler
2 D.O. Meters
2 pH meters
1 Surber square foot sampler

APPENDIX B

FIGURES

a. - Palouse River, River Mile 160.1-140.9

b. - Palouse River, River Mile 140.9-132.2

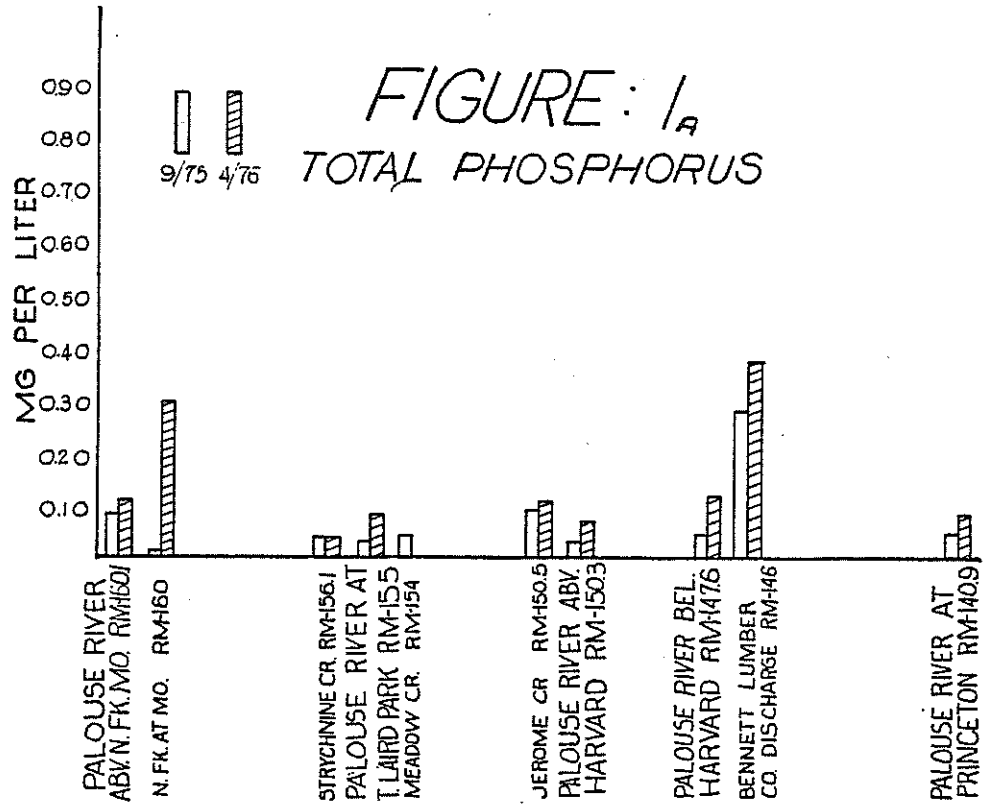
FIGURE: 1A
TOTAL PHOSPHORUS
9/75 4/76
MG PER LITER
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
PALOUSE RIVER ABV. N. FK. MO. RM 160.1
N. FK. AT MO. RM 160
STRYCHNINE CR. RM 156.1
PALOUSE RIVER AT T. LAIRD PARK RM 155
MEADOW CR. RM 154
JEROME CR RM 150.5
PALOUSE RIVER ABV. HARVARD RM 150.3
PALOUSE RIVER BEL. HARVARD RM 147.6
BENNETT LUMBER CO. DISCHARGE RM 146
PALOUSE RIVER AT PRINCETON RM 140.9

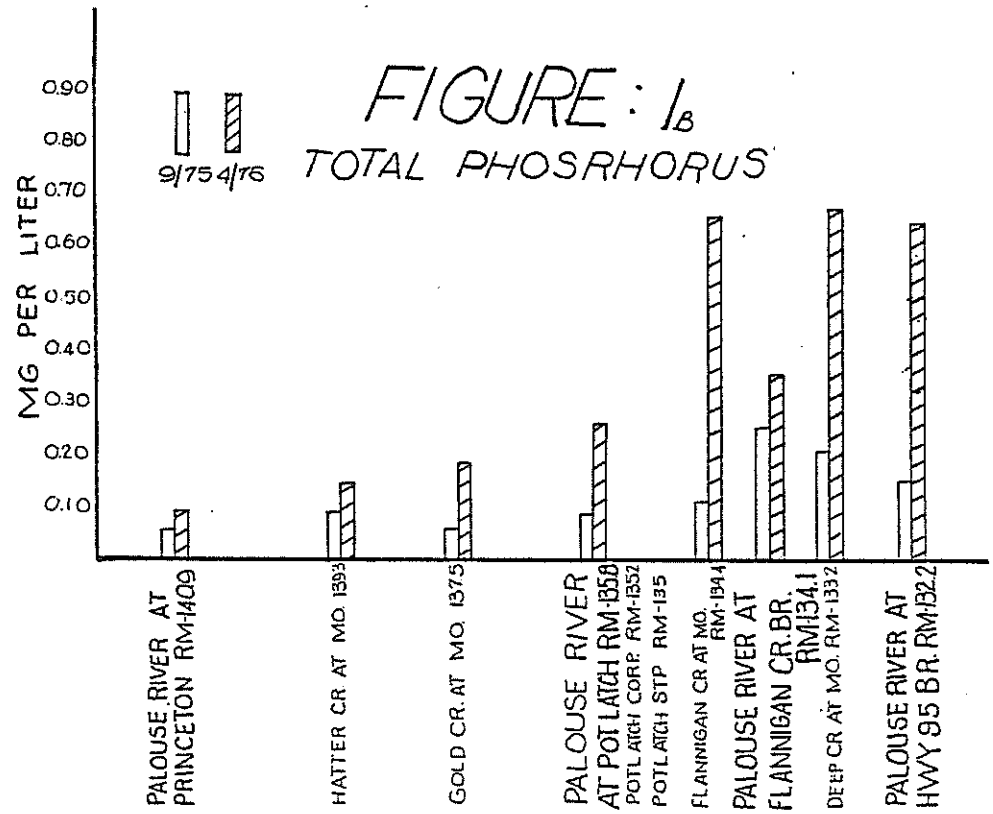
FIGURE: 1B
TOTAL PHOSRHORUS
9/75 4/76
MG PER LITER
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
PALOUSE RIVER AT PRINCETON RM 140.9
HATTER CR AT MO. 139.3
GOLD CR. AT MO. 137.5
PALOUSE RIVER AT POTLATCH RM 135.8
POTLATCH CORP. RM 135.2
POTLATCH STP RM 135
FLANNIGAN CR AT MO. RM 134.4
PALOUSE RIVER AT FLANNIGAN CR. BR. RM 134.1
DEEP CR AT MO. RM 133.2
PALOUSE RIVER AT HWY 95 BR. RM 132.2

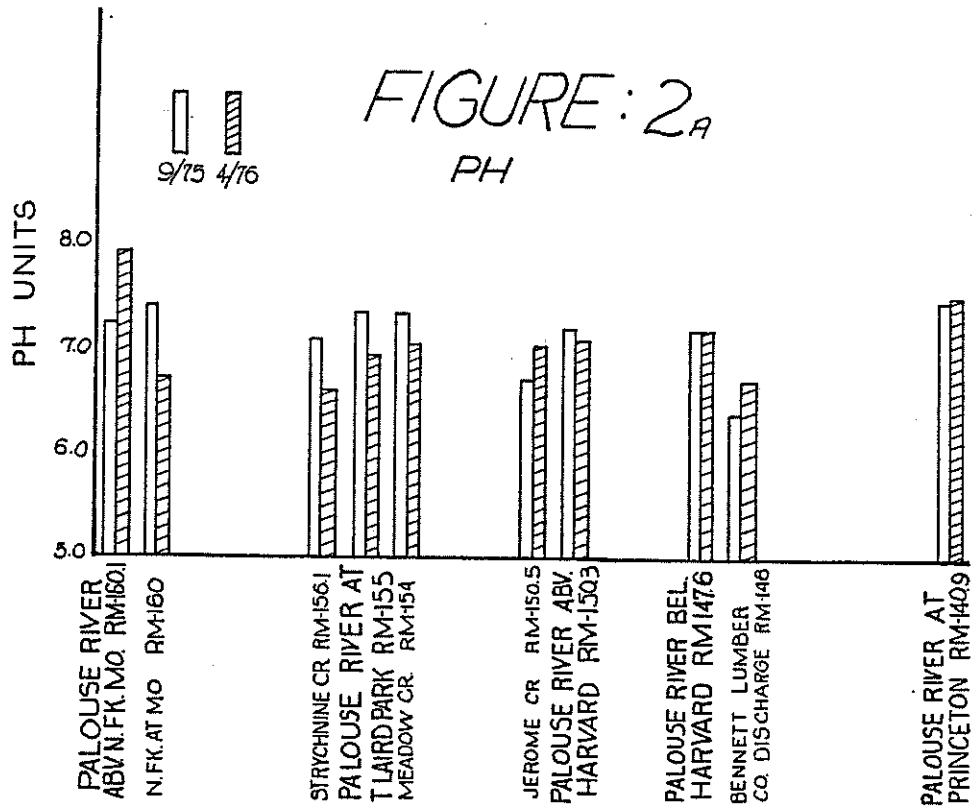
FIGURE: 2A
PH
9/75 4/76
PH UNITS
8.0
7.0
6.0
5.0
PALOUSE RIVER ABV N.FK. MO. RM 160.1
N. FK. AT MO RM 160
STRYCHNINE CR RM 156.1
PALOUSE RIVER AT TLAIRD PARK RM 155
MEADOW CR RM 154
JEROME CR RM 150.5
PALOUSE RIVER ABV. HARVARD RM 150.3
PALOUSE RIVER BEL. HARVARD RM 147.6
BENNETT LUMBER CO. DISCHARGE RM 146
PALOUSE RIVER AT PRINCETON RM 140.9

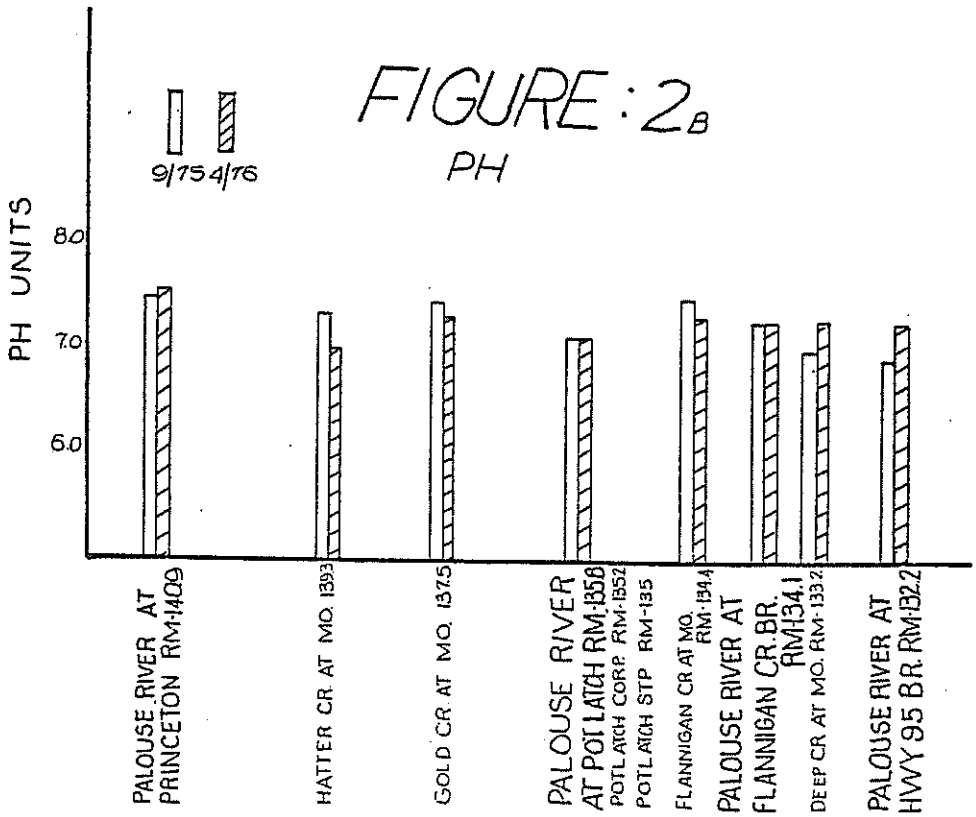
FIGURE: 2B
PH
9/75 4/76
PH UNITS
8.0
7.0
6.0
PALOUSE RIVER AT PRINCETON RM 140.9
HATTER CR AT MO. 139.3
GOLD CR AT MO. 137.5
PALOUSE RIVER AT POTLATCH RM 135.6
POTLATCH CORP. RM 135.2
POTLATCH STP RM 135
FLANNIGAN CR AT MO. RM 134.4
PALOUSE RIVER AT FLANNIGAN CR. BR. RM 134.1
DEEP CR AT MO. RM 133.2
PALOUSE RIVER AT HWY 95 B.R. RM 132.2

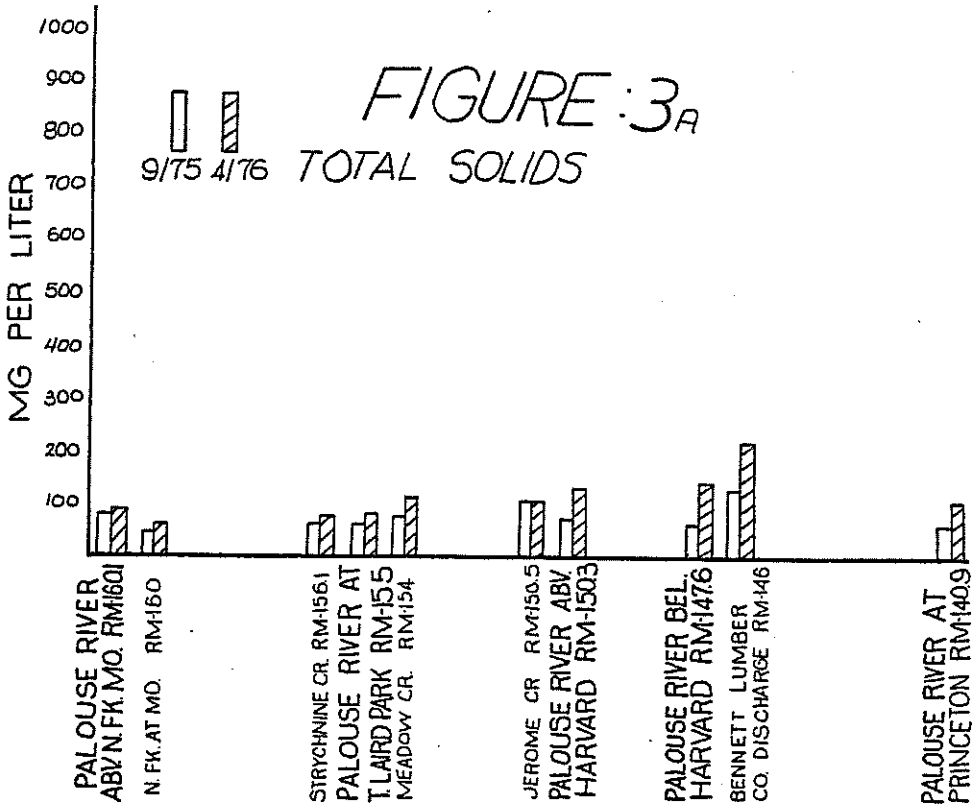
FIGURE: 3A
9/75 4/76 TOTAL SOLIDS
MG PER LITER
1000
900
800
700
600
500
400
300
200
100
PALOUSE RIVER ABV N.FK. MO. RM1601
N. FK. AT MO. RM160
STRYCHNINE CR. RM156.1
PALOUSE RIVER AT T. LAIRD PARK RM-155
MEADOW CR. RM154
JEROME CR RM150.5
PALOUSE RIVER ABV. HARVARD RM-1503
PALOUSE RIVER BEL. HARVARD RM1476
BENNETT LUMBER CO. DISCHARGE RM-146
PALOUSE RIVER AT PRINCETON RM1409

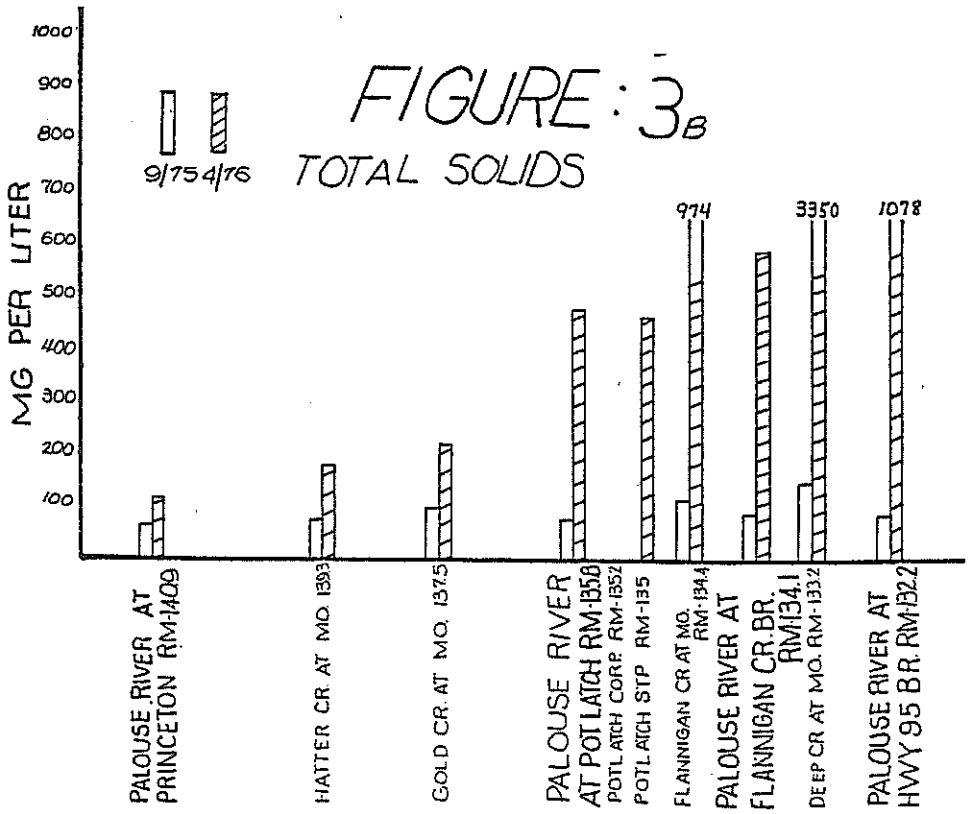
FIGURE: 3B
9/75 4/76 TOTAL SOLIDS
MG PER LITER
1000
900
800
700
600
500
400
300
200
100
974
3350
1078
PALOUSE RIVER AT PRINCETON RM1409
HATTER CR AT MO. 1393
GOLD CR AT MO. 1375
PALOUSE RIVER AT POTLATCH RM1358
POTLATCH CORP. RM-1352
POTLATCH STP RM-135
FLANNIGAN CR AT MO. RM-1344
PALOUSE RIVER AT FLANNIGAN CR. BR. RM1341
DEEP CR AT MO. RM-1332
PALOUSE RIVER AT HWY 95 B.R. RM1322

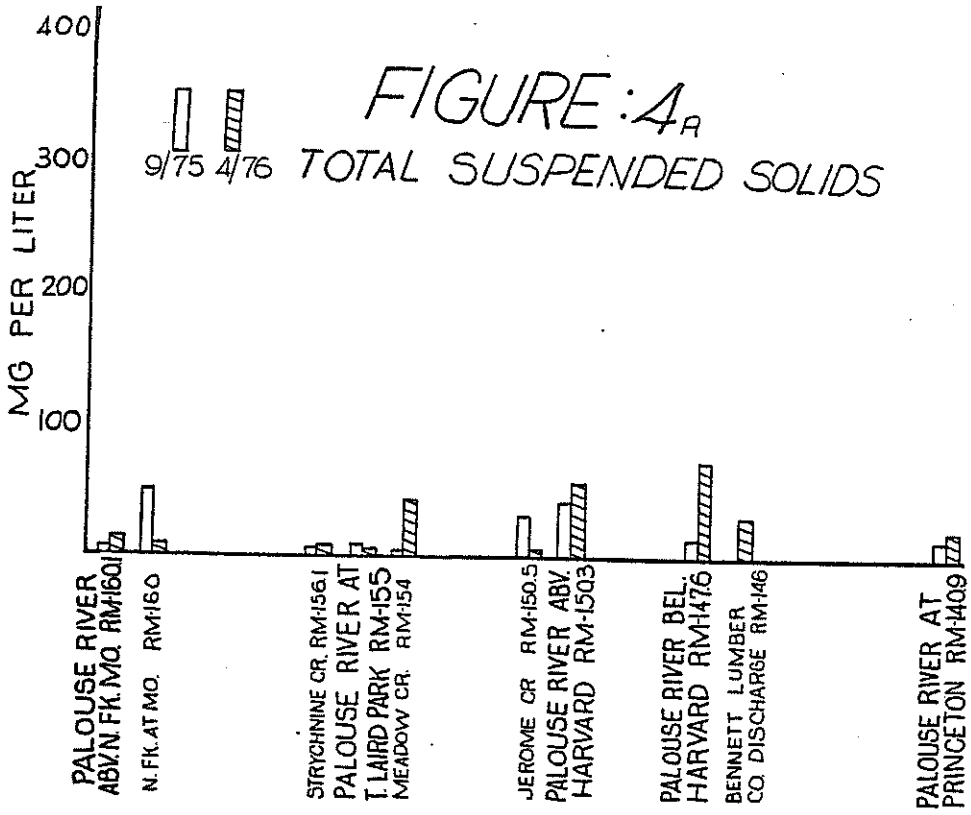

FIGURE: 4A

TOTAL SUSPENDED SOLIDS

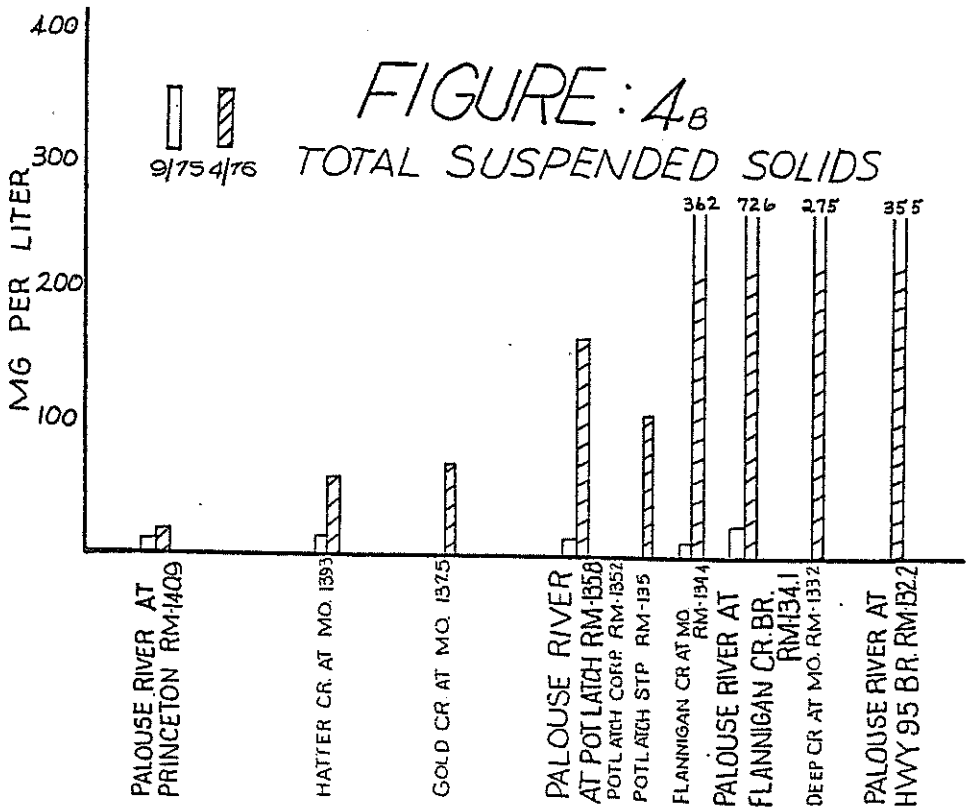

FIGURE: 4B

TOTAL SUSPENDED SOLIDS

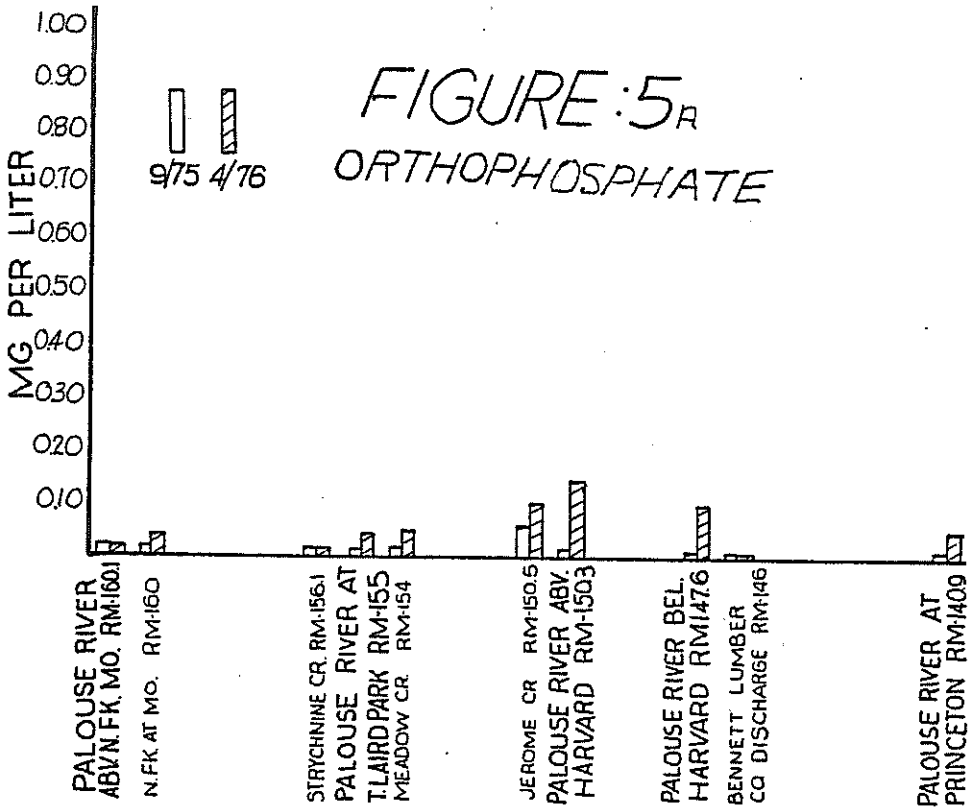

FIGURE: 5A

ORTHOPHOSPHATE

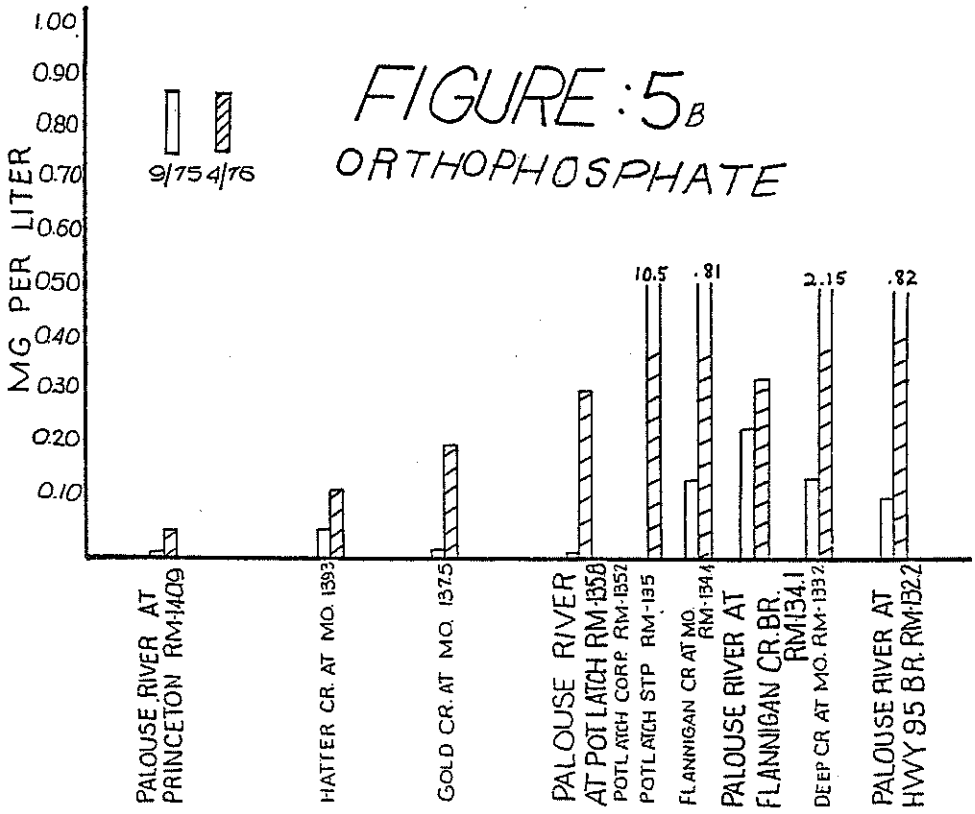

FIGURE: 5B

ORTHOPHOSPHATE

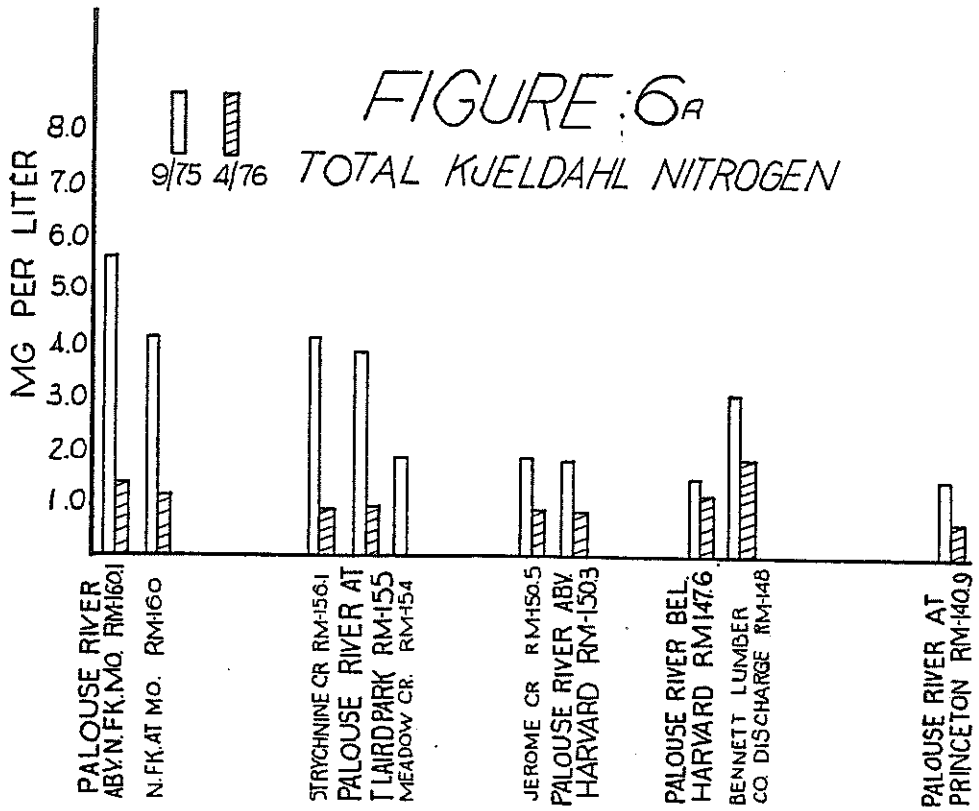
FIGURE: 6A
TOTAL KJELDAHL NITROGEN
9/75 4/76
MG PER LITER
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
PALOUSE RIVER ABV. N.FK. MO. RM 160.1
N.FK. AT MO. RM 160
STRYCHNINE CR RM 156.1
PALOUSE RIVER AT TLAIRD PARK RM 155
MEADOW CR. RM 154
JEROME CR RM 150.5
PALOUSE RIVER ABV. HARVARD RM 150.3
PALOUSE RIVER BEL. HARVARD RM 147.6
BENNETT LUMBER CO. DISCHARGE RM 148
PALOUSE RIVER AT PRINCETON RM 140.9

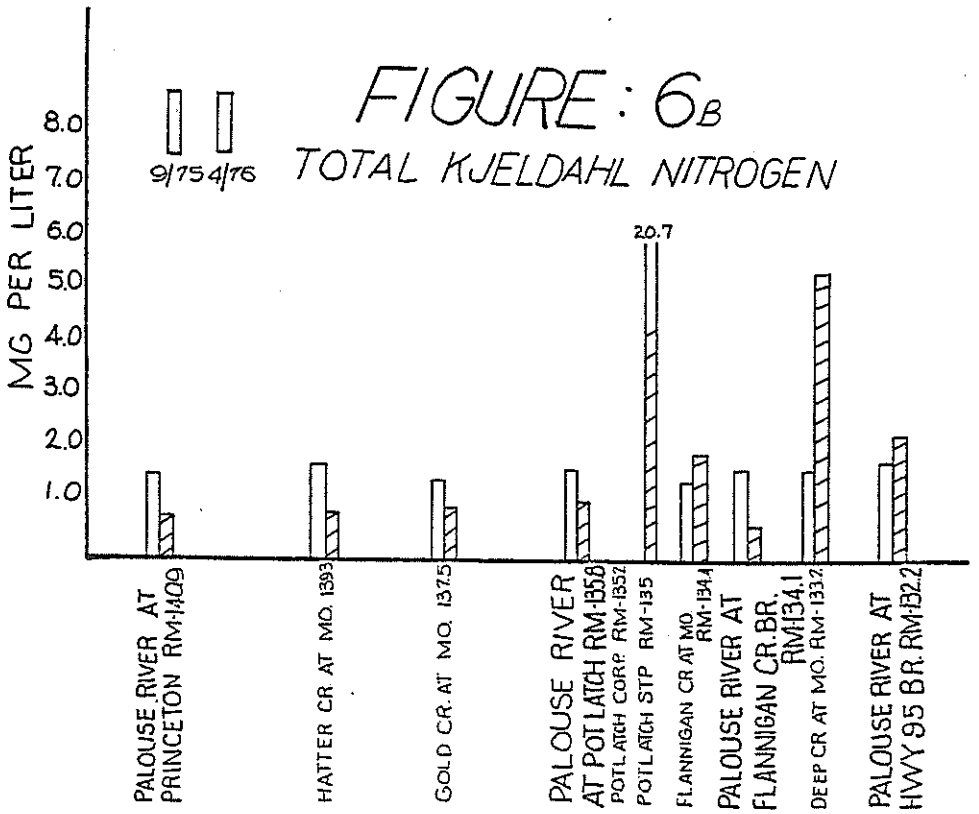
FIGURE: 6B
TOTAL KJELDAHL NITROGEN
9/75 4/76
MG PER LITER
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
20.7
PALOUSE RIVER AT PRINCETON RM 140.9
HATTER CR AT MO. 139.3
GOLD CR. AT MO. 137.5
PALOUSE RIVER AT POTLATCH RM 135.8
POTLATCH CORP RM 135.2
POTLATCH STP RM 135
FLANNIGAN CR AT MO. RM 134.4
PALOUSE RIVER AT FLANNIGAN CR. BR. RM 134.1
DEEP CR AT MO. RM 133.2
PALOUSE RIVER AT HWY 95 BR. RM 132.2

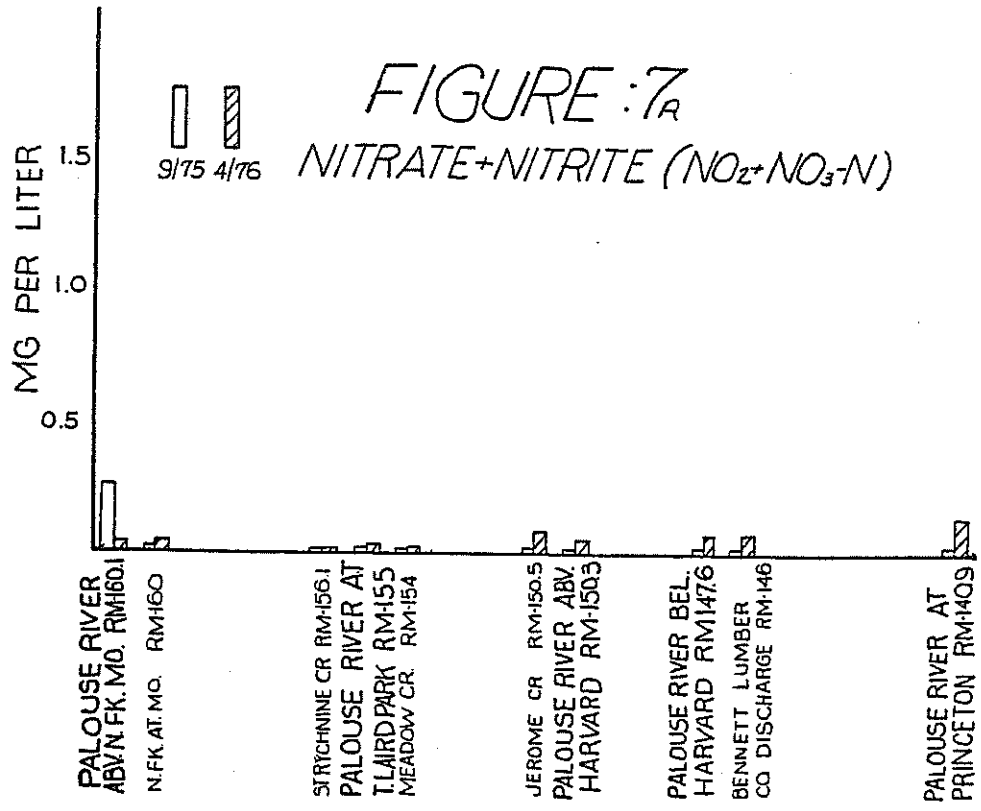
FIGURE :7A
NITRATE+NITRITE (NO2+NO3-N)
9/75 4/76
MG PER LITER
1.5
1.0
0.5
PALOUSE RIVER ABV N FK. MO. RM 160.1
N. FK. AT MO. RM 160
STRICHNINE CR RM 156.1
PALOUSE RIVER AT T LAIRD PARK RM 155
MEADOW CR. RM 154
JEROME CR RM 150.5
PALOUSE RIVER ABV. HARVARD RM 150.3
PALOUSE RIVER BEL. HARVARD RM 147.6
BENNETT LUMBER CO DISCHARGE RM 146
PALOUSE RIVER AT PRINCETON RM 140.9

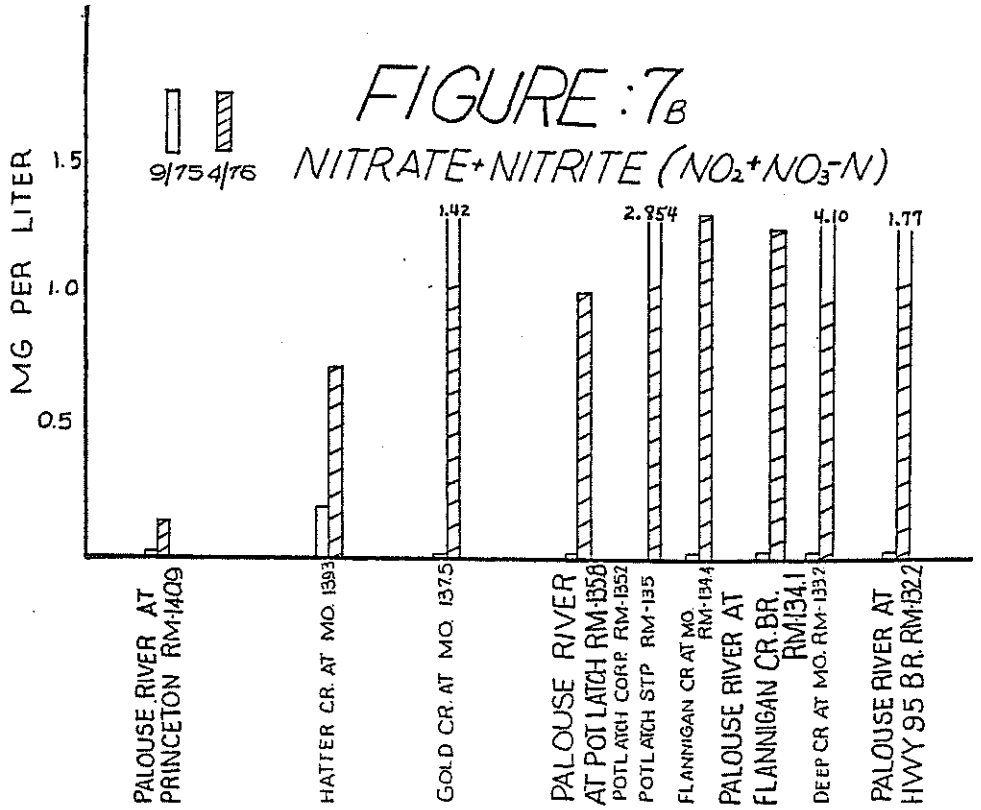
FIGURE :7B
NITRATE+NITRITE (NO2+NO3-N)
9/75 4/76
MG PER LITER
1.5
1.0
0.5
1.42
2.854
4.10
1.77
PALOUSE RIVER AT PRINCETON RM 140.9
HATTER CR. AT MO. 139.3
GOLD CR. AT MO. 137.5
PALOUSE RIVER AT POTLATCH RM 135.8
POTLATCH CORP. RM 135.2
POTLATCH STP RM 135
FLANNIGAN CR AT MO. RM 134.4
PALOUSE RIVER AT FLANNIGAN CR. BR. RM 134.1
DEEP CR AT MO. RM 133.2
PALOUSE RIVER AT HWY 95 B.R. RM 132.2

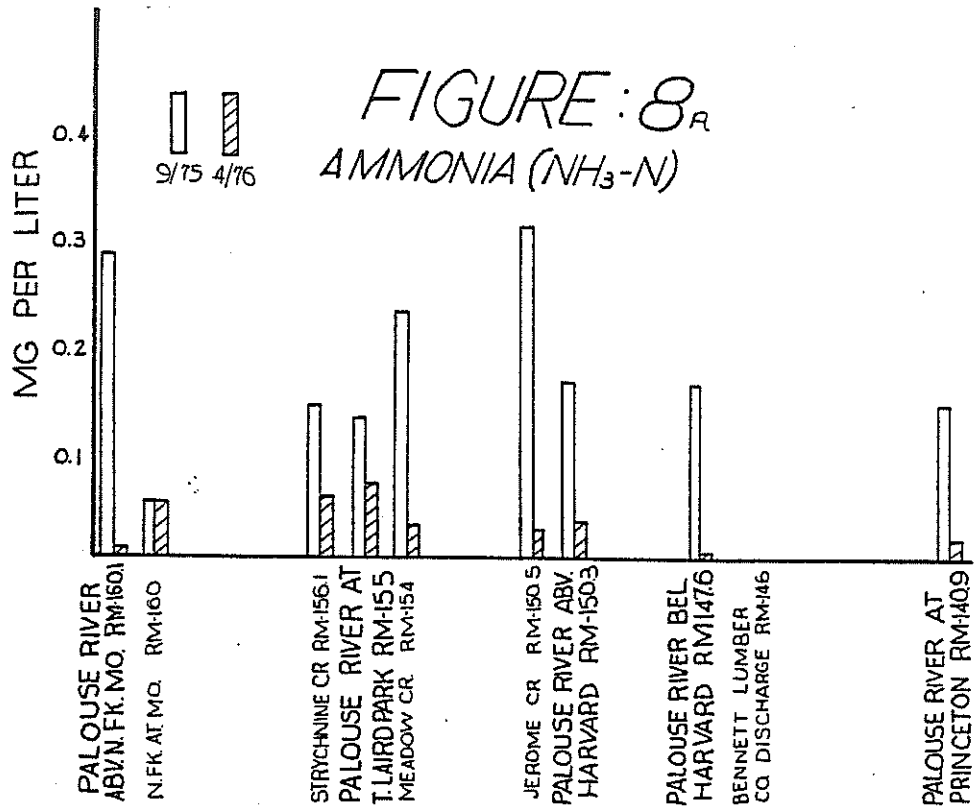
FIGURE: 8R
AMMONIA (NH_3-N)
9/75 4/76
MG PER LITER
0.4
0.3
0.2
0.1
PALOUSE RIVER ABV. N.FK. MO. RM-160.1
N.FK. AT MO. RM-160
STRYCHNINE CR RM-156.1
PALOUSE RIVER AT T. LAIRD PARK RM-155
MEADOW CR. RM-154
JEROME CR RM-150.5
PALOUSE RIVER ABV. HARVARD RM-150.3
PALOUSE RIVER BEL. HARVARD RM 147.6
BENNETT LUMBER CO. DISCHARGE RM-146
PALOUSE RIVER AT PRINCETON RM-140.9

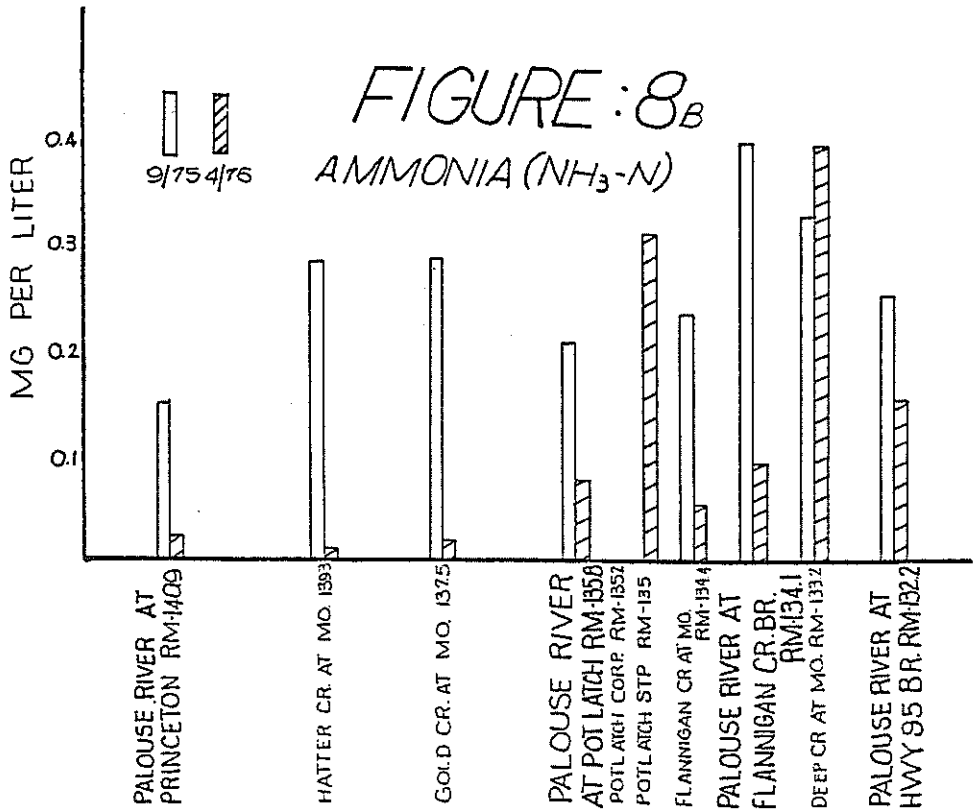
FIGURE: 8B
AMMONIA (NH_3-N)
9/75 4/76
MG PER LITER
0.4
0.3
0.2
0.1
PALOUSE RIVER AT PRINCETON RM-140.9
HATTER CR. AT MO. 139.3
GOLD CR. AT MO. 137.5
PALOUSE RIVER AT POTLATCH RM-135.8
POTLATCH CORP. RM-135.2
POTLATCH STP RM-135
FLANNIGAN CR AT MO. RM-134.4
PALOUSE RIVER AT FLANNIGAN CR. BR. RM 134.1
DEEP CR AT MO. RM-133.2
PALOUSE RIVER AT HWY 95 B.R. RM-132.2

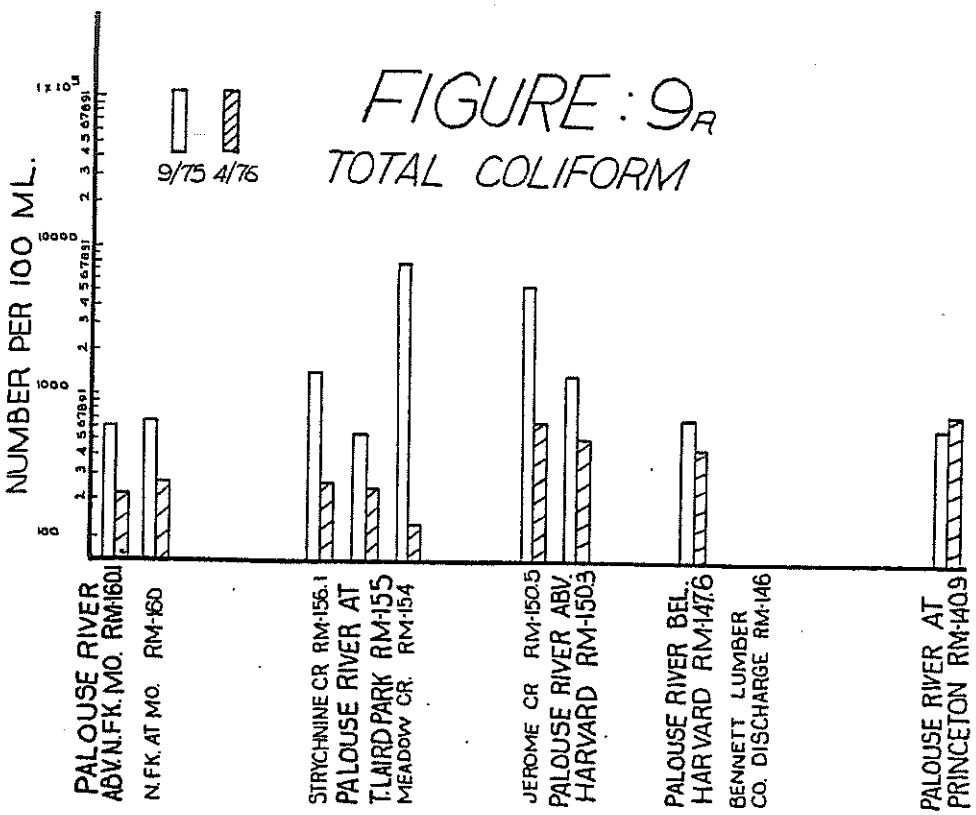

FIGURE : 9A
TOTAL COLIFORM

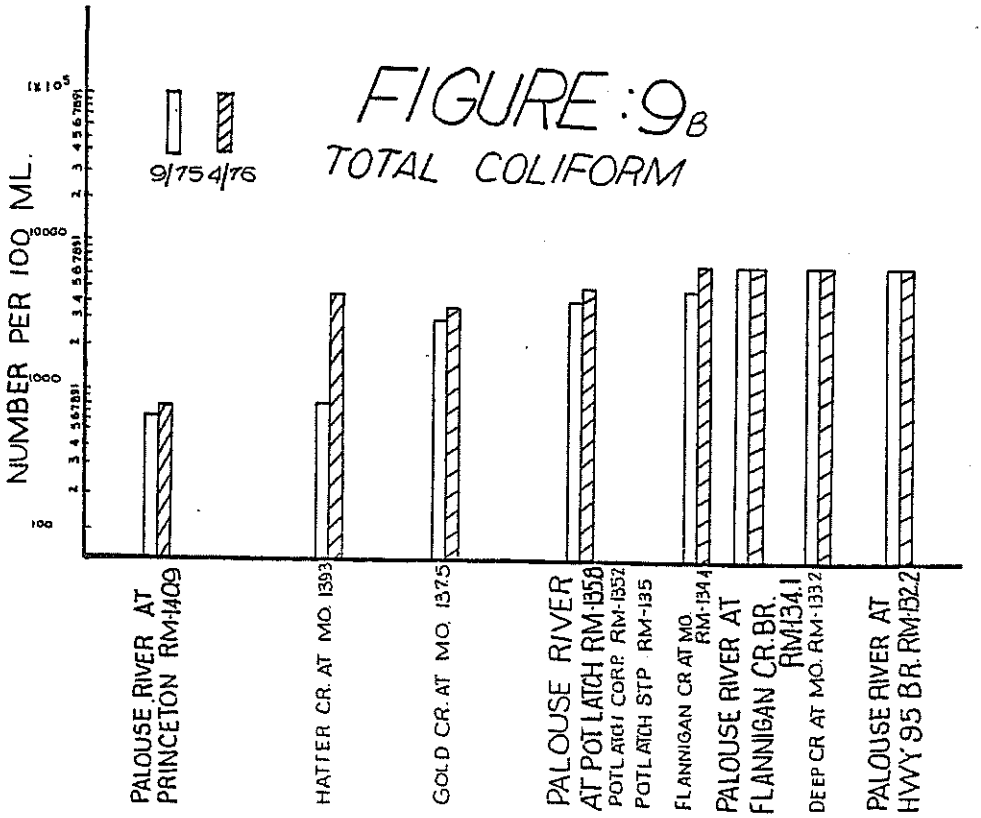

FIGURE : 9B
TOTAL COLIFORM

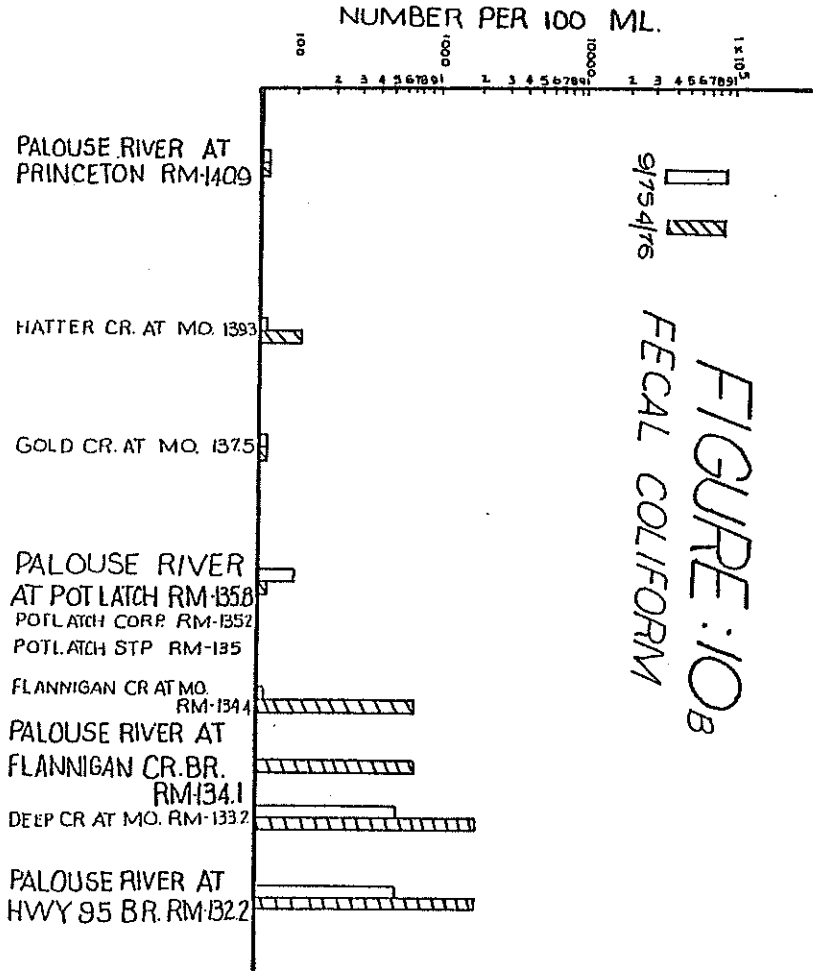

FIGURE :10B FECAL COLIFORM

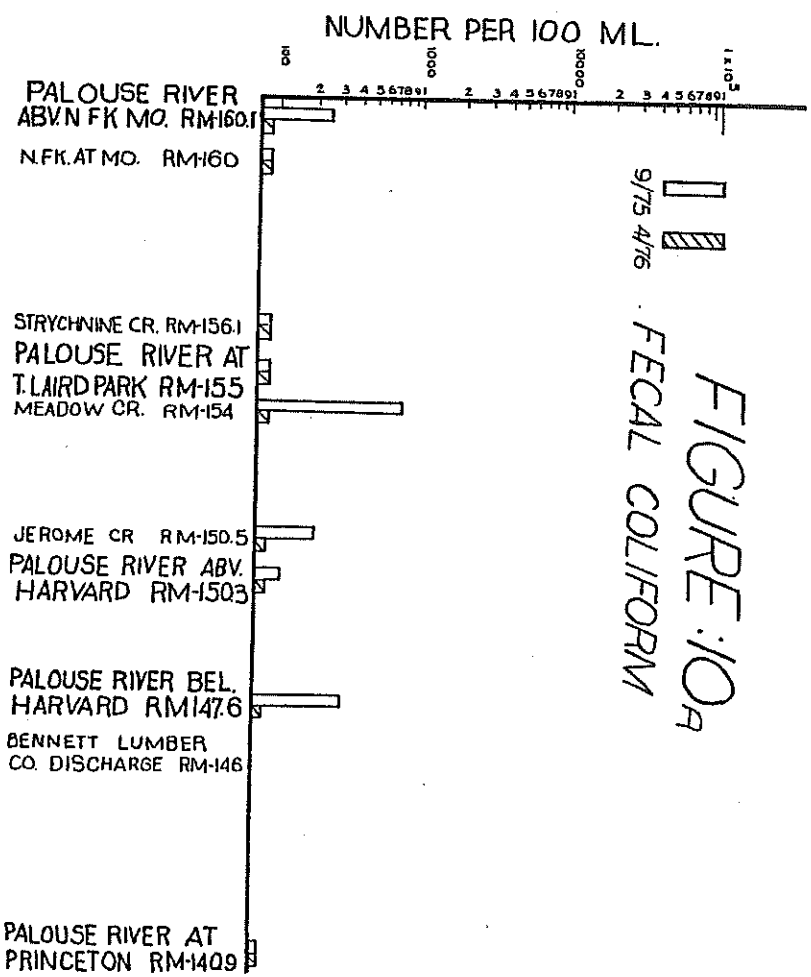

FIGURE :10A FECAL COLIFORM

APPENDIX C

TABLES

Table 1

MAJOR EFFLUENTS DISCHARGED TO PALOUSE RIVER SYSTEM IN IDAHO

AS SAMPLED APRIL 20, 1976 [1]

	Bennett Lumber Co.	Potlatch STP*	Moscow STP
Temperature (^{o}C)	13.0		13.0
Flow (MGD)	.013		4.0
D.O. (mg/l)	5.2		6.9
pH (pH units)	6.7	6.7	7.2
Total Solids (mg/l)	212	466	452
Suspended Solids (mg/l)	33	110	8
BOD_5 (mg/l)	95	110	8
Ammonia (mg/l)	0.47	6.88	2.3
Nitrate (mg/l)	0.08	2.85	48.6
Nitrite (mg/l)	0.002	0.004	0.386
Total K. Nitrogen (mg/l)	1.8	20.7	5.5
Total Phosphorus (mg/l)	0.37	4.24	4.97
Orthophosphate (mg/l)	0.01	10.5	12.2
Total Inorganic Phosphate (mg/l)	1.11	13.0	12.8
Total Coliform (colonies/100 ml)	12200	>80000	>800
Fecal Coliform (colonies/100 ml)	246	>1200	>120
Fecal Streptococci (colonies/100 ml)	4	>600	116

* Raw sewage bypass of treatment works

1 Potlatch Corporation (Potlatch Mill) was not discharging on April 20, 1976

Table 2

PALOUSE RIVER POLLUTANT LOADINGS

SEGMENT: Headwaters To Princeton

September 10, 1975

BASIN SOURCE	BOD 5		TOTAL SOLIDS		TOTAL NITROGEN		TOTAL PHOSPHORUS	
	Loading lbs/day	% Contribution	Loading lbs/day	% Contribution	Loading lbs/day	% Contribution	Loading Lbs/day	% Contribution
Palouse R.Abv.No.Fk.Mo. R.M. 161	*	*	1069	19.3	72.7	34.3	0.87	20.4
North Fork Palouse River RM 160	*	*	921	16.7	80.8	38.1	0.19	4.5
Strychnine Creek RM 156	*	*	267	4.8	17.5	8.3	0.17	4
Meadow Creek RM 154	*	*	1283	23.2	31.4	14.8	0.73	17.2
Jerome Creek RM 151	*	*	480	8.7	9.1	4.3	0.50	11.8
Bennett Lumber Co. RM 145	*	*	13	0.2	0.3	0.1	0.03	0.7
Non Point Sources	*	*	1496	27.1	1.7	0.8	1.76	41.4
TOTAL (Palouse River @ Princeton RM 141)	*	*	5529	100%	212	100%	4.25	100%

* Not Analyzed

Table 3

PALOUSE RIVER POLLUTANT LOADING

Segment: Princeton To Idaho-Washington Border

September 10, 1975

BASIN SOURCE	BOD_5		Total Solids		Total Nitrogen		Total Phosphorus	
	Loading lbs/day	% Contribution	Loading lbs/day	% Contribution	Loading lbs/day	% Contribution	Loading lbs/day	% Contribution
Palouse River @ Princeton RM 141	*	*	5529	88.8	137	93.2	4.25	37.5
Hatter Creek RM 139	*	*	117	1.9	3.2	2.2	.14	1.2
Gold Creek RM 138	*	*	45	0.7	0.8	0.5	.03	0.3
Potlatch STP RM 135	*	*	**	**	**	**	**	**
Potlatch Corp. RM 135	*	*	**	**	**	**	**	**
Flannigan Creek RM 134	*	*	52	0.8	0.8	0.5	.06	0.5
Deep Creek RM 133	*	*	70	1.1	0.9	0.6	.10	0.9
Non Point Sources	*	*	417	6.7	4.4	3	6.75	59.6
TOTAL (Palouse R.@Hwy 95) (Bridge RM 132)			6229	100%	147	100%	11.33	100%

** No Discharge * Not Analyzed

Table 4

PALOUSE RIVER POLLUTANT LOADINGS

Segment: Headwaters To Princeton

April 20, 1976

BASIN SOURCE	BOD_5 Loading lbs/day	BOD_5 % Contribution	Total Solids Loading lbs/day	Total Solids % Contribution	Total Nitrogen Loading lbs/day	Total Nitrogen % Contribution	Total Phosphorus Loading lbs/day	Total Phosphorus % Contribution
Palouse Above No. Fk. RM 161	485	12.9	42690	10.4	645.5	20.7	53.31	4
No. Fork RM 160	728	19.3	45141	11	903.5	29	218.42	72
Strychine Cr. RM 156	512	13.5	39942	9.7	416.9	13.4	20.48	7
Meadow Cr. RM 154	674	17.9	71419	17.4	*	*	*	*
Jerome Cr, RM 151	324	8.6	15532	3.8	144.9	9.1	19.42	6
Bennett Lumber RM 145	10.2	0.3	23	< 0.1	0.2	< 0.1	.04	< 0.1
Non Point Sources	1038	27.5	196512	47.7	*	*	*	*
TOTAL(Palouse R. @ Princeton RM 141)	3773	100%	411259	100%	3116	86	301.84	89

* Not Analyzed

Table 5

PALOUSE RIVER POLLUTANT LOADINGS

Segment: Princeton To Ida-Wash. Border

April 20, 1976

BASIN SOURCE	BOD_5 Loading lbs/day	% Concentrations	Total Solids Loading lbs/day	% Concentra..	Total Nitrogen Loading lbs/day	% Concentrations	Total Phosphorus Loading lbs/day	% Concentrat.
Palouse R @ Princeton RM 141	3773	16.1	411259	5.1	3116	9.5	301.84	6
Hatter Cr. RM 139	269	1.1	47950	0.6	441	1.3	37.71	0.8
Gold Creek RM 138	54	0.2	11764	0.1	134	4.1	9.76	0.2
Potlatch STP RM 135	80	0.3	338	0.1	17.1	0.1	3.1	0.1
Potlatch Corp. RM 135	*	*	*	*	*	*	*	*
Flannigan Cr. RM 134	958	4	315179	4	1156	3.5	213.57	4.3
Deep Cr. RM 133	3395	14.5	3.8×10^6	47.5	10860	33.2	2433.24	48.7
Non Point Sources	14915	63.8	3.4×10^6	42.7	15780	48.3	1996	39.9
TOTAL (Palouse Rv. @ Hwy.95 Br. RM 132)	23444	100%	8×10^6	100%	32670	100%	5001.38	100%

* No Discharge

Table 6

PALOUSE RIVER SURVEY STREAMFLOW DATA

Flows in cubic feet per second(cfs)	9-10-75	4-20-76
Palouse River above North Fork Mouth	2.3	90
North Fork Palouse River at Mouth	3.6	135
Strychnine Creek at Mouth	0.7	95
Palouse River at Laird Park Dam	10.0	370
Meadow Creek at Mouth	3.4	125
Jerome Creek at Mouth	1.0	30
Palouse River Above Harvard	15.2	630
Palouse River Hwy. 9 Br.	15.5	680
Bennett Lumber Co. Effluent	0.02	0.02
Palouse River at Princeton	15.8	700
Hatter Creek at Mouth	0.3	50
Gold Creek at Highway 95A Bridge	0.1	10
Palouse River At Potlatch	19.4	770
Potlatch STP Effluent	*	0.08
Potlatch Corporation Effluent	*	*
Flannigan Creek at Mouth	0.1	60
Palouse River at Flannigan Creek Rd. Br.	21.7	850
Deep Cr. at Hwy 95 Br.	0.1	210
Palouse River at Hwy 95 Br.	22	1100
Paradise Cr. at Latah Co. Fairgrounds	**	**
Moscow STP Effluent	3.1	6.2
Paradise Cr. at Idaho-Wash. Border	3.2	100
South Fork Palouse River at Idaho-Wash. Border	0.3	140

* No Discharge
** Not Measured

Table 7

PALOUSE RIVER

WATER QUALITY DATA

September 10, 1975

	RIVER MILE							
	161	155	150	147	141	136	134	132
Temperature (^{o}C)	11.0	14.0	16.0	18.0	21.5	18.5	21.1	16.0
Dissolved Oxygen (mg/l)	10.0	9.3	9.9	9.3	8.9	8.5	8.4	6.9
pH (s.u.)	7.2	7.3	7.2	7.2	7.4	7.2	7.3	*
BOD_5(mg/l)	*	*	5	1	1	*	2	1
Turbidity (JTU)	1.6	1.0	3.2	2.1	1.9	3.3	3.8	3.5
Total Solids (mg/l)	86	66	66	59	65	68	77	77
Suspended Solids (mg/l)	2	7	40	12	13	10	26	*
Ammonia (mg/l)	.28	.14	.17	.17	.15	.21	.40	.26
Nitrate(mg/l)	.25	<.01	<.01	<.01.	<.01	<.01	<.01	<.01
Nitrite (mg/l)	.001	<.001	.001	<.001	.001	<.001	.002	.005
T. Kjeldahl Nitrogen (mg/l)	5.6	3.8	1.7	1.4	1.6	1.7	1.7	1.8
Ortho Phosphate (mg/l)	.02	.01	<.01	.01	.01	<.01	.25	.12
J. Phosphorus (mg/l)	.07	.03	.04	.04	.05	.08	.25	.14
T. Inorganic Phosphate (mg/l)	.10	.07	.07	.08	.09	.18	.72	.34
Spec. Conductance (umhos)	80	49	50	50	51	58	75	75
Alkalinity (mg/l)	44	32	36	28	36	32	44	44
Total Coliform (colonies/100 ml)	600	540	1100	700	620	420	>8000	>8000
Fecal Coliform (colonies/100 ml)	260	18	114	320	22	116	259	> 600

Table 8

PALOUSE RIVER

WATER QUALITY DATA

April 20, 1976

	RIVER MILE							
	161	155	150	147	141	136	134	132
Temperature (°C)	2.0	2.3	3.4	3.5	3.8	3.5	4.0	4.1
Dissolved Oxygen (mg/l)	12.2	12.0	11.7	11.8	11.4	11.9	11.8	11.2
pH (s.u.)	7.8	6.9	7.1	7.3	7.5	7.2	7.3	7.3
BOD_5 (mg/l)	<1	2	<1	<1	<1	3	2	3
Turbidity (JTU)	7.1	9.2	22	24	19	86	150	270
Total Solids (mg/l)	88	83	126	134	109	477	589	1078
Suspended Solids (mg/l)	10	3	57	73	19	166	362	355
Ammonia (mg/l)	,01	.07	.03	.01	.02	.07	.08	.16
Nitrate (mg/l)	.03	.02	.05	.06	.12	1.07	1.19	1.70
Nitrite (mg/l)	.002	.002	.004	.006	.006	.025	.040	.072
T. Kjeldahl Nitrogen (mg/l)	1.3	.9	.7	1.2	.7	1.2	.7	2.4
Ortho Phosphate (mg/l)	.01	.04	.14	.10	.05	.32	.41	.82
J. Phosphorus (mg/l)	.11	.08	.08	.12	.08	.26	.35	.64
T. Inorganic Phosphate (mg/l)	.17	.18	.26	.34	.22	.79	.98	1.83
Spec. Conductance (umhos)	39	28	29	31	34	46	53	53
Alkalinity (mg/l)	28	20	16	20	20	24	28	28
Total Coliform(colonies/100 ml)	220	240	520	440	800	5700	>8000	>8000
Fecal Coliform (colonies/100 ml)	2	2	10	16	28	96	800	>1200

Table 9

PALOUSE RIVER TRIBUTARIES
WATER QUALITY DATA

September 10, 1975

	North Fork	Strychnine	Meadow	Jerome	Hatter	Gold	Flannigan	Deep	Paradise	South Fork
Temperature (^{o}C)	13.0	12.0	19.5	11.0	17.5	13.7	18.2	12.0	20.4	16.9
Dissolved Oxygen (mg/l)	9.6	9.7	9.2	8.4	9.1	7.0	9.6	3.3	6.9	4.5
pH (s.u.)	7.3	7.1	7.3	6.7	7.3	7.4	7.5	7.1	7.0	7.2
BOD_5 (mg/l)	*	*	*	1	1	*	*	1	4.5	2
Turbidity (JTU)	1.3	2.0	2.2	4.6	4.0	4.0	4.4	8.0	5.0	5.5
Total Solids (mg/l)	48	64	70	96	74	90	104	140	519	244
Suspended Solids (mg/l)	49	2	1	31	13	*	13	*	*	*
Ammonia (mg/l)	.05	.15	.23	.31	.29	.28	.23	.34	1.90	235
Nitrate (mg/l)	<.01	<.01	<.01	<.01	.20	<.01	<.01	<.01	36.1	3.10
Nitrite (mg/l)	<.001	<.001	<.001	<.001	<.001	<.001	.001	.008	.776	.141
T. Kjeldahl Nitrogen (mg/l)	4.2	4.2	1.7	1.8	1.8	1.5	1.6	1.7	3.6	1.8
Ortho Phosphate (mg/l)	.02	<.01	.01	.05	.06	.02	.14	.15	20.8	1.35
T. Phosphorus (mg/l)	.01	.04	.04	.10	.09	.06	.11	.19	6.52	.85
T. Inorganic Phosphate (mg/l)	.04	.10	.11	.27	.21	.14	.27	.50	21.0	2.40
Spec. Conductance (umhos)	50	38	56	70	61	90	110	175	670	330
Alkalinity (mg/l)	28	24	36	44	36	56	64	96	160	140
Total Coliform (colonies/100 ml)	640	1100	1800	5600	840	2290	5400	>8000	700	>8000
Fecal Coliform (colonies/100 ml)	10	26	280	218	16	44	84	>600	220	>600

Table 10

PALOUSE RIVER TRIBUTARIES
WATER QUALITY DATA

April 20, 1976

	North Fork	Strychnine	Meadow	Jerome	Hatter	Gold	Flannigan	Deep	Paradise	South Fork
Temperature (^{o}C)	2.2	2.0	4.0	3.0	4.0	4.5	*	5.0	7.0	7.5
Dissolved Oxygen (mg/l)	11.9	12.4	11.2	11.8	11.6	11.4	*	11.0	10.2	10.8
pH (s.u.)	6.7	6.6	7.1	7.0	7.1	7.3	*	7.3	7.6	7.4
BOD_5 (mg/l)	<1	1	1	2	1	< 1	3	3	8	5
Turbidity (JTU)	3.2	10	18	17	28	43	260	280	250	180
Total Solids (mg/l)	62	78	106	96	178	217	974	3350	1381	618
Suspended Solids (mg/l)	7	3	42	4	59	70	726	275	585	403
Ammonia (mg/l)	.05	.06	.03	.02	.02	.02	.05	.40	.88	.19
Nitrate (mg/l)	.04	.01	.02	.09	.73	1.45	1.31	3.90	21.2	11.9
Nitrite (mg/l)	.001	.004	.004	.006	.009	.017	.061	.196	.314	.097
T. Kjeldahl Nitrogen (mg/l)	1.2	.8	*	.8	.9	1.0	2.2	5.5	6.0	1.58
Ortho Phosphate (mg/l)	.04	.01	.05	.10	.13	.22	.81	2.15	2.05	.77
T. Phosphorus (mg/l)	.30	.04	*	.12	.14	.18	.66	1.67	.124	.54
T. Inorganic Phosphate (mg/l)	.11	.10	*	.31	.44	.50	1.80	4.4	3.8	1.58
Spec. Conductance (umhos)	22	26	29	38	41	*	66	72	203	118
Alkalinity (mg/l)	16	20	16	24	24	28	36	28	56	44
Total Coliform (colonies/100 ml)	180	260	140	700	14500	3700	>8000	>8000	>8000	>8000
Fecal Coliform (colonies/100 ml)	2	8	10	82	124	78	800	>1200	340	>120

Table 11

PALOUSE RIVER SAMPLING SITE LOCATIONS

By River Mile (RM)

Site Description	RM	STORET
Palouse River above North Fork Mouth	161	2020037
North Fork Palouse River at Mouth	160	2020043
Strychnine Creek at Mouth	156	2020045
Palouse River at Laird Park Dam	155	2020038
Meadow Creek at Mouth	154	2020046
Jerome Creek at Mouth	151	2020047
Palouse River above Harvard	150	2020039
Palouse River Hwy. 9 Bridge	147	2020040
Bennett Lumber Co. Effluent	145	--
Palouse River at Princeton	141	2020041
Hatter Creek at Mouth	139	2020048
Gold Creek at Highway 95A Bridge	138	2020049
Palouse River at Potlatch	136	2020069
Potlatch STP Effluent	135	--
Potlatch Corporation Effluent	135	--
Flannigan Creek at Mouth	134	2020051
Palouse River at Flannigan Cr. Rd. Br.	134	2020070
Deep Creek at Highway 95 Bridge	133	2020052
Palouse River at Highway 95 Bridge	132	2020042
Paradise Creek at Latah Co. Fairgrounds	--	--
Moscow STP Effluent	--	--
Paradise Creek at Idaho-Washington Border	23	2020050
South Fork Palouse River at Idaho-Washington Border	--	2020068

APPENDIX D

HISTORIC DATA FROM IDHW-DOE NETWORK STATIONS, 1968-1975

STORET RETRIEVAL DATE 78/05/11

151011
46 55 00.0 116 57 00.0 5
PALOUSE RIVER BELOW POTLATCH IDA
16 IDAHO
PACIFIC NORTHWEST 130890
LOWER SNAKE RIVER BASIN
21IDAHO
0000 FEET DEPTH CLASS 00

/TYPA/AMBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00011 WATER TEMP FAHN	00061 STREAM FLOW, INST-CFS	00299 DO PROBE MG/L	00300 DO MG/L	00310 BOD 5 DAY MG/L	00335 COD LOWLEVEL MG/L	00340 COD HI LEVEL MG/L	00400 PH SU	00403 LAB PH SU
68/03/06		0001									7.20	
66/07/31			25.5				2.0				6.70	6.7
69/10/16			8.0				3.5	6.0L			6.50	6.5
70/03/16			4.4				11.4				6.80	
70/05/27			6.7								7.40	
71/05/20			5.0				10.1				7.00	7.0
71/08/25			18.5				5.0				6.90	6.9
72/04/19			7.0				11.2				6.90	6.5
72/05/24			11.3				9.6				7.20	6.6
72/06/27			16.0				9.4				6.90	7.4
72/07/25			24.0				9.5				6.80	
72/08/30			23.2				8.5					7.8
72/09/20			14.0				10.2				7.90	
72/10/20			8.0				9.6				7.70	
72/11/14			5.5				10.2					7.3
73/01/10			0.0				11.0				6.70	7.0
73/01/16			2.0				10.8					6.9
73/02/13			2.0				11.2				7.40	7.6
73/03/14			2.0				10.8				6.90	9.6
73/04/11			12.0				10.8				7.60	8.3
73/06/12			18.4				7.5				8.30	7.6
73/07/17			25.5				11.0					7.4
73/08/21												7.8
73/10/10			7.0				7.9					7.3
73/12/05			2.0				11.2				8.60	7.2
74/02/12			3.0				12.4				7.90	6.2
74/03/07	09	05	2.0				12.4				7.80	6.9
74/04/24			9.0				11.9				8.50	7.0
74/07/11	10	15	19.8				10.8				6.50	6.7
74/09/10												7.4
74/10/22			7.0								7.10	7.4
75/01/07			0.0				11.6	1.3			5.80	7.3
75/03/20			2.5				12.8				6.20	7.0
75/04/22			6.0				11.9				6.30	7.1
75/05/12			8.5		1389		12.1				7.40	6.9

STORET RETRIEVAL DATE 78/05/11

151011
46 55 00.0 116 57 00.0 5
PALOUSE RIVER BELOW POTLATCH IDA
16 IDAHO
PACIFIC NORTHWEST 130890
LOWER SNAKE RIVER BASIN
21IDAHO
0000 FEET DEPTH CLASS 00

/TYPA/AMBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	70300 RESIDUE DISS-180 C MG/L	00515 RESIDUE DISS-105 C MG/L	00095 CNDUCTVY AT 25C MICROMHO	00094 CNDUCTVY FIELD MICROMHO	00500 RESIDUE TOTAL MG/L	00505 RESIDUE TOT VOL MG/L	00530 RESIDUE TOT NFLT MG/L	00520 RESIDUE VOL FLT MG/L	00535 RESIDUE VOL NFLT MG/L	00545 RESIDUE SETTLBLE ML/L
68/03/06		0001			26							
68/07/31					64		64					
69/06/18			138				152					
69/10/16							224					
70/03/16			184				668					
70/05/27							92					
71/05/20			64				108					
71/08/25			64				92					
72/04/19					43		128					
72/05/24					34		164					
72/06/27					56		116					
72/07/25					63		84					
72/08/30					68		112					
72/09/20					65		88					
72/10/20					57		88					
72/11/14					64		72					
73/01/10					72		92					
73/01/16					74		256					
73/02/13					54		76					
73/03/14					52		72					
73/04/11					43		60					
73/06/12					59		80					
73/07/17					74		96					
73/08/21					117		204					
73/10/10					73		104					
73/12/05					65		89					
74/02/12					72		192					
74/03/07	09 05				44		116					
74/04/24					29		124					
74/07/11	10 15				56		44					
74/09/10					79		82					
74/10/22					66		81					
75/01/07					77		76		1			
75/03/20					62		182					
75/04/22					40		151					
75/05/12					32		354					

STORET RETRIEVAL DATE 78/05/11

151011
46 55 00.0 116 57 00.0 5
PALOUSE RIVER BELOW POTLATCH IDA
16 IDAHO
PACIFIC NORTHWEST 130890
LOWER SNAKE RIVER BASIN
211DAHO
0000 FEET DEPTH CLASS 00

/TYPA/AMBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00620 NO3-N TOTAL MG/L	71850 NITRATE TOT-NO3 MG/L	00630 NO2&NO3 N-TOTAL MG/L	00610 NH3-N TOTAL MG/L	71845 AMMONIA TOT-NH4 MG/L	00615 NO2-N TOTAL MG/L	71855 NITRITE TOT-NO2 MG/L	00625 TOT KJEL N MG/L	00660 ORTHOPO4 PO4 MG/L	70507 PHOS-T ORTHO MG/L P
68/03/06		0001		1.4							0.18	
68/07/31				3.6							0.34	
69/06/18				2.4			0.40				0.10	
69/10/16				2.6			0.20				0.06	
70/03/16				5.5			1.70				0.42	
70/05/27				1.1			0.60				0.12	
71/05/20				0.8			0.20				0.05	
71/08/25				1.1			0.20				0.24	
72/04/19				0.8			0.20				0.04	
72/05/24				0.3			0.20				0.04	
72/06/27				0.3			0.20				0.04	
72/07/25				0.7			0.20				0.07	
72/08/30				0.4							0.04	
72/09/20				0.5							0.06	
72/10/20				0.5							0.04	
72/11/14				0.8			0.40		10.00K		0.07	
73/01/10				0.8			0.60		0.01		0.17	
73/01/16				7.0			1.10		0.05		0.10	
73/02/13				0.3			0.40		40.00		0.15	
73/03/14				2.0			0.10		20.00		0.01K	
73/04/11				0.7			0.20		1.00		0.07	
73/06/12				0.8							0.14	
73/07/17				1.4			0.90		1.00K		0.29	
73/08/21				3.3			0.70		1.00K		0.04	
73/10/10				1.1			0.40		1.00K		0.16	
73/12/05				5.2			0.10		0.001		0.10	
74/02/12				2.8			0.60		1.00K		0.02	
74/03/07	09	05		2.3			0.10		1.00		0.16	
74/04/24				0.2			0.62		0.45		0.15	
74/07/11	10	15		0.3			0.17		0.01		0.15	
74/09/10				0.4			0.34		0.03		0.30	
74/10/22				0.1			0.12		5.00		0.07	
75/01/07				0.3			0.01K		1.00		0.01K	
75/03/20				5.4			0.52		5.00		0.01	
75/04/22				0.4			0.38		2.00		0.16	
75/05/12				1.0			0.54		10.00		0.08	

STORET RETRIEVAL DATE 78/05/11

151011
46 55 00.0 116 57 00.0 5
PALOUSE RIVER BELOW POTLATCH IDA
16 IDAHO
PACIFIC NORTHWEST 130890
LOWER SNAKE RIVER BASIN
21IDAHO
0000 FEET DEPTH CLASS 00

/TYPA/AMBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00650 T PO4 PO4 MG/L	00665 PHOS-TOT MG/L P	00669 PHOS-TOT HYDRO MG/L P	T	00680 ORG C C MG/L	00070 TURB JKSN JTU	31501 TOT COLI MF IMENDO /100ML	31616 FEC COLI MFM-FCBR /100ML	31505 TOT COLI MPN CONF /100ML	31679 FECSTREP MF M-ENT /100ML	71205 COLIFORM MPN PRES /100ML
68/07/31									4800	1300			
69/06/18								25.0K					
69/10/16									10000				
71/05/20									7000				
71/08/25								5.0					
72/04/19								5.0					
72/05/24								5.0	38000				
72/06/27								4.0	41000				
72/07/25								4.0	80000				
72/08/30								7.0	66000				
72/09/20								2.0	80000				
72/10/20								2.0	49000				
72/11/14								3.0	260				
73/01/10								3.0	830				
73/01/16								140.0	5000				
73/02/13								11.0	520				
73/03/14								7.0	600				
73/04/11								5.0	860	84			
73/06/12								4.0	3220				
73/07/17								2.0	1000				
73/08/21								6.0					
73/10/10								21.0	9000				
73/12/05								6.0	1720	220			
74/02/12								14.0	350				
74/03/07	09	05						17.0	680	40			
74/04/24								10.0	5800				
74/07/11	10	15						6.5	21000	880			
74/09/10								6.0					
74/10/22								6.9	400	160			
75/01/07								4.3	1300	54			
75/03/20								18.0					
75/04/22								16.0	960	44			
75/05/12								45.0	1300	600L			
76/03/15									1000	66		44	

STORET RETRIEVAL DATE 78/05/11

151011
46 55 00.0 116 57 00.0 5
PALOUSE RIVER BELOW POTLATCH IDA
16 IDAHO
PACIFIC NORTHWEST 130890
LOWER SNAKE RIVER BASIN
21IDAHO
0000 FEET DEPTH CLASS 00

/TYPA/AMBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00410 T ALK CACO3 MG/L	00425 HCO3 ALK CACO3 MG/L	00430 CO3 ALK CACO3 MG/L	00900 TOT HARD CACO3 MG/L	00915 CALCIUM CA,DISS MG/L	00916 CALCIUM CA-TOT MG/L	00925 MGNSIUM MG,DISS MG/L	00927 MGNSIUM MG,TOT MG/L	00929 SODIUM NA,TOT MG/L	00930 SODIUM NA,DISS MG/L
68/03/06		0001	24			23		6.0		2.0	6.00	
68/07/31			36			64		11.0		9.0	28.00	
69/06/18			76			52		8.0		8.0	4.00	
69/10/16			36			80		11.0		12.0	5.00	
70/03/16			32			76		10.0		12.0	1.00	
70/05/27			28			76		5.0		15.0	1.00	
71/05/20			52			32		3.0		6.0	3.00	
71/08/25			40			44		6.0		6.0	4.00	
72/04/19			36			52		5.0		10.0	2.00	
72/05/24			32			76		5.0		15.0	1.00	
72/06/27			32			24		6.0		2.0	3.00	
72/07/25			40			48		11.0		5.0	3.00	
72/08/30											8.00	
72/09/20											8.00	
72/10/20			48								3.00	
72/11/14			40								2.00	
73/01/10			36								2.00	
73/01/16			24								4.00	
73/02/13			28								2.00	
73/03/14			24								1.00	
73/04/11			24								2.00	
73/06/12			44								4.00	
73/07/17			44								3.00	
73/08/21			48								14.00	
73/10/10			48								2.00	
73/12/05			32								4.00	
74/02/12			36			32		11.0		1.0	3.00	
74/03/07	09	05	24								3.00	
74/04/24			28								1.80	
74/07/11	10	15	24								3.20	
74/09/10			54								5.60	
74/10/22			46								4.50	
75/01/07			40								3.60	
75/03/20			30								2.90	
75/04/22			28								2.40	
75/05/12			20								2.20	

STORET RETRIEVAL DATE 78/05/11

151011
46 55 00.0 116 57 00.0 5
PALOUSE RIVER BELOW POTLATCH IDA
16 IDAHO
PACIFIC NORTHWEST 130890
LOWER SNAKE RIVER BASIN
211DAHO
0000 FEET DEPTH CLASS 00

/TYPA/AMBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00935 PTSSIUM K,DISS MG/L	00937 PTSSIUM K,TOT MG/L	00940 CHLORIDE CL MG/L	50060 CHLORINE TOT RESD MG/L	00945 SULFATE SO4-TOT MG/L	00950 FLUORIDE F,DISS MG/L	00740 SULFITE SO3 MG/L	00745 SULFIDE TOTAL MG/L	00956 SILICA TOTAL MG/L	C1055 MANGNESE MN UG/L
68/03/06		0001			8		7	0.09				20.0
68/07/31					2		6	0.01K				
69/06/18				34.00	34		14	0.13				20.0
69/10/16					36		12	0.01K				60.0
70/03/16				6.00	6		45	0.01K				40.0
70/05/27				1.00	6		3	0.09				10.0
71/05/20				1.00	6		1	0.01K			18.9	10.0
71/08/25				2.30	6		4	0.01K			20.6	70.0
72/04/19				1.00	10		4	0.16			45.7	20.0
72/05/24				0.10	4		1	0.16			44.0	10.0
72/06/27				0.20	2		1K	0.26			42.7	150.0
72/07/25				0.20	4		3	0.38			22.2	10.0K
72/08/30				1.20	9							60.0
72/09/20				1.10	8							50.0
72/10/20				0.40	2							30.0
72/11/14				1.30	2							90.0
73/01/10				1.30	2							100.0
73/01/16				2.00	6							250.0
73/02/13				0.30	6							20.0
73/03/14				0.10	4							10.0
73/04/11				0.30	4							60.0
73/06/12				0.30	2							20.0
73/07/17				0.20	2		3					10.0K
73/08/21				1.10	4							140.0
73/10/10				0.20	2		6					10.0K
73/12/05				1.10	1K		10					10.0K
74/02/12				1.10	2		3					50.0
74/03/07	09 05			2.50	2							10.0
74/04/24				1.30	4							50.0
74/07/11	10 15			1.70	8							20.0
74/09/10				1.50	4							230.0
74/10/22				2.10	3							80.0
75/01/07				1.20								10.0
75/03/20				1.20	4							10.0
75/04/22				1.10	2K							20.0
75/05/12				1.90	2							180.0

STORET RETRIEVAL DATE 78/05/11

151011
46 55 00.0 116 57 00.0 5
PALOUSE RIVER BELOW POTLATCH IDA
16 IDAHO
PACIFIC NORTHWEST 130890
LOWER SNAKE RIVER BASIN
21IDAHO
0000 FEET DEPTH CLASS 00

/TYPA/AMBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	01045 IRON FE,TOT UG/L	74010 IRON FE MG/L	01025 CADMIUM CD,DISS UG/L	01027 CADMIUM CD,TOT UG/L	01049 LEAD PB,DISS UG/L	01050 LEAD PB,SUSP UG/L	01051 LEAD PB,TOT UG/L	01090 ZINC ZN,DISS UG/L	01092 ZINC ZN,TOT UG/L	01105 ALUMINUM AL,TOT UG/L
68/03/06		0001	300									
68/07/31			1620									
69/06/18			370									
69/10/16			950						10K			
70/03/16			4030			50						4500
70/05/27			380			40			10K		10K	100K
71/05/20			150									
71/08/25			60									
72/04/19			380									
72/05/24			230									
72/06/27			850									
72/07/25			130									
72/08/30			50									
72/09/20			10K									
72/10/20			40									
72/11/14			40									
73/01/10			230									
73/01/16			790									
73/02/13			160									
73/03/14			10									
73/04/11			100									
73/06/12			40									
73/07/17			10									
73/08/21			470									
73/10/10			150			1K			10K		1K	
73/12/05			90									
74/02/12			770			1K			10K		1K	
74/03/07	09	05	430			10K			10K		10K	
74/04/24			540						30		27	
74/07/11	10	15	490									
74/09/10			2100									
74/10/22			830			1K			30		16	
75/01/07			340									
75/03/20			60									
75/04/22			570									
75/05/12			4580			1K			10		13	

STORET RETRIEVAL DATE 78/05/11

151011
46 55 00.0 116 57 00.0 5
PALOUSE RIVER BELOW POTLATCH IDA
16 IDAHO
PACIFIC NORTHWEST 130690
LOWER SNAKE RIVER BASIN
211IDAHO
0000 FEET DEPTH CLASS 00

/TYPA/AMBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	71900 MERCURY HG,TOTAL UG/L	71890 MERCURY HG,DISS UG/L	01020 BORON B,DISS UG/L	01022 BORON B,TOT UG/L	01075 SILVER AG,DISS UG/L	01077 SILVER AG,TOT UG/L	01005 BARIUM BA,DISS UG/L	01007 BARIUM BA,TOT UG/L	01000 ARSENIC AS,DISS UG/L	01002 ARSENIC AS,TOT UG/L
71/05/20						100K						
71/08/25						100K						
72/05/24						100K						
74/02/12			5.0K									
74/03/07	09	05	0.5K									
74/04/24			0.5K									
74/10/22			5.0K									
75/05/12			5.0K									

STORET RETRIEVAL DATE 78/05/11

151011
46 55 00.0 116 57 00.0 5
PALOUSE RIVER BELOW POTLATCH IDA
16 IDAHO
PACIFIC NORTHWEST 130890
LOWER SNAKE RIVER BASIN
21IDAHO
0000 FEET DEPTH CLASS 00

/TYPA/AMBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00550 OIL-GRSE TOT-SXLT MG/L	00080 COLOR PT-CO UNITS	00030 INCDT LT SURF C/SQCM/D	38260 MBAS MG/L	71875 H2S MG/L	00033 WEATHER CODE	28601 BA-140 TOTAL PC/L	32730 PHENOLS TOTAL UG/L	01040 COPPER CU,DISS UG/L	01042 COPPER CU,TOT UG/L
69/06/18												20
69/10/16												10
70/05/27												10K
73/10/10												1K
74/02/12												1K
74/03/07	09	05										1K
74/04/24												1K
74/10/22												3
75/05/12												1K

STORET RETRIEVAL DATE 78/07/21

151012
46 58 14.0 116 46 30.0 2
PALOUSE R AT PRINCETON, IDAHO
16 IDAHO
PACIFIC NORTHWEST 130790
LOWER SNAKE RIVER BASIN
21IDAHO
0000 FEET DEPTH CLASS 00

/TYPA/AMBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00011 WATER TEMP FAHN	00299 DO PROBE MG/L	00300 DO MG/L	00301 DO SATUR PERCENT	00310 BOD 5 DAY MG/L	00335 COD LOWLEVEL MG/L	00340 COD HI LEVEL MG/L	00355 BOD 56 DAY MG/L	00400 PH SU
70/03/16												7.00
71/05/20			5.0			12.0						
71/08/25			17.5			9.0						
72/04/19			7.0			11.8						7.00
72/05/24			8.9			10.1						7.00
72/06/27			15.2			10.2						7.00
72/07/25			25.0			10.2						7.10
72/08/30			23.8			9.4						
72/09/20			13.4			10.2						8.10
72/10/20			6.0			10.6						
72/11/14			4.5			10.6						
73/01/16			1.5			10.7						0.00
73/02/13			1.0			11.6						7.40
73/03/14			1.5			10.8						6.90
73/04/11			11.8			11.6						7.50
73/06/12			19.0			8.2						7.60
73/07/17			26.0									
73/10/10			9.0			8.2						
73/12/05			1.0			10.8						7.20
74/02/12			2.0			11.2						7.90
74/03/07	08 55		2.5			12.6						7.70
74/04/24			9.0			12.0						8.50
74/07/11	09 55		18.0			10.9						6.90
74/10/22			6.5			7.5						
75/01/07			0.0			11.9		1.5				5.60
75/03/20			2.0			13.0						6.80
75/04/22			5.0			11.8						6.40
75/05/12			7.0			12.2						7.10

STORET RETRIEVAL DATE 78/07/21

151012
46 58 14.0 116 46 30.0 2
PALOUSE R AT PRINCETON, IDAHO
16 IDAHO
PACIFIC NORTHWEST 130790
LOWER SNAKE RIVER BASIN
21IDAHO
0000 FEET DEPTH CLASS 00

/TYPA/AMONT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00403 LAB PH SU	00061 STREAM FLOW, INST-CFS	00070 TURB JKSN JTU	00550 OIL-GRSE TOT-SXLT MG/L	31501 TOT COLI MFIMENDO /100ML	31505 TOT COLI MPN CONF /100ML	31616 FEC COLI MFM-FCBR /100ML	31618 FEC COLI EKM 45C TUBECODE	31679 FECSTREP MF M-ENT /100ML	71205 COLIFORM MPN PRES /100ML
68/03/02			6.7									
68/03/13			6.8		85.0							
68/12/10			7.1		25.0K		2780		2780			
71/05/20			7.1				610					
71/08/25			7.7		4.0		620					
72/04/19			7.4		3.0		148					
72/05/24			6.8		3.0		520					
72/06/27			8.0		3.0		9200					
72/07/25					2.0		200					
72/08/30			8.4		3.0		6000					
72/09/20					3.0		3200					
72/10/20			8.0		2.0		1560					
72/10/24							1560					
72/11/14			7.7		3.0		120					
73/01/16			6.8		50.0		900					
73/02/13			7.7		5.0		250					
73/03/14			8.2		5.0		168					
73/04/11			8.0		4.0		140		4			
73/06/12			7.7		2.0		720					
73/07/17			7.8		6.0		100					
73/08/21			7.9		3.0		3820					
73/10/10			7.8		5.0		2000					
73/12/05			7.1		8.0		488					
74/02/12			7.8		10.0		160					
74/03/07	08	55	6.8		5.0		230		20			
74/04/24			6.8		10.0		1200		34			
74/07/11	09	55	6.8		4.5		1960		10			
74/09/10			7.4		3.5							
74/10/22			7.4		3.7		200		2K			
75/01/07			7.4		4.3		300		14			
75/03/20			7.0		11.0							
75/04/22			7.1		15.0		520		28			
75/05/12			6.8		48.0		520		260			

STORET RETRIEVAL DATE 78/07/21

151012
46 58 14.0 116 46 30.0 2
PALOUSE R AT PRINCETON, IDAHO
16 IDAHO
PACIFIC NORTHWEST 130790
LOWER SNAKE RIVER BASIN
21IDAHO
0000 FEET DEPTH CLASS 00

/TYPA/AMBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00600 TOTAL N MG/L	00610 NH3-N TOTAL MG/L	71845 AMMONIA TOT-NH4 MG/L	00615 NO2-N TOTAL MG/L	71855 NITRITE TOT-NO2 MG/L	00620 NO3-N TOTAL MG/L	71850 NITRATE TOT-NO3 MG/L	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00650 T PO4 PO4 MG/L
68/03/02								1.761				
68/03/13								1.309				
68/12/10								0.542				
70/03/16				1.009				0.271				
71/05/20				0.155				0.158				
71/08/25				0.078K				0.023				
72/04/19				0.233				0.113				
72/05/24				0.078K				0.045				
72/06/27				0.078				0.023				
72/07/25				0.155				0.158				
72/08/30								0.045				
72/09/20								0.068				
72/10/20								0.090				
72/11/14				0.155		0.003K		0.045				
73/01/16				0.311		0.002		0.023K				
73/02/13				0.155		0.003		0.023				
73/03/14				0.078K		0.002		0.361				
73/04/11				0.155		0.0003		0.158				
73/06/12				0.078		0.0003		0.181				
73/07/17				0.233		0.0003K		0.181				
73/08/21				0.311		0.0003K		0.677				
73/10/10				0.155		0.0003		0.158				
73/12/05				0.155		0.001		0.587				
74/02/12				0.388		0.0003K		0.339				
74/03/07	08	55		0.078K		0.003		0.429				
74/04/24				0.373		0.001		0.011				
74/07/11	09	55		0.054		0.002		0.135				
74/09/10				0.031		0.0003K		0.002K				
74/10/22				0.008K				0.002K				
75/01/07				0.008K		0.0003		0.056				
75/03/20				0.326		0.001		0.395				
75/04/22				0.318		0.0003		0.074				
75/05/12				0.668		0.002		0.113				
75/05/19						0.002		0.117				

STORET RETRIEVAL DATE 78/07/21

151012
46 58 14.0 116 46 30.0 2
PALOUSE R AT PRINCETON, IDAHO
16 IDAHO
PACIFIC NORTHWEST 130790
LOWER SNAKE RIVER BASIN
21IDAHO
0000 FEET DEPTH CLASS 00

/TYPA/AMBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	70507 PHOS-T ORTHO MG/L P	00660 ORTHOPO4 PO4 MG/L	00665 PHOS-TOT MG/L P	00669 PHOS-TOT HYDRO MG/L P	00680 T ORG C C MG/L	00690 T-CARBON C MG/L	70300 RESIDUE DISS-180 C MG/L	00515 RESIDUE DISS-105 C MG/L	00094 CNDUCTVY FIELD MICROMHO	00095 CNDUCTVY AT 25C MICROMHO
68/03/02			0.130									80
68/03/13			0.163									85
68/12/10			0.130									32
70/03/16			0.072						168			
71/05/20			0.016						48			
71/08/25			0.016						56			
72/04/19			0.036									48
72/05/24			0.013									28
72/06/27			0.003									39
72/07/25			0.010									47
72/08/30			0.007									45
72/09/20			0.013									49
72/10/20			0.013									55
72/11/14			0.033									56
73/01/16			0.049									65
73/02/13			0.016									41
73/03/14			0.003K									40
73/04/11			0.016									37
73/06/12			0.020									49
73/07/17			0.075									50
73/08/21			0.003K									76
73/10/10			0.003K									52
73/12/05			0.016									47
74/02/12			0.091									35
74/03/07	08	55	0.036									33
74/04/24			0.029									24
74/07/11	09	55										47
74/09/10			0.007									52
74/10/22			0.003									52
75/01/07			0.081									68
75/03/20			0.003									42
75/04/22			0.039									32
75/05/12			0.052									27
75/05/19			0.052									27

STORET RETRIEVAL DATE 78/07/21

151012
46 58 14.0 116 46 30.0 2
PALOUSE R AT PRINCETON, IDAHO
16 IDAHO
PACIFIC NORTHWEST 130790
LOWER SNAKE RIVER BASIN
21IDAHO
0000 FEET DEPTH CLASS 00

/TYPA/AMBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00530 RESIDUE TOT NFLT MG/L	00500 RESIDUE TOTAL MG/L	00505 RESIDUE TOT VOL MG/L	00520 RESIDUE VOL FLT MG/L	00535 RESIDUE VOL NFLT MG/L	00543 RESIDUE FIX SET MG/L	00545 RESIDUE SETTLBLE ML/L
70/03/16				448					
71/05/20				76					
71/08/25				72					
72/04/19				136					
72/05/24				152					
72/06/27				84					
72/07/25				72					
72/08/30				72					
72/09/20				80					
72/10/20				84					
72/11/14				60					
73/01/16				132					
73/02/13				56					
73/03/14				48					
73/04/11				48					
73/06/12				68					
73/07/17				68					
73/08/21				152					
73/12/05				73					
74/02/12				148					
74/03/07	08	55		112					
74/04/24				104					
74/07/11	09	55		36					
74/09/10				61					
74/10/22				61					
75/01/07				76					
75/03/20				115					
75/04/22				115					
75/05/12				349					

151012
46 58 14.0 116 46 30.0 2
PALOUSE R AT PRINCETON, IDAHO
16 IDAHO
PACIFIC NORTHWEST 130790
LOWER SNAKE RIVER BASIN
21 IDAHO
0000 FEET DEPTH CLASS 00

/TYPA/AMBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00410 T ALK CACO3 MG/L	00425 HCO3 ALK CACO3 MG/L	00430 CO3 ALK CACO3 MG/L	00900 TOT HARD CACO3 MG/L	00915 CALCIUM CA,DISS MG/L	00916 CALCIUM CA-TOT MG/L	00925 MGNSIUM MG,DISS MG/L	00927 MGNSIUM MG,TOT MG/L	00929 SODIUM NA,TOT MG/L	00930 SODIUM NA,DISS MG/L
68/03/02			44			102		28.0		8.0	15.00	
68/03/13			32			97		26.0		8.0	24.00	
68/12/10			24			16		5.0		1.0	8.00	
70/03/16			48			60		5.0		12.0	1.00	
71/05/20			16			32		6.0		4.0	2.00	
71/08/25			36			40		6.0		6.0	3.00	
72/04/19			48			56		6.0		10.0	2.00	
72/05/24			36			52		3.0		11.0	1.00	
72/06/27			24			20		5.0		2.0	2.00	
72/07/25			40			36		10.0		3.0	4.00	
72/08/30											3.00	
72/09/20											4.00	
72/10/20			40								2.00	
72/11/14			28								1.00	
73/01/16			20								2.00	
73/02/13			28								1.00	
73/03/14			20								1.00	
73/04/11			24								1.00	
73/06/12			44								3.00	
73/07/17			44								2.00	
73/08/21			52								4.00	
73/10/10			44								2.00	
73/12/05			24								2.00	
74/02/12			20			24		5.0		3.0	3.00	
74/03/07	08	55	24								3.00	
74/04/24			28								1.70	
74/07/11	09	55	24								2.20	
74/09/10			40								2.70	
74/10/22			34								2.60	
75/01/07			42								3.00	
75/03/20			26								2.40	
75/04/22			28								2.00	
75/05/12			24								2.10	
75/05/19			24								2.10	

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PALOUSE R AT PRINCETON, IDAHO
16 IDAHO
PACIFIC NORTHWEST 130790
LOWER SNAKE RIVER BASIN
21IDAHO
0000 FEET DEPTH CLASS 00

/TYPA/AMBNT/STREAM

DATE FROM TO	TIME OF DAY	DEPTH FEET	00935 PTSSIUM K,DISS MG/L	00937 PTSSIUM K,TOT MG/L	00940 CHLORIDE CL MG/L	50060 CHLORINE TOT RESD MG/L	00945 SULFATE SO4-TOT MG/L	00949 F MUD DRY WGT MG/KG-F	00950 FLUORIDE F,DISS MG/L	00956 SILICA TOTAL MG/L	01045 IRON FE,TOT UG/L	74010 IRON FE MG/L
68/03/02					8		10		0.01K		300	
68/03/13					8		7		0.18		300	
68/12/10					11		9		0.02		270	
70/03/16					6		19		0.01K		2180	
71/05/20				1.10	6		1		0.01K	21.4	60	
71/08/25				1.70	8		1		0.01K	4.6	10	
72/04/19				0.10	6		2		0.01	39.8	500	
72/05/24				0.10	4		1K		0.20	33.0	200	
72/06/27				0.10					0.16	24.3	400	
72/07/25				0.10	4		2		0.32	20.8	100	
72/08/30				0.60			4				10K	
72/09/20				0.60	5						60	
72/10/20				0.30	2						30	
72/11/14				0.90	2						270	
73/01/16				0.50	4						460	
73/02/13				0.10	4						90	
73/03/14				0.10	6						20	
73/04/11				0.30	6						120	
73/06/12				0.20	2						30	
73/07/17				0.20	2		3				30	
73/08/21				0.60	4						190	
73/10/10				0.20	2		5				10	
73/12/05				0.70	1K		5				70	
74/02/12				0.90	2		2				640	
74/03/07	08	55		2.30	2						1160	
74/04/24				1.30	2						420	
74/07/11	09	55		1.50	8						320	
74/09/10				2.10	2						200	
74/10/22				1.50	3						540	
75/01/07				0.90							90	
75/03/20				1.30	4						40	
75/04/22				1.20	2K						370	
75/05/12				1.70	2K						5190	
75/05/19				1.70	2K							

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DATE FROM TO	TIME OF DAY	DEPTH FEET	01055 MANGNESE MN UG/L	01002 ARSENIC AS,TOT UG/L	01007 BARIUM BA,TOT UG/L	01012 BERYLIUM BE,TOT UG/L	01020 BORON B,DISS UG/L	01022 BORON B,TOT UG/L	01025 CADMIUM CD,DISS UG/L	01027 CADMIUM CD,TOT UG/L	01040 COPPER CU,DISS UG/L	01042 COPPER CU,TOT UG/L
60/03/13			20.0									
68/12/10			10.0K									
70/03/16			30.0					100K		90		10
71/05/20			10.0K					100K				
71/08/25			10.0K					100K				
72/04/19			30.0					100K				
72/05/24			10.0					100K				
72/06/27			10.0K									
72/07/25			10.0K									
72/08/30			10.0K									
72/09/20			20.0									
72/10/20			10.0K									
72/11/14			10.0									
73/01/16			20.0									
73/02/13			10.0									
73/03/14			10.0K									
73/04/11			30.0									
73/06/12			10.0K									
73/07/17			10.0									
73/08/21			40.0									
73/10/10			10.0K							1K		1K
73/12/05			10.0									
74/01/24												3
74/02/12			30.0							1K		1K
74/03/07	08	55	30.0							10K		1K
74/04/24			20.0									
74/07/11	09	55	10.0K									
74/09/10			100.0									
74/10/22			20.0							2		3
75/01/07			10.0									
75/03/20			10.0									
75/04/22			20.0									
75/05/12			200.0							1K		2
75/05/19			200.0									

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DATE FROM TO	TIME OF DAY	DEPTH FEET	01034 CHROMIUM CR,TOT UG/L	01049 LEAD PB,DISS UG/L	01051 LEAD PB,TOT UG/L	01060 MOLY MO,DISS UG/L	01062 MOLY MO,TOT UG/L	01075 SILVER AG,DISS UG/L	01077 SILVER AG,TOT UG/L	01087 VANADIUM V,TOT UG/L	01090 ZINC ZN,DISS UG/L	01092 ZINC ZN,TOT UG/L
70/03/16					10K							10
73/10/10					10K							1K
74/02/12					10K							1K
74/03/07	08 55				10K							10
74/04/24					30							48
74/10/22					30							3
75/05/12					10K							6

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DATE FROM TO	TIME OF DAY	DEPTH FEET	01105 ALUMINUM AL,TOT UG/L	71890 MERCURY HG,DISS UG/L	71900 MERCURY HG,TOTAL UG/L
70/03/16			1860		
74/02/12					0.5K
74/03/07	08 55				0.5K
74/04/24					0.5K
74/10/22					5.0K
75/05/12					5.0K

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