WATER QUALITY STATUS REPORT NO. 106

Teton Canyon

Fremont, Madison, and Teton Counties, Idaho

1988-1990

Idaho Department of Health and Welfare
Division of Environmental Quality
Eastern Idaho Regional Office

July 1993

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ABSTRACT

The Teton Canyon study area consists of the drainage which flows into the Teton River between the U. S. Geologic Survey gage station on Teton River mile 56.3 to the mouth of Canyon Creek (USB-234). The drainage is located in portions of Teton, Madison, and Fremont Counties, Idaho. The Teton River was identified in the Agricultural Nonpoint Source Pollution Abatement Plan as a second priority stream segment for the reduction of agriculture related pollutants. Major tributaries in the drainage are Packsaddle Creek, Horseshoe Creek, Leigh Creek, Spring Creek, Badger Creek, Bitch Creek, Milk Creek, and Canyon Creek.

In conjunction with the Teton, Madison, and Yellowstone Water and Soil Conservation Districts, a State agricultural planning study was conducted from October 17, 1988 through May 17, 1990. The objectives of the study were to: 1) document the water quality impact that agricultural practices had on the Teton River and its tributaries; 2) determine the sources of the pollution found in the streams and river; 3) based on the water quality data and analysis, rank each watershed as to the severity of agricultural pollution and; 4) recommend to the Soil and Water Conservation Districts, based on the ranking, areas where pollution control programs would produce the greatest reduction of agricultural water pollution.

Due to continuing dry weather conditions, low soil water content, and lack of a significant storm event, runoff and soil erosion was much less than normal. Much of the spring runoff was retained in the soils and that which did run off flowed slowly with little erosive potential. Some of the streams which have contained water in the past were dry until late in the spring or did not flow.

Data collected during this study showed no indication the beneficial uses in the Teton River were affected by agricultural practices. Suspended sediment concentrations were below 50 mg/l in all but two samples, both from tributaries. Inorganic nitrogen concentrations decreased within the Teton River the further downstream the samples were taken. Of 212 total phosphorus and dissolved ortho-phosphate samples, 15 exceeded recommended levels. Only two of those samples were taken on the Teton River. Fecal bacteria counts were higher than Idaho standards once each at three stations.

The dry weather conditions prevented an accurate assessment of the potential for agriculturally caused pollution and beneficial use impairment. However, agricultural use of the area has the potential to severely degrade water quality. Data collected from a localized rainstorm demonstrated a drastic increase in agriculturally related pollution loads, and soils within the study area have a high water erosion potential.

INTRODUCTION

The Teton Canyon study area is located in the eastern Idaho Counties of Fremont, Madison, and Teton. The area includes all lands within Idaho which drain into the Teton River from the USGS gage located on river mile 56.3 to the mouth of Canyon Creek inclusive (Figures 1 and 2). Major tributaries in the Teton Canyon drainage are Packsaddle Creek, Horseshoe Creek, Leigh Creek, Spring Creek, Bull Elk Creek, Badger Creek, Bitch Creek, Milk Creek, and Canyon Creek.

Milk Creek and Canyon Creek had previous agricultural studies completed in 1986 and 1987 respectfully. The findings on Milk Creek were discussed in a 1988 report from the Idaho Department of Health and Welfare (IDHW) and on Canyon Creek in IDHW, 1987a. Milk Creek and Canyon Creek were included in the Teton Canyon study at the request of the Teton Soil and Water Conservation District since the data in the original studies was collected during drought years and was considered inapplicable to normal water years.

The current protected designated uses of the Teton River (USB-234) are domestic and agricultural water supply, cold water biota, salmonid spawning, and primary and secondary contact recreation. The Teton River is also designated a special resource water by the and is protected as such (IDHW 1987b).

The IDHW (1988b) lists the Teton River and all of the major tributaries in the study area, with the exceptions of Bitch Creek, Milk Creek, and Bull Elk Creek, as "not fully supporting at least one beneficial use". The Teton River from Bitch Creek to the Teton Dam site is listed as not supporting salmonid spawning and cold water biota due to high impacts from dam construction and channelization. The segment from the upstream end of the study to Highway 33 only partially supports salmonid spawning and cold water biota due to loss of riparian habitat and pasture land treatment.

Canyon Creek is listed (IDHW 1988b) as partially supporting salmonid spawning and cold water biota caused by nonirrigated cropland runoff, flow regulation and dam construction. Badger Creek is moderately impacted by nonirrigated cropland runoff resulting in cold water biota and salmonid spawning being only partially supported. Spring Creek is highly affected by flow regulation and riparian removal resulting in only partial support of cold water biota and salmonid spawning.

Leigh Creek is listed as partially supporting cold water biota and salmonid spawning due to non-irrigated crop runoff. Packsaddle Creek is highly affected by flow modification and riparian removal, only partially supporting cold water biota and salmonid spawning (IDHW 1988b).

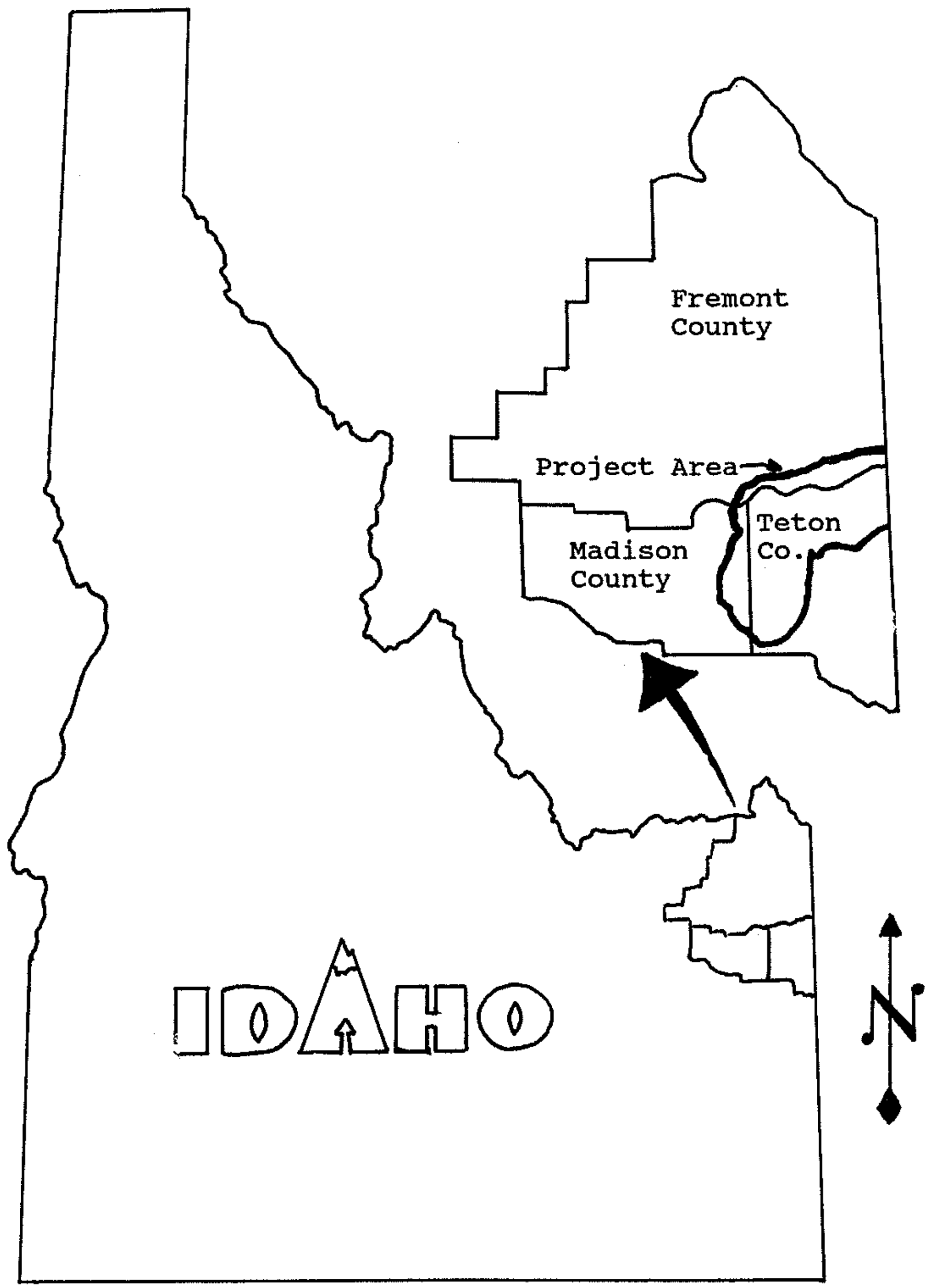

Figure 1. Teton Canyon Project Location

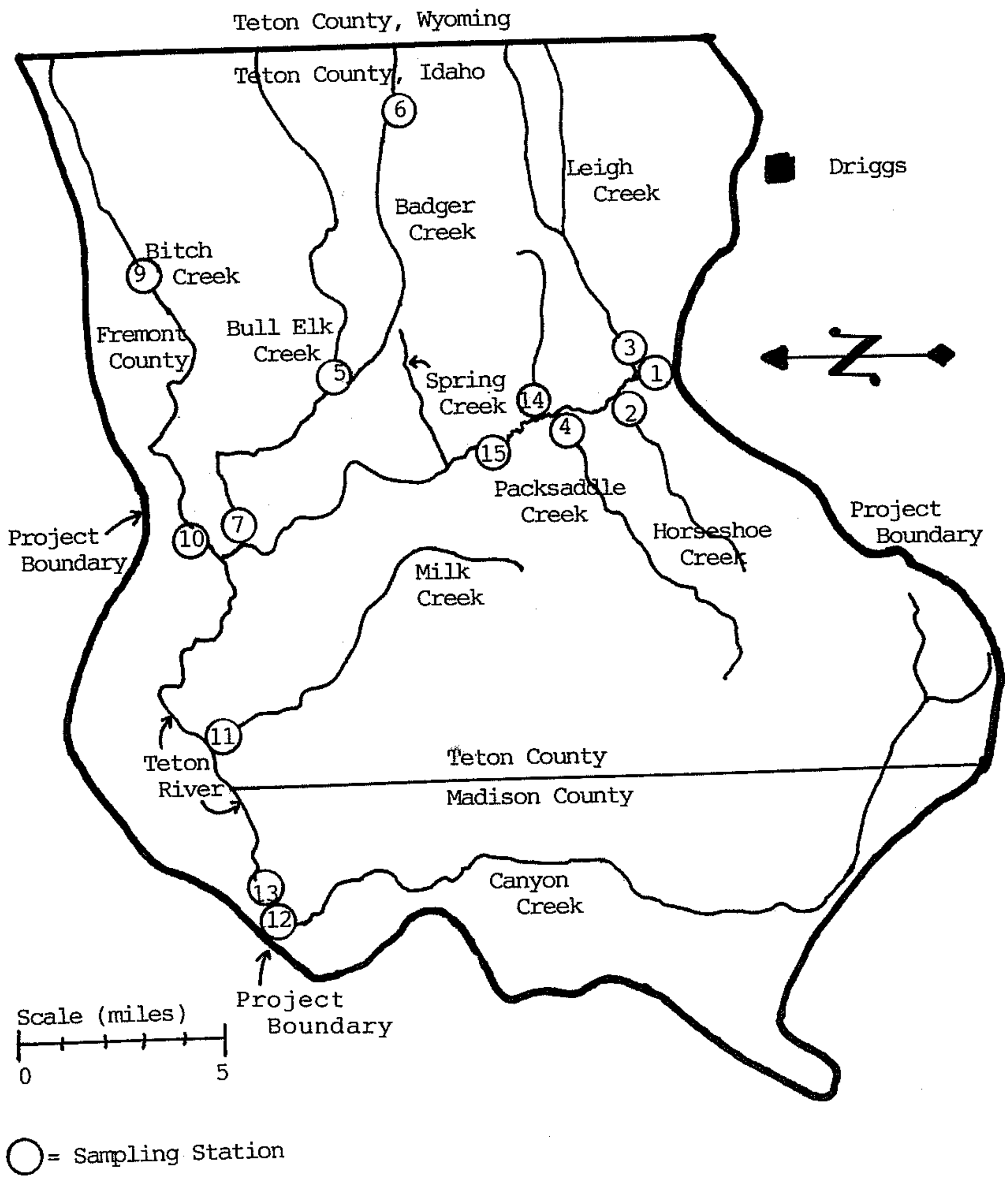

Figure 2. Teton Canyon Watershed

Horseshoe Creek is listed as partially supporting salmonid spawning with the impacts coming from flow modification (IDHW 1988b).

The Teton River from the upper end of the study area to Bitch Creek (Segments 116.00 and 117.00 in part) have been designated as stream segments of concern under the antidegredation plan with agricultural and grazing concerns being the primary purpose for the designation (Dunn 1990). The IDHW (1983) has identified the Teton River as a second priority stream segment with both irrigated and nonirrigated cropland listed as a problem source.

The Teton Canyon watershed contains approximately 182,508 acres. An additional 61,721 acres are located in Teton County, Wyoming. All land in Wyoming is Federally owned and managed by the Forest Service. Of the lands located in Idaho, 124,589 acres are privately owned, 119,440 acres are Federally owned, and 200 acres are State owned. All of the Federal lands are managed for timber, wildlife, grazing and recreational uses.

Private land use is estimated to have 65,000 acres of dryland cropland, 20,000 acres of irrigated cropland and 39,589 acres of range, woodlands, and wildlife lands. The Teton Soil and Water Conservation District (TSWCD) estimates there are 120 operators in the watershed.

The climate of the Teton Canyon area is semi-arid with cool, moist winters and warm, dry summers. Annual precipitation ranges from 15 inches in the lower elevations to over 26 inches in higher elevations. Winter precipitation is mostly in the form of snow with some rainfall in late fall and early spring. Snowpacks of 60 to 70 inches are common in the higher elevations. The frost-free growing season ranges from 90 days in the valleys to 50 days at higher elevations. The average annual temperature is 41 degrees F.

Topography of the study area is characteristic of eastern Idaho with rolling hills and mountainous terrain. Elevations range from 5,100 to over 10,000 feet. Agricultural slopes range from 4 to 30 percent, with woodland and range slopes in excess of 60 percent. All upper portions of the tributaries are used for range and forest. There has been some logging over the past decade. The lower portions are used extensively in a grain-fallow rotation with winter wheat and spring barley being the major dryland crops. Other agricultural uses of the project area are grass pastures, alfalfa, potatoes, and small feedlots.

Four soil associations make up the bulk of the farmed croplands. These soils are highly erodible, especially during spring snow melt and during summer thunderstorms. These soil associations are:

<u>Driggs-Tetonia-Badgerton:</u> Level to gently rolling soils formed in alluvium and loess over gravel or sand. These soils

are found at elevations of 6,000 to 7,000 feet and receive from 13 to 20 inches of precipitation annually. Soil profiles range from 20 to 60 inches with the majority of soils less than 36 inches deep. Farms are comparatively large and irrigated with small grains, potatoes, and hay being the main crops. If irrigation water is unavailable, these lands are dryfarmed for small grains or grazed.

Karlan-Ard-Swanner: Gently sloping to sloping soils formed in loess and residuum over bedrock. These soils are found on uplands with an elevation of 6,000 to 7,000 feet. Average annual precipitation is 12 to 18 inches. Average soil depth is between 20 to 36 inches. Farms are comparatively large and are dryfarmed for small grains.

Lantonia-Tetonia-Rin: Undulating and rolling soils formed in loess on uplands with elevations of 6,000 to 6,400 feet. Precipitation averages 16 to 20 inches annually. Average soil depths are more than 36 inches deep. Farms are comparatively large and are dryfarmed for small grains (USDA 1969).

Recreation and tourism are major sources of income for many of the residents. The Teton basin is nationally known for its fishing, hunting, and scenic vistas. The valley is bounded on the east by the Teton Mountains and the area is bounded on three sides by national forests, hence the aesthetics of the area come under constant scrutiny. The Teton River, Bitch Creek and Badger Creek are nationally known blue ribbon trout fisheries.

The purpose of the Teton Canyon Planning Project was twofold. First, and assessment of the pollution impact on the water quality of the Teton River was conducted. This was done through regular chemical sampling of the Teton River and its tributaries. Second, the sources of pollution on the tributaries were ascertained to determine the areas where the installation of Best Management Practices (BMPs) would produce rapid reduction in the amounts of pollutants delivered to the streams.

MATERIALS AND METHODS

Methods of sample collection, preservation, and analysis followed American Public Health Association methodology (1985), US Environmental Protection Agency guidelines (1979), and US Geological Survey methods (1977). All samples, except bacterial, were collected using a Bel-Art Products sample splitter from which split samples were drawn. Samples were preserved in accordance with the above referenced guidelines and methods, and shipped with ice to keep the temperature in the shipping container as cool as possible. All samples were shipped to the laboratory within 48 hours of collection, except bacterial samples which were delivered to the laboratory within 30 hours of collection.

Samples were collected using cross-composite depth integrated techniques when possible. When this method was impossible to accomplish, samples were collected from the center of the stream at 0.6 depth in an area of complete mixing. Bacterial samples were hand dipped directly into the sample containers.

Sample Stations

Thirteen stations were designated on the Teton River and the main tributaries (Figure 2). These locations were chosen to differentiate pollutant sources entering the streams. Additionally, Station 5 was placed at the mouth of Bull Elk Creek in an effort to determine the pollution impact into Badger Creek from this major drainage. The sample sites, a brief watershed description, STORET numbers, and reasons for their placement are given below and in Table 1.

Station 1. Teton River above Horseshoe Creek. STORET # 2020525. This was the uppermost station on the Teton River and was the baseline data station for the Teton River.

Station 2. Horseshoe Creek at the mouth. STORET # 2080526. Data collected at this site was indicative of the pollution loading from the Horseshoe Creek drainage. Horseshoe Creek has had severe stream and riparian damage in the lower reaches due to past grazing and farming practices. This stream was intermittent during the study.

Station 3. South Leigh Creek at the mouth. STORET # 2080527. The pollution load from the Leigh drainage was measured here. This stream supports riparian growth along its length, although grazing and irrigation diversions threaten the healthy growth. This stream was intermittent during the study.

Station 4. Packsaddle Creek at the mouth. STORET # 2080528. Pollution levels from the Packsaddle drainage was measured here. There is a weak riparian zone along the length of this creek. However, this growth is threatened by irrigation diversions and past farming practices. The stream was intermittent during the time of the study.

Station 5. Bull Elk Creek at the mouth. STORET # 2080529. This station delineated the pollution levels entering Badger Creek from the northern portion of the Badger Creek drainage. The Bull Elk Creek drainage is heavily farmed, and, it was believed, the majority of pollution entering Badger Creek comes from this drainage. There is no appreciable riparian area on Bull Elk Creek due to the intermittent flows present.

Table 1. Sample Sites in the Teton Canyon Study Area

STORET NUMBER	SURVEY ID #	DESCRIPTION	LATITUDE	LONGITUDE	RIVER MILE	ELEVATION (FEET)
2080525	1	TETON RIVER ABOVE HORSESHOE CREEK	43 46 54	111 12 30	324.3/1347.4/32.8/53.5	5960
2080526	2	HORSESHOE CREEK AT THE MOUTH	43 47 05	111 13 00	324.3 1347.4/32.8/54.3/.1	5960
2080527	3	SOUTH LEIGH CREEK AT THE MOUTH	43 47 18	111 12 00	324.3 1347.4/32.8/56.1/1.6	5973
2080528	4	PACKSADDLE CREEK AT THE MOUTH	43 47 22	111 13 12	324.3 1347.4/32.8/55.3/.1	5960
2080529	5	BULL ELK CREEK AT THE MOUTH	43 53 34	111 13 05	324.3 1347.4/32.8/72.2/5.5/.1	5900
2080530	6	BADGER CREEK AT FOREST BOUNDARY	43 51 40	111 02 30	324.3 1347.4/32.8/72.2/16.5	6600
2080531	7	BADGER CREEK AT THE MOUTH	43 55 55	111 16 48	324.3 1347.4/32.8/72.2/.1	5460
2080532	9	BITCH CREEK AT FOREST BOUNDARY	43 57 05	111 08 27	324.3 1347.4/32.8/71.2/10.5	6000
2080533	10	BITCH CREEK AT THE MOUTH	43 55 30	111 17 15	324.3 1347.4/32.8/71.2/.1	5490
2080476	11	MILK CREEK AT THE MOUTH	43 55 17	111 22 45	324.3 1347.4/32.8/58.8/.6	5650
2080511	12	CANYON CREEK AT THE MOUTH	43 54 58	111 27 42	324.3 1347.4/32.8/33.5/.1	5080
2080513	13	TETON RIVER BELOW CANYON CREEK	43 55 00	111 27 58	324.3 1347.4/32.8/33.2	5080
2080534	14	SPRING CREEK AT THE MOUTH	43 49 30	111 13 58	324.3 1347.4/32.8/60.5/.1	5928
2080535	15	TETON RIVER AT HIGHWAY 33	43 47 55	111 13 20	324.3 1347.4/32.8/56.2	5950

Station 6. Badger Creek at the Forest. STORET # 2080530. Badger Creek is one of the three major permanent tributaries to the Teton River. As such, this station was set up to be the baseline data station for the Badger Creek drainage. Only later was it discovered that the total flow of Badger Creek is diverted for irrigation use approximately 1.5 miles below this station. From the diversion to the drop into the Teton Canyon, Badger Creek was intermittent during the length of the study.

Station 7. Badger Creek at the mouth. STORET # 2080531. This station was to have been the lowest station in the Badger Creek watershed. However, during irrigation season, the loss of stream flow allowed measurement of only the spring waters coming from the Teton Canyon. Badger Creek has a healthy riparian system from the headwaters to the diversion. There is old growth from the diversion to the canyon but the lack of constant water sources puts the riparian area in jeopardy.

Station 9. Bitch Creek at the forest. STORET # 2080532. This is the second of the permanent tributaries in the study area. It was determined a baseline station was necessary at the forest to determine the pollution loading from the agricultural lands.

Station 10. Bitch Creek at the mouth. STORET # 2080533. This station measured the total pollution load coming from the Bitch Creek drainage. Agricultural loading was assumed to be the difference between station 9 and station 10. Bitch Creek has a healthy riparian area along its length.

Station 11. Milk Creek at the mouth. STORET # 2080476. This creek did not flow during the length of study.

Station 12. Canyon Creek at the mouth. STORET # 2080511. This is the third permanent tributary in the study area. Since a separate study was conducted in 1986-87, it was determined an upper station was not necessary. This station measured the total pollution load coming from the Canyon Creek drainage. There is a healthy riparian habitat along the length of Canyon Creek.

Station 13. Teton River below Canyon Creek. STORET # 2080513. This station was located on the low end of the study area. Data gathered here represents the total impact of pollution from the Teton drainage. Pollution loading from the study area was assumed to be the results from station 13 minus the results from stations 1 and 9.

Station 14. Spring Creek at the mouth. STORET # 2080534. Data collected here represents the pollution load from the spring creek drainage. The majority of water is from a spring source. The riparian habitat has been severely damaged in the lower segments due to cattle grazing practices.

Station 15. Teton River at HWY 33. STORET # 2080535. This station is located roughly half way between the upper end of the study area and the bottom of the study area. This station was chosen to act as a check on the data collected at station 1. Secondly, this station is located about 1 mile above where the Teton River enters the Teton Canyon. It was concluded this station would give a truer representation of the pollution levels in the river prior to mixing with the spring waters present in the canyon.

The study was designed to monitor water quality during spring and storm runoff events when the maximum influx of nutrients and suspended sediment was expected. Samples were taken on a bi-monthly basis from March through June 1989, and once each month in October and November 1988 and February and July 1989. Additionally, 1 sample run was conducted in February and May 1990 and 2 runs conducted in April 1990.

The determination of total solutes contributed during any one day was based on the assumption that an individual sample was representative of the whole day.

Parameters

Parameters which were sampled and are discussed in this report are shown in Table 2.

Flow

Direct measurement of stream velocity was made with a Marsh McBirney Model 201 or 201D flow meter. Cross sections of the streams were made by measuring the stream to the nearest tenth of a foot and measuring the depth of the stream to the nearest tenth of a foot. Velocities were measured each foot on streams of less than 40 foot width and every two feet on streams greater than 40 feet width. Measurements were taken at 0.6 water depth. Flow data for station 1 was obtained from the USGS, which maintains a flow gage at this site (USGS gage station #13052200).

Flows during runoff at Badger Creek at the forest, the Teton River at HWY 33, and the Teton River below Canyon Creek were difficult to measure due to depth, velocity, and lack of proper equipment. In these situations, the flow was calculated on an area-volume basis as described in IDHW (1991).

Suspended sediment

Suspended sediment are one of the prime indicators of non-point agricultural pollution. Suspended sediment consist of soil particles that are entrained in the water column from three inches above the stream bottom to the top of the water column (Clark 1985).

Table 2. Parameters Sampled

Parameter	Units	STORET No.
Flow	CFS	00061
Suspended Sediment	mg/l	00530
Nutrients		
Total Ammonia as N	mg/l	00610
Total Nitrate + Nitrite as N	mg/l	00630
Total Kjeldahl Nitrogen as N	mg/l	00625
Total Phosphorus as P	mg/l	00665
Dissolved ortho-phosphate as P	mg/l	70507
Bacteria		
Fecal Coliform	colonies/100 ml	31616
Fecal Streptococcus	colonies/100 ml	31679

Nitrogen

Nitrogen is a primary plant nutrient and is applied in various forms to agricultural lands. This study looked at the four most common nitrogen compounds: nitrate, nitrite, ammonia, and total Kjeldahl nitrogen (TKN). Because of the rapid interchangability of nitrate and nitrite, these compounds were analyzed together as nitrate + nitrite. TKN was used to determine the amount of organic nitrogen present in a sample. The TKN method does not distinguish between organic and ammonia nitrogen compounds. An estimate of the total amount of organic nitrogen present is made by subtracting the concentration of ammonia from the TKN concentration.

Phosphorus

Phosphorus is another of the primary plant nutrients. The most common use of phosphorus is as a fertilizer although some pesticides are phosphorus based. Most phosphorus is tightly bound with soil particles making them unavailable for plant uptake. However, a small portion becomes water soluble as dissolved ortho-phosphate. Dissolved ortho-phosphate is that form of phosphorus which is available for plant uptake.

Bacteria

Two bacterial parameters were sampled during the study. Fecal coliform and fecal streptococcus are monitored to determine livestock and/or human waste impacts. Both analyses are reported in terms of numbers of colonies per 100 ml of sample. A ratio of the fecal coliform to the fecal streptococcus colonies can be used to determine the source of the contamination (APHA 1985). Bacterial samples were collected in sterile 250 ml nalgene bottles.

QUALITY ASSURANCE

Split samples were collected each sampling date from the Teton River at HWY 33 to measure sampling precision. The chemical samples were divided with the Bel-Art churn splitter. Average relative ranges were calculated according to Bauer et al. (1986).

Spiked field samples were used to determine accuracy. The IDHW Bureau of Laboratories supplied spikes which were added to 900 ml of sample water. Spiked samples were analyzed for suspended sediment, nitrate + nitrite, TKN, ammonia, total phosphorus, and dissolved ortho-phosphate. A sampling site was randomly selected for spiking each sampling run. Percent recovery is determined by subtracting the values of the unspiked sample from the known amount in the spike.

Two other tests were conducted to assure the samples and analytical tests were accurate. The IDHW, Bureau of Laboratories in Boise ran a blank composed of distilled water to check for contamination in their instrumentation. These blanks were made of distilled water at the laboratory and carried by field personnel during sampling runs. Any readings above laboratory detection levels are considered contaminants.

Dissolved ortho-phosphate samples were filtered in the field. A sample from each batch of filters was tested for ortho-phosphate content prior to that batch being used to filter a field sample.

Field instruments were calibrated to standards in accordance with manufacturers instructions. The instruments were calibrated immediately prior to beginning a sampling run.

RESULTS AND DISCUSSION

FLOW

The Teton Canyon drainage is subject to extremes in flows. The highest flows recorded in the drainage occur during spring runoff prior to irrigation season. During irrigation season, flow is diverted from the Teton River and Canyon, Badger, Packsaddle, and Horseshoe Creeks. Since there are no major impoundments within the drainage, flows decrease as irrigation demands increase and runoff declines. The lowest flows were recorded in the winter months when most of the precipitation was retained in mountain snowpacks (Appendix 1).

Badger Creek is completely diverted about 1 mile below the forest boundary. Flows recorded at the mouth are a combination of spring sources within the canyon, overland runoff, and input from Elk Creek. During 1987, irrigation diversions from Canyon Creek accounted for 89% of the flow above the diversion (IDHW 1987a). Smaller diversions are located on Horseshoe and Packsaddle Creeks.

The amount of water originating from the watershed was smaller than normal due to the third low precipitation year in a row. Milk Creek did not have a flow during the study. Canyon Creek which had average flows at the mouth of 93.3 cubic feet per second (CFS) in 1987 had an average flow of 39.1 CFS in 1988-1990. Continuation of dry conditions in 1990 resulted in lower flows in all of the streams than were recorded in 1988-1989.

Dry soil conditions due to the lack of rainfall allowed the precipitation to infiltrate into the ground instead of flowing overland into the streams. Spring Creek, a perennial stream due to springs at the headwaters, had no flow at the mouth until May when the soil profile became saturated.

SUSPENDED Sediment

Suspended sediment directly affect the beneficial uses of a stream. High levels of sediment can settle into salmonid spawning areas smothering fry and smolt. Interstitial spaces which provide protection and habitat for macroinvertebrates can be filled in resulting in stream armoring, reduced biodiversity, and reduced food supply for fish. Heavy concentrations of suspended sediment reduce vision in foraging fish and abrade the gills.

There is no accepted instream water quality standard to compare suspended sediment results with, but for the purpose of comparison the EPA Water Quality Index (EPA-WQI) guidelines will be used (EPA 1983). The index uses the following scale to rate the effects of suspended sediment in streams:

0-80 mg/l No impact
81-500 mg/l Moderately polluted
Over 500 mg/l Severely polluted

Dry weather conditions over the length of the study had the greatest influence on suspended sediment concentrations. Suspended sediment concentrations are directly related to the force of a water flow on exposed soils. With the dry conditions experienced throughout the study, suspended sediment concentrations were abnormally low.

Using the EPA-WQI, only two of 102 samples had sediment concentrations in the polluted categories. Canyon Creek, on March 13, 1989, had a suspended sediment concentration of 1032 mg/l, and on April 23, 1990 Horseshoe Creek had a concentration of 104 mg/l. Field notes state the weather on March 13, 1989 was cold and raining lightly. This storm was localized in the Canyon Creek drainage. The result obtained at Horseshoe Creek was due to spring runoff.

NUTRIENTS

Nitrogen

Nitrates, nitrites, and ammonia are considered inorganic nitrogen compounds. A concentration of 0.3 mg/l total organic nitrogen is the recommended limit for the prevention of nuisance aquatic vegetation (Mackenthun 1973). These inorganic compounds are water soluble with high concentrations being found in waters with high debris breakdown, near fertilizer application sites, animal feedlots and pastures, and near legume crops, especially after the plow out of alfalfa fields (Clark 1985).

Sampling data shows the Teton River receives the majority of inorganic nitrogen from above the study area (Appendix 1). Inorganic nitrogen concentrations actually decrease when the upper Teton River station is compared with the Highway station and when the highway station is compared with the lower station.

Using the formula:

Load (pounds/day)= Flow (CFS) * Concentration (mg/l) * 5.4

a determination of the load of inorganic nitrogen transported can be estimated. This estimation can then be used on the river stations to estimate the amount of inorganic nitrogen transported through the system. These loading figures (Table 3) show the amount of inorganic nitrogen transported through the watershed remains relatively constant from the upper Teton River station to the lower station.

In comparing the inorganic nitrogen concentrations to the loads transported at these stations, it is apparent the majority of the inorganic nitrogen came from upstream sources and was transported through the system. Little inorganic nitrogen was retained within the study area, and little was added to the water by the streams within the study area. The reduction in inorganic nitrogen concentration in the River is due to the addition of low nitrogen waters from springs and streams diluting the higher nitrogen waters entering from above the study area.

Of the tributaries, Badger Creek at the mouth consistently exceeded the recommended inorganic nitrogen levels. The inorganic nitrogen concentrations on Badger Creek at the forest are all well below the recommended limits. This is the most intensely farmed of the subwatersheds. The addition of nitrogen fertilizers is the most likely source of nitrogen found in Badger Creek.

Canyon Creek and Bitch Creek at the mouth exceeded inorganic nitrogen levels on one sampling run each. The data does not indicate that there is a long term problem with inorganic nitrogen at either of these stations.

Ammonia standards are set by the IDHW (1987b). These standards are based upon toxicity to fish and are modified by the water temperature and pH. Ammonia standards were not exceeded at any station at any station.

Natural (unpolluted) waters normally exhibit total Kjeldahl Nitrogen (TKN) values between 0.05 and 2.0 mg/l (Mackenthun 1973). Canyon Creek, on March 13, 1989, was the only station to exceed the recommended level. There was a localized storm in the area on that date which may have washed organic nitrogen into the stream.

<u>Phosphorus</u>

Total phosphorus and dissolved ortho-phosphate were sampled at each of the stations. Total phosphorus includes all forms of phosphorus. Most of this phosphorus is bound to soil particles and is unavailable to the plants. Total phosphorus levels are expected to increase as the sediment concentrations increase. Dissolved

Table 3. Inorganic Nitrogen Loads in the Teton River (lbs/day)

DATE	Upstream Sta.	Highway Sta.	Downstream Sta.
10/25/88	420	310	N/S
11/28/88	540	520	N/S
2/27/89	1,700	1,300	N/S
3/13,14/89	670	1,200	44
3/27,28/89	580	710	1,300
4/10,11/89	1,300	940	1,200
4/25,26/89	2,200	1,800	1,800
5/30,31/89	970	1,200	1,200
6/12,13/89	1,300	550	1,100
7/24,25/89	1,100	1,400	2,300
5/11,12/90	530	560	1,500
5/22,23/90	760	490	1,100

N/S= No sample

ortho-phosphate is that form which is dissolved in the water column and available for plant uptake. Mackenthun (1973) recommends total phosphorus levels no higher than 0.1 mg/l, and dissolved ortho-phosphate levels of less than 0.025 mg/l.

Total phosphorus concentrations, based on the suspended sediment concentrations, were expected to be low. Streams with exposed soil banks and mass wasting are expected to have higher total phosphorus levels than stable streams. The data collected showed this was the case.

Horseshoe and Bull Elk Creeks were above the recommended levels during spring runoff of 1990. Both of these streams have soil bottoms and exposed banks.

The Teton River station at the highway had a total phosphorus concentration of 0.11 on April 12, 1990. The high reading is due to overland runoff which contributed over 70 pounds per day of phosphorus to the Teton River between the upper station and the highway station. This level was diluted to below recommended levels prior to reaching the lower station.

The recommended level was also exceeded at Canyon Creek on March 13, 1989. The levels were elevated by runoff and erosion caused by the localized storm.

Dissolved ortho-phosphate is the more important of the phosphorus types sampled for. Since this form of phosphorus is available for plant use, it has the potential for allowing rapid plant growth and associated beneficial use degradation. The most immediate effect of dissolved ortho-phosphate in high levels is rapid aquatic plant growth. Therefore, in intermittent streams the plant growth would not occur due to a lack of water. However, the intermittent streams generally have the highest dissolved ortho-phosphate levels and this can affect the growth of aquatic plants in the permanent receiving streams.

The highest dissolved ortho-phosphate levels were on the intermittent streams during spring runoff. Bull Elk, Packsaddle, and Spring Creeks all exceeded the 0.025 mg/l recommended level. The flows within the receiving streams were great enough that the elevated levels were diluted to below levels of concern on all but one occasion.

On May 31, 1989, dissolved ortho-phosphate levels reached 0.097 mg/l in the Teton River at the highway. Readings on the same date at the upper station were 0.006 mg/l. Loading calculations at the upper station show 15.9 pounds/day came from above the project area with the streams between the upper Teton River station and the highway station contributing 8.36 pounds/day, yet the highway station had a loading rate of 283 pounds/day. This indicates direct input flows between the upper station and the highway station contributed the majority of dissolved ortho-phosphate to the Teton River.

BACTERIA

The Teton River is protected for primary and secondary contact recreation (IDHW 1987b). As such, the fecal coliform count shall not exceed 500 and 800 colonies respectively per 100 ml of sample from May 1 through September 30 of each calendar year. During data condensation, the regulatory standards were applied to the tributaries and the date deadlines were deleted so comparisons could be made to standards throughout the year on all of the waterways.

Primary and secondary fecal coliform standards were exceeded three times. Bull Elk Creek had a count of 19,000 colonies/100 ml on June 13, 1989, Spring Creek had 2,200 colonies/100 ml on July 24, 1989, and the Teton River at the highway had a count of 930 colonies/100 ml on May 31, 1989.

Fecal coliform-fecal streptococcus ratios were calculated on all samples (Appendix 1). Samples which contained fewer than 100 colonies were considered to have too few colonies to obtain a significant ratio. These samples are assumed to have livestock as the main source of bacteria. A coliform/streptococcus ratio of less than 0.7 indicates livestock sources, 0.71 to 4.1 indicates a mix of livestock and human sources, and a ratio greater than 4.1 indicates humans are the source.

Of the 114 samples, all but 6 had ratios and/or bacterial counts which indicated the source was livestock. Four ratios showed livestock/human mixes, and two indicated human sources. Since the samples which showed human/livestock mix were evenly distributed among the sample sites with one each on the Teton River at the highway and Leigh, Horseshoe, and Spring Creeks, the concern the samples actually represent long term human contamination is unfounded.

It should be noted that the sample taken on Bull Elk Creek on June 13, 1989 had a high indication that the source was human and a high fecal coliform count, yet there is no human habitation within 1/4 mile of the creek. The February 1989 sample from the Teton River also shows human contamination, but again, there is no home within 1/2 mile of the station.

QUALITY ASSURANCE

Table 5 shows the average relative range for the precision of the split samples. The precision of all of the parameters except suspended sediment was excellent. Suspended sediment precision was good.

Table 4. Teton Canyon Precision Samples

PARAMETER	N	RANGE (%)
Suspended Sediment	13	14.7
Total Nitrate + Nitrite	11	2.3
Total Ammonia	11	8.0
Total Kjeldahl Nitrogen	14	8.2
Total Phosphorus	12	1.6
Dissolved ortho-phosphate	14	8.6

Table 5. Teton Canyon Accuracy Samples.

PARAMETER	N	AVE. % RECOVERY	95% CL
Suspended Sediment	11	95.8	± 9.1
Total Nitrate + Nitrite	10	93.9	±11.5
Total Ammonia	11	105.3	± 4.7
Total Kjeldahl Nitrogen	10	83.0	±12.5
Total Phosphorus	10	117.6	± 9.1
Dissolved ortho-phosphate	9	93.2	± 3.8

The accuracy of the spiked samples was excellent for all parameters except for nitrate + nitrite and TKN. Nitrite + nitrite and TKN accuracy is in the good category (Table 6).

The blank results indicate a minor problem with the nitrogen compounds (Table 7). This may be due to the distilling process in the laboratory where the ammonia and volatile nitrogen compounds are volatilized off and incorporated in the blank. During the holding time involved in the sampling run, some of the volatile nitrogen compounds may evolve into nitrates and nitrites.

The TKN results may be due to the testing procedure which converts organic nitrogen into ammonia. The TKN sample results are actually a measurement of total ammonia in the sample where the actual TKN readings are the TKN results minus the ammonia results. Therefore, the TKN results may be due, in part, to the ammonia in the distilled water. Other sources of contamination may be the materials used in the manufacture of the cubitainer, sampling procedures, or residual in the testing equipment.

Results of the ortho-phosphate testing conducted on the filters indicated no contamination in the field filters.

CONCLUSIONS AND RECOMMENDATIONS

The most important variable during the study was the continuation of drought-like conditions. The results did not indicate the true potential for agricultural impacts on the water quality and beneficial uses due to the dry conditions.

Sampling results on the Teton River at the lower station show the cumulative water quality impact of the watershed drainage. On no sampling date did suspended sediment, ammonia, TKN, total phosphorus, dissolved ortho-phosphate, or bacteria levels exceed regulatory or recommended limits.

Nitrate + nitrite levels were consistently over recommended levels at the lower Teton River station. However, if the nitrate + nitrite loads at the upper station were subtracted from the loads at the lower station, the input from the watershed is minimal.

Although the water quality sampling does not show any impact on the beneficial use of the receiving stream (the Teton River), agriculture has the potential to severely degrade water quality. Soils within the area have high water erosion potentials. Sampling conducted on Canyon Creek during a light localized rain event raised sediment levels to over twice what is recommended as severely polluted water. Nutrients loads had a corresponding rise with concentrations of TKN and total phosphorus exceeding recommended levels.

Table 6. Teton Canyon Blank Sample Results (mg/l)

			PARAMETER			
DATE	SS	NO2 + NO3	NH3	TKN	TP	D-O-PHOS.
3/1/89	ND	0.090	0.064	ND	ND	ND
3/28/89	ND	0.010	0.048	ND	ND	ND
4/27/89	ND	0.008	0.051	ND	ND	ND
7/26/89	2	0.015	0.022	ND	ND	ND
4/12/90	N/S	ND	0.021	0.12	ND	N/S
4/26/90	N/S	ND	0.033	ND	ND	N/S
AVERAGE RECOVERED	0.5	0.021	0.040	0.02	ND	ND

ND= None Detected
N/S= Not Sampled

Although the extremely dry weather pattern prevented the study from determining the "normal" agricultural pollution inputs, the study was able to determine the areas which have the greatest potential for degrading water quality. These areas are, in order of highest potential to least potential:

1) Direct flow area from the upper Teton River station to the Teton River Highway station,
2) Canyon Creek drainage,
3) Milk Creek drainage,
4) Direct flow area from the Teton River Highway station to the bottom of the study area,
5) Horseshoe Creek drainage,
6) Packsaddle Creek drainage,
7) Bull Elk Drainage,
8) Badger Creek Drainage,
9) Bitch Creek drainage, and
10) Spring Creek drainage.

The above priority ranking is based upon a low water year and may not represent normal pollution loadings. Because of the dry weather during the study, it is thought the pollutant concentrations and loading represent minimum conditions. Priority should be given to the segments listed first when considering implementing agricultural best management practices.

ACKNOWLEDGEMENTS

We express our gratitude to those who made this report possible. Employees, board members, and district conservationists of the Madison, Teton, and Yellowstone Soil and Water Conservation Districts, Kathy Weaver of the Idaho Soil Conservation Commission, and the area Soil Conservation Service.

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Appendix 1

Teton Canyon Water Quality Data

STORET RETRIEVAL DATE 92/11/10 PGM=ALLPARM

2080525
43 46 54.0 111 12 30.0 2
TETON R AB HORSESHOE CK
16081 IDAHO TETON
PACIFIC NORTHWEST 130600
UPPER SNAKE
21IDSURV 910202 17040204
0000 FEET DEPTH 5960 METERS ELEVATION

/TYPA/AMBNT/STREAM

			88/10/25	88/11/28	89/02/27	89/03/14	89/03/28	89/04/10	89/04/26	89/05/31	89/06/13
INITIAL TIME			1225	1315	1330	1020	0930	1715	0915	0930	1330
MEDIUM			WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00010 WATER	TEMP	CENT		1.0	.9	.1	3.0	7.1	5.4	6.8	10.3
00011 WATER	TEMP	FAHN		33.8$	33.6$	32.2$	37.4$	44.8$	41.7$	44.2$	50.5$
00025 BAROMTRC	PRESSURE	MM OF HG				.9					
00061 STREAM	FLOW,	INST-CFS	140	150	200	170	160	260	460	490	520
00076 TURB	TRBIDMTR	HACH FTU	.4	1.8	8.4	12.0	5.1	8.5	14.0	5.6	4.5
00095 CNDUCTVY	AT 25C	MICROMHO	353	576	398	339	352	346	286	272	263
00116 INTNSVE	SURVEY	IDENT	881615	881615	881615	881615	881615	881615	881615	881615	881615
00300 DO		MG/L			10.9	12.4	13.6	15.0	11.6	11.4	12.2
00301 DO	SATUR	PERCENT			77.0$	84.7$	101.0$	122.7$	90.9$	93.4$	107.9$
00400 PH		SU		6.80	8.70			8.37			7.76
00530 RESIDUE	TOT NFLT	MG/L			30	36					
00610 NH3+NH4-	N TOTAL	MG/L	.010	.092	.346	.440	.096	.048	.036	.025	.035
00612 UN-IONZD	NH3-N	MG/L		.00005$	.015$			.002$			.0004$
00619 UN-IONZD	NH3-NH3	MG/L		.00006$	.018$			.002$			.0005$
00625 TOT KJEL	N	MG/L	.170	.440	.800		.700	.650	.460	.410	.270
00630 NO2&NO3	N-TOTAL	MG/L	.55	.58	.75	.62	.58	.87	.86	.34	.43
00665 PHOS-TOT		MG/L P	.050K	.050K	.060	.050K	.070	.080	.070	.060	.060
00671 PHOS-DIS	ORTHO	MG/L P	.001K	.003	.015	.006	.001K	.008	.015	.006	.001K
31616 FEC COLI	MFM-FCBR	/100ML	1	4		10K	10	1K	40	240	58
31679 FECSTREP	MF M-ENT	/100ML	3	96		250	360	20	90	420	110
74041 WQF	SAMPLE	UPDATED	910211	910211	910211	910227	910314	910211	910314	910227	910211
80154 SUSP SED	CONC	MG/L	4	12			28	68	54	24	20
82028 RATIO	FEC COL	FEC STRP	.3$	.04$		.04$	.03$	.05$	.4$	.6$	.5$

INITIAL DATE			89/07/24	90/02/20	90/04/12	90/04/23	90/05/17
INITIAL TIME			1320	1410	0900	0920	0934
MEDIUM			WATER	WATER	WATER	WATER	WATER
00010 WATER	TEMP	CENT	18.4		8.2	7.5	9.2
00011 WATER	TEMP	FAHN	65.1$		46.8$	45.5$	48.6$
00061 STREAM	FLOW,	INST-CFS	370	110	160	190	310
00076 TURB	TRBIDMTR	HACH FTU	1.0	3.9	4.7	5.8	
00095 CNDUCTVY	AT 25C	MICROMHO	328	336	367	324	
00116 INTNSVE	SURVEY	IDENT	881615	881615	881615	881615	881615
00300 DO		MG/L	6.3	14.1	10.5	9.9	11.9
00301 DO	SATUR	PERCENT	66.1$		88.2$	81.0$	102.5$

(SAMPLE CONTINUED ON NEXT PAGE)

2080525
43 46 54.0 111 12 30.0 2
TETON R AB HORSESHOE CK
16081 IDAHO TETON
PACIFIC NORTHWEST 130600
UPPER SNAKE
21IDSURV 910202 17040204
0000 FEET DEPTH 5960 METERS ELEVATION

/TYPA/AMBNT/STREAM

(SAMPLE CONTINUED FROM PREVIOUS PAGE)

INITIAL DATE				89/07/24	90/02/20	90/04/12	90/04/23	90/05/17
INITIAL TIME				1320	1410	0700	0920	0934
MEDIUM				WATER	WATER	WATER	WATER	WATER
00400	PH		SU	7.49	8.13	8.25	7.90	7.60
00610	NH3+NH4-	N TOTAL	MG/L	.022	.054	.037	.032	
00612	UN-IONZD	NH3-N	MG/L	.0002$		.001$	.0004$	
00619	UN-IONZD	NH3-NH3	MG/L	.0003$		.001$	.0005$	
00625	TOT KJEL	N	MG/L	.260	.190	.560	.300	
00630	NO2&NO3	N-TOTAL	MG/L	.52	.95	.58	.44	
00665	PHOS-TOT		MG/L P	.050K	.030K	.070	.048	
00671	PHOS-DIS	ORTHO	MG/L P	.001K	.009	.017	.015	
00900	TOT HARD	CACO3	MG/L		220	208		
31616	FEC COLI	MFM-FCBR	/100ML	20	2	140		10
31679	FECSTREP	MF M-ENT	/100ML	27	1	330		61
74041	WQF	SAMPLE	UPDATED	910314	910227	910227	910227	910419
80154	SUSP SED	CONC	MG/L	14	2	16	26	
82028	RATIO	FEC COL	FEC STRP	.7$	2$	.4$		.2$

27

2080526
43 47 50.0 111 13 00.0 2
HORSESHOE CK @ MOUTH
16081 IDAHO TETON
PACIFIC NORTHWEST 130600
UPPER SNAKE
21IDSURV 900908 17040204
0000 FEET DEPTH 5960 METERS ELEVATION

/TYPA/AMBNT/STREAM

INITIAL DATE				89/04/26	89/05/31	89/06/13	90/04/12	90/04/23	90/05/16
INITIAL TIME				0900	0715	1310	0820	0910	1553
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER
00010	WATER	TEMP	CENT	1.8	4.9	16.0	4.3	4.2	10.1
00011	WATER	TEMP	FAHN	35.2$	40.8$	60.8$	39.7$	39.6$	50.2$
00061	STREAM	FLOW,	INST-CFS	21	15	5	4	13	11
00076	TURB	TRBIDMTR	HACH FTU	18.0	5.5	12.0	16.0	33.0	
00095	CNDUCTVY	AT 25C	MICROMHO	253	272	298	310	240	
00116	INTNSVE	SURVEY	IDENT	881615	881615	881615	881615	881615	881615
00300	DO		MG/L	14.4	12.4	10.6	9.4	11.8	10.2
00301	DO	SATUR	PERCENT	104.0$	96.6$	106.2$	71.5$	90.4$	90.4$
00400	PH		SU	7.43		8.22	8.53	8.07	7.51
00530	RESIDUE	TOT NFLT	MG/L	56	32	42	52	104	
00610	NH3+NH4-	N TOTAL	MG/L	.039	.011	.036	.020	.022	
00612	UN-IONZD	NH3-N	MG/L	.0001$		.002$	.0008$	.0003$	
00619	UN-IONZD	NH3-NH3	MG/L	.0001$		.002$	.0009$	.0004$	
00625	TOT KJEL	N	MG/L	.320	.330	.270	.350	.599	
00630	NO2&NO3	N-TOTAL	MG/L	.10	.007	.003	.005K	.02	
00665	PHOS-TOT		MG/L P	.080	.050	.090	.130	.128	
00671	PHOS-DIS	ORTHO	MG/L P	.006	.006	.001K	.010	.005K	.007
00900	TOT HARD	CACO3	MG/L				168		
31616	FEC COLI	MFM-FCBR	/100ML	20	8	420	3	19	1
31679	FECSTREP	MF M-ENT	/100ML	30	26	300	87	75	25
74041	WQF	SAMPLE	UPDATED	910227	910227	910211	910227	910227	910419
82028	RATIO	FEC COL	FEC STRP	.7$	.3$	1$	.03$	.3$	.04$

2080527
43 47 18.0 111 12 00.0 2
S LEIGH CK @ MOUTH
16081 IDAHO TETON
PACIFIC NORTHWEST 130600
UPPER SNAKE
21IDSURV 910202 17040204
0000 FEET DEPTH 5973 METERS ELEVATION

/TYPA/AMBNT/STREAM

INITIAL DATE				89/04/25	89/05/31	89/06/13	89/07/24
INITIAL TIME				1845	1000	1345	1430
MEDIUM				WATER	WATER	WATER	WATER
00010	WATER	TEMP	CENT	6.9	6.8	11.3	15.7
00011	WATER	TEMP	FAHN	44.4$	44.2$	52.3$	60.3$
00061	STREAM	FLOW,	INST-CFS	10	2	10	6
00076	TURB	TRBIDMTR	HACH FTU		.2	1.2	.6
00095	CNDUCTVY	AT 25C	MICROMHO		188	195	266
00116	INTNSVE	SURVEY	IDENT	881615	881615	881615	881615
00300	DO		MG/L	12.6	8.8	10.7	7.2
00301	DO	SATUR	PERCENT	103.1$	72.0$	96.5$	72.4$
00400	PH		SU	7.03		6.96	7.04
00530	RESIDUE	TOT NFLT	MG/L		2	2	12
00610	NH3+NH4-	N TOTAL	MG/L		.012	.024	.015
00612	UN-IONZD	NH3-N	MG/L			.00004$	.00005$
00619	UN-IONZD	NH3-NH3	MG/L			.00005$	.00006$
00625	TOT KJEL	N	MG/L		.250	.110	.100
00630	NO2&NO3	N-TOTAL	MG/L		.03	.09	.02
00665	PHOS-TOT		MG/L P		.050K	.050K	.050K
00671	PHOS-DIS	ORTHO	MG/L P		.001K	.001K	.001K
31616	FEC COLI	MFM-FCBR	/100ML	10K	28	30	82
31679	FECSTREP	MF M-ENT	/100ML	40	89	120	125
74041	WQF	SAMPLE	UPDATED	910211	910211	910227	910227
82028	RATIO	FEC COL	FEC STRP	.3$	.3$	.3$	.7$

2080528
43 47 22.0 111 13 12.0 2
PACKSADDLE CK @ MOUTH
16081 IDAHO TETON
PACIFIC NORTHWEST 130600
UPPER SNAKE
21IDSURV 900908 17040204
0000 FEET DEPTH 5960 METERS ELEVATION

/TYPA/AMBNT/STREAM

INITIAL DATE				89/04/26	89/05/31	89/06/13	89/06/26	90/04/12	90/04/23	90/05/16
INITIAL TIME				0845	0845	1245	1935	0840	0845	1607
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER	WATER
00010	WATER	TEMP	CENT	1.8	4.8	10.6	14.2	2.8	4.0	9.5
00011	WATER	TEMP	FAHN	35.2$	40.6$	51.1$	57.6$	37.0$	39.2$	49.1$
00061	STREAM	FLOW,	INST-CFS	11	36	20	1	3	5	13
00076	TURB	TRBIDMTR	HACH FTU	4.6	5.5	4.2	2.0	1.5	3.4	5.0
00095	CNDUCTVY	AT 25C	MICROMHO	147	81	103	125	184	157	116
00116	INTNSVE	SURVEY	IDENT	881615	881615	881615	881615	881615	881615	881615
00300	DO		MG/L	15.1	12.4	11.2	8.2	12.9	12.1	9.8
00301	DO	SATUR	PERCENT	109.1$	97.2$	100.5$	78.8$	95.6$	92.2$	84.7$
00400	PH		SU	7.04		7.16	6.91	8.42	7.86	7.58
00530	RESIDUE	TOT NFLT	MG/L	14	2	4	2	2K	10	18
00610	NH3+NH4-	N TOTAL	MG/L	.039	.053	.019	.013	.017	.027	.009
00612	UN-IONZD	NH3-N	MG/L	.00004$		.00005$	.00003$	.0005$	.0002$	.00006$
00619	UN-IONZD	NH3-NH3	MG/L	.00005$		.00006$	.00003$	.0006$	.0003$	.00007$
00625	TOT KJEL	N	MG/L	.160	.180	.070	.060	.090	.050K	.110
00630	NO2&NO3	N-TOTAL	MG/L	.06	.04	.002	.001K	.005K	.009	.005K
00665	PHOS-TOT		MG/L P	.050K	.050K	.050K	.050K	.060	.053	.050K
00671	PHOS-DIS	ORTHO	MG/L P	.016	.030	.001K	.001K	.033	.027	.015
00900	TOT HARD	CACO3	MG/L					104		
31616	FEC COLI	MFM-FCBR	/100ML	8	7	3	66	47	13	1
31679	FECSTREP	MF M-ENT	/100ML	3	9	19	150	30	32	12
74041	WQF	SAMPLE	UPDATED	910227	910227	910211	910211	910227	910227	910419
82028	RATIO	FEC COL	FEC STRP	3$	.8$	.2$	.4$	2$	.4$	.08$

2080529
43 53 34.0 111 13 50.0 2
BULL ELK CK @ MOUTH
16081 IDAHO TETON
PACIFIC NORTHWEST 130600
/TYPA/AMBNT/STREAM UPPER SNAKE
21IDSURV 900908 17040204
0000 FEET DEPTH 5900 METERS ELEVATION

INITIAL DATE				89/04/25	89/05/31	89/06/13	90/04/11	90/04/22	90/05/16
INITIAL TIME				1845	1215	0830	1655	1525	1440
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER
00010	WATER	TEMP	CENT	6.9	10.3	8.2	10.7	7.9	11.4
00011	WATER	TEMP	FAHN	44.4$	50.5$	46.8$	51.3$	46.2$	52.5$
00061	STREAM	FLOW,	INST-CFS	10	11	3	3	29	2
00076	TURB	TRBIDMTR	HACH FTU	12.0	3.8	2.5	9.5	17.0	4.5
00095	CNDUCTVY	AT 25C	MICROMHO	54	45	69	68	30	53
00116	INTNSVE	SURVEY	IDENT	881615	881615	881615	881615	881615	881615
00300	DO		MG/L	12.6	11.1	9.1	8.2	11.7	9.9
00301	DO	SATUR	PERCENT	103.1$	98.1$	76.6$	73.4$	98.3$	89.0$
00400	PH		SU	7.03		7.08	9.14	8.54	7.88
00530	RESIDUE	TOT NFLT	MG/L	24	8	2	2	56	12
00610	NH3+NH4-	N TOTAL	MG/L	.019	.048	.041	.032	.038	.029
00612	UN-IONZD	NH3-N	MG/L	.00003$		.00008$	.007$	.002$	.0004$
00619	UN-IONZD	NH3-NH3	MG/L	.00004$		.00010$	.008$	.002$	.0005$
00625	TOT KJEL	N	MG/L	.240	.230	.290	.180	.329	.130
00630	NO2&NO3	N-TOTAL	MG/L	.58	.06	.03	.51	.14	.005K
00665	PHOS-TOT		MG/L P	.070	.050K	.060	.130	.118	.050K
00671	PHOS-DIS	ORTHO	MG/L P	.029	.017	.026	.041	.041	.015
00900	TOT HARD	CACO3	MG/L				48		
31616	FEC COLI	MFM-FCBR	/100ML	10K	11	19000	16	70	20
31679	FECSTREP	MF M-ENT	/100ML	40	32	860	240	710	41
74041	WQF	SAMPLE	UPDATED	910227	910211	910227	910314	910227	910419
82028	RATIO	FEC COL	FEC STRP	.3$	.3$	22$	.07$	.10$	.5$

2080530
43 52 01.0 111 02 30.0 2
BADGER CK @ ~~MOUTH~~ FOREST BOUNDARY
16065 IDAHO MADISON
PACIFIC NORTHWEST 130600
UPPER SNAKE
21IDSURV 910209 17040204
0000 FEET DEPTH 6600 METERS ELEVATION

/TYPA/AMBNT/STREAM

				89/04/25	89/05/31	89/06/13	89/07/24	90/02/20	90/04/11	90/04/23	90/05/16
INITIAL TIME				1915	1230	1130	1715		1615	1030	1504
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00010	WATER	TEMP	CENT	4.4	6.5	6.9	20.5	.7	6.1	3.7	7.1
00011	WATER	TEMP	FAHN	39.9$	43.7$	44.4$	68.9$	33.3$	43.0$	38.7$	44.8$
00061	STREAM	FLOW,	INST-CFS	130	130	93	10	2	72	120	62
00076	TURB	TRBIDMTR	HACH FTU	6.5	1.6	2.0	.8	1.0A	7.6	7.1	3.0
00095	CNDUCTVY	AT 25C	MICROMHO	36	35	39	66	81A	49	31	40
00116	INTNSVE	SURVEY	IDENT	881615	881615	881615	881615	881615	881615	881615	881615
00300	DO		MG/L	13.3	10.5	12.5	6.5	12.4	10.4		10.8
00301	DO	SATUR	PERCENT	101.5$	84.1$	102.1$	70.7$	87.3$	83.3$		88.3$
00400	PH		SU	8.18		7.11	7.51	8.14	8.65	8.81	8.00
00530	RESIDUE	TOT NFLT	MG/L	36	4	4	14	2K	2	10	8
00610	NH3+NH4-	N TOTAL	MG/L	.028	.021	.022	.030	.030A	.022	.022	.024
00612	UN-IONZD	NH3-N	MG/L	.0005$		.00004$	.0004$	.0004$	.001$	.001$	.0003$
00619	UN-IONZD	NH3-NH3	MG/L	.0006$		.00005$	.0005$	.0004$	.002$	.002$	.0004$
00625	TOT KJEL	N	MG/L	.240	.200	.130	.230	.055A	.390	.240	.060
00630	NO2&NO3	N-TOTAL	MG/L	.25	.02	.006	.01	.10A	.02	.05	.005K
00665	PHOS-TOT		MG/L P	.050K	.050K	.050K	.050K	.050K	.080	.050K	.050K
00671	PHOS-DIS	ORTHO	MG/L P	.005	.003	.001K	.001K	.002A	.007	.006	.005K
00700	TOT HARD	CACO3	MG/L					40A	24		
31616	FEC COLI	MFM-FCBR	/100ML	30	1K	3	11	1	15	6	1A
31679	FECSTREP	MF M-ENT	/100ML	10	43	13	390	1K	29	11	5A
74041	WQF	SAMPLE	UPDATED	910211	910211	910211	910227	910227	910227	910227	910419
82028	RATIO	FEC COL	FEC STRP	3$	.02$	.2$	.03$	1$	.5$	.5$	.2$

2080531
43 54 55.0 111 16 48.0 2
BADGER CK @ MOUTH
16081 IDAHO TETON
PACIFIC NORTHWEST 130600
UPPER SNAKE
21IDSURV 900908 17040204
0000 FEET DEPTH 5460 METERS ELEVATION

/TYPA/AMBNT/STREAM

INITIAL DATE				88/10/18	88/10/25	89/04/25	89/05/30	89/06/13	89/07/25	90/04/11	90/04/22	90/05/16
INITIAL TIME				1630	1630	1630	1830	0930	0930	1730	1615	1332
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00010	WATER	TEMP	CENT			8.1	9.5	8.4	10.9	10.3	8.3	10.5
00011	WATER	TEMP	FAHN			46.6$	49.1$	47.1$	51.6$	50.5$	46.9$	50.9$
00061	STREAM	FLOW,	INST-CFS	49	46	150	200	170	29	79	130	76
00076	TURB	TRBIDMTR	HACH FTU		.3		1.8	1.4	.6	2.8	6.2	1.0
00095	CNDUCTVY	AT 25C	MICROMHO		260		88	107	232	184	100	162
00116	INTNSVE	SURVEY	IDENT	881615	881615	881615	881615	881615	881615	881615	881615	881615
00300	DO		MG/L			12.7	11.3	10.3	11.4	8.3	11.9	10.3
00301	DO	SATUR	PERCENT			106.8$	97.2$	86.3$	102.3$	73.4$	99.7$	90.8$
00400	PH		SU			7.91		6.81	7.43	8.95	7.97	7.70
00530	RESIDUE	TOT NFLT	MG/L		4		10	2K	12	4	24	8
00610	NH3+NH4-	N TOTAL	MG/L		.074	.062	.062	.019	.069	.021	.039	.005K
00612	UN-IONZD	NH3-N	MG/L			.0008$		.00002$	.0004$	.003$	.0006$	.00005$
00619	UN-IONZD	NH3-NH3	MG/L			.0010$		.00002$	.0004$	.004$	.0007$	.00006$
00625	TOT KJEL	N	MG/L		.170	.180	.380	.090	.140	.050K	.154	.040
00630	NO2&NO3	N-TOTAL	MG/L		.95	.58	.29	.27	.88	.60	.29	.50
00665	PHOS-TOT		MG/L P		.050K	.050K	.050K	.050K	.050K	.050K	.050K	.050K
00671	PHOS-DIS-	ORTHO	MG/L P		.002	.011	.004	.001K	.001K	.005K	.010	.005K
00900	TOT HARD	CACO3	MG/L							100		
31616	FEC COLI	MFM-FCBR	/100ML		1	17	25	36	28	3	27	1K
31679	FECSTREP	MF M-ENT	/100ML		3	17	3	19	32	14	150	4
74041	WQF	SAMPLE	UPDATED	910211	910211	910211	910211	910227	910227	910227	910227	910419
82028	RATIO	FEC COL	FEC STRP		.3$	1$	8$	2$	.9$	.2$	.2$	.3$

2080532
43 57 50.0 111 08 27.0 2
BITCH CR. @ FOREST
16081 IDAHO TETON
PACIFIC NORTHWEST 130600
UPPER SNAKE
21IDSURV 900908 17040204
0000 FEET DEPTH 6000 METERS ELEVATION

/TYPA/AMBNT/STREAM

	INITIAL DATE			88/10/26	89/05/31	89/06/12	89/06/13	89/07/24	90/04/11	90/04/22	90/05/16
	INITIAL TIME			1420	1130	1930	1100	1815	1454	1945	1205
	MEDIUM			WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00010	WATER	TEMP	CENT		4.4		4.8	17.5	4.7	3.7	3.5
00011	WATER	TEMP	FAHN		39.9$		40.6$	63.5$	40.5$	38.7$	38.3$
00061	STREAM	FLOW,	INST-CFS	21	120		150	130	110	81	120
00076	TURB	TRBIDMTR	HACH FTU	.3	2.0	2.2	4.0	1.0	5.9	8.2	3.1
00095	CNDUCTVY	AT 25C	MICROMHO	179	70	87	96	18900	89	60	75
00116	INTNSVE	SURVEY	IDENT	881615	881615	881615	881615	881615	881615	881615	881615
00300	DO		MG/L		12.5		10.2	8.1	12.3	12.9	12.1
00301	DO	SATUR	PERCENT		95.7$		79.4$	83.4$	96.1$	98.8$	89.5$
00400	PH		SU				7.32	7.52	8.53	8.34	7.80
00530	RESIDUE	TOT NFLT	MG/L	4	6	6	10	10	2	28	2
00610	NH3+NH4-	N TOTAL	MG/L	.010	.013	.025	.029	.007	.028	.059	.007
00612	UN-IONZD	NH3-N	MG/L				.00007$	.00008$	.001$	.001$	.00005$
00619	UN-IONZD	NH3-NH3	MG/L				.00009$	.00009$	.001$	.002$	.00006$
00625	TOT KJEL	N	MG/L	.100	.170	.190	.140	.070	.210	.243	.070
00630	NO2&NO3	N-TOTAL	MG/L	1.13	.03	.04	.06	.001K	.03	.05	.005K
00665	PHOS-TOT		MG/L P	.050K	.050K	.050K	.050K	.050K	.050K	.029	.050K
00671	PHOS-DIS	ORTHO	MG/L P	.005K	.006	.001K	.001K	.002	.010	.005K	.005K
00900	TOT HARD	CACO3	MG/L						44		
31616	FEC COLI	MFM-FCBR	/100ML	1K	1		3	3	1K	71	
31679	FECSTREP	MF M-ENT	/100ML	170	4		4	46	1	24	
74041	WQF	SAMPLE	UPDATED	910227	910211	910211	910227	910227	910227	910227	910211
82028	RATIO	FEC COL	FEC STRP	.006$	.3$		.8$	.07$	1$	3$	

2080533
43 55 30.0 111 17 15.0 2
BITCH CR. @ MOUTH
16081 IDAHO TETON
PACIFIC NORTHWEST 130600
/TYPA/AMBNT/STREAM UPPER SNAKE
21IDSURV 900908 17040204
0000 FEET DEPTH 5490 METERS ELEVATION

INITIAL DATE				88/10/18	88/10/26	88/10/28	89/04/25	89/05/30	89/06/12	89/06/26	89/07/25
INITIAL TIME				1400	1630	1400	1500	1730	1930	1600	1145
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00010	WATER	TEMP	CENT				5.6	6.5	8.5	11.3	14.4
00011	WATER	TEMP	FAHN				42.1$	43.7$	47.3$	52.3$	57.9$
00061	STREAM	FLOW,	INST-CFS	41	42	41	100	85	130	65	110
00076	TURB	TRBIDMTR	HACH FTU		.2		11.0	2.0		1.6	1.0
00095	CNDUCTVY	AT 25C	MICROMHO		234		72	72		105	138
00116	INTNSVE	SURVEY	IDENT	881615	881615	881615	881615	881615	881615	881615	881615
00300	DO		MG/L				13.5	12.2	9.2	9.4	6.5
00301	DO	SATUR	PERCENT				108.1$	97.8$	77.2$	84.7$	62.2$
00400	PH		SU				8.52		7.53	7.89	7.49
00530	RESIDUE	TOT NFLT	MG/L		2K		24	10		12	8
00610	NH3+NH4-	N TOTAL	MG/L		.010		.046	.023		.019	.010
00612	UN-IONZD	NH3-N	MG/L				.002$			.0003$	.00008$
00619	UN-IONZD	NH3-NH3	MG/L				.002$			.0004$	.00010$
00625	TOT KJEL	N	MG/L		.120		.190	.260		.080	.110
00630	NO2&NO3	N-TOTAL	MG/L		.003		.28	.07		.08	.24
00665	PHOS-TOT		MG/L P		.050K		.050K	.050K		.050K	.050K
00671	PHOS-DIS	ORTHO	MG/L P		.001K		.010	.001K		.001K	.001K
31616	FEC COLI	MFM-FCBR	/100ML				10K	1	4	1K	4
31679	FECSTREP	MF M-ENT	/100ML				10	1	6	4	43
74041	WQF	SAMPLE	UPDATED	910227	910211	910211	910211	910211	910211	910211	910227
82028	RATIO	FEC COL	FEC STRP				1$	1$	.7$	.3$	.09$

STORET RETRIEVAL DATE 92/11/10 PGM=ALLPARM

2080534
43 49 30.0 111 13 58.0 2
SPRING CR. @ MOUTH
16081 IDAHO TETON
PACIFIC NORTHWEST 130600
UPPER SNAKE
21IDSURV 900908 17040204
0000 FEET DEPTH 5928 METERS ELEVATION

/TYPA/AMBNT/STREAM

				88/10/25	88/10/26	89/05/31	89/06/12	89/06/13	89/07/24	90/05/17
INITIAL DATE				88/10/25	88/10/26	89/05/31	89/06/12	89/06/13	89/07/24	90/05/17
INITIAL TIME				1400	1630	1030	1630	1400	1515	1014
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER	WATER
00010	WATER	TEMP	CENT			8.0		14.1	22.8	6.6
00011	WATER	TEMP	FAHN			46.4$		57.4$	73.0$	43.9$
00061	STREAM	FLOW,	INST-CFS	2		9		15	4	6
00076	TURB	TRBIDMTR	HACH FTU	1.1		1.1		2.2	2.2	1.0
00095	CNDUCTVY	AT 25C	MICROMHO	338		188		226	302	228
00116	INTNSVE	SURVEY	IDENT	881615	881615	881615	881615	881615	881615	881615
00300	DO		MG/L			12.0		10.2	5.9	11.6
00301	DO	SATUR	PERCENT			101.1$		98.0$	68.0$	95.1$
00400	PH		SU						7.25	7.60
00530	RESIDUE	TOT NFLT	MG/L	2K		6		2	10	10
00610	NH3+NH4-	N TOTAL	MG/L	.008		.013		.024	.030	.005K
00612	UN-IONZD	NH3-N	MG/L						.0003$	.00003$
00619	UN-IONZD	NH3-NH3	MG/L						.0003$	.00003$
00625	TOT KJEL	N	MG/L	.150		.260		.220	.500	.110
00630	NO2&NO3	N-TOTAL	MG/L	.001K		.16		.10	.16	.005K
00665	PHOS-TOT		MG/L P	.050K		.050K		.050K	.050	.050K
00671	PHOS-DIS	ORTHO	MG/L P	.001K		.042		.001K	.001K	.006
31616	FEC COLI	MFM-FCBR	/100ML	27	11	190	54	85	2200	16
31679	FECSTREP	MF M-ENT	/100ML	9	4	940	140	220	1300	15
74041	WQF	SAMPLE	UPDATED	910211	910211	910211	910211	910211	910227	910419
82028	RATIO	FEC COL	FEC STRP	3$	3$	.2$	.4$	.4$	2$	1$

2080535
43 47 55.0 111 13 20.0 2
TETON RIVER @ HWY 33
16081 IDAHO TETON
PACIFIC NORTHWEST 130600
UPPER SNAKE
21IDSURV 900908 17040204
0000 FEET DEPTH 5950 METERS ELEVATION

/TYPA/AMBNT/STREAM

INITIAL DATE				88/10/17	88/10/25	88/11/28	88/11/29	89/02/27	89/03/10	89/03/13	89/03/13	89/03/13
INITIAL TIME				1500		1120	1615	1445		1400	1405	1600
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00010	WATER	TEMP	CENT					.1				3.0
00011	WATER	TEMP	FAHN					32.2$				37.4$
00061	STREAM	FLOW,	INST-CFS	160	170	170		240				310
00076	TURB	TRBIDMTR	HACH FTU		.6A	1.6	1.7	2.5A	300.0		164.0	10.2
00095	CNDUCTVY	AT 25C	MICROMHO		364A	600	607	387A	269	285	216	339
00116	INTNSVE	SURVEY	IDENT	881615	881615	881615	881615	881615	881615	881615	881615	881615
00300	DO		MG/L					9.8				11.2
00301	DO	SATUR	PERCENT					67.3$				83.0$
00400	PH		SU			7.60		8.50				
00530	RESIDUE	TOT NFLT	MG/L					7A	1304	1032	728	
00610	NH3+NH4-	N TOTAL	MG/L		.013A	.036	.035	.251A		.075	.025	.183
00612	UN-IONZD	NH3-N	MG/L					.006$				
00619	UN-IONZD	NH3-NH3	MG/L					.008$				
00625	TOT KJEL	N	MG/L		.160A	.350	.360	.650A		2.270	1.600	.895
00630	NO2&NO3	N-TOTAL	MG/L		.33A	.43	.64	.71A		.21	.18	.54
00665	PHOS-TOT		MG/L P		.050K	.050K	.050K	.050K		1.340	.980	.075
00671	PHOS-DIS	ORTHO	MG/L P		.001A	.002	.003	.015A		.019		.024
31616	FEC COLI	MFM-FCBR	/100ML		3A	5						10
31679	FECSTREP	MF M-ENT	/100ML		13A	78						380
74041	WQF	SAMPLE	UPDATED	910211	910517	910227	910211	910227	910211	910211	910211	910227
80154	SUSP SED	CONC	MG/L		2K	12	8					32
82028	RATIO	FEC COL	FEC STRP		.2$	.06$						.03$

INITIAL DATE				89/03/28	89/04/11	89/04/26	89/05/31	89/06/12	89/06/13	89/07/24	90/04/11	90/04/12
INITIAL TIME					1015	0945	1100	1700	1430	1600	1920	
MEDIUM				WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00010	WATER	TEMP	CENT	3.8	5.0	5.3	8.9		14.9	20.4	7.2	
00011	WATER	TEMP	FAHN	38.8$	41.0$	41.5$	48.0$		58.8$	68.7$	45.0$	
00061	STREAM	FLOW,	INST-CFS	250	280	520	540		550	510	230	
00076	TURB	TRBIDMTR	HACH FTU	4.8A		8.5A			2.8A	1.0A		7.0A
00095	CNDUCTVY	AT 25C	MICROMHO	364A	370A	286A	265		266A	307A		394A
00116	INTNSVE	SURVEY	IDENT	881615	881615	881615	881615	881615	881615	881615	881615	881615
00300	DO		MG/L	13.6	14.9	14.4	13.4		12.2	10.2	12.4	
00301	DO	SATUR	PERCENT	103.8$	116.2$	112.3$	115.2$		119.6$	110.4$	101.8$	
00400	PH		SU		8.26					7.63	8.29	

(SAMPLE CONTINUED ON NEXT PAGE)

2080535
43 47 55.0 111 13 20.0 2
TETON RIVER @ HWY 33
16081 IDAHO TETON
PACIFIC NORTHWEST 130600
UPPER SNAKE
21IDSURV 900908 17040204
0000 FEET DEPTH 5950 METERS ELEVATION

/TYPA/AMBNT/STREAM

(SAMPLE CONTINUED FROM PREVIOUS PAGE)

INITIAL DATE			89/03/28	89/04/11	89/04/26	89/05/31	89/06/12	89/06/13	89/07/24	90/04/11	90/04/12
INITIAL TIME				1015	0945	1100	1700	1430	1600	1920	
MEDIUM			WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00610 NH3+NH4-	N TOTAL	MG/L	.104A	.041A	.035A	.034		.039A	.029A		.106A
00612 UN-IONZD	NH3-N	MG/L		.0009$					.0005$		
00619 UN-IONZD	NH3-NH3	MG/L		.001$					.0006$		
00625 TOT KJEL	N	MG/L	.570A	.475A	.275A	.270		.315A	.270A		.965A
00630 NO2&NO3	N-TOTAL	MG/L	.42A	.58A	.60A	.37		.15A	.50A		.35A
00665 PHOS-TOT		MG/L P	.050A	.025A	.050K	.050K		.050K	.050K		.110A
00671 PHOS-DIS	ORTHO	MG/L P	.001A	.001K	.008A	.097		.001K	.001K		.012A
00900 TOT HARD	CACO3	MG/L									230A
31616 FEC COLI	MFM-FCBR	/100ML	10	6	10	930	5	90	11		140
31679 FECSTREP	MF M-ENT	/100ML	120	30	40	1100	11	270	18		200
74041 WQF	SAMPLE	UPDATED	910227	910227	910227	910314	910211	910314	910227	910211	910227
80154 SUSP SED	CONC	MG/L	16A	31A	20A	18		6A	7A		20A
82028 RATIO	FEC COL	FEC STRP	.08$	.2$	.3$	.8$	.5$	.3$	.6$		.7$

INITIAL DATE			90/04/23	90/05/17
INITIAL TIME			1015	1106
MEDIUM			WATER	WATER
00010 WATER	TEMP	CENT	7.4	9.0
00011 WATER	TEMP	FAHN	45.3$	48.2$
00061 STREAM	FLOW,	INST-CFS	410	450
00076 TURB	TRBIDMTR	HACH FTU	4.1A	2.0
00095 CNDUCTVY	AT 25C	MICROMHO	339A	286
00116 INTNSVE	SURVEY	IDENT	881615	881615
00300 DO		MG/L	9.4	14.1
00301 DO	SATUR	PERCENT	77.4$	121.6$
00400 PH		SU	8.07	7.72
00610 NH3+NH4-	N TOTAL	MG/L	2.000A	.005K
00612 UN-IONZD	NH3-N	MG/L	.035$	.00004$
00619 UN-IONZD	NH3-NH3	MG/L	.042$	.00005$
00625 TOT KJEL	N	MG/L	.418A	.150
00630 NO2&NO3	N-TOTAL	MG/L	.22A	.05K
00665 PHOS-TOT		MG/L P	.035A	.050K
00671 PHOS-DIS	ORTHO	MG/L P	.005K	.005K
31616 FEC COLI	MFM-FCBR	/100ML	460	9
31679 FECSTREP	MF M-ENT	/100ML	2400	37
74041 WQF	SAMPLE	UPDATED	910419	910419
80154 SUSP SED	CONC	MG/L	12A	10
82028 RATIO	FEC COL	FEC STRP	.2$	.2$

2080511
43 54 58.0 111 27 42.0 2
CANYON CK @ MOUTH
16065 IDAHO MADISON
PACIFIC NORTHWEST 130600
UPPER SNAKE RIVER
21IDSURV 870404 17040204
0000 FEET DEPTH

/TYPA/AMBNT/STREAM

	INITIAL DATE			89/02/28	89/03/13	89/03/27	89/04/11	89/04/25	89/05/30	89/06/12	89/06/12	89/06/26
	INITIAL TIME			1030	1400	1430	1215	1215	1530	1200	1700	1530
	MEDIUM			WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00010	WATER	TEMP	CENT	1.5	4.6	6.9	5.6	6.8	6.8		11.8	13.3
00011	WATER	TEMP	FAHN	34.7$	40.3$	44.4$	42.1$	44.2$	44.2$		53.2$	55.9$
00061	STREAM	FLOW,	INST-CFS	13	29	21	10	90	95		24	7
00076	TURB	TRBIDMTR	HACH FTU	1.0		1.9	2.9	11.0	6.0	4.5		2.4
00095	CNDUCTVY	AT 25C	MICROMHO	384		275	275	138	109	143		269
00116	INTNSVE	SURVEY	IDENT	881615	881615	881615	881615	881615	881615	881615	881615	881615
00300	DO		MG/L	11.0	12.6	12.1	14.4	13.5	12.1		6.8	10.8
00301	DO	SATUR	PERCENT	93.2$	118.4$	119.5$	139.0$	133.4$	119.8$		75.5$	122.5$
00400	PH		SU	8.60			8.41	8.26			6.68	7.22
00530	RESIDUE	TOT NFLT	MG/L	4		8	16	42	22	14		6
00610	NH3+NH4-	N TOTAL	MG/L	.055		.034	.033	.031	.023	.085		.082
00612	UN-IONZD	NH3-N	MG/L	.002$			.001$	.0008$				.0003$
00619	UN-IONZD	NH3-NH3	MG/L	.002$			.001$	.0010$				.0004$
00625	TOT KJEL	N	MG/L	.160		.190	.250	.330	.180	.210		.300
00630	NO2&NO3	N-TOTAL	MG/L	.04		.07	.11	.18	.06	.05		.42
00665	PHOS-TOT		MG/L P	.050		.050K	.050K	.070	.050K	.050K		.080
00671	PHOS-DIS	ORTHO	MG/L P	.009		.001K	.001K	.022	.010	.001K		.003
31616	FEC COLI	MFM-FCBR	/100ML		40	1K	5	10	15			1
31679	FECSTREP	MF M-ENT	/100ML		910	1K	3	10	3			10
74041	WQF	SAMPLE	UPDATED	910211	910211	910211	910227	910211	910211	910211	910211	910211
82028	RATIO	FEC COL	FEC STRP		.04$	1$	2$	1$	5$			.1$

	INITIAL DATE			90/04/11	90/04/22	90/05/16
	INITIAL TIME			1200	1755	1020
	MEDIUM			WATER	WATER	WATER
00010	WATER	TEMP	CENT	8.3	8.0	6.3
00011	WATER	TEMP	FAHN	46.9$	46.4$	43.3$
00061	STREAM	FLOW,	INST-CFS	32	55	54
00076	TURB	TRBIDMTR	HACH FTU	4.7	9.4	5.0
00095	CNDUCTVY	AT 25C	MICROMHO	36	131	145
00116	INTNSVE	SURVEY	IDENT	881615	881615	881615
00300	DO		MG/L	7.1	11.4	12.2
00301	DO	SATUR	PERCENT	72.0$	115.2$	117.3$
00400	PH		SU	8.53	7.82	7.76
00530	RESIDUE	TOT NFLT	MG/L	14	34	16

(SAMPLE CONTINUED ON NEXT PAGE)

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43 54 58.0 111 27 42.0 2
CANYON CK @ MOUTH
16065 IDAHO . MADISON
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21IDSURV 870404 17040204
0000 FEET DEPTH

(SAMPLE CONTINUED FROM PREVIOUS PAGE)

	INITIAL DATE			90/04/11	90/04/22	90/05/16
	INITIAL TIME			1200	1755	1020
	MEDIUM			WATER	WATER	WATER
00610	NH3+NH4-	N TOTAL	MG/L	.029	.056	.005K
00612	UN-IONZD	NH3-N	MG/L	.002$	.0006$	.00004$
00619	UN-IONZD	NH3-NH3	MG/L	.002$	.0007$	.00005$
00625	TOT KJEL	N	MG/L	.050K	.226	.090
00630	NO2&NO3	N-TOTAL	MG/L	.005K	.05	.005K
00665	PHOS-TOT		MG/L P	.080	.080	.050K
00671	PHOS-DIS	ORTHO	MG/L P	.023	.019	.008
00900	TOT HARD	CACO3	MG/L	120		
31616	FEC COLI	MFM-FCBR	/100ML	1	32	7
31679	FECSTREP	MF M-ENT	/100ML	19	52	20
74041	WQF	SAMPLE	UPDATED	910227	910227	910419
82028	RATIO	FEC COL	FEC STRP	.05$	.6$	.4$

40

2080513
43 55 00.0 111 27 58.0 2
TETON R .2 MI BL CANYON CK
16065 IDAHO MADISON
PACIFIC NORTHWEST 130600
UPPER SNAKE RIVER
21IDSURV 870404 17040204
0000 FEET DEPTH

/TYPA/AMBNT/STREAM

INITIAL DATE			89/03/27	89/04/11	89/04/25	89/05/30	89/06/12	89/06/26	89/07/25	90/04/11	90/04/22
INITIAL TIME			1530	1300	1230	1545	1630	1450	1315	1230	1815
MEDIUM			WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
00010 WATER	TEMP	CENT	7.0	6.0	8.5	9.7	11.7	14.1	19.1	8.8	8.6
00011 WATER	TEMP	FAHN	44.6$	42.8$	47.3$	49.5$	53.1$	57.4$	66.4$	47.8$	47.5$
00061 STREAM	FLOW,	INST-CFS	350	350	600	600	600	600	1000	550	700
00076 TURB	TRBIDMTR	HACH FTU	4.6	4.2	13.0	3.6	4.5	1.5	1.5	5.5	8.5
00095 CNDUCTVY	AT 25C	MICROMHO	307	325	176	176	192	239	266	276	141
00116 INTNSVE	SURVEY	IDENT	881615	881615	881615	881615	881615	881615	881615	881615	881615
00300 DO		MG/L	12.9	13.7	12.9	11.6	9.3	9.2	6.3	9.9	10.9
00301 DO	SATUR	PERCENT	127.6$	131.7$	130.5$	123.9$	103.7$	106.8$	80.7$	102.7$	113.6$
41 00400 PH		SU		8.49	8.03		7.26	7.56	7.54	8.26	8.18
00530 RESIDUE	TOT NFLT	MG/L	18	20	48						
00610 NH3+NH4-	N TOTAL	MG/L	.056	.057	.043	.035	.088	.031	.037	.034	.039
00612 UN-IONZD	NH3-N	MG/L		.002$	.0007$		.0003$	.0003$	.0005$	.001$	.0010$
00619 UN-IONZD	NH3-NH3	MG/L		.003$	.0009$		.0004$	.0003$	.0006$	.001$	.001$
00625 TOT KJEL	N	MG/L	.410	.380	.370	.280	.300	.160	.240	.400	.416
00630 NO2&NO3	N-TOTAL	MG/L	.66	.57	.51	.33	.26	.39	.38	.48	.25
00665 PHOS-TOT		MG/L P	.050	.050K	.060	.050K	.050K	.060	.050K	.050K	.059
00671 PHOS-DIS	ORTHO	MG/L P	.001K	.001K	.016	.001K	.001K	.014	.001K	.015	.005K
00900 TOT HARD	CACO3	MG/L								156	
31616 FEC COLI	MFM-FCBR	/100ML	1K	1K	2	13		1	7	2	29
31679 FECSTREP	MF M-ENT	/100ML	70	5	22	2		16	43	59	70
74041 WQF	SAMPLE	UPDATED	910211	910227	910211	910211	910211	910211	910227	910227	910227
80154 SUSP SED	CONC	MG/L				20	24	8	10	12	40
82028 RATIO	FEC COL	FEC STRP	.01$	.2$	.09$	7$		.06$	.2$	.03$	.4$

INITIAL DATE			90/05/16
INITIAL TIME			1040
MEDIUM			WATER
00010 WATER	TEMP	CENT	8.7
00011 WATER	TEMP	FAHN	47.7$
00076 TURB	TRBIDMTR	HACH FTU	2.2
00095 CNDUCTVY	AT 25C	MICROMHO	196
00116 INTNSVE	SURVEY	IDENT	881615
00300 DO		MG/L	11.3
00301 DO	SATUR	PERCENT	117.2$
00400 PH		SU	7.70

(SAMPLE CONTINUED ON NEXT PAGE)

2080513
43 55 00.0 111 27 58.0 2
TETON R .2 MI BL CANYON CK
16065 IDAHO MADISON
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0000 FEET DEPTH

/TYPA/AMBNT/STREAM

(SAMPLE CONTINUED FROM PREVIOUS PAGE)

	INITIAL DATE			90/05/16
	INITIAL TIME			1040
	MEDIUM			WATER
00610	NH3+NH4-	N TOTAL	MG/L	.012
00612	UN-IONZD	NH3-N	MG/L	.0001$
00619	UN-IONZD	NH3-NH3	MG/L	.0001$
00625	TOT KJEL	N	MG/L	.140
00630	NO2&NO3	N-TOTAL	MG/L	.005K
00665	PHOS-TOT		MG/L P	.050K
00671	PHOS-DIS	ORTHO	MG/L P	.005K
31616	FEC COLI	MFM-FCBR	/100ML	1K
31679	FECSTREP	MF M-ENT	/100ML	4
74041	WQF	SAMPLE	UPDATED	910419
80154	SUSP SED	CONC	MG/L	8
82028	RATIO	FEC COL	FEC STRP	.3$

THAT'S ALL FOLKS