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# Water Quality Studies at Cougar Lake, Blue River Lake, and the McKenzie River, Oregon

John J. Hains

April 2000

Environmental Laboratory

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# Water Quality Studies at Cougar Lake, Blue River Lake, and the McKenzie River, Oregon

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# Preface

The work described herein was conducted under a Military Interdepartmental Purchase Request by the U.S. Army Engineer Research and Development Center (ERDC), Waterways Experiment Station (WES), Vicksburg, MS, for the U.S. Army Engineer District, Portland (NPP).

This report was prepared by Dr. John J. Hains, Environmental Processess and Effects Division (EPED), Environmental Laboratory (EL), WES. Dr. Robert H. Kennedy and Mr. Steven Ashby, EPED, WES; Mr. Ken Dunn, AScI Corp., Mr. James Britton, Ms. Nicole Flint, Messrs. Michael Posovich and George Kalli, CENPP-PE-HR, provided assistance with field sampling. Dr. Patrick Howle, AScI Corp., and Mr. Van Garner, University of Georgia, performed laboratory analyses. Ms. Heather Rice, EPED, EL, WES, assisted with the data entry for this study.

In addition, field sampling was greatly facilitated by the gracious assistance from personnel at Cougar Dam Project. Messrs. Lester E. Schmig, Bruce S. McClamroch, Doug W. Esch, Wesley Hively, and Christopher Taylor provided an invaluable resource during this work, taking great care and effort to ensure its successful and safe completion.

Accomodations during much of this work were provided by the H. J. Andrews Experimental Forest Research Facility located adjacent to Blue River Lake.

The work was performed under the general supervision of Dr. Richard E. Price, Acting Chief, EPED, EL; and Dr. Phil G. Combs, Chief, Hydraulic Structures Division (HSD), Coastal and Hydraulics Laboratory (CHL); Dr. John W. Keeley, Director, EL; and Dr. James R. Houston, Director, CHL.

At the time of publication of this report, Dr. Lewis E. Link was Acting Director of ERDC, and COL Robin R. Cababa, EN, was Commander.

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# Executive Summary

Blue River and Cougar Reservoirs are proposed for modification to their withdrawal structures to allow selective withdrawal. The purpose of the proposed modifications is to improve downstream temperatures for the coldwater fishery in the McKenzie River. The Corps committed to study water quality at the reservoirs in order to predict downstream impacts to water quality in the McKenzie River as a result of selective withdrawal.

Proposed modifications to the project structures at Blue River and Cougar Lakes will result in release of warmer surface water during the spring and summer. Assuming that the current limnological structure of the lake is maintained, the present absence of strong chemical trends is unlikely to result in future increases in outflow chemical concentrations. Indeed, turbid releases may be decreased or postponed until later in the season during the release of the deeper water. The chemical trends that exist tend toward greater concentrations with depth. Surface releases may improve the water quality in those outflows.

Under current conditions, the forms of organic carbon measured in this study will not likely be altered in the outflows as a result of proposed modifications. If surface waters were selectively released, under current conditions outflows would likely contain chlorophyll biomass. The peak of this biomass would occur during May or June and decrease later in the summer. There is apparently no effect of this bloom on the TOC and DOC trends observed in the lakes or on downstream TOC and DOC concentrations. Future effects will depend on algal growth rates, intake depth, and hydraulic retention time for those depths associated with algal populations and the releases.

Proposed modifications will alter the processes contributing to many of the above conditions. The limiting resource for much of the biological activity is the element nitrogen (N) which is also important for many other limnological characteristics. Because of its biological importance, nitrogen metabolism in this system is also important to the water quality effects of the proposed structural modifications.

Nitrogen (N) concentrations were often less than phosphorus (P) for free ionic forms ($NH_3$ and $NO_3$). Ammonia ($NH_3$) was undetectable in many samples early in the season. Later, in deeper waters, this form of N was detected at concentrations greater than 0.03 mg/l. This was especially true for Cougar Lake in which late summer maxima for this ion were observed at intermediate depths (30-50 m) with less concentration at shallower and greater depths. Stream stations had measurable concentrations but no consistent patterns for $NH_3$.

Concentrations of $NO_3$ were less than 0.03 mg/l for most samples through April and May. However, on 23 July, $NO_3$ in Cougar Lake increased to 0.052 mg/l at the lake bottom. By August and September the bottom of Cougar Lake contained greater than 0.1 mg/l $NO_3$. A similar trend was observed in Blue River Lake but final concentrations did not exceed 0.1 mg/l $NO_3$. Stream stations continued to have low concentrations of $NO_3$ except for reservoir outflows which approached 0.05 mg/l $NO_3$. The McKenzie River was not obviously affected by these trends and maintained concentrations of less than 0.01 mg/l for most samples.

The materially combined forms of N, TN and TSN, were always greater than dissolved forms. Digested sample analyses yielded highly variable results and no obvious trends were found except that stream samples often contained greater concentrations of these nutrients.

Concentrations of P in the streams had a very consistent pattern with the greatest concentrations occurring in the McKenzie River upstream of the confluence of the outflows of Blue River and Cougar Lakes. There was consistently a pattern of decrease of concentration downstream which can be explained by either dilution or uptake by biota.

Water quality concerns which remain regarding the proposed structural modifications are:

1. the unknown extent to which additional particulate organic material may be released from the lakes,
2. the late summer fate of accumulated nutrients in the hypolimnion of the lakes,
3. and the additional changes which may occur as a result of increased retention of deeper waters, the turbid materials they contain, the increased hypoxia that can occur, and the potential response of biota when these become available during mixing or during late-summer releases.

Although these concerns remain, factors that may mitigate their effect include the fact that much of this response will occur during the late summer when the lake is drawn down and depending on intake design, such waters may be diminished during drawdown. The maximum extent to which these processes may occur does not likely exceed the observed present deep hypolimnion conditions in Cougar Lake. Indeed the submerged ridge associated with Rush Creek currently provides a model of the likely behavior of Cougar Lake after modification and further changes in water quality as a result of intake modifications may be quite small.

CONVERSION FACTORS, NON-SI TO SI (Metric) UNITS OF MEASUREMENT

Non-SI units of measurement used in this report may be converted to SI units as follows:

| Multiply | By | To Obtain |
|---|---|---|
| feet | 0.3048 | meters |
| meters | 3.281 | feet |
| Fahrenheit temperature | 5/9 after subtracting 32 | Celcius temperature |
| Celsius temperature | 9/5 and add 32 | Fahrenheit temperature |
| cubic feet | 0.02831685 | cubic meters |
| cubic meters | 35.289 | cubic feet |
| acres | 0.405 | hectares |
| hectares | 2.47 | acres |
| miles | 1.609344 | kilometers |
| kilometers | 0.62 | miles |
| square miles | 2.59 | square kilometers |
| square kilometers | 0.3861 | square miles |
| gallons | 3.785 | liters |
| liters | 0.264201 | gallons |
| pounds | 0.454 | kilograms |
| kilograms | 2.2046 | pounds |

## INTRODUCTION

The Willamette River Basin is an area of interest with respect to a variety of issues because of its proximity to the large urban area of Portland, OR and because it drains an important region of agriculture, industry, and commerce. Issues such as water quality or flood control are related to watershed processes or practices and because of this, tributaries to the Willamettte River are also of interest with respect to these water resource issues.

Many of the tributaries to the Willamette River have been impounded, primarily for the purpose of controlling flows in the Willamette River. One such tributary, the McKenzie River, is diagrammed in Figure 1 showing the hydrologic complex of tributaries, dams, lakes, and diversions in the McKenzie River Basin. Cougar and Blue River Lakes are Corps impoundments of tributaries to the McKenzie River. These lakes were authorized by the Flood Control Act of 1938 (Public Law 75-761) as part of a "general comprehensive plan for flood control, navigation, and other purposes.." The Willamette projects are operated for the multiple purposes of flood control, power generation, navigation, and irrigation. Additional "secondary" purposes have been added by legislation and policy. These additional purposes include recreation, fish and wildlife conservation, and pollution abatement. Summer conservation operation of this system helps meet minimum flows, power generation, irrigation, navigation, recreation, instream flows for fish, water quality, and municipal and industrial needs. The water of Cougar and Blue River Lakes is released first to meet conservation needs but the other authorized purposes also apply to both of these lakes.

Cougar Dam was completed in 1963 and formed Cougar Lake (Figure 2). Blue River Dam was completed in 1968 and formed Blue River Lake (Figure 3). Cougar and Blue River Lakes are of similar size but Cougar is much deeper and has a hydroelectric generation plant in addition to providing flood control capacity. Blue River Lake provides flood control capacity but does not provide hydroelectric generation although such development was authorized and is possible in the future for Blue River Dam.

The impoundment of Cougar and Blue River Lakes in the 1960's had unanticipated consequences on the thermal patterns in the McKenzie River. After these two lakes were completed the McKenzie River downstream from these lakes experienced delayed warming in the spring and delayed cooling in the fall of each year. The fish populations of this system were not adapted to this thermal pattern and the modification of the thermal properties of the McKenzie River had an adverse impact on those fisheries.

Figure 4 (taken from USGS data) illustrates the effect of impoundment on thermal patterns in the McKenzie River. Prior to the formation of these lakes, the McKenzie attained a temperature of 10°C (50°F) in late May. After impoundment the river did not attain this temperature until August.
In these comparisons, 10°C was chosen because of its importance as a themal limit to salmonid habitat. Attaining temperatures greater than 10°C in the spring are important to the timing of upstream migration as well as for the early development of eggs and fry. After impoundment, the maintenance of cooler water temperatures through much of the summer diminished normal migration and spawning upstream of Leaburg Dam on the McKenzie River. During July and early August, the maximum thermal difference between pre- and post-impoundment was approximately 14°C.

In the fall the impoundments effectively increased temperatures in the McKenzie River although the increase over pre-impoundment conditions was small in comparison to the cooling effect earlier in the summer. The fall increase, however, speeds the maturity of downstream eggs and fry causing them to migrate downstream under seasonal conditions for which they are not adapted.

Reservoir operation and location of water outlets are relevant to the explanation for these post-impoundment thermal effects. In the spring, the reservoirs are filled (Figure 5) by decreasing the outflows (Figure 6). This causes colder water to accumulate in the filling lakes at the greatest depths and near the outlets. Therefore during late spring and summer, water released from the lakes is colder than expected for the streams. In the fall, when the reservoirs are drawn down (Figure 5) and outflows are increased (Figure 6), warmer surface waters reach the outlets. At this time warmer water is released from the lakes (Figures 7 and 8). Reservoir operation, location of withdrawal outlets, and seasonal thermal inputs, taken together, explain the release of cooler water in summer, of warmer water in the fall, and the associated downstream impacts to fish.

Thermal changes within the McKenzie River system impacted both resident and anadromous species of fish. Special concerns were raised with regard to certain species such as bull trout and the Willamette spring chinook salmon. A Draft Feasibility Report and Environmental Impact Statement (EIS) of potential modifications to Cougar and Blue River projects was completed in 1994 (USACE-NPP 1994). This report detailed the impacts to biota and proposed alterations to these projects. In conjunction with the EIS, an exhaustive study of thermal dynamics of the McKenzie River was completed and updated in 1994 (USACE-HEC 1994).

Of the proposed alternatives, selective withdrawal was considered an effective means of managing water temperatures in reservoir releases. Selective withdrawal through structural modifications at Blue River and Cougar projects was one alternative considered as a means of returning the thermal patterns of the McKenzie River to approximately pre-impoundment characteristics.

Selective withdrawal allows water to be released from specific depths in order to achieve water quality goals. However, the water that is released for one characteristic brings with it the other limnological characteristics present at that depth. If opposite depth-dependent water quality trends are present in a lake, selective withdrawal decisions must consider competing water quality trends. If Blue River and Cougar Lakes contain greater concentrations in the warmer surface waters of substances that may impact certain types of use, then the selective withdrawal option for temperature management must consider those materials as an additional water quality issue.

The Eugene Water and Electric Board expressed such concerns in their letter response which was contained in an appendix to the EIS. The concerns were:

1. Turbidity changes due to surface withdrawal

2. Increased demand for dissolved oxygen (either biological or chemical)

3. Algal biomass as a source of taste or odor problems

4. Increased organic loading as potential precursors to the formation of trihalomethanes or haloacetic acids in finished water.

These concerns were posed as potential risks to the drinking water supply and the last of these was the greatest concern. Formation of halogenated hydrocarbons in significant concentrations would require expensive treatment options.

## Study Goals

This study was designed to accomplish the following goals:

1. to describe the current general limnological conditions in Blue River and Cougar Lakes and the McKenzie River as they compare to recent similar studies;

2. to identify the chemical structure, if any, that exists in the two lakes and the chemical trends in the McKenzie River;

3. to describe the specific trends of dissolved organic carbon within this system;

4. to identify the distributions of algal biomass in the system as it may relate to chemical composition in the water.

5. to identify potential impacts to water quality in the McKenzie River as a result of the proposed structural and operational modifications.

## Study Rationale

The goals of the study were addressed by performing a comprehensive limnological survey of the lakes as well as the McKenzie River downstream from the lakes. These results either provided the first descriptions of previously unknown characteristics or they provided the basis for comparison with previous studies.

Because the characteristics of interest were expected to occur primarily during the summer season, and because maximum pool elevation occurs during that season, approximately monthly surveys were performed from April through September 1996. The study methods were partitioned into three efforts. The first was to complete *in situ* surveys of field-measurable parameters. These were collected and used for subsequent water sampling prior to their entry into the database. The second method employed water sampling followed by subsequent chemical analysis for basic chemical parameters important for plant growth, important as potential contaminants, important as sources of downstream loading, or important to other processes in the lakes. The third method examined directly the trends of algal distributions in the lakes on the assumption that chemical gradients may be related to the algal distributions.

## Site Description

The McKenzie River has its source at Clear Lake at RM 89.6 and flows southwards approximately 15 miles before flowing westward at approximately 44° N latitude for an additional 75 miles to the Willamette River. Approximately 70-80% of annual precipitation occurs during October through April. Precipitation is variable and is maximum at higher elevations (up to 110 inches in the Blue River drainage).

Soils in this system are derived from an underlying base which consists primarily of pyroclastics, andesite intrusives, and contact breccias. The foundation rock at Cougar Dam is primarily basalt. At Blue River Dam the foundation rock is primarily andesite.

The waters entering Cougar and Blue River during base flow are clear and dilute. Nutrient concentrations are often near detection limits in waters draining these soils. This is especially true for the element nitrogen (N) which is considered a limiting nutrient in these waters.

The seasonal precipitation pattern that Cougar and Blue River Lakes were designed to moderate produces frequent high flow events. Such an event occurred just prior to this study. Figures 9 and 10 show the hydrologic history for these two lakes beginning 1 January 1996 and continuing through the duration of the study. These figures clearly show the high flow event in February 1996. They also demonstrate that there are other lesser events that may also provide frequent high flows and inputs of materials to these lakes. Inflows to the lakes are characteristic of their respective basins and exhibit some variation in their content. This study assessed only the major inflows on each lake.

Cougar Dam was constructed 7.2 km upstream from the McKenzie River on the South Fork McKenzie River. It is a rock-fill embankment and is approximately 138 meters high from average tailwater to the crest of the dam. Cougar Dam was completed and began operation in 1963. The South Fork McKenzie River enters the McKenzie River at RM 59.7. Upstream from Cougar Lake the South Fork McKenzie River is the largest single inflow. The major physical features of Cougar Lake are listed in Table 1.

Blue River Dam was constructed 2.9 km upstream from the McKenzie River on the Blue River. It is an earth-and-rockfill embankment and is approximately 82 meters high. Blue River Dam began operation in 1968. The Blue River enters the McKenzie River at RM 57.0. Upstream from Blue River Lake the Blue River and Lookout Creek are the two largest inflows. During the flood event in February 1996 Lookout Creek was altered and it will have a new rating for the purposes of calculating flows since that event. The major physical features of Blue River Lake are also listed in Table 1.

## MATERIALS AND METHODS

### Sample Locations

Sample locations were selected in order to accurately characterize the limnological status of the lakes and to provide information for the prediction of material distributions within the lakes and the McKenzie River Basin. Table 2 lists the sample stations, their abbreviations, and locations. Four sample sites each were selected in Blue River and Cougar Lakes. These corresponded to the deepest locations near the dams and three approximately equally spaced locations upstream in each lake (Figures 2 and 3). The deepest station was designated as station 1 and used for all chemical sampling in each lake. The three additional stations were selected to provide spatial detail for those limnological parameters that could be measured *in situ*.

Stream sample locations were selected to characterize the waters flowing into the lakes, exiting the lakes, and in the McKenzie River downstream to Hayden Bridge. Both water chemical samples and *in situ* measurements were taken at all stream sample stations.

Inflow stations (SF-IN, LC, and BR-IN) were selected to provide data on stream characteristics prior to entering the lakes. Lake stations (CR and BR #'s 1-4) were selected to characterize the lakes and dam outflow stations (BR-OUT and CR-OUT) were selected to provide data on water quality of the outflows. One station on the McKenzie River (MR-UP) was selected upstream from the confluence of the South Fork McKenzie River and the Blue River in order to characterize the McKenzie River prior to any influence by the dam outflows. Another station on the McKenzie River was selected just downstream from that confluence at Finn Rock (MR-FR). Leaburg Dam is an important feature for this system because the Leaburg Canal which exits the river at that location as well as the fish hatchery which is also located just downstream from the dam. A sampling station was selected at the Leaburg Dam (MR-LD) to characterize the water quality of its outflows. Another station was selected just after the Walterville Canal exits the McKenzie River at a USGS gaging station (MR-GS). This site is intermediate between Leaburg Dam and Hayden Bridge. At Hayden Bridge a sampling station (MR-HB) was selected at the water intake for the Eugene Water and Electric Board (EWEB) pumping station.

### Lake *In situ* Methods

Temperature, dissolved oxygen, pH and specific conductance were measured *in situ* at designated stations along the main stem of the McKenzie River, in Blue River and Cougar Lakes, and in major tributaries to each lake (Figures 1, 2, and 3). Stream stations were sampled by collecting water in two clean, rinsed buckets. One bucket was reserved for chemical samples and the other was used to immerse the *in situ* limnological survey equipment. In the lakes, measurements were taken at two-meter intervals from the surface to a depth of 50 meters and then at five-meter intervals to one-half meter above bottom. On some occasions the depth interval was two meters from surface to bottom.

Additional temperature data was collected in Cougar Lake using continuous monitoring techniques. Stowaway® instruments, capable of logging thermal data continuously at discrete depths and time intervals, were deployed at the deepest location on Cougar Lake by personnel from Portland District. These were deployed prior to the beginning of this study at depths chosen to best characterize the summer temperature trends of Cougar Lake. The instruments were physically attached to a cable suspended vertically in the water column. At the end of the deployment period, the cable and attached loggers were retrieved from the lake. Later the loggers were downloaded to a computer and the thermal data from individual loggers was associated with the appropriate depth in the final database. The resultant data was used in this study to depict the thermal history of Cougar Lake.

Field limnological survey equipment (Hydrolab H20) was employed for *in situ* measurements. The instrument was calibrated in a manner which conformed to Standard Methods (APHA 1992). Temperature was calibrated against a standard thermometer related to an NBS standard. Dissolved oxygen was calibrated against air saturation or the result of a Winkler titration prior to transport. Prepared known chemical standards were used for pH calibrations and for conductivity. Depth was calibrated at the water surface and checked against known depth marks on the cable.

*In situ* data was recorded on standard data forms and returned to Trotters Shoals Limnological Research Facility (TSLRF) for entry into the database. A draft of the entered data was checked by a third party against the original field sheets in order to detect any entry errors. This draft was returned for correction and the 'proofing' procedure was repeated until no additional typographical errors could be detected. Once in the database, an error checking program was finally employed to detect any errors that remained. The database was updated with each new data addition.

Field chemical analyses were performed on samples from Cougar Lake, Blue River Lake, their tributaries, and the McKenzie River. When possible, the sampling effort was completed in one day for each lake. The field surveys of the McKenzie River were scheduled in a manner which gave priority to the more demanding schedules for Cougar and Blue River Lakes. If possible, biological sampling was completed in conjunction with the limnological sampling.

Water samples for chemical analyses were collected as whole water or the product of field filtrations. Water was usually collected through a hose which was marked for depths. The hose end was connected to a weighted intake in order to maintain an extended configuration and proper depth. Water was pumped using a diaphragm pump through a manifold capable of delivering the samples through attached filter holders. Each sample was taken after the pump had cleared the hose of water from previous depths. This was accomplished by measuring the travel time through the hose and waiting twice that time after repositioning to the next depth. Samples were collected at 10m intervals in the lakes. Based on examination of the *in situ* profiles, another sample was occasionally collected at an intermediate depth corresponding to the thermocline or at a depth of rapid dissolved oxygen change. Samples were labeled with waterproof labels which identified the station, depth, date, time and type of analysis.

Chlorophyll samples were collected as whole water and filtered in the laboratory using glass fiber filters (Gelman type A/E). Dissolved organic carbon samples were also collected by filtration through the glass fiber filters after they were thoroughly rinsed with sample water to remove any residual organics on the filters. The filters for organic carbon sample filtrations were pre-treated by baking them for one hour at 400°C in a muffle furnace to combust any associated organic carbon. This pre-treatment was performed by the manufacturer and specified for this sampling in order to diminish potential background contaminants. Samples for total content analyses were collected as unfiltered, whole water. Field filtrations were performed for chemical analyses of dissolved substances. These filtrations were performed using either a field filtration manifold with pressure supplied by a pump or a filter flask and a hand vacuum pump. Filtered water for chemical analysis was collected by filtration through a 0.45 µm membrane filter. Each sample was collected into chemically cleaned containers rinsed in the field with the sample water to be collected. Additional samples were taken for quality control (QC) purposes. The stations and depths of these QC samples were subjectively distributed throughout the sampling effort to encompass the full time and range of field sampling activity. Because the analyses were performed in conjunction with samples from other lakes for other projects, the combined QC results were used for the studies on Cougar and Blue River Lakes and the McKenzie River.

Field measurements of in vivo fluorescence were made using a Turner Designs field fluorometer that had been configured to examine chlorophyll fluorescence. After the chemical samples had been collected the pump hose was connected in-line with the fluorometer. Filtered water collected from 50m and 10m depths was then pumped through the fluorometer to determine the background fluorescence in the water for depths in the photic zone and deeper depths. Water at each depth was then pumped through the fluorometer and readings of fluorescence units were made at each depth as estimates of the distribution of chlorophyll fluorescence. Once the fluorescence readings were corrected for background fluorescence, the measurements were compared against extracted chlorophyll concentrations at those depths where the two methods were coincidental. This procedure enabled assessment of much finer scale of chlorophyll distribution in the lakes than standard assessment procedures would allow.

Additional samples were collected for phytoplankton enumeration. At least 500 ml was collected and returned to the field lab for preservation. These samples were preserved with a final concentration of approximately 2% glutaraldehyde. Some duplicate samples were preserved with Lugol's solution for purposes of comparison and quality control. Microscopic counts were completed at 500X magnification using techniques of settling, concentration, and enumeration in a Palmer nanoplankton counting chamber (APHA 1992). Identifications to major class were made using phase contrast illumination on a Zeiss Photomicroscope I equipped with a water immersion objective designed for this purpose. At least 500 cells were enumerated for the dominant taxon. If other taxa were sufficiently numerous they were counted separately. However, because the assemblage was vastly dominated by cyanobacteria, mostly *Anabaena*, the count data for that taxon was the only fraction which had statistical reliability. Other taxa were noted but the estimates of their population densities were not considered statistically accurate.

Results of the completed analyses were compiled into spreadsheet tables and transported to the database where the database was updated to incorporate the most recent entries.

Chemical Methods

Various sized sample containers were used to collect field water samples destined for analysis in the laboratory. Samples were transported and stored in coolers to control their thermal conditions as much as possible. Ice was used when necessary. Samples were transported to the field laboratory on the day they were collected and shipped to the analytical laboratory for analysis within 48 hours of collection.

All samples were collected in laboratory-prepared bottles. Bottle preparation consisted of standard acid cleaning (APHA 1992), except for chlorophyll, alkalinity, turbidity and biological sample bottles. Samples for nutrient and metal analyses were collected in acid-washed, clear high-density polyethylene (HDPE) bottles. Samples for carbon analyses were collected in acid-washed, rinsed glass bottles with teflon-lined caps. Acid-washed brown HDPE bottles were used for turbidity samples. Chlorophyll, alkalinity and biological samples were collected in tap water rinsed clear HDPE bottles. Care was taken to minimize agitation of turbidity and alkalinity samples at all times. Metal samples were preserved in the lab by acidification with nitric acid to pH<2.

Laboratory water used for analyses was produced either by distillation (Model THREE LITER, Corning Glass Works, Corning, NY) or by ultrapurification (E-pure®, Barnstead, Dubuque, IA). E-pure® water provided Type 1 Reagent Grade Water (RGW) per ASTM-D1193, NCCLS-ASC-3 and CAP. All reagents and chemicals were grade certified. Standards were primary standards or traceable to NBS standards. All glassware and most plasticware was acid-washed in 10% hydrochloric acid, followed by three rinses with >8 megohm water (SYBRON/Barnstead, Barnstead, Dubuque, IA).

Analytical QC was maintained in three ways:

1) analysis of split and replicate samples;

2) analysis of spiked samples; and

3) analysis of blind quality assurance (QA) samples.

Split and replicate samples provided a means to estimate intrinsic variabilities due to laboratory and field sampling errors, respectively. A coefficient of variation (CV) was calculated for each parameter at each sampling period. A mean CV across time for each parameter was tabulated (Table 3). These means represent relative sampling precision and provide a way to compare different analytical procedures.

In-house spikes and blind QA samples (Analytical Products Group, Inc., Belpre, OH) provided a measure of laboratory accuracy. Spikes were prepared for each parameter from four selected stations during each sample run. The value derived by comparing a spiked to an unspiked sample was used to calculate a percent recovery based on the actual spike addition. The results from the blind QA samples were also reported as percent recovery. Both are summarized in Table 4.

Total (T) and total soluble (TS) nutrients were determined using the same preparation sequence. All samples were treated with persulfate digestion (APHA 4500-P B, 5) to convert phosphorus (P) containing compounds to orthophosphate. Samples were stored at room temperature until assayed. TP and TSP were determined by the ascorbate method as described in APHA 4500-PE. Soluble reactive phosphorus (SRP) reacts with molybdate and antimony ions in the presence of ascorbic acid to form a blue color. This phosphomolybdate complex was read at 880 nm on a Technicon™ AutoAnalyzer™ II.

Following TP and TSP analyses, samples underwent Devarda alloy reduction (Raveh and Avnimelech, 1979) in which available nitrogen (N) was reduced to ammonia. TN and TSN were determined by the salycilate method as described in Technicon™ Industrial Method N. 329-74W/B (revised 11/78). The reaction of ammonia with alkaline buffered (pH 12.8-13.0) salicylate/nitroprusside/hypochlorite solution produced an emerald-green ammonia-salicylate complex which was read at 660 nm on a Technicon™ AutoAnalyzer™ II.

The metals iron (Fe) and manganese (Mn) were determined by the direct air-acetylene flame method (APHA 3111 B; APHA 3500-Fe A, B; APHA 3500-Mg A, B) on a Perkin-Elmer 4000 atomic absorption spectrophotometer. Dissolved metals were assayed directly from field sample bottles, while total metals were digested in a CEM MDS-2100 microwave (USEPA, 1986) prior to analysis. Analyses of calcium, magnesium, sodium, and potassium were performed on a Dionex DX-300 ion chromatograph with a cation column.

Soluble nutrient (nitrate, nitrite, SRP, and sulfate) concentrations were determined by chromatography on a Dionex DX-300 ion chromatograph with chemical suppression of eluent conductivity (APHA 4110 B).

Pigments were measured on dimethyl formamide extracts (Hains, 1985) using a Shimadzu UV-2101PC UV-VIS scanning spectrophotometer.

Total alkalinity was determined by the titration method (APHA 2320 B) with a Beckman analog pH meter.

Total organic carbon was determined by the combustion infrared method (APHA 5310 B using a Shimadzu TOC 5000 carbon analyzer. This instrument was capable of measuring organic carbon concentrations three orders of magnitude less than commonly observed in surface waters. The concentrations encountered in the McKenzie River system were similar to other waters studied by TSLRF and no analytical modifications were necessary to accomodate lower limits of detection.

Turbidity was determined by the nephelometric method (APHA 2130 B) on a HACH Model 2100 turbidimeter.

## RESULTS AND DISCUSSION

The surveys on Cougar and Blue River Lakes display similarities to the earlier studies of thermal trends. Stratification progressed through the spring as the surface elevation increased. The lakes filled with cold meltwater and the summer heating primarily affected the lake surface depths. In 1996, the thermal data logged continuously (Figures 11 and 12) show a common pattern of summer warming followed by fall cooling and mixing. This process is compounded by the continued withdrawal and drawdown according to the operational curve.

The hydrology of the two lakes is determined by the inflow trends against which a standard operational surface elevation is maintained. Early in the spring an unusual inflow event caused rapid filling of each of the lakes. Although the subsequent drawdown brought the surface elevation to standard, the magnitude of the inflows may be relevant to the substances suspended or dissolved in these waters later in the year. As shown later, this may be of particular relevance to turbidity in Blue River Lake.

### Thermal Results

Temperatures at the lake surfaces varied in these surveys from a minimum of approximately 5°C to a maximum of approximately 23°C. The earliest survey in April showed the minimum stratification although by that time, stratification had developed in both lakes. In April a thermal gradient of approximately 6°C had developed between the surface and bottom. The presence of stratification is important because the development of chemical or biological gradients depends upon the temperature/density gradients and the length of time these gradients exist.

Figure 11 shows the seasonal pattern expected for these monomictic lakes which occur at a latitude of approximately 44°N. Stratification begins each spring and can be observed in thermal profiles by April. However, a strong thermocline does not develop until later in the summer and this was observed in July - September 1996. Figure 12 shows each of the summer months as separate panels in order to depict the process in which surface warming affects deeper waters through time. The effect of diel warming and cooling is also evident in this figure. Close examination of the figure shows an "undulation" of the surface temperatures that coincides with diurnal warming and nocturnal cooling for most of these summer days. The daily pattern only affects the surface few meters of the lakes but is important in helping determine the depth of the thermocline and is potentially important in determining the distribution of materials in those surface depths.

There were no releases from shallow depths for Cougar and Blue River Lakes and the thermal patterns with depth are determined mostly by meterological interactions during the summer season. Releases from deeper depths does affect the heat content of the lake by reducing the volume of colder water in each lake as the season progresses. As stated in the Introduction, this process is central to the concerns for these lakes and thermal aspects of this were exhaustively addressed by earlier studies (HEC, 1994).

Throughout the surveys, the deeper waters were much cooler than the surface. For example the deepest waters in Cougar Lake never exceeded approximately 5°C, slightly greater than the temperature of maximum density for water. At those temperatures, biological processes likely to consume dissolved oxygen proceed more slowly, even when substantial substrates are present.

**Field Surveys - Blue River Lake**

As much of the characterization of these lakes as possible (and the streams associated with them) was completed using field techniques and measurements. In addition to thermal measurements, field limnological surveys identified trends in the important parameters dissolved oxygen, pH, and conductivity. Figures 13 - 18 summarize the results of these surveys for Blue River Lake.

Of all the variables measured in the field, pH showed the least change. Dissolved oxygen had little variability in April (Figure 13) and in May (Figure 14) only showed a reduction to 8 mg/l near the lake bottom from a nominal 10-12 mg/l nearer the surface. Furthermore this decrease was observed only at station 3.

In July, dissolved oxygen concentrations were less throughout the water column but exceeded 8 mg/l at all depths (Figure 15). In July, an interesting metalimnetic maximum dissolved oxygen concentration was observed at approximately 8 m depth at most locations on the lake. There was also a measureable increase in pH where the dissolved oxygen maximum occurred suggesting that photosynthesis was at least partly responsible for these heterogeneities.

By August, the metalimnetic maximum had diminished and only a mixed heterograde pattern was observed for stations 1 and 2 (Figure 16). At that time pH had no observable structure. Maximum temperatures were observed in August. Temperatures attained nearly 23°C in the surface waters and accompanied a maximum overall gradient of approximately 13°C from surface to bottom. Dissolved oxygen showed a pattern of decrease near the bottom of the lake at station 2 and 3. Station 3 was nearly anoxic near the lake bottom.

In September, lake surface elevation had decreased and in spite of removing the cooler bottom waters to accomplish this, there was still a strong thermal gradient present at all but station 4 in Blue River Lake (Figure 17). At this time, pH had no discernable trend. Dissolved oxygen displayed a heterograde pattern at station 1 similar to the pattern observed in August. A decrease in dissolved oxygen concentration at depths near the thermocline was followed by an increase at immediately greater depths. At station 3 and nowhere else in the lake, dissolved oxygen decreased to anoxia at the lake bottom.

Because of the measuring device, field measurements of ionized materials dissolved in the water are expressed as specific conductance and because the machine does not have the capability to separate the measures, this study uses the term ‘specific conductance’ interchangeably with ‘conductivity’ which is correct where measurements have been standardized. Conductivity was variable at most times and locations in Blue River Lake. Conductivities varied from approximately 24 - 32µS throughout the lake at most times (Figure 18). However, the variation observed was over a small value range and did not likely represent an important trend. The only exceptions occurred at the thermocline (approximately 8m) in July and at station 3 in May, August and September. In early July, conductivity increased visibly at all sampling stations at depths near the thermocline. This observation coincided with increases in dissolved oxygen and pH and likely was a response to increased biological activity at those depths. Station 3 displayed another trend in which conductivity increased near the lake bottom and its coincidence with decreases in dissolved oxygen supports the hypothesis that more intense biological or chemical activity occurs near that station at the lake bottom. By September, the bottom conductivity had increased from approximately 35 to a maximum of greater than 60 µS.

## Field Surveys - Cougar Lake

Thermal trends in Cougar Lake were similar to those observed in Blue River Lake. The seasonal thermal trends in Cougar Lake have already been described and are depicted in Figures 11 and 12. However, the field surveys were able to provide finer depth resolution than the continuous loggers. Figures 19 and 20 show the initial thermal structure for April and May 1996. During this time at most locations there was one obvious thermocline and a similar gradient to that of Blue River Lake. However, at station 1 and 2 in May there was evidence of the formation of a multiple thermocline with a deeper thermocline occurring at approximately 50 m. A similar trend may also have been forming at station 3 indicating that the pattern was lakewide at 50 m depth. This pattern was obvious by July (Figure 21), and consistently occurred at the 50 - 60 m depth range. The pattern became less obvious in August because waters shallower than 50 m were warming by that time (Figure 22). In September the pattern persisted near 35 - 40 m depth because of the late-summer drawdown which had started by that time (Figure 23).

Cougar Dam has numerous structural features which make this lake more complex. The elevation of the deepest location (station 1) is approximately 1290 ft. This corresponds approximately to the location of the main diversion tunnel entrance. This tunnel did not release water during this study. Releases that did occur originated at approximately 1420 ft elevation. Between the deepest location and the penstock intake for Cougar Dam is a shallower crest at approximately 1525 ft elevation. It would not be incorrect to interpret this structural feature as a physical barrier to movements of waters in a thermally stratified lake at elevations less than 1525 ft. Although the intake for Cougar Dam was located at a deeper elevation of 1420 ft, the shallower crest at 1525 ft. may have restricted water movement at greater depths allowing warmer waters to be released than would have occurred were it not for the restriction. The depth of the secondary thermocline corresponds to the elevation of the crest which at maximum pool elevation is approximately 70 m shallower than station 1 and a little more than 50 m deep.

Dissolved oxygen showed more pronounced trends in Cougar Lake than had been observed in Blue River Lake. In April dissolved oxygen concentrations were nearly constant from surface to the bottom at most locations in Cougar Lake. There was a slight decline near the bottom at station 1 (Figure 19). In May (Figure 20) The oxygen concentrations in deeper waters remained nearly 12 mg/l for most depths but showed the beginning of a positive heterograde distribution at approximately 8 m depth. This corresponded with the shallow thermocline and coincided with an increase in pH at shallow depths in May. The positive heterograde pattern was very obvious in July with dissolved oxygen concentrations approaching 15 mg/l in the thermocline (Figure 21). However, this trend was stronger for the deepest stations and less obvious nearer the headwaters at station 4. In August (Figure 22) dissolved oxygen concentrations continued to show the heterograde pattern but also displayed an increase through a broad depth range at depths from 50 to 90 m. August dissolved oxygen also showed some decline near the bottom although minimum concentrations were usually greater than approximately 5 mg/l. In September the pattern had become less visible (Figure 23) perhaps due to the releases from the lake or to surface cooling and mixing. However, near the lake bottom, concentrations did decrease to less than 2 mg/l.

Specific conductance values were different in Cougar Lake compared to Blue River Lake. This is probably due to the fact that the South Fork McKenzie River has greater specific conductance than the major inflows to Blue River Lake. Patterns in conductivity were highly variable for most depths, times and locations (Figure 24). However, in July conductivity showed a different pattern in that values near the thermocline increased in comparison to other depths. Another pattern of increased conductivity was displayed at greater depths for that month as well as for August and September. Specific conductance is a measure of the ability of water to conduct electricity under standard temperature conditions. This parameter is influenced by the concentration of chemical ions in the water and the type of ions present. Any process that produces or consumes chemical ions causing a net increase or decrease of ion concentration will change the conducting properties of the water. Photosynthesis may decrease nutrient ions or inorganic carbon producing a change in specific conductance. Respiration conversely may mineralize organic materials adding to the concentrations of chemical ions. In addition, if inflowing streams are of different specific conductance than the receiving body of water, the depth to which the inflows entrain will tend to reflect the conducting character of the inflows and shallower or deeper waters may retain the character of the lake. These and other processes pose difficulty for the interpretation of distributions of specific conductance and this measure is used most often as an indicator of biogeochemical activity or as a predictor for the concentrations of dissolved materials in the water (total dissolved solids).

**Field Surveys - Streams and Rivers**

Surveys of *in situ* characteristics were performed on inflows, outflows, and in the McKenzie River primarily in support of the chemical analyses. These surveys showed that thermal trends compared with previously described trends and that other *in situ* parameters were either normal or expected for these waters.

Temperatures were cooler in outflows from the dams and warmer in the streams as expected. Dissolved oxygen concentrations were close to saturation values dependent on temperature at all locations except the dam outflows. Dissolved oxygen in the outflows were related to the concentrations existing in the lakes at the depths of the intake. However, in most cases the outflows had greater dissolved oxygen than existed in the lake because of the aeration taking place in the tailrace where the samples were collected. There were no obvious trends for pH.

Specific conductance was the most interesting *in situ* parameter. Although specific conductance was nominal for all observations, ranging between 25 and 60 μS, there was a consistent pattern of greater values in the McKenzie River at all locations (Figure 25), and to a lesser extent the inflows. The outflow from the Blue River dam (BR-OUT) was consistently less than the other stations. Specific conductance values at that location were always less than 30 μS. In April and May the two inflows to Blue River Lake (BR-IN and LC) joined the outflow having the three lowest values.

During mid-summer, July and August, the Cougar Dam outflow (SF-OUT) was second least for specific conductance. This contrasted with the major inflow to that lake, the South Fork McKenzie River (SF-IN), which had the greatest or second greatest specific conductance for both of those months. During September and fall drawdown, the outflow from Cougar Dam began to resemble the inflow to that lake but they still were within the values observed for the McKenzie River (40 to 50 μS) at all locations.

The McKenzie River upstream from the confluence of the outflows from Cougar and Blue River Dams consistently had the greatest specific conductance. The decrease for this parameter seen downstream from the two projects is seen as the effect of dilution although the specific conductance tended to remain approximately the same farther downstream.

**Analytical Parameters**

**Turbidity**

Although turbidity is a crude measure of an optical effect of suspended materials in water, it is indicative of the presence of such materials. Turbidities were of minimal values at all locations, times, and depths with the exception of the deepest depths and the outflows from Blue River Lake (Figures 26 - 30). In Blue River Lake, turbidity was visually obvious in the outflows and numerically important in the deeper waters which were the source for those outflows. Turbidities were also greater in the deepest waters for Cougar Lake, but at depths outside of the withdrawal zone for the penstock. The maximum value for turbidity was observed at 110 m depth in Cougar Lake (10.3 NTU).

For each month of sampling there was a pattern of turbidity distribution in both lakes in which the turbidity increased from surface to a maximum value near the bottom of the lake (Figures 26-30). Comparison of the values near the surface of each lake also showed that the surface waters became less turbid through the season and that bottom waters maintained greatest turbidity. However, because outflows released the turbid bottom waters from Blue River Lake, the turbidity near the bottom of Blue River Lake also diminished through the season. Cougar Lake, in spite of the existence of the most turbid waters in the deepest waters of either lake, had an intake at intermediate depth and released waters with less turbidity than did Blue River Lake. The two lakes, then, acted as a reservoirs for the suspended materials in the inflows as well as the inflowing water. The outflow from Blue River Lake (BR-OUT) was positioned to allow the gradual release of these materials through the season while the intermediate depth of the intake on Cougar Lake did not allow the release (SF-OUT) of much of this material. Sediment trapping is a common feature of reservoirs and some reservoirs are constructed specifically for this purpose. Where turbidity is a product of materials suspended in inflows, and if there is no autochthonous source for the turbidity, adjusting the depth of the intake can often improve the turbid properties of releases. This may explain the differences observed between Blue River and Cougar Lakes.

Observations of turbidity for the stream stations further supported the observations in the lakes. In February, prior to the first sampling, both lakes were subject to a spring flood event with the greatest effect on Blue River. This event is evident in the hydrographic data and it moved great quantities of materials and debris into both lakes. This may have been the source of turbidity in the deepest waters of the two lakes. For the entire season the Blue River outflow (BR-OUT) consistently had the greatest turbidity of any stream station. In May (Figure 27) turbidity increased from 0.3 upstream from the project confluences to 2.0 NTU just downstream from the confluences at MR-FR. This was the maximum turbidity observed on the McKenzie River for any time or location. July turbidities for the stream stations (Figure 28) continued a similar pattern to that observed in May except that the McKenzie River upstream of the two reservoirs (MR-UP) had its maximum value (still less than 1 NTU). In August and September (Figures 29 and 30, respectively), the effect of outflows on the turbidity of the McKenzie River were less noticeable. However, upstream of the projects the McKenzie River (MR-UP) remained remarkably constant at approximately 0.3 NTU and just downstream of the confluence was usually the greatest of the remaining river stations but still less than 2.0 NTU. The consistently clearest stations were always upstream from the projects, either on the McKenzie River or the inflows (MR-UP, SF-IN, LC, and BR-IN). This may be due to the gradual release from deep intakes of turbid waters previously stored during high flow events or it may be due to additional turbid inputs from activities downstream in the McKenzie River watershed.

### Water Chemistry

### Organic Carbon

Of all the chemical analyses those for carbon are of greatest interest. Carbon was measured as two organic forms, total organic carbon (TOC) and dissolved organic carbon (DOC). TOC is the total of all organic forms of carbon whether dissolved or particulate. DOC is operationally defined as organic carbon surviving filtration through a glass-fiber filter with a nominal pore size of 0.45μm. As a measure, the dissolved fraction defined in this manner tends to overestimate the actual dissolved organic carbon due to the variable occurrence of particles capable of passing through this filter.

In this system as in many surface waters in this country, the largest fraction of TOC in the water is the DOC fraction. In most cases, the errors present in the analysis makes them indistinguishable. Interpretation of results is made more difficult by the fact that modern analytical methods require very small samples for analysis. A few or even one unusual particle in a sample can provide a precise value for the sample but an inaccurate TOC estimate. Therefore, it is normal to encounter samples for which DOC appears to be similar to nearby waters while TOC has a much greater value.

For Blue River Lake in April (Figure 31) there were no trends for either form of organic carbon and the approximately equal numbers indicate that most of the organic carbon was in dissolved form. Concentrations occurred at approximately 1-2 mg/l. In May, TOC in Blue River Lake had a maximum concentration at 50 m depth that did not agree with the corresponding DOC. TOC and DOC at other depths were similar to each other as well as to the values observed in April. The maximum value observed at 50 m for May is possibly due to a sample artifact as explained in the previous paragraph. Organic carbon in Blue River Lake for July and August were again unremarkable and ranged from approximately 1-2 mg/l for TOC and DOC. At 10 m depth in July there was a small but real increase in both TOC and DOC. This depth was near the themocline for the lake at that time and may have been associated with accumulation of settled materials which could contribute to both fractions of organic carbon. This was a very small difference compared to those observed September. Although DOC concentrations were approximately 1 mg/l at all depths, the September survey showed a large difference between DOC and TOC at the bottom depths of 40 and 50 m (Figure 31). Although the DOC remained at concentrations similar to other depths, TOC increased to 9-12 mg/l at those depths. Because of the magnitude of the value and the fact that the discrepancy was observed at two adjacent depths, these values are probably correct. As noted in the discussion of dissolved oxygen trends, an oxygen deficit was observed upstream of the dam in August. By September the biogeochemical activity which produced that deficit could have contributed suspended organic particles to the water which was moved to the dam as a result of the deep-water release. The analysis was not capable of identifying the nature of this material other than its organic content.

Cougar Lake had minimum organic carbon concentrations that were less than those observed for Blue River Lake. However, there were unusual trends for some times. The April lake values were remarkably uniform with a modest trend of increase with depth (Figure 32). Both TOC and DOC were similar in magnitude and trend suggesting that most of the organic carbon in this lake was in the dissolved fraction. In May, however, there were substantial differences between TOC and DOC at some depths and substantial heterogeneity through all depths. The surface concentrations were elevated with DOC (approx. 2.1 mg/l) occurring at approximately 35% of the TOC. However, to 20 m depth both fractions decreased to concentrations similar to the April samples. At 30 m both increased to concentrations similar to the surface. Another decrease to April values was observed at 40-50 m and at 60m another increase in both TOC and DOC was observed. This was followed by another decline at 70 and 80 m an a final increase at 90 m. The deepest sample, in contrast, declined to a values similar to those observed in April at approximately 1.5 mg/l. This heterogeneity is unexplained by other observations of chemical or biological materials and it poses a question that, without further inquiry, must remain unresolved.

The heterogeneity observed in the May samples for Cougar Lake apparently did not persist because the July and August surveys found no such trends except for the deepest waters. In July, the samples were uniform at approximately 1-1.5 mg/l to 80 m depth. At that depth the DOC exceeded TOC. In addition, TOC at 80 m remained similar to concentrations found at other depths. These facts tend to place suspicion on the measurement of DOC at 80 m as a potentially inaccurate estimate. Similarly, the result at 100 m of measuring 0 DOC is also unlikely and the trend in the deepest waters for DOC in July in doubt. However, if TOC is an indicator, the organic carbon was nearly uniform at all depths for July.

In August, the concentrations of organic carbon at all depths decreased to approximatly 33% of their July concentrations. However, there was another anomalous observation of more than 8 mg/l TOC at 90 m depth which then returned to a value of approximately 1.5 mg/l at 100 m. DOC remained at nearly 0.5 mg/l at all depths. In September (Figure 32, cont'd) organic carbon distributions in Cougar Lake showed little trend except a slight increase at depths greater than 30 m. Concentrations at shallower depths were approximately 0.5 mg/l and at depths greater than 30 m concentrations increased to approximately 1 mg/l.

Stream concentrations (Figures 33-35) showed some trends. In April the water at most stations contained 1-1.5 mg/l TOC and DOC. Station MR-UP was the only exception with less than 1 mg/l TOC and DOC. In May a pattern of lower concentrations for inflows and greater concentrations for outflows and the downstream stations developed (Figure 33). The lowest concentrations were observed at stations SF-IN and MR-UP. The inflow stations LC, and BR-IN had concentrations similar to MR-GS and MR-HB the two stations farthest downstream on the McKenzie River (Figure 33). The outflows from Cougar and Blue River Lakes had the greatest organic carbon concentrations at approximately 1.5 mg/l. The intermediate stations MR-FR and MR-LD had intermediate concentrations of approximately 1.0 mg/l. By July the pattern became less clear (Figure 34). The greatest concentrations of TOC occurred at MR-GS and MR-HB (5-8 mg/l) while DOC (approximately 1.75 mg/l) was less than most of the other stations. The greatest DOC concentrations actually occurred at the inflow stations BR-IN and SF-IN (2.5-3.5 mg/l). The lake outflows and other stations were intermediate at approximately 2 mg/l TOC and DOC except for station LC which had the lowest concentrations of approximately 1.5 mg/l TOC and DOC. This mixed result continued in August (Figure 34) where all samples were low in concentration (indeed, undetectable for SF-IN and MR-UP) except for the downstream most stations MR-GS and MR-HB which had low DOC but elevated TOC concentrations at approximately 2-3 mg/l. In September, the pattern only had one anomaly, the TOC in the outflow from Cougar Lake (Figure 35). This anomaly was an elevated TOC concentration of approximately 3 mg/l at SF-OUT with a low DOC concentration of approximately 0,5 mg/l, similar to other stations. The anomalous greater TOC concentrations observed at occasional stations throughout this study may be explained by unexpected collection and analysis of particulates that are otherwise patchy in distribution or by unexplainable analytical problems. The low DOC concentrations accompanying these observations, however, indicate that aside from filtration and sampling considerations, organic carbon is remarkably uniform in this system.

## Other Chemical Trends

### Alkalinity

Of the chemical analyses performed, the one completed in the field was alkalinity due to the labile nature of dissolved gases likely to influence this measure. Alkalinities varied from approximately 9 to 25 mEq. The greatest alkalinities were always measured in water from the major inflow to Cougar Lake (SF-IN) and in the McKenzie River upstream from the project confluences (MR-UP). There was no obvious trend for alkalinity elsewhere.

### Nutrients - Lake Survey Results

Nutrient concentrations (N and P) were often near detection limits for the analytical methods. In these methods the concentrations reported are units of elemental concentration. This means, for example, that nitrate concentrations are expressed as the mg/l of nitrogen contained in the nitrate and not the mg/l of nitrate. Concentrations of any form of N or P were usually low but were often expressed in this report units of mg/l. Total digestions often yielded concentrations up to several hundred ppb while undigested reactive nutrients usually were less than 50 ppb except in the deepest waters in the lakes. As often observed in other lakes, surface waters tended to have the least concentrations.

Phosphorus (P) was measured in three forms, two of which were products of digestions. In April P occurred in concentrations less than 40 ppb at all depths (Figures 36 and 37). Soluble reactive phosphorus (SRP), the form often referred to as ortho-P, occurred in lower concentrations than were observed for total P (TP) and total soluble P (TSP). SRP is the form of phosphorus that is immediately available for biological uptake. TP includes a solid fraction which is either organismal in nature or is another solid form which may not be immediately available for uptake. TSP has a soluble fraction that does not react colorimetrically until after digestion. TSP, then, includes SRP as well as other dissolved forms of P. Throughout the lakes in April, however, the concentrations were so low that the small observed differences may not be significant.

Nitrogen (N) was analyzed in four fractions. Total N (TN) includes all fractions containing N. Total soluble N contains all fractions that are not particulate. Ammonia (NH3) is a reactive and potentially toxic form of nitrogen that is produced as a waste product of biological activity and is also readily utilized by plants as a nutrient. NH3 occurs as a dissolved gas in water and forms the ion ammonium under many aquatic conditions. It is obviously not conservative and is capable of being quickly volatilized, oxidized, or incorporated into organic material. Nitrate (NO3) is an oxidized form of N and is also readily utilized by plants. NO3 exists only in ionic form and does not have a gaseous phase except by conversion to NH3. April TN and TSN for Blue River and Cougar Lakes (Figure 36) occurred at a concentration of approximately 0.1 mg/l. Because of the variation associated with the digestion, trends were not easily identified for this month. NO3 occurred at lower concentrations (Figure 37) than observed for SRP. NH3 was unmeasureable. These low concentrations were at or below detections limits and the fact that biologically available forms of N occurred at such low concentrations is indicative of N-limitation of plant growth.

May results (Figures 38 and 39) were similar to April except that there was a trend of increase for SRP with depth in Cougar Lake (Figure 39). In July trends of increasing concentration for TP, TSP, NO3, and SRP were observed in Blue River Lake (Figure 40). NH3 could not be measured in Blue River Lake. Cougar Lake had concentrations of TP, TSP, and SRP that increased with depth (Figure 40). However, NH3 and NO3 showed large changes with depth with NH3 peak concentrations at 30 m and NO3 peak concentrations at 60 m and 110 m depth. Although NH3 and NO3 occurred at only 0.04 mg/l, TN and TSN occurred at greater concentrations of approximately 0.4 mg/l for Blue River Lake and 0.2 mg/l for Cougar Lake (Figure 41). There was no depth trend for TN or TSN in July.

In August P concentrations showed a trend of increasing concentration with depth for both lakes (Figure 42) but they occurred at low concentrations of approximately 0.01 mg/l in Blue River Lake and approximately 0.02 mg/l in Cougar Lake.

Except at the deepest depth, TN and TSN diminished to approximately 0.2 mg/l in Blue River Lake (Figure 43) compared to July. TN and TSN were unchanged in Cougar Lake. NO3 had strong trends of increase with depth in both lakes in August (Figure 44) and occurred at maximum concentrations of approximately 0.06 mg/l at the bottom of Blue River Lake and 0.075 mg/l at the bottom of Cougar Lake. NH3 was measureable in Blue River Lake but occurred at approximately 0.01 mg/l. NH3 occurred at similar concentrations in Cougar Lake but with a peak concentration near the thermocline at 30 m depth (Figure 44). The peak concentration was approximately 0.06 mg/l.

In September TP, TSP, and SRP showed little trend in Blue River Lake (Figure 45). However both NH3 and NO3 increased with depth in that lake (Figure 45). TP, TSP, and SRP behaved very similarly in Cougar Lake with a small peak at appriximately 30 m depth. TP also showed an increase near the lake bottom. TN and TSN seemed to decrease in Blue River Lake with depth in September whereas they tended to increase with depth in Cougar Lake (Figure 46). The September trends for TN and TSN were weak and concentrations of these two N fractions occurred at approximately 0.2 mg/l for both lakes.

Stream stations showed interesting trends for nutrients. April results (Figure 47) show that concentrations of TN and TSN were similar for inflows and outflows for both lakes. There may have been slightly more TN and TSN entering Cougar Lake from SF-IN than was exiting at SF-OUT and slightly more TN and TSN just downstream from the confluence of the project outflows at MR-FR compared with MR-UP. Concentrations of TN and TSN seemed to occur at approximately 0.2 mg/l at most locations.

Interestingly, NH3 always exceeded NO3 in the stream samples for April. The greatest concentration of NH3 occurred at BR-IN at approximately 0.035 mg/l. SF-IN also had approximately 0.03 mg/l and although the outflows had less than the inflows, MR-FR had more than 0.03 mg/l NH3 compared with less than 0.01 mg/l at MR-UP. NH3 at MR-FR exceeded the concentrations observed at the outflows. Although they were less than their respective inflows the reservoir outflows undoubtedly influenced this increase in the McKenzie River but the entire increase could not be explained by the outflows. Maximum NO3 concentrations were observed in April at SF-OUT at approximately 0.015 mg/l. Other stations were nearer 0.01 mg/l except for BR-IN and MR-UP at which concentrations were approximately 0.005 mg/l.

April P fractions showed clear trends with the greatest concentrations of all fractions occurring at stations on the McKenzie River and the lowest concentrations at project inflows and outflows (Figure 47). There was a slight decrease in concentration of all P fractions downstream from MR-FR. These trends was similar in May (Figure 48) although the maximum concentrations decreased slightly to approximately 0.03 mg/l at MR-UP. There seemed to be a clear decline of SRP from a concentration of 0.03 mg/l at MR-UP to less than 0.01 at MR-HB.

In contrast, TN and TSN increased dramatically at MR-HB over all other sampling sites in May 1996 (Figure 48). At most locations concentrations of TN and TSN occurred at approximately 0.25 mg/l with the lowest ones occurring at McKenzie River stations MR-UP, MR-FR, and MR-LD. At MR-GS TN increased to approximately 0.35 mg/l although TSN remained at less than 0.25 mg/l. At Hayden Bridge, these increased to greater than 0.5 mg/l TN and almost as much TSN (Figure 48).

In May NH3 was undetected at all stream stations. NO3, however, was detected at low concentrations of approximately 0.005 mg/l or less at most stations (Figure 48). However, again there was a trend of increase with distance downstream on the McKenzie River with the greatest NO3 concentration at Hayden Bridge of approximately 0.016 mg/l.

In July, P concentrations mostly followed the pattern observed in April and May (Figure 49). However, SF-IN showed elevated concentration over other inflows and outflows. And SF-OUT contained greater than 0.05 mg/l TSP while other fractions of P were 50% of inflow concentrations (Figure 49). MR-UP was again generally higher in concentration for all fractions of P compared with other stream stations. These occurred at approximately 0.05 mg/l and tended to decrease with distance downstream to approximately 0.035 mg/l.

TN and TSN concentrations showed little trend except for SF-OUT which had greater than 0.5 mg/l TSN which greatly exceeded TN (Figure 49). This fact makes the measurement suspect because TN should always be approximately equal to- or greater than TSN. A large difference in the opposite direction may be due to a contaminant or an analytical error which in this sample could not be discovered.

NH3 was undetected at locations along the McKenzie River and the sample for MR-FR was lost in transport. Where NH3 was detected, the maximum value occurred in the outflows of both lakes (Figure 49). BR-OUT had a concentration of NH3 of approximately 0.023 mg/l while SF-OUT had 0.015 mg/l. NO3 occurred at approximately 0.005 mg/l where detected except for SF-IN and SF-OUT. The Cougar Lake inflow, SF-IN contained approximately 0.01 mg/l NO3 and SF-OUT contained 0.015 mg/l NO3. NO3 was undetected at BR-OUT.

In August, NH3 and NO3 were detected at all stream stations (Figure 50). Concentrations, moreover, were approximately 0.005 to 0.010 mg/l at all locations for both NH3 and NO3 except for the outflows BR-OUT and SF-OUT which had NO3 concentrations of approximately 0.05 mg/l. TN and TSN were also similar for most stations except for BR-OUT which had almost 0.5 mg/l TN and MR-GS and MR-HB which had approximately 0.35 and 0.25 mg/l TN respectively. The elevated TN concentrations at MR-GS and MR-HB occurred after a decline along the other locations of the McKenzie River to a concentration of approximately 0.11 mg/l at MR-LD (Figure 50). Also at MR-LD there was an anomalous elevated concentration of TSP as had been observed for July at SF-OUT.

Stream P concentrations for August followed a remarkably similar pattern to that observed in July with the exception of low TSP for SF-OUT in August compared to the anomalous high concentration observed in July (Figure 50). The greatest concentrations for all fractions of P were observed at MR-UP. These declined downstream to MR-HB. Inflows to the reservoirs tended to contain greater concentrations of P fractions compared with the outflows. This was especially true for SF-IN which contained more than double the concentration of SF-OUT.

In September the pattern was again similar to that observed in August (Figure 51). Concentrations of P were maximum at MR-UP and declined with distance downstream. Inflows to Blue River Lake and BR-OUT contained the lowest concentrations. SF-IN was again much greater than SF-OUT with regard to all P fractions.

TN and TSN showed virtually no pattern (Figure 51) and NH3 was undetected at all locations. NO3, however showed elevated concentrations of approximately 0.023 mg/l at BR-OUT and 0.014 mg/l at SF-OUT. MR-UP contained no detectable NO3 and the concentrations of NO3 observed downstream (approximately 0.005 mg/l, near the limit of detection) may be due to releases from the reservoirs at that time.

**Other chemical components**

An additional trend that was observed was the difference between the tributary systems with regard to sulfate (SO4). Blue River, the McKenzie River, and Blue River Lake occasionally contained concentrations of this ion in the part per million (ppm) range. These concentrations were as much as four times greater than those observed for Lookout Creek, the South Fork McKenzie River, and Cougar Lake. The greatest concentrations of SO4 were observed in Blue River (BR-IN) in September with nearly 5 ppm.

Additional analytical capability was incorporated in July with the additional ability to measure potassium (K), magnesium (Mg), and calcium (Ca). For the remainder of the season the stream samples from Blue River and the McKenzie River contained the greatest concentrations of these cations, approximately 4 ppm for K and Ca and approximately 2 ppm for Mg. There were no patterns except that the lakes contained lower concentrations.

The metals, iron (Fe) and manganese (Mn) were assessed because they are common in certain aqueous environments. They occasionally existed at measureable concentrations in this system but showed no important trends. The numerical data for $SO_4$, K, Mg, Ca, Fe, and Mn are in Appendix B, Chemistry Data.

**Biological Analyses - Chlorophyll**

Of the biological measurements, chlorophyll biomass is the most repeatable assessment. Chlorophyll *a* showed strong trends in both lakes and no trends whatsoever in the stream samples. At all inflow, outflow, and river stations, chlorophyll *a* was always less than 1 µg/l. The absence of chlorophyll from these sites was not unexpected.

Blue River Lake had a strong chlorophyll *a* peak at 10 m depth in May 1996 (Figure 52). The peak concentration was nearly 10 µg/l and was coincidental with an algal bloom ongoing in that lake. At all other depths and times concentrations were less than 2 µg/l.

Cougar Lake had a more visible algal bloom than Blue River Lake and this was shown in the chlorophyll *a* data (Figure 53). A peak concentration of approximately 15 µg/l occurred at the lake surface in May followed by a July peak of approximately 6 µg/l at 10 m depth. At all other times chlorophyll *a* concentrations were less than 2 µg/l. The Oregon standard for chlorophyll *a* concentrations is 15 µg/l, the maximum observed for Cougar Lake. At no time was a greater concentration observed elsewhere in the system.

Chlorophyll fluorescence measured in situ did not exhibit a strong fluorescence peak and where it did, followed the same trend as seen in the results of chlorophyll *a* analyses.

Phytoplankton

Samples were taken at 10 m depth intervals at station 1 of both lakes. Enumerations were completed for most of these samples although so few cells were encountered at depths greater than 30 m that only brief 'scans' were completed for deeper depths to confirm the low population densities. Phytoplankton densities in Blue River and Cougar Lakes are reflective of the chlorophyll concentrations described earlier. The phytoplankton of these lakes are typical of many such lakes and are dominated by cyanobacteria for much of the spring and summer.

In Blue River and Cougar Lakes, the dominant taxon was *Anabaena circinalis*. This taxon was identified on the basis of the growth form which placed it in the genus *Anabaena*. The specific identity was determined by the filament characteristics, and the dimensions and shape of vegetative cells, heterocysts, and akinetes. Figure 54 summarizes the distribution of this alga in Blue River and Cougar Lakes. Its presence in waters deeper than the thermocline was noticed but cells appeared to be in a state of decomposition, to be expected at those depths. The absence of active chlorophyll *a* at those depths supports the hypothesis that cells sinking to those depths are either not active or decomposing.

Other taxa noted included diatoms, green algae, and dinoflagellates (specifically *Ceratium*). Where there were significant phytoplankton densities present, based on numerical counts, the dominant taxon was always *Anabaena*. The presence of other taxa was expected but those taxa did not form populations of importance comparable to *Anabaena circinalis*.

An important feature of the population of *Anabaena circinalis* was the presence of a large percentage of heterocysts, cells that function to incorporate free gaseous nitrogen into an organic form (nitrogen fixation). In these lakes heterocysts represented from 5% to 9% of the population cell density.

Another noticeable feature is the presence of akinetes in mid- to late-summer. Akinetes are specialized cells which are capable of resisting conditions not conducive to growth. They are sometimes referred to as 'resting stages' and may function as the source of subsequent populations in successive seasons of growth. Akinetes were found in all samples but incidental samples taken in surface scums were almost exclusively composed of akinetes making taxonomic identification difficult initially.

Anecdotal observations can be useful but are rarely of any quantifiable importance. However, during August when station 1 at Cougar Lake had low phytoplankton densities, a thick cyanobacteria scum was present elsewhere in the lake. This accumulation had formed in July and was observed in several locations during sampling. The location seemed dependent on the direction of prevailing winds.

Anecdotal observations made during stream sampling also indicated the presence of a heterogeneous algal growth. These growths were composed primarily of green algae and diatoms and occurred in May in the downstream reaches of the McKenzie River, in August and September in the inflow streams, and continuously in the outflows from the two dams. The tailrace below Blue River Dam had particularly massive growths of filamentous algae that occasionally obscured the rock substrate.

**SELECT Analysis of Cougar Lake Outflows**

The numerical method SELECT (USACEWES rev.1992) was employed to analyze the relationship between outflows from Cougar Dam and the water column characteristics in Cougar Lake. SELECT is a computational tool which uses information about intake design, flow rate, lake elevation, and water column characteristics to predict the characteristics of outflows. Because appropriate information was known and collected for Cougar Lake this approach was employed to explore those relationships.

SELECT is a one-dimensional numerical model that predicts the vertical extent and distribution of withdrawal from a reservoir of known density and quality distribution for a given discharge from a specific outlet. It is simple approach in which simplifying assumptions are made regarding such factors as water density or lake dynamics. These assumptions are often violated but if the approach is used to make instantaneous predictions and the characteristics being investigated do behave in an approximately conservative manner, it can successfully predict outflow characteristics.

Cougar Lake presented some strong violations of these assumptions. The most important of these were related to the morphometric characteristics of the lake near the intake. Specifically, a deep area at the intake associated with Rush Creek is isolated from the main body of the lake by a submerged hill or ridge which extends from the south shore under the lake to the dam. This obstructs water movements downstream at depths greater than the ridgetop. Furthermore this obstruction occurs a significant distance upstream from the deep intake. At low flows common for much of the summer, this distance corresponds to an undetermined but large amount of travel time. Therefore, characteristics in the main body of the lake have some time to change during travel from the point of measurement to the intake structure.

Significant time of travel weakens the assumption that a characteristic of interest is conservative. SELECT assumes that travel time is short enough that temperatures, dissolved oxygen, or other chemical concentrations do not have time to change significantly allowing an accurate prediction. SELECT also does not account for the dynamic changes associated with depletion of water from certain depths and replacement with different characteristics. In Cougar Lake both limitations are present. In the first instance, travel time is probably long enough that some parameters can change before reaching the intake. In the second instance, measurements taken in the main body may not accurately depict the conditions of water then reaching the intake. These are obviously related problems.

SELECT also has two primary modes, selective withdrawal through one or more intake ports and withdrawal with a submerged weir upstream from the intake. Cougar Lake does not technically fit either of these modes. However, this study was able to achieve prediction success employing a weak assumption that the submerged ridge at Rush Creek is a submerged weir. This success actually reveals some important characteristics of Cougar Lake and the results of the SELECT runs were used for later interpretation of the results in the conclusions of this report.

Initial trials using the actual port specifications for the Cougar Dam intake failed to accurately predict the observed outflow temperatures or dissolved oxygen concentrations. All efforts to impose accurate characteristics for the intake structure failed. The differences between prediction and observed values were too great to be accounted for by the non-conservative nature of the parameters. Another way to view this is that the travel time between the intake port and the outflow structure was too short to account for significant changes in temperature or dissolved oxygen. Therefore, other factors between the intake structure and the rest of the lake must have altered the water characteristics near the intake structure.

The only plausible explanation for such an external factor was that deeper water movements were restricted by the submerged ridge associated with Rush Creek. When the intake was specified as a submerged weir with characteristics based on the approximate shape of the submerged ridge, acceptably accurate predictions were made. For those successful SELECT trials the characteristics of the submerged weir were specified as listed in Appendix F which presents the actual output of those trials. Briefly, the weir was described as being 100 ft in length with a crest elevation of 155 ft above the greatest depth in the lake.

SELECT trials were completed for all sampling months except for April during which time the lakes were most weakly stratified and were still filling to maximum summer elevations. Because the water quality concerns were mostly associated with the later summer season, trials were confined to that the period of May to September. From May to September outflows from Cougar Lake were minimal, approximately 14 - 31 cfs. It was found from repeated trials that at those modest flows, that the length of the weir crest was unimportant unless narrowed to approximately 10 ft. At that extreme the velocity field was altered such that deeper waters were predicted to be entrained making less accurate predictions. Doubling the weir length to 200 ft had no significant effect.

The altitude of the crest above the lake bottom was more critical. Examination of the topographic information from maps and construction specifications indicated that the ridge crest just upstream from the inflow of Rush Creek is irregular and highly variable. The elevation at its deepest location was approximately 105 ft but most of the ridge had a greater altitude above the lake bottom. There was no means to actually measure the depth of this ridge with accuracy. Therefore in order to employ the numerical approach for predictions of other water quality characteristics, the altitude of the ridge was adjusted during trials for temperature and dissolved oxygen until reasonably accurate predictions were attained. As indicated in the appendix, the least altitude that gave acceptable results was 155 ft.

During SELECT trials the specification of a submerged weir disallows any additional specification of intake port characteristics. Therefore, for these trials, the adjustment of the altitude of the weir crest accounted not only for travel time effects, but for other intake characteristics, and any non-conservative tendencies as well.

Table 8 shows the comparison of temperature and dissolved oxygen for predicted and measured values. As listed in the table, dissolved oxygen was more accurately predicted than temperature. This should not be interpreted too liberally. Comparison of the dissolved oxygen data to the temperature data in the lake showed greater changes with depth for temperature than dissolved oxygen. This could explain the difference in accuracy. Another explanation could be that the water changed temperature slightly during the travel time but not dissolved oxygen. Either or both explanations could be true. Nevertheless, the agreement for both parameters was acceptable and the intake characteristics for those trials were subsequently employed with the organic carbon data collected from chemical analysis of the lake and the outflow.

The SELECT trials for temperature and dissolved oxygen were reasonably good. One exception was for 25 September 1996 at which time outflows were measured at 12.5°C while SELECT predicted 10.15°C. At other times the difference was smaller, usually increments of 0.2 C° or less and within the known error for the measuring device. Dissolved oxygen was predicted by SELECT to be within approximately 0.5 mg/l or less of the measured value. The fact that dissolved oxygen usually increased in the measured value could be the result of aeration between the outlet structure and the location of measurement a short distance downstream.

The results of the SELECT trials incorporating TOC and DOC are instructive (Table 8). Whereas the TOC and DOC measurements were subject to occasional anomalous concentrations, SELECT was acceptably realistic in its predictions. Most organic carbon in the lakes was in the dissolved form (DOC) and SELECT was within 1 mg/l of measured values for DOC. The largest difference occurred in July when there was a time difference of approximately two weeks between data taken for the lake and data taken for the stream stations. Often SELECT was within 0.2 mg/l of the measured value, good agreement for a parameter difficult to measure accurately. The success with DOC, then, sheds light on results for TOC which present greater analytical challenges. TOC includes particulate carbon and should always be equal to or greater than DOC. In the McKenzie River system, occasional large concentrations of TOC were encountered. These were occasionally larger than expected and the analytical error may explain these occurrences. One such occurrence existed for the Cougar Dam outflow on 25 September 1996. At that time a concentration of TOC approximately 3.12 mg/l was measured. This was nearly an order of magnitude greater than measured for DOC (0.46 mg/l) and unexpected. SELECT used the data for the Cougar Lake water column to predict that TOC should have been approximately 0.66 mg/l. This prediction was consistent with the expected TOC concentration in that TOC should have been slightly greater than DOC which was predicted and measured at 0.57 and 0.46 mg/l respectively. This supports the possiblity that the TOC value measured at 3.12 mg/l is incorrect and adds robustness to the measured data from Cougar Dam.

## SUMMARY AND CONCLUSIONS

The proposed structural modification to Blue River and Cougar Dam intake structures (U.S. Army Corps of Engineers 1994a) will alter the thermal characteristics of the lakes, the outflows, and the McKenzie River in a manner which is favorable to fisheries interests. However, other resource users expressed concern regarding other potential impacts to the river and to the quality of the water supply. These concerns were primarily with regard to turbidity, organic carbon, taste and odor, and nutrient concentrations. This study was performed to assess the current status of this system as well as the potential impact with regard to the above concerns. Because the U.S. Army Corps of Engineers Portland District had previously performed a survey regarding taste and odor with negative results (James Britton personal communication) and because the analytical capability necessary to address this concern was not available for this study, taste and odor was not addressed. However, the study did address the other concerns and these conclusions summarize the current status of this system and the possible effect of the proposed modifications on this system.

The thermal trends in the two lakes are controlled by two major factors, hydrodynamics and meteorological forces. The resulting thermal structure affects dissolved oxygen distributions and to some extent, pH, ionic content, and organismal distributions. Current impacts on the thermal structure of Blue River and Cougar Lakes as well as the expected changes following proposed modifications were exhaustively described in a separate report (U.S. Army Corps Engineers 1994b)

Dissolved oxygen is one of the most important factors determining habitat for aquatic life. No observations were made that showed significant anoxia in either lake, although the tendency for oxygen decrease in the hypolimnion was observed. In Blue River Lake, anoxia was observed near the lake bottom at one location during late summer.

Turbidity was identified as a potential problem although the maximum values observed were not excessive. The state of Oregon allows no more than a 10% increase over a control immediately upstream from the source of turbidity (Oregon Department of Environmental Quality 1996). If Blue River Dam and the stored suspended material from earlier inflows is interpreted as a source of turbidity, and if the inflowing streams are used as the upstream controls, then this standard was violated during this survey. However, the maximum turbidity observed in the stream did not exceed the EPA guideline of 25 NTUs. The tendency for these lakes to retain turbid materials and to release them over time has been noted previously (U.S. Army Corps of Engineers 1994a) and this study confirmed that tendency.

Turbidity tended to increase with depth in both Blue River and Cougar Lakes, an expected outcome of settling suspended materials. Any modification that selectively released water from shallower depths would obviously decrease the turbidity in the outflows. In confirmation of this, although the turbidity of the lake waters was greater near the bottom for Cougar than for Blue River Lake, the mid-depth water release of Cougar Dam had less turbidity than releases from Blue River Dam.

In the proposed modification, releases will be made from depths which contain water temperatures that meet the target criteria. These shallower depths are likely to be less turbid leaving cooler more turbid waters at depth for later release during the fall drawdown noted in Figure 5. The tendency of these basins to act as traps for this material will be maximized under this scenario and the greatest impact on turbidity may occur later and with less intensity. It is important to note that although the turbid materials seem to be the result of sudden or large inflows, biological processes can also modify these and the actual outcome may depend on additional processes.

The distribution of organic material in the system suggests that great concentrations of organic carbon are rare, at least in forms available for water analysis. Oregon did not list a state standard for organic carbon and the range of concentrations of organic carbon in surface waters is large and dependent on many factors. The large debris entering the system as a result of flooding may be a contributing factor to the organic carbon in the water but this study did not address the potential sources of organic material. TOC and DOC were observed in the 1 to 2 mg/l range at most locations and times. Occasional greater concentrations up to 12.56 mg/l were observed for TOC but sometimes in inexplicable locations.

Blue River Lake usually had approximately 1 to 2 mg/l TOC and DOC indicating that most of the organic carbon in this lake exists either dissolved or as particles small enough to avoid being removed by filtration. May and September TOC concentrations were exceptional and could not be explained against the comparison with earlier or later samples at the same depths. However, under current conditions these concentrations, if real, are confined to the greatest depths of the lake.

Under current conditions, the release of these materials downstream did not clearly affect the subsequent locations on the McKenzie River. Although the lowest concentrations of organic carbon were often observed upstream (MR-UP), the concentrations downstream were unrelated to the outflow concentrations from the projects. Indeed the greatest concentrations observed at stream stations were for the farthest stations downstream for TOC in July (8 mg/l) and for the inflows to the reservoirs for DOC (3.6 mg/l at BR-IN), also in July.

Under current conditions the lakes do contain greater concentrations of TOC and DOC than inflows at most times and may contribute to small increases to organic carbon in the McKenzie River. However, this trend is based on small differences and the distribution of organic carbon in the lake suggests that releases from shallower depths will not likely cause further increases in organic carbon in the outflows.

The proposed modification would likely retard the release of particulate organic materials potentially improving the quality of releases during the stratified season. Retention for a longer time raises additional questions regarding the fate of these materials especially where biological activity has already been observed producing hypoxic conditions at depth (Blue River Lake). These organic particles may be available for the production of additional DOC or they may be converted to inorganic carbon (CO2 or bicarbonate) through respiration processes.

In studies more recent than this (Stepczuk 1997), additional issues regarding the contribution to organic carbon to the formation of unwanted disinfection by-products such as THM or similar compounds have been identified. These issues include the relative contribution by various forms of organic carbon, the major forms being dissolved versus total or particulate. The drinking water standard is for TOC although increasing evidence shows that the dissolved fraction actually contributes to the unwanted compounds. In addition, the nature of the DOM has come into question with aromatic organic forms being proposed as more contributory than aliphatic forms. These unresolved issues are important to the McKenzie River lakes and streams because the greatest DOC and TOC are contributed to the system from the watershed. And these organic compounds are more likely to occur as the aromatic forms. Organic carbon formed in the lakes autochthonously, however, tend to take the aliphatic form and if the contributory difference between them regarding THM precursors is true, then the newer techniques capable identifying the form should be included in future work. In this manner, the actual contribution of organic materials by the lakes can be identified and the relative contribution to THM precursors through the various forms of organic carbon can be described.

Oregon supports the EPA guideline of 0.1 mg/l for phosphorus in these and other waters (Oregon Department of Environmental Quality 1996). No mention was made for other nutrients which poses an interesting situation for waters that are nitrogen-limited such as the McKenzie River system. Moreover this guideline makes no distinction between the various forms that P can assume, some more available to biota than others. Regardless, P concentrations in any form never exceeded the guideline during the course of this study.

Nutrient concentrations in this system were also noteworthy because of their often low concentrations and because of the tendency of plankton to interact with the nutrients. Furthermore, concentrations of N and P were observed in ratios indicative of nitrogen limitation for these waters. Nutrient limitation in this sense is defined using an atomic ratio test in which the ratio of nitrogen to phosphorus (the N/P ratio) is examined. If greater than approximately 12 - 15, phosphorus is suspect as a potential limiting nutrient. If the ratio is less, nitrogen is suspect. Although growth potential assays and other laboratory tests may be performed to elucidate the finer qualities of these relationships, this study used the N/P ratio and the fact that dominant organisms were capable of fixing external sources of nitrogen as diagnostic of N-limitation.

The tendency of this system to be nitrogen limited was also previously noted in the EIS (U.S. Army Corps of Engineers 1994a). Much of each of the nutrient elements, N and P, was in some combined form, not ionic, and hence was more available where processes tended to decompose those combined materials into inorganic or ionic species.

Under current conditions, N is the limiting nutrient although it seems to occur in substantial concentrations at certain times and locations. This is especially true for TN and TSN in Blue River and Cougar Lakes. These forms of N can be made available for microbial uptake through decomposition processes which can produce NH3. In what is a rapid oxidation step NH3 oxidation consumes oxygen in the waters where this process takes place. This is important where NH3 production occurs and especially if oxygen is not replenished. The ultimate product of this oxidation is NO3. Both NO3 and NH3 are available as plant or microbial growth nutrients. Both of these tend to be distributed in greater concentrations at greater depths in both Blue River and Cougar Lakes.

Processes which consume oxygen require organic material in order to continue. The products of respiration processes include mineral substances which may contribute to dissolved ionic content of the water. Evidence of such processes was found in the observed decrease in oxygen over the season as well as the apparent increase of specific conductance at certain depths below the thermocline.

The relationship between oxygen dynamics, phytoplankton growth, and nitrogen metabolism (especially where N is a limiting nutrient) is complex but very important to determining water quality in many systems. This study did not assess the full implications of these complex interactions.

Differences in specific conductance throughout the system also reflected the varying nature of the geologic composition of the watershed as did distributions of sulfate. These distributions had little relationship to aquatic processes in the lakes. If anything, the lakes tended to dilute the ionic content of the McKenzie River, as measured by specific conductance.

Biological activity in these lakes is strongly influenced by the available nutrients present in the waters. The phytoplankton bloom as recorded by chlorophyll a concentrations showed a strong peak in May and a decline through July. The distribution of this bloom is near the surface although cells are found at greater depths later in the summer. Most autotrophic activity occurs in the surface 10 meters of the lakes and this corresponds approximately to the photic zone.

The dominant component of the phytoplankton is *Anabaena circinalis*, a cyanobacteria. It furthermore forms heterocysts and is capable of fixing nitrogen from dissolved gases in the water. Heterocysts are specialized cells formed by some genera of cyanobacteria and are the site of N-fixation for those cyanobacteria. *Anabaena circinalis* , then has a competitive advantage over other algal forms competing for nutrients, especially the limiting nutrient, nitrogen. At present, peak chlorophyll biomass values approach 15 µg/l during bloom conditions. This maximum biomass was observed at one depth and at one time although heterogeneities in the spatial distribution of these organisms could produce localized greater concentrations of biomass. Additional study would be required to completely answer questions regarding the growth and distribution of these blooms throughout the lakes.

Another capability of the genus *Anabaena* is the formation of gas vesicles. Gas vesicles are structures internal to the cells which, filled with gas, cause more or less buoyancy for the cells possessing them. Although this study did not examine the degree to which this occurred in Blue River and Cougar Lakes, qualitative tests supported the hypothesis that the cells did contain gas vesicles during bloom conditions. This test involved applying external pressure to floating accumulations of cells which, if they possess gas vesicles, will tend to sink after the pressure is applied. Such buoyant capability would tend to keep the bloom near the surface depths of the lake and may be responsible for the observed scums during July and August.

Nitrogen limitation, dominance by Anabaena, the relatively high percentage of heterocysts, and the ability to form resistant cells and gas vesicles make this organism well adapted to Blue River and Cougar Lakes. The populations will always have the capability of blooming and changes in the system could influence growth or distribution.

The tendency of NO3 and NH3 as well as other chemicals to increase concentrations in the deeper waters is important to the proposed operation of Blue River and Cougar Projects. Any modification that causes the deeper waters to remain 'isolated' for a longer time will tend to allow these chemicals to accumulate in greater concentrations. In other lakes such as Carter's Lake in Georgia or Yatesville Lake in Kentucky this has led to substantial accumulations of reduced metals such as Fe or Mn or soluble nutrients such as PO4 or NH3. In those lakes the process of mixing and aeration of the water during the winter has not been complete unlike Blue River and Cougar Lakes which do experience complete mixing each year. However, if NO3 or NH3 accumulate during the stratified season, these will become available to the photic zone (where light is available for plant growth) during mixing or else they will be released downstream during the drawdown phase of the rule curve (Figure 5).

The hydraulic retention time of these reservoirs varies greatly and depends on the season and lake level. In the summer when materials can accumulate in deeper waters or be released from the sediments, the hydraulic retention time is much greater than during the high flow season especially if the lakes' surface elevations are at their minima. The nutrient release peaks observed during September (Figure 51) could increase as a result of the proposed modifications.

The effect of such releases of nutrients is speculative but may contribute to increased algal growth in the downstream reaches if other conditions are favorable for such growth. If there is increased availability of these nutrients (NO3, NH3) to the surface waters of the lakes, increased algal growth will likely favor competitors of the cyanobacteria and some shift of late summer algal dominance may be observed.

Change of release depths to shallower warmer waters may also impact plankton populations through physical removal. During the summer waters released would tend to remove populations in the vicinity of the intake, in essence exporting biomass from the lakes. Depending on flow rates, growth rates, and spatial distribution, the loss of biomass due to releases may cause the populations not to reach the peak densities currently observed. Or growth may be maintained over a greater time. There is still much that is not known nor can predictions be made that are accurate or precise with regard to these populations.

Recommendations for future work on these projects include the following:

1. basic monitoring studies in which the predicted thermal and limnological behavior of the projects is confirmed,

2. stream monitoring for physical and chemical characteristics using sites similar to those employed in this study,

3. population surveys to monitor the major taxa and population densities in the lakes,

4. quantitative surveys of aufwuchs growth in the McKenzie River to discern growth impacts,

5. additional study of the dynamics of nitrogen metabolism in Blue River and Cougar with the goal of refining and applying a modeling approach to prediction of ecosystem responses.

Recommendations 1 and 2 are similar to the scope of this study. The third recommendation is also similar although future study should place greater emphasis on population dynamics. The fourth recommendation will elucidate the real trends of algal growth in the streams - trends that have been incompletely described at this time. The last recommendation is complex and requires laboratory analysis of complex nutrient interactions. The benefit derived from recommendation 5 will be an ability to predict the consequences to the ecosystem as a result of the project modifications and an understanding of the mechanisms controlling that outcome.

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**FIGURES**

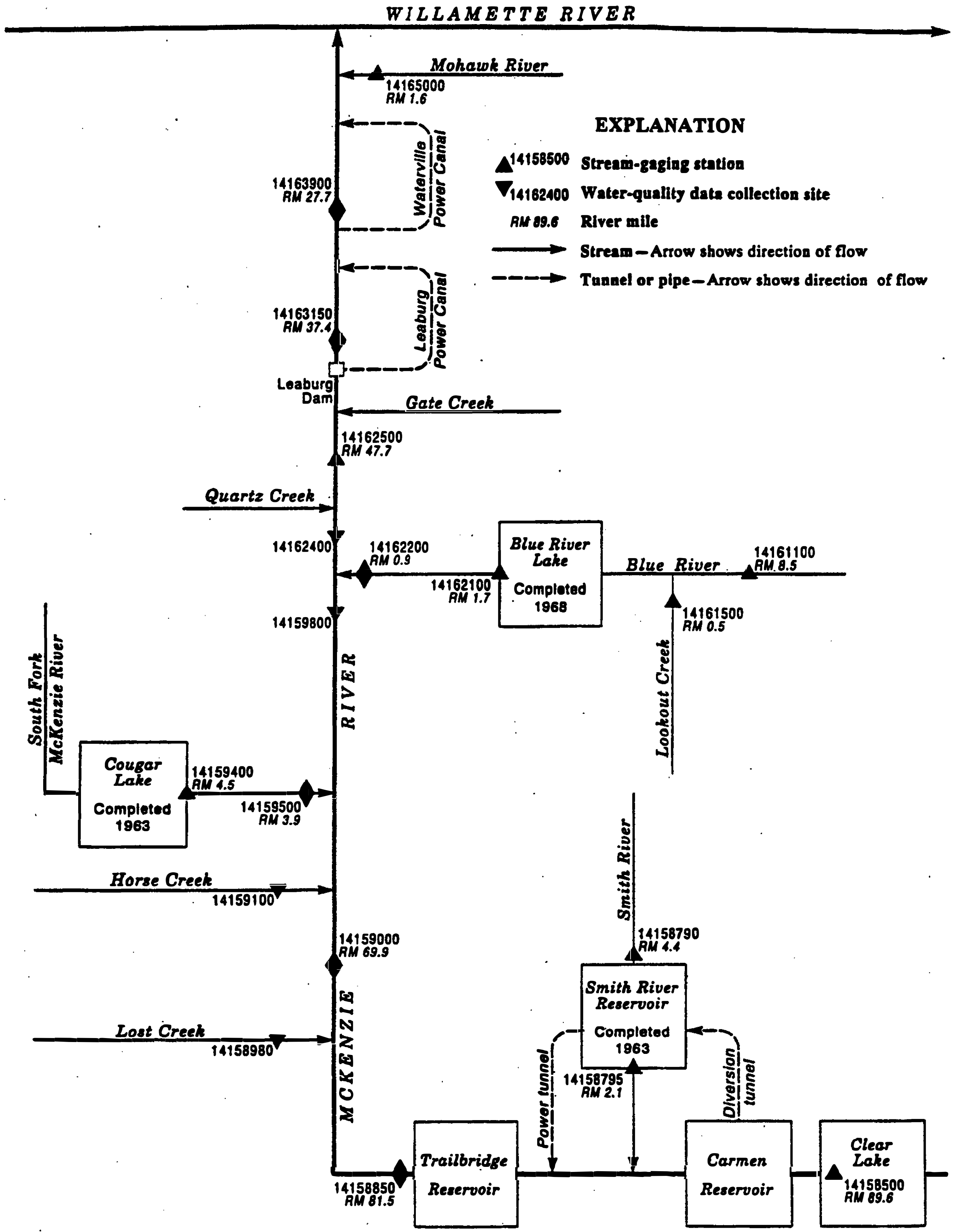



Figure 1. Schematic diagram of the McKenzie River Basin showing the complex of reservoirs, diversions, lakes, tributaries, and the USGS gaging stations located within the basin. Note: the station on the South Fork of the McKenzie River upstream of Cougar Lake is not shown in this diagram
(Source, U.S.G.S. Water Data Report OR-95-1)

# Cougar Lake

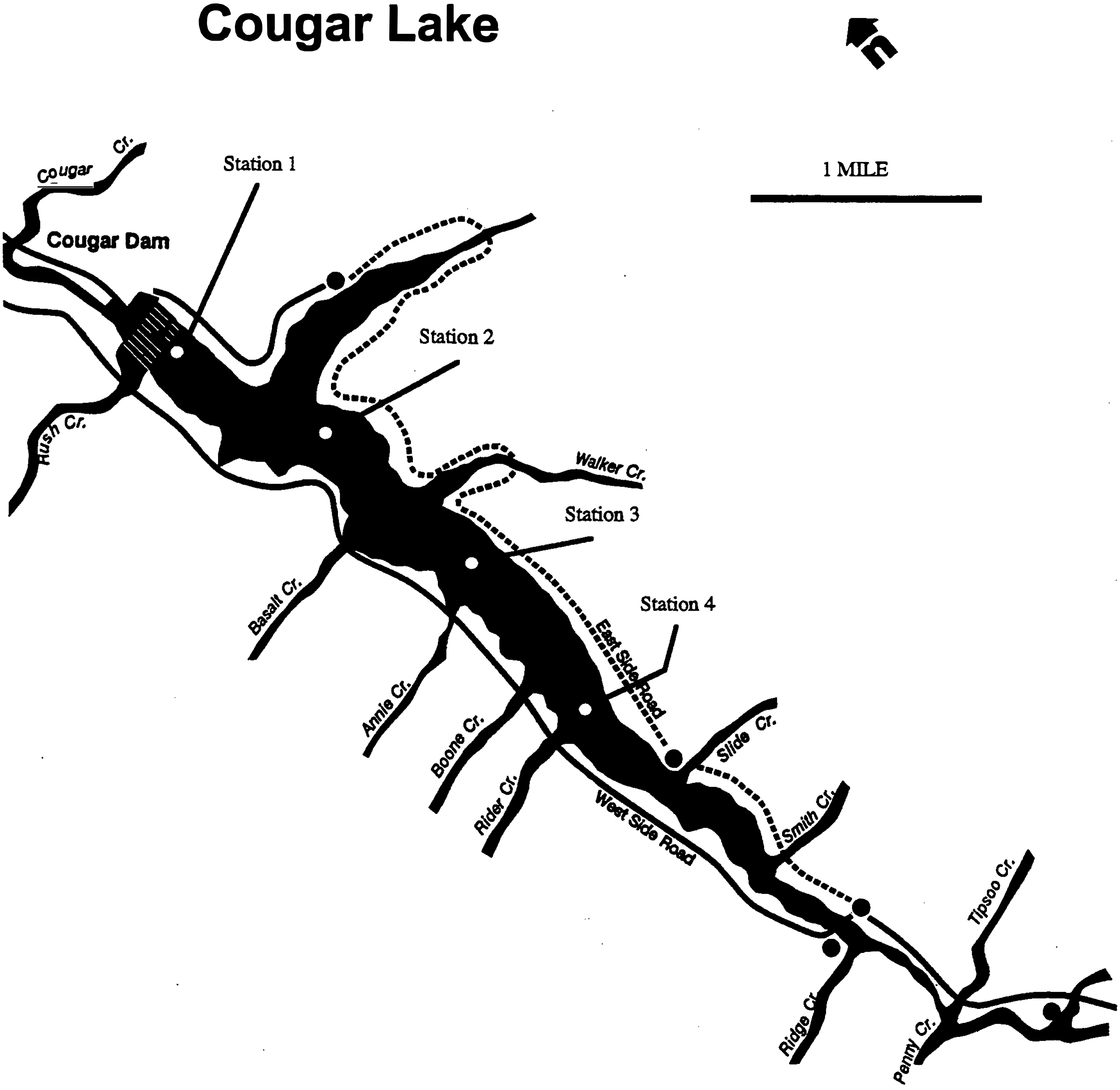



Figure 2. Map of Cougar Lake showing the locations of tributaries and sampling station locations

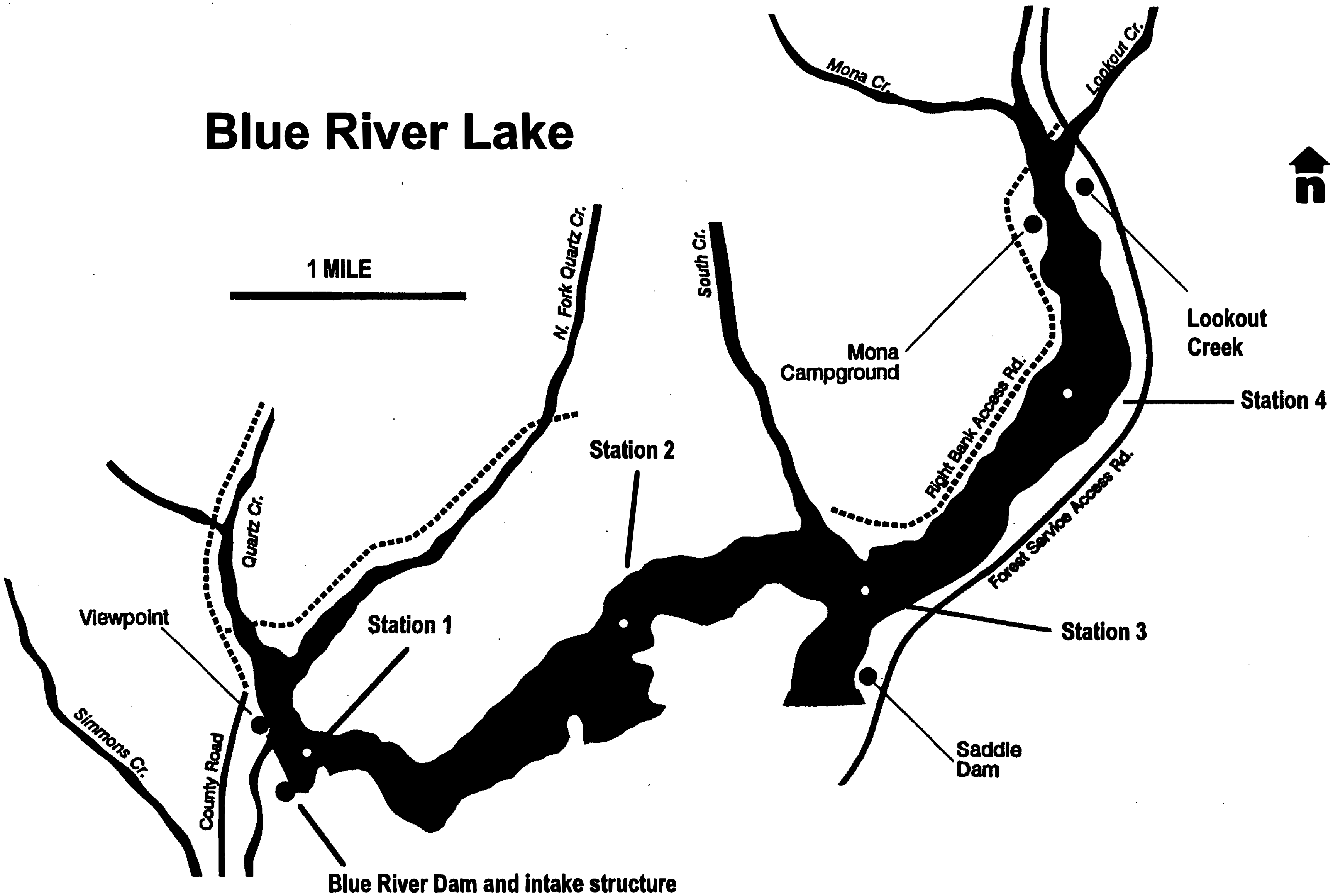



Figure 3. Map of Blue River Lake showing the locations of tributaries and sampling station locations

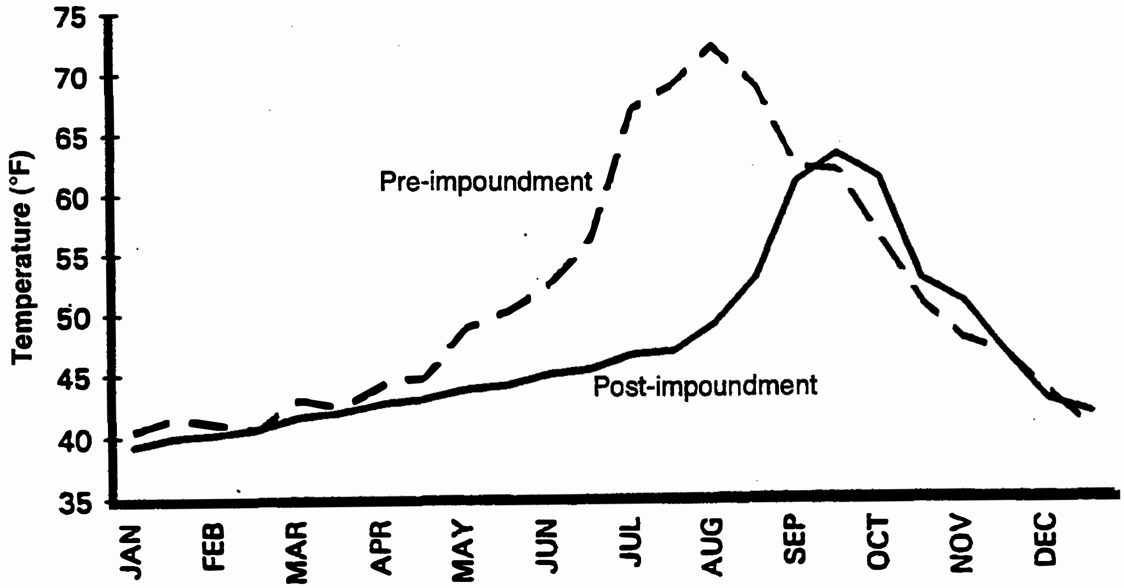



Figure 4. Plot of temperatures downstream from Blue River Dam prior to and after impoundment. Note: Graph is base on USGS temperature data. (Reproduced from USACE 1994)

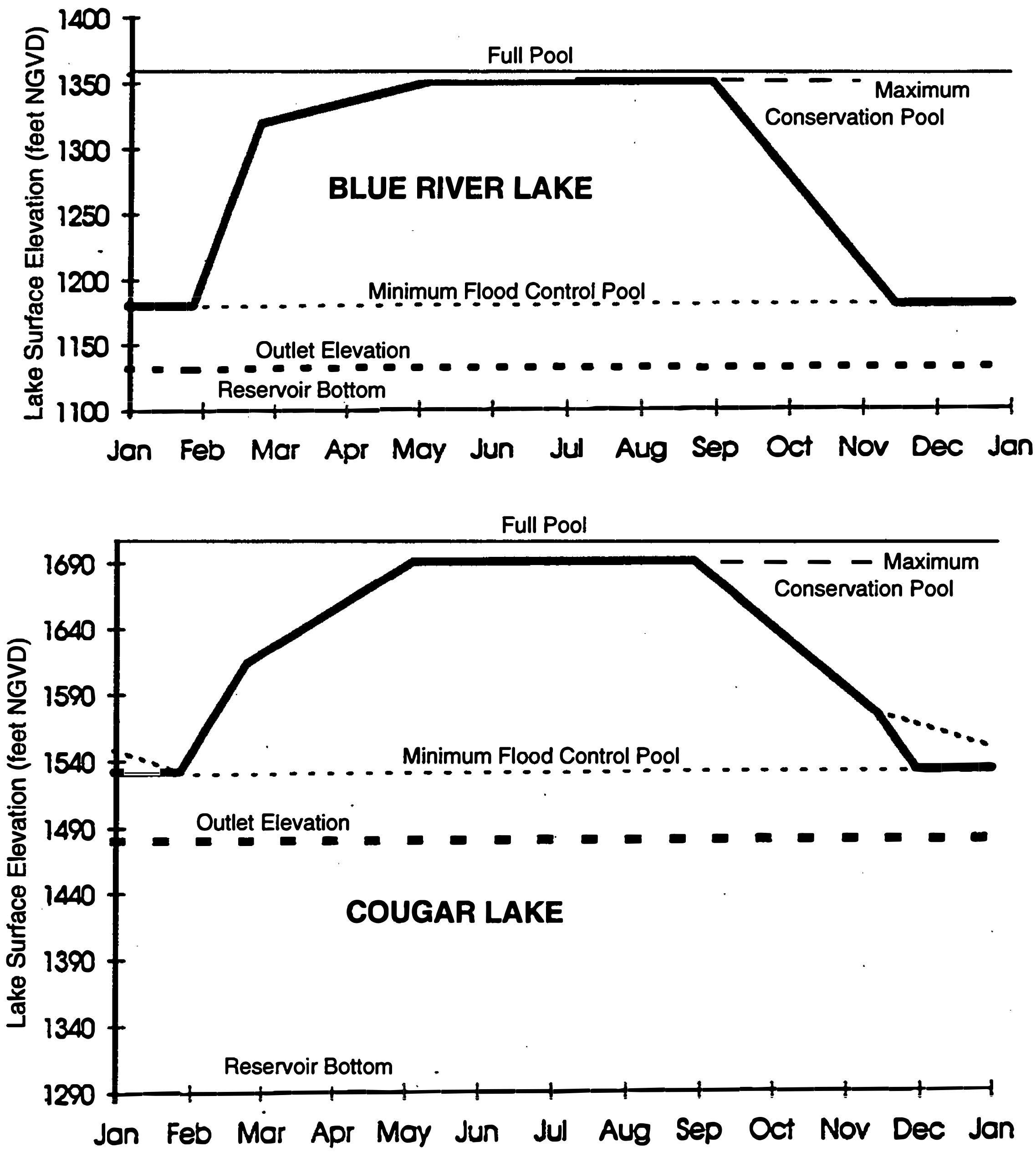



Figure 5. Diagrams of reservoir elevation schedules for Cougar and Blue River Lakes.
(Taken from the Feasibility Report, USACE 1994)

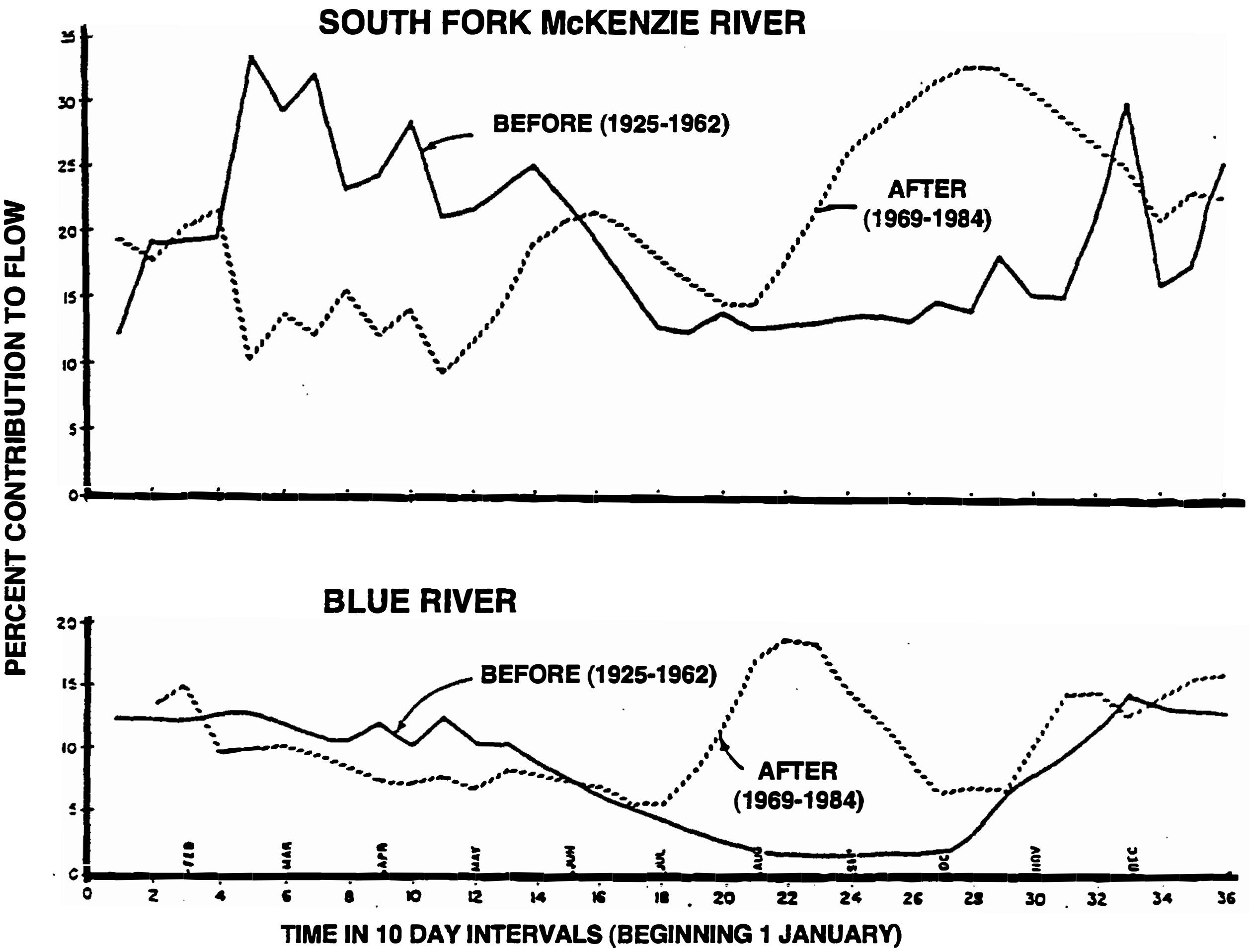
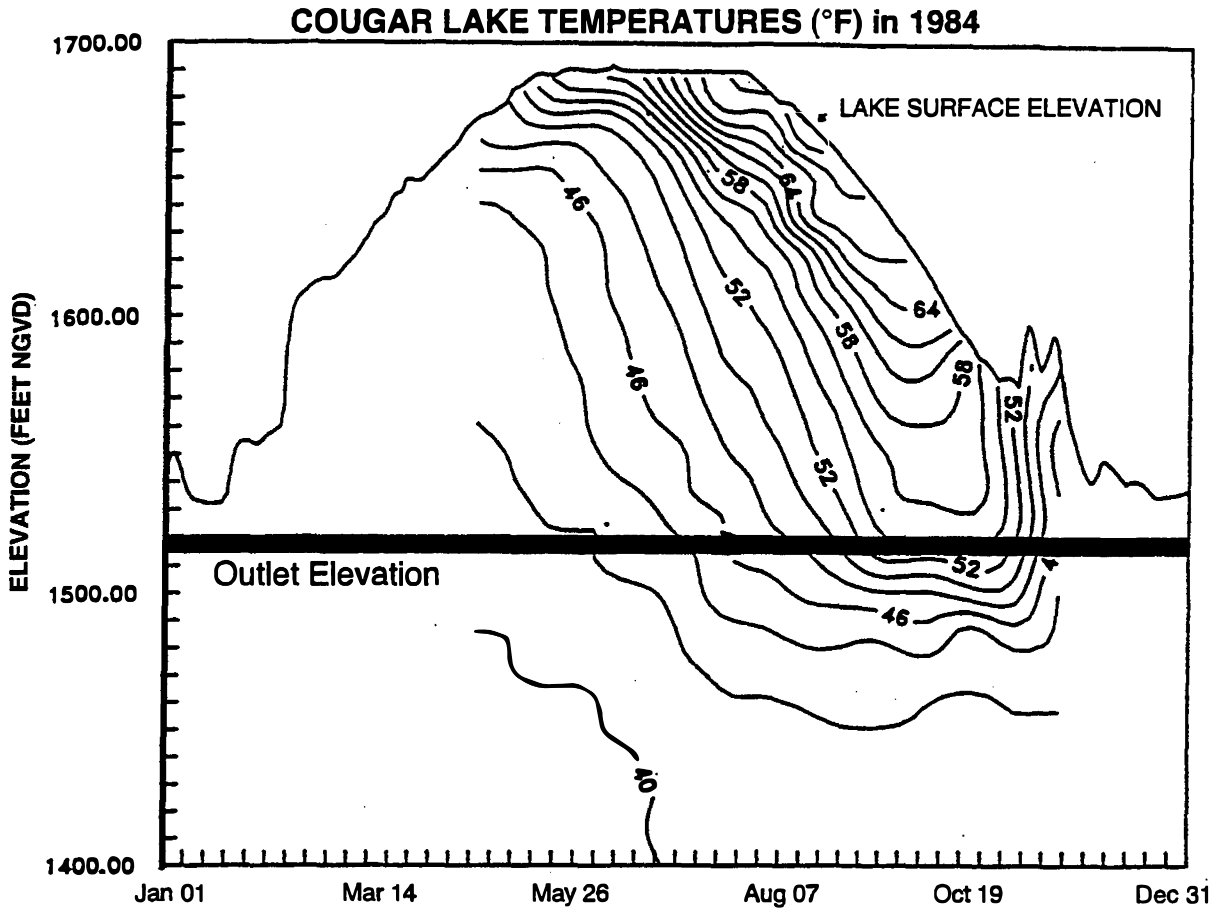



Figure 6. Pre- and post-impoundment flows in the South Fork McKenzie River and in Blue River downstream from the respective Dams. (Data from USGS gaging stations, graphs reproduced form USACE 1994)



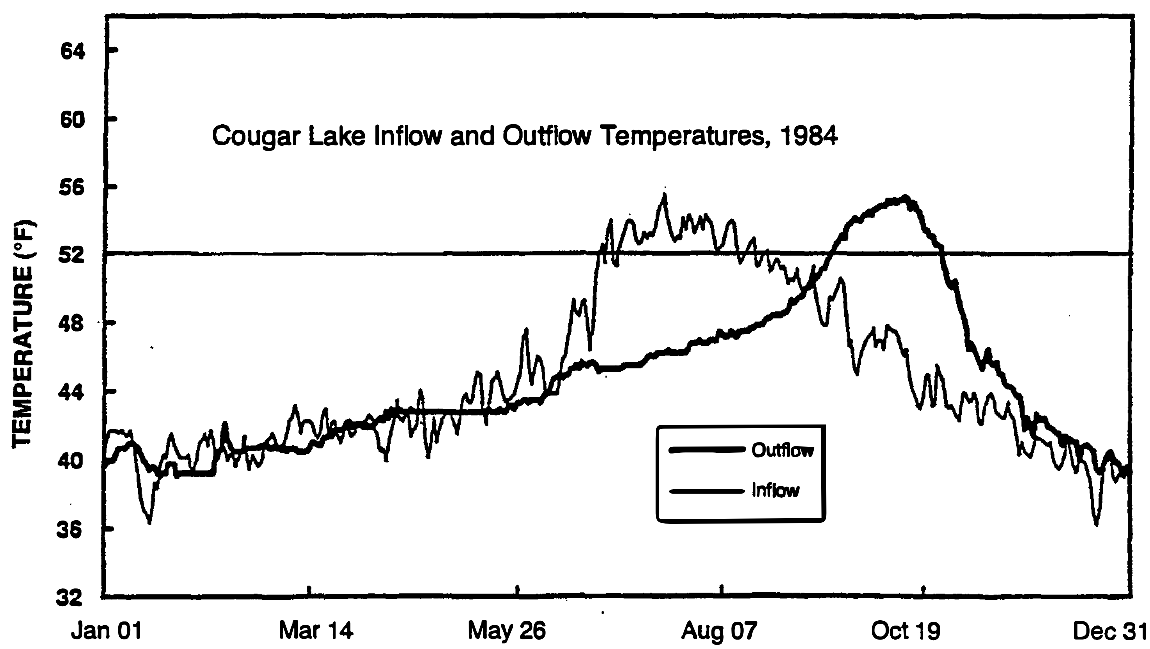
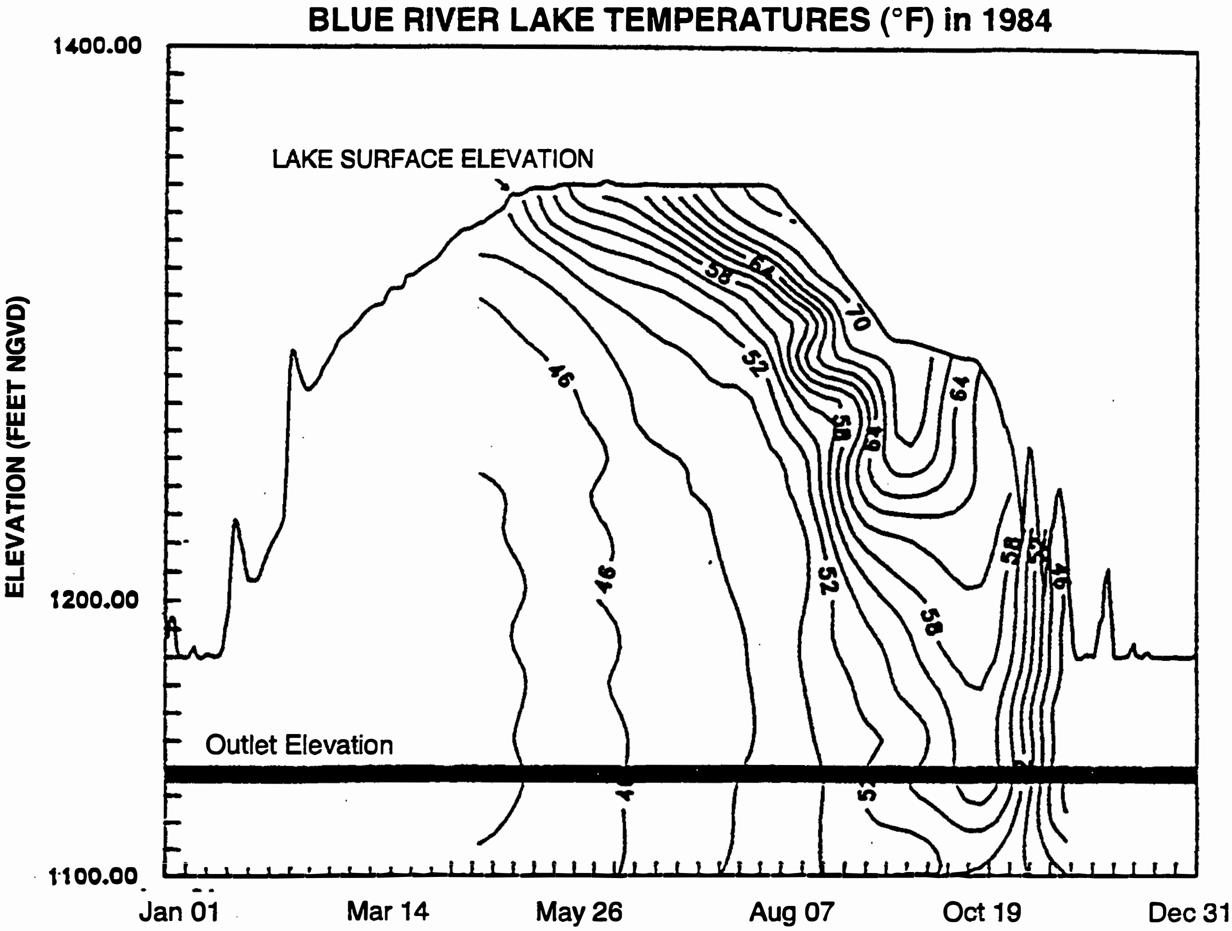




Figure 7. Plots of thermal isopleths and inflow and outflow temperatures for 1984 at Cougar Dam. (Plots reproduced from USACE 1994)



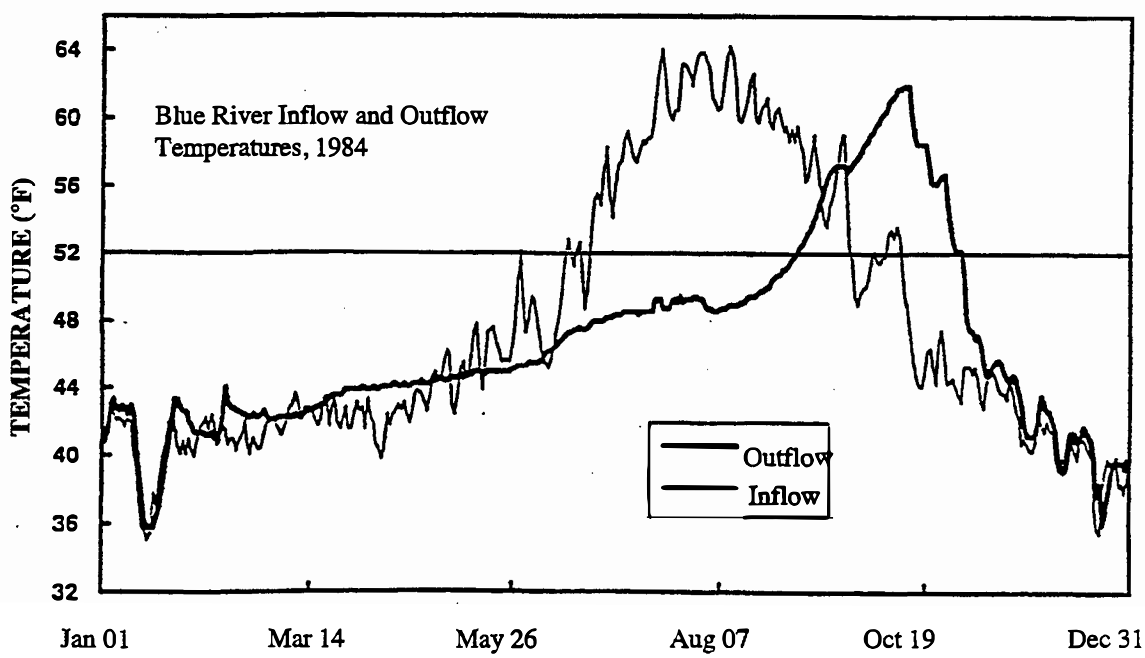




Figure 8. Plots of thermal isopleths and inflow and outflow temperatures for 1984 at Blue River Dam (Plots reproduced from USACE 1994)

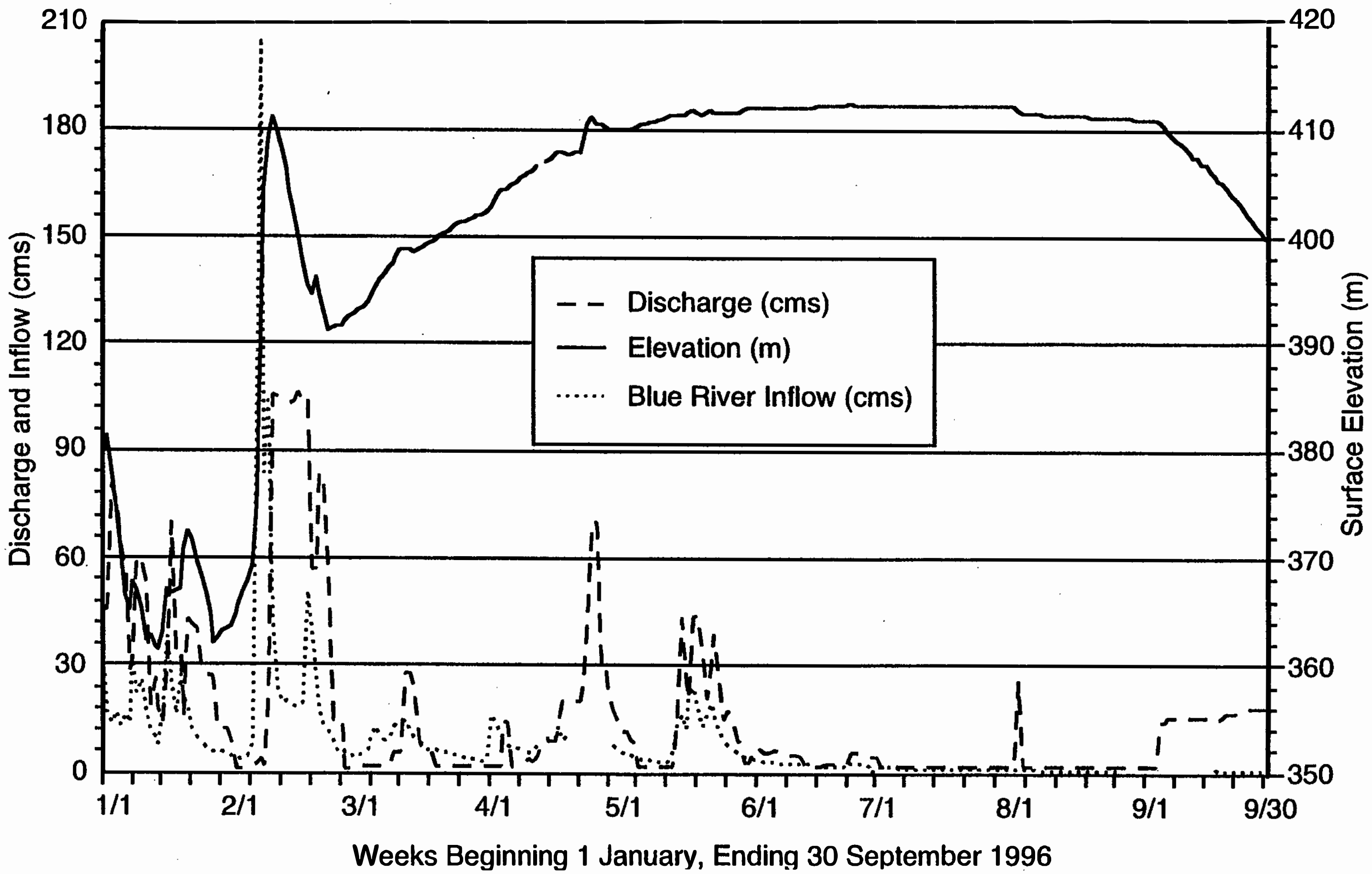



Figure 9. Hydrologic history of Blue River Lake beginning 1 January 1996 and ending 30 September 1996. A major storm event occurred during February 1996 and this is illustrated by the Blue River inflow plot as well as the change in elevation for Blue River Lake at that time

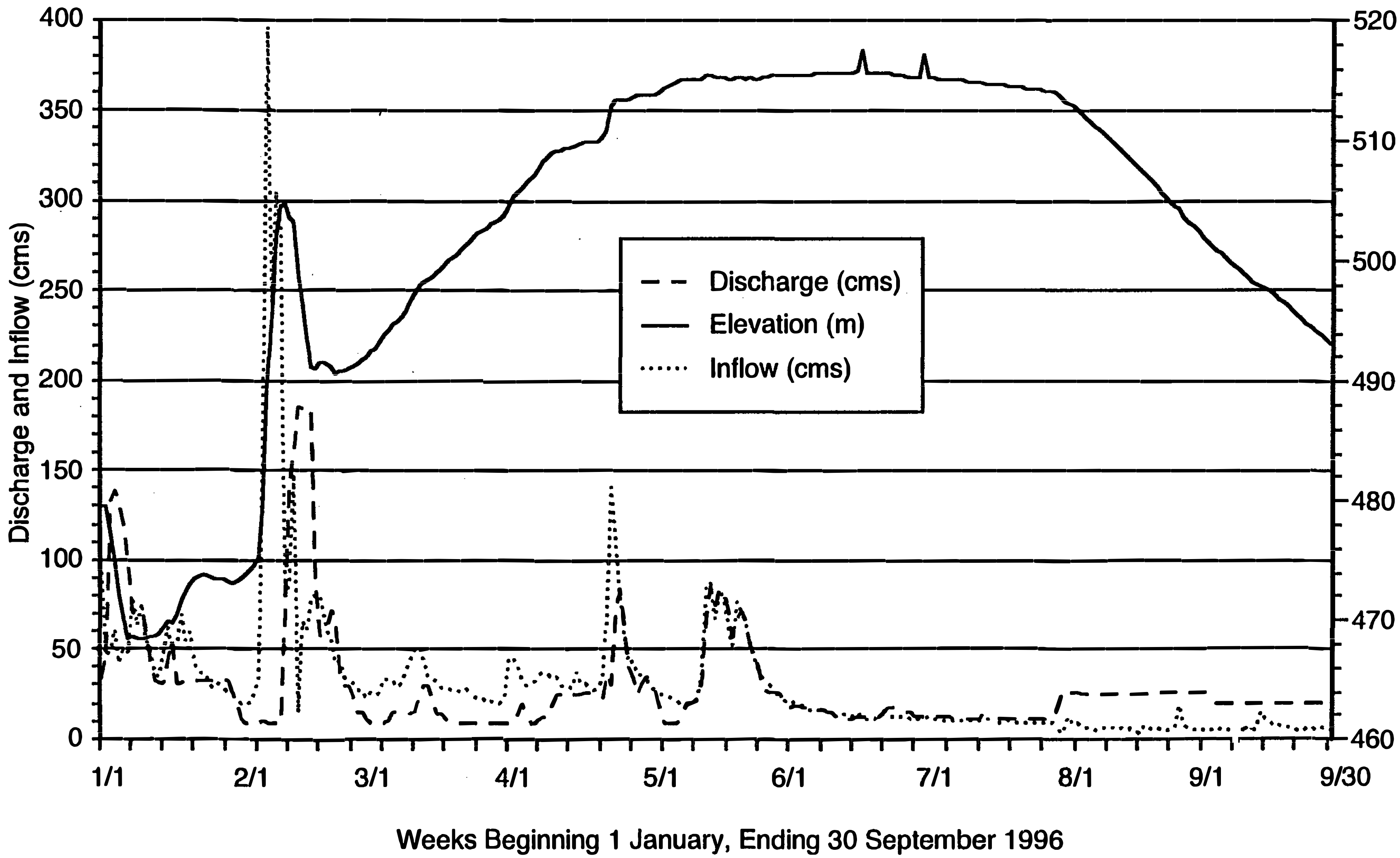



Figure 10. Hydrologic history of Cougar Lake beginning 1 January and ending 30 September 1996. A major storm event occurred during February and this is illustrated by the inflow plot for the South Fork McKenzie River as well as the change in elevation for Cougar Lake at that time

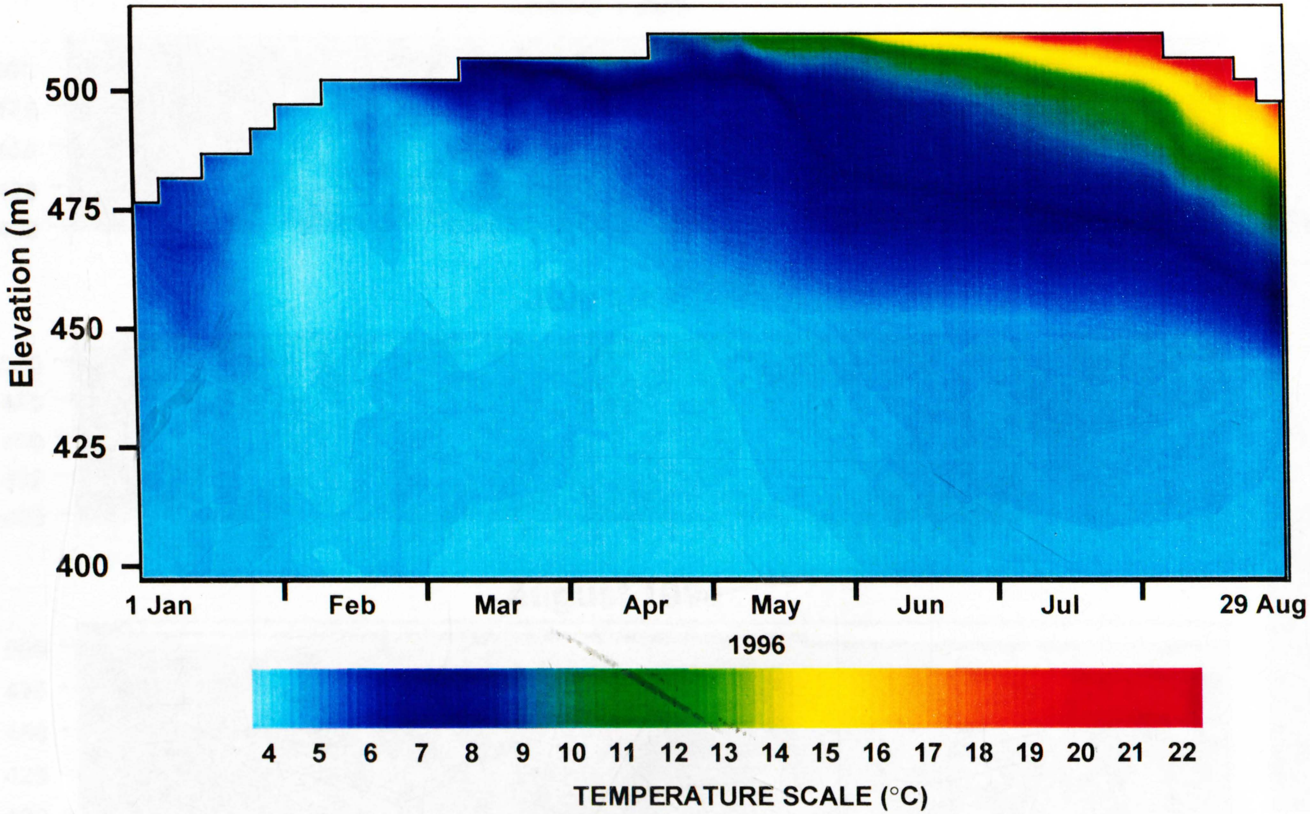



Figure 11. Thermal pattern for the continuous data logged in Cougar Lake in 1996. The logging devices were removed 29 August 1996. Data courtesy of Bob Magne, USACE-NPP.

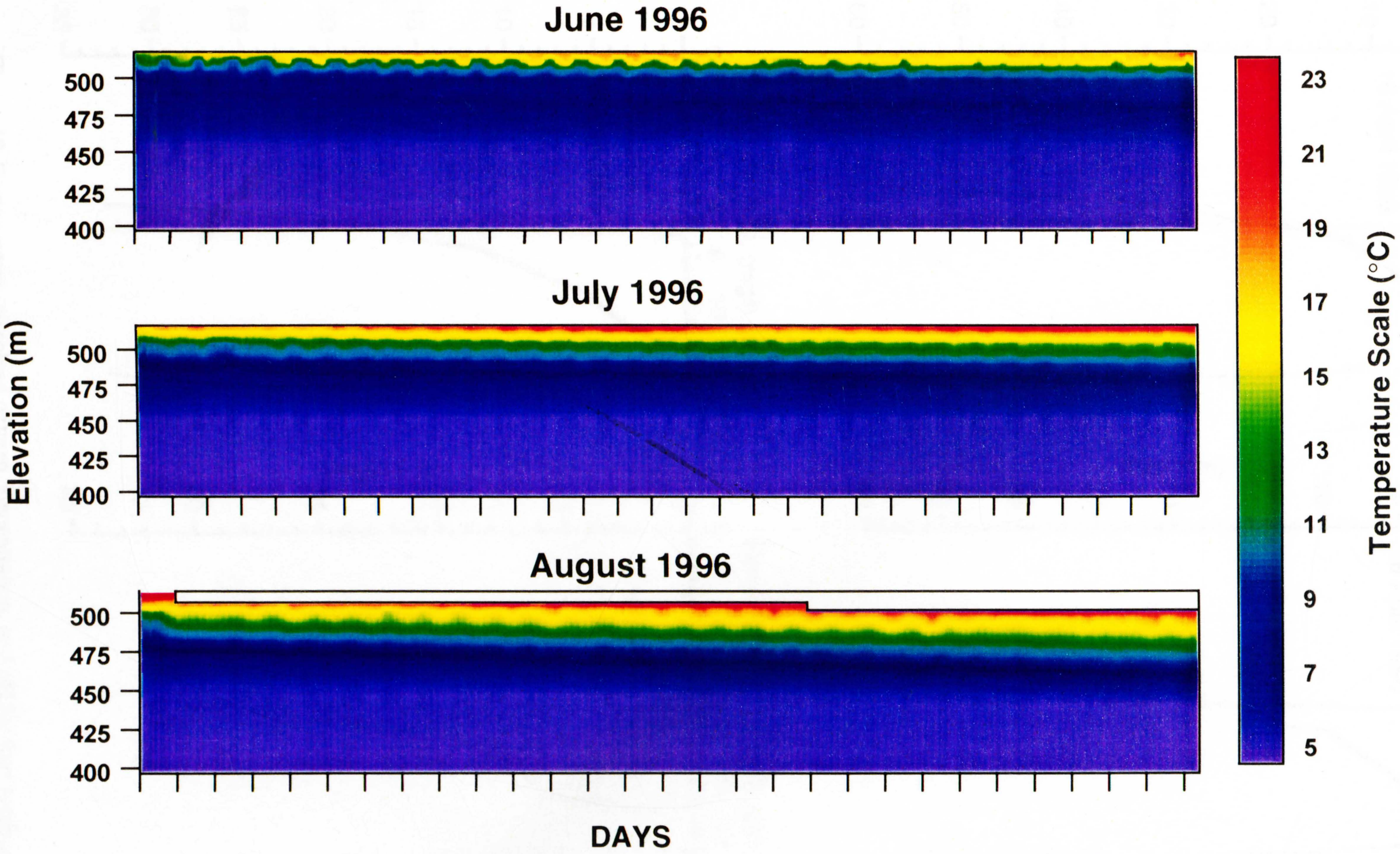



Figure 12. Thermal changes in Cougar Lake during the June, July, and August 1996. Data logged in situ using remote thermal loggers. Data courtesy of Bob Magne, USACE-NPP.

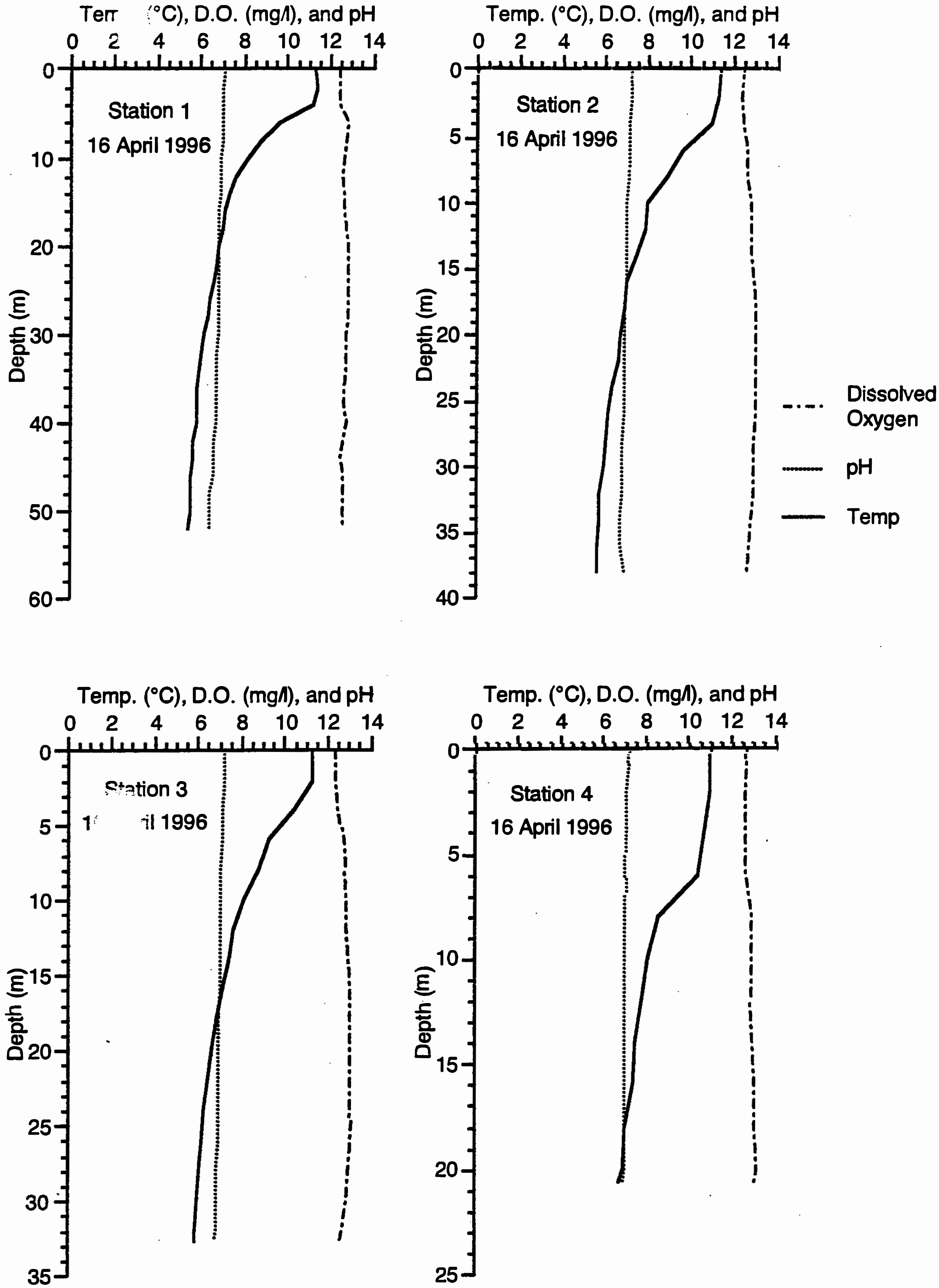



Figure 13. Temperature, dissolved oxygen concentration, and pH for four stations on Blue River Lake, April 1996

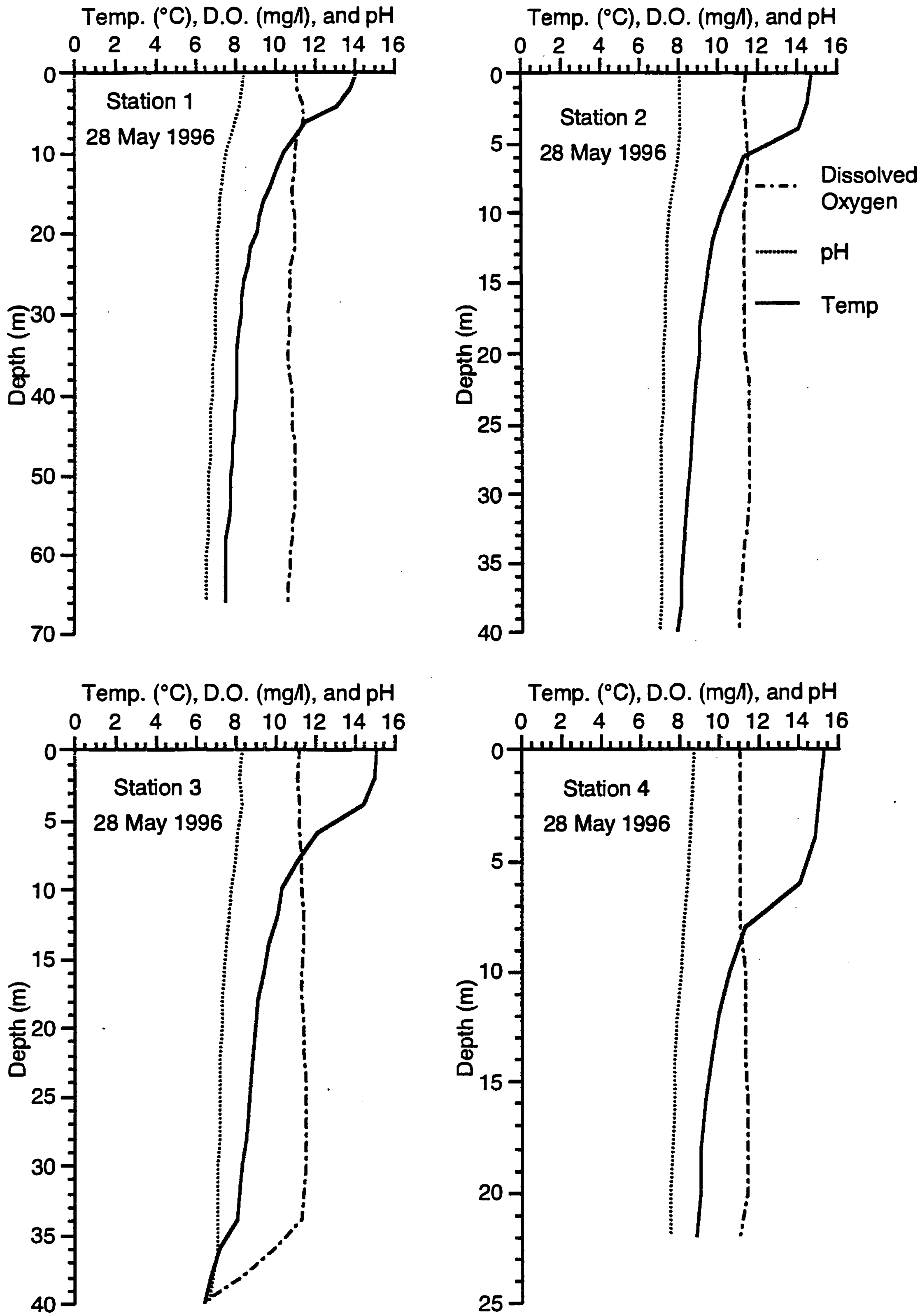



Figure 14. Temperature, dissolved oxygen concentration, and pH for four stations on Blue River Lake, May 1996

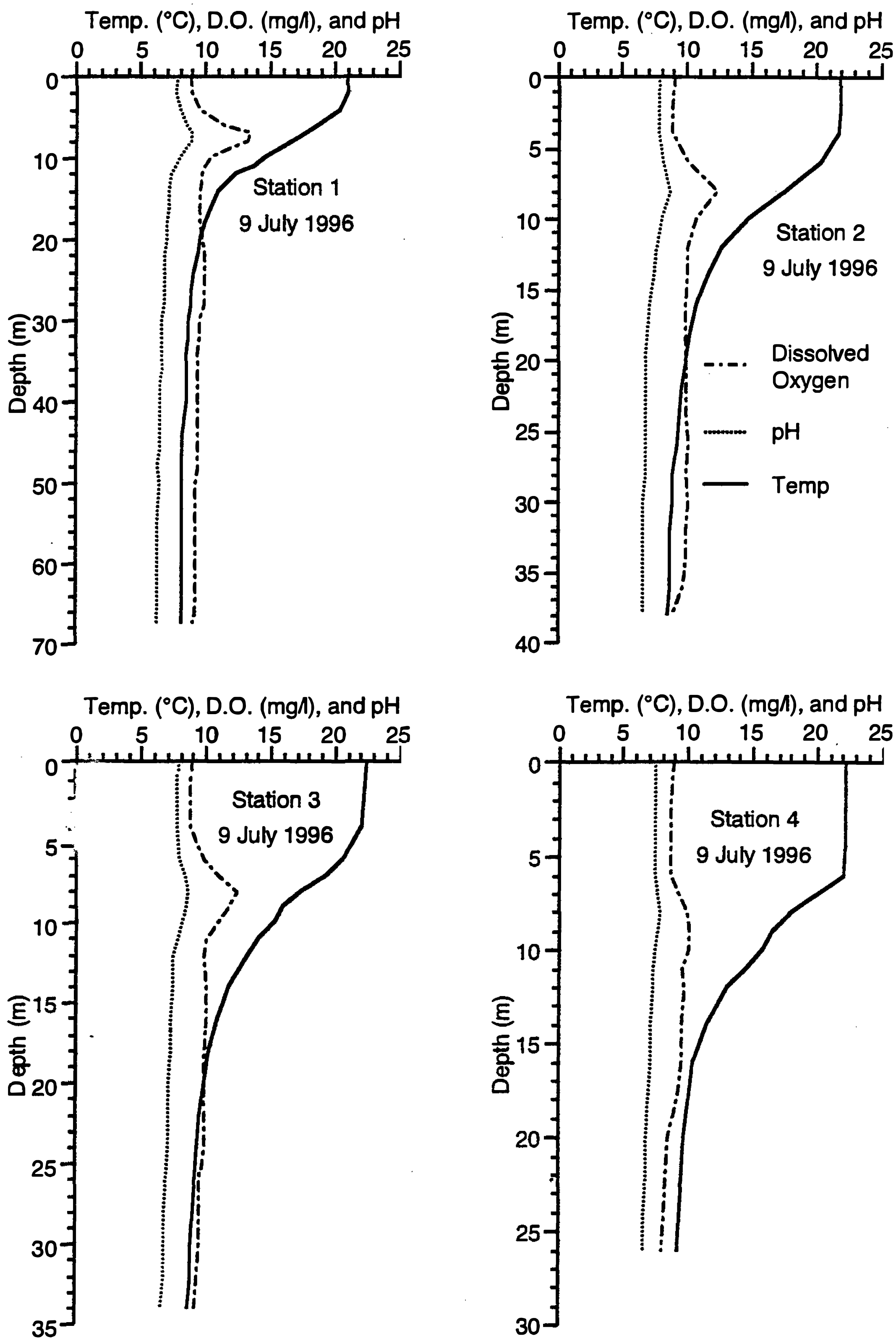



Figure 15. Temperature, dissolved oxygen concentration, and pH for four stations on Blue River Lake, July 1996

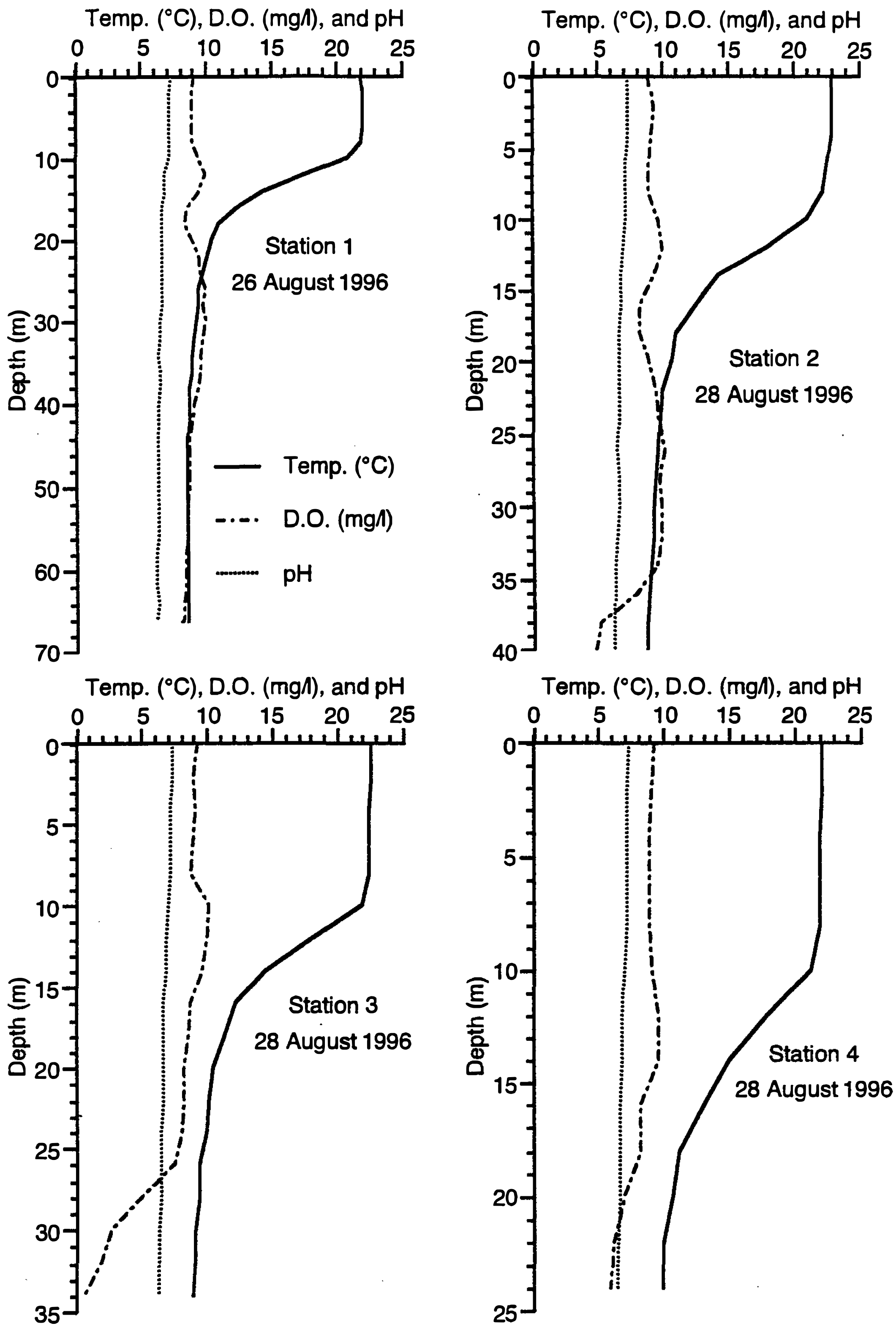



Figure 16. Temperature, dissolved oxygen concentration, and pH for four stations on Blue River Lake, August 1996

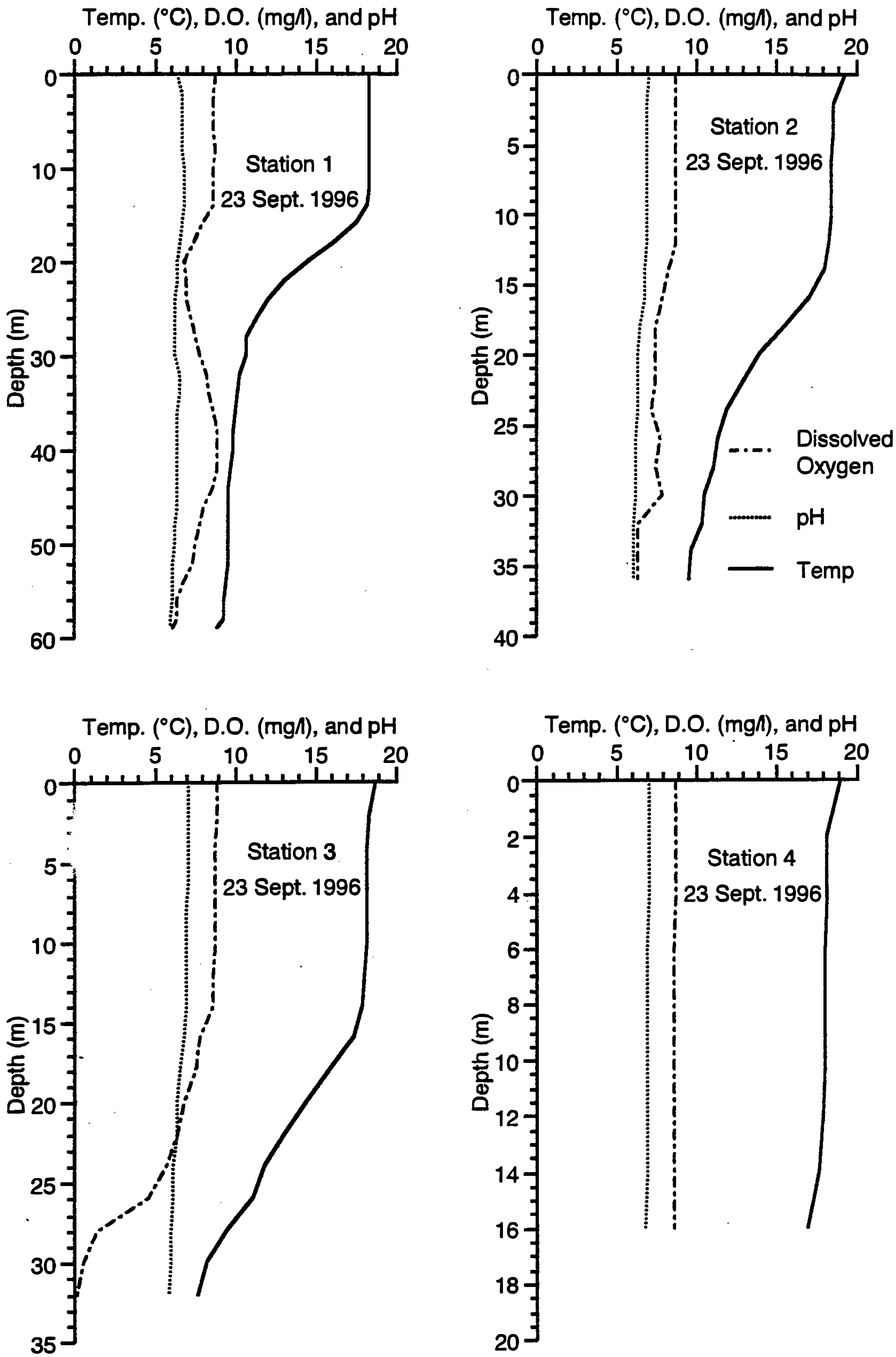



Figure 17. Temperature, dissolved oxygen concentration, and pH for four stations on Blue River Lake, September 1996

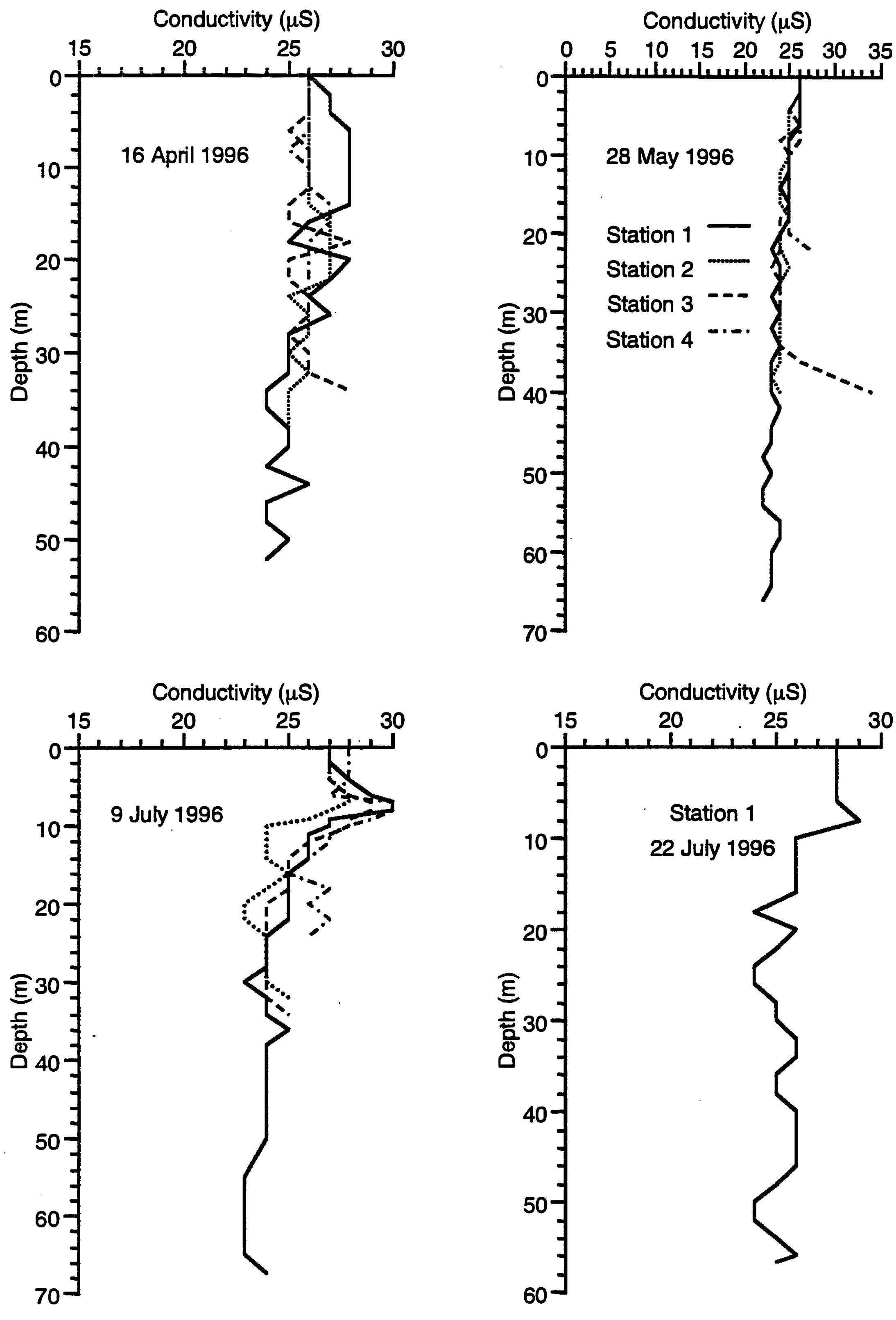



Figure 18. Conductivity plots for Blue River Lake in April - September 1996

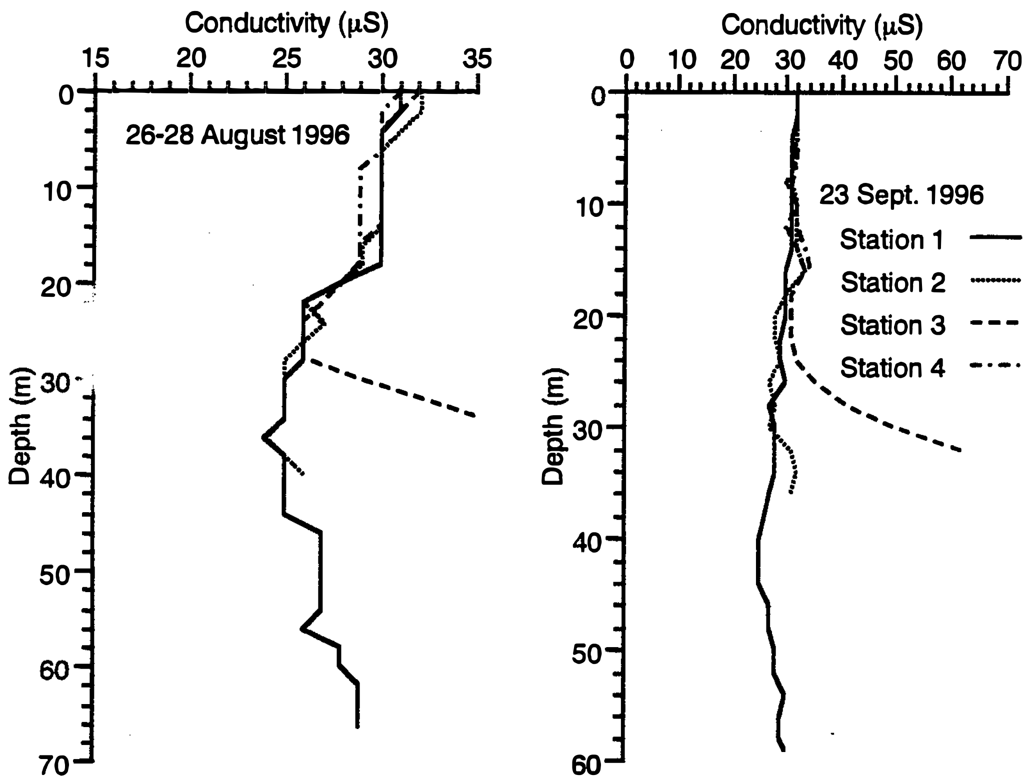



Figure 18. cont'd. Conductivity plots for Blue River Lake in April - September 1996

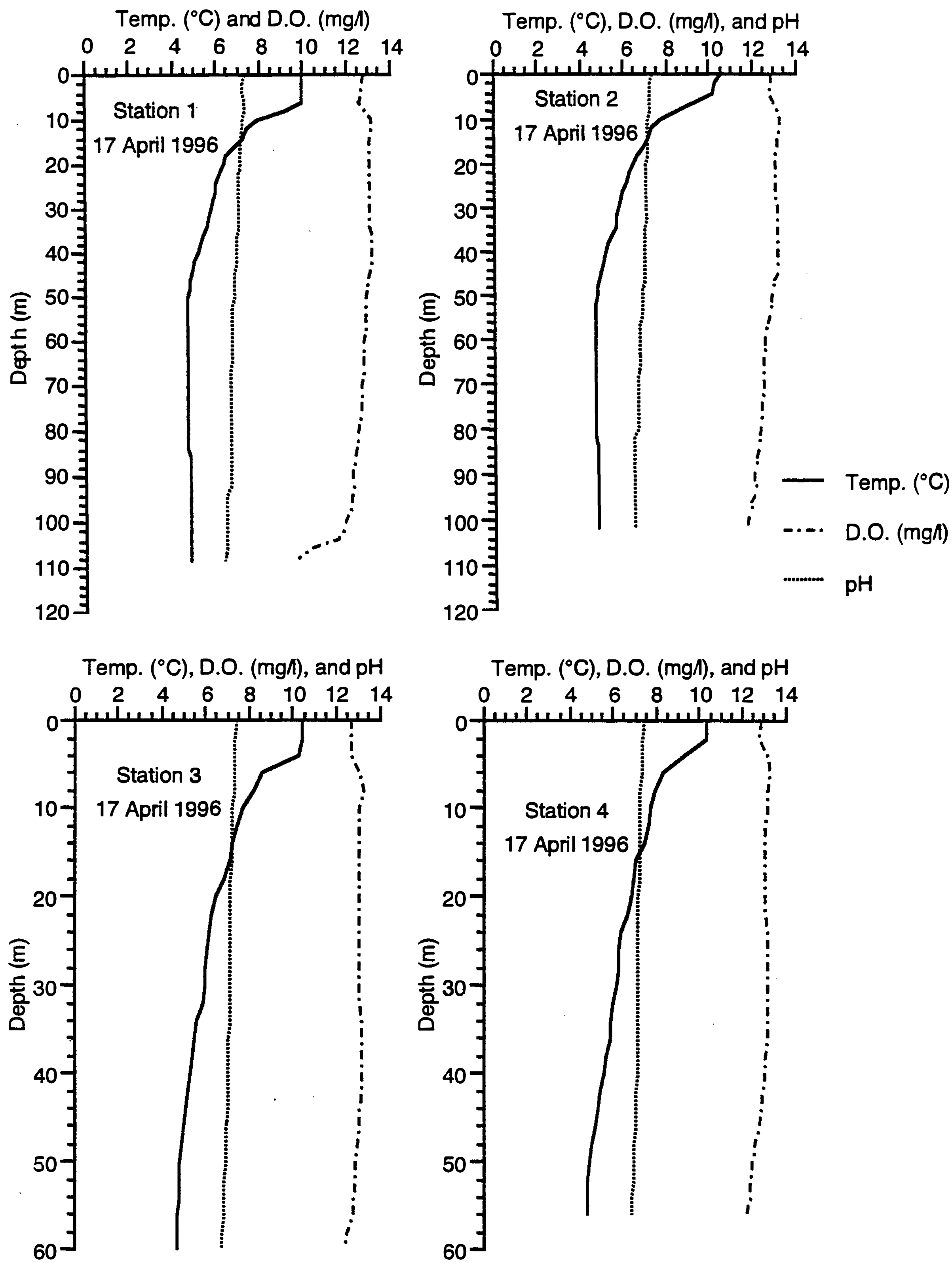



Figure19. Temperature, dissolved oxygen concentration, and pH for four stations in Cougar Lake, April 1996

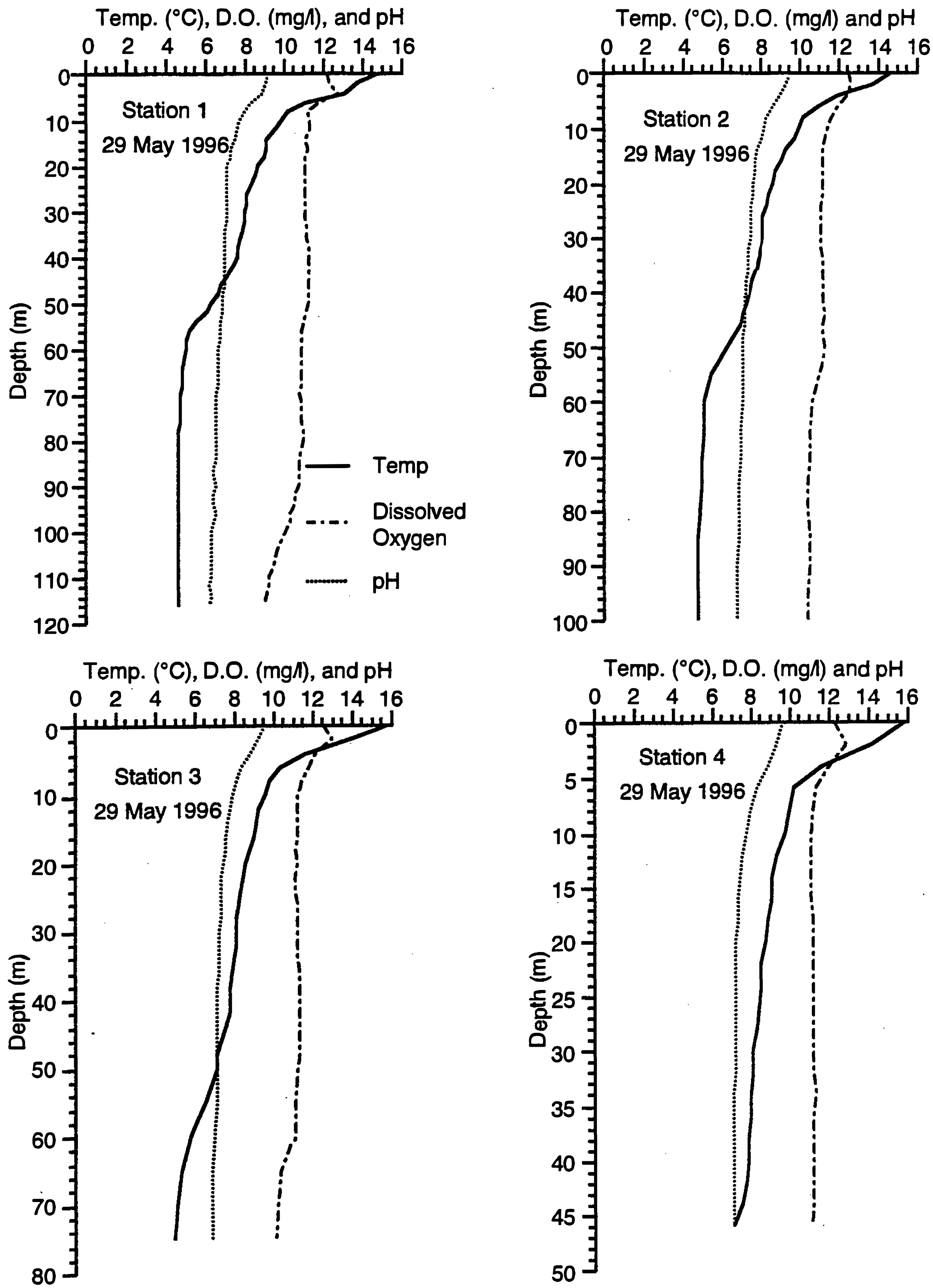



Figure 20. Temperature, dissolved oxygen concentration, and pH for four stations in Blue River Lake, May 1996

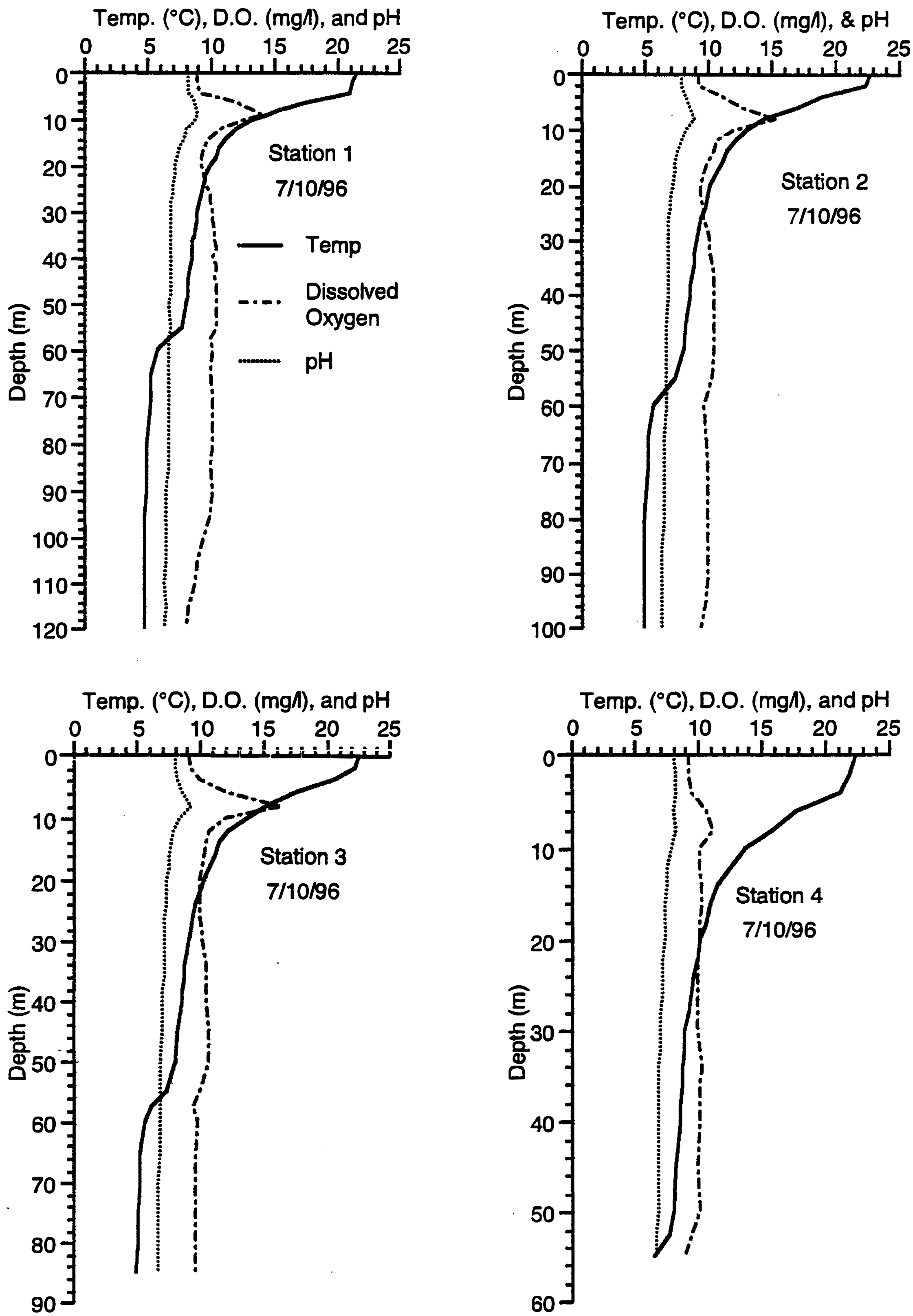



Figure 21. Temperature, dissolved oxygen concentration, and pH for four stations in Cougar Lake, July 1996

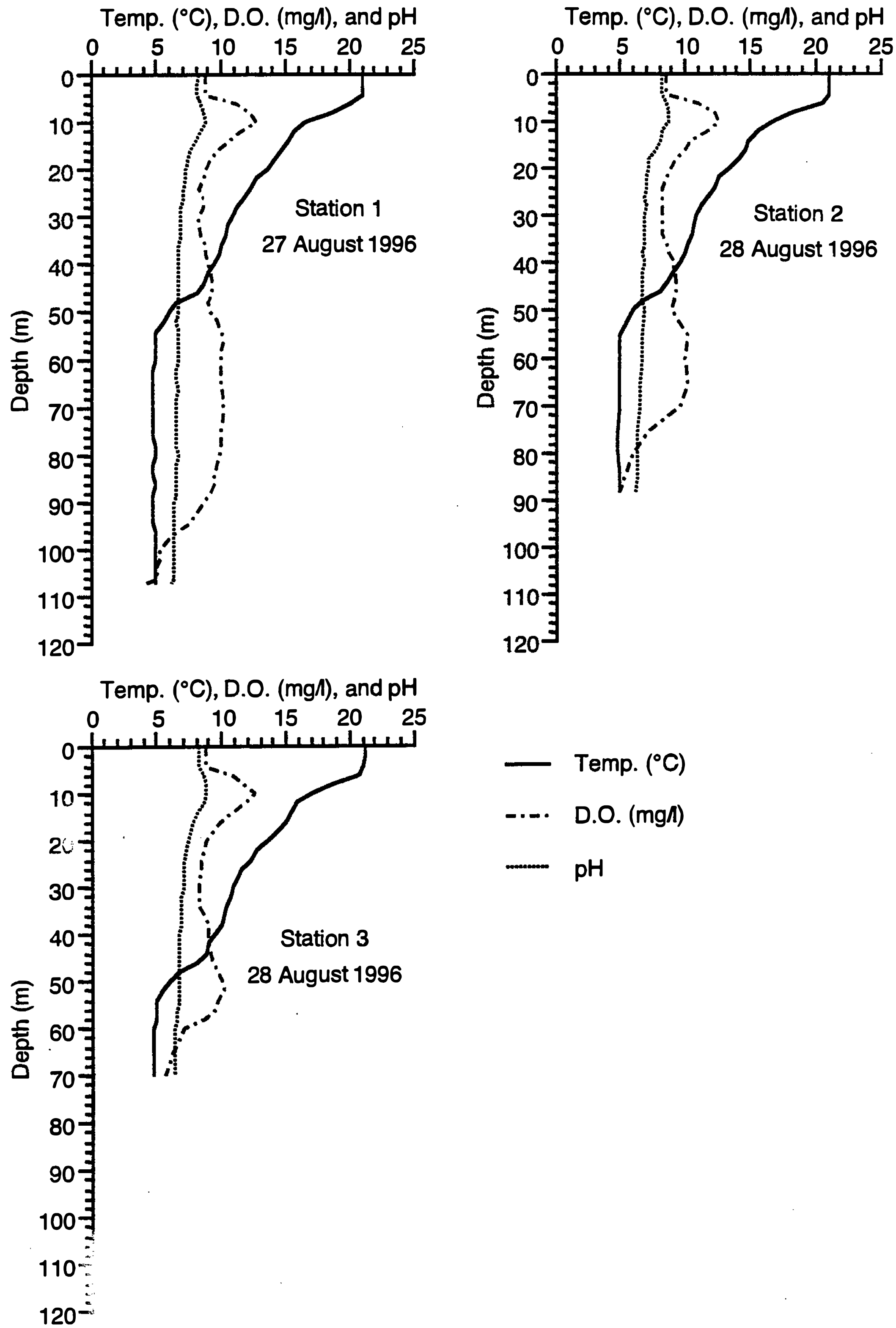



Figure 22. Temperature, dissolved oxygen concentration, and pH for three stations on Cougar Lake, August 1996

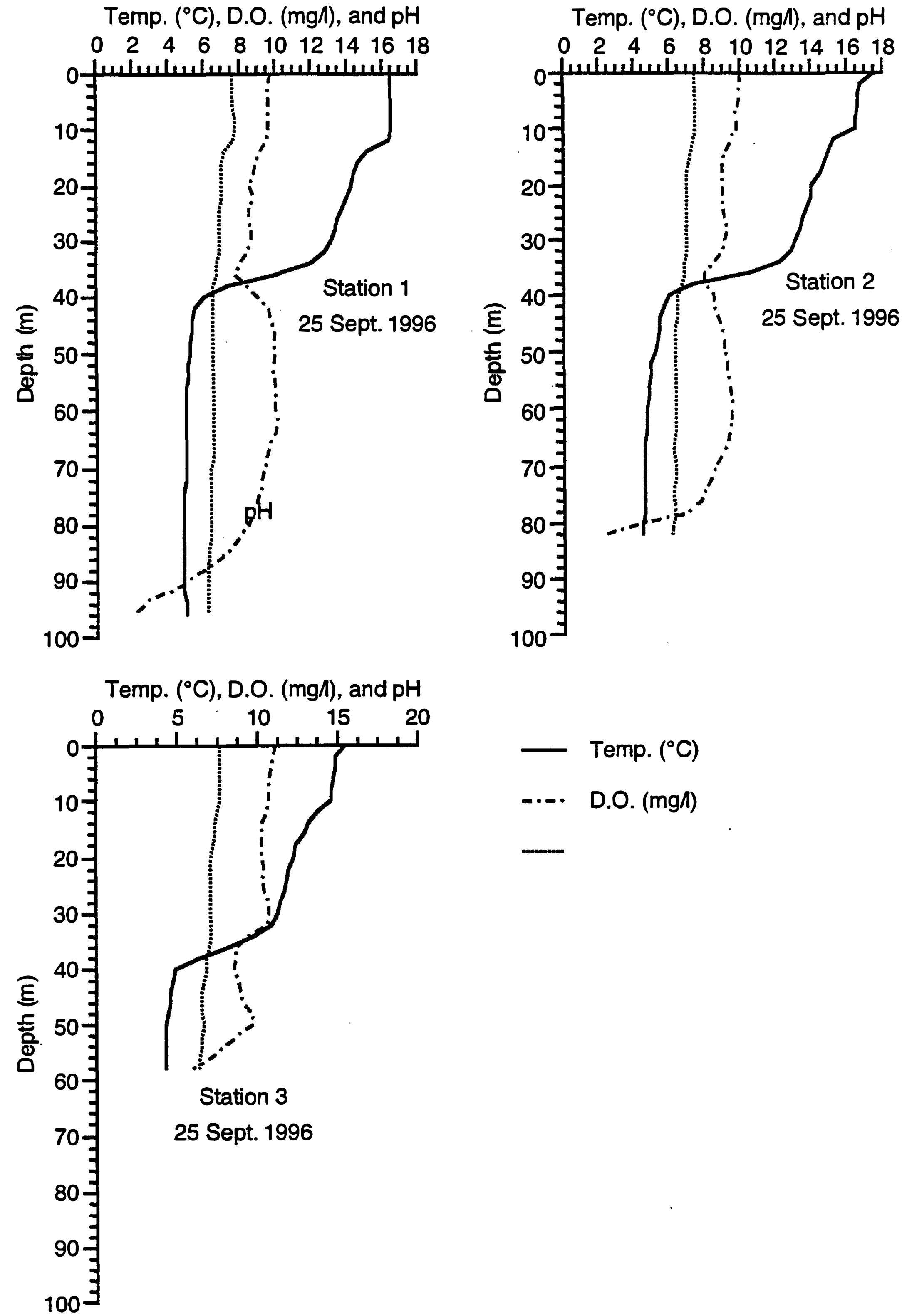



Figure 23. Temperature, dissolved oxygen concentration, and pH for three stations in Cougar Lake, September 1996

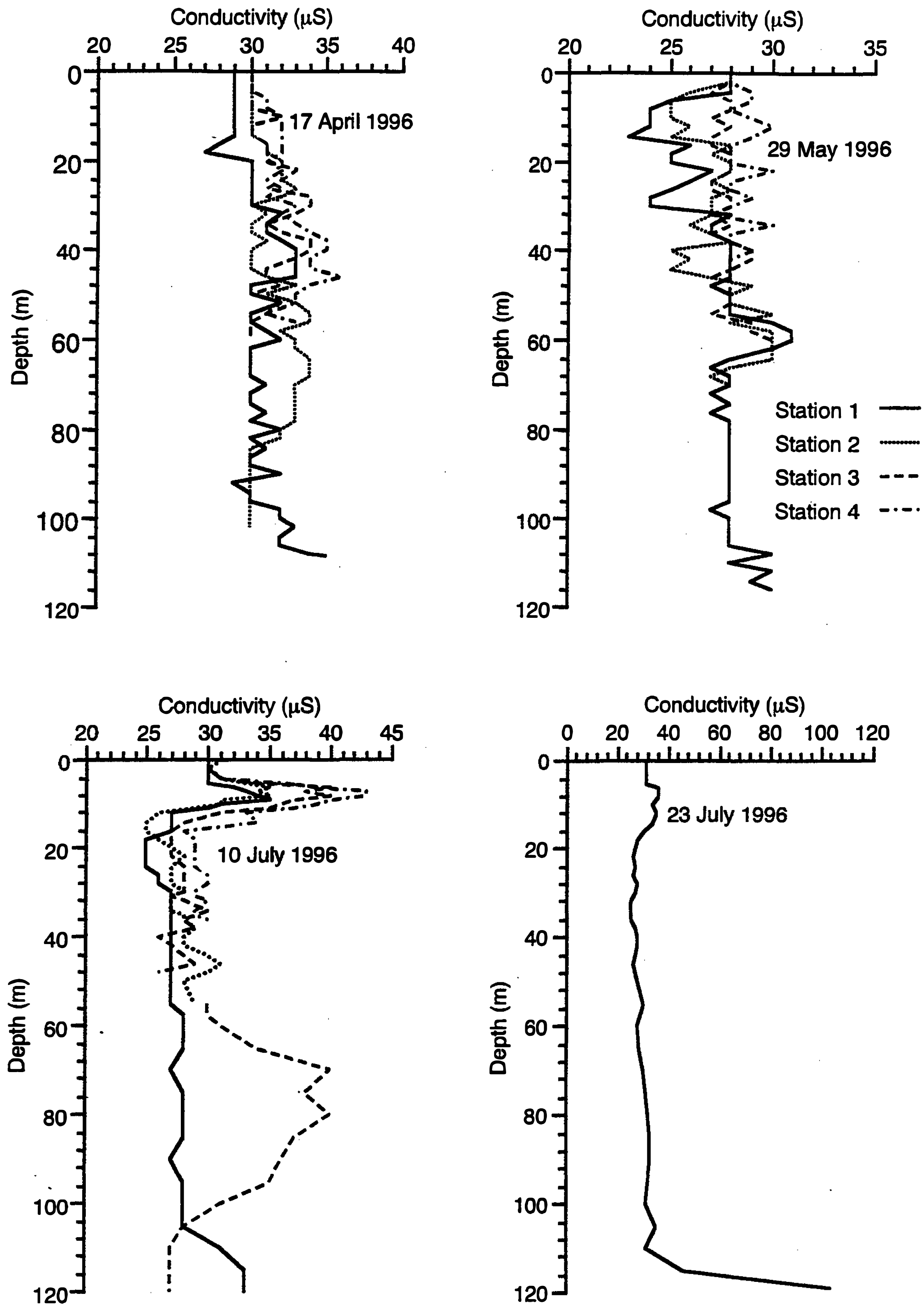



Figure 24. Specific conductance at four stations in Cougar Lake, April - September 1996

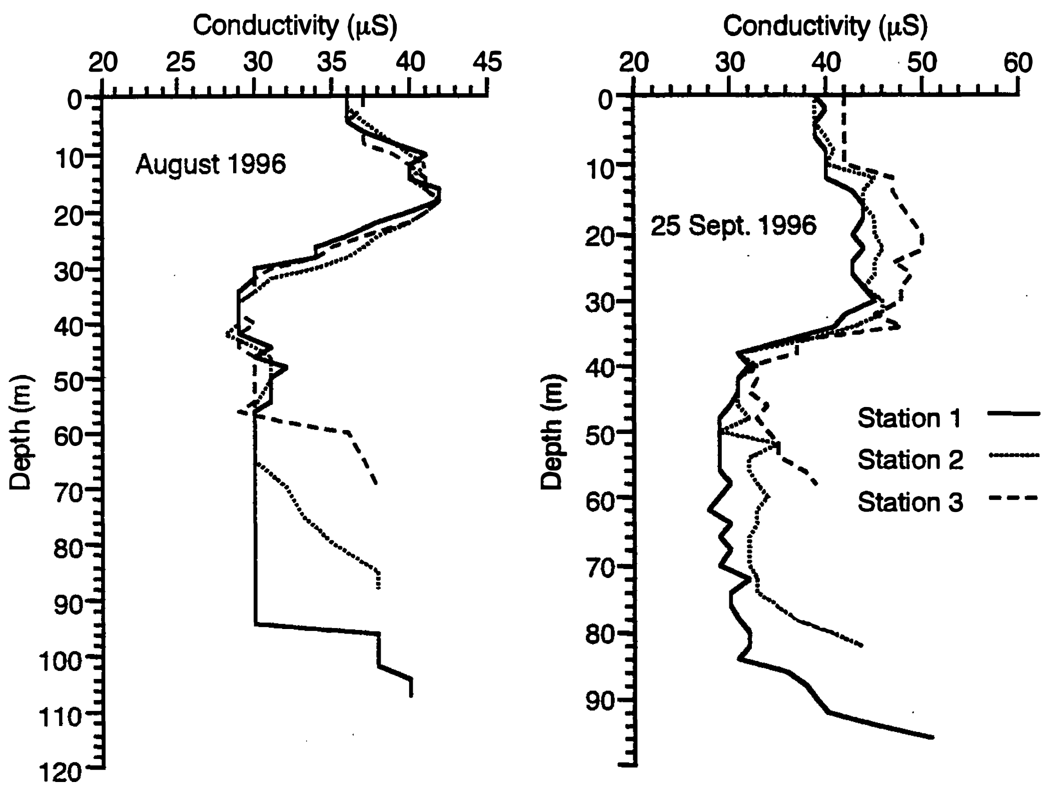



Figure 24. cont'd. Specific conductance at four stations in Cougar Lake, April - September 1996

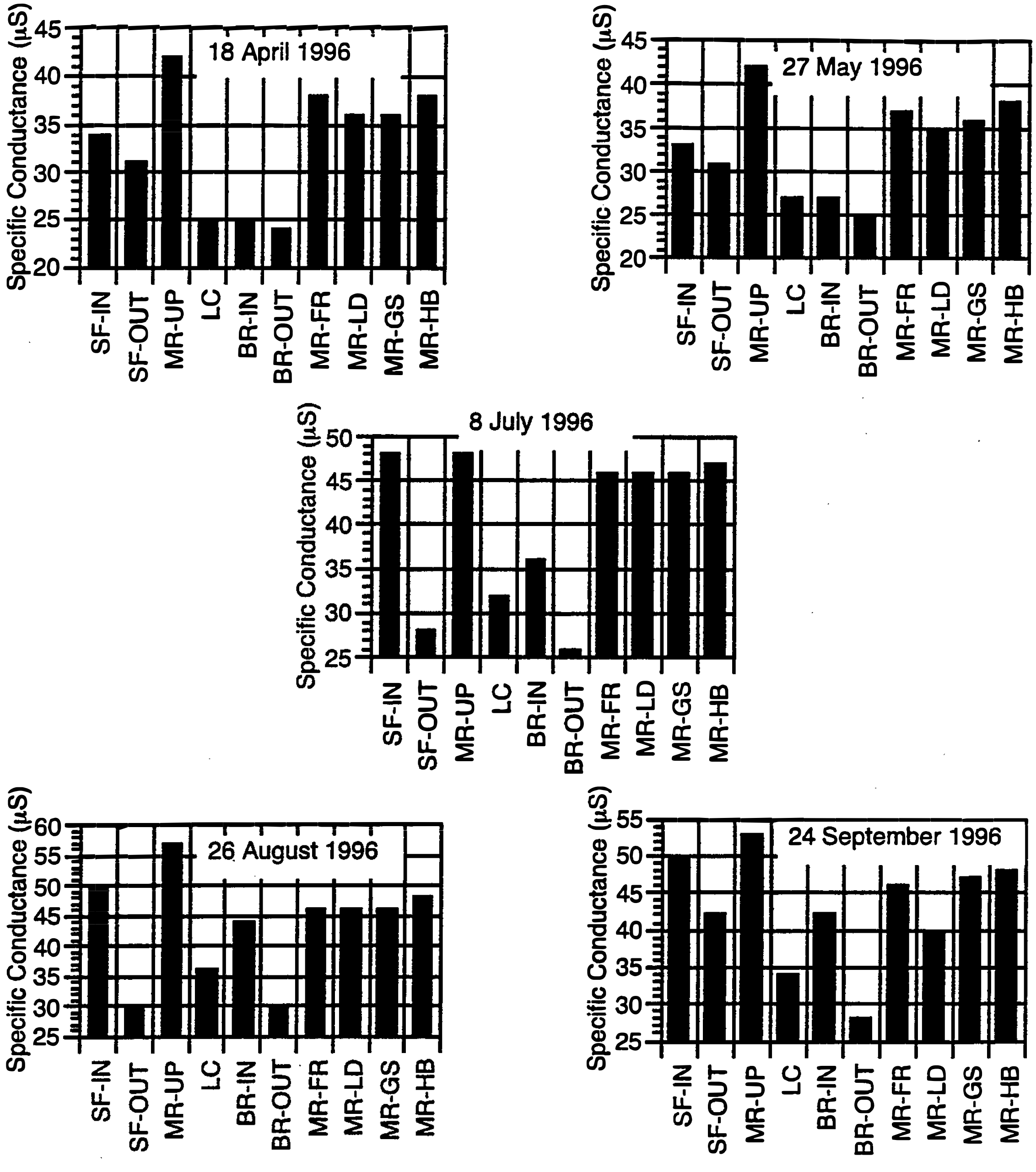



Figure 25. Specific conductance distributions in the McKenzie River system associated with Cougar and Blue River projects. Station designations are listed in Table 2

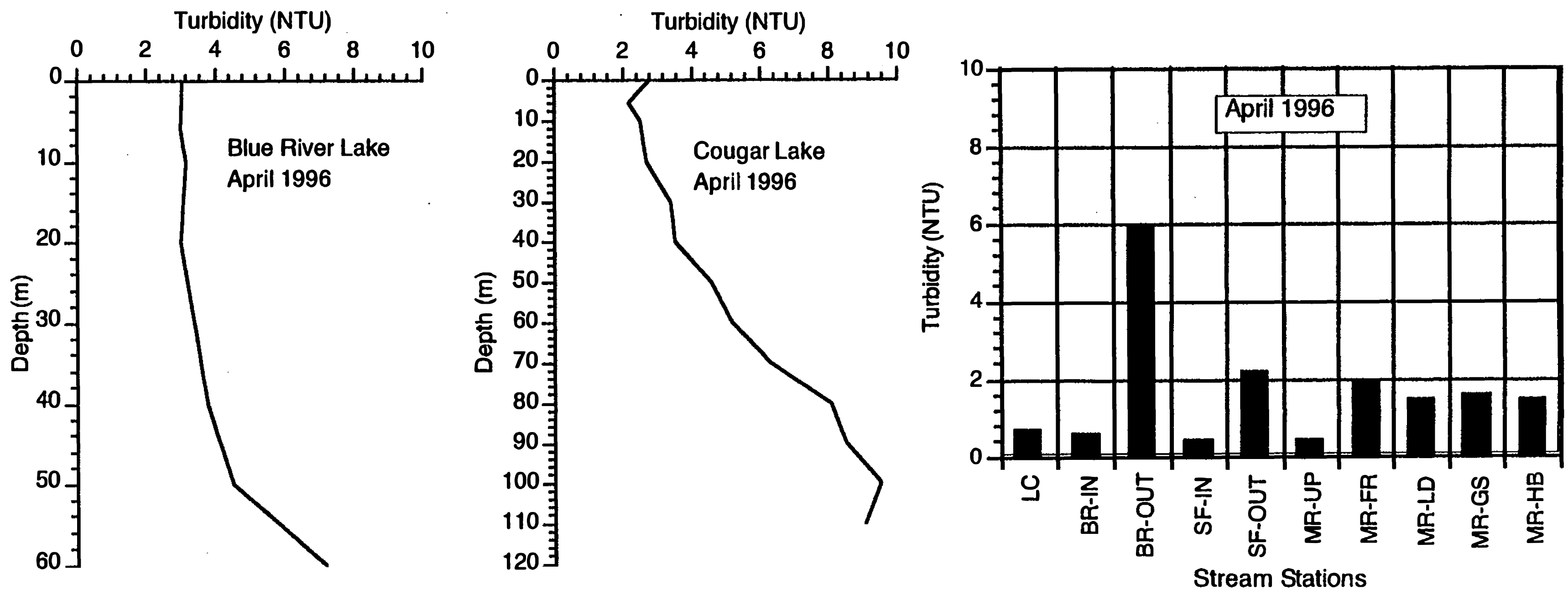



Figure 26. Patterns of turbidity in Blue River Lake, Cougar Lake, and the McKenzie River system for April 1996

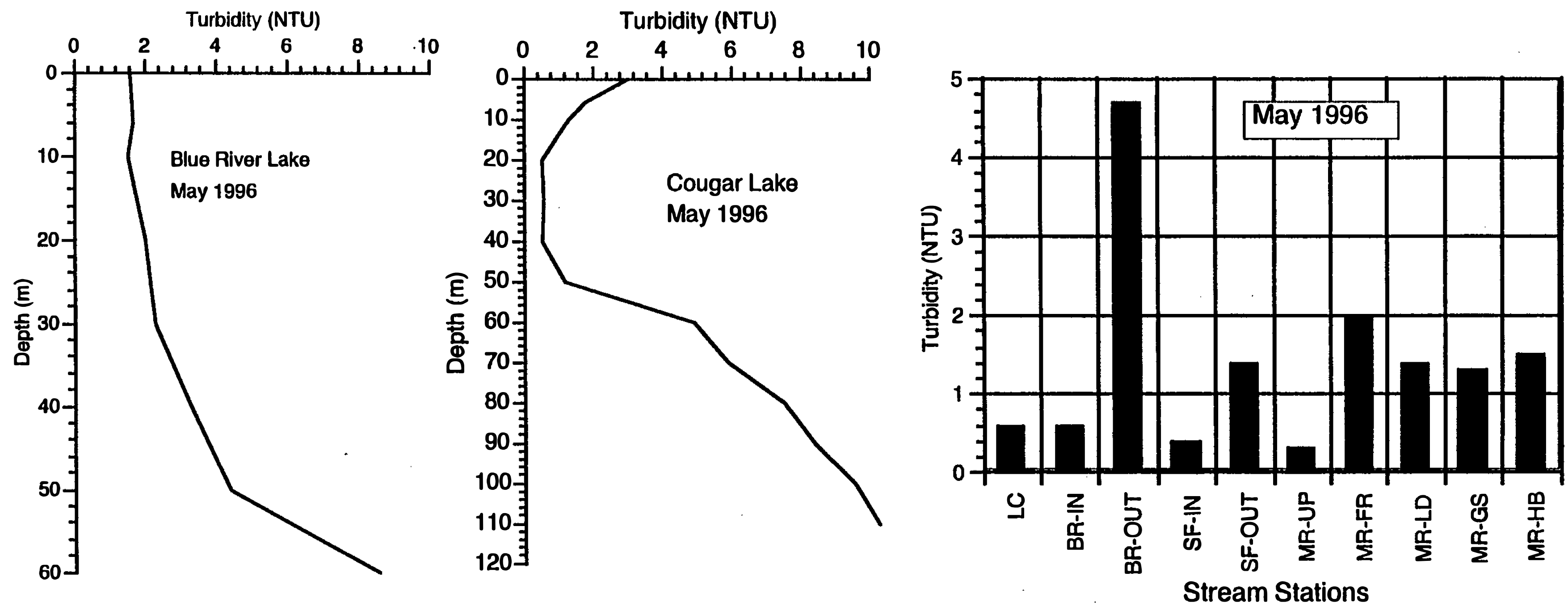



Figure 27. Patterns of turbidity in Blue River Lake, Cougar Lake, and the McKenzie River system for May 1996

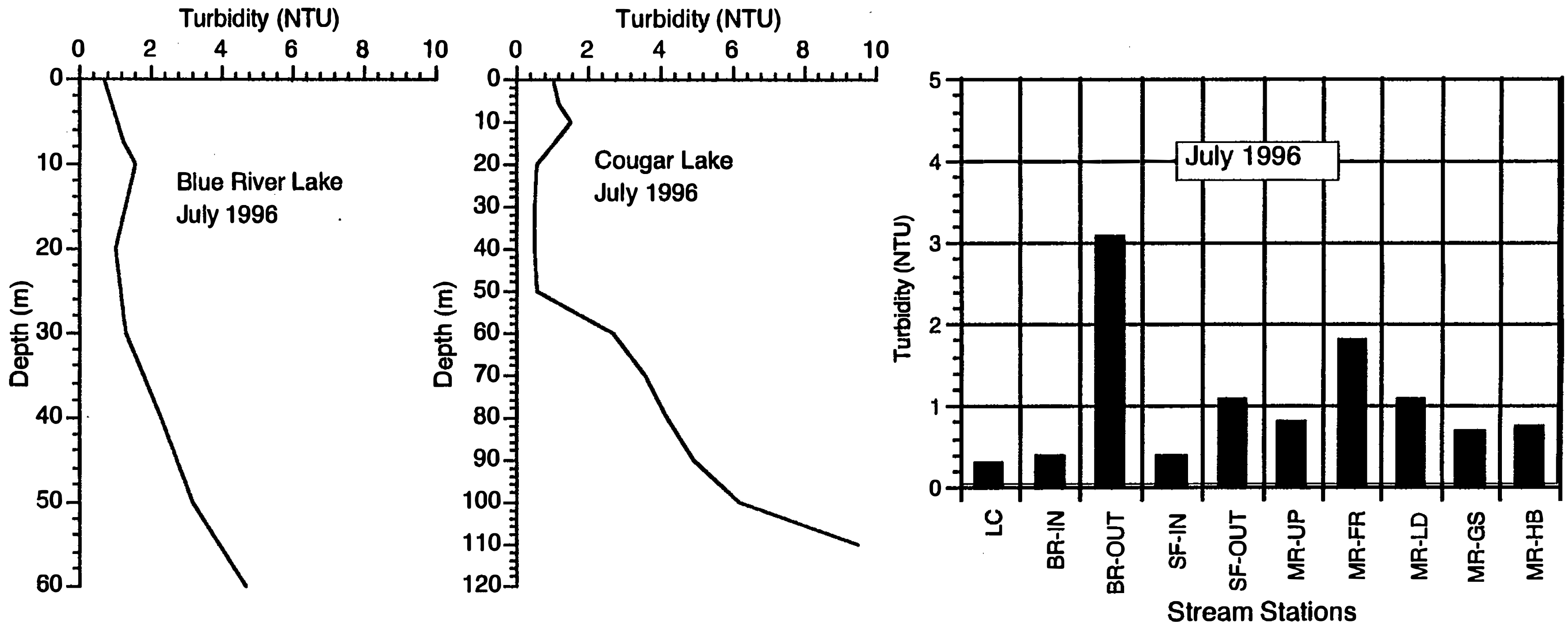



Figure 28. Patterns of turbidity in Blue River Lake, Cougar Lake, and the McKenzie River system for July 1996

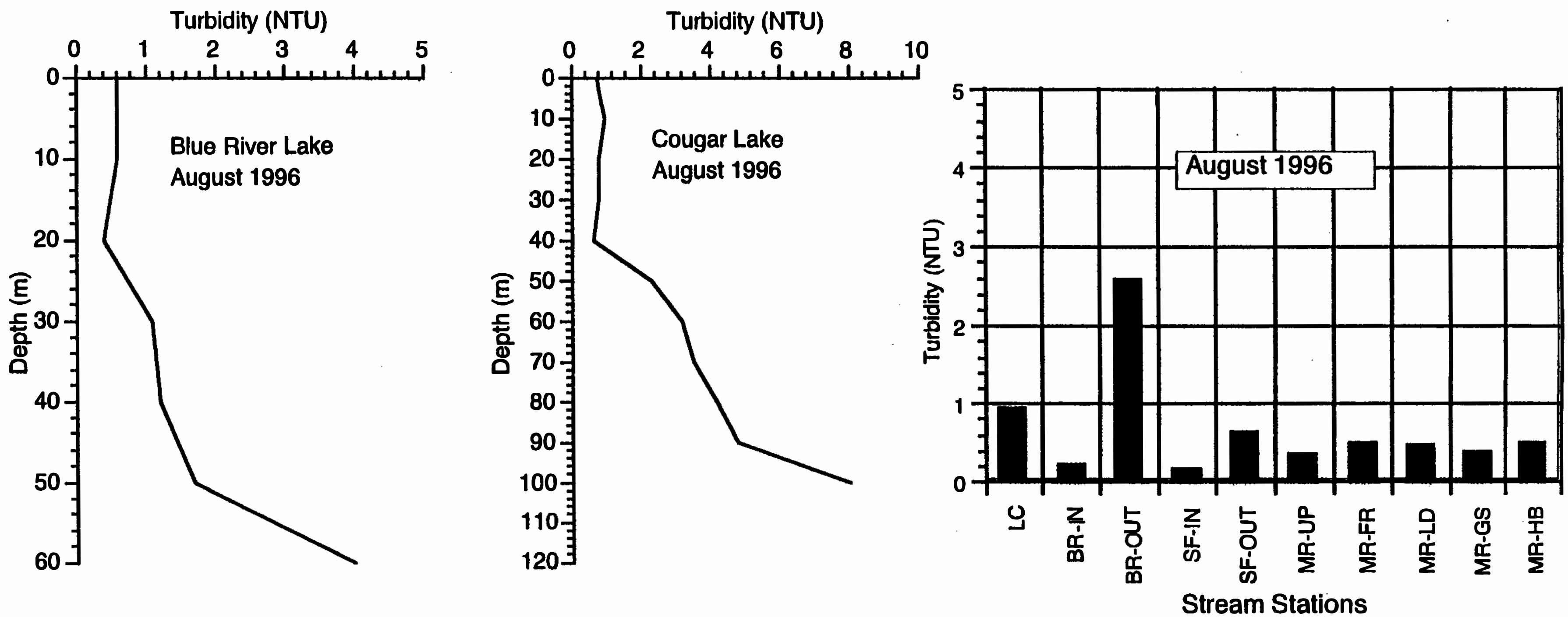



Figure 29. Patterns of turbidity in Blue River Lake, Cougar Lake, and the McKenzie River system for August 1996

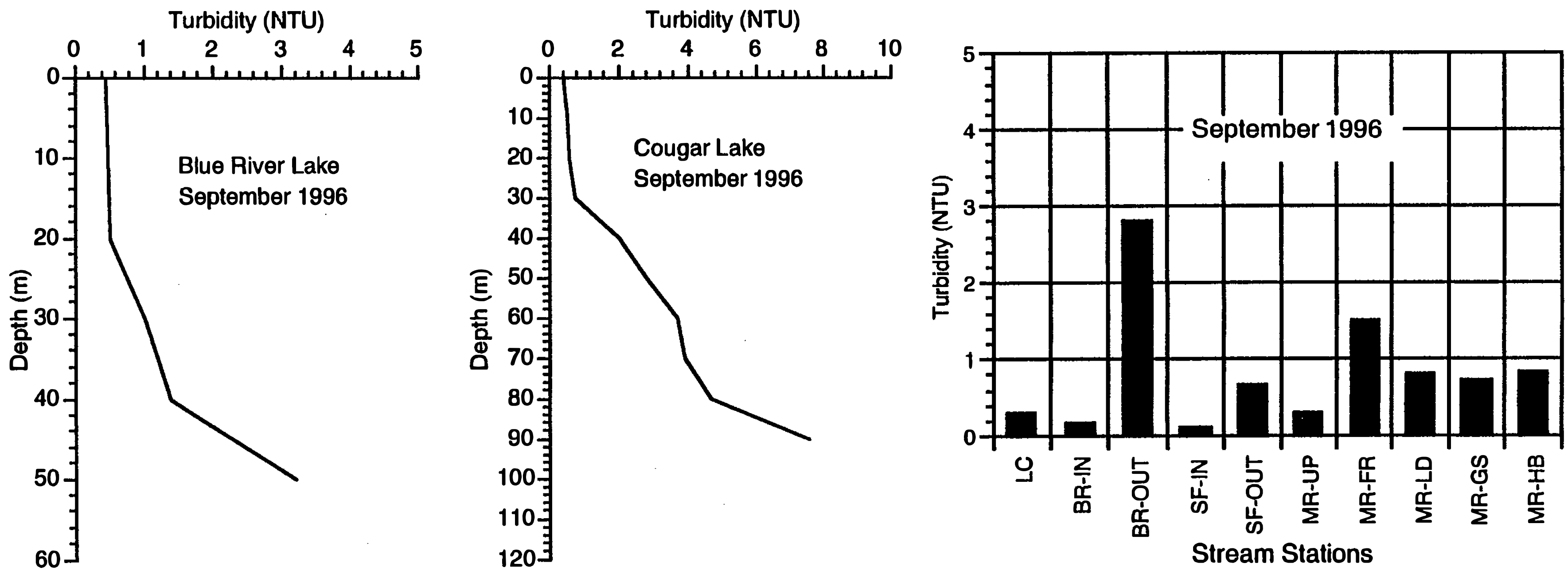



Figure 30. Patterns of turbidity in Blue River Lake, Cougar Lake, and the McKenzie River system for September 1996

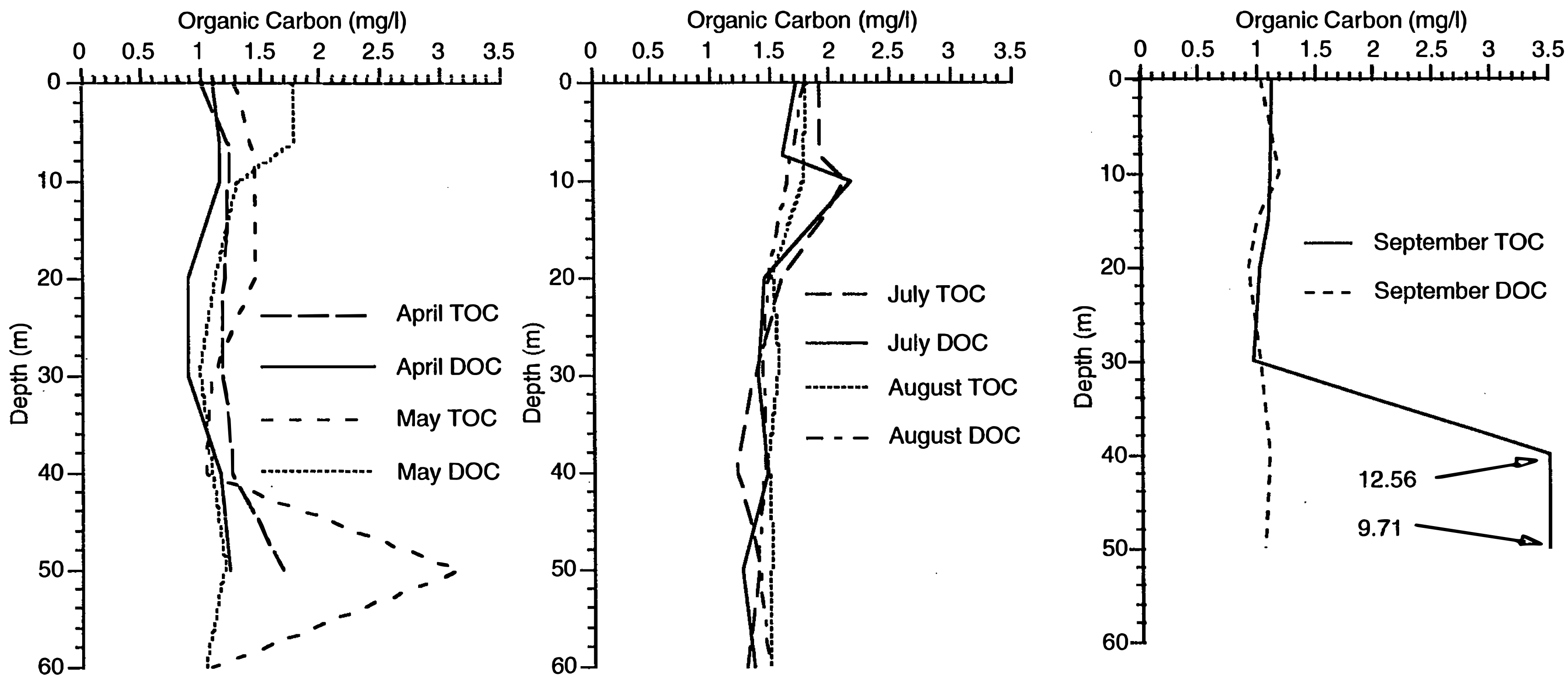



Figure 31. Organic carbon distributions in Blue River Lake in April - September 1996 showing that dissolved organic carbon is the greatest fraction of the total for most times, locations, and depths. Note the exceptional TOC concentrations at the bottom depths in September

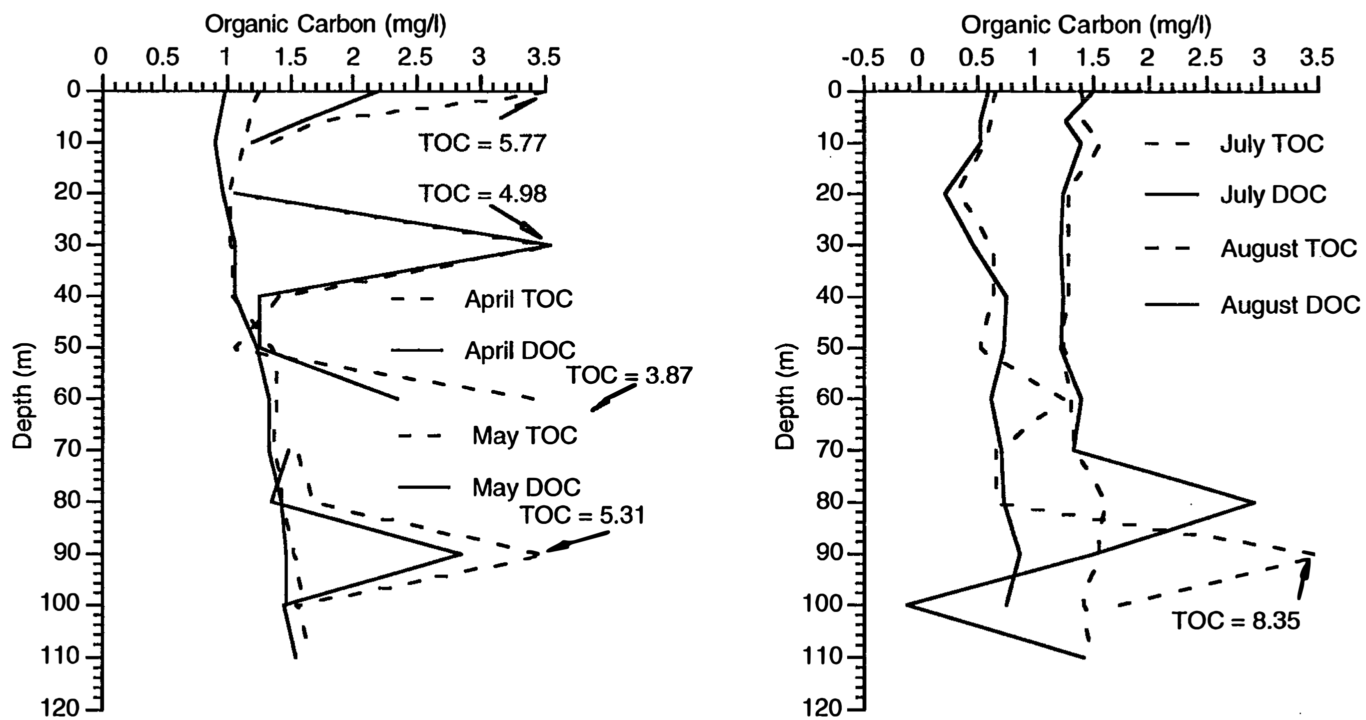



Figure 32. Organic carbon distributions in Cougar Lake in April - August 1996 showing that dissolved organic carbon is the greatest fraction of the total for most times, locations, and depths

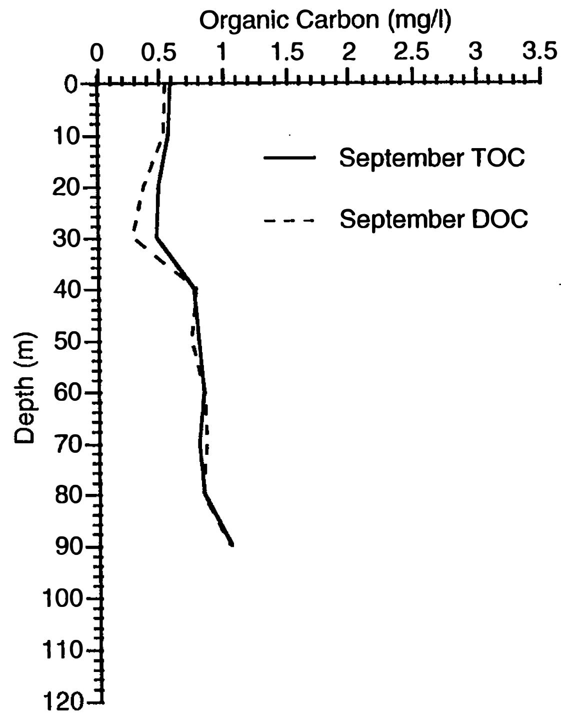



Figure 32. cont'd. Organic carbon distributions in Cougar Lake in September 1996 showing that dissolved organic carbon is the greatest fraction of the total for most times, locations, and depths

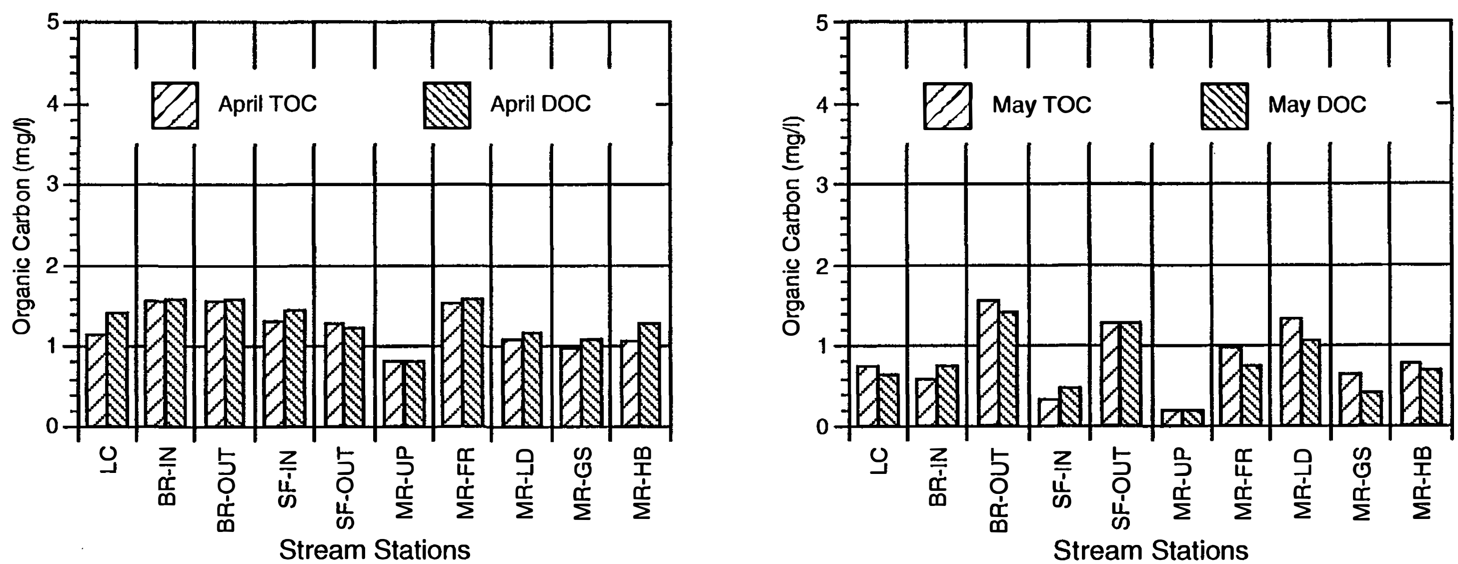



Figure 33. Organic carbon distributions in tributaries to and in the McKenzie River for the months April and May 1996. The dissolved fraction is usually the largest fraction of the total

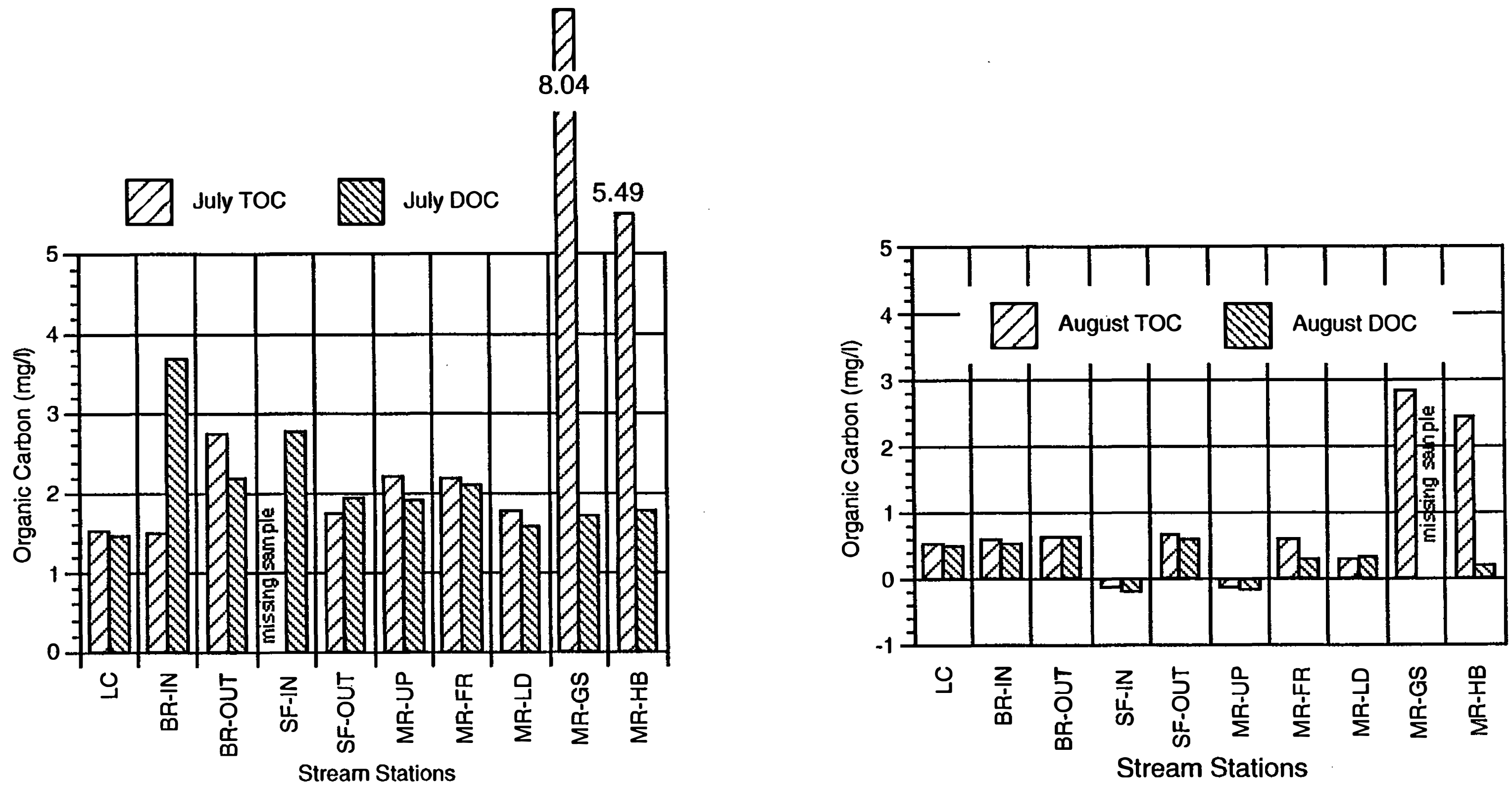



Figure 34. Organic carbon distributions in tributaries to and in the McKenzie River for the months July and August 1996. The dissolved fraction is usually the largest fraction of the total. July samples had greater concentrations of organic carbon than any other group of samples

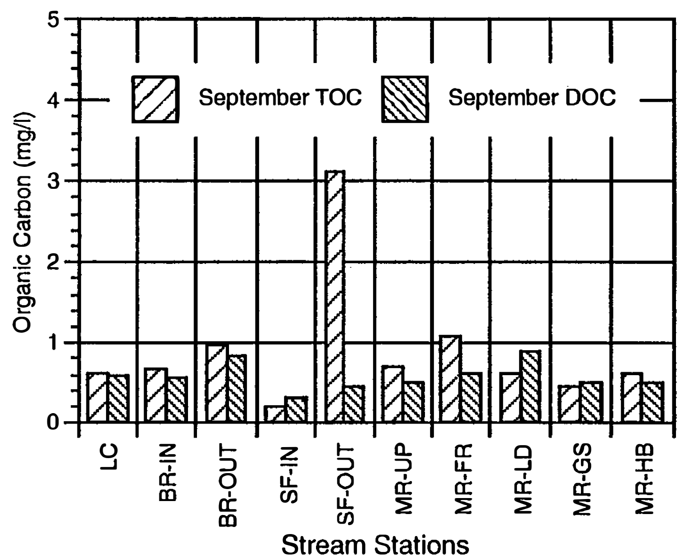



Figure 35. Organic carbon distributions in tributaries to and in the McKenzie River for September 1996

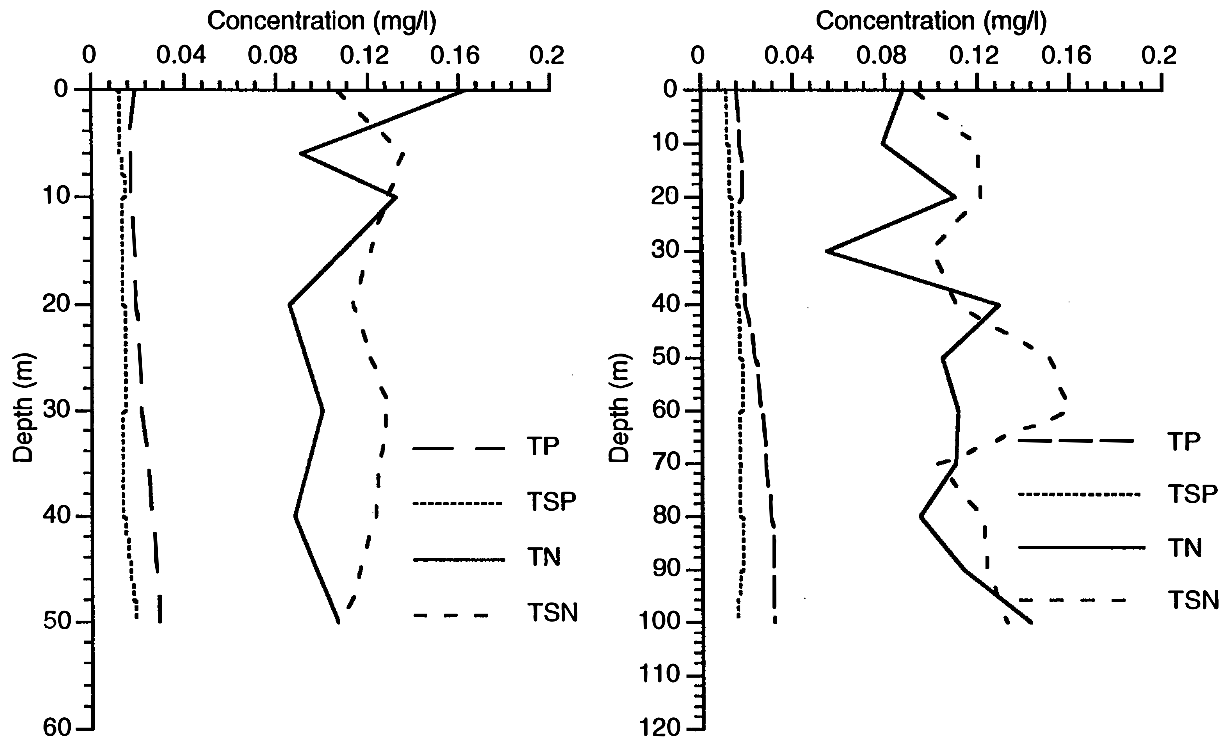



Figure 36. April 1996 concentrations of the nutrients total phosphorus (TP), total soluble phosphorus (TSP), total nitrogen (TN), and total soluble nitrogen (TSN) in Blue River and Cougar Lakes

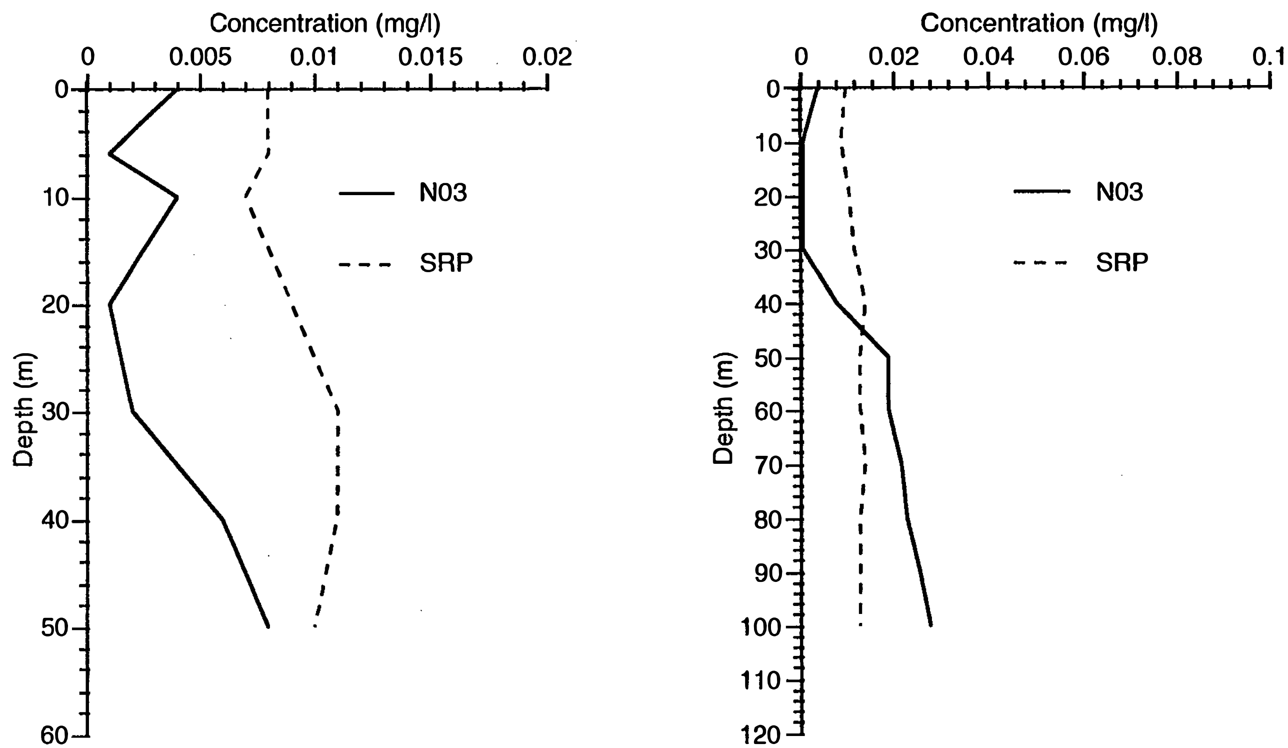



Figure 37. April 1996 concentrations of the nutrients nitrate (NO3) and soluble reactive phosphorus (SRP) in Blue River and Cougar Lakes

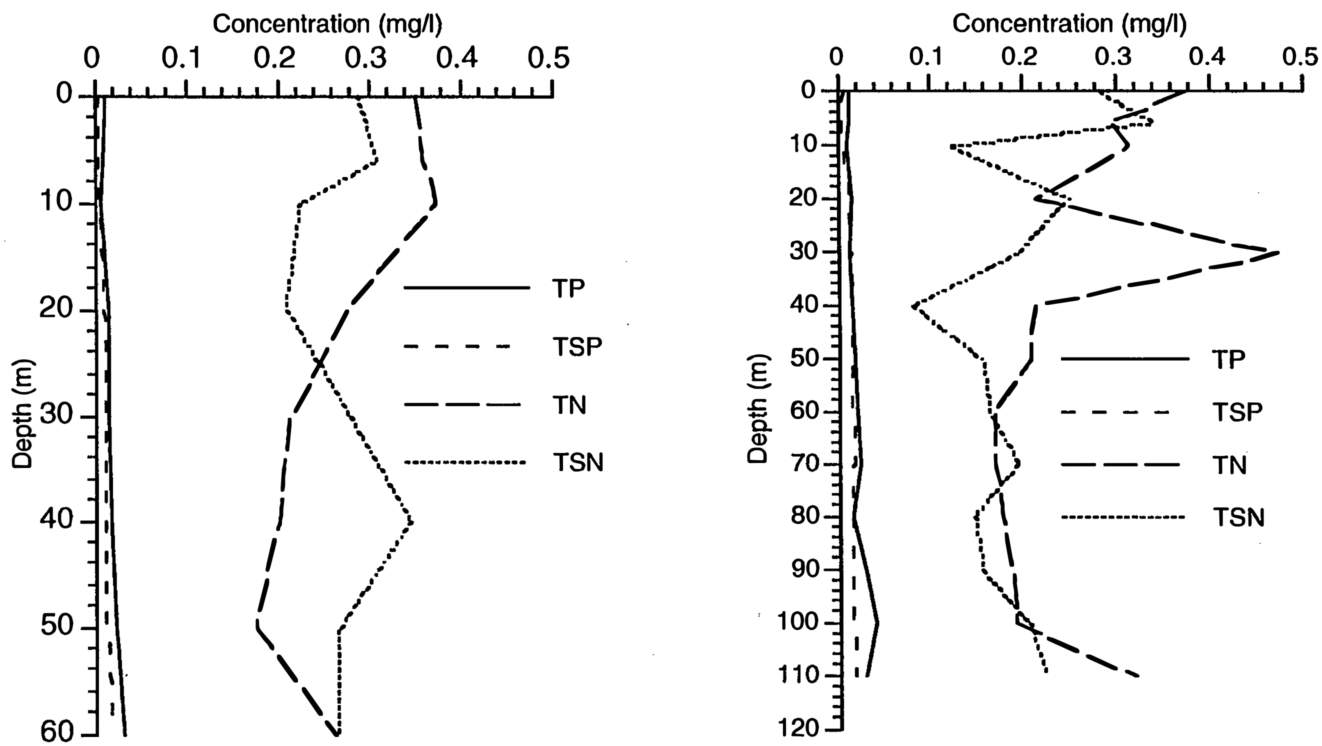



Figure 38. May 1996 concentrations of the nutrients; total phosphorus (TP), total soluble phosphorus (TSP), total nitrogen (TN), and total soluble nitrogen (TSN) in Blue River and Cougar Lakes.

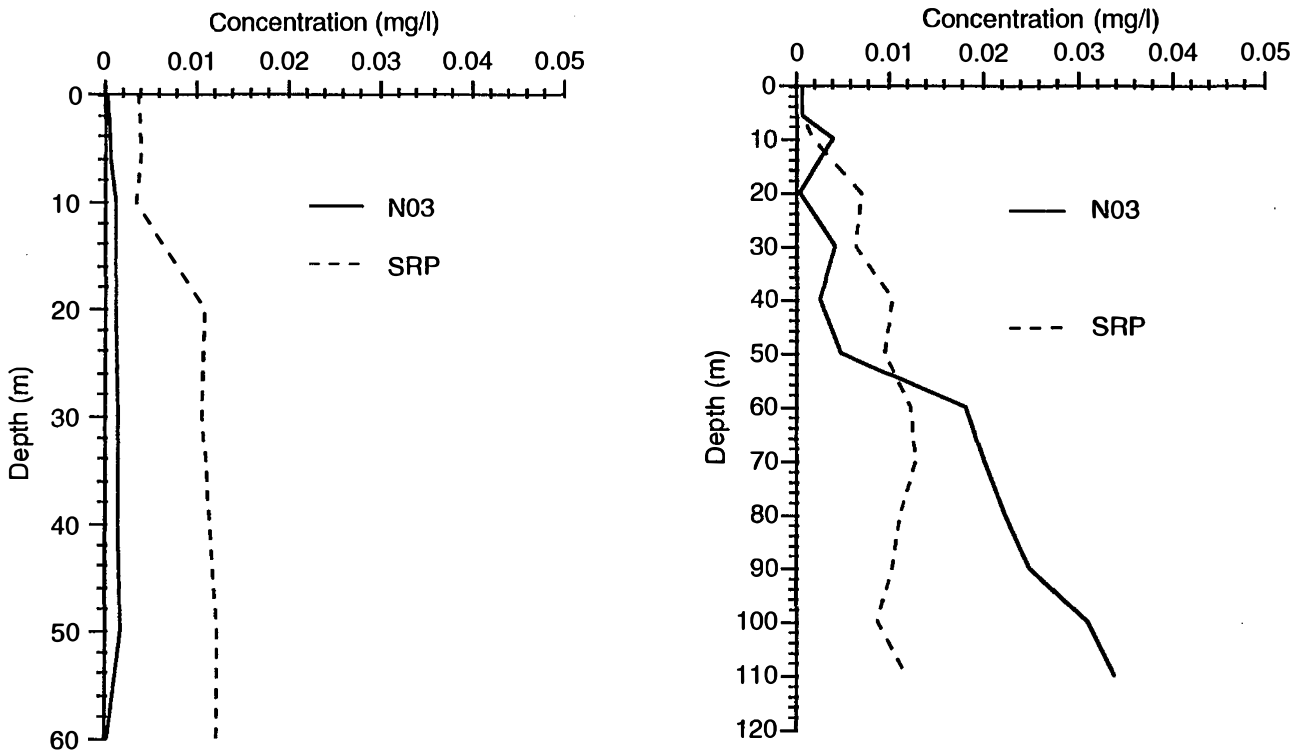



Figure 39. May 1996 concentrations of the nutrients nitrate (NO3) and soluble reactive phosphorus (SRP) in Blue River and Cougar Lakes

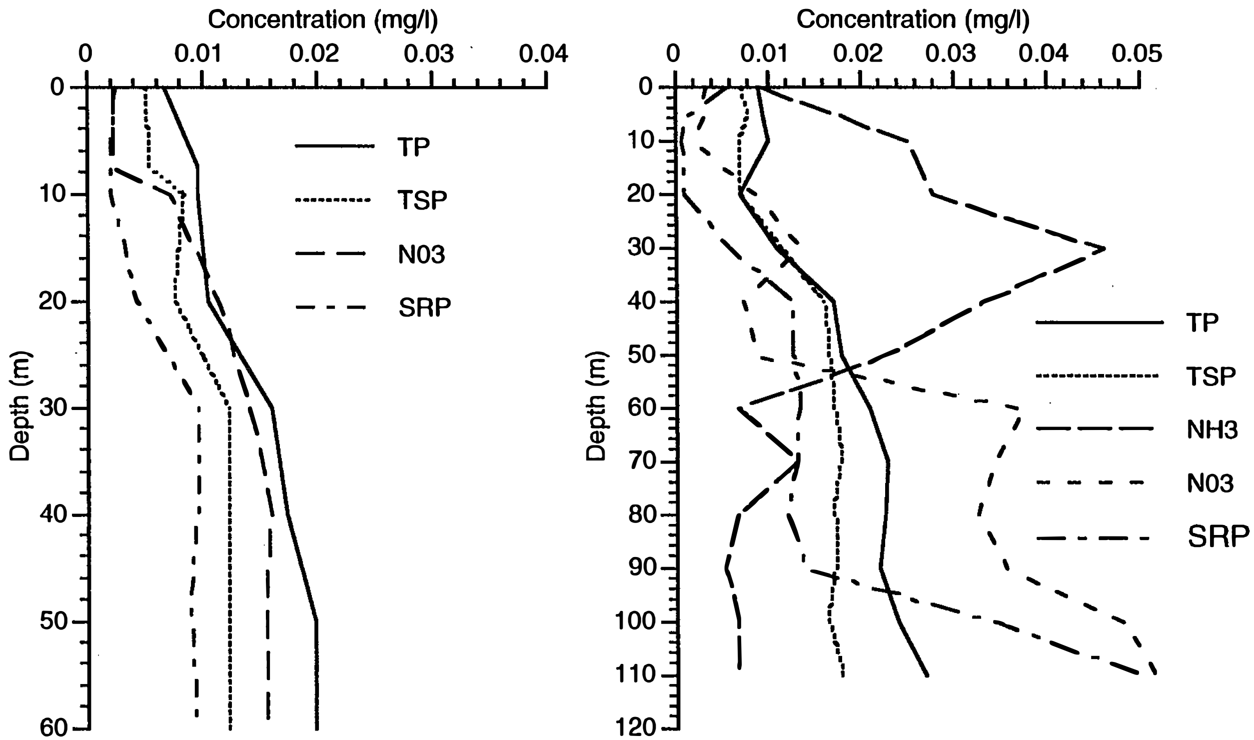



Figure 40. July 1996 concentrations of the nutrients total phosphorus (TP), total soluble phosphorus (TSP), soluble reactive phosphorus (SRP),ammonia (NH3), and nitrate (NO3) in Blue River and Cougar Lakes

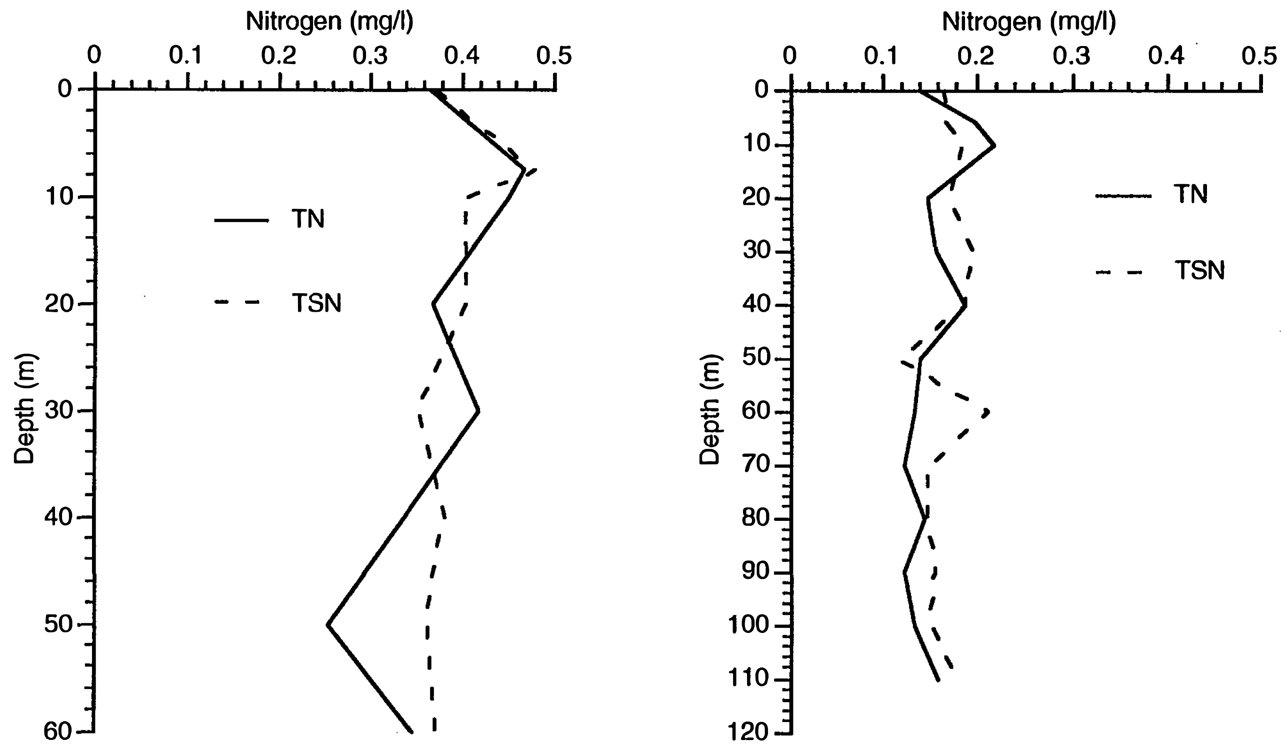



Figure 41. July 1996 concentrations of the nutrients: total nitrogen (TN) and total soluble nitrogen (TSN) in Blue River and Cougar Lakes

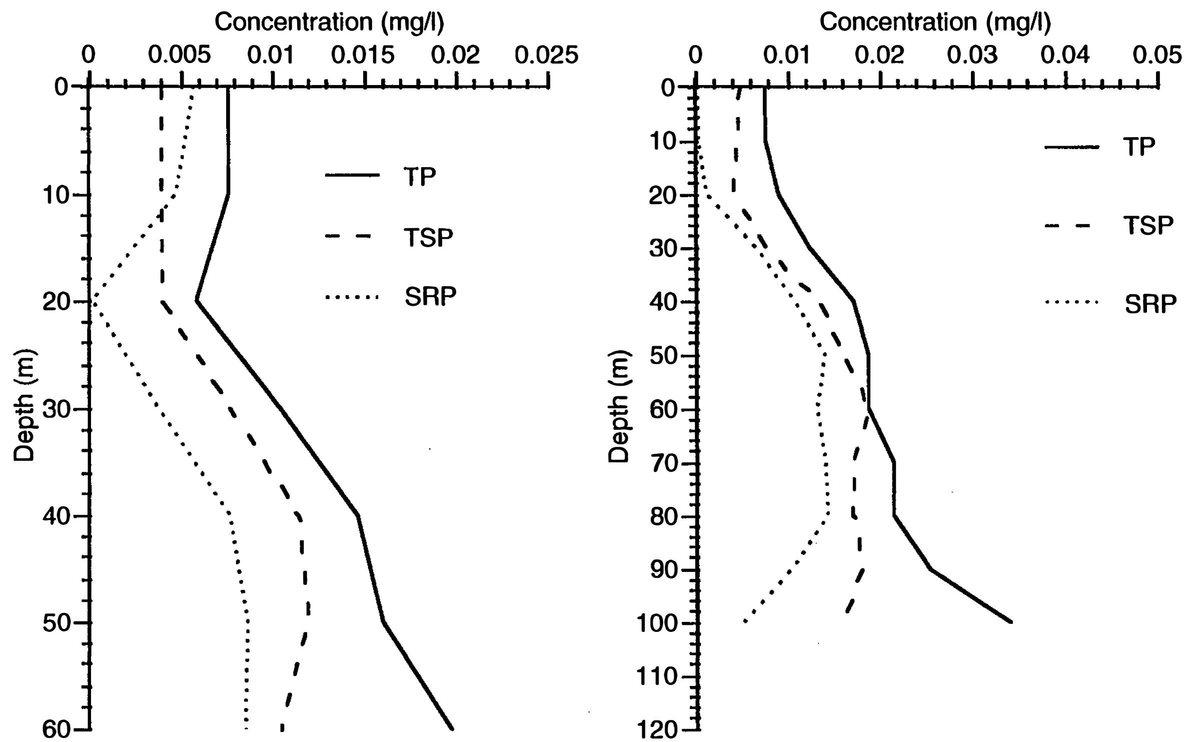



Figure 42. August 1996 concentrations of the nutrients, total phosphorus (TP), total soluble phosphorus (TSP), and soluble reactive phosphorus (SRP) in Blue River and Cougar Lakes

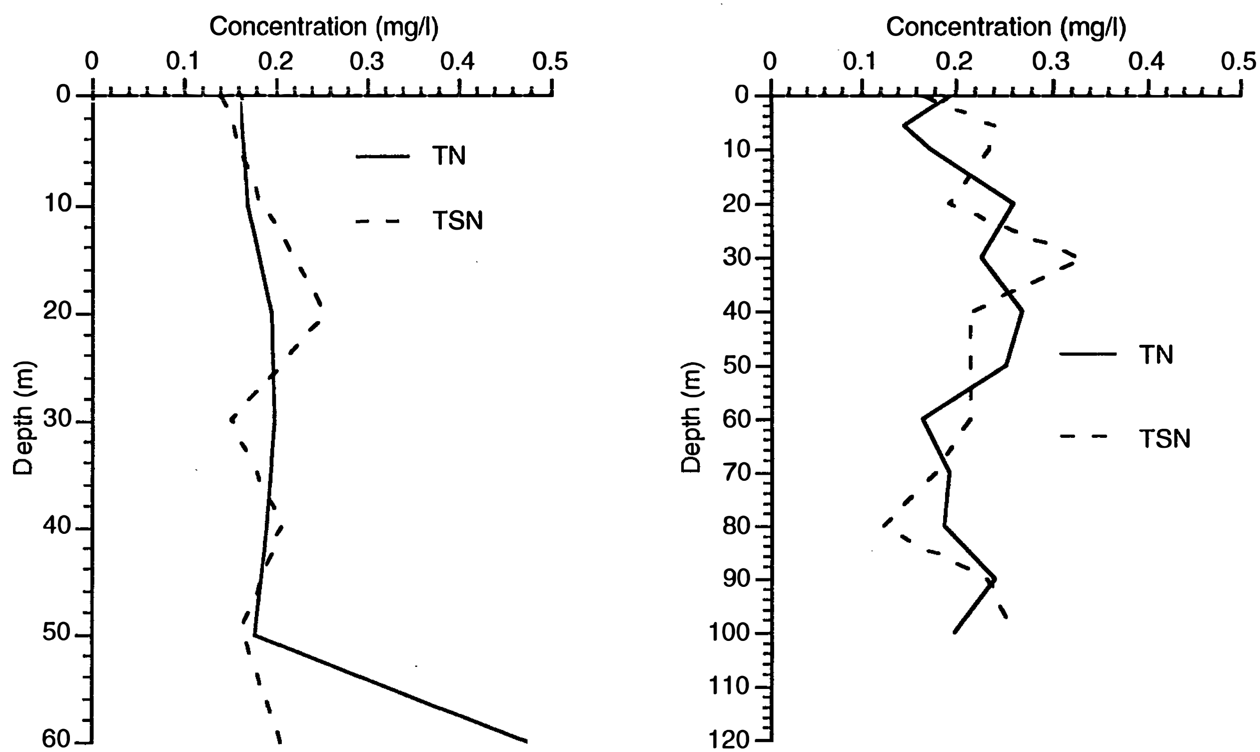



Figure 43. August 1996 concentrations of the nutrients total nitrogen (TN) and total soluble nitrogen (TSN) in Blue River and Cougar Lakes

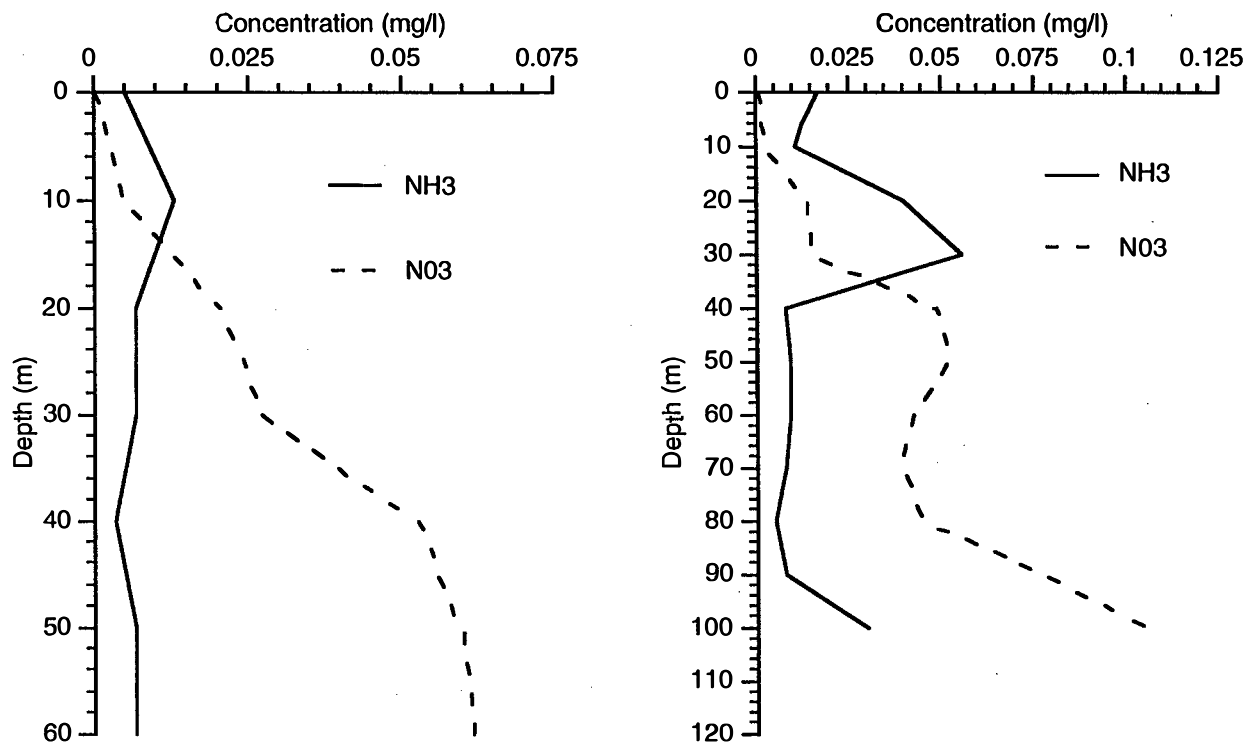



Figure 44. August 1996 concentrations of the nutrients, ammonia (NH3) and nitrate (NO3) in Blue River and Cougar Lakes.

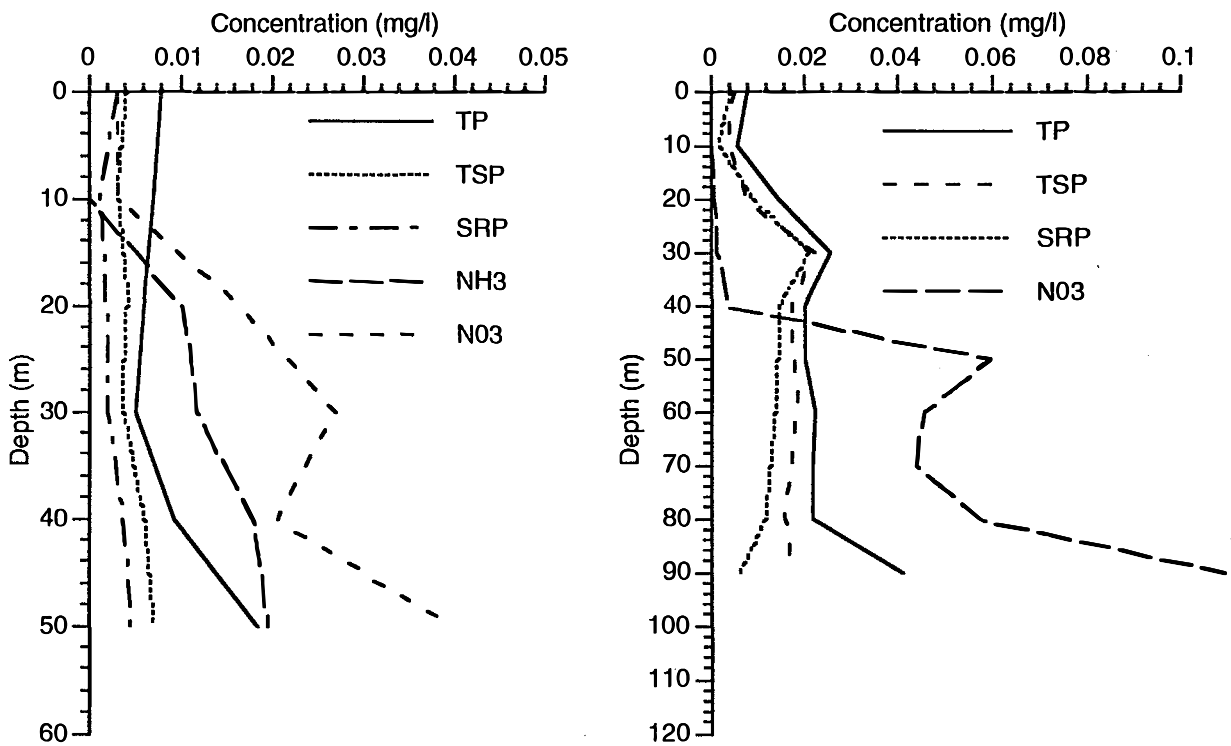



Figure 45. September 1996 concentrations of the nutrients:total phosphorus (TP), total soluble phosphorus (TSP), soluble reactive phosphorus (SRP),ammonia (NH3), and nitrate (NO3) in Blue River and Cougar Lakes

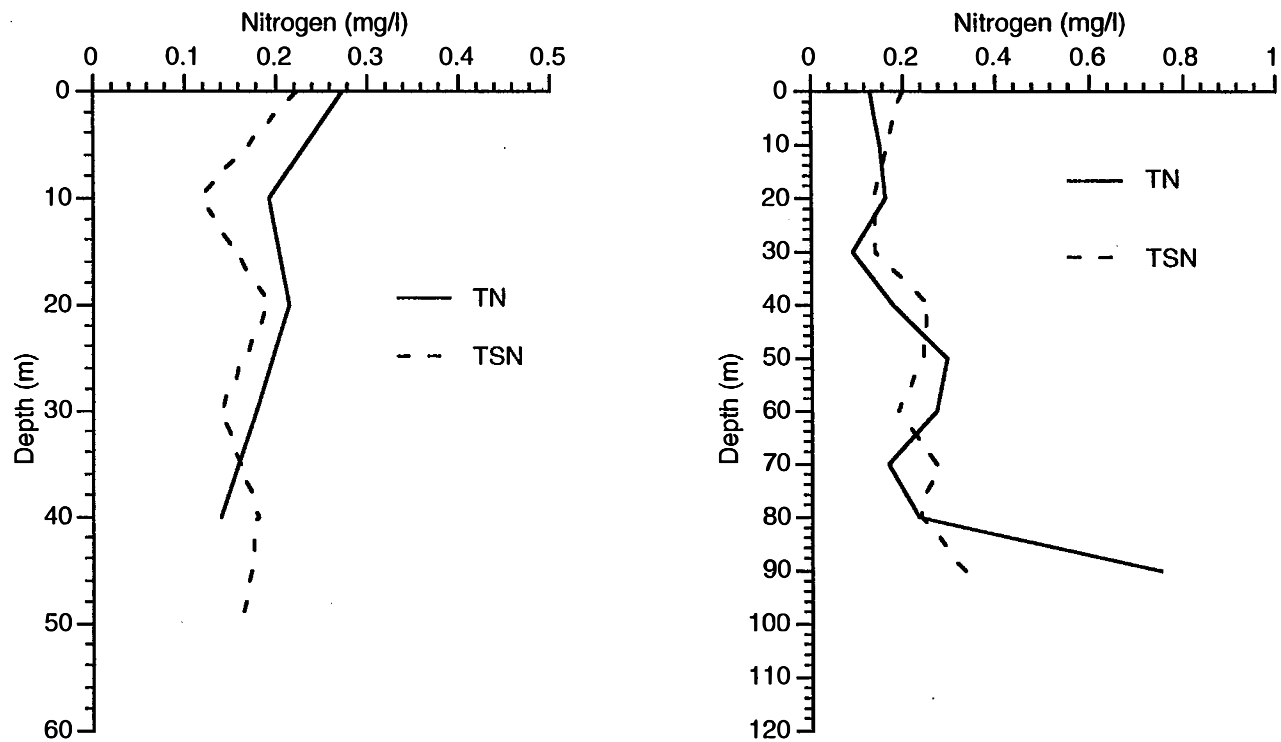



Figure 46. September 1996 concentrations of total nitrogen (TN) and total soluble nitrogen (TSN) in Blue River and Cougar Lakes

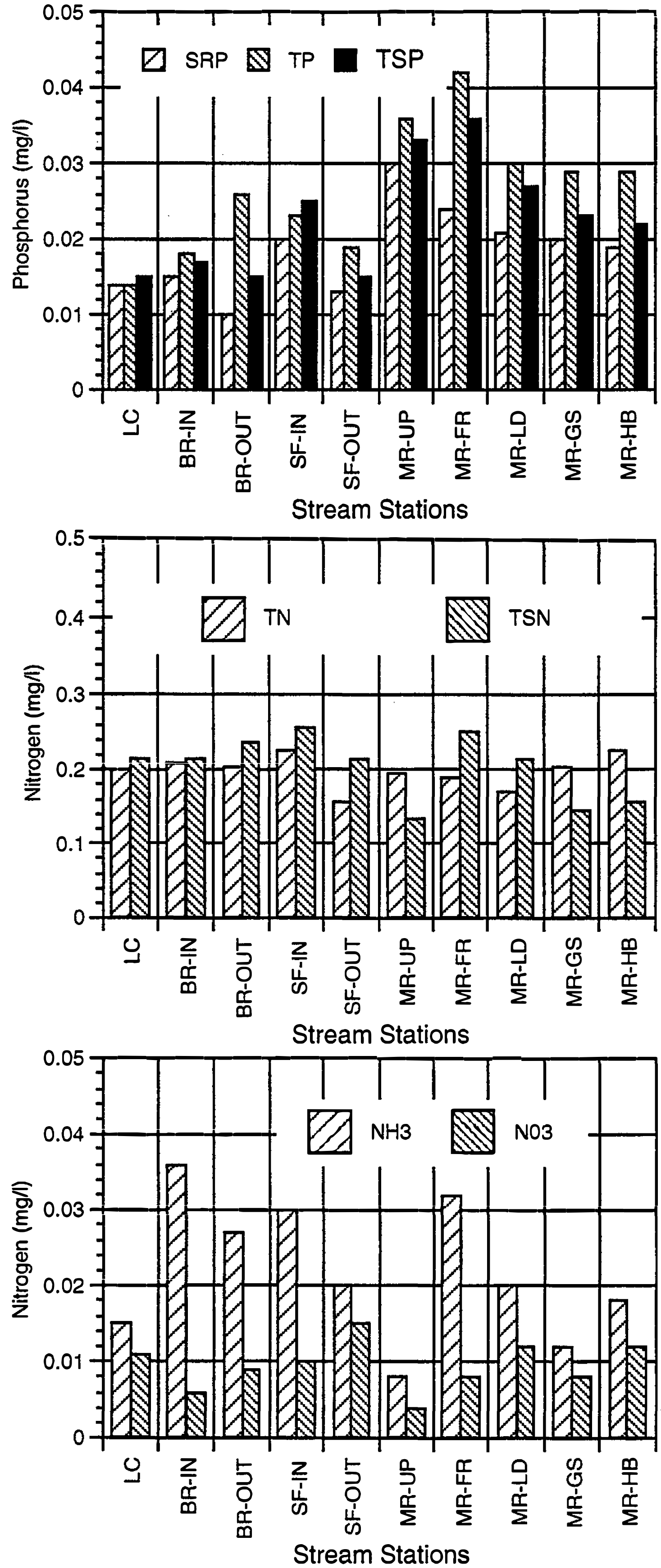



Figure 47. April 1996 chemical concentrations for inflows, outflows, and McKenzie River stations

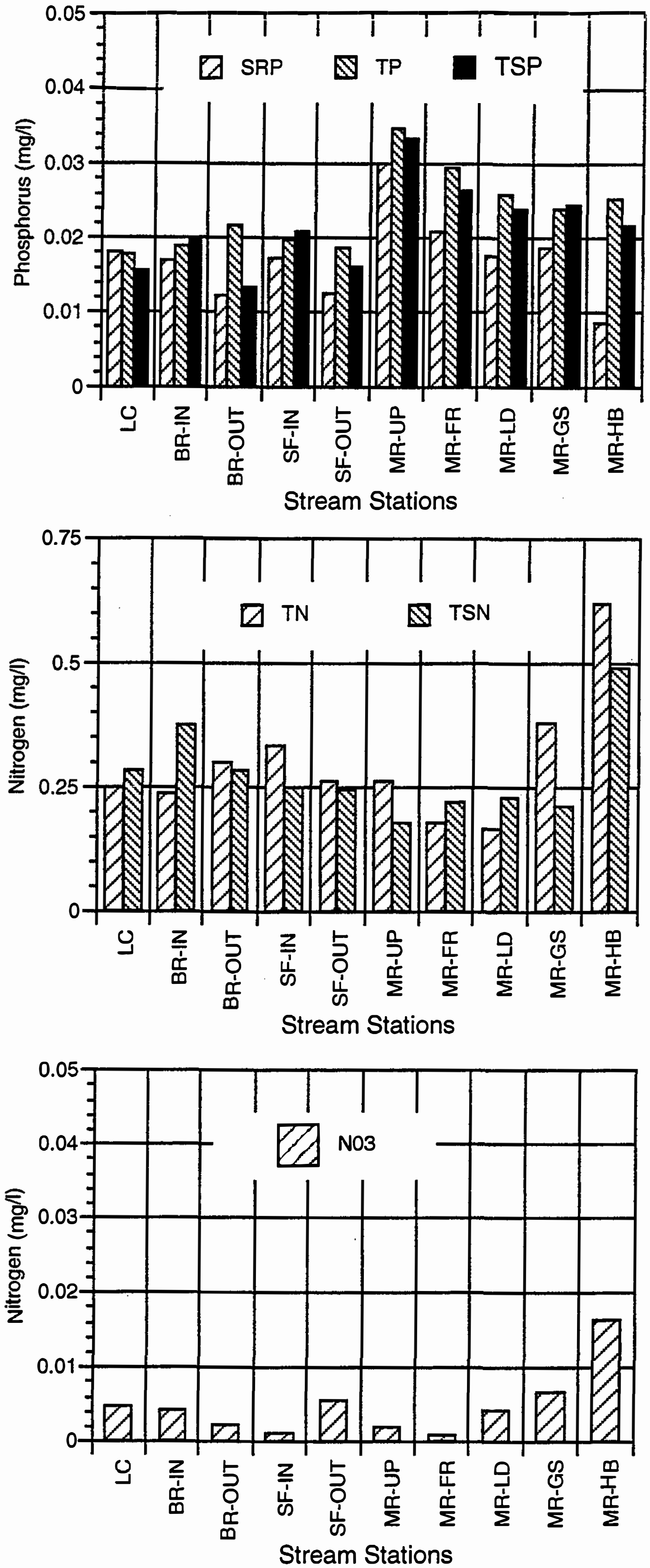



Figure 48. May 1996 chemical concentrations for inflows, outflows, and McKenzie River stations

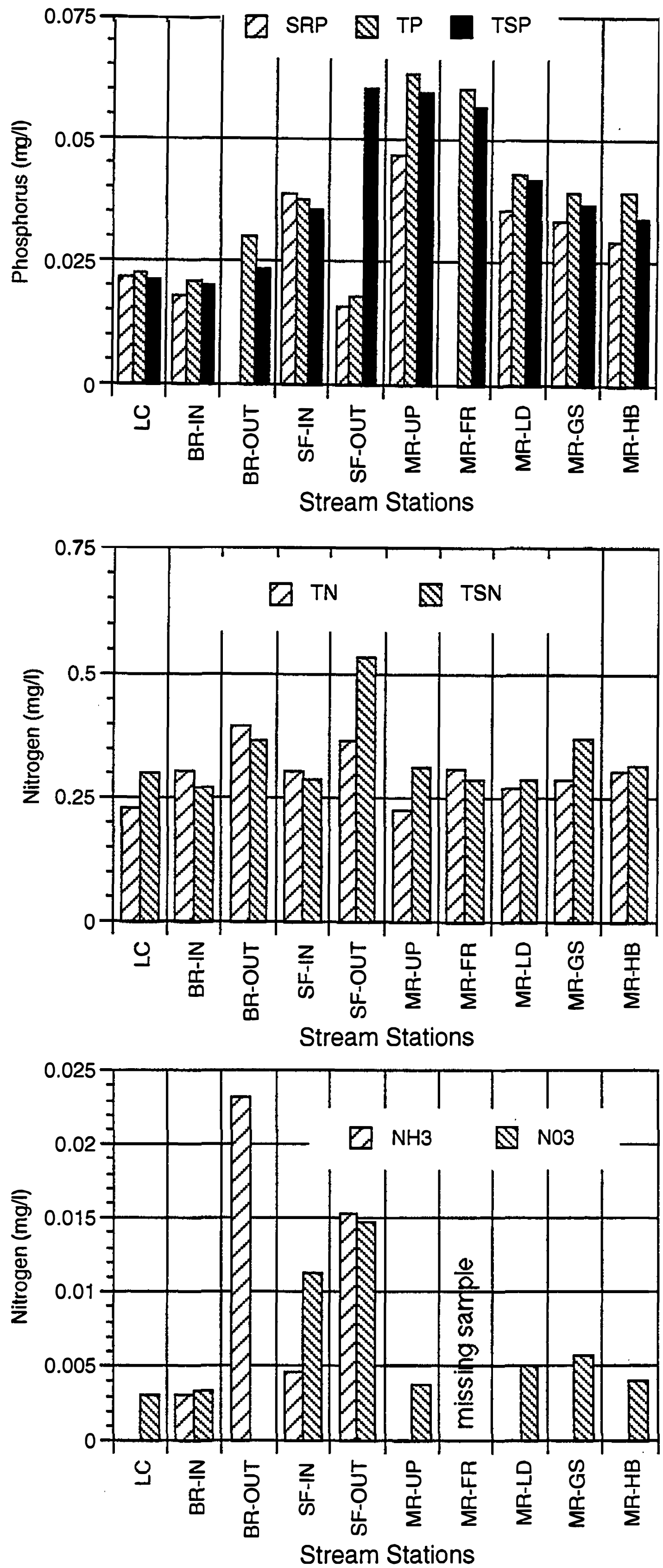



Figure 49. July 1996 chemical concentrations for inflows, outflows, and McKenzie River stations

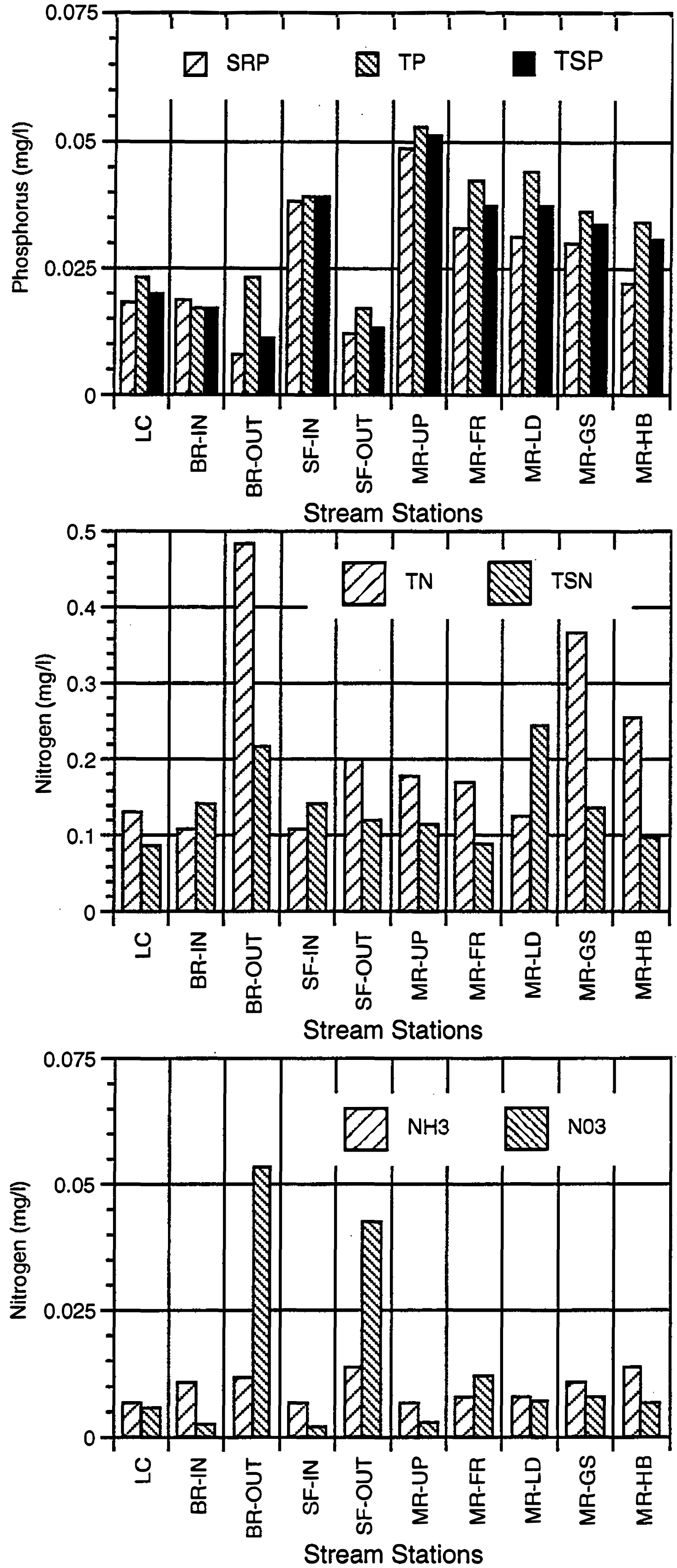
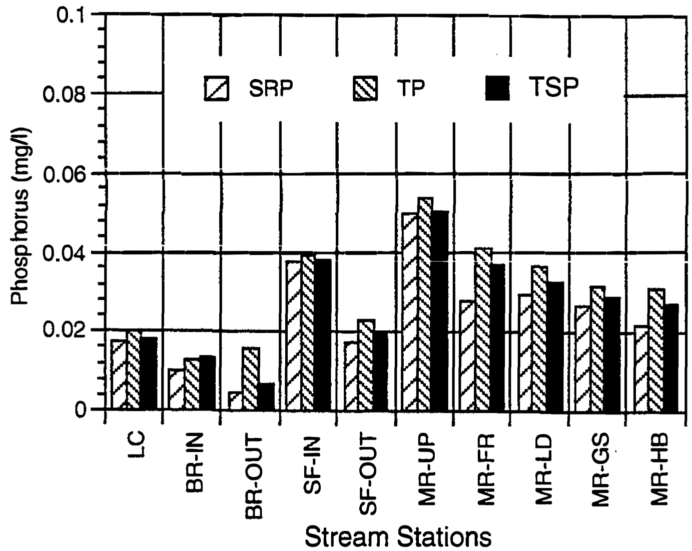
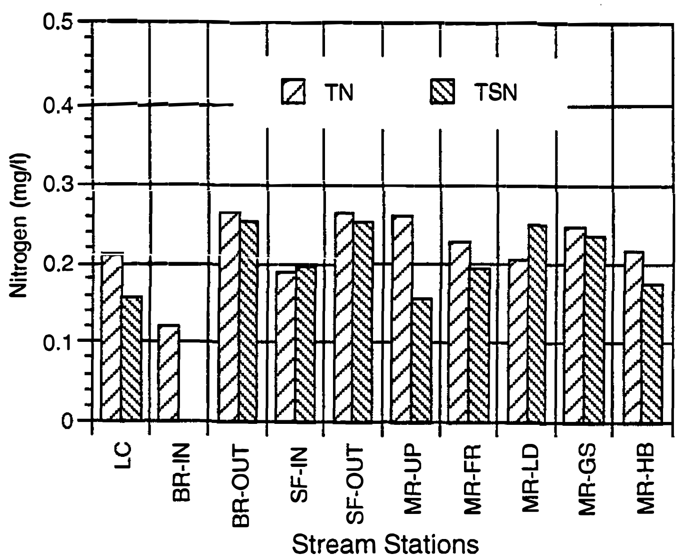



Figure 50. August 1996 chemical concentrations for inflows, outflows, and McKenzie River stations



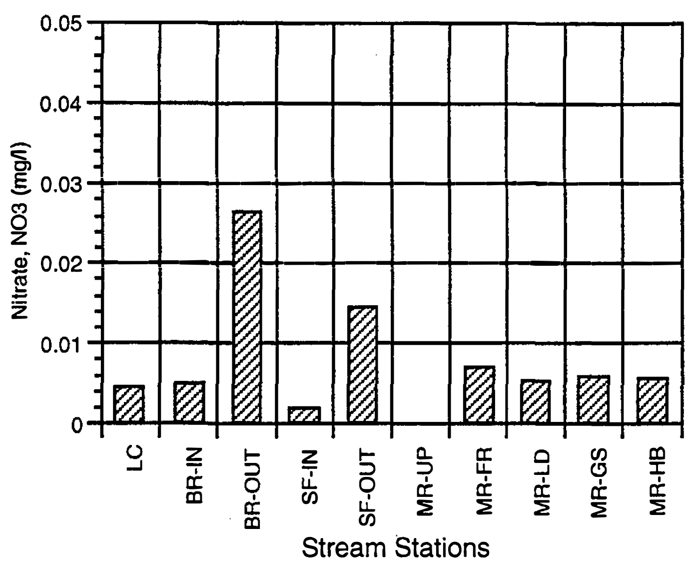




Figure 51. September 1996 chemical concentrations for inflows, outflows, and McKenzie River stations

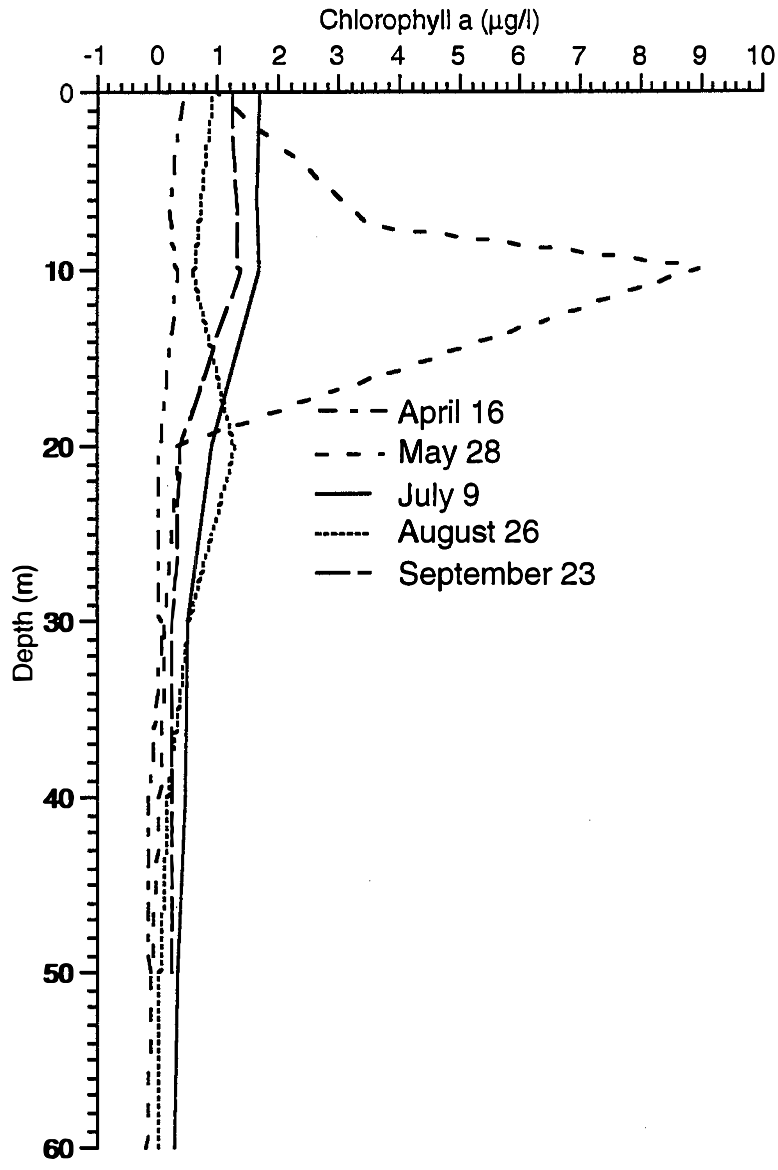



Figure52. Chlorophyll a concentrations (corrected for pheophytin) in Blue River Lake for 1996

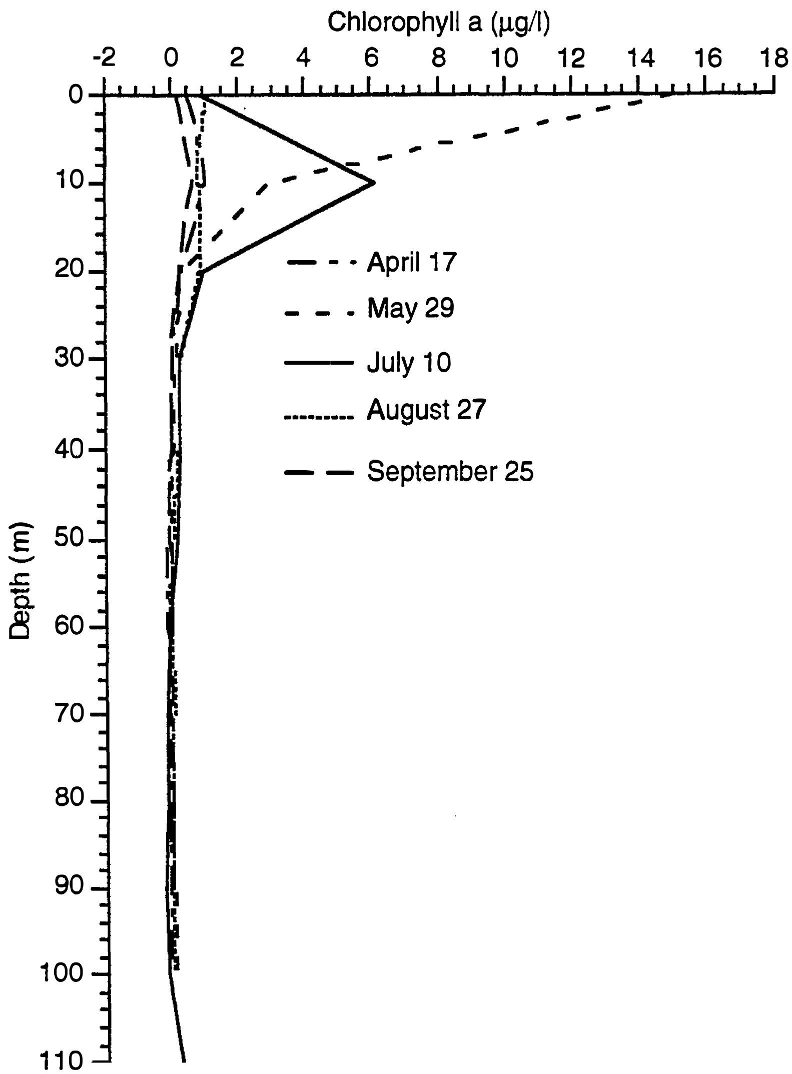



Figure53. Chlorophyll a concentrations (corrected for pheophytin) in Cougar Lake for 1996

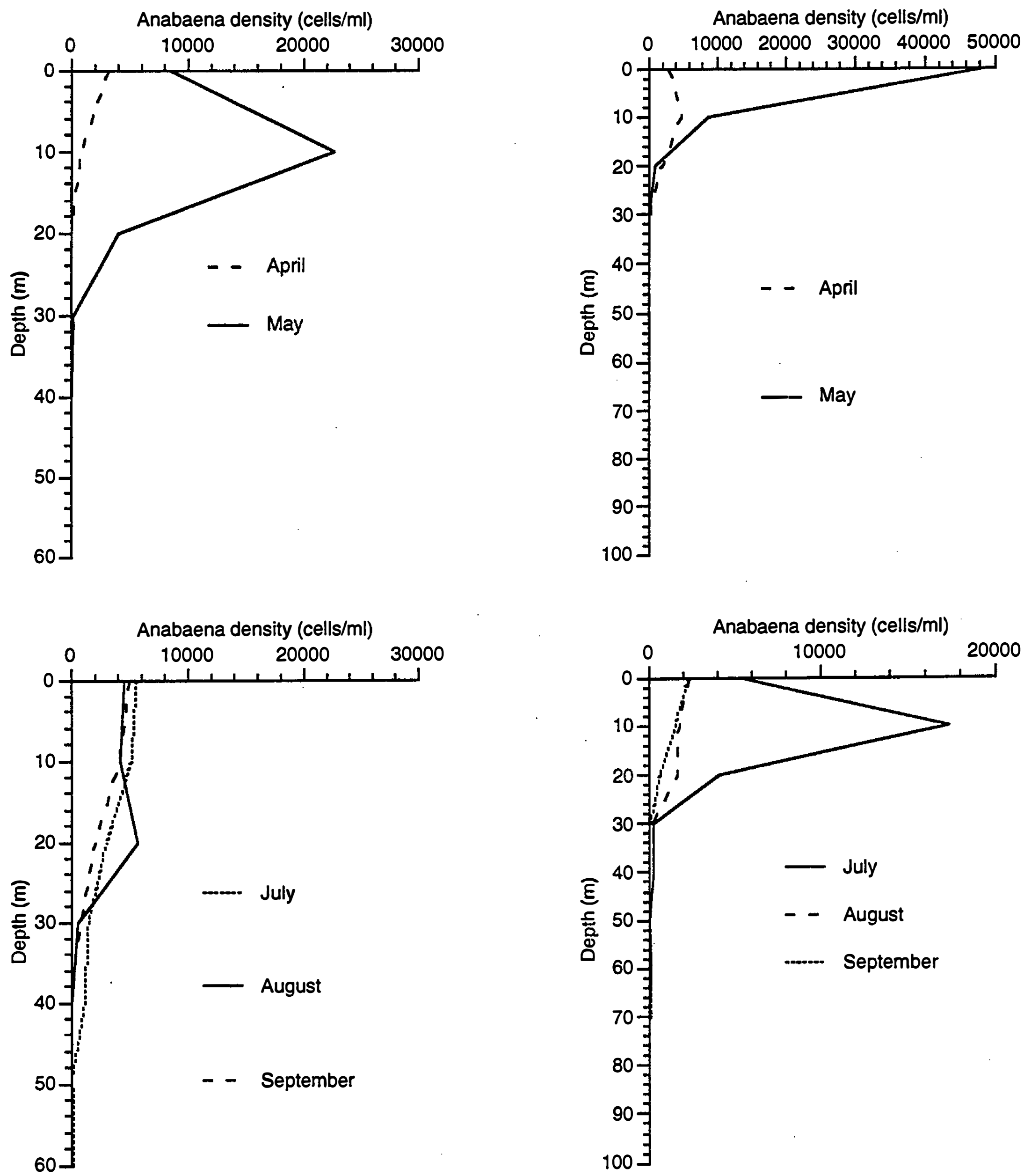



Figure 54. Population densities for *Anabaena* in Blue River and Cougar Lakes, 1996

**TABLES**

**Table 1. Limnological characteristics of Cougar (CR) and Blue River (BR) Lakes**

| Characteristics | CR (1964) | Characteristics | BR (1968) |
|---|---|---|---|
| Maximum power pool elevation, m ngvd | 517.9 | Maximum pool elevation, m ngvd | 413.6 |
| Minimum power pool elevation, m ngvd | 462.1 | Minimum flood control pool, m ngvd | 359.7 |
| Flood control pool, m ngvd | 467 | Maximum conservation pool, m ngvd | 411.5 |
| Surface area, $km^2$, at max. power pool | 518.4 | Surface area, $km^2$, at max. power pool | 395 |
| Volume, $m^3$ ($10^6$), at max. power pool | 270.7 | Volume, $m^3$ ($10^6$), at max. power pool | 110.5 |
| Maximum depth, m, at max. power pool | 120 | Maximum depth, m, at max. power pool | 70 |
| Reservoir length , km, at max. power pool | 10.5 | Reservoir length , km, at max. power pool | 10.3 |
| Drainage area, $km^2$ | 544 | Drainage area, $km^2$ | 278 |
| Theoretical residence time, days at max. power pool | 306 | Theoretical residence time, days at max. power pool | 102 |
| Elevation, top of penstocks, m ngvd | 181.4 | Elevation, top of penstocks, m ngvd | 133.2 |
| Elevation, bottom of penstocks, m ngvd | 160.9 | Elevation, bottom of penstocks, m ngvd | 110 |

**Table 2. Descriptions of stream and lake locations of water quality sample. Each lake had four locations for in situ sampling and one for chemical sampling. All parameters were measured for each stream station**

| Station Description | Abbreviation | Location (lake, RM) |
|---|---|---|
| McKenzie River upstream from lakes, bridge on SF 19 | MR-UP | RM 60 |
| South Fork McKenzie River inflow to Cougar Lake | SF-IN | 1 km above lake |
| Lookout Creek | LC | RM 0.5 above BR |
| Blue River inflow to Blue River Lake | BR-IN | RM 8. 5 |
| Cougar Dam outflow | SF-OUT | RM 4.5 |
| Blue River Dam outflow | BR-OUT | RM 1.7 |
| Finn Rock bridge | MR-FR | RM 54. 2 |
| Leaburg Dam outflow | MR-LD | RM 38.8 |
| Gaging station downstream from Walterville canal | MR-GS | RM 27.7 |
| Hayden Bridge water intake | MR-HB | |
| Cougar Lake sampling stations | CR1-4 | Figure 2 |
| Blue River Lake sampling stations | BR1-4 | Figure 3 |

**Table 3. Mean coefficient of variation of replicate and split samples**

| Parameter | Replicate | Split |
|---|---|---|
| Total phosphorous | 5.68 | 2.54 |
| Total dissolved phosphorous | 12.11 | 1.81 |
| Total nitrogen | 7.28 | 8.38 |
| Total dissolved nitrogen | 10.86 | 9.84 |
| Ammonia nitrogen | 8.90 | 4.51 |
| Nitrate nitrogen | 8.45 | 1.11 |
| Sulfate | 0.85 | 1.06 |
| Total organic carbon | 3.94 | 2.06 |
| Total dissolved organic carbon | 3.50 | 2.50 |
| Total manganese | 13.95 | 3.03 |
| Total dissolved manganese | 7.37 | 0.58 |
| Total iron | 7.70 | 2.62 |
| Total dissolved iron | 7.73 | 2.43 |
| Total alkalinity | 2.16 | 1.67 |
| Total suspended solids | 26.95 | 28.19 |
| Turbidity | 7.90 | 5.75 |

**Table 4. Mean percent recovery and standard deviation of spike and quality assurance (QA) samples**

| Parameter | Spike | QA |
|---|---|---|
| Total phosphorous | 101.1±5.1 | 105.5±0.9 |
| Total dissolved phosphorous | 102.6±3.4 | - |
| Soluble reactive phosphorous | 95.2±5.0 | 104.2±3.4 |
| Total nitrogen | 112.2±27.8 | - |
| Total dissolved nitrogen | 95.4±28.8 | - |
| Ammonia nitrogen | 105.7±16.3 | 104.7±3.2 |
| Nitrate nitrogen | 96.9±4.6 | 101.2±3.6 |
| Sulfate | 99.6±5.1 | - |
| Total organic carbon | 106.0±9.9 | 96.6±6.7 |
| Total dissolved organic carbon | 106.3±17.3 | - |
| Total manganese | 100.9±4.4 | - |
| Total dissolved manganese | 103.0±2.3 | 100.8±2.2 |
| Total iron | 105.6±19.7 | - |
| Total dissolved iron | 99.4±3.5 | 93.4±8.6 |
| Total alkalinity | 88.5±7.2 | 96.5±1.2 |
| Turbidity | 104.7±17.1 | - |
| Total suspended solids | - | 99.2±3.5 |

**Table 5. Phytopigment data for stream, inflow, and outflow stations, 1996. Note: negative numbers indicate likely zero concentrations. Concentrations expressed as µg pigment per liter (µg/l)**

| Station | Date | Depth | Chlorophyll a (corr) | Pheophytin | Chlorophyll a (tri) | Chlorophyll b | Chlorophyll c |
|---|---|---|---|---|---|---|---|
| BR-IN | Apr 18, 96 | 0 | -0.147 | -0.204 | 0.21 | 0.427 | 0.696 |
| LC | Apr 18, 96 | 0 | 0.214 | -0.454 | 0.014 | -0.03 | -0.052 |
| SF | Apr 18, 96 | 0 | 0.147 | -0.068 | 0.46 | 0.079 | 0.129 |
| BR-OF | Apr 18, 96 | 0 | -0.107 | -0.136 | 0.158 | 0.054 | 0.246 |
| CR-OF | Apr 18, 96 | 0 | 0.147 | -0.113 | 0.194 | 0.037 | 0.241 |
| MR-UP | Apr 18, 96 | 0 | -0.067 | 0.159 | 0.426 | 0.067 | 0.215 |
| MR-FR | Apr 18, 96 | 0 | 0.427 | 0.068 | 0.69 | 0.176 | 0.288 |
| MR-GS | Apr 18, 96 | 0 | 0.441 | 0.182 | 0.849 | 0.107 | 0.323 |
| MR-LD | Apr 18, 96 | 0 | 0.16 | -0.091 | 0.359 | 0.284 | 0.563 |
| MR-HB | Apr 18, 96 | 0 | 0.187 | 0.182 | 0.593 | 0.114 | 0.214 |
| | | | | | | | |
| BR-IN | May 27, 96 | 0 | 0.254 | -0.068 | 0.174 | 0.008 | 0.153 |
| LC | May 27, 96 | 0 | 0.267 | 0.068 | 0.518 | 0.12 | 0.306 |
| SF | May 27, 96 | 0 | 0.174 | 0 | 0.333 | 0.026 | 0.095 |
| BR-OF | May 27, 96 | 0 | 0.214 | 0 | 0.482 | 0.13 | 0.372 |
| CR-OF | May 27, 96 | 0 | -0.107 | 0.023 | 0.239 | -0.005 | 0.079 |
| MR-UP | May 27, 96 | 0 | -0.027 | 0.023 | 0.255 | 0.021 | 0.04 |
| MR-FR | May 27, 96 | 0 | 0.027 | -0.227 | 0.262 | 0 | 0.023 |
| MR-LD | May 27, 96 | 0 | 0.174 | -0.045 | 0.404 | 0.011 | 0.02 |
| MR-GS | May 27, 96 | 0 | 0.12 | -0.182 | 0.252 | 0.28 | 0.528 |
| MR-HB | May 27, 96 | 0 | 0.334 | 0.159 | 0.597 | 0.067 | 0.184 |
| | | | | | | | |
| BR-IN | Jul 8, 96 | 0 | 0.053 | 0.045 | 0.112 | -0.12 | -0.013 |
| LC | Jul 8, 96 | 0 | -0.067 | 0.113 | 0.054 | -0.099 | -0.038 |
| SF | Jul 8, 96 | 0 | -0.027 | -0.25 | 0.09 | -0.054 | 0.016 |
| BR-OF | Jul 8, 96 | 0 | -0.053 | -0.182 | 0.159 | -0.021 | 0.216 |
| CR-OF | Jul 8, 96 | 0 | 0.267 | -0.136 | 0.389 | 0.048 | 0.105 |
| MR-UP | Jul 9, 96 | 0 | 0.067 | -0.045 | 0.332 | 0.047 | 0.088 |
| MR-FR | Jul 9, 96 | 0 | 0.067 | 0.159 | 0.386 | 0.087 | 0.114 |
| MR-LD | Jul 9, 96 | 0 | -0.147 | 0.295 | -0.028 | -0.065 | -0.083 |
| MR-GS | Jul 9, 96 | 0 | 0.307 | 0.272 | 0.568 | 0.02 | 0.117 |
| MR-HB | Jul 9, 96 | 0 | -0.214 | 0 | 0.141 | 0.012 | 0.08 |
| | | | | | | | |
| BR-IN | Aug 28, 96 | 0 | 0.147 | -0.454 | 0.136 | -0.133 | 0.008 |
| LC | Aug 28, 96 | 0 | 0 | -0.113 | 0.08 | -0.05 | 0.287 |
| SF | Aug 28, 96 | 0 | 0.107 | 0.045 | 0.15 | -0.003 | 0.352 |
| BR-OF | Aug 28, 96 | 0 | 0.401 | -0.091 | 0.363 | -0.003 | 0.238 |
| CR-OF | Aug 28, 96 | 0 | 0.227 | -0.091 | 0.429 | 0.063 | 0.497 |
| MR-UP | Aug 28, 96 | 0 | 0.36 | -0.295 | 0.387 | 0.038 | 0.285 |
| MR-FR | Aug 28, 96 | 0 | 0.334 | -0.023 | 0.447 | 0.02 | 0.191 |
| MR-LD | Aug 28, 96 | 0 | 0.427 | -0.227 | 0.706 | 0.113 | 0.355 |
| MR-GS | Aug 26, 96 | 0 | 0.481 | 0.113 | 0.559 | 0.022 | 0.307 |
| MR-HB | Aug 26, 96 | 0 | 0.414 | 0 | 0.682 | -0.057 | 0.146 |
| | | | | | | | |
| BR-IN | Sep 26, 96 | 0 | -0.147 | -0.068 | 0.037 | -0.182 | -0.012 |
| LC | Sep 26, 96 | 0 | 0 | 0.068 | 0.079 | -0.144 | 0.089 |
| SF | Sep 26, 96 | 0 | 0.053 | -0.113 | 0.118 | -0.125 | 0.011 |
| BR-OF | Sep 26, 96 | 0 | 0.134 | 0.113 | 0.428 | -0.036 | 0.254 |
| CR-OF | Sep 26, 96 | 0 | 0.04 | 0.068 | 0.267 | -0.057 | -0.016 |
| MR-UP | Sep 24, 96 | 0 | 0.401 | 0 | 0.469 | -0.05 | 0.199 |
| MR-FR | Sep 24, 96 | 0 | 0.481 | -0.113 | 0.718 | -0.021 | 0.191 |
| MR-LD | Sep 24, 96 | 0 | 0.147 | -0.091 | 0.582 | -0.097 | 0.146 |
| MR-GS | Sep 24, 96 | 0 | 0.347 | 0.136 | 0.556 | -0.048 | 0.077 |
| MR-HB | Sep 26, 96 | 0 | 0.134 | -0.023 | 0.482 | -0.178 | -0.014 |

**Table 6. Phytopigment data for Blue River Lake. Note: negative numbers indicate likely zero concentrations. Concentrations expressed as µg pigment per liter (µg/l)**

| Date | Depth | Chlorophyll a (corr) | Pheophytin | Chlorophyll a (tri) | Chlorophyll b | Chlorophyll c |
|---|---|---|---|---|---|---|
| Apr 16, 96 | 0 | 0.427 | 0.113 | 0.717 | 0.063 | 0.229 |
| Apr 16, 96 | 6 | 0.174 | 0.113 | 0.481 | 0.081 | 0.286 |
| Apr 16, 96 | 10 | 0.32 | -0.204 | 0.344 | 0.081 | 0.259 |
| Apr 16, 96 | 20 | 0.013 | 0.045 | 0.274 | 0.294 | 0.481 |
| Apr 16, 96 | 30 | 0.053 | -0.045 | 0.334 | 0.486 | 0.869 |
| Apr 16, 96 | 40 | -0.147 | -0.204 | 0.21 | 0.427 | 0.696 |
| Apr 16, 96 | 50 | -0.107 | -0.136 | 0.158 | 0.054 | 0.246 |
| | | | | | | |
| May 28, 96 | 0 | 1.669 | 0.113 | 1.843 | -0.03 | 0.214 |
| May 28, 96 | 6 | 1.615 | -0.136 | 1.785 | -0.096 | 0.175 |
| May 28, 96 | 10 | 1.682 | 0.136 | 1.942 | -0.073 | 0.257 |
| May 28, 96 | 20 | 0.894 | 0.227 | 1.268 | -0.04 | 0.118 |
| May 28, 96 | 30 | 0.494 | 0.182 | 0.657 | -0.017 | 0.068 |
| May 28, 96 | 40 | 0.454 | 0.091 | 0.594 | 0.04 | 0.172 |
| May 28, 96 | 50 | 0.32 | -0.113 | 0.469 | 0.101 | 0.247 |
| May 28, 96 | 60 | 0.267 | 0.068 | 0.518 | 0.12 | 0.306 |
| | | | | | | |
| Jul 9, 96 | 0 | 1.001 | 0.227 | 1.395 | -0.065 | 0.158 |
| Jul 9, 96 | 7.5 | 3.564 | 0.477 | 4.211 | -0.215 | 0.367 |
| Jul 9, 96 | 10 | 8.964 | 0.681 | 9.949 | -0.656 | 1.037 |
| Jul 9, 96 | 20 | 0.347 | -0.068 | 0.557 | 0.087 | 0.083 |
| Jul 9, 96 | 30 | 0.107 | -0.159 | 0.203 | 0.018 | 0.117 |
| Jul 9, 96 | 40 | 0.013 | -0.113 | 0.145 | 0.024 | 0.133 |
| Jul 9, 96 | 50 | -0.107 | -0.091 | 0.126 | -0.012 | 0.012 |
| Jul 9, 96 | 60 | -0.214 | 0 | 0.141 | 0.012 | 0.08 |
| | | | | | | |
| Aug 26, 96 | 0 | 0.894 | -0.227 | 1.05 | 0.035 | 0.205 |
| Aug 26, 96 | 10 | 0.574 | -0.045 | 0.89 | -0.031 | 0.164 |
| Aug 26, 96 | 20 | 1.308 | 0.068 | 1.722 | 0.028 | 0.382 |
| Aug 26, 96 | 30 | 0.521 | -0.068 | 0.61 | -0.025 | 0.168 |
| Aug 26, 96 | 40 | 0.147 | 0.068 | 0.217 | -0.097 | 0.121 |
| Aug 26, 96 | 50 | 0.013 | -0.113 | 0.028 | -0.14 | -0.002 |
| Aug 26, 96 | 60 | 0.04 | 0.068 | 0.176 | 0.076 | 0.056 |
| | | | | | | |
| Sep 23, 96 | 0 | 1.255 | -0.045 | 1.398 | 0.029 | 0.261 |
| Sep 23, 96 | 10 | 1.375 | -0.091 | 1.604 | -0.052 | 0.286 |
| Sep 23, 96 | 20 | 0.387 | 0.091 | 0.619 | 0.006 | 0.2 |
| Sep 23, 96 | 30 | 0.254 | 0.091 | 0.381 | -0.065 | 0.01 |
| Sep 23, 96 | 40 | 0.227 | -0.182 | 0.297 | -0.028 | 0.128 |
| Sep 23, 96 | 50 | 0.254 | -0.159 | 0.363 | -0.06 | 0.131 |

**Table 7. Phytopigment data for Cougar Lake. Note: negative numbers indicate likely zero concentrations. Concentrations expressed as µg pigment per liter (µg/l)**

| Date | Depth (m) | Chlorophyll a (corr) | Pheophytin | Chlorophyll a (tri) | Chlorphyll b | Chlorphyll c |
|---|---|---|---|---|---|---|
| Apr 17, 96 | 0 | 0.481 | 0.045 | 0.693 | 0.091 | 0.168 |
| Apr 17, 96 | 10 | 1.028 | 0.499 | 1.54 | 0.092 | 0.403 |
| Apr 17, 96 | 20 | 0.32 | -0.182 | 0.53 | -0.011 | 0.118 |
| Apr 17, 96 | 30 | 0.04 | -0.023 | 0.183 | -0.013 | 0.041 |
| Apr 17, 96 | 40 | 0.053 | -0.091 | 0.113 | -0.009 | 0.12 |
| Apr 17, 96 | 50 | -0.08 | 0.136 | 0.087 | 0.046 | 0.096 |
| Apr 17, 96 | 60 | -0.12 | 0.159 | 0.158 | 0.249 | 0.417 |
| Apr 17, 96 | 70 | 0 | -0.023 | 0.152 | 0.186 | 0.397 |
| Apr 17, 96 | 80 | -0.04 | 0.023 | 0.073 | 0.126 | 0.222 |
| Apr 17, 96 | 90 | -0.093 | -0.227 | 0.204 | 0.316 | 0.494 |
| Apr 17, 96 | 100 | -0.067 | -0.182 | 0.297 | 0.467 | 0.759 |
| May 29, 96 | 0 | 15.052 | 0.936 | 16.024 | -0.657 | 1.332 |
| May 29, 96 | 6 | 7.383 | 0.159 | 8.108 | -0.005 | 0.869 |
| May 29, 96 | 10 | 2.937 | 0.409 | 3.633 | 0.03 | 0.362 |
| May 29, 96 | 20 | 0.294 | 0.023 | 0.445 | -0.008 | 0.014 |
| May 29, 96 | 30 | 0.134 | -0.113 | 0.21 | 0.002 | 0.05 |
| May 29, 96 | 40 | 0.067 | -0.113 | 0.215 | 0.079 | 0.124 |
| May 29, 96 | 50 | 0.027 | -0.091 | 0.196 | 0.039 | 0.04 |
| May 29, 96 | 60 | 0.027 | 0.136 | 0.21 | 0.105 | 0.351 |
| May 29, 96 | 70 | -0.027 | -0.023 | 0.113 | 0.144 | 0.155 |
| May 29, 96 | 80 | -0.16 | 0.091 | 0.183 | 0.28 | 0.562 |
| May 29, 96 | 90 | 0 | 0.068 | 0.212 | 0.227 | 0.385 |
| May 29, 96 | 100 | 0.12 | -0.182 | 0.252 | 0.28 | 0.528 |
| Jul 10, 96 | 0 | 0.868 | 0.045 | 1.138 | 0.004 | 0.189 |
| Jul 10, 96 | 10 | 6.101 | 0.613 | 6.812 | -0.326 | 0.699 |
| Jul 10, 96 | 20 | 0.961 | 0.477 | 1.568 | -0.033 | 0.266 |
| Jul 10, 96 | 30 | 0.227 | 0.068 | 0.494 | 0.02 | 0.082 |
| Jul 10, 96 | 40 | 0.24 | -0.204 | 0.358 | 0.005 | 0.096 |
| Jul 10, 96 | 50 | 0.134 | 0.204 | 0.426 | 0.012 | 0.095 |
| Jul 10, 96 | 60 | -0.08 | 0 | 0.309 | 0.105 | 0.19 |
| Jul 10, 96 | 70 | -0.16 | 0.136 | 0.137 | 0.066 | 0.049 |
| Jul 10, 96 | 80 | -0.12 | -0.068 | 0.268 | 0.107 | 0.261 |
| Jul 10, 96 | 90 | -0.187 | -0.091 | 0.264 | 0.216 | 0.349 |
| Jul 10, 96 | 100 | -0.107 | 0.182 | 0.209 | 0.059 | 0.239 |
| Jul 10, 96 | 110 | 0.28 | -0.091 | 0.599 | 0.179 | 0.305 |
| Aug 27, 96 | 0 | 1.108 | -0.045 | 1.343 | 0.08 | 0.212 |
| Aug 27, 96 | 6 | 0.881 | -0.159 | 1.151 | -0.013 | 0.203 |
| Aug 27, 96 | 10 | 0.788 | -0.091 | 0.924 | 0.105 | 0.289 |
| Aug 27, 96 | 20 | 0.854 | 0.272 | 1.269 | 0.195 | 0.461 |
| Aug 27, 96 | 30 | 0.307 | 0.113 | 0.72 | 0.019 | 0.269 |
| Aug 27, 96 | 40 | 0.227 | -0.272 | 0.263 | -0.016 | 0.075 |
| Aug 27, 96 | 50 | 0.093 | -0.159 | 0.084 | -0.063 | 0.033 |
| Aug 27, 96 | 60 | -0.027 | 0.136 | 0.02 | -0.097 | -0.086 |
| Aug 27, 96 | 70 | 0.107 | 0.159 | 0.058 | -0.023 | 0.049 |
| Aug 27, 96 | 80 | 0.053 | 0.182 | 0.058 | -0.021 | 0.025 |
| Aug 27, 96 | 90 | -0.013 | 0.045 | 0.06 | -0.039 | 0.008 |
| Aug 27, 96 | 100 | 0 | 0.068 | 0.124 | 0.011 | 0.074 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Sep 25, 96 | 0 | 0.174 | -0.023 | 0.359 | -0.057 | -0.057 |
| Sep 25, 96 | 10 | 0.627 | -0.113 | 0.675 | -0.033 | 0.045 |
| Sep 25, 96 | 20 | 0.227 | 0.159 | 0.486 | -0.101 | 0.061 |
| Sep 25, 96 | 30 | 0.013 | -0.25 | 0.112 | -0.103 | -0.078 |
| Sep 25, 96 | 40 | 0.027 | -0.227 | 0.09 | -0.071 | 0.081 |
| Sep 25, 96 | 50 | -0.053 | 0.113 | 0.015 | -0.046 | 0.001 |
| Sep 25, 96 | 60 | -0.013 | -0.34 | 0.021 | -0.121 | -0.054 |
| Sep 25, 96 | 70 | -0.067 | -0.023 | 0.044 | 0.007 | 0.101 |
| Sep 25, 96 | 80 | -0.013 | 0.159 | 0.08 | 0.038 | 0.195 |
| Sep 25, 96 | 90 | 0.013 | -0.295 | 0.1 | 0.013 | 0.163 |

**Table 8. Comparisons between measured and predicted SELECT release characteristics**

| Sample Date | Outflow temp. | SELECT temp. | Outflow D.O. | SELECT D.O. |
|---|---|---|---|---|
| | (°C) | (°C) | (mg/l) | (mg/l) |
| May 29 | 7.3 | 7.31 | 11.8 | 11.18 |
| July 10 | 9.0 | 8.67 | 11.0 | 10.27 |
| July 23 | NA | 8.81 | NA | 9.54 |
| August 27 | 9.3 | 9.57 | 9.8 | 9.44 |
| September 25 | 12.5 | 10.15 | 9.1 | 9.11 |

| Sample Date | Outflow temp. | SELECT temp. | Outflow TOC | SELECT TOC | Outflow DOC | SELECT DOC |
|---|---|---|---|---|---|---|
| | (°C) | (°C) | (mg/l) | (mg/l) | (mg/l) | (mg/l) |
| May 29 | 7.3 | 7.31 | 1.27 | 2.35 | 1.27 | 1.75 |
| July 10 | 9.0 | 8.67 | 1.75 | NA | 1.95 | NA |
| July 23 | NA | 8.81 | NA | 1.34 | NA | 1.27 |
| August 27 | 9.3 | 9.57 | 0.67 | 0.64 | 0.60 | 0.57 |
| September 25 | 12.5 | 10.15 | 3.12 | 0.66 | 0.46 | 0.57 |

# APPENDIX A

## LIMNOLOGICAL FIELD DATA FOR BLUE RIVER AND COUGAR LAKES, AND THE MCKENZIE RIVER AND TRIBUTARIES

Appendix A1: Lake Data
Appendix A2: Stream Data

| Month | Day | Year | time | Lake | Station | Secchi | Depth | CDepth | Temp | D. O. | pH | Cond. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 16 | 96 | 1130 | Blue River | 1 | 3.2 | 0 | 52.3 | 11.3 | 12.5 | 7.1 | 26 |
| 4 | 16 | 96 | 1130 | Blue River | 1 | 3.2 | 2 | 52.3 | 11.4 | 12.5 | 7 | 27 |
| 4 | 16 | 96 | 1130 | Blue River | 1 | 3.2 | 4 | 52.3 | 11.2 | 12.5 | 7 | 27 |
| 4 | 16 | 96 | 1130 | Blue River | 1 | 3.2 | 6 | 52.3 | 9.7 | 12.9 | 7 | 28 |
| 4 | 16 | 96 | 1130 | Blue River | 1 | 3.2 | 8 | 52.3 | 8.8 | 12.8 | 7 | 28 |
| 4 | 16 | 96 | 1130 | Blue River | 1 | 3.2 | 10 | 52.3 | 8.2 | 12.7 | 6.9 | 28 |
| 4 | 16 | 96 | 1130 | Blue River | 1 | 3.2 | 12 | 52.3 | 7.6 | 12.6 | 6.9 | 28 |
| 4 | 16 | 96 | 1130 | Blue River | 1 | 3.2 | 14 | 52.3 | 7.3 | 12.7 | 6.9 | 28 |
| 4 | 16 | 96 | 1130 | Blue River | 1 | 3.2 | 16 | 52.3 | 7.1 | 12.7 | 6.8 | 26 |
| 4 | 16 | 96 | 1130 | Blue River | 1 | 3.2 | 18 | 52.3 | 7 | 12.8 | 6.8 | 25 |
| 4 | 16 | 96 | 1130 | Blue River | 1 | 3.2 | 20 | 52.3 | 6.8 | 12.9 | 6.8 | 28 |
| 4 | 16 | 96 | 1130 | Blue River | 1 | 3.2 | 22 | 52.3 | 6.7 | 12.9 | 6.8 | 27 |
| 4 | 16 | 96 | 1130 | Blue River | 1 | 3.2 | 24 | 52.3 | 6.6 | 12.9 | 6.8 | 26 |
| 4 | 16 | 96 | 1130 | Blue River | 1 | 3.2 | 26 | 52.3 | 6.5 | 12.9 | 6.8 | 27 |
| 4 | 16 | 96 | 1130 | Blue River | 1 | 3.2 | 28 | 52.3 | 6.4 | 12.9 | 6.8 | 25 |
| 4 | 16 | 96 | 1130 | Blue River | 1 | 3.2 | 30 | 52.3 | 6.2 | 12.8 | 6.8 | 25 |
| 4 | 16 | 96 | 1130 | Blue River | 1 | 3.2 | 32 | 52.3 | 6.1 | 12.8 | 6.7 | 25 |
| 4 | 16 | 96 | 1130 | Blue River | 1 | 3.2 | 34 | 52.3 | 6 | 12.8 | 6.7 | 24 |
| 4 | 16 | 96 | 1130 | Blue River | 1 | 3.2 | 36 | 52.3 | 5.9 | 12.7 | 6.7 | 24 |
| 4 | 16 | 96 | 1130 | Blue River | 1 | 3.2 | 38 | 52.3 | 5.9 | 12.7 | 6.7 | 25 |
| 4 | 16 | 96 | 1130 | Blue River | 1 | 3.2 | 40 | 52.3 | 5.9 | 12.8 | 6.7 | 25 |
| 4 | 16 | 96 | 1130 | Blue River | 1 | 3.2 | 42 | 52.3 | 5.7 | 12.6 | 6.6 | 24 |
| 4 | 16 | 96 | 1130 | Blue River | 1 | 3.2 | 44 | 52.3 | 5.7 | 12.5 | 6.6 | 26 |
| 4 | 16 | 96 | 1130 | Blue River | 1 | 3.2 | 46 | 52.3 | 5.6 | 12.6 | 6.6 | 24 |
| 4 | 16 | 96 | 1130 | Blue River | 1 | 3.2 | 48 | 52.3 | 5.6 | 12.6 | 6.5 | 24 |
| 4 | 16 | 96 | 1130 | Blue River | 1 | 3.2 | 50 | 52.3 | 5.6 | 12.6 | 6.5 | 25 |
| 4 | 16 | 96 | 1130 | Blue River | 1 | 3.2 | 52 | 52.3 | 5.5 | 12.6 | 6.5 | 24 |
| 4 | 16 | 96 | 1430 | Blue River | 2 | 2 | 0 | 38.2 | 11.4 | 12.5 | 7.2 | 26 |
| 4 | 16 | 96 | 1430 | Blue River | 2 | 2 | 2 | 38.2 | 11.3 | 12.4 | 7.2 | 26 |
| 4 | 16 | 96 | 1430 | Blue River | 2 | 2 | 4 | 38.2 | 11 | 12.5 | 7.1 | 26 |
| 4 | 16 | 96 | 1430 | Blue River | 2 | 2 | 6 | 38.2 | 9.7 | 12.7 | 7.1 | 26 |
| 4 | 16 | 96 | 1430 | Blue River | 2 | 2 | 8 | 38.2 | 8.9 | 12.7 | 7.1 | 26 |
| 4 | 16 | 96 | 1430 | Blue River | 2 | 2 | 10 | 38.2 | 8 | 12.9 | 7 | 26 |
| 4 | 16 | 96 | 1430 | Blue River | 2 | 2 | 12 | 38.2 | 7.9 | 12.9 | 7 | 26 |
| 4 | 16 | 96 | 1430 | Blue River | 2 | 2 | 14 | 38.2 | 7.5 | 12.9 | 7 | 26 |
| 4 | 16 | 96 | 1430 | Blue River | 2 | 2 | 16 | 38.2 | 7 | 13 | 7 | 27 |
| 4 | 16 | 96 | 1430 | Blue River | 2 | 2 | 18 | 38.2 | 6.9 | 13.1 | 6.9 | 27 |
| 4 | 16 | 96 | 1430 | Blue River | 2 | 2 | 20 | 38.2 | 6.7 | 13.1 | 6.9 | 27 |
| 4 | 16 | 96 | 1430 | Blue River | 2 | 2 | 22 | 38.2 | 6.6 | 13.1 | 6.9 | 27 |
| 4 | 16 | 96 | 1430 | Blue River | 2 | 2 | 24 | 38.2 | 6.4 | 13.1 | 6.9 | 25 |
| 4 | 16 | 96 | 1430 | Blue River | 2 | 2 | 26 | 38.2 | 6.2 | 13.1 | 6.9 | 26 |
| 4 | 16 | 96 | 1430 | Blue River | 2 | 2 | 28 | 38.2 | 6.1 | 13 | 6.8 | 26 |
| 4 | 16 | 96 | 1430 | Blue River | 2 | 2 | 30 | 38.2 | 6 | 13 | 6.8 | 25 |
| 4 | 16 | 96 | 1430 | Blue River | 2 | 2 | 32 | 38.2 | 5.8 | 13 | 6.8 | 26 |
| 4 | 16 | 96 | 1430 | Blue River | 2 | 2 | 34 | 38.2 | 5.8 | 12.9 | 6.7 | 25 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 16 | 96 | 1430 | Blue River | 2 | 2 | 36 | 38.2 | 5.7 | 12.8 | 6.7 | 25 |
| 4 | 16 | 96 | 1430 | Blue River | 2 | 2 | 38 | 38.2 | 5.7 | 12.7 | 6.9 | 25 |
| 4 | 16 | 96 | 1500 | Blue River | 3 | 2.2 | 0 | 33.2 | 11.3 | 12.4 | 7.2 | 26 |
| 4 | 16 | 96 | 1500 | Blue River | 3 | 2.2 | 2 | 33.2 | 11.3 | 12.4 | 7.2 | 26 |
| 4 | 16 | 96 | 1500 | Blue River | 3 | 2.2 | 4 | 33.2 | 10.4 | 12.5 | 7.1 | 26 |
| 4 | 16 | 96 | 1500 | Blue River | 3 | 2.2 | 6 | 33.2 | 9.3 | 12.7 | 7.1 | 25 |
| 4 | 16 | 96 | 1500 | Blue River | 3 | 2.2 | 8 | 33.2 | 8.8 | 12.8 | 7 | 26 |
| 4 | 16 | 96 | 1500 | Blue River | 3 | 2.2 | 10 | 33.2 | 8.1 | 12.9 | 7 | 26 |
| 4 | 16 | 96 | 1500 | Blue River | 3 | 2.2 | 12 | 33.2 | 7.6 | 12.9 | 7 | 26 |
| 4 | 16 | 96 | 1500 | Blue River | 3 | 2.2 | 14 | 33.2 | 7.4 | 13 | 7 | 25 |
| 4 | 16 | 96 | 1500 | Blue River | 3 | 2.2 | 16 | 33.2 | 7.1 | 13.1 | 7 | 25 |
| 4 | 16 | 96 | 1500 | Blue River | 3 | 2.2 | 18 | 33.2 | 6.8 | 13.1 | 6.9 | 28 |
| 4 | 16 | 96 | 1500 | Blue River | 3 | 2.2 | 20 | 33.2 | 6.6 | 13.1 | 6.9 | 25 |
| 4 | 16 | 96 | 1500 | Blue River | 3 | 2.2 | 22 | 33.2 | 6.5 | 13.1 | 6.9 | 25 |
| 4 | 16 | 96 | 1500 | Blue River | 3 | 2.2 | 24 | 33.2 | 6.3 | 13.1 | 6.9 | 26 |
| 4 | 16 | 96 | 1500 | Blue River | 3 | 2.2 | 26 | 33.2 | 6.2 | 13 | 6.9 | 26 |
| 4 | 16 | 96 | 1500 | Blue River | 3 | 2.2 | 28 | 33.2 | 6.1 | 12.9 | 6.8 | 25 |
| 4 | 16 | 96 | 1500 | Blue River | 3 | 2.2 | 30 | 33.2 | 6 | 12.8 | 6.8 | 26 |
| 4 | 16 | 96 | 1500 | Blue River | 3 | 2.2 | 32 | 33.2 | 5.9 | 12.6 | 6.8 | 26 |
| 4 | 16 | 96 | 1500 | Blue River | 3 | 2.2 | 32.7 | 33.2 | 5.9 | 12.5 | 6.7 | 28 |
| 4 | 16 | 96 | 1525 | Blue River | 4 | 2.2 | 0 | 21.1 | 11 | 12.7 | 7.2 | 26 |
| 4 | 16 | 96 | 1525 | Blue River | 4 | 2.2 | 2 | 21.1 | 11 | 12.6 | 7 | 26 |
| 4 | 16 | 96 | 1525 | Blue River | 4 | 2.2 | 4 | 21.1 | 10.7 | 12.6 | 7 | 26 |
| 4 | 16 | 96 | 1525 | Blue River | 4 | 2.2 | 6 | 21.1 | 10.4 | 12.6 | 7 | 26 |
| 4 | 16 | 96 | 1525 | Blue River | 4 | 2.2 | 8 | 21.1 | 8.6 | 12.9 | 7 | 25 |
| 4 | 16 | 96 | 1525 | Blue River | 4 | 2.2 | 10 | 21.1 | 8.1 | 12.9 | 7 | 26 |
| 4 | 16 | 96 | 1525 | Blue River | 4 | 2.2 | 12 | 21.1 | 7.8 | 12.9 | 7 | 26 |
| 4 | 16 | 96 | 1525 | Blue River | 4 | 2.2 | 14 | 21.1 | 7.5 | 13 | 7 | 27 |
| 4 | 16 | 96 | 1525 | Blue River | 4 | 2.2 | 16 | 21.1 | 7.4 | 13.1 | 7 | 27 |
| 4 | 16 | 96 | 1525 | Blue River | 4 | 2.2 | 18 | 21.1 | 7 | 13.1 | 7 | 26 |
| 4 | 16 | 96 | 1525 | Blue River | 4 | 2.2 | 20 | 21.1 | 6.9 | 13.2 | 7 | 26 |
| 4 | 16 | 96 | 1525 | Blue River | 4 | 2.2 | 20.6 | 21.1 | 6.7 | 13.1 | 6.9 | 26 |
| 5 | 28 | 96 | 1107 | Blue River | 01 | 2.9 | 0 | 66.2 | 14.1 | 11.1 | 8.5 | 26 |
| 5 | 28 | 96 | 1107 | Blue River | 01 | 2.9 | 2 | 66.2 | 13.8 | 11.2 | 8.4 | 26 |
| 5 | 28 | 96 | 1107 | Blue River | 01 | 2.9 | 4 | 66.2 | 13.1 | 11.5 | 8.3 | 26 |
| 5 | 28 | 96 | 1107 | Blue River | 01 | 2.9 | 6 | 66.2 | 11.6 | 11.5 | 8.0 | 26 |
| 5 | 28 | 96 | 1107 | Blue River | 01 | 2.9 | 8 | 66.2 | 11.0 | 11.2 | 7.8 | 25 |
| 5 | 28 | 96 | 1107 | Blue River | 01 | 2.9 | 10 | 66.2 | 10.5 | 11.0 | 7.6 | 25 |
| 5 | 28 | 96 | 1107 | Blue River | 01 | 2.9 | 12 | 66.2 | 10.1 | 11.0 | 7.5 | 25 |
| 5 | 28 | 96 | 1107 | Blue River | 01 | 2.9 | 14 | 66.2 | 9.8 | 10.9 | 7.4 | 24 |
| 5 | 28 | 96 | 1107 | Blue River | 01 | 2.9 | 16 | 66.2 | 9.5 | 10.9 | 7.3 | 25 |
| 5 | 28 | 96 | 1107 | Blue River | 01 | 2.9 | 18 | 66.2 | 9.3 | 11.0 | 7.3 | 25 |
| 5 | 28 | 96 | 1107 | Blue River | 01 | 2.9 | 20 | 66.2 | 9.1 | 11.0 | 7.2 | 24 |
| 5 | 28 | 96 | 1107 | Blue River | 01 | 2.9 | 22 | 66.2 | 8.8 | 11.0 | 7.2 | 23 |
| 5 | 28 | 96 | 1107 | Blue River | 01 | 2.9 | 24 | 66.2 | 8.7 | 10.8 | 7.1 | 24 |
| 5 | 28 | 96 | 1107 | Blue River | 01 | 2.9 | 26 | 66.2 | 8.5 | 10.8 | 7.1 | 24 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 28 | 96 | 1107 | Blue River | 01 | 2.9 | 28 | 66.2 | 8.4 | 10.8 | 7.0 | 23 |
| 5 | 28 | 96 | 1107 | Blue River | 01 | 2.9 | 30 | 66.2 | 8.4 | 10.7 | 7.0 | 24 |
| 5 | 28 | 96 | 1107 | Blue River | 01 | 2.9 | 32 | 66.2 | 8.3 | 10.8 | 7.0 | 23 |
| 5 | 28 | 96 | 1107 | Blue River | 01 | 2.9 | 34 | 66.2 | 8.2 | 10.7 | 7.0 | 24 |
| 5 | 28 | 96 | 1107 | Blue River | 01 | 2.9 | 36 | 66.2 | 8.1 | 10.7 | 6.9 | 23 |
| 5 | 28 | 96 | 1107 | Blue River | 01 | 2.9 | 38 | 66.2 | 8.1 | 10.8 | 6.9 | 23 |
| 5 | 28 | 96 | 1107 | Blue River | 01 | 2.9 | 40 | 66.2 | 8.1 | 10.9 | 6.9 | 23 |
| 5 | 28 | 96 | 1107 | Blue River | 01 | 2.9 | 42 | 66.2 | 8.0 | 10.9 | 6.8 | 24 |
| 5 | 28 | 96 | 1107 | Blue River | 01 | 2.9 | 44 | 66.2 | 8.0 | 10.9 | 6.8 | 23 |
| 5 | 28 | 96 | 1107 | Blue River | 01 | 2.9 | 46 | 66.2 | 7.9 | 11.0 | 6.8 | 23 |
| 5 | 28 | 96 | 1107 | Blue River | 01 | 2.9 | 48 | 66.2 | 7.9 | 11.0 | 6.8 | 22 |
| 5 | 28 | 96 | 1107 | Blue River | 01 | 2.9 | 50 | 66.2 | 7.8 | 11.0 | 6.7 | 23 |
| 5 | 28 | 96 | 1107 | Blue River | 01 | 2.9 | 52 | 66.2 | 7.8 | 11.0 | 6.7 | 22 |
| 5 | 28 | 96 | 1107 | Blue River | 01 | 2.9 | 54 | 66.2 | 7.8 | 11.0 | 6.7 | 22 |
| 5 | 28 | 96 | 1107 | Blue River | 01 | 2.9 | 56 | 66.2 | 7.7 | 10.9 | 6.7 | 24 |
| 5 | 28 | 96 | 1107 | Blue River | 01 | 2.9 | 58 | 66.2 | 7.6 | 10.9 | 6.7 | 24 |
| 5 | 28 | 96 | 1107 | Blue River | 01 | 2.9 | 60 | 66.2 | 7.6 | 10.8 | 6.6 | 23 |
| 5 | 28 | 96 | 1107 | Blue River | 01 | 2.9 | 62 | 66.2 | 7.6 | 10.8 | 6.6 | 23 |
| 5 | 28 | 96 | 1107 | Blue River | 01 | 2.9 | 64 | 66.2 | 7.6 | 10.7 | 6.6 | 23 |
| 5 | 28 | 96 | 1107 | Blue River | 01 | 2.9 | 66 | 66.2 | 7.6 | 10.7 | 6.6 | 22 |
| 5 | 28 | 96 | 1445 | Blue River | 02 | 2.7 | 0 | 41.1 | 14.8 | 11.5 | 8.1 | 26 |
| 5 | 28 | 96 | 1445 | Blue River | 02 | 2.7 | 2 | 41.1 | 14.6 | 11.4 | 8.1 | 26 |
| 5 | 28 | 96 | 1445 | Blue River | 02 | 2.7 | 4 | 41.1 | 14.2 | 11.5 | 8.2 | 25 |
| 5 | 28 | 96 | 1445 | Blue River | 02 | 2.7 | 6 | 41.1 | 11.4 | 11.6 | 8.0 | 25 |
| 5 | 28 | 96 | 1445 | Blue River | 02 | 2.7 | 8 | 41.1 | 10.8 | 11.5 | 7.8 | 25 |
| 5 | 28 | 96 | 1445 | Blue River | 02 | 2.7 | 10 | 41.1 | 10.3 | 11.4 | 7.6 | 25 |
| 5 | 28 | 96 | 1445 | Blue River | 02 | 2.7 | 12 | 41.1 | 9.8 | 11.4 | 7.5 | 24 |
| 5 | 28 | 96 | 1445 | Blue River | 02 | 2.7 | 14 | 41.1 | 9.6 | 11.4 | 7.5 | 24 |
| 5 | 28 | 96 | 1445 | Blue River | 02 | 2.7 | 16 | 41.1 | 9.4 | 11.4 | 7.4 | 24 |
| 5 | 28 | 96 | 1445 | Blue River | 02 | 2.7 | 18 | 41.1 | 9.2 | 11.4 | 7.4 | 25 |
| 5 | 28 | 96 | 1445 | Blue River | 02 | 2.7 | 20 | 41.1 | 9.1 | 11.4 | 7.3 | 24 |
| 5 | 28 | 96 | 1445 | Blue River | 02 | 2.7 | 22 | 41.1 | 8.9 | 11.6 | 7.3 | 24 |
| 5 | 28 | 96 | 1445 | Blue River | 02 | 2.7 | 24 | 41.1 | 8.8 | 11.6 | 7.3 | 25 |
| 5 | 28 | 96 | 1445 | Blue River | 02 | 2.7 | 26 | 41.1 | 8.7 | 11.6 | 7.2 | 24 |
| 5 | 28 | 96 | 1445 | Blue River | 02 | 2.7 | 28 | 41.1 | 8.6 | 11.6 | 7.2 | 23 |
| 5 | 28 | 96 | 1445 | Blue River | 02 | 2.7 | 30 | 41.1 | 8.5 | 11.6 | 7.2 | 24 |
| 5 | 28 | 96 | 1445 | Blue River | 02 | 2.7 | 32 | 41.1 | 8.4 | 11.5 | 7.1 | 24 |
| 5 | 28 | 96 | 1445 | Blue River | 02 | 2.7 | 34 | 41.1 | 8.3 | 11.4 | 7.1 | 24 |
| 5 | 28 | 96 | 1445 | Blue River | 02 | 2.7 | 36 | 41.1 | 8.2 | 11.3 | 7.1 | 24 |
| 5 | 28 | 96 | 1445 | Blue River | 02 | 2.7 | 38 | 41.1 | 8.1 | 11.2 | 7.1 | 23 |
| 5 | 28 | 96 | 1445 | Blue River | 02 | 2.7 | 40 | 41.1 | 7.9 | 11.1 | 7.0 | 24 |
| 5 | 28 | 96 | 1637 | Blue River | 03 | 2.8 | 0 | 40.5 | 15.1 | 11.3 | 8.4 | 26 |
| 5 | 28 | 96 | 1637 | Blue River | 03 | 2.8 | 2 | 40.5 | 15.0 | 11.2 | 8.3 | 26 |
| 5 | 28 | 96 | 1637 | Blue River | 03 | 2.8 | 4 | 40.5 | 14.5 | 11.3 | 8.4 | 25 |
| 5 | 28 | 96 | 1637 | Blue River | 03 | 2.8 | 6 | 40.5 | 12.2 | 11.3 | 8.2 | 26 |
| 5 | 28 | 96 | 1637 | Blue River | 03 | 2.8 | 8 | 40.5 | 11.2 | 11.4 | 8.0 | 24 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 28 | 96 | 1637 | Blue River | 03 | 2.8 | 10 | 40.5 | 10.4 | 11.4 | 7.8 | 25 |
| 5 | 28 | 96 | 1637 | Blue River | 03 | 2.8 | 12 | 40.5 | 10.1 | 11.5 | 7.7 | 25 |
| 5 | 28 | 96 | 1637 | Blue River | 03 | 2.8 | 14 | 40.5 | 9.7 | 11.5 | 7.6 | 25 |
| 5 | 28 | 96 | 1637 | Blue River | 03 | 2.8 | 16 | 40.5 | 9.5 | 11.4 | 7.5 | 25 |
| 5 | 28 | 96 | 1637 | Blue River | 03 | 2.8 | 18 | 40.5 | 9.2 | 11.4 | 7.4 | 24 |
| 5 | 28 | 96 | 1637 | Blue River | 03 | 2.8 | 20 | 40.5 | 9.0 | 11.5 | 7.4 | 24 |
| 5 | 28 | 96 | 1637 | Blue River | 03 | 2.8 | 22 | 40.5 | 8.9 | 11.5 | 7.3 | 24 |
| 5 | 28 | 96 | 1637 | Blue River | 03 | 2.8 | 24 | 40.5 | 8.8 | 11.6 | 7.3 | 23 |
| 5 | 28 | 96 | 1637 | Blue River | 03 | 2.8 | 26 | 40.5 | 8.7 | 11.6 | 7.3 | 24 |
| 5 | 28 | 96 | 1637 | Blue River | 03 | 2.8 | 28 | 40.5 | 8.6 | 11.6 | 7.3 | 24 |
| 5 | 28 | 96 | 1637 | Blue River | 03 | 2.8 | 30 | 40.5 | 8.4 | 11.6 | 7.2 | 24 |
| 5 | 28 | 96 | 1637 | Blue River | 03 | 2.8 | 32 | 40.5 | 8.3 | 11.5 | 7.2 | 23 |
| 5 | 28 | 96 | 1637 | Blue River | 03 | 2.8 | 34 | 40.5 | 8.1 | 11.4 | 7.2 | 24 |
| 5 | 28 | 96 | 1637 | Blue River | 03 | 2.8 | 36 | 40.5 | 7.3 | 10.0 | 7.1 | 26 |
| 5 | 28 | 96 | 1637 | Blue River | 03 | 2.8 | 38 | 40.5 | 6.8 | 8.4 | 6.9 | 30 |
| 5 | 28 | 96 | 1637 | Blue River | 03 | 2.8 | 40 | 40.5 | 6.5 | 6.4 | 6.7 | 34 |
| 5 | 28 | 96 | 1700 | Blue River | 04 | 2.7 | 0 | 23.0 | 15.4 | 11.1 | 8.8 | 26 |
| 5 | 28 | 96 | 1700 | Blue River | 04 | 2.7 | 2 | 23.0 | 15.2 | 11.2 | 8.7 | 26 |
| 5 | 28 | 96 | 1700 | Blue River | 04 | 2.7 | 4 | 23.0 | 14.9 | 11.2 | 8.6 | 25 |
| 5 | 28 | 96 | 1700 | Blue River | 04 | 2.7 | 6 | 23.0 | 14.1 | 11.2 | 8.5 | 26 |
| 5 | 28 | 96 | 1700 | Blue River | 04 | 2.7 | 8 | 23.0 | 11.4 | 11.2 | 8.3 | 26 |
| 5 | 28 | 96 | 1700 | Blue River | 04 | 2.7 | 10 | 23.0 | 10.6 | 11.4 | 8.1 | 25 |
| 5 | 28 | 96 | 1700 | Blue River | 04 | 2.7 | 12 | 23.0 | 10.0 | 11.4 | 7.9 | 25 |
| 5 | 28 | 96 | 1700 | Blue River | 04 | 2.7 | 14 | 23.0 | 9.7 | 11.4 | 7.8 | 25 |
| 5 | 28 | 96 | 1700 | Blue River | 04 | 2.7 | 16 | 23.0 | 9.4 | 11.5 | 7.8 | 25 |
| 5 | 28 | 96 | 1700 | Blue River | 04 | 2.7 | 18 | 23.0 | 9.2 | 11.5 | 7.7 | 25 |
| 5 | 28 | 96 | 1700 | Blue River | 04 | 2.7 | 20 | 23.0 | 9.1 | 11.5 | 7.6 | 25 |
| 5 | 28 | 96 | 1700 | Blue River | 04 | 2.7 | 22 | 23.0 | 8.9 | 11.1 | 7.6 | 27 |
| 7 | 9 | 96 | 904 | Blue River | 1 | 6.7 | 0 | 67.9 | 21 | 8.9 | 7.9 | 27 |
| 7 | 9 | 96 | 904 | Blue River | 1 | 6.7 | 2 | 67.9 | 21 | 8.9 | 7.7 | 27 |
| 7 | 9 | 96 | 904 | Blue River | 1 | 6.7 | 4 | 67.9 | 20.3 | 9.6 | 8 | 28 |
| 7 | 9 | 96 | 904 | Blue River | 1 | 6.7 | 6 | 67.9 | 18.7 | 11.6 | 8.6 | 29 |
| 7 | 9 | 96 | 904 | Blue River | 1 | 6.7 | 7 | 67.9 | 17.7 | 13.5 | 9 | 30 |
| 7 | 9 | 96 | 904 | Blue River | 1 | 6.7 | 8 | 67.9 | 16.8 | 13.3 | 8.9 | 30 |
| 7 | 9 | 96 | 904 | Blue River | 1 | 6.7 | 9 | 67.9 | 15.5 | 11.5 | 8.4 | 27 |
| 7 | 9 | 96 | 904 | Blue River | 1 | 6.7 | 10 | 67.9 | 14.6 | 10.5 | 8 | 27 |
| 7 | 9 | 96 | 904 | Blue River | 1 | 6.7 | 11 | 67.9 | 13.7 | 10 | 7.7 | 26 |
| 7 | 9 | 96 | 904 | Blue River | 1 | 6.7 | 12 | 67.9 | 12.4 | 9.8 | 7.4 | 26 |
| 7 | 9 | 96 | 904 | Blue River | 1 | 6.7 | 14 | 67.9 | 11 | 9.6 | 7.2 | 26 |
| 7 | 9 | 96 | 904 | Blue River | 1 | 6.7 | 16 | 67.9 | 10.4 | 9.6 | 7.1 | 25 |
| 7 | 9 | 96 | 904 | Blue River | 1 | 6.7 | 18 | 67.9 | 9.9 | 9.7 | 7 | 25 |
| 7 | 9 | 96 | 904 | Blue River | 1 | 6.7 | 20 | 67.9 | 9.7 | 9.8 | 7 | 25 |
| 7 | 9 | 96 | 904 | Blue River | 1 | 6.7 | 22 | 67.9 | 9.5 | 9.9 | 6.9 | 25 |
| 7 | 9 | 96 | 904 | Blue River | 1 | 6.7 | 24 | 67.9 | 9.1 | 9.9 | 6.9 | 24 |
| 7 | 9 | 96 | 904 | Blue River | 1 | 6.7 | 26 | 67.9 | 9 | 9.9 | 6.8 | 24 |
| 7 | 9 | 96 | 904 | Blue River | 1 | 6.7 | 28 | 67.9 | 8.9 | 9.9 | 6.8 | 24 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 9 | 96 | 904 | Blue River | 1 | 6.7 | 30 | 67.9 | 8.8 | 9.7 | 6.7 | 23 |
| 7 | 9 | 96 | 904 | Blue River | 1 | 6.7 | 32 | 67.9 | 8.7 | 9.6 | 6.7 | 24 |
| 7 | 9 | 96 | 904 | Blue River | 1 | 6.7 | 34 | 67.9 | 8.6 | 9.5 | 6.7 | 24 |
| 7 | 9 | 96 | 904 | Blue River | 1 | 6.7 | 36 | 67.9 | 8.5 | 9.4 | 6.6 | 25 |
| 7 | 9 | 96 | 904 | Blue River | 1 | 6.7 | 38 | 67.9 | 8.5 | 9.4 | 6.5 | 24 |
| 7 | 9 | 96 | 904 | Blue River | 1 | 6.7 | 40 | 67.9 | 8.5 | 9.5 | 6.5 | 24 |
| 7 | 9 | 96 | 904 | Blue River | 1 | 6.7 | 42 | 67.9 | 8.4 | 9.4 | 6.5 | 24 |
| 7 | 9 | 96 | 904 | Blue River | 1 | 6.7 | 44 | 67.9 | 8.3 | 9.4 | 6.5 | 24 |
| 7 | 9 | 96 | 904 | Blue River | 1 | 6.7 | 46 | 67.9 | 8.3 | 9.4 | 6.5 | 24 |
| 7 | 9 | 96 | 904 | Blue River | 1 | 6.7 | 48 | 67.9 | 8.3 | 9.4 | 6.4 | 24 |
| 7 | 9 | 96 | 904 | Blue River | 1 | 6.7 | 50 | 67.9 | 8.3 | 9.3 | 6.5 | 24 |
| 7 | 9 | 96 | 904 | Blue River | 1 | 6.7 | 55 | 67.9 | 8.3 | 9.3 | 6.4 | 23 |
| 7 | 9 | 96 | 904 | Blue River | 1 | 6.7 | 60 | 67.9 | 8.2 | 9.2 | 6.4 | 23 |
| 7 | 9 | 96 | 904 | Blue River | 1 | 6.7 | 65 | 67.9 | 8.2 | 9.2 | 6.4 | 23 |
| 7 | 9 | 96 | 904 | Blue River | 1 | 6.7 | 67.4 | 67.9 | 8.2 | 9.1 | 6.4 | 24 |
| 7 | 22 | 96 | 1710 | Blue River | 1 | 5.5 | 0 | 57.3 | 23.1 | 8.3 | 7.7 | 28 |
| 7 | 22 | 96 | 1710 | Blue River | 1 | 5.5 | 2 | 57.3 | 22.4 | 8.3 | 7.8 | 28 |
| 7 | 22 | 96 | 1710 | Blue River | 1 | 5.5 | 4 | 57.3 | 22.2 | 8.2 | 7.8 | 28 |
| 7 | 22 | 96 | 1710 | Blue River | 1 | 5.5 | 6 | 57.3 | 21.5 | 8.3 | 7.6 | 28 |
| 7 | 22 | 96 | 1710 | Blue River | 1 | 5.5 | 8 | 57.3 | 18.9 | 10.1 | 8.2 | 29 |
| 7 | 22 | 96 | 1710 | Blue River | 1 | 5.5 | 10 | 57.3 | 15.7 | 10.6 | 8.1 | 26 |
| 7 | 22 | 96 | 1710 | Blue River | 1 | 5.5 | 12 | 57.3 | 12.2 | 8.8 | 7.7 | 26 |
| 7 | 22 | 96 | 1710 | Blue River | 1 | 5.5 | 14 | 57.3 | 11.1 | 8.5 | 7.6 | 26 |
| 7 | 22 | 96 | 1710 | Blue River | 1 | 5.5 | 16 | 57.3 | 10.7 | 8.7 | 7.5 | 26 |
| 7 | 22 | 96 | 1710 | Blue River | 1 | 5.5 | 18 | 57.3 | 10 | 9.1 | 7.4 | 24 |
| 7 | 22 | 96 | 1710 | Blue River | 1 | 5.5 | 20 | 57.3 | 9.7 | 9.2 | 7.3 | 26 |
| 7 | 22 | 96 | 1710 | Blue River | 1 | 5.5 | 22 | 57.3 | 9.5 | 9.3 | 7.3 | 25 |
| 7 | 22 | 96 | 1710 | Blue River | 1 | 5.5 | 24 | 57.3 | 9.3 | 9.4 | 7.2 | 24 |
| 7 | 22 | 96 | 1710 | Blue River | 1 | 5.5 | 26 | 57.3 | 9.1 | 9.3 | 7.1 | 24 |
| 7 | 22 | 96 | 1710 | Blue River | 1 | 5.5 | 28 | 57.3 | 9 | 9.2 | 7.2 | 25 |
| 7 | 22 | 96 | 1710 | Blue River | 1 | 5.5 | 30 | 57.3 | 8.9 | 9.4 | 7.1 | 25 |
| 7 | 22 | 96 | 1710 | Blue River | 1 | 5.5 | 32 | 57.3 | 8.8 | 9.3 | 7.1 | 26 |
| 7 | 22 | 96 | 1710 | Blue River | 1 | 5.5 | 34 | 57.3 | 8.7 | 9.1 | 7.1 | 26 |
| 7 | 22 | 96 | 1710 | Blue River | 1 | 5.5 | 36 | 57.3 | 8.6 | 8.7 | 7 | 25 |
| 7 | 22 | 96 | 1710 | Blue River | 1 | 5.5 | 38 | 57.3 | 8.5 | 8.6 | 7 | 25 |
| 7 | 22 | 96 | 1710 | Blue River | 1 | 5.5 | 40 | 57.3 | 8.4 | 8.8 | 7.1 | 26 |
| 7 | 22 | 96 | 1710 | Blue River | 1 | 5.5 | 42 | 57.3 | 8.4 | 8.8 | 7.1 | 26 |
| 7 | 22 | 96 | 1710 | Blue River | 1 | 5.5 | 44 | 57.3 | 8.4 | 8.7 | 7.1 | 26 |
| 7 | 22 | 96 | 1710 | Blue River | 1 | 5.5 | 46 | 57.3 | 8.4 | 8.6 | 6.9 | 26 |
| 7 | 22 | 96 | 1710 | Blue River | 1 | 5.5 | 48 | 57.3 | 8.4 | 8.6 | 6.8 | 25 |
| 7 | 22 | 96 | 1710 | Blue River | 1 | 5.5 | 50 | 57.3 | 8.3 | 8.6 | 6.9 | 24 |
| 7 | 22 | 96 | 1710 | Blue River | 1 | 5.5 | 52 | 57.3 | 8.3 | 8.5 | 6.8 | 24 |
| 7 | 22 | 96 | 1710 | Blue River | 1 | 5.5 | 54 | 57.3 | 8.3 | 8.3 | 6.8 | 25 |
| 7 | 22 | 96 | 1710 | Blue River | 1 | 5.5 | 56 | 57.3 | 8.3 | 8.4 | 6.7 | 26 |
| 7 | 22 | 96 | 1710 | Blue River | 1 | 5.5 | 56.6 | 57.3 | 8.3 | 8.4 | 6.7 | 25 |
| 7 | 9 | 96 | 1245 | Blue River | 2 | 6.6 | 0 | 39 | 22 | 9.1 | 7.8 | 27 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 9 | 96 | 1245 | Blue River | 2 | 6.6 | 2 | 39 | 22 | 9 | 7.9 | 27 |
| 7 | 9 | 96 | 1245 | Blue River | 2 | 6.6 | 4 | 39 | 21.8 | 9 | 7.9 | 27 |
| 7 | 9 | 96 | 1245 | Blue River | 2 | 6.6 | 6 | 39 | 20.3 | 10.2 | 8.3 | 28 |
| 7 | 9 | 96 | 1245 | Blue River | 2 | 6.6 | 8 | 39 | 17.6 | 12.4 | 8.8 | 28 |
| 7 | 9 | 96 | 1245 | Blue River | 2 | 6.6 | 10 | 39 | 14.9 | 10.9 | 8 | 27 |
| 7 | 9 | 96 | 1245 | Blue River | 2 | 6.6 | 12 | 39 | 12.8 | 10.1 | 7.7 | 26 |
| 7 | 9 | 96 | 1245 | Blue River | 2 | 6.6 | 14 | 39 | 11.7 | 10.1 | 7.5 | 24 |
| 7 | 9 | 96 | 1245 | Blue River | 2 | 6.6 | 16 | 39 | 10.9 | 10 | 7.2 | 24 |
| 7 | 9 | 96 | 1245 | Blue River | 2 | 6.6 | 18 | 39 | 10.3 | 10 | 7 | 24 |
| 7 | 9 | 96 | 1245 | Blue River | 2 | 6.6 | 20 | 39 | 9.9 | 9.9 | 6.9 | 24 |
| 7 | 9 | 96 | 1245 | Blue River | 2 | 6.6 | 22 | 39 | 9.6 | 9.9 | 6.9 | 25 |
| 7 | 9 | 96 | 1245 | Blue River | 2 | 6.6 | 24 | 39 | 9.4 | 10 | 6.8 | 24 |
| 7 | 9 | 96 | 1245 | Blue River | 2 | 6.6 | 26 | 39 | 9.2 | 10.1 | 6.8 | 23 |
| 7 | 9 | 96 | 1245 | Blue River | 2 | 6.6 | 28 | 39 | 9 | 10 | 6.8 | 23 |
| 7 | 9 | 96 | 1245 | Blue River | 2 | 6.6 | 30 | 39 | 8.9 | 10.1 | 6.7 | 24 |
| 7 | 9 | 96 | 1245 | Blue River | 2 | 6.6 | 32 | 39 | 8.8 | 10 | 6.7 | 24 |
| 7 | 9 | 96 | 1245 | Blue River | 2 | 6.6 | 34 | 39 | 8.7 | 9.9 | 6.7 | 24 |
| 7 | 9 | 96 | 1245 | Blue River | 2 | 6.6 | 36 | 39 | 8.7 | 9.8 | 6.7 | 24 |
| 7 | 9 | 96 | 1245 | Blue River | 2 | 6.6 | 38 | 39 | 8.5 | 9 | 6.6 | 25 |
| 7 | 9 | 96 | 1334 | Blue River | 3 | 6.7 | 0 | 35.3 | 22.5 | 9 | 7.9 | 27 |
| 7 | 9 | 96 | 1334 | Blue River | 3 | 6.7 | 2 | 35.3 | 22.3 | 8.9 | 7.8 | 27 |
| 7 | 9 | 96 | 1334 | Blue River | 3 | 6.7 | 4 | 35.3 | 22.2 | 9 | 7.9 | 27 |
| 7 | 9 | 96 | 1334 | Blue River | 3 | 6.7 | 6 | 35.3 | 20.7 | 9.9 | 8.1 | 28 |
| 7 | 9 | 96 | 1334 | Blue River | 3 | 6.7 | 7 | 35.3 | 19.3 | 11.2 | 8.5 | 29 |
| 7 | 9 | 96 | 1334 | Blue River | 3 | 6.7 | 8 | 35.3 | 17.4 | 12.5 | 8.7 | 29 |
| 7 | 9 | 96 | 1334 | Blue River | 3 | 6.7 | 9 | 35.3 | 16.1 | 11.9 | 8.6 | 28 |
| 7 | 9 | 96 | 1334 | Blue River | 3 | 6.7 | 10 | 35.3 | 15.3 | 11 | 8.2 | 28 |
| 7 | 9 | 96 | 1334 | Blue River | 3 | 6.7 | 11 | 35.3 | 14.2 | 10.2 | 7.8 | 27 |
| 7 | 9 | 96 | 1334 | Blue River | 3 | 6.7 | 12 | 35.3 | 13.2 | 10 | 7.6 | 26 |
| 7 | 9 | 96 | 1334 | Blue River | 3 | 6.7 | 14 | 35.3 | 11.8 | 10.2 | 7.5 | 25 |
| 7 | 9 | 96 | 1334 | Blue River | 3 | 6.7 | 16 | 35.3 | 11 | 10.1 | 7.4 | 25 |
| 7 | 9 | 96 | 1334 | Blue River | 3 | 6.7 | 18 | 35.3 | 10.3 | 10 | 7.3 | 25 |
| 7 | 9 | 96 | 1334 | Blue River | 3 | 6.7 | 20 | 35.3 | 9.9 | 9.9 | 7.2 | 24 |
| 7 | 9 | 96 | 1334 | Blue River | 3 | 6.7 | 22 | 35.3 | 9.6 | 9.9 | 7.1 | 24 |
| 7 | 9 | 96 | 1334 | Blue River | 3 | 6.7 | 24 | 35.3 | 9.4 | 9.9 | 7.1 | 24 |
| 7 | 9 | 96 | 1334 | Blue River | 3 | 6.7 | 26 | 35.3 | 9.3 | 9.6 | 7 | 24 |
| 7 | 9 | 96 | 1334 | Blue River | 3 | 6.7 | 28 | 35.3 | 9.1 | 9.6 | 6.9 | 24 |
| 7 | 9 | 96 | 1334 | Blue River | 3 | 6.7 | 30 | 35.3 | 9 | 9.7 | 6.9 | 24 |
| 7 | 9 | 96 | 1334 | Blue River | 3 | 6.7 | 32 | 35.3 | 8.9 | 9.5 | 6.8 | 24 |
| 7 | 9 | 96 | 1334 | Blue River | 3 | 6.7 | 34 | 35.3 | 8.7 | 9.2 | 6.7 | 25 |
| 7 | 9 | 96 | 1407 | Blue River | 4 | 6.5 | 0 | 27.3 | 22.3 | 8.9 | 7.6 | 28 |
| 7 | 9 | 96 | 1407 | Blue River | 4 | 6.5 | 2 | 27.3 | 22.3 | 8.8 | 7.6 | 28 |
| 7 | 9 | 96 | 1407 | Blue River | 4 | 6.5 | 4 | 27.3 | 22.3 | 8.8 | 7.6 | 28 |
| 7 | 9 | 96 | 1407 | Blue River | 4 | 6.5 | 6 | 27.3 | 22.2 | 8.8 | 7.6 | 27 |
| 7 | 9 | 96 | 1407 | Blue River | 4 | 6.5 | 8 | 27.3 | 18.1 | 10 | 7.9 | 30 |
| 7 | 9 | 96 | 1407 | Blue River | 4 | 6.5 | 9 | 27.3 | 16.6 | 10.1 | 7.7 | 30 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 9 | 96 | 1407 | Blue River | 4 | 6.5 | 10 | 27.3 | 15.8 | 10.2 | 7.6 | 29 |
| 7 | 9 | 96 | 1407 | Blue River | 4 | 6.5 | 11 | 27.3 | 14.4 | 9.6 | 7.4 | 28 |
| 7 | 9 | 96 | 1407 | Blue River | 4 | 6.5 | 12 | 27.3 | 13.1 | 9.8 | 7.3 | 27 |
| 7 | 9 | 96 | 1407 | Blue River | 4 | 6.5 | 14 | 27.3 | 11.6 | 9.6 | 7.1 | 27 |
| 7 | 9 | 96 | 1407 | Blue River | 4 | 6.5 | 16 | 27.3 | 10.5 | 9.6 | 7.1 | 26 |
| 7 | 9 | 96 | 1407 | Blue River | 4 | 6.5 | 18 | 27.3 | 10.1 | 9.2 | 7 | 25 |
| 7 | 9 | 96 | 1407 | Blue River | 4 | 6.5 | 20 | 27.3 | 9.8 | 8.6 | 6.8 | 27 |
| 7 | 9 | 96 | 1407 | Blue River | 4 | 6.5 | 22 | 27.3 | 9.7 | 8.4 | 6.8 | 26 |
| 7 | 9 | 96 | 1407 | Blue River | 4 | 6.5 | 24 | 27.3 | 9.4 | 8.3 | 6.7 | 27 |
| 7 | 9 | 96 | 1407 | Blue River | 4 | 6.5 | 26 | 27.3 | 9.3 | 8 | 6.7 | 26 |
| 8 | 26 | 96 | 1030 | Blue River | 1 | 6.3 | 0 | 66.8 | 22 | 9.1 | 7.3 | 31 |
| 8 | 26 | 96 | 1030 | Blue River | 1 | 6.3 | 2 | 66.8 | 22.1 | 9 | 7.2 | 31 |
| 8 | 26 | 96 | 1030 | Blue River | 1 | 6.3 | 4 | 66.8 | 22.1 | 9 | 7.2 | 30 |
| 8 | 26 | 96 | 1030 | Blue River | 1 | 6.3 | 6 | 66.8 | 22.1 | 8.9 | 7.2 | 30 |
| 8 | 26 | 96 | 1030 | Blue River | 1 | 6.3 | 8 | 66.8 | 22 | 8.9 | 7.2 | 30 |
| 8 | 26 | 96 | 1030 | Blue River | 1 | 6.3 | 10 | 66.8 | 20.9 | 9.5 | 7.1 | 30 |
| 8 | 26 | 96 | 1030 | Blue River | 1 | 6.3 | 12 | 66.8 | 17.8 | 9.9 | 6.9 | 30 |
| 8 | 26 | 96 | 1030 | Blue River | 1 | 6.3 | 14 | 66.8 | 14.3 | 9.5 | 6.8 | 30 |
| 8 | 26 | 96 | 1030 | Blue River | 1 | 6.3 | 16 | 66.8 | 12.4 | 8.5 | 6.6 | 30 |
| 8 | 26 | 96 | 1030 | Blue River | 1 | 6.3 | 18 | 66.8 | 11 | 8.4 | 6.6 | 30 |
| 8 | 26 | 96 | 1030 | Blue River | 1 | 6.3 | 20 | 66.8 | 10.5 | 8.9 | 6.6 | 28 |
| 8 | 26 | 96 | 1030 | Blue River | 1 | 6.3 | 22 | 66.8 | 10.1 | 9.4 | 6.6 | 26 |
| 8 | 26 | 96 | 1030 | Blue River | 1 | 6.3 | 24 | 66.8 | 9.8 | 9.7 | 6.6 | 26 |
| 8 | 26 | 96 | 1030 | Blue River | 1 | 6.3 | 26 | 66.8 | 9.5 | 10 | 6.6 | 26 |
| 8 | 26 | 96 | 1030 | Blue River | 1 | 6.3 | 28 | 66.8 | 9.4 | 9.8 | 6.6 | 26 |
| 8 | 26 | 96 | 1030 | Blue River | 1 | 6.3 | 30 | 66.8 | 9.2 | 9.9 | 6.5 | 25 |
| 8 | 26 | 96 | 1030 | Blue River | 1 | 6.3 | 32 | 66.8 | 9.1 | 9.8 | 6.5 | 25 |
| 8 | 26 | 96 | 1030 | Blue River | 1 | 6.3 | 34 | 66.8 | 9 | 9.7 | 6.4 | 25 |
| 8 | 26 | 96 | 1030 | Blue River | 1 | 6.3 | 36 | 66.8 | 8.9 | 9.7 | 6.5 | 24 |
| 8 | 26 | 96 | 1030 | Blue River | 1 | 6.3 | 38 | 66.8 | 8.8 | 9.5 | 6.5 | 25 |
| 8 | 26 | 96 | 1030 | Blue River | 1 | 6.3 | 40 | 66.8 | 8.7 | 9.1 | 6.4 | 25 |
| 8 | 26 | 96 | 1030 | Blue River | 1 | 6.3 | 42 | 66.8 | 8.7 | 8.9 | 6.4 | 25 |
| 8 | 26 | 96 | 1030 | Blue River | 1 | 6.3 | 44 | 66.8 | 8.6 | 8.8 | 6.4 | 25 |
| 8 | 26 | 96 | 1030 | Blue River | 1 | 6.3 | 46 | 66.8 | 8.6 | 8.8 | 6.3 | 27 |
| 8 | 26 | 96 | 1030 | Blue River | 1 | 6.3 | 48 | 66.8 | 8.6 | 8.8 | 6.3 | 27 |
| 8 | 26 | 96 | 1030 | Blue River | 1 | 6.3 | 50 | 66.8 | 8.5 | 8.7 | 6.3 | 27 |
| 8 | 26 | 96 | 1030 | Blue River | 1 | 6.3 | 52 | 66.8 | 8.5 | 8.6 | 6.3 | 27 |
| 8 | 26 | 96 | 1030 | Blue River | 1 | 6.3 | 54 | 66.8 | 8.5 | 8.5 | 6.3 | 27 |
| 8 | 26 | 96 | 1030 | Blue River | 1 | 6.3 | 56 | 66.8 | 8.5 | 8.5 | 6.3 | 26 |
| 8 | 26 | 96 | 1030 | Blue River | 1 | 6.3 | 58 | 66.8 | 8.5 | 8.4 | 6.2 | 28 |
| 8 | 26 | 96 | 1030 | Blue River | 1 | 6.3 | 60 | 66.8 | 8.5 | 8.4 | 6.2 | 28 |
| 8 | 26 | 96 | 1030 | Blue River | 1 | 6.3 | 62 | 66.8 | 8.5 | 8.4 | 6.2 | 29 |
| 8 | 26 | 96 | 1030 | Blue River | 1 | 6.3 | 64 | 66.8 | 8.5 | 8.3 | 6.3 | 29 |
| 8 | 26 | 96 | 1030 | Blue River | 1 | 6.3 | 66 | 66.8 | 8.5 | 8.2 | 6.2 | 29 |
| 8 | 26 | 96 | 1030 | Blue River | 1 | 6.3 | 66.3 | 66.8 | 8.5 | 8 | 6.2 | 29 |
| 8 | 28 | 96 | 1445 | Blue River | 2 | 6.1 | 0 | 41.3 | 23 | 9 | 7.4 | 32 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | 28 | 96 | 1445 | Blue River | 2 | 6.1 | 2 | 41.3 | 23 | 9.2 | 7.4 | 32 |
| 8 | 28 | 96 | 1445 | Blue River | 2 | 6.1 | 4 | 41.3 | 22.9 | 9.1 | 7.3 | 31 |
| 8 | 28 | 96 | 1445 | Blue River | 2 | 6.1 | 6 | 41.3 | 22.7 | 9 | 7.2 | 30 |
| 8 | 28 | 96 | 1445 | Blue River | 2 | 6.1 | 8 | 41.3 | 22.3 | 8.9 | 7.2 | 30 |
| 8 | 28 | 96 | 1445 | Blue River | 2 | 6.1 | 10 | 41.3 | 21 | 9.6 | 7.1 | 30 |
| 8 | 28 | 96 | 1445 | Blue River | 2 | 6.1 | 12 | 41.3 | 17.9 | 10 | 7 | 30 |
| 8 | 28 | 96 | 1445 | Blue River | 2 | 6.1 | 14 | 41.3 | 14.3 | 9.2 | 6.9 | 30 |
| 8 | 28 | 96 | 1445 | Blue River | 2 | 6.1 | 16 | 41.3 | 12.5 | 8.3 | 6.8 | 29 |
| 8 | 28 | 96 | 1445 | Blue River | 2 | 6.1 | 18 | 41.3 | 11 | 8.2 | 6.6 | 29 |
| 8 | 28 | 96 | 1445 | Blue River | 2 | 6.1 | 20 | 41.3 | 10.6 | 8.9 | 6.6 | 28 |
| 8 | 28 | 96 | 1445 | Blue River | 2 | 6.1 | 22 | 41.3 | 10 | 9.4 | 6.6 | 26 |
| 8 | 28 | 96 | 1445 | Blue River | 2 | 6.1 | 24 | 41.3 | 9.8 | 9.6 | 6.6 | 27 |
| 8 | 28 | 96 | 1445 | Blue River | 2 | 6.1 | 26 | 41.3 | 9.7 | 10.2 | 6.5 | 26 |
| 8 | 28 | 96 | 1445 | Blue River | 2 | 6.1 | 28 | 41.3 | 9.4 | 9.8 | 6.6 | 25 |
| 8 | 28 | 96 | 1445 | Blue River | 2 | 6.1 | 30 | 41.3 | 9.3 | 9.9 | 6.6 | 25 |
| 8 | 28 | 96 | 1445 | Blue River | 2 | 6.1 | 32 | 41.3 | 9.2 | 9.9 | 6.5 | 25 |
| 8 | 28 | 96 | 1445 | Blue River | 2 | 6.1 | 34 | 41.3 | 9.1 | 9.7 | 6.4 | 25 |
| 8 | 28 | 96 | 1445 | Blue River | 2 | 6.1 | 36 | 41.3 | 9 | 8 | 6.3 | 24 |
| 8 | 28 | 96 | 1445 | Blue River | 2 | 6.1 | 38 | 41.3 | 8.8 | 5.2 | 6.4 | 25 |
| 8 | 28 | 96 | 1445 | Blue River | 2 | 6.1 | 40 | 41.3 | 8.7 | 5 | 6.4 | 26 |
| 8 | 28 | 96 | 1515 | Blue River | 3 | 5.8 | 0 | 34.6 | 22.7 | 9.2 | 7.4 | 32 |
| 8 | 28 | 96 | 1515 | Blue River | 3 | 5.8 | 2 | 34.6 | 22.6 | 9 | 7.3 | 31 |
| 8 | 28 | 96 | 1515 | Blue River | 3 | 5.8 | 4 | 34.6 | 22.5 | 9.1 | 7.2 | 30 |
| 8 | 28 | 96 | 1515 | Blue River | 3 | 5.8 | 6 | 34.6 | 22.5 | 8.9 | 7.2 | 30 |
| 8 | 28 | 96 | 1515 | Blue River | 3 | 5.8 | 8 | 34.6 | 22.4 | 8.8 | 7.1 | 30 |
| 8 | 28 | 96 | 1515 | Blue River | 3 | 5.8 | 10 | 34.6 | 22 | 10.2 | 7 | 30 |
| 8 | 28 | 96 | 1515 | Blue River | 3 | 5.8 | 12 | 34.6 | 18 | 10 | 6.9 | 30 |
| 8 | 28 | 96 | 1515 | Blue River | 3 | 5.8 | 14 | 34.6 | 14.5 | 9.7 | 6.8 | 30 |
| 8 | 28 | 96 | 1515 | Blue River | 3 | 5.8 | 16 | 34.6 | 12.3 | 8.7 | 6.7 | 29 |
| 8 | 28 | 96 | 1515 | Blue River | 3 | 5.8 | 18 | 34.6 | 11.3 | 8.5 | 6.6 | 29 |
| 8 | 28 | 96 | 1515 | Blue River | 3 | 5.8 | 20 | 34.6 | 10.4 | 8.2 | 6.6 | 28 |
| 8 | 28 | 96 | 1515 | Blue River | 3 | 5.8 | 22 | 34.6 | 10.1 | 8.2 | 6.6 | 27 |
| 8 | 28 | 96 | 1515 | Blue River | 3 | 5.8 | 24 | 34.6 | 9.9 | 8 | 6.5 | 26 |
| 8 | 28 | 96 | 1515 | Blue River | 3 | 5.8 | 26 | 34.6 | 9.5 | 7.6 | 6.5 | 26 |
| 8 | 28 | 96 | 1515 | Blue River | 3 | 5.8 | 28 | 34.6 | 9.4 | 5 | 6.5 | 26 |
| 8 | 28 | 96 | 1515 | Blue River | 3 | 5.8 | 30 | 34.6 | 9.1 | 2.6 | 6.4 | 29 |
| 8 | 28 | 96 | 1515 | Blue River | 3 | 5.8 | 32 | 34.6 | 9.1 | 1.8 | 6.3 | 32 |
| 8 | 28 | 96 | 1515 | Blue River | 3 | 5.8 | 34 | 34.6 | 8.9 | 0.5 | 6.3 | 35 |
| 8 | 28 | 96 | 1540 | Blue River | 4 | 5.9 | 0 | 25.3 | 22.2 | 9.2 | 7.3 | 31 |
| 8 | 28 | 96 | 1540 | Blue River | 4 | 5.9 | 2 | 25.3 | 22.1 | 9.1 | 7.2 | 30 |
| 8 | 28 | 96 | 1540 | Blue River | 4 | 5.9 | 4 | 25.3 | 22 | 9 | 7.1 | 30 |
| 8 | 28 | 96 | 1540 | Blue River | 4 | 5.9 | 6 | 25.3 | 22 | 9 | 7.2 | 30 |
| 8 | 28 | 96 | 1540 | Blue River | 4 | 5.9 | 8 | 25.3 | 21.9 | 8.9 | 7.1 | 29 |
| 8 | 28 | 96 | 1540 | Blue River | 4 | 5.9 | 10 | 25.3 | 21.3 | 9.1 | 7 | 29 |
| 8 | 28 | 96 | 1540 | Blue River | 4 | 5.9 | 12 | 25.3 | 17.9 | 9.6 | 6.9 | 29 |
| 8 | 28 | 96 | 1540 | Blue River | 4 | 5.9 | 14 | 25.3 | 15 | 9.6 | 6.9 | 29 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | 28 | 96 | 1540 | Blue River | 4 | 5.9 | 16 | 25.3 | 13 | 8.2 | 6.7 | 29 |
| 8 | 28 | 96 | 1540 | Blue River | 4 | 5.9 | 18 | 25.3 | 11.2 | 8.2 | 6.6 | 29 |
| 8 | 28 | 96 | 1540 | Blue River | 4 | 5.9 | 20 | 25.3 | 10.6 | 7 | 6.6 | 28 |
| 8 | 28 | 96 | 1540 | Blue River | 4 | 5.9 | 22 | 25.3 | 10 | 6.2 | 6.5 | 26 |
| 8 | 28 | 96 | 1540 | Blue River | 4 | 5.9 | 24 | 25.3 | 9.9 | 6 | 6.5 | 27 |
| 9 | 23 | 96 | 1125 | Blue River | 1 | 6.3 | 0 | 59.3 | 18.4 | 8.8 | 6.5 | 32 |
| 9 | 23 | 96 | 1125 | Blue River | 1 | 6.3 | 2 | 59.3 | 18.4 | 8.7 | 6.7 | 32 |
| 9 | 23 | 96 | 1125 | Blue River | 1 | 6.3 | 4 | 59.3 | 18.4 | 8.7 | 6.7 | 31 |
| 9 | 23 | 96 | 1125 | Blue River | 1 | 6.3 | 6 | 59.3 | 18.4 | 8.7 | 6.7 | 31 |
| 9 | 23 | 96 | 1125 | Blue River | 1 | 6.3 | 8 | 59.3 | 18.4 | 8.8 | 6.7 | 31 |
| 9 | 23 | 96 | 1125 | Blue River | 1 | 6.3 | 10 | 59.3 | 18.4 | 8.7 | 6.8 | 31 |
| 9 | 23 | 96 | 1125 | Blue River | 1 | 6.3 | 12 | 59.3 | 18.4 | 8.7 | 6.8 | 31 |
| 9 | 23 | 96 | 1125 | Blue River | 1 | 6.3 | 14 | 59.3 | 18.3 | 8.7 | 6.8 | 31 |
| 9 | 23 | 96 | 1125 | Blue River | 1 | 6.3 | 16 | 59.3 | 17.5 | 7.9 | 6.7 | 30 |
| 9 | 23 | 96 | 1125 | Blue River | 1 | 6.3 | 18 | 59.3 | 16.1 | 7.4 | 6.6 | 30 |
| 9 | 23 | 96 | 1125 | Blue River | 1 | 6.3 | 20 | 59.3 | 14.7 | 6.9 | 6.5 | 30 |
| 9 | 23 | 96 | 1125 | Blue River | 1 | 6.3 | 22 | 59.3 | 13.1 | 7 | 6.4 | 29 |
| 9 | 23 | 96 | 1125 | Blue River | 1 | 6.3 | 24 | 59.3 | 12.2 | 7 | 6.3 | 29 |
| 9 | 23 | 96 | 1125 | Blue River | 1 | 6.3 | 26 | 59.3 | 11.4 | 7.3 | 6.3 | 30 |
| 9 | 23 | 96 | 1125 | Blue River | 1 | 6.3 | 28 | 59.3 | 10.8 | 7.6 | 6.3 | 27 |
| 9 | 23 | 96 | 1125 | Blue River | 1 | 6.3 | 30 | 59.3 | 10.7 | 7.8 | 6.3 | 28 |
| 9 | 23 | 96 | 1125 | Blue River | 1 | 6.3 | 32 | 59.3 | 10.3 | 8.3 | 6.6 | 28 |
| 9 | 23 | 96 | 1125 | Blue River | 1 | 6.3 | 34 | 59.3 | 10.2 | 8.4 | 6.6 | 28 |
| 9 | 23 | 96 | 1125 | Blue River | 1 | 6.3 | 36 | 59.3 | 10.1 | 8.6 | 6.5 | 27 |
| 9 | 23 | 96 | 1125 | Blue River | 1 | 6.3 | 38 | 59.3 | 9.9 | 8.9 | 6.4 | 26 |
| 9 | 23 | 96 | 1125 | Blue River | 1 | 6.3 | 40 | 59.3 | 9.9 | 8.9 | 6.4 | 25 |
| 9 | 23 | 96 | 1125 | Blue River | 1 | 6.3 | 42 | 59.3 | 9.8 | 8.9 | 6.5 | 25 |
| 9 | 23 | 96 | 1125 | Blue River | 1 | 6.3 | 44 | 59.3 | 9.7 | 8.7 | 6.4 | 25 |
| 9 | 23 | 96 | 1125 | Blue River | 1 | 6.3 | 46 | 59.3 | 9.6 | 8.1 | 6.4 | 27 |
| 9 | 23 | 96 | 1125 | Blue River | 1 | 6.3 | 48 | 59.3 | 9.6 | 7.8 | 6.3 | 27 |
| 9 | 23 | 96 | 1125 | Blue River | 1 | 6.3 | 50 | 59.3 | 9.6 | 7.6 | 6.3 | 28 |
| 9 | 23 | 96 | 1125 | Blue River | 1 | 6.3 | 52 | 59.3 | 9.6 | 7.4 | 6.2 | 28 |
| 9 | 23 | 96 | 1125 | Blue River | 1 | 6.3 | 54 | 59.3 | 9.5 | 6.8 | 6.2 | 30 |
| 9 | 23 | 96 | 1125 | Blue River | 1 | 6.3 | 56 | 59.3 | 9.4 | 6.4 | 6.1 | 29 |
| 9 | 23 | 96 | 1125 | Blue River | 1 | 6.3 | 58 | 59.3 | 9.3 | 6.4 | 6 | 29 |
| 9 | 23 | 96 | 1125 | Blue River | 1 | 6.3 | 59 | 59.3 | 8.9 | 6.1 | 6 | 30 |
| 9 | 23 | 96 | 1425 | Blue River | 2 | 6.3 | 0 | 37.5 | 19.4 | 8.8 | 7.1 | 32 |
| 9 | 23 | 96 | 1425 | Blue River | 2 | 6.3 | 2 | 37.5 | 18.7 | 8.8 | 7 | 32 |
| 9 | 23 | 96 | 1425 | Blue River | 2 | 6.3 | 4 | 37.5 | 18.6 | 8.8 | 7 | 32 |
| 9 | 23 | 96 | 1425 | Blue River | 2 | 6.3 | 6 | 37.5 | 18.5 | 8.8 | 7 | 31 |
| 9 | 23 | 96 | 1425 | Blue River | 2 | 6.3 | 8 | 37.5 | 18.5 | 8.8 | 7 | 31 |
| 9 | 23 | 96 | 1425 | Blue River | 2 | 6.3 | 10 | 37.5 | 18.5 | 8.8 | 7 | 32 |
| 9 | 23 | 96 | 1425 | Blue River | 2 | 6.3 | 12 | 37.5 | 18.4 | 8.8 | 7 | 32 |
| 9 | 23 | 96 | 1425 | Blue River | 2 | 6.3 | 14 | 37.5 | 18.1 | 8.4 | 6.9 | 32 |
| 9 | 23 | 96 | 1425 | Blue River | 2 | 6.3 | 16 | 37.5 | 17.2 | 8 | 6.8 | 33 |
| 9 | 23 | 96 | 1425 | Blue River | 2 | 6.3 | 18 | 37.5 | 15.6 | 7.6 | 6.6 | 30 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9 | 23 | 96 | 1425 | Blue River | 2 | 6.3 | 20 | 37.5 | 14.1 | 7.5 | 6.5 | 28 |
| 9 | 23 | 96 | 1425 | Blue River | 2 | 6.3 | 22 | 37.5 | 12.9 | 7.5 | 6.4 | 28 |
| 9 | 23 | 96 | 1425 | Blue River | 2 | 6.3 | 24 | 37.5 | 12 | 7.3 | 6.4 | 29 |
| 9 | 23 | 96 | 1425 | Blue River | 2 | 6.3 | 26 | 37.5 | 11.4 | 7.8 | 6.3 | 27 |
| 9 | 23 | 96 | 1425 | Blue River | 2 | 6.3 | 28 | 37.5 | 11.1 | 7.5 | 6.3 | 28 |
| 9 | 23 | 96 | 1425 | Blue River | 2 | 6.3 | 30 | 37.5 | 10.6 | 8 | 6.3 | 27 |
| 9 | 23 | 96 | 1425 | Blue River | 2 | 6.3 | 32 | 37.5 | 10.4 | 6.4 | 6.2 | 31 |
| 9 | 23 | 96 | 1425 | Blue River | 2 | 6.3 | 34 | 37.5 | 9.8 | 6.4 | 6.1 | 32 |
| 9 | 23 | 96 | 1425 | Blue River | 2 | 6.3 | 36 | 37.5 | 9.7 | 6.5 | 6.1 | 31 |
| 9 | 23 | 96 | 1453 | Blue River | 3 | 5.7 | 0 | 33.5 | 18.8 | 8.9 | 7.2 | 32 |
| 9 | 23 | 96 | 1453 | Blue River | 3 | 5.7 | 2 | 33.5 | 18.4 | 8.9 | 7.1 | 32 |
| 9 | 23 | 96 | 1453 | Blue River | 3 | 5.7 | 4 | 33.5 | 18.3 | 8.8 | 7.1 | 31 |
| 9 | 23 | 96 | 1453 | Blue River | 3 | 5.7 | 6 | 33.5 | 18.3 | 8.8 | 7.1 | 32 |
| 9 | 23 | 96 | 1453 | Blue River | 3 | 5.7 | 8 | 33.5 | 18.2 | 8.8 | 7 | 30 |
| 9 | 23 | 96 | 1453 | Blue River | 3 | 5.7 | 10 | 33.5 | 18.2 | 8.8 | 7 | 32 |
| 9 | 23 | 96 | 1453 | Blue River | 3 | 5.7 | 12 | 33.5 | 18.1 | 8.7 | 7 | 30 |
| 9 | 23 | 96 | 1453 | Blue River | 3 | 5.7 | 14 | 33.5 | 18 | 8.6 | 7 | 32 |
| 9 | 23 | 96 | 1453 | Blue River | 3 | 5.7 | 16 | 33.5 | 17.4 | 7.8 | 6.8 | 33 |
| 9 | 23 | 96 | 1453 | Blue River | 3 | 5.7 | 18 | 33.5 | 15.9 | 7.5 | 6.6 | 31 |
| 9 | 23 | 96 | 1453 | Blue River | 3 | 5.7 | 20 | 33.5 | 14.5 | 6.8 | 6.5 | 31 |
| 9 | 23 | 96 | 1453 | Blue River | 3 | 5.7 | 22 | 33.5 | 13.1 | 6.5 | 6.4 | 31 |
| 9 | 23 | 96 | 1453 | Blue River | 3 | 5.7 | 24 | 33.5 | 11.8 | 5.8 | 6.2 | 32 |
| 9 | 23 | 96 | 1453 | Blue River | 3 | 5.7 | 26 | 33.5 | 11.1 | 4.7 | 6.1 | 35 |
| 9 | 23 | 96 | 1453 | Blue River | 3 | 5.7 | 28 | 33.5 | 9.5 | 1.5 | 6 | 41 |
| 9 | 23 | 96 | 1453 | Blue River | 3 | 5.7 | 30 | 33.5 | 8.3 | 0.6 | 6 | 50 |
| 9 | 23 | 96 | 1453 | Blue River | 3 | 5.7 | 32 | 33.5 | 7.7 | 0.2 | 5.9 | 63 |
| 9 | 23 | 96 | 1530 | Blue River | 4 | 4.9 | 0 | 17.6 | 19.1 | 8.8 | 7.2 | 32 |
| 9 | 23 | 96 | 1530 | Blue River | 4 | 4.9 | 2 | 17.6 | 18.3 | 8.8 | 7.1 | 32 |
| 9 | 23 | 96 | 1530 | Blue River | 4 | 4.9 | 4 | 17.6 | 18.2 | 8.8 | 7.1 | 32 |
| 9 | 23 | 96 | 1530 | Blue River | 4 | 4.9 | 6 | 17.6 | 18.1 | 8.7 | 7 | 32 |
| 9 | 23 | 96 | 1530 | Blue River | 4 | 4.9 | 8 | 17.6 | 18.1 | 8.7 | 7 | 31 |
| 9 | 23 | 96 | 1530 | Blue River | 4 | 4.9 | 10 | 17.6 | 18.1 | 8.7 | 7 | 32 |
| 9 | 23 | 96 | 1530 | Blue River | 4 | 4.9 | 12 | 17.6 | 18 | 8.7 | 7 | 32 |
| 9 | 23 | 96 | 1530 | Blue River | 4 | 4.9 | 14 | 17.6 | 17.7 | 8.6 | 7 | 33 |
| 9 | 23 | 96 | 1530 | Blue River | 4 | 4.9 | 16 | 17.6 | 17 | 8.7 | 6.9 | 34 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 0 | 108.8 | 10 | 12.8 | 7.3 | 29 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 2 | 108.8 | 10 | 12.7 | 7.2 | 29 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 4 | 108.8 | 10 | 12.7 | 7.2 | 29 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 6 | 108.8 | 10 | 12.6 | 7.3 | 29 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 8 | 108.8 | 9.2 | 12.9 | 7.3 | 29 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 10 | 108.8 | 7.9 | 13.2 | 7.2 | 29 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 12 | 108.8 | 7.4 | 13.2 | 7.2 | 29 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 14 | 108.8 | 7.2 | 13.1 | 7.1 | 29 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 16 | 108.8 | 6.8 | 13.1 | 7.1 | 28 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 18 | 108.8 | 6.5 | 13.1 | 7.1 | 27 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 20 | 108.8 | 6.4 | 13.1 | 7.1 | 30 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 22 | 108.8 | 6.2 | 13.1 | 7 | 30 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 24 | 108.8 | 6 | 13.1 | 7 | 30 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 26 | 108.8 | 6 | 13.1 | 7 | 30 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 28 | 108.8 | 5.9 | 13.1 | 7 | 30 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 30 | 108.8 | 5.8 | 13.1 | 7 | 30 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 32 | 108.8 | 5.7 | 13.1 | 7 | 32 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 34 | 108.8 | 5.6 | 13.1 | 7 | 31 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 36 | 108.8 | 5.4 | 13.2 | 6.9 | 31 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 38 | 108.8 | 5.3 | 13.2 | 6.9 | 32 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 40 | 108.8 | 5.2 | 13.2 | 6.9 | 33 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 42 | 108.8 | 5 | 13.2 | 6.9 | 33 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 44 | 108.8 | 4.9 | 13.1 | 6.8 | 33 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 46 | 108.8 | 4.8 | 13 | 6.8 | 33 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 48 | 108.8 | 4.8 | 13 | 6.8 | 30 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 50 | 108.8 | 4.7 | 12.9 | 6.8 | 30 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 52 | 108.8 | 4.7 | 12.9 | 6.7 | 32 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 54 | 108.8 | 4.7 | 12.9 | 6.7 | 30 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 56 | 108.8 | 4.7 | 12.9 | 6.7 | 30 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 58 | 108.8 | 4.7 | 12.9 | 6.7 | 31 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 60 | 108.8 | 4.7 | 12.8 | 6.7 | 32 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 62 | 108.8 | 4.7 | 12.8 | 6.7 | 30 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 64 | 108.8 | 4.7 | 12.8 | 6.7 | 30 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 66 | 108.8 | 4.7 | 12.8 | 6.6 | 30 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 68 | 108.8 | 4.7 | 12.8 | 6.6 | 30 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 70 | 108.8 | 4.7 | 12.7 | 6.6 | 31 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 72 | 108.8 | 4.7 | 12.7 | 6.6 | 30 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 74 | 108.8 | 4.7 | 12.7 | 6.6 | 30 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 76 | 108.8 | 4.7 | 12.7 | 6.6 | 31 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 78 | 108.8 | 4.7 | 12.6 | 6.6 | 30 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 80 | 108.8 | 4.7 | 12.6 | 6.6 | 32 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 82 | 108.8 | 4.7 | 12.5 | 6.6 | 30 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 84 | 108.8 | 4.7 | 12.5 | 6.6 | 31 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 86 | 108.8 | 4.8 | 12.4 | 6.6 | 30 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 88 | 108.8 | 4.8 | 12.3 | 6.6 | 30 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 90 | 108.8 | 4.8 | 12.3 | 6.6 | 32 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 92 | 108.8 | 4.8 | 12.3 | 6.6 | 29 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 94 | 108.8 | 4.8 | 12.2 | 6.5 | 30 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 96 | 108.8 | 4.8 | 12.2 | 6.5 | 30 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 98 | 108.8 | 4.8 | 12.1 | 6.5 | 32 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 100 | 108.8 | 4.8 | 12 | 6.5 | 32 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 102 | 108.8 | 4.8 | 11.8 | 6.5 | 33 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 104 | 108.8 | 4.8 | 11.6 | 6.5 | 32 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 106 | 108.8 | 4.8 | 10.4 | 6.5 | 32 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 108 | 108.8 | 4.8 | 9.9 | 6.4 | 34 |
| 4 | 17 | 96 | 1045 | Cougar | 1 | 4.8 | 108.3 | 108.8 | 4.8 | 9.8 | 6.4 | 35 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 0 | 102.5 | 10.5 | 12.9 | 7.3 | 30 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 2 | 102.5 | 10.2 | 12.9 | 7.2 | 30 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 4 | 102.5 | 10.1 | 12.8 | 7.2 | 30 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 6 | 102.5 | 9.4 | 13 | 7.2 | 30 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 8 | 102.5 | 8.5 | 13.2 | 7.2 | 30 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 10 | 102.5 | 7.7 | 13.3 | 7.1 | 30 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 12 | 102.5 | 7.3 | 13.3 | 7.1 | 30 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 14 | 102.5 | 7.1 | 13.2 | 7.1 | 30 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 16 | 102.5 | 6.9 | 13.2 | 7.1 | 31 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 18 | 102.5 | 6.6 | 13.1 | 7.1 | 31 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 20 | 102.5 | 6.5 | 13.1 | 7 | 32 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 22 | 102.5 | 6.3 | 13.1 | 7 | 32 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 24 | 102.5 | 6.2 | 13.1 | 7 | 32 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 26 | 102.5 | 6 | 13.1 | 7 | 33 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 28 | 102.5 | 5.9 | 13.1 | 7 | 32 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 30 | 102.5 | 5.8 | 13.2 | 7 | 30 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 32 | 102.5 | 5.7 | 13.2 | 7 | 31 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 34 | 102.5 | 5.7 | 13.2 | 6.9 | 30 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 36 | 102.5 | 5.5 | 13.2 | 6.9 | 30 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 38 | 102.5 | 5.3 | 13.2 | 6.9 | 31 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 40 | 102.5 | 5.2 | 13.2 | 6.9 | 30 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 42 | 102.5 | 5.1 | 13.2 | 6.9 | 30 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 44 | 102.5 | 5 | 13.2 | 6.9 | 30 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 46 | 102.5 | 4.9 | 13 | 6.9 | 31 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 48 | 102.5 | 4.8 | 13 | 6.8 | 33 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 50 | 102.5 | 4.8 | 12.9 | 6.8 | 31 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 52 | 102.5 | 4.7 | 12.9 | 6.8 | 33 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 54 | 102.5 | 4.7 | 12.8 | 6.8 | 34 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 56 | 102.5 | 4.7 | 12.7 | 6.7 | 34 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 58 | 102.5 | 4.7 | 12.6 | 6.7 | 32 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 60 | 102.5 | 4.7 | 12.6 | 6.7 | 33 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 62 | 102.5 | 4.7 | 12.6 | 6.7 | 33 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 64 | 102.5 | 4.7 | 12.5 | 6.7 | 34 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 66 | 102.5 | 4.7 | 12.5 | 6.7 | 34 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 68 | 102.5 | 4.7 | 12.5 | 6.6 | 34 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 70 | 102.5 | 4.7 | 12.5 | 6.6 | 33 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 72 | 102.5 | 4.7 | 12.5 | 6.6 | 33 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 74 | 102.5 | 4.7 | 12.4 | 6.6 | 33 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 76 | 102.5 | 4.7 | 12.4 | 6.6 | 33 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 78 | 102.5 | 4.7 | 12.4 | 6.6 | 33 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 80 | 102.5 | 4.7 | 12.4 | 6.6 | 32 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 82 | 102.5 | 4.7 | 12.3 | 6.5 | 32 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 84 | 102.5 | 4.8 | 12.3 | 6.5 | 30 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 86 | 102.5 | 4.8 | 12.2 | 6.5 | 30 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 88 | 102.5 | 4.8 | 12.1 | 6.5 | 30 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 90 | 102.5 | 4.8 | 12.1 | 6.5 | 30 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 92 | 102.5 | 4.8 | 12.1 | 6.5 | 30 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 94 | 102.5 | 4.8 | 12.1 | 6.5 | 30 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 96 | 102.5 | 4.8 | 11.9 | 6.5 | 30 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 98 | 102.5 | 4.8 | 11.9 | 6.5 | 30 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 100 | 102.5 | 4.8 | 11.8 | 6.5 | 30 |
| 4 | 17 | 96 | 1420 | Cougar | 2 | 4 | 102 | 102.5 | 4.8 | 11.8 | 6.5 | 30 |
| 4 | 17 | 96 | 1506 | Cougar | 3 | 4.2 | 0 | 60.3 | 10.4 | 12.7 | 7.4 | 30 |
| 4 | 17 | 96 | 1506 | Cougar | 3 | 4.2 | 2 | 60.3 | 10.4 | 12.7 | 7.3 | 30 |
| 4 | 17 | 96 | 1506 | Cougar | 3 | 4.2 | 4 | 60.3 | 10.2 | 12.7 | 7.3 | 30 |
| 4 | 17 | 96 | 1506 | Cougar | 3 | 4.2 | 6 | 60.3 | 8.6 | 13.1 | 7.3 | 30 |
| 4 | 17 | 96 | 1506 | Cougar | 3 | 4.2 | 8 | 60.3 | 8.2 | 13.3 | 7.3 | 30 |
| 4 | 17 | 96 | 1506 | Cougar | 3 | 4.2 | 10 | 60.3 | 7.7 | 13.1 | 7.2 | 32 |
| 4 | 17 | 96 | 1506 | Cougar | 3 | 4.2 | 12 | 60.3 | 7.4 | 13.1 | 7.2 | 30 |
| 4 | 17 | 96 | 1506 | Cougar | 3 | 4.2 | 14 | 60.3 | 7.2 | 13.1 | 7.2 | 30 |
| 4 | 17 | 96 | 1506 | Cougar | 3 | 4.2 | 16 | 60.3 | 7.1 | 13.1 | 7.2 | 31 |
| 4 | 17 | 96 | 1506 | Cougar | 3 | 4.2 | 18 | 60.3 | 6.8 | 13.1 | 7.1 | 31 |
| 4 | 17 | 96 | 1506 | Cougar | 3 | 4.2 | 20 | 60.3 | 6.5 | 13.1 | 7.1 | 31 |
| 4 | 17 | 96 | 1506 | Cougar | 3 | 4.2 | 22 | 60.3 | 6.3 | 13.1 | 7.1 | 33 |
| 4 | 17 | 96 | 1506 | Cougar | 3 | 4.2 | 24 | 60.3 | 6.2 | 13.1 | 7.1 | 32 |
| 4 | 17 | 96 | 1506 | Cougar | 3 | 4.2 | 26 | 60.3 | 6.1 | 13.1 | 7.1 | 31 |
| 4 | 17 | 96 | 1506 | Cougar | 3 | 4.2 | 28 | 60.3 | 6 | 13.1 | 7.1 | 34 |
| 4 | 17 | 96 | 1506 | Cougar | 3 | 4.2 | 30 | 60.3 | 6 | 13.1 | 7.1 | 34 |
| 4 | 17 | 96 | 1506 | Cougar | 3 | 4.2 | 32 | 60.3 | 5.9 | 13.1 | 7.1 | 33 |
| 4 | 17 | 96 | 1506 | Cougar | 3 | 4.2 | 34 | 60.3 | 5.6 | 13.2 | 7.1 | 31 |
| 4 | 17 | 96 | 1506 | Cougar | 3 | 4.2 | 36 | 60.3 | 5.5 | 13.2 | 7 | 32 |
| 4 | 17 | 96 | 1506 | Cougar | 3 | 4.2 | 38 | 60.3 | 5.4 | 13.2 | 7 | 34 |
| 4 | 17 | 96 | 1506 | Cougar | 3 | 4.2 | 40 | 60.3 | 5.3 | 13.2 | 7 | 34 |
| 4 | 17 | 96 | 1506 | Cougar | 3 | 4.2 | 42 | 60.3 | 5.2 | 13.2 | 7 | 33 |
| 4 | 17 | 96 | 1506 | Cougar | 3 | 4.2 | 44 | 60.3 | 5.1 | 13.1 | 7 | 31 |
| 4 | 17 | 96 | 1506 | Cougar | 3 | 4.2 | 46 | 60.3 | 5 | 13.1 | 6.9 | 31 |
| 4 | 17 | 96 | 1506 | Cougar | 3 | 4.2 | 48 | 60.3 | 4.9 | 13 | 6.9 | 32 |
| 4 | 17 | 96 | 1506 | Cougar | 3 | 4.2 | 50 | 60.3 | 4.8 | 2.9 | 6.9 | 30 |
| 4 | 17 | 96 | 1506 | Cougar | 3 | 4.2 | 52 | 60.3 | 4.8 | 2.9 | 6.8 | 32 |
| 4 | 17 | 96 | 1506 | Cougar | 3 | 4.2 | 54 | 60.3 | 4.8 | 2.8 | 6.8 | 31 |
| 4 | 17 | 96 | 1506 | Cougar | 3 | 4.2 | 56 | 60.3 | 4.7 | 2.8 | 6.8 | 30 |
| 4 | 17 | 96 | 1506 | Cougar | 3 | 4.2 | 58 | 60.3 | 4.7 | 12.5 | 6.7 | 30 |
| 4 | 17 | 96 | 1506 | Cougar | 3 | 4.2 | 60 | 60.3 | 4.7 | 12.4 | 6.7 | 30 |
| 4 | 17 | 96 | 1536 | Cougar | 4 | 4.2 | 0 | 56.1 | 10.3 | 12.9 | 7.4 | 30 |
| 4 | 17 | 96 | 1536 | Cougar | 4 | 4.2 | 2 | 56.1 | 10.3 | 12.8 | 7.3 | 30 |
| 4 | 17 | 96 | 1536 | Cougar | 4 | 4.2 | 4 | 56.1 | 9.3 | 13.2 | 7.3 | 30 |
| 4 | 17 | 96 | 1536 | Cougar | 4 | 4.2 | 6 | 56.1 | 8.3 | 13.3 | 7.3 | 31 |
| 4 | 17 | 96 | 1536 | Cougar | 4 | 4.2 | 8 | 56.1 | 7.9 | 13.2 | 7.2 | 31 |
| 4 | 17 | 96 | 1536 | Cougar | 4 | 4.2 | 10 | 56.1 | 7.7 | 13.2 | 7.2 | 32 |
| 4 | 17 | 96 | 1536 | Cougar | 4 | 4.2 | 12 | 56.1 | 7.6 | 13.1 | 7.2 | 32 |
| 4 | 17 | 96 | 1536 | Cougar | 4 | 4.2 | 14 | 56.1 | 7.4 | 13.1 | 7.2 | 32 |
| 4 | 17 | 96 | 1536 | Cougar | 4 | 4.2 | 16 | 56.1 | 7 | 13.1 | 7.2 | 32 |
| 4 | 17 | 96 | 1536 | Cougar | 4 | 4.2 | 18 | 56.1 | 6.9 | 13.1 | 7.2 | 32 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 17 | 96 | 1536 | Cougar | 4 | 4.2 | 20 | 56.1 | 6.8 | 13.1 | 7.1 | 31 |
| 4 | 17 | 96 | 1536 | Cougar | 4 | 4.2 | 22 | 56.1 | 6.6 | 13.1 | 7.1 | 32 |
| 4 | 17 | 96 | 1536 | Cougar | 4 | 4.2 | 24 | 56.1 | 6.4 | 13.2 | 7.1 | 31 |
| 4 | 17 | 96 | 1536 | Cougar | 4 | 4.2 | 26 | 56.1 | 6.3 | 13.2 | 7.1 | 32 |
| 4 | 17 | 96 | 1536 | Cougar | 4 | 4.2 | 28 | 56.1 | 6.3 | 13.2 | 7.1 | 31 |
| 4 | 17 | 96 | 1536 | Cougar | 4 | 4.2 | 30 | 56.1 | 6.2 | 13.2 | 7.1 | 33 |
| 4 | 17 | 96 | 1536 | Cougar | 4 | 4.2 | 32 | 56.1 | 6 | 13.2 | 7.1 | 32 |
| 4 | 17 | 96 | 1536 | Cougar | 4 | 4.2 | 34 | 56.1 | 5.9 | 13.2 | 7.1 | 33 |
| 4 | 17 | 96 | 1536 | Cougar | 4 | 4.2 | 36 | 56.1 | 5.9 | 13.2 | 7.1 | 34 |
| 4 | 17 | 96 | 1536 | Cougar | 4 | 4.2 | 38 | 56.1 | 5.7 | 13.1 | 7.1 | 35 |
| 4 | 17 | 96 | 1536 | Cougar | 4 | 4.2 | 40 | 56.1 | 5.6 | 13.1 | 7.1 | 35 |
| 4 | 17 | 96 | 1536 | Cougar | 4 | 4.2 | 42 | 56.1 | 5.4 | 13 | 7 | 34 |
| 4 | 17 | 96 | 1536 | Cougar | 4 | 4.2 | 44 | 56.1 | 5.3 | 12.9 | 7 | 34 |
| 4 | 17 | 96 | 1536 | Cougar | 4 | 4.2 | 46 | 56.1 | 5.2 | 12.8 | 7 | 36 |
| 4 | 17 | 96 | 1536 | Cougar | 4 | 4.2 | 48 | 56.1 | 5 | 12.6 | 6.9 | 34 |
| 4 | 17 | 96 | 1536 | Cougar | 4 | 4.2 | 50 | 56.1 | 4.9 | 12.5 | 6.9 | 33 |
| 4 | 17 | 96 | 1536 | Cougar | 4 | 4.2 | 52 | 56.1 | 4.8 | 12.4 | 6.9 | 33 |
| 4 | 17 | 96 | 1536 | Cougar | 4 | 4.2 | 54 | 56.1 | 4.8 | 12.4 | 6.8 | 31 |
| 4 | 17 | 96 | 1536 | Cougar | 4 | 4.2 | 56 | 56.1 | 4.8 | 12.2 | 6.8 | 33 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 0 | 118.0 | 14.8 | 12.3 | 9.1 | 28 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 2 | 118.0 | 13.8 | 12.4 | 9.0 | 28 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 4 | 118.0 | 13.1 | 12.8 | 8.8 | 28 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 6 | 118.0 | 11.1 | 11.8 | 8.3 | 25 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 8 | 118.0 | 10.3 | 11.3 | 7.9 | 24 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 10 | 118.0 | 9.9 | 11.4 | 7.7 | 24 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 12 | 118.0 | 9.6 | 11.4 | 7.6 | 24 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 14 | 118.0 | 9.2 | 11.1 | 7.5 | 23 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 16 | 118.0 | 9.1 | 11.3 | 7.3 | 26 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 18 | 118.0 | 9.0 | 11.2 | 7.3 | 25 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 20 | 118.0 | 8.7 | 11.2 | 7.2 | 25 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 22 | 118.0 | 8.6 | 11.1 | 7.2 | 27 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 24 | 118.0 | 8.4 | 11.2 | 7.2 | 26 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 26 | 118.0 | 8.2 | 11.2 | 7.2 | 25 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 28 | 118.0 | 8.1 | 11.2 | 7.1 | 24 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 30 | 118.0 | 8.0 | 11.2 | 7.1 | 24 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 32 | 118.0 | 8.0 | 11.2 | 7.1 | 28 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 34 | 118.0 | 7.9 | 11.2 | 7.0 | 27 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 36 | 118.0 | 7.8 | 11.2 | 7.0 | 27 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 38 | 118.0 | 7.7 | 11.3 | 7.0 | 28 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 40 | 118.0 | 7.7 | 11.3 | 7.0 | 28 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 42 | 118.0 | 7.5 | 11.3 | 7.0 | 28 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 44 | 118.0 | 7.1 | 11.3 | 7.0 | 28 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 46 | 118.0 | 6.8 | 11.3 | 7.0 | 28 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 48 | 118.0 | 6.7 | 11.3 | 6.9 | 27 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 50 | 118.0 | 6.4 | 11.3 | 6.9 | 28 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 52 | 118.0 | 6.1 | 11.2 | 6.9 | 28 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 54 | 118.0 | 5.6 | 11.0 | 6.8 | 28 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 56 | 118.0 | 5.3 | 10.9 | 6.8 | 30 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 58 | 118.0 | 5.2 | 10.9 | 6.8 | 31 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 60 | 118.0 | 5.1 | 10.9 | 6.7 | 31 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 62 | 118.0 | 5.0 | 10.9 | 6.7 | 30 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 64 | 118.0 | 4.9 | 10.9 | 6.7 | 28 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 66 | 118.0 | 4.9 | 10.9 | 6.7 | 27 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 68 | 118.0 | 4.9 | 10.9 | 6.7 | 28 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 70 | 118.0 | 4.8 | 10.8 | 6.6 | 28 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 72 | 118.0 | 4.8 | 10.9 | 6.6 | 27 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 74 | 118.0 | 4.8 | 10.9 | 6.6 | 28 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 76 | 118.0 | 4.8 | 10.9 | 6.6 | 27 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 78 | 118.0 | 4.7 | 11.0 | 6.6 | 28 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 80 | 118.0 | 4.7 | 11.0 | 6.6 | 28 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 82 | 118.0 | 4.7 | 10.9 | 6.6 | 28 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 84 | 118.0 | 4.7 | 10.8 | 6.6 | 28 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 86 | 118.0 | 4.7 | 10.8 | 6.5 | 28 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 88 | 118.0 | 4.7 | 10.8 | 6.5 | 28 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 90 | 118.0 | 4.7 | 10.8 | 6.6 | 28 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 92 | 118.0 | 4.7 | 10.6 | 6.5 | 28 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 94 | 118.0 | 4.7 | 10.6 | 6.5 | 28 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 96 | 118.0 | 4.7 | 10.4 | 6.6 | 28 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 98 | 118.0 | 4.7 | 10.4 | 6.5 | 27 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 100 | 118.0 | 4.7 | 10.1 | 6.4 | 28 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 102 | 118.0 | 4.7 | 9.9 | 6.4 | 28 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 104 | 118.0 | 4.7 | 9.7 | 6.4 | 28 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 106 | 118.0 | 4.7 | 9.6 | 6.4 | 28 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 108 | 118.0 | 4.7 | 9.5 | 6.4 | 30 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 110 | 118.0 | 4.7 | 9.3 | 6.4 | 28 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 112 | 118.0 | 4.7 | 9.3 | 6.3 | 30 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 114 | 118.0 | 4.7 | 9.1 | 6.4 | 29 |
| 5 | 29 | 96 | 0110 | Cougar | 01 | 1.6 | 116 | 118.0 | 4.7 | 9.0 | 6.3 | 30 |
| 5 | 29 | 96 | 1530 | Cougar | 02 | 1.5 | 0 | 103.0 | 14.7 | 12.6 | 9.5 | 28 |
| 5 | 29 | 96 | 1530 | Cougar | 02 | 1.5 | 2 | 103.0 | 13.8 | 12.7 | 9.3 | 28 |
| 5 | 29 | 96 | 1530 | Cougar | 02 | 1.5 | 4 | 103.0 | 12.0 | 12.5 | 8.9 | 26 |
| 5 | 29 | 96 | 1530 | Cougar | 02 | 1.5 | 6 | 103.0 | 11.0 | 12.0 | 8.6 | 25 |
| 5 | 29 | 96 | 1530 | Cougar | 02 | 1.5 | 8 | 103.0 | 10.3 | 11.7 | 8.3 | 25 |
| 5 | 29 | 96 | 1530 | Cougar | 02 | 1.5 | 10 | 103.0 | 10.0 | 11.5 | 8.1 | 25 |
| 5 | 29 | 96 | 1530 | Cougar | 02 | 1.5 | 12 | 103.0 | 9.8 | 11.4 | 8.0 | 26 |
| 5 | 29 | 96 | 1530 | Cougar | 02 | 1.5 | 14 | 103.0 | 9.4 | 11.3 | 7.8 | 25 |
| 5 | 29 | 96 | 1530 | Cougar | 02 | 1.5 | 16 | 103.0 | 9.1 | 11.3 | 7.7 | 28 |
| 5 | 29 | 96 | 1530 | Cougar | 02 | 1.5 | 18 | 103.0 | 8.8 | 11.3 | 7.7 | 27 |
| 5 | 29 | 96 | 1530 | Cougar | 02 | 1.5 | 20 | 103.0 | 8.7 | 11.3 | 7.6 | 28 |
| 5 | 29 | 96 | 1530 | Cougar | 02 | 1.5 | 22 | 103.0 | 8.5 | 11.3 | 7.6 | 28 |
| 5 | 29 | 96 | 1530 | Cougar | 02 | 1.5 | 24 | 103.0 | 8.4 | 11.2 | 7.5 | 27 |
| 5 | 29 | 96 | 1530 | Cougar | 02 | 1.5 | 26 | 103.0 | 8.2 | 11.2 | 7.5 | 28 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 29 | 96 | 1530 | Cougar | 02 | 1.5 | 28 | 103.0 | 8.2 | 11.2 | 7.5 | 27 |
| 5 | 29 | 96 | 1530 | Cougar | 02 | 1.5 | 30 | 103.0 | 8.1 | 11.2 | 7.5 | 27 |
| 5 | 29 | 96 | 1530 | Cougar | 02 | 1.5 | 32 | 103.0 | 8.0 | 11.2 | 7.4 | 27 |
| 5 | 29 | 96 | 1530 | Cougar | 02 | 1.5 | 34 | 103.0 | 7.9 | 11.3 | 7.4 | 26 |
| 5 | 29 | 96 | 1530 | Cougar | 02 | 1.5 | 36 | 103.0 | 7.8 | 11.3 | 7.4 | 27 |
| 5 | 29 | 96 | 1530 | Cougar | 02 | 1.5 | 38 | 103.0 | 7.6 | 11.3 | 7.3 | 28 |
| 5 | 29 | 96 | 1530 | Cougar | 02 | 1.5 | 40 | 103.0 | 7.5 | 11.3 | 7.3 | 25 |
| 5 | 29 | 96 | 1530 | Cougar | 02 | 1.5 | 42 | 103.0 | 7.4 | 11.3 | 7.3 | 26 |
| 5 | 29 | 96 | 1530 | Cougar | 02 | 1.5 | 44 | 103.0 | 7.1 | 11.4 | 7.3 | 25 |
| 5 | 29 | 96 | 1530 | Cougar | 02 | 1.5 | 46 | 103.0 | 7.0 | 11.3 | 7.3 | 27 |
| 5 | 29 | 96 | 1530 | Cougar | 02 | 1.5 | 48 | 103.0 | 6.7 | 11.3 | 7.2 | 29 |
| 5 | 29 | 96 | 1530 | Cougar | 02 | 1.5 | 50 | 103.0 | 6.4 | 11.4 | 7.2 | 28 |
| 5 | 29 | 96 | 1530 | Cougar | 02 | 1.5 | 55 | 103.0 | 5.5 | 11.0 | 7.1 | 28 |
| 5 | 29 | 96 | 1530 | Cougar | 02 | 1.5 | 60 | 103.0 | 5.1 | 10.7 | 7.1 | 30 |
| 5 | 29 | 96 | 1530 | Cougar | 02 | 1.5 | 65 | 103.0 | 5.1 | 10.6 | 7.0 | 28 |
| 5 | 29 | 96 | 1530 | Cougar | 02 | 1.5 | 70 | 103.0 | 5.0 | 10.6 | 7.0 | 30 |
| 5 | 29 | 96 | 1530 | Cougar | 02 | 1.5 | 75 | 103.0 | 5.0 | 10.5 | 6.9 | 30 |
| 5 | 29 | 96 | 1530 | Cougar | 02 | 1.5 | 80 | 103.0 | 4.9 | 10.5 | 6.9 | 30 |
| 5 | 29 | 96 | 1530 | Cougar | 02 | 1.5 | 85 | 103.0 | 4.8 | 10.6 | 6.9 | 30 |
| 5 | 29 | 96 | 1530 | Cougar | 02 | 1.5 | 90 | 103.0 | 4.8 | 10.6 | 6.8 | 28 |
| 5 | 29 | 96 | 1530 | Cougar | 02 | 1.5 | 95 | 103.0 | 4.8 | 10.5 | 6.8 | 27 |
| 5 | 29 | 96 | 1530 | Cougar | 02 | 1.5 | 100 | 103.0 | 4.8 | 10.5 | 6.8 | 28 |
| 5 | 29 | 96 | 1610 | Cougar | 03 | 1.8 | 0 | 83.0 | 15.8 | 12.6 | 9.6 | 28 |
| 5 | 29 | 96 | 1610 | Cougar | 03 | 1.8 | 2 | 83.0 | 14.0 | 13.0 | 9.3 | 28 |
| 5 | 29 | 96 | 1610 | Cougar | 03 | 1.8 | 4 | 83.0 | 11.6 | 12.2 | 8.8 | 27 |
| 5 | 29 | 96 | 1610 | Cougar | 03 | 1.8 | 6 | 83.0 | 10.4 | 11.8 | 8.4 | 28 |
| 5 | 29 | 96 | 1610 | Cougar | 03 | 1.8 | 8 | 83.0 | 9.8 | 11.5 | 8.1 | 28 |
| 5 | 29 | 96 | 1610 | Cougar | 03 | 1.8 | 10 | 83.0 | 9.6 | 11.3 | 7.9 | 27 |
| 5 | 29 | 96 | 1610 | Cougar | 03 | 1.8 | 12 | 83.0 | 9.3 | 11.3 | 7.8 | 28 |
| 5 | 29 | 96 | 1610 | Cougar | 03 | 1.8 | 14 | 83.0 | 9.1 | 11.3 | 7.7 | 27 |
| 5 | 29 | 96 | 1610 | Cougar | 03 | 1.8 | 16 | 83.0 | 9.0 | 11.3 | 7.6 | 27 |
| 5 | 29 | 96 | 1610 | Cougar | 03 | 1.8 | 18 | 83.0 | 8.8 | 11.2 | 7.6 | 28 |
| 5 | 29 | 96 | 1610 | Cougar | 03 | 1.8 | 20 | 83.0 | 8.6 | 11.3 | 7.5 | 28 |
| 5 | 29 | 96 | 1610 | Cougar | 03 | 1.8 | 22 | 83.0 | 8.5 | 11.2 | 7.4 | 28 |
| 5 | 29 | 96 | 1610 | Cougar | 03 | 1.8 | 24 | 83.0 | 8.4 | 11.2 | 7.4 | 27 |
| 5 | 29 | 96 | 1610 | Cougar | 03 | 1.8 | 26 | 83.0 | 8.3 | 11.3 | 7.4 | 27 |
| 5 | 29 | 96 | 1610 | Cougar | 03 | 1.8 | 28 | 83.0 | 8.2 | 11.3 | 7.4 | 28 |
| 5 | 29 | 96 | 1610 | Cougar | 03 | 1.8 | 30 | 83.0 | 8.2 | 11.3 | 7.3 | 28 |
| 5 | 29 | 96 | 1610 | Cougar | 03 | 1.8 | 32 | 83.0 | 8.1 | 11.3 | 7.3 | 27 |
| 5 | 29 | 96 | 1610 | Cougar | 03 | 1.8 | 34 | 83.0 | 8.0 | 11.3 | 7.3 | 28 |
| 5 | 29 | 96 | 1610 | Cougar | 03 | 1.8 | 36 | 83.0 | 7.9 | 11.4 | 7.3 | 27 |
| 5 | 29 | 96 | 1610 | Cougar | 03 | 1.8 | 38 | 83.0 | 7.8 | 11.4 | 7.2 | 28 |
| 5 | 29 | 96 | 1610 | Cougar | 03 | 1.8 | 40 | 83.0 | 7.8 | 11.4 | 7.2 | 29 |
| 5 | 29 | 96 | 1610 | Cougar | 03 | 1.8 | 42 | 83.0 | 7.8 | 11.4 | 7.2 | 29 |
| 5 | 29 | 96 | 1610 | Cougar | 03 | 1.8 | 44 | 83.0 | 7.6 | 11.4 | 7.2 | 28 |
| 5 | 29 | 96 | 1610 | Cougar | 03 | 1.8 | 46 | 83.0 | 7.4 | 11.4 | 7.2 | 28 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 29 | 96 | 1610 | Cougar | 03 | 1.8 | 48 | 83.0 | 7.2 | 11.4 | 7.1 | 28 |
| 5 | 29 | 96 | 1610 | Cougar | 03 | 1.8 | 50 | 83.0 | 7.1 | 11.3 | 7.1 | 28 |
| 5 | 29 | 96 | 1610 | Cougar | 03 | 1.8 | 55 | 83.0 | 6.6 | 11.2 | 7.1 | 28 |
| 5 | 29 | 96 | 1610 | Cougar | 03 | 1.8 | 60 | 83.0 | 5.8 | 11.1 | 7.0 | 27 |
| 5 | 29 | 96 | 1610 | Cougar | 03 | 1.8 | 65 | 83.0 | 5.4 | 10.5 | 6.9 | 29 |
| 5 | 29 | 96 | 1610 | Cougar | 03 | 1.8 | 70 | 83.0 | 5.2 | 10.4 | 6.9 | 29 |
| 5 | 29 | 96 | 1610 | Cougar | 03 | 1.8 | 75 | 83.0 | 5.0 | 10.3 | 6.9 | 30 |
| 5 | 29 | 96 | 1640 | Cougar | 04 | 1.8 | 0 | 47.4 | 15.9 | 12.4 | 9.7 | 28 |
| 5 | 29 | 96 | 1640 | Cougar | 04 | 1.8 | 2 | 47.4 | 14.3 | 12.9 | 9.4 | 28 |
| 5 | 29 | 96 | 1640 | Cougar | 04 | 1.8 | 4 | 47.4 | 11.7 | 12.0 | 8.9 | 29 |
| 5 | 29 | 96 | 1640 | Cougar | 04 | 1.8 | 6 | 47.4 | 10.3 | 11.4 | 8.4 | 29 |
| 5 | 29 | 96 | 1640 | Cougar | 04 | 1.8 | 8 | 47.4 | 10.0 | 11.3 | 8.0 | 28 |
| 5 | 29 | 96 | 1640 | Cougar | 04 | 1.8 | 10 | 47.4 | 9.8 | 11.2 | 7.8 | 29 |
| 5 | 29 | 96 | 1640 | Cougar | 04 | 1.8 | 12 | 47.4 | 9.4 | 11.2 | 7.6 | 30 |
| 5 | 29 | 96 | 1640 | Cougar | 04 | 1.8 | 14 | 47.4 | 9.2 | 11.2 | 7.5 | 29 |
| 5 | 29 | 96 | 1640 | Cougar | 04 | 1.8 | 16 | 47.4 | 9.1 | 11.2 | 7.4 | 28 |
| 5 | 29 | 96 | 1640 | Cougar | 04 | 1.8 | 18 | 47.4 | 8.9 | 11.3 | 7.4 | 28 |
| 5 | 29 | 96 | 1640 | Cougar | 04 | 1.8 | 20 | 47.4 | 8.8 | 11.3 | 7.3 | 28 |
| 5 | 29 | 96 | 1640 | Cougar | 04 | 1.8 | 22 | 47.4 | 8.6 | 11.3 | 7.3 | 30 |
| 5 | 29 | 96 | 1640 | Cougar | 04 | 1.8 | 24 | 47.4 | 8.6 | 11.3 | 7.3 | 28 |
| 5 | 29 | 96 | 1640 | Cougar | 04 | 1.8 | 26 | 47.4 | 8.5 | 11.3 | 7.3 | 28 |
| 5 | 29 | 96 | 1640 | Cougar | 04 | 1.8 | 28 | 47.4 | 8.4 | 11.3 | 7.3 | 29 |
| 5 | 29 | 96 | 1640 | Cougar | 04 | 1.8 | 30 | 47.4 | 8.2 | 11.3 | 7.3 | 28 |
| 5 | 29 | 96 | 1640 | Cougar | 04 | 1.8 | 32 | 47.4 | 8.2 | 11.3 | 7.3 | 27 |
| 5 | 29 | 96 | 1640 | Cougar | 04 | 1.8 | 34 | 47.4 | 8.0 | 11.4 | 7.2 | 30 |
| 5 | 29 | 96 | 1640 | Cougar | 04 | 1.8 | 36 | 47.4 | 8.0 | 11.3 | 7.2 | 28 |
| 5 | 29 | 96 | 1640 | Cougar | 04 | 1.8 | 38 | 47.4 | 7.9 | 11.3 | 7.2 | 28 |
| 5 | 29 | 96 | 1640 | Cougar | 04 | 1.8 | 40 | 47.4 | 7.9 | 11.3 | 7.2 | 29 |
| 5 | 29 | 96 | 1640 | Cougar | 04 | 1.8 | 42 | 47.4 | 7.8 | 11.3 | 7.2 | 28 |
| 5 | 29 | 96 | 1640 | Cougar | 04 | 1.8 | 44 | 47.4 | 7.6 | 11.3 | 7.1 | 28 |
| 5 | 29 | 96 | 1640 | Cougar | 04 | 1.8 | 46 | 47.4 | 7.1 | 11.2 | 7.1 | 27 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 0 | 120.3 | 21.6 | 9 | 8.2 | 30 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 2 | 120.3 | 21.3 | 9 | 8.2 | 30 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 4 | 120.3 | 21.1 | 9.1 | 8.2 | 30 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 5 | 120.3 | 19.7 | 10.5 | 8.5 | 30 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 6 | 120.3 | 17.7 | 12 | 8.7 | 32 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 7 | 120.3 | 16.6 | 12.6 | 8.8 | 33 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 8 | 120.3 | 15.4 | 13.5 | 8.9 | 34 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 9 | 120.3 | 14.4 | 14.2 | 9 | 35 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 10 | 120.3 | 13.4 | 12.8 | 8.8 | 31 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 11 | 120.3 | 12.7 | 11.9 | 8.6 | 30 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 12 | 120.3 | 12.1 | 10.8 | 8.1 | 27 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 14 | 120.3 | 11.2 | 9.8 | 7.8 | 27 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 16 | 120.3 | 10.7 | 9.5 | 7.5 | 27 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 18 | 120.3 | 10.4 | 9.2 | 7.3 | 25 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 20 | 120.3 | 9.9 | 9.2 | 7.2 | 25 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 22 | 120.3 | 9.7 | 9.5 | 7.1 | 25 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 24 | 120.3 | 9.4 | 9.7 | 7 | 25 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 26 | 120.3 | 9.3 | 9.9 | 7 | 26 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 28 | 120.3 | 9.1 | 10 | 6.9 | 26 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 30 | 120.3 | 9 | 10.2 | 6.9 | 27 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 31 | 120.3 | 8.9 | 10.2 | 6.9 | 27 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 32 | 120.3 | 8.9 | 10.1 | 6.9 | 27 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 34 | 120.3 | 8.7 | 10.3 | 6.9 | 27 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 35 | 120.3 | 8.7 | 10.3 | 6.9 | 27 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 36 | 120.3 | 8.6 | 10.3 | 6.9 | 27 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 38 | 120.3 | 8.6 | 10.4 | 6.9 | 27 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 40 | 120.3 | 8.5 | 10.2 | 6.8 | 27 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 42 | 120.3 | 8.4 | 10.4 | 6.8 | 27 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 44 | 120.3 | 8.3 | 10.3 | 6.8 | 27 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 46 | 120.3 | 8.2 | 10.5 | 6.8 | 27 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 48 | 120.3 | 8.2 | 10.5 | 6.8 | 27 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 50 | 120.3 | 8.1 | 10.5 | 6.7 | 27 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 55 | 120.3 | 7.7 | 10.4 | 6.8 | 27 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 57.5 | 120.3 | 6.7 | 9.9 | 6.6 | 28 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 60 | 120.3 | 5.8 | 10.1 | 6.7 | 28 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 65 | 120.3 | 5.3 | 10 | 6.6 | 28 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 70 | 120.3 | 5.2 | 10.1 | 6.6 | 27 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 75 | 120.3 | 5.1 | 10.2 | 6.6 | 28 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 80 | 120.3 | 5 | 10.1 | 6.6 | 28 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 85 | 120.3 | 4.9 | 10 | 6.6 | 28 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 90 | 120.3 | 4.9 | 10.1 | 6.5 | 27 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 95 | 120.3 | 4.8 | 9.9 | 6.5 | 28 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 100 | 120.3 | 4.8 | 9.5 | 6.5 | 28 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 105 | 120.3 | 4.8 | 9 | 6.5 | 28 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 110 | 120.3 | 4.8 | 8.7 | 6.4 | 31 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 115 | 120.3 | 4.8 | 8.2 | 6.5 | 33 |
| 7 | 10 | 96 | 950 | Cougar | 1 | 5.1 | 120 | 120.3 | 4.8 | 8.1 | 6.4 | 33 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 0 | 119.5 | 22.2 | 8.2 | 8.1 | 31 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 2 | 119.5 | 22.1 | 8.2 | 8 | 31 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 4 | 119.5 | 22 | 7.9 | 8 | 31 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 5 | 119.5 | 21.9 | 8 | 8.4 | 31 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 6 | 119.5 | 17.9 | 13 | 9 | 36 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 8 | 119.5 | 16.1 | 14.9 | 9.2 | 36 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 10 | 119.5 | 14.4 | 13.8 | 9 | 34 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 12 | 119.5 | 13.5 | 10.9 | 8.5 | 35 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 14 | 119.5 | 12.4 | 9.7 | 8.2 | 34 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 16 | 119.5 | 11.6 | 8.9 | 7.9 | 30 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 18 | 119.5 | 10.9 | 8.3 | 7.7 | 28 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 20 | 119.5 | 10.5 | 8.1 | 7.6 | 27 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 22 | 119.5 | 10.2 | 8.1 | 7.6 | 26 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 24 | 119.5 | 9.9 | 8.1 | 7.5 | 27 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 26 | 119.5 | 9.6 | 8.6 | 7.4 | 26 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 28 | 119.5 | 9.4 | 8.9 | 7.4 | 28 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 30 | 119.5 | 9.2 | 9 | 7.4 | 27 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 32 | 119.5 | 9.1 | 9.1 | 7.4 | 25 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 34 | 119.5 | 8.9 | 9.1 | 7.3 | 25 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 36 | 119.5 | 8.8 | 9.2 | 7.3 | 25 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 38 | 119.5 | 8.6 | 9.6 | 7.3 | 27 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 40 | 119.5 | 8.6 | 9.4 | 7.3 | 28 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 42 | 119.5 | 8.5 | 9.6 | 7.2 | 28 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 44 | 119.5 | 8.4 | 9.5 | 7.2 | 27 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 46 | 119.5 | 8.3 | 9.4 | 7.2 | 26 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 48 | 119.5 | 8.3 | 9.5 | 7.2 | 27 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 50 | 119.5 | 8.2 | 9.7 | 7.2 | 28 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 55 | 119.5 | 7 | 9.4 | 7.1 | 30 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 60 | 119.5 | 5.6 | 9.1 | 7.1 | 28 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 65 | 119.5 | 5.4 | 9.2 | 7 | 29 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 70 | 119.5 | 5.2 | 9.4 | 7 | 30 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 75 | 119.5 | 5.1 | 9.5 | 7 | 31 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 80 | 119.5 | 5 | 9.5 | 7 | 32 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 85 | 119.5 | 5 | 9.5 | 7 | 33 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 90 | 119.5 | 4.9 | 9.4 | 6.9 | 33 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 95 | 119.5 | 4.8 | 9.3 | 6.8 | 32 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 100 | 119.5 | 4.8 | 9.2 | 6.7 | 31 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 105 | 119.5 | 4.8 | 8.6 | 6.9 | 35 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 110 | 119.5 | 4.8 | 7.3 | 6.8 | 31 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 115 | 119.5 | 4.8 | 2 | 6.7 | 46 |
| 7 | 23 | 96 | 835 | Cougar | 1 | 5.7 | 119 | 119.5 | 4.9 | 1.1 | 6.6 | 104 |
| 7 | 10 | 96 | 1530 | Cougar | 2 | 5.2 | 0 | 103.5 | 22.8 | 9.3 | 7.8 | 31 |
| 7 | 10 | 96 | 1530 | Cougar | 2 | 5.2 | 2 | 103.5 | 22.5 | 9.2 | 7.9 | 30 |
| 7 | 10 | 96 | 1530 | Cougar | 2 | 5.2 | 4 | 103.5 | 19 | 11.2 | 8.3 | 31 |
| 7 | 10 | 96 | 1530 | Cougar | 2 | 5.2 | 6 | 103.5 | 17 | 12.8 | 8.5 | 33 |
| 7 | 10 | 96 | 1530 | Cougar | 2 | 5.2 | 8 | 103.5 | 14.4 | 15.4 | 8.9 | 35 |
| 7 | 10 | 96 | 1530 | Cougar | 2 | 5.2 | 10 | 103.5 | 13.1 | 12.1 | 8.3 | 34 |
| 7 | 10 | 96 | 1530 | Cougar | 2 | 5.2 | 12 | 103.5 | 12.2 | 10.7 | 7.9 | 35 |
| 7 | 10 | 96 | 1530 | Cougar | 2 | 5.2 | 14 | 103.5 | 11.6 | 10.4 | 7.6 | 31 |
| 7 | 10 | 96 | 1530 | Cougar | 2 | 5.2 | 16 | 103.5 | 11.1 | 9.9 | 7.4 | 31 |
| 7 | 10 | 96 | 1530 | Cougar | 2 | 5.2 | 18 | 103.5 | 10.6 | 9.7 | 7.3 | 29 |
| 7 | 10 | 96 | 1530 | Cougar | 2 | 5.2 | 20 | 103.5 | 10.2 | 9.5 | 7.2 | 26 |
| 7 | 10 | 96 | 1530 | Cougar | 2 | 5.2 | 22 | 103.5 | 9.9 | 9.5 | 7 | 25 |
| 7 | 10 | 96 | 1530 | Cougar | 2 | 5.2 | 24 | 103.5 | 9.8 | 9.6 | 7 | 25 |
| 7 | 10 | 96 | 1530 | Cougar | 2 | 5.2 | 26 | 103.5 | 9.5 | 9.7 | 6.9 | 26 |
| 7 | 10 | 96 | 1530 | Cougar | 2 | 5.2 | 28 | 103.5 | 9.3 | 10 | 6.9 | 27 |
| 7 | 10 | 96 | 1530 | Cougar | 2 | 5.2 | 30 | 103.5 | 9.1 | 10.1 | 6.9 | 28 |
| 7 | 10 | 96 | 1530 | Cougar | 2 | 5.2 | 32 | 103.5 | 9 | 10.2 | 6.8 | 27 |
| 7 | 10 | 96 | 1530 | Cougar | 2 | 5.2 | 34 | 103.5 | 8.9 | 10.3 | 6.8 | 27 |
| 7 | 10 | 96 | 1530 | Cougar | 2 | 5.2 | 36 | 103.5 | 8.7 | 10.4 | 6.8 | 27 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 10 | 96 | 1530 | Cougar | 2 | 5.2 | 38 | 103.5 | 8.6 | 10.4 | 6.8 | 28 |
| 7 | 10 | 96 | 1530 | Cougar | 2 | 5.2 | 40 | 103.5 | 8.5 | 10.5 | 6.8 | 27 |
| 7 | 10 | 96 | 1530 | Cougar | 2 | 5.2 | 45 | 103.5 | 8.3 | 10.5 | 6.7 | 27 |
| 7 | 10 | 96 | 1530 | Cougar | 2 | 5.2 | 50 | 103.5 | 8.1 | 10.5 | 6.7 | 27 |
| 7 | 10 | 96 | 1530 | Cougar | 2 | 5.2 | 55 | 103.5 | 7.4 | 10.3 | 6.7 | 28 |
| 7 | 10 | 96 | 1530 | Cougar | 2 | 5.2 | 60 | 103.5 | 5.6 | 9.7 | 6.6 | 28 |
| 7 | 10 | 96 | 1530 | Cougar | 2 | 5.2 | 65 | 103.5 | 5.3 | 9.8 | 6.5 | 29 |
| 7 | 10 | 96 | 1530 | Cougar | 2 | 5.2 | 70 | 103.5 | 5.2 | 9.9 | 6.5 | 28 |
| 7 | 10 | 96 | 1530 | Cougar | 2 | 5.2 | 75 | 103.5 | 5.1 | 9.9 | 6.5 | 28 |
| 7 | 10 | 96 | 1530 | Cougar | 2 | 5.2 | 80 | 103.5 | 5 | 10 | 6.5 | 30 |
| 7 | 10 | 96 | 1530 | Cougar | 2 | 5.2 | 85 | 103.5 | 4.9 | 10 | 6.4 | 31 |
| 7 | 10 | 96 | 1530 | Cougar | 2 | 5.2 | 90 | 103.5 | 4.9 | 10 | 6.4 | 30 |
| 7 | 10 | 96 | 1530 | Cougar | 2 | 5.2 | 95 | 103.5 | 4.9 | 9.8 | 6.4 | 28 |
| 7 | 10 | 96 | 1530 | Cougar | 2 | 5.2 | 100 | 103.5 | 4.9 | 9.5 | 6.4 | 29 |
| 7 | 10 | 96 | 1625 | Cougar | 3 | 5.4 | 0 | 85 | 22.7 | 9.1 | 8.1 | 30 |
| 7 | 10 | 96 | 1625 | Cougar | 3 | 5.4 | 2 | 85 | 22.3 | 9.2 | 8.1 | 30 |
| 7 | 10 | 96 | 1625 | Cougar | 3 | 5.4 | 4 | 85 | 20.8 | 10 | 8.3 | 31 |
| 7 | 10 | 96 | 1625 | Cougar | 3 | 5.4 | 6 | 85 | 17.4 | 12.2 | 8.6 | 34 |
| 7 | 10 | 96 | 1625 | Cougar | 3 | 5.4 | 8 | 85 | 15.2 | 16.4 | 9.2 | 40 |
| 7 | 10 | 96 | 1625 | Cougar | 3 | 5.4 | 10 | 85 | 13.7 | 12 | 8.4 | 38 |
| 7 | 10 | 96 | 1625 | Cougar | 3 | 5.4 | 12 | 85 | 12.3 | 10.7 | 7.9 | 40 |
| 7 | 10 | 96 | 1625 | Cougar | 3 | 5.4 | 14 | 85 | 11.6 | 10.4 | 7.7 | 37 |
| 7 | 10 | 96 | 1625 | Cougar | 3 | 5.4 | 16 | 85 | 11.1 | 10.3 | 7.6 | 36 |
| 7 | 10 | 96 | 1625 | Cougar | 3 | 5.4 | 18 | 85 | 10.7 | 10.1 | 7.5 | 35 |
| 7 | 10 | 96 | 1625 | Cougar | 3 | 5.4 | 20 | 85 | 10.3 | 10 | 7.4 | 31 |
| 7 | 10 | 96 | 1625 | Cougar | 3 | 5.4 | 22 | 85 | 9.9 | 9.9 | 7.4 | 28 |
| 7 | 10 | 96 | 1625 | Cougar | 3 | 5.4 | 24 | 85 | 9.6 | 9.9 | 7.3 | 27 |
| 7 | 10 | 96 | 1625 | Cougar | 3 | 5.4 | 26 | 85 | 9.4 | 10 | 7.2 | 27 |
| 7 | 10 | 96 | 1625 | Cougar | 3 | 5.4 | 28 | 85 | 9.3 | 10.2 | 7.2 | 27 |
| 7 | 10 | 96 | 1625 | Cougar | 3 | 5.4 | 30 | 85 | 9.1 | 10.2 | 7.2 | 27 |
| 7 | 10 | 96 | 1625 | Cougar | 3 | 5.4 | 32 | 85 | 8.9 | 10.3 | 7.1 | 28 |
| 7 | 10 | 96 | 1625 | Cougar | 3 | 5.4 | 34 | 85 | 8.8 | 10.4 | 7.1 | 28 |
| 7 | 10 | 96 | 1625 | Cougar | 3 | 5.4 | 36 | 85 | 8.7 | 10.5 | 7.1 | 28 |
| 7 | 10 | 96 | 1625 | Cougar | 3 | 5.4 | 38 | 85 | 8.6 | 10.5 | 7 | 28 |
| 7 | 10 | 96 | 1625 | Cougar | 3 | 5.4 | 40 | 85 | 8.5 | 10.5 | 7 | 27 |
| 7 | 10 | 96 | 1625 | Cougar | 3 | 5.4 | 45 | 85 | 8.3 | 10.6 | 7 | 28 |
| 7 | 10 | 96 | 1625 | Cougar | 3 | 5.4 | 50 | 85 | 8.1 | 10.6 | 6.9 | 30 |
| 7 | 10 | 96 | 1625 | Cougar | 3 | 5.4 | 55 | 85 | 7.3 | 10 | 6.9 | 29 |
| 7 | 10 | 96 | 1625 | Cougar | 3 | 5.4 | 57.5 | 85 | 6.2 | 9.5 | 6.8 | 28 |
| 7 | 10 | 96 | 1625 | Cougar | 3 | 5.4 | 60 | 85 | 5.6 | 9.8 | 6.8 | 29 |
| 7 | 10 | 96 | 1625 | Cougar | 3 | 5.4 | 65 | 85 | 5.3 | 9.7 | 6.8 | 26 |
| 7 | 10 | 96 | 1625 | Cougar | 3 | 5.4 | 70 | 85 | 5.2 | 9.7 | 6.7 | 27 |
| 7 | 10 | 96 | 1625 | Cougar | 3 | 5.4 | 75 | 85 | 5.1 | 9.7 | 6.7 | 28 |
| 7 | 10 | 96 | 1625 | Cougar | 3 | 5.4 | 80 | 85 | 5.1 | 9.7 | 6.6 | 29 |
| 7 | 10 | 96 | 1625 | Cougar | 3 | 5.4 | 85 | 85 | 5 | 9.6 | 6.6 | 26 |
| 7 | 10 | 96 | 1700 | Cougar | 4 | 5.4 | 0 | 55.3 | 22.4 | 9.2 | 8.1 | 30 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 10 | 96 | 1700 | Cougar | 4 | 5.4 | 2 | 55.3 | 21.9 | 9.3 | 8.2 | 30 |
| 7 | 10 | 96 | 1700 | Cougar | 4 | 5.4 | 4 | 55.3 | 21.3 | 9.5 | 8.2 | 31 |
| 7 | 10 | 96 | 1700 | Cougar | 4 | 5.4 | 6 | 55.3 | 17.7 | 10.6 | 8.1 | 36 |
| 7 | 10 | 96 | 1700 | Cougar | 4 | 5.4 | 8 | 55.3 | 15.9 | 11.1 | 8.3 | 39 |
| 7 | 10 | 96 | 1700 | Cougar | 4 | 5.4 | 10 | 55.3 | 13.7 | 10.2 | 7.8 | 43 |
| 7 | 10 | 96 | 1700 | Cougar | 4 | 5.4 | 12 | 55.3 | 12.5 | 10.2 | 7.6 | 43 |
| 7 | 10 | 96 | 1700 | Cougar | 4 | 5.4 | 14 | 55.3 | 11.6 | 10.3 | 7.5 | 40 |
| 7 | 10 | 96 | 1700 | Cougar | 4 | 5.4 | 16 | 55.3 | 11 | 10.3 | 7.4 | 39 |
| 7 | 10 | 96 | 1700 | Cougar | 4 | 5.4 | 18 | 55.3 | 10.6 | 10.2 | 7.4 | 37 |
| 7 | 10 | 96 | 1700 | Cougar | 4 | 5.4 | 20 | 55.3 | 10.2 | 10.1 | 7.3 | 33 |
| 7 | 10 | 96 | 1700 | Cougar | 4 | 5.4 | 22 | 55.3 | 9.9 | 10 | 7.2 | 34 |
| 7 | 10 | 96 | 1700 | Cougar | 4 | 5.4 | 24 | 55.3 | 9.6 | 9.9 | 7.1 | 28 |
| 7 | 10 | 96 | 1700 | Cougar | 4 | 5.4 | 26 | 55.3 | 9.4 | 10 | 7.1 | 29 |
| 7 | 10 | 96 | 1700 | Cougar | 4 | 5.4 | 28 | 55.3 | 9.2 | 9.9 | 7 | 29 |
| 7 | 10 | 96 | 1700 | Cougar | 4 | 5.4 | 30 | 55.3 | 9 | 9.9 | 7 | 29 |
| 7 | 10 | 96 | 1700 | Cougar | 4 | 5.4 | 32 | 55.3 | 8.9 | 10.2 | 7 | 29 |
| 7 | 10 | 96 | 1700 | Cougar | 4 | 5.4 | 34 | 55.3 | 8.8 | 10.3 | 6.9 | 30 |
| 7 | 10 | 96 | 1700 | Cougar | 4 | 5.4 | 36 | 55.3 | 8.7 | 10.2 | 6.9 | 30 |
| 7 | 10 | 96 | 1700 | Cougar | 4 | 5.4 | 38 | 55.3 | 8.6 | 10.2 | 6.9 | 29 |
| 7 | 10 | 96 | 1700 | Cougar | 4 | 5.4 | 40 | 55.3 | 8.5 | 10.1 | 6.9 | 29 |
| 7 | 10 | 96 | 1700 | Cougar | 4 | 5.4 | 45 | 55.3 | 8.2 | 9.9 | 6.8 | 30 |
| 7 | 10 | 96 | 1700 | Cougar | 4 | 5.4 | 50 | 55.3 | 8 | 10.1 | 6.8 | 29 |
| 7 | 10 | 96 | 1700 | Cougar | 4 | 5.4 | 52.5 | 55.3 | 7.7 | 9.5 | 6.7 | 29 |
| 7 | 10 | 96 | 1700 | Cougar | 4 | 5.4 | 55 | 55.3 | 6.5 | 9 | 6.7 | 30 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 0 | 107.3 | 21 | 8.7 | 8.2 | 36 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 2 | 107.3 | 21 | 8.7 | 8.1 | 36 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 4 | 107.3 | 21 | 8.7 | 8 | 36 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 6 | 107.3 | 20.1 | 11.1 | 8.4 | 37 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 8 | 107.3 | 18.6 | 12.2 | 8.5 | 39 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 10 | 107.3 | 16.6 | 12.7 | 8.7 | 41 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 12 | 107.3 | 15.7 | 11.5 | 8.4 | 40 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 14 | 107.3 | 15.1 | 10.4 | 7.9 | 40 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 16 | 107.3 | 14.6 | 9.6 | 7.6 | 42 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 18 | 107.3 | 14.1 | 9.1 | 7.4 | 42 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 20 | 107.3 | 13.6 | 8.8 | 7.2 | 40 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 22 | 107.3 | 12.7 | 8.5 | 7.1 | 38 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 24 | 107.3 | 12.2 | 8.3 | 7 | 36 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 26 | 107.3 | 11.7 | 8.6 | 7 | 34 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 28 | 107.3 | 11.2 | 8.5 | 6.9 | 34 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 30 | 107.3 | 10.8 | 8.3 | 6.9 | 30 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 32 | 107.3 | 10.5 | 8.2 | 6.8 | 30 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 34 | 107.3 | 10.3 | 8.4 | 6.8 | 29 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 36 | 107.3 | 10 | 8.7 | 6.7 | 29 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 38 | 107.3 | 9.8 | 8.8 | 6.7 | 29 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 40 | 107.3 | 9.4 | 9 | 6.7 | 29 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 42 | 107.3 | 9 | 9.1 | 6.7 | 29 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 44 | 107.3 | 8.6 | 9.2 | 6.7 | 31 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 46 | 107.3 | 8 | 9.2 | 6.7 | 30 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 48 | 107.3 | 6.5 | 8.9 | 6.6 | 32 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 50 | 107.3 | 5.9 | 9.1 | 6.6 | 31 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 52 | 107.3 | 5.6 | 9.6 | 6.5 | 31 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 54 | 107.3 | 5 | 10 | 6.6 | 31 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 56 | 107.3 | 4.9 | 10.1 | 6.6 | 30 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 58 | 107.3 | 4.9 | 10 | 6.6 | 30 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 60 | 107.3 | 4.9 | 9.9 | 6.6 | 30 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 62 | 107.3 | 4.8 | 10 | 6.5 | 30 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 64 | 107.3 | 4.8 | 10 | 6.5 | 30 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 66 | 107.3 | 4.8 | 10 | 6.6 | 30 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 68 | 107.3 | 4.8 | 10.1 | 6.5 | 30 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 70 | 107.3 | 4.8 | 10.1 | 6.5 | 30 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 72 | 107.3 | 4.8 | 10.1 | 6.5 | 30 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 74 | 107.3 | 4.8 | 10 | 6.5 | 30 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 76 | 107.3 | 4.8 | 10 | 6.5 | 30 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 78 | 107.3 | 4.9 | 9.9 | 6.5 | 30 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 80 | 107.3 | 4.9 | 9.8 | 6.6 | 30 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 82 | 107.3 | 4.8 | 9.7 | 6.5 | 30 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 84 | 107.3 | 4.8 | 9.5 | 6.5 | 30 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 86 | 107.3 | 4.9 | 9.4 | 6.5 | 30 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 88 | 107.3 | 4.8 | 9.1 | 6.5 | 30 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 90 | 107.3 | 4.8 | 8.5 | 6.4 | 30 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 92 | 107.3 | 4.8 | 8.1 | 6.4 | 30 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 94 | 107.3 | 4.8 | 7.6 | 6.4 | 30 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 96 | 107.3 | 4.9 | 6.5 | 6.4 | 38 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 98 | 107.3 | 4.9 | 5.8 | 6.3 | 38 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 100 | 107.3 | 4.9 | 5.3 | 6.3 | 38 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 102 | 107.3 | 4.9 | 5.2 | 6.3 | 38 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 104 | 107.3 | 4.9 | 5 | 6.3 | 40 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 106 | 107.3 | 4.9 | 5.1 | 6.3 | 40 |
| 8 | 27 | 96 | 1030 | Cougar | 1 | 5.5 | 107 | 107.3 | 4.9 | 4.3 | 6.2 | 40 |
| 8 | 28 | 96 | 1115 | Cougar | 2 | 5.8 | 0 | 88.5 | 21 | 8.5 | 8.3 | 36 |
| 8 | 28 | 96 | 1115 | Cougar | 2 | 5.8 | 2 | 88.5 | 21 | 8.5 | 8.2 | 36 |
| 8 | 28 | 96 | 1115 | Cougar | 2 | 5.8 | 4 | 88.5 | 21 | 8.5 | 8.2 | 37 |
| 8 | 28 | 96 | 1115 | Cougar | 2 | 5.8 | 6 | 88.5 | 20.5 | 11 | 8.5 | 38 |
| 8 | 28 | 96 | 1115 | Cougar | 2 | 5.8 | 8 | 88.5 | 18.3 | 12.3 | 8.7 | 39 |
| 8 | 28 | 96 | 1115 | Cougar | 2 | 5.8 | 10 | 88.5 | 16.7 | 12.5 | 8.8 | 40 |
| 8 | 28 | 96 | 1115 | Cougar | 2 | 5.8 | 12 | 88.5 | 15.7 | 11.8 | 8.3 | 41 |
| 8 | 28 | 96 | 1115 | Cougar | 2 | 5.8 | 14 | 88.5 | 14.9 | 10.3 | 8 | 40 |
| 8 | 28 | 96 | 1115 | Cougar | 2 | 5.8 | 16 | 88.5 | 14.7 | 9.9 | 7.7 | 41 |
| 8 | 28 | 96 | 1115 | Cougar | 2 | 5.8 | 18 | 88.5 | 14.1 | 9.3 | 7.2 | 42 |
| 8 | 28 | 96 | 1115 | Cougar | 2 | 5.8 | 20 | 88.5 | 13.5 | 9 | 7.1 | 41 |
| 8 | 28 | 96 | 1115 | Cougar | 2 | 5.8 | 22 | 88.5 | 12.5 | 8.6 | 7 | 40 |
| 8 | 28 | 96 | 1115 | Cougar | 2 | 5.8 | 24 | 88.5 | 12.3 | 8.2 | 7 | 38 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | 28 | 96 | 1115 | Cougar | 2 | 5.8 | 26 | 88.5 | 11.7 | 8.3 | 6.9 | 37 |
| 8 | 28 | 96 | 1115 | Cougar | 2 | 5.8 | 28 | 88.5 | 11.1 | 8.3 | 7 | 36 |
| 8 | 28 | 96 | 1115 | Cougar | 2 | 5.8 | 30 | 88.5 | 10.9 | 8.2 | 6.9 | 34 |
| 8 | 28 | 96 | 1115 | Cougar | 2 | 5.8 | 32 | 88.5 | 10.7 | 8.2 | 6.9 | 31 |
| 8 | 28 | 96 | 1115 | Cougar | 2 | 5.8 | 34 | 88.5 | 10.4 | 8.3 | 6.8 | 30 |
| 8 | 28 | 96 | 1115 | Cougar | 2 | 5.8 | 36 | 88.5 | 10.1 | 8.5 | 6.8 | 29 |
| 8 | 28 | 96 | 1115 | Cougar | 2 | 5.8 | 38 | 88.5 | 9.9 | 8.8 | 6.7 | 29 |
| 8 | 28 | 96 | 1115 | Cougar | 2 | 5.8 | 40 | 88.5 | 9.6 | 9.1 | 6.8 | 29 |
| 8 | 28 | 96 | 1115 | Cougar | 2 | 5.8 | 42 | 88.5 | 9.1 | 9.1 | 6.7 | 28 |
| 8 | 28 | 96 | 1115 | Cougar | 2 | 5.8 | 44 | 88.5 | 8.6 | 9.2 | 6.7 | 30 |
| 8 | 28 | 96 | 1115 | Cougar | 2 | 5.8 | 46 | 88.5 | 8 | 9.2 | 6.7 | 31 |
| 8 | 28 | 96 | 1115 | Cougar | 2 | 5.8 | 48 | 88.5 | 6.6 | 9.1 | 6.7 | 31 |
| 8 | 28 | 96 | 1115 | Cougar | 2 | 5.8 | 50 | 88.5 | 6 | 9 | 6.8 | 31 |
| 8 | 28 | 96 | 1115 | Cougar | 2 | 5.8 | 55 | 88.5 | 5 | 10.1 | 6.7 | 30 |
| 8 | 28 | 96 | 1115 | Cougar | 2 | 5.8 | 60 | 88.5 | 4.9 | 10 | 6.6 | 30 |
| 8 | 28 | 96 | 1115 | Cougar | 2 | 5.8 | 65 | 88.5 | 4.9 | 10.1 | 6.5 | 30 |
| 8 | 28 | 96 | 1115 | Cougar | 2 | 5.8 | 70 | 88.5 | 4.9 | 9.7 | 6.5 | 32 |
| 8 | 28 | 96 | 1115 | Cougar | 2 | 5.8 | 75 | 88.5 | 4.8 | 7.1 | 6.4 | 33 |
| 8 | 28 | 96 | 1115 | Cougar | 2 | 5.8 | 80 | 88.5 | 4.8 | 6 | 6.4 | 35 |
| 8 | 28 | 96 | 1115 | Cougar | 2 | 5.8 | 85 | 88.5 | 4.9 | 5.2 | 6.3 | 38 |
| 8 | 28 | 96 | 1115 | Cougar | 2 | 5.8 | 88 | 88.5 | 4.9 | 5 | 6.2 | 38 |
| 8 | 28 | 96 | 1200 | Cougar | 3 | 5.5 | 0 | 72.1 | 21.2 | 8.7 | 8.2 | 37 |
| 8 | 28 | 96 | 1200 | Cougar | 3 | 5.5 | 2 | 72.1 | 21.2 | 8.8 | 8.2 | 37 |
| 8 | 28 | 96 | 1200 | Cougar | 3 | 5.5 | 4 | 72.1 | 21.1 | 8.8 | 8.2 | 36 |
| 8 | 28 | 96 | 1200 | Cougar | 3 | 5.5 | 6 | 72.1 | 20.7 | 10.9 | 8.6 | 37 |
| 8 | 28 | 96 | 1200 | Cougar | 3 | 5.5 | 8 | 72.1 | 18.7 | 11.7 | 8.7 | 37 |
| 8 | 28 | 96 | 1200 | Cougar | 3 | 5.5 | 10 | 72.1 | 17 | 12.5 | 8.7 | 39 |
| 8 | 28 | 96 | 1200 | Cougar | 3 | 5.5 | 12 | 72.1 | 15.9 | 11.8 | 8.5 | 40 |
| 8 | 28 | 96 | 1200 | Cougar | 3 | 5.5 | 14 | 72.1 | 15.3 | 10.7 | 8.1 | 41 |
| 8 | 28 | 96 | 1200 | Cougar | 3 | 5.5 | 16 | 72.1 | 15 | 9.8 | 7.7 | 41 |
| 8 | 28 | 96 | 1200 | Cougar | 3 | 5.5 | 18 | 72.1 | 14.3 | 9.2 | 7.5 | 42 |
| 8 | 28 | 96 | 1200 | Cougar | 3 | 5.5 | 20 | 72.1 | 13.6 | 8.8 | 7.3 | 41 |
| 8 | 28 | 96 | 1200 | Cougar | 3 | 5.5 | 22 | 72.1 | 12.8 | 8.6 | 7.1 | 40 |
| 8 | 28 | 96 | 1200 | Cougar | 3 | 5.5 | 24 | 72.1 | 12.2 | 8.4 | 7 | 37 |
| 8 | 28 | 96 | 1200 | Cougar | 3 | 5.5 | 26 | 72.1 | 11.6 | 8.4 | 7 | 35 |
| 8 | 28 | 96 | 1200 | Cougar | 3 | 5.5 | 28 | 72.1 | 11.1 | 8.3 | 7 | 34 |
| 8 | 28 | 96 | 1200 | Cougar | 3 | 5.5 | 30 | 72.1 | 10.8 | 8.3 | 7 | 31 |
| 8 | 28 | 96 | 1200 | Cougar | 3 | 5.5 | 32 | 72.1 | 10.6 | 8.2 | 6.8 | 30 |
| 8 | 28 | 96 | 1200 | Cougar | 3 | 5.5 | 34 | 72.1 | 10.3 | 8.3 | 6.9 | 30 |
| 8 | 28 | 96 | 1200 | Cougar | 3 | 5.5 | 36 | 72.1 | 10.1 | 8.5 | 6.8 | 29 |
| 8 | 28 | 96 | 1200 | Cougar | 3 | 5.5 | 38 | 72.1 | 9.9 | 8.9 | 6.8 | 29 |
| 8 | 28 | 96 | 1200 | Cougar | 3 | 5.5 | 40 | 72.1 | 9.5 | 8.9 | 6.7 | 30 |
| 8 | 28 | 96 | 1200 | Cougar | 3 | 5.5 | 42 | 72.1 | 9 | 9 | 6.7 | 29 |
| 8 | 28 | 96 | 1200 | Cougar | 3 | 5.5 | 44 | 72.1 | 8.8 | 9.1 | 6.7 | 29 |
| 8 | 28 | 96 | 1200 | Cougar | 3 | 5.5 | 46 | 72.1 | 8.1 | 9.3 | 6.6 | 30 |
| 8 | 28 | 96 | 1200 | Cougar | 3 | 5.5 | 48 | 72.1 | 6.7 | 9.7 | 6.6 | 30 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | 28 | 96 | 1200 | Cougar | 3 | 5.5 | 50 | 72.1 | 6 | 10 | 6.6 | 30 |
| 8 | 28 | 96 | 1200 | Cougar | 3 | 5.5 | 52 | 72.1 | 5.5 | 10.1 | 6.6 | 30 |
| 8 | 28 | 96 | 1200 | Cougar | 3 | 5.5 | 54 | 72.1 | 5 | 9.7 | 6.6 | 30 |
| 8 | 28 | 96 | 1200 | Cougar | 3 | 5.5 | 56 | 72.1 | 4.9 | 9.4 | 6.5 | 29 |
| 8 | 28 | 96 | 1200 | Cougar | 3 | 5.5 | 58 | 72.1 | 4.9 | 8.6 | 6.5 | 32 |
| 8 | 28 | 96 | 1200 | Cougar | 3 | 5.5 | 60 | 72.1 | 4.8 | 7 | 6.4 | 36 |
| 8 | 28 | 96 | 1200 | Cougar | 3 | 5.5 | 65 | 72.1 | 4.8 | 6.1 | 6.4 | 37 |
| 8 | 28 | 96 | 1200 | Cougar | 3 | 5.5 | 70 | 72.1 | 4.8 | 5.7 | 6.3 | 38 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 0 | 97.5 | 16.5 | 9.8 | 7.7 | 39 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 2 | 97.5 | 16.5 | 9.7 | 7.7 | 40 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 4 | 97.5 | 16.6 | 9.7 | 7.7 | 39 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 6 | 97.5 | 16.5 | 9.7 | 7.7 | 39 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 8 | 97.5 | 16.5 | 9.7 | 7.8 | 40 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 10 | 97.5 | 16.5 | 9.7 | 7.8 | 40 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 12 | 97.5 | 16.4 | 9.6 | 7.7 | 40 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 14 | 97.5 | 15.2 | 9.2 | 7.2 | 43 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 16 | 97.5 | 14.7 | 8.9 | 7.1 | 44 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 18 | 97.5 | 14.4 | 8.8 | 7 | 44 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 20 | 97.5 | 14.3 | 8.5 | 7 | 43 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 22 | 97.5 | 14.1 | 8.8 | 7 | 44 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 24 | 97.5 | 13.8 | 8.5 | 6.9 | 43 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 26 | 97.5 | 13.6 | 8.5 | 6.9 | 43 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 28 | 97.5 | 13.4 | 8.7 | 6.9 | 44 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 30 | 97.5 | 13.2 | 8.7 | 6.9 | 45 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 32 | 97.5 | 12.8 | 8.4 | 6.9 | 42 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 34 | 97.5 | 12.1 | 8.1 | 6.8 | 41 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 36 | 97.5 | 10 | 7.8 | 6.8 | 36 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 38 | 97.5 | 7.4 | 8.4 | 6.6 | 31 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 40 | 97.5 | 6.1 | 9.1 | 6.6 | 32 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 42 | 97.5 | 5.5 | 9.7 | 6.5 | 31 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 44 | 97.5 | 5.4 | 9.8 | 6.5 | 31 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 46 | 97.5 | 5.4 | 10 | 6.5 | 30 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 48 | 97.5 | 5.3 | 9.9 | 6.5 | 29 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 50 | 97.5 | 5.3 | 10 | 6.5 | 29 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 52 | 97.5 | 5.2 | 9.9 | 6.5 | 29 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 54 | 97.5 | 5.2 | 9.9 | 6.5 | 29 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 56 | 97.5 | 5.1 | 10 | 6.5 | 29 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 58 | 97.5 | 5.1 | 10 | 6.5 | 30 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 60 | 97.5 | 5.1 | 10.1 | 6.5 | 29 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 62 | 97.5 | 5 | 10.2 | 6.5 | 28 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 64 | 97.5 | 5 | 10 | 6.5 | 30 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 66 | 97.5 | 5 | 9.7 | 6.5 | 29 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 68 | 97.5 | 5 | 9.5 | 6.5 | 30 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 70 | 97.5 | 5 | 9.4 | 6.4 | 29 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 72 | 97.5 | 5 | 9.3 | 6.4 | 32 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 74 | 97.5 | 4.9 | 9.2 | 6.4 | 30 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 76 | 97.5 | 4.9 | 9 | 6.4 | 30 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 78 | 97.5 | 4.9 | 8.8 | 6.4 | 31 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 80 | 97.5 | 4.9 | 8.5 | 6.4 | 32 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 82 | 97.5 | 4.9 | 8.1 | 6.4 | 32 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 84 | 97.5 | 4.9 | 7.6 | 6.3 | 31 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 86 | 97.5 | 4.9 | 7 | 6.3 | 36 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 88 | 97.5 | 4.9 | 6.2 | 6.3 | 38 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 90 | 97.5 | 4.9 | 5.2 | 6.3 | 39 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 92 | 97.5 | 4.9 | 4 | 6.3 | 40 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 94 | 97.5 | 5 | 2.7 | 6.3 | 45 |
| 9 | 25 | 96 | 1000 | Cougar | 1 | 9.7 | 96 | 97.5 | 5 | 2 | 6.3 | 51 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 0 | 84.3 | 17.5 | 10.1 | 7.5 | 39 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 2 | 84.3 | 16.8 | 10 | 7.6 | 39 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 4 | 84.3 | 16.7 | 9.9 | 7.6 | 39 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 6 | 84.3 | 16.7 | 9.8 | 7.6 | 40 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 8 | 84.3 | 16.6 | 9.8 | 7.6 | 41 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 10 | 84.3 | 16.6 | 9.8 | 7.6 | 40 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 12 | 84.3 | 15.3 | 9.4 | 7.4 | 45 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 14 | 84.3 | 15 | 9.2 | 7.3 | 44 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 16 | 84.3 | 14.8 | 9 | 7.2 | 44 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 18 | 84.3 | 14.5 | 9 | 7.1 | 45 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 20 | 84.3 | 14.1 | 9 | 7.1 | 45 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 22 | 84.3 | 14 | 9 | 7.1 | 46 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 24 | 84.3 | 13.8 | 9.1 | 7 | 45 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 26 | 84.3 | 13.5 | 9.2 | 7 | 45 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 28 | 84.3 | 13.4 | 9.3 | 7 | 44 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 30 | 84.3 | 13.2 | 9.2 | 7 | 46 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 32 | 84.3 | 12.9 | 9 | 7 | 46 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 34 | 84.3 | 12.3 | 8.5 | 6.9 | 43 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 36 | 84.3 | 10.6 | 8 | 6.9 | 38 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 38 | 84.3 | 7.4 | 8.1 | 6.8 | 31 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 40 | 84.3 | 6.1 | 8.5 | 6.5 | 33 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 42 | 84.3 | 5.8 | 8.6 | 6.5 | 31 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 44 | 84.3 | 5.6 | 8.8 | 6.5 | 31 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 46 | 84.3 | 5.5 | 9 | 6.4 | 31 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 48 | 84.3 | 5.4 | 9.2 | 6.4 | 32 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 50 | 84.3 | 5.3 | 9.2 | 6.4 | 29 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 52 | 84.3 | 5 | 9.3 | 6.4 | 35 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 54 | 84.3 | 5.1 | 9.3 | 6.4 | 32 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 56 | 84.3 | 4.9 | 9.4 | 6.4 | 32 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 58 | 84.3 | 4.9 | 9.5 | 6.4 | 33 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 60 | 84.3 | 4.8 | 9.5 | 6.4 | 34 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 62 | 84.3 | 4.8 | 9.5 | 6.4 | 33 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 64 | 84.3 | 4.8 | 9.4 | 6.4 | 33 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 66 | 84.3 | 4.7 | 9.3 | 6.3 | 32 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 68 | 84.3 | 4.7 | 9 | 6.3 | 32 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 70 | 84.3 | 4.7 | 8.5 | 6.4 | 32 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 72 | 84.3 | 4.7 | 8.4 | 6.4 | 33 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 74 | 84.3 | 4.7 | 8.1 | 6.3 | 33 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 76 | 84.3 | 4.7 | 7.8 | 6.3 | 35 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 78 | 84.3 | 4.7 | 7 | 6.4 | 37 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 80 | 84.3 | 4.6 | 4.3 | 6.3 | 41 |
| 9 | 25 | 96 | 1515 | Cougar | 2 | 9.2 | 82 | 84.3 | 4.6 | 2.3 | 6.2 | 44 |
| 9 | 25 | 96 | 1550 | Cougar | 3 | 8.8 | 0 | 59 | 15.4 | 11.2 | 7.7 | 42 |
| 9 | 25 | 96 | 1550 | Cougar | 3 | 8.8 | 2 | 59 | 14.9 | 11 | 7.7 | 42 |
| 9 | 25 | 96 | 1550 | Cougar | 3 | 8.8 | 4 | 59 | 14.9 | 10.9 | 7.7 | 42 |
| 9 | 25 | 96 | 1550 | Cougar | 3 | 8.8 | 6 | 59 | 14.8 | 10.8 | 7.7 | 42 |
| 9 | 25 | 96 | 1550 | Cougar | 3 | 8.8 | 8 | 59 | 14.6 | 10.8 | 7.7 | 42 |
| 9 | 25 | 96 | 1550 | Cougar | 3 | 8.8 | 10 | 59 | 14.6 | 10.8 | 7.7 | 42 |
| 9 | 25 | 96 | 1550 | Cougar | 3 | 8.8 | 12 | 59 | 13.8 | 10.6 | 7.5 | 47 |
| 9 | 25 | 96 | 1550 | Cougar | 3 | 8.8 | 14 | 59 | 13.3 | 10.3 | 7.4 | 47 |
| 9 | 25 | 96 | 1550 | Cougar | 3 | 8.8 | 16 | 59 | 12.9 | 10.3 | 7.4 | 48 |
| 9 | 25 | 96 | 1550 | Cougar | 3 | 8.8 | 18 | 59 | 12.4 | 10.3 | 7.3 | 49 |
| 9 | 25 | 96 | 1550 | Cougar | 3 | 8.8 | 20 | 59 | 12.3 | 10.3 | 7.2 | 50 |
| 9 | 25 | 96 | 1550 | Cougar | 3 | 8.8 | 22 | 59 | 12 | 10.4 | 7.2 | 50 |
| 9 | 25 | 96 | 1550 | Cougar | 3 | 8.8 | 24 | 59 | 11.8 | 10.3 | 7.2 | 47 |
| 9 | 25 | 96 | 1550 | Cougar | 3 | 8.8 | 26 | 59 | 11.7 | 10.5 | 7.2 | 49 |
| 9 | 25 | 96 | 1550 | Cougar | 3 | 8.8 | 28 | 59 | 11.5 | 10.8 | 7.2 | 48 |
| 9 | 25 | 96 | 1550 | Cougar | 3 | 8.8 | 30 | 59 | 11.3 | 10.8 | 7.2 | 48 |
| 9 | 25 | 96 | 1550 | Cougar | 3 | 8.8 | 32 | 59 | 10.9 | 10.6 | 7.2 | 45 |
| 9 | 25 | 96 | 1550 | Cougar | 3 | 8.8 | 34 | 59 | 9.8 | 9.3 | 7.1 | 48 |
| 9 | 25 | 96 | 1550 | Cougar | 3 | 8.8 | 36 | 59 | 8.3 | 8.6 | 7 | 37 |
| 9 | 25 | 96 | 1550 | Cougar | 3 | 8.8 | 38 | 59 | 6.5 | 8.7 | 6.9 | 37 |
| 9 | 25 | 96 | 1550 | Cougar | 3 | 8.8 | 40 | 59 | 4.9 | 8.5 | 6.8 | 32 |
| 9 | 25 | 96 | 1550 | Cougar | 3 | 8.8 | 42 | 59 | 4.8 | 8.8 | 6.7 | 33 |
| 9 | 25 | 96 | 1550 | Cougar | 3 | 8.8 | 44 | 59 | 4.7 | 9 | 6.6 | 32 |
| 9 | 25 | 96 | 1550 | Cougar | 3 | 8.8 | 46 | 59 | 4.6 | 9.1 | 6.6 | 34 |
| 9 | 25 | 96 | 1550 | Cougar | 3 | 8.8 | 48 | 59 | 4.5 | 9.7 | 6.6 | 33 |
| 9 | 25 | 96 | 1550 | Cougar | 3 | 8.8 | 50 | 59 | 4.4 | 9.8 | 6.7 | 34 |
| 9 | 25 | 96 | 1550 | Cougar | 3 | 8.8 | 52 | 59 | 4.3 | 8.8 | 6.6 | 35 |
| 9 | 25 | 96 | 1550 | Cougar | 3 | 8.8 | 54 | 59 | 4.3 | 8 | 6.6 | 35 |
| 9 | 25 | 96 | 1550 | Cougar | 3 | 8.8 | 56 | 59 | 4.3 | 7.2 | 6.5 | 38 |
| 9 | 25 | 96 | 1550 | Cougar | 3 | 8.8 | 58 | 59 | 4.3 | 6 | 6.4 | 39 |
| 8 | 28 | 96 | 1140 | Cougar | 2 | 5.8 | 0 | 88.5 | 21 | 8.5 | 8.3 | 36 |
| 8 | 28 | 96 | 1140 | Cougar | 2 | 5.8 | 2 | 88.5 | 21 | 8.5 | 8.2 | 36 |
| 8 | 28 | 96 | 1140 | Cougar | 2 | 5.8 | 4 | 88.5 | 21 | 8.5 | 8.2 | 37 |
| 8 | 28 | 96 | 1140 | Cougar | 2 | 5.8 | 6 | 88.5 | 20.5 | 11 | 8.5 | 38 |
| 8 | 28 | 96 | 1140 | Cougar | 2 | 5.8 | 8 | 88.5 | 18.3 | 12.3 | 8.7 | 39 |
| 8 | 28 | 96 | 1140 | Cougar | 2 | 5.8 | 10 | 88.5 | 16.7 | 12.5 | 8.8 | 40 |
| 8 | 28 | 96 | 1140 | Cougar | 2 | 5.8 | 12 | 88.5 | 15.7 | 11.8 | 8.3 | 41 |
| 8 | 28 | 96 | 1140 | Cougar | 2 | 5.8 | 14 | 88.5 | 14.9 | 10.3 | 8 | 40 |
| 8 | 28 | 96 | 1140 | Cougar | 2 | 5.8 | 16 | 88.5 | 14.7 | 9.9 | 7.7 | 41 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | 28 | 96 | 1140 | Cougar | 2 | 5.8 | 18 | 88.5 | 14.1 | 9.3 | 7.2 | 42 |
| 8 | 28 | 96 | 1140 | Cougar | 2 | 5.8 | 20 | 88.5 | 13.5 | 9 | 7.1 | 41 |
| 8 | 28 | 96 | 1140 | Cougar | 2 | 5.8 | 22 | 88.5 | 12.5 | 8.6 | 7 | 40 |
| 8 | 28 | 96 | 1140 | Cougar | 2 | 5.8 | 24 | 88.5 | 12.3 | 8.2 | 7 | 38 |
| 8 | 28 | 96 | 1140 | Cougar | 2 | 5.8 | 26 | 88.5 | 11.7 | 8.3 | 6.9 | 37 |
| 8 | 28 | 96 | 1140 | Cougar | 2 | 5.8 | 28 | 88.5 | 11.1 | 8.3 | 7 | 36 |
| 8 | 28 | 96 | 1140 | Cougar | 2 | 5.8 | 30 | 88.5 | 10.9 | 8.2 | 6.9 | 34 |
| 8 | 28 | 96 | 1140 | Cougar | 2 | 5.8 | 32 | 88.5 | 10.7 | 8.2 | 6.9 | 31 |
| 8 | 28 | 96 | 1140 | Cougar | 2 | 5.8 | 34 | 88.5 | 10.4 | 8.3 | 6.8 | 30 |
| 8 | 28 | 96 | 1140 | Cougar | 2 | 5.8 | 36 | 88.5 | 10.1 | 8.5 | 6.8 | 29 |
| 8 | 28 | 96 | 1140 | Cougar | 2 | 5.8 | 38 | 88.5 | 9.9 | 8.8 | 6.7 | 29 |
| 8 | 28 | 96 | 1140 | Cougar | 2 | 5.8 | 40 | 88.5 | 9.6 | 9.1 | 6.8 | 29 |
| 8 | 28 | 96 | 1140 | Cougar | 2 | 5.8 | 42 | 88.5 | 9.1 | 9.1 | 6.7 | 28 |
| 8 | 28 | 96 | 1140 | Cougar | 2 | 5.8 | 44 | 88.5 | 8.6 | 9.2 | 6.7 | 30 |
| 8 | 28 | 96 | 1140 | Cougar | 2 | 5.8 | 46 | 88.5 | 8 | 9.2 | 6.7 | 31 |
| 8 | 28 | 96 | 1140 | Cougar | 2 | 5.8 | 48 | 88.5 | 6.6 | 9.1 | 6.7 | 31 |
| 8 | 28 | 96 | 1140 | Cougar | 2 | 5.8 | 50 | 88.5 | 6 | 9 | 6.8 | 31 |
| 8 | 28 | 96 | 1140 | Cougar | 2 | 5.8 | 55 | 88.5 | 5 | 10.1 | 6.7 | 30 |
| 8 | 28 | 96 | 1140 | Cougar | 2 | 5.8 | 60 | 88.5 | 4.9 | 10 | 6.6 | 30 |
| 8 | 28 | 96 | 1140 | Cougar | 2 | 5.8 | 65 | 88.5 | 4.9 | 10.1 | 6.5 | 30 |
| 8 | 28 | 96 | 1140 | Cougar | 2 | 5.8 | 70 | 88.5 | 4.9 | 9.7 | 6.5 | 32 |
| 8 | 28 | 96 | 1140 | Cougar | 2 | 5.8 | 75 | 88.5 | 4.8 | 7.1 | 6.4 | 33 |
| 8 | 28 | 96 | 1140 | Cougar | 2 | 5.8 | 80 | 88.5 | 4.8 | 6 | 6.4 | 35 |
| 8 | 28 | 96 | 1140 | Cougar | 2 | 5.8 | 85 | 88.5 | 4.9 | 5.2 | 6.3 | 38 |
| 8 | 28 | 96 | 1140 | Cougar | 2 | 5.8 | 88 | 88.5 | 4.9 | 5 | 6.2 | 38 |
| 8 | 28 | 96 | 1300 | Cougar | 3 | 5.5 | 0 | 72.1 | 21.2 | 8.7 | 8.2 | 37 |
| 8 | 28 | 96 | 1300 | Cougar | 3 | 5.5 | 2 | 72.1 | 21.2 | 8.8 | 8.2 | 37 |
| 8 | 28 | 96 | 1300 | Cougar | 3 | 5.5 | 4 | 72.1 | 21.1 | 8.8 | 8.2 | 36 |
| 8 | 28 | 96 | 1300 | Cougar | 3 | 5.5 | 6 | 72.1 | 20.7 | 10.9 | 8.6 | 37 |
| 8 | 28 | 96 | 1300 | Cougar | 3 | 5.5 | 8 | 72.1 | 18.7 | 11.7 | 8.7 | 37 |
| 8 | 28 | 96 | 1300 | Cougar | 3 | 5.5 | 10 | 72.1 | 17 | 12.5 | 8.7 | 39 |
| 8 | 28 | 96 | 1300 | Cougar | 3 | 5.5 | 12 | 72.1 | 15.9 | 11.8 | 8.5 | 40 |
| 8 | 28 | 96 | 1300 | Cougar | 3 | 5.5 | 14 | 72.1 | 15.3 | 10.7 | 8.1 | 41 |
| 8 | 28 | 96 | 1300 | Cougar | 3 | 5.5 | 16 | 72.1 | 15 | 9.8 | 7.7 | 41 |
| 8 | 28 | 96 | 1300 | Cougar | 3 | 5.5 | 18 | 72.1 | 14.3 | 9.2 | 7.5 | 42 |
| 8 | 28 | 96 | 1300 | Cougar | 3 | 5.5 | 20 | 72.1 | 13.6 | 8.8 | 7.3 | 41 |
| 8 | 28 | 96 | 1300 | Cougar | 3 | 5.5 | 22 | 72.1 | 12.8 | 8.6 | 7.1 | 40 |
| 8 | 28 | 96 | 1300 | Cougar | 3 | 5.5 | 24 | 72.1 | 12.2 | 8.4 | 7 | 37 |
| 8 | 28 | 96 | 1300 | Cougar | 3 | 5.5 | 26 | 72.1 | 11.6 | 8.4 | 7 | 35 |
| 8 | 28 | 96 | 1300 | Cougar | 3 | 5.5 | 28 | 72.1 | 11.1 | 8.3 | 7 | 34 |
| 8 | 28 | 96 | 1300 | Cougar | 3 | 5.5 | 30 | 72.1 | 10.8 | 8.3 | 7 | 31 |
| 8 | 28 | 96 | 1300 | Cougar | 3 | 5.5 | 32 | 72.1 | 10.6 | 8.2 | 6.8 | 30 |
| 8 | 28 | 96 | 1300 | Cougar | 3 | 5.5 | 34 | 72.1 | 10.3 | 8.3 | 6.9 | 30 |
| 8 | 28 | 96 | 1300 | Cougar | 3 | 5.5 | 36 | 72.1 | 10.1 | 8.5 | 6.8 | 29 |
| 8 | 28 | 96 | 1300 | Cougar | 3 | 5.5 | 38 | 72.1 | 9.9 | 8.9 | 6.8 | 29 |
| 8 | 28 | 96 | 1300 | Cougar | 3 | 5.5 | 40 | 72.1 | 9.5 | 8.9 | 6.7 | 30 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | 28 | 96 | 1300 | Cougar | 3 | 5.5 | 42 | 72.1 | 9 | 9 | 6.7 | 29 |
| 8 | 28 | 96 | 1300 | Cougar | 3 | 5.5 | 44 | 72.1 | 8.8 | 9.1 | 6.7 | 29 |
| 8 | 28 | 96 | 1300 | Cougar | 3 | 5.5 | 46 | 72.1 | 8.1 | 9.3 | 6.6 | 30 |
| 8 | 28 | 96 | 1300 | Cougar | 3 | 5.5 | 48 | 72.1 | 6.7 | 9.7 | 6.6 | 30 |
| 8 | 28 | 96 | 1300 | Cougar | 3 | 5.5 | 50 | 72.1 | 6 | 10 | 6.6 | 30 |
| 8 | 28 | 96 | 1300 | Cougar | 3 | 5.5 | 52 | 72.1 | 5.5 | 10.1 | 6.6 | 30 |
| 8 | 28 | 96 | 1300 | Cougar | 3 | 5.5 | 54 | 72.1 | 5 | 9.7 | 6.6 | 30 |
| 8 | 28 | 96 | 1300 | Cougar | 3 | 5.5 | 56 | 72.1 | 4.9 | 9.4 | 6.5 | 29 |
| 8 | 28 | 96 | 1300 | Cougar | 3 | 5.5 | 58 | 72.1 | 4.9 | 8.6 | 6.5 | 32 |
| 8 | 28 | 96 | 1300 | Cougar | 3 | 5.5 | 60 | 72.1 | 4.8 | 7 | 6.4 | 36 |
| 8 | 28 | 96 | 1300 | Cougar | 3 | 5.5 | 65 | 72.1 | 4.8 | 6.1 | 6.4 | 37 |
| 8 | 28 | 96 | 1300 | Cougar | 3 | 5.5 | 70 | 72.1 | 4.8 | 5.7 | 6.3 | 38 |

| Station | Month | Day | Year | Temp. (°C) | Diss. Ox. | pH | Conductivity |
|---|---|---|---|---|---|---|---|
| SF-IN | 4 | 18 | 96 | 5.2 | 11.9 | 7.2 | 34 |
| SF-OUT | 4 | 18 | 96 | 5.8 | 12.3 | 7.2 | 31 |
| MR-UP | 4 | 18 | 96 | 6.1 | 12.5 | 7.3 | 42 |
| LC | 4 | 18 | 96 | 5.7 | 12 | 7.2 | 25 |
| BR-IN | 4 | 18 | 96 | 5.7 | 12.1 | 7.3 | 25 |
| BR-OUT | 4 | 18 | 96 | 6.4 | 12.3 | 7.2 | 24 |
| MR-FR | 4 | 18 | 96 | 7.4 | 12.1 | 7.3 | 38 |
| MR-LD | 4 | 18 | 96 | 7.3 | 12.2 | 7.3 | 36 |
| MR-GS | 4 | 18 | 96 | 7.3 | 12.1 | 7.3 | 36 |
| MR-HB | 4 | 18 | 96 | 8.2 | 11.7 | 7.3 | 38 |
| SF-IN | 5 | 27 | 96 | 10.2 | 11.4 | 7.1 | 33 |
| SF-OUT | 5 | 27 | 96 | 7.3 | 11.8 | 7.2 | 31 |
| MR-UP | 5 | 27 | 96 | 9.7 | 11.6 | 7 | 42 |
| LC | 5 | 27 | 96 | 9 | 11.6 | 7.7 | 27 |
| BR-IN | 5 | 27 | 96 | 9.2 | 11.6 | 7.6 | 27 |
| BR-OUT | 5 | 27 | 96 | 8.7 | 12.2 | 7 | 25 |
| MR-FR | 5 | 27 | 96 | 10.7 | 11.6 | 7.1 | 37 |
| MR-LD | 5 | 27 | 96 | 10 | 11.9 | 7 | 35 |
| MR-GS | 5 | 27 | 96 | 10.4 | 11.7 | 6.9 | 36 |
| MR-HB | 5 | 27 | 96 | 10.6 | 11.6 | 6.8 | 38 |
| SF-IN | 7 | 8 | 96 | 15.1 | 10.3 | 6.7 | 48 |
| SF-OUT | 7 | 8 | 96 | 9 | 11 | 7.3 | 28 |
| MR-UP | 7 | 8 | 96 | 14.1 | 10 | 7.5 | 48 |
| LC | 7 | 8 | 96 | 18.6 | 9.7 | 7.3 | 32 |
| BR-IN | 7 | 8 | 96 | 18.7 | 9.6 | 7.5 | 36 |
| BR-OUT | 7 | 8 | 96 | 9.4 | 11.4 | 7.5 | 26 |
| MR-FR | 7 | 8 | 96 | 15.3 | 10.2 | 7.5 | 46 |
| MR-LD | 7 | 8 | 96 | 13.5 | 10.5 | 7.6 | 46 |
| MR-GS | 7 | 8 | 96 | 15.6 | 10.2 | 7.5 | 46 |
| MR-HB | 7 | 8 | 96 | 17.8 | 9.6 | 7.5 | 47 |
| SF-IN | 8 | 26 | 96 | 9 | 11.5 | 7.3 | 50 |
| SF-OUT | 8 | 26 | 96 | 9.3 | 9.8 | 7.3 | 30 |
| MR-UP | 8 | 26 | 96 | 9.5 | 11.8 | 8.2 | 57 |
| LC | 8 | 26 | 96 | 14.6 | 9.9 | 7.6 | 36 |
| BR-IN | 8 | 26 | 96 | 15.2 | 10.2 | 7.5 | 44 |
| BR-OUT | 8 | 26 | 96 | 10 | 11.4 | 7.5 | 30 |
| MR-FR | 8 | 26 | 96 | 12.6 | 11.5 | 7.6 | 46 |
| MR-LD | 8 | 26 | 96 | 12.4 | 11.2 | 7.6 | 46 |
| MR-GS | 8 | 26 | 96 | 13.9 | 11.4 | 7.3 | 46 |
| MR-HB | 8 | 26 | 96 | 14.2 | 11.8 | 7.3 | 48 |
| SF-IN | 9 | 24 | 96 | 7.5 | 11.5 | 7.5 | 50 |
| SF-OUT | 9 | 24 | 96 | 12.5 | 9.1 | 7.3 | 42 |
| MR-UP | 9 | 24 | 96 | 8.6 | 11.8 | 7.3 | 53 |
| LC | 9 | 24 | 96 | 9.5 | 10.9 | 7.4 | 34 |
| BR-IN | 9 | 24 | 96 | 8.8 | 11 | 7.3 | 42 |
| BR-OUT | 9 | 24 | 96 | 9.7 | 11.3 | 7.3 | 28 |
| MR-FR | 9 | 24 | 96 | 10.8 | 11.2 | 7.5 | 46 |
| MR-LD | 9 | 24 | 96 | 14.3 | 9 | 7.5 | 40 |
| MR-GS | 9 | 24 | 96 | 12 | 11.4 | 7.7 | 47 |
| MR-HB | 9 | 24 | 96 | 13 | 11 | 7.6 | 48 |

APPENDIX B

CHEMISTRY DATA

Legend for data tables:

| | |
|---|---|
| MO | = month sample collected |
| DAY | = day sample collected |
| YR | = year sample collected |
| STA | = station or lake for sample |
| DEP | = depth or other station descriptor |
| IN | = station descriptor denoting inflow to the lake |
| OUT | = station descriptor denoting outflow from dam |
| UP | = station descriptor denoting upstream position from confluence of dam outflows |
| FR | = station descriptor denoting Finn Rock Bridge over McKenzie River |
| LD | = station descriptor denoting Leaburg Dam on McKenzie River |
| GS | = station descriptor denoting a USGS gaging station just downstream from the exit of Walterville canal |
| HB | = station descriptor denoting the water intake on the McKenzie River at Hayden Bridge |
| TP | = total phosphorus (unfiltered and digested) |
| TSP | = total soluble phosphorus (filtered and digested) |
| TN | = total nitrogen (unfiltered and digested) |
| TSN | = total soluble nitrogen (filtered and digested) |
| NH3 | = ammonia in undigested water |
| SRP | = soluble reactive phosphorus (filtered and undigested) |
| SO4 | = dissolved sulfate (filtered and undigested) |
| TOC | = total organic carbon (unfiltered and inorganic removed) |
| DOC | = dissolved organic carbon (filtered and inorganic removed) |
| TMN | = total manganese (unfiltered and digested) |
| TFE | = total iron (unfiltered and digested) |
| DMn | = dissolved manganese (filtered and digested) |
| DFe | = dissolved iron (filtered and digested) |
| TALK | = total alkalinity (milli-equivalents) |
| TURB | = turbidity (NTU) |
| ND | = not detected |
| -0.05 | = below detection limit = ND |
| -9 | = sample lost in preparation for analysis |

Note: all values for measured concentrations are in units of mg/liter (parts per million) unless otherwise noted above. (See TURB and TALK.)

WATER CHEMISTRY, APRIL 1996 SUMMARY

| MO | YR | DAY | STA | DEP | TP | TSP | TN | TSN | NH3 | N03 | SRP | SO4 | TOC | DOC | TMN | DMn | TFe | DFe | TALK |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 96 | 16 | BR | 0 | 0.019 | 0.012 | 0.164 | 0.107 | ND | 0.004 | 0.008 | 0.697 | 1.00 | 1.10 | -0.050 | -0.050 | 0.133 | -0.050 | 11.8 |
| 4 | 96 | 16 | BR | 6 | 0.017 | 0.013 | 0.091 | 0.136 | ND | 0.001 | 0.008 | 0.839 | 1.21 | 1.15 | -0.050 | -0.050 | 0.111 | -0.050 | 12.0 |
| 4 | 96 | 16 | BR | 10 | 0.017 | 0.015 | 0.133 | 0.129 | ND | 0.004 | 0.007 | 0.899 | 1.24 | 1.16 | -0.050 | -0.050 | 0.144 | -0.050 | 11.8 |
| 4 | 96 | 16 | BR | 20 | 0.019 | 0.014 | 0.086 | 0.114 | ND | 0.001 | 0.009 | 0.711 | 1.20 | 0.88 | -0.050 | -0.050 | 0.200 | -0.050 | 9.0 |
| 4 | 96 | 16 | BR | 30 | 0.021 | 0.015 | 0.100 | 0.129 | ND | 0.002 | 0.011 | 0.662 | 1.18 | 0.89 | -0.050 | -0.050 | 0.255 | -0.050 | 11.8 |
| 4 | 96 | 16 | BR | 40 | 0.026 | 0.014 | 0.088 | 0.124 | ND | 0.006 | 0.011 | 0.716 | 1.25 | 1.15 | -0.050 | -0.050 | 0.599 | -0.050 | 11.5 |
| 4 | 96 | 16 | BR | 50 | 0.029 | 0.019 | 0.107 | 0.110 | ND | 0.008 | 0.010 | 0.689 | 1.67 | 1.23 | -0.050 | -0.050 | 0.622 | -0.050 | 11.5 |
| 4 | 96 | 17 | CR | 0 | 0.016 | 0.011 | 0.088 | 0.093 | ND | 0.004 | 0.010 | 0.332 | 1.25 | 0.97 | -0.050 | -0.050 | 0.056 | -0.050 | 14.0 |
| 4 | 96 | 17 | CR | 10 | 0.017 | 0.011 | 0.079 | 0.119 | ND | 0.001 | 0.009 | 0.237 | 1.14 | 0.91 | -0.050 | -0.050 | 0.078 | -0.050 | 13.5 |
| 4 | 96 | 17 | CR | 20 | 0.018 | 0.013 | 0.110 | 0.121 | ND | 0.001 | 0.011 | 0.241 | 1.02 | 0.96 | -0.050 | -0.050 | 0.100 | -0.050 | 14.8 |
| 4 | 96 | 17 | CR | 30 | 0.017 | 0.014 | 0.055 | 0.100 | ND | 0.001 | 0.012 | 0.254 | 1.02 | 1.06 | -0.050 | -0.050 | 0.078 | -0.050 | 14.5 |
| 4 | 96 | 17 | CR | 40 | 0.019 | 0.016 | 0.129 | 0.110 | ND | 0.008 | 0.014 | 0.233 | 1.03 | 1.05 | -0.050 | -0.050 | 0.078 | -0.050 | 15.8 |
| 4 | 96 | 17 | CR | 50 | 0.024 | 0.017 | 0.105 | 0.152 | ND | 0.019 | 0.013 | 0.264 | 1.34 | 1.23 | -0.050 | -0.050 | 0.244 | -0.050 | 15.5 |
| 4 | 96 | 17 | CR | 60 | 0.026 | 0.018 | 0.112 | 0.159 | ND | 0.019 | 0.013 | 0.243 | 1.41 | 1.33 | -0.050 | -0.050 | 0.344 | 0.050 | 15.5 |
| 4 | 96 | 17 | CR | 70 | 0.028 | 0.017 | 0.110 | 0.103 | ND | 0.022 | 0.014 | 0.255 | 1.36 | 1.33 | -0.050 | -0.050 | 0.433 | -0.050 | 15.3 |
| 4 | 96 | 17 | CR | 80 | 0.030 | 0.017 | 0.095 | 0.121 | ND | 0.023 | 0.013 | 0.248 | 1.43 | 1.42 | -0.050 | -0.050 | 0.566 | -0.050 | 15.0 |
| 4 | 96 | 17 | CR | 90 | 0.032 | 0.018 | 0.114 | 0.124 | ND | 0.026 | 0.013 | 0.256 | 1.52 | 1.47 | -0.050 | -0.050 | 0.660 | 0.060 | 14.8 |
| 4 | 96 | 17 | CR | 100 | 0.032 | 0.016 | 0.143 | 0.133 | ND | 0.028 | 0.013 | 0.265 | 1.60 | 1.47 | -0.050 | -0.050 | 0.730 | 0.070 | 16.5 |
| 4 | 96 | 18 | LC | IN | 0.014 | 0.015 | 0.199 | 0.214 | 0.015 | 0.011 | 0.014 | 0.332 | 1.15 | 1.41 | -0.050 | -0.050 | 0.089 | -0.050 | 12.5 |
| 4 | 96 | 18 | BR | IN | 0.018 | 0.017 | 0.209 | 0.214 | 0.036 | 0.006 | 0.015 | 0.714 | 1.56 | 1.58 | -0.050 | -0.050 | 0.122 | -0.050 | 12.2 |
| 4 | 96 | 18 | BR | OUT | 0.026 | 0.015 | 0.202 | 0.237 | 0.027 | 0.009 | 0.010 | 0.738 | 1.56 | 1.60 | -0.050 | -0.050 | 0.500 | -0.050 | 11.5 |
| 4 | 96 | 18 | SF | IN | 0.023 | 0.025 | 0.225 | 0.256 | 0.030 | 0.010 | 0.020 | 0.253 | 1.31 | 1.46 | -0.050 | -0.050 | 0.056 | -0.050 | 16.0 |
| 4 | 96 | 18 | SF | OUT | 0.019 | 0.015 | 0.157 | 0.214 | 0.020 | 0.015 | 0.013 | 0.359 | 1.27 | 1.23 | -0.050 | -0.050 | 0.211 | -0.050 | 15.0 |
| 4 | 96 | 18 | MR | UP | 0.036 | 0.033 | 0.195 | 0.133 | 0.008 | 0.004 | 0.030 | 0.670 | 0.80 | 0.81 | -0.050 | -0.050 | 0.089 | -0.050 | 19.8 |
| 4 | 96 | 18 | MR | FR | 0.042 | 0.036 | 0.188 | 0.249 | 0.032 | 0.008 | 0.024 | 0.618 | 1.52 | 1.58 | -0.050 | -0.050 | 0.122 | -0.050 | 18.5 |
| 4 | 96 | 18 | MR | LD | 0.030 | 0.027 | 0.169 | 0.214 | 0.020 | 0.012 | 0.021 | 0.685 | 1.10 | 1.16 | -0.050 | -0.050 | 0.144 | -0.050 | 17.0 |
| 4 | 96 | 18 | MR | GS | 0.029 | 0.023 | 0.202 | 0.145 | 0.012 | 0.008 | 0.020 | 0.644 | 0.97 | 1.09 | -0.050 | -0.050 | 0.144 | -0.050 | 17.8 |
| 4 | 96 | 18 | MR | HB | 0.029 | 0.022 | 0.225 | 0.155 | 0.018 | 0.012 | 0.019 | 0.709 | 1.05 | 1.27 | -0.050 | -0.050 | 0.167 | -0.050 | 19.0 |

WATER CHEMISTRY, MAY 1996 SUMMARY

| MO | DAY | YR | STA | DEP | TP | TSP | TN | TSN | NH3 | N03 | SRP | SO4 | TOC | DOC | TMN | DMn | TFe | DFe | TALK | TURB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 28 | 96 | BR | 0 | 0.012 | 0.003 | 0.350 | 0.286 | -0.020 | 0.000 | 0.004 | 0.804 | 1.27 | 5.76 | -0.05 | -0.05 | 0.12 | -0.05 | 12.4 | 1.60 |
| 5 | 28 | 96 | BR | 6 | 0.008 | 0.003 | 0.358 | 0.310 | -0.020 | 0.001 | 0.004 | 1.014 | 1.42 | 1.78 | -0.05 | -0.05 | 0.11 | -0.05 | 12.6 | 1.70 |
| 5 | 28 | 96 | BR | 6 | | | | | | | | | | | | | | | 13.0 | |
| 5 | 28 | 96 | BR | 10 | 0.008 | 0.003 | 0.374 | 0.227 | -0.020 | 0.001 | 0.004 | 0.982 | 1.44 | 3.30 | -0.05 | -0.05 | 0.11 | -0.05 | 12.7 | 1.50 |
| 5 | 28 | 96 | BR | 20 | 0.016 | 0.010 | 0.275 | 0.210 | -0.020 | 0.001 | 0.011 | 0.757 | 1.45 | 1.12 | -0.05 | -0.05 | 0.16 | -0.05 | 12.1 | 2.00 |
| 5 | 28 | 96 | BR | 20 | | | | | | 0.002 | 0.010 | 0.750 | | | | | | | | |
| 5 | 28 | 96 | BR | 30 | 0.016 | 0.011 | 0.214 | 0.280 | -0.020 | 0.001 | 0.011 | 0.857 | 1.10 | 0.98 | -0.05 | -0.05 | 0.16 | -0.05 | 11.8 | 2.30 |
| 5 | 28 | 96 | BR | 40 | 0.018 | 0.011 | 0.201 | 0.345 | -0.020 | 0.001 | 0.012 | 0.781 | 1.04 | 1.08 | -0.05 | -0.05 | 0.20 | -0.05 | 11.4 | 3.30 |
| 5 | 28 | 96 | BR | 50 | 0.022 | 0.012 | 0.175 | 0.267 | -0.020 | 0.002 | 0.012 | 0.621 | 3.14 | 1.20 | -0.05 | -0.05 | 0.32 | -0.05 | 12.1 | 4.40 |
| 5 | 28 | 96 | BR | 50 | | | | | | | | | | | | | | | 12.4 | |
| 5 | 28 | 96 | BR | 60 | 0.031 | 0.017 | 0.263 | 0.265 | -0.020 | 0.000 | 0.012 | 0.597 | 1.08 | 1.03 | -0.05 | -0.05 | 0.68 | -0.05 | 11.5 | 8.60 |
| 5 | 28 | 96 | BR | 60 | | | | | | 0.002 | 0.012 | 0.604 | | | | | | | | |
| 5 | 28 | 96 | BR | 60 | | | | | | 0.000 | 0.011 | 0.586 | | | | | | | | |
| 5 | 29 | 96 | CR | 0 | 0.013 | 0.005 | 0.376 | 0.284 | -0.020 | 0.001 | 0.001 | 0.217 | 5.77 | 2.18 | -0.05 | -0.05 | 0.13 | -0.05 | 15.5 | 3.00 |
| 5 | 29 | 96 | CR | 6 | 0.012 | 0.003 | 0.295 | 0.339 | -0.020 | 0.001 | 0.001 | 0.242 | 1.69 | 1.60 | -9 | -9 | 0.11 | -0.05 | 11.7 | 1.80 |
| 5 | 29 | 96 | CR | 10 | 0.009 | 0.003 | 0.314 | 0.122 | -0.020 | 0.004 | 0.002 | 0.241 | 1.34 | 1.20 | -0.05 | -0.05 | 0.12 | -0.05 | 13.2 | 1.30 |
| 5 | 29 | 96 | CR | 10 | | | | | | 0.005 | 0.000 | 0.259 | | | | | | | | |
| 5 | 29 | 96 | CR | 20 | 0.015 | 0.011 | 0.214 | 0.250 | -0.020 | 0.001 | 0.007 | 0.247 | 1.10 | 1.05 | -0.05 | -0.05 | 0.09 | -0.05 | 14.3 | 0.50 |
| 5 | 29 | 96 | CR | 30 | 0.012 | 0.011 | 0.472 | 0.199 | -0.020 | 0.004 | 0.007 | 0.273 | 4.98 | 3.54 | -0.05 | -0.05 | 0.07 | -0.05 | 12.3 | 0.60 |
| 5 | 29 | 96 | CR | 40 | 0.016 | 0.014 | 0.214 | 0.083 | -0.020 | 0.003 | 0.010 | 0.252 | 1.40 | 1.26 | -0.05 | -0.05 | 0.07 | -0.05 | 15.2 | 0.50 |
| 5 | 29 | 96 | CR | 50 | 0.018 | 0.016 | 0.210 | 0.157 | -0.020 | 0.005 | 0.010 | 0.265 | 1.05 | 1.26 | -0.05 | -0.05 | 0.11 | -0.05 | 14.6 | 1.20 |
| 5 | 29 | 96 | CR | 60 | 0.022 | 0.016 | 0.170 | 0.166 | -0.020 | 0.018 | 0.012 | 0.281 | 3.87 | 2.35 | -0.05 | -0.05 | 0.33 | 0.05 | 16.6 | 4.90 |
| 5 | 29 | 96 | CR | 60 | | | | | | | | | | | | | | | 16.1 | |
| 5 | 29 | 96 | CR | 70 | 0.024 | 0.017 | 0.170 | 0.194 | -0.020 | 0.020 | 0.013 | 0.275 | 1.55 | 1.49 | -0.05 | -0.05 | 0.42 | -0.05 | 15.7 | 5.90 |
| 5 | 29 | 96 | CR | 80 | 0.016 | 0.015 | 0.179 | 0.148 | -0.020 | 0.022 | 0.011 | 0.281 | 1.68 | 1.34 | -0.05 | -0.05 | 0.53 | 0.08 | 15.4 | 7.50 |
| 5 | 29 | 96 | CR | 90 | 0.030 | 0.015 | 0.188 | 0.157 | -0.020 | 0.025 | 0.010 | 0.289 | 5.31 | 2.84 | -0.05 | -0.05 | 0.73 | 0.14 | 15.6 | 8.40 |
| 5 | 29 | 96 | CR | 100 | 0.039 | 0.015 | 0.192 | 0.205 | -0.020 | 0.031 | 0.009 | 0.331 | 1.54 | 1.44 | -0.05 | -0.05 | 0.61 | 0.05 | 16.7 | 9.60 |
| 5 | 27 | 96 | CR | 110 | 0.029 | 0.017 | 0.321 | 0.223 | -0.020 | 0.034 | 0.012 | 0.372 | 1.64 | 1.54 | 0.08 | -0.05 | 0.61 | 0.11 | 17.2 | 10.30 |
| 5 | 27 | 96 | LC | LC | 0.018 | 0.016 | 0.252 | 0.284 | -0.020 | 0.005 | 0.018 | 0.498 | 0.74 | 0.65 | -0.05 | -0.05 | 0.09 | -0.05 | 13.1 | 0.60 |
| 5 | 27 | 96 | BR | IN | 0.019 | 0.020 | 0.239 | 0.376 | -0.020 | 0.004 | 0.017 | 0.871 | 0.60 | 0.74 | -0.05 | -0.05 | 0.12 | -0.05 | 13.4 | 0.60 |
| 5 | 27 | 96 | BR | OUT | 0.022 | 0.013 | 0.299 | 0.284 | -0.020 | 0.002 | 0.012 | 0.579 | 1.56 | 1.41 | -0.05 | -0.05 | 0.40 | -0.05 | 12.1 | 4.70 |
| 5 | 27 | 96 | SF | IN | 0.020 | 0.021 | 0.332 | 0.249 | -0.020 | 0.001 | 0.017 | 0.193 | 0.32 | 0.47 | -0.05 | -0.05 | 0.08 | -0.05 | 17.3 | 0.40 |
| 5 | 27 | 96 | SF | OUT | 0.019 | 0.016 | 0.264 | 0.245 | -0.020 | 0.006 | 0.013 | 0.282 | 1.27 | 1.27 | -0.05 | -0.05 | 0.11 | -0.05 | 15.1 | 1.40 |
| 5 | 27 | 96 | MR | UP | 0.035 | 0.033 | 0.262 | 0.179 | -0.020 | 0.002 | 0.030 | 0.611 | 0.20 | 0.21 | -0.05 | -0.05 | 0.10 | -0.05 | 19.6 | 0.30 |
| 5 | 27 | 96 | MR | FR | 0.029 | 0.026 | 0.180 | 0.223 | -0.020 | 0.001 | 0.021 | 0.535 | 0.98 | 0.76 | -0.05 | -0.05 | 0.12 | -0.05 | 18.0 | 2.00 |
| 5 | 27 | 96 | MR | LD | 0.026 | 0.024 | 0.166 | 0.232 | -0.020 | 0.004 | 0.018 | 0.568 | 1.33 | 1.06 | -0.05 | -0.05 | 0.10 | -0.05 | 17 | 1.40 |
| 5 | 27 | 96 | MR | GS | 0.024 | 0.024 | 0.378 | 0.212 | -0.020 | 0.007 | 0.019 | 0.555 | 0.65 | 0.41 | -0.05 | -0.05 | 0.12 | -0.05 | 17 | 1.30 |
| 5 | 27 | 96 | MR | HB | 0.025 | 0.022 | 0.621 | 0.492 | -0.020 | 0.016 | 0.009 | 0.591 | 0.78 | 0.68 | -0.05 | -0.05 | 0.21 | -0.05 | 19 | 1.50 |

# WATER CHEMISTRY, JULY 1996 SUMMARY

| MO | DAY | YR | STA | DEP | K | P | Mg | Ca | TP | TSP | TN | TSN | NH3 | N03 | SRP | SO4 | TOC | DOC | TMN | DMn | TFe | DFe | TALK | TURB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 23 | 96 | BR | 0 | | | | | | | | | 0.000 | | | | 1.92 | 1.71 | | | | | 12.5 | 0.7 |
| 7 | 23 | 96 | BR | 7.5 | | | | | | | | | 0.000 | | | | 1.91 | 1.61 | | | | | 15.3 | 1.25 |
| 7 | 23 | 96 | BR | 10 | | | | | | | | | 0.004 | | | | 2.13 | 2.17 | | | | | 12.5 | 1.6 |
| 7 | 23 | 96 | BR | 20 | | | | | | | | | 0.000 | | | | 1.60 | 1.45 | | | | | 12.3 | 1 |
| 7 | 23 | 96 | BR | 30 | | | | | | | | | 0.009 | | | | 1.37 | 1.38 | | | | | 11.5 | 1.3 |
| 7 | 23 | 96 | BR | 40 | | | | | | | | | 0.014 | | | | 1.22 | 1.46 | | | | | 13.3 | 2.3 |
| 7 | 23 | 96 | BR | 50 | | | | | | | | | 0.015 | | | | 1.40 | 1.25 | | | | | 12.0 | 3.2 |
| 7 | 23 | 96 | BR | 60 | | | | | | | | | 0.020 | | | | 1.29 | 1.35 | | | | | 11.5 | 4.7 |
| 7 | 23 | 96 | CR | 0 | 2.14 | 0.53 | 1.14 | 3.17 | 0.009 | 0.007 | 0.141 | 0.165 | 0.009 | 0.004 | 0.006 | 0.356 | 1.39 | 1.50 | -0.05 | -0.05 | 0.06 | -0.05 | 13.8 | 1 |
| 7 | 23 | 96 | CR | 6 | 2.18 | 0.58 | 1.23 | 3.37 | 0.010 | 0.008 | 0.199 | 0.166 | 0.019 | 0.003 | 0.001 | 0.200 | 1.42 | 1.26 | | | | | -9 | -9 |
| 7 | 23 | 96 | CR | 10 | 2.11 | 0.62 | 1.29 | 3.45 | 0.010 | 0.007 | 0.219 | 0.187 | 0.025 | 0.002 | 0.001 | 0.119 | 1.58 | 1.40 | -0.05 | -0.05 | 0.08 | -0.05 | 16.8 | 1.5 |
| 7 | 23 | 96 | CR | 20 | 1.91 | 0.49 | 1.02 | 2.94 | 0.007 | 0.007 | 0.148 | 0.172 | 0.028 | 0.009 | 0.001 | 0.252 | 1.29 | 1.24 | -0.05 | -0.05 | 0.10 | -0.05 | 13.3 | 0.6 |
| 7 | 23 | 96 | CR | 30 | 1.77 | 0.49 | 1.01 | 2.85 | 0.011 | 0.012 | 0.158 | 0.195 | 0.046 | 0.013 | 0.006 | 0.268 | 1.28 | 1.22 | -0.05 | -0.05 | 0.08 | -0.05 | 14.3 | 0.5 |
| 7 | 23 | 96 | CR | 40 | 1.92 | 0.51 | 1.09 | 3.04 | 0.017 | 0.016 | 0.187 | 0.187 | 0.033 | 0.007 | 0.013 | 0.250 | 1.28 | 1.24 | -0.05 | -0.05 | 0.08 | -0.05 | 14.3 | 0.5 |
| 7 | 23 | 96 | CR | 50 | 1.91 | 0.52 | 1.10 | 3.06 | 0.018 | 0.017 | 0.141 | 0.117 | 0.022 | 0.009 | 0.013 | 0.248 | 1.25 | 1.22 | -0.05 | -0.05 | 0.24 | -0.05 | 14.5 | 0.6 |
| 7 | 23 | 96 | CR | 60 | 1.97 | 0.53 | 1.23 | 3.37 | 0.021 | 0.017 | 0.134 | 0.212 | 0.007 | 0.038 | 0.013 | 0.264 | 1.28 | 1.40 | -0.05 | -0.05 | 0.34 | 0.05 | 14.5 | 2.7 |
| 7 | 23 | 96 | CR | 70 | 2.00 | 0.52 | 1.23 | 3.37 | 0.023 | 0.018 | 0.124 | 0.151 | 0.013 | 0.035 | 0.013 | 0.279 | 1.33 | 1.32 | -0.05 | -0.05 | 0.43 | -0.05 | 15.3 | 3.6 |
| 7 | 23 | 96 | CR | 80 | 2.00 | 0.53 | 1.22 | 3.37 | 0.023 | 0.017 | 0.144 | 0.148 | 0.007 | 0.033 | 0.012 | 0.276 | 1.62 | 2.93 | -0.05 | -0.05 | 0.57 | -0.05 | 15.3 | 4.2 |
| 7 | 23 | 96 | CR | 90 | 2.02 | 0.51 | 1.21 | 3.34 | 0.022 | 0.017 | 0.124 | 0.158 | 0.005 | 0.036 | 0.014 | 0.291 | 1.56 | 1.50 | -0.05 | -0.05 | 0.66 | 0.06 | 14.3 | 4.9 |
| 7 | 23 | 96 | CR | 100 | 2.14 | 0.50 | 1.21 | 3.41 | 0.024 | 0.017 | 0.134 | 0.151 | 0.007 | 0.049 | 0.035 | 0.379 | 1.43 | -0.12 | -0.05 | -0.05 | 0.73 | 0.07 | 15.0 | 6.2 |
| 7 | 23 | 96 | CR | 110 | 2.21 | 0.50 | 1.22 | 3.45 | 0.027 | 0.018 | 0.160 | 0.180 | 0.007 | 0.052 | 0.051 | 0.391 | 1.46 | 1.42 | -0.05 | -0.05 | 0.73 | 0.07 | 15.5 | 9.5 |
| 7 | 9 | 96 | LC | LC | 2.35 | 0.57 | 1.09 | 3.31 | 0.023 | 0.021 | 0.231 | 0.299 | 0.000 | 0.003 | 0.022 | 0.359 | 1.54 | 1.46 | -0.05 | -0.05 | 0.10 | -0.05 | 16.5 | -9 |
| 7 | 9 | 96 | BR | IN | 2.65 | 0.35 | 1.00 | 4.12 | 0.021 | 0.020 | 0.304 | 0.271 | 0.003 | 0.003 | 0.018 | 1.486 | 1.51 | 3.71 | -0.05 | -0.05 | 0.10 | -0.05 | 15.5 | -9 |
| 7 | 9 | 96 | BR | OUT | 1.85 | 0.30 | 0.80 | 3.14 | 0.030 | 0.023 | 0.397 | 0.366 | 0.023 | | | | 2.74 | 2.21 | -0.05 | -0.05 | 0.57 | -0.05 | 12.8 | -9 |
| 7 | 9 | 96 | SF | IN | 2.71 | 1.10 | 1.85 | 4.68 | 0.037 | 0.036 | 0.304 | 0.287 | 0.005 | 0.011 | 0.039 | 0.816 | -9 | 2.78 | -0.05 | -0.05 | 0.10 | -0.05 | 24.5 | -9 |
| 7 | 9 | 96 | SF | OUT | 2.04 | 0.55 | 1.09 | 3.05 | 0.018 | 0.061 | 0.366 | 0.534 | 0.015 | 0.015 | 0.016 | 0.308 | 1.75 | 1.95 | -0.05 | -0.05 | 0.18 | -0.05 | 14.0 | -9 |
| 7 | 9 | 96 | MR | UP | 4.20 | 1.15 | 2.02 | 4.03 | 0.063 | 0.060 | 0.226 | 0.313 | 0.000 | 0.004 | 0.047 | 0.923 | 2.21 | 1.92 | -0.05 | -0.05 | 0.09 | -0.05 | 24.3 | 0.8 |
| 7 | 9 | 96 | MR | FR | 3.75 | 1.06 | 1.82 | 3.76 | 0.061 | 0.057 | 0.310 | 0.287 | 0.000 | | | | 2.21 | 2.11 | -0.05 | -0.05 | 0.07 | -0.05 | 22.8 | 1.8 |
| 7 | 9 | 96 | MKR | LD | 3.76 | 0.93 | 1.81 | 3.82 | 0.043 | 0.042 | 0.271 | 0.287 | 0.000 | 0.005 | 0.036 | 0.846 | 1.77 | 1.59 | -0.05 | -0.05 | 0.14 | -0.05 | 22.5 | 1.1 |
| 7 | 9 | 96 | MKR | GS | 3.71 | 0.94 | 1.84 | 4.02 | 0.039 | 0.037 | 0.287 | 0.372 | 0.000 | 0.006 | 0.033 | 0.821 | 8.04 | 1.72 | -0.05 | -0.05 | 0.13 | -0.05 | 21.5 | 0.7 |
| 7 | 9 | 96 | MKR | HB | 3.65 | 0.92 | 1.83 | 3.95 | 0.039 | 0.034 | 0.304 | 0.315 | 0.000 | 0.004 | 0.029 | 0.765 | 5.49 | 1.77 | -0.05 | -0.05 | 0.18 | -0.05 | 22.5 | 0.75 |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 10 | 96 | CR | 0 | | | | | 0.006 | 0.006 | 0.304 | 0.372 | 0.002 | 0.002 | 0.552 | -0.05 | -0.05 | 0.12 | -0.05 |
| 7 | 10 | 96 | CR | 10 | | | | | 0.007 | 0.006 | 0.439 | 0.416 | 0.001 | 0.000 | 0.241 | -0.05 | -0.05 | 0.08 | -0.05 |
| 7 | 10 | 96 | CR | 20 | | | | | 0.006 | 0.004 | 0.344 | 0.271 | 0.006 | 0.001 | 0.235 | -0.05 | -0.05 | 0.11 | -0.05 |
| 7 | 10 | 96 | CR | 30 | | | | | 0.006 | 0.005 | 0.315 | 0.287 | 0.001 | 0.001 | 0.251 | -0.05 | -0.05 | 0.10 | -0.05 |
| 7 | 10 | 96 | CR | 30 | | | | | 0.006 | 0.004 | 0.338 | 0.271 | 0.000 | 0.000 | 0.233 | | | | |
| 7 | 10 | 96 | CR | 40 | | | | | 0.008 | 0.009 | 0.287 | 0.254 | 0.001 | 0.003 | 0.298 | -0.05 | -0.05 | 0.08 | -0.05 |
| 7 | 10 | 96 | CR | 50 | | | | | 0.012 | 0.007 | 0.287 | 0.220 | 0.001 | 0.002 | 0.238 | -0.05 | -0.05 | 0.19 | -0.05 |
| 7 | 10 | 96 | CR | 60 | | | | | 0.012 | 0.006 | 0.254 | 0.254 | 0.000 | 0.001 | 0.271 | -0.05 | -0.05 | 0.32 | -0.05 |
| 7 | 10 | 96 | CR | 70 | | | | | 0.016 | 0.006 | 0.299 | 0.332 | 0.001 | 0.000 | 0.287 | -0.05 | -0.05 | 0.34 | -0.05 |
| 7 | 10 | 96 | CR | 80 | | | | | 0.012 | 0.009 | 0.310 | 0.282 | 0.000 | 0.003 | 0.259 | -0.05 | -0.05 | 0.38 | -0.05 |
| 7 | 10 | 96 | CR | 90 | | | | | 0.019 | 0.006 | 0.296 | 0.358 | 0.000 | 0.001 | 0.288 | -0.05 | -0.05 | 0.34 | -0.05 |
| 7 | 10 | 96 | CR | 100 | | | | | 0.020 | 0.011 | 0.293 | 0.251 | 0.000 | 0.000 | 0.293 | -0.05 | -0.05 | 0.41 | -0.05 |
| 7 | 10 | 96 | CR | 110 | | | | | 0.018 | 0.010 | 0.248 | 0.299 | 0.000 | 0.000 | 0.320 | -0.05 | -0.05 | 0.78 | 0.07 |
| 7 | 9 | 96 | BR | 0 | 1.93 | 0.27 | 0.82 | 3.24 | 0.007 | 0.005 | 0.366 | 0.372 | 0.002 | 0.003 | 0.867 | -0.05 | -0.05 | 0.14 | -0.05 |
| 7 | 9 | 96 | BR | 7.5 | 1.87 | 0.30 | 0.85 | 3.37 | 0.010 | 0.005 | 0.467 | 0.478 | 0.002 | 0.002 | 0.982 | -0.05 | -0.05 | 0.09 | -0.05 |
| 7 | 9 | 96 | BR | 10 | 1.80 | 0.27 | 0.82 | 3.33 | 0.010 | 0.009 | 0.450 | 0.405 | 0.007 | 0.002 | 0.944 | -0.05 | -0.05 | 0.08 | -0.05 |
| 7 | 9 | 96 | BR | 20 | 1.78 | 0.25 | 0.78 | 3.22 | 0.010 | 0.008 | 0.369 | 0.405 | 0.011 | 0.004 | 0.858 | -0.05 | -0.05 | 0.14 | -0.05 |
| 7 | 9 | 96 | BR | 30 | 1.78 | 0.25 | 0.77 | 3.10 | 0.016 | 0.012 | 0.416 | 0.352 | 0.014 | 0.010 | 0.813 | -0.05 | -0.05 | 0.20 | -0.05 |
| 7 | 9 | 96 | BR | 40 | 1.78 | 0.26 | 0.78 | 3.18 | 0.017 | 0.012 | 0.338 | 0.383 | 0.016 | 0.010 | 0.769 | -0.05 | -0.05 | 0.29 | -0.05 |
| 7 | 9 | 96 | BR | 50 | 1.80 | 0.27 | 0.79 | 3.16 | 0.020 | 0.012 | 0.254 | 0.360 | 0.016 | 0.009 | 0.737 | -0.05 | -0.05 | 0.38 | -0.05 |
| 7 | 9 | 96 | BR | 60 | 1.80 | 0.26 | 0.79 | 3.08 | 0.020 | 0.012 | 0.346 | 0.372 | 0.016 | 0.009 | 0.714 | -0.05 | -0.05 | 0.6 | -0.05 |

## WATER CHEMISTRY, AUGUST 1996 SUMMARY

| MO | DAY | YR | STA | DEP | K | P | Mg | Ca | TP | TSP | TN | TSN | NH3 | N03 | SRP | SO4 | TOC | DOC | TMN | DMn | TFe | DFe | TALK | TURB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | 26 | 96 | BR | 0 | 2.14 | 0.31 | 0.89 | 3.33 | 0.008 | 0.004 | 0.163 | 0.141 | 0.005 | 0.000 | 0.006 | 0.946 | 1.82 | 1.80 | -0.05 | -0.05 | 0.13 | -0.05 | 12.50 | 0.60 |
| 8 | 26 | 96 | BR | 10 | 2.09 | 0.31 | 0.88 | 3.35 | 0.008 | 0.004 | 0.170 | 0.185 | 0.013 | 0.005 | 0.005 | 0.987 | 1.78 | 1.64 | -0.05 | -0.05 | 0.14 | -0.05 | 12.00 | 0.60 |
| 8 | 26 | 96 | BR | 20 | 1.74 | 0.25 | 0.81 | 3.61 | 0.006 | 0.004 | 0.196 | 0.252 | 0.007 | 0.021 | 0.000 | 1.081 | 1.51 | 1.48 | -0.05 | -0.05 | 0.20 | -0.05 | 12.00 | 0.40 |
| 8 | 26 | 96 | BR | 30 | 1.83 | 0.25 | 0.77 | 3.09 | 0.010 | 0.008 | 0.199 | 0.152 | 0.007 | 0.028 | 0.004 | 0.817 | 1.57 | 1.42 | -0.05 | -0.05 | 0.26 | -0.05 | 10.00 | 1.10 |
| 8 | 26 | 96 | BR | 40 | 1.82 | 0.26 | 0.82 | 3.30 | 0.015 | 0.011 | 0.190 | 0.207 | 0.004 | 0.053 | 0.008 | 0.780 | 1.46 | 1.44 | -0.05 | -0.05 | 0.60 | -0.05 | 11.00 | 1.20 |
| 8 | 26 | 96 | BR | 50 | 1.84 | 0.27 | 0.85 | 3.30 | 0.016 | 0.012 | 0.176 | 0.161 | 0.007 | 0.060 | 0.009 | 0.722 | 1.50 | 1.38 | -0.05 | -0.05 | 0.62 | -0.05 | 11.50 | 1.70 |
| 8 | 26 | 96 | BR | 60 | 1.87 | 0.29 | 0.88 | 3.39 | 0.020 | 0.010 | 0.472 | 0.203 | 0.007 | 0.062 | 0.009 | 0.679 | 1.49 | 1.46 | -0.05 | -0.05 | 0.62 | -0.05 | 11.00 | 4.00 |
| 8 | 28 | 96 | CR | 0 | 2.35 | 0.64 | 1.30 | 3.48 | 0.008 | 0.005 | 0.196 | 0.166 | 0.017 | 0.001 | 0.000 | 0.435 | 0.66 | 0.61 | -0.05 | -0.05 | 0.06 | -0.05 | 17.00 | 0.74 |
| 8 | 28 | 96 | CR | 6 | 2.34 | 0.68 | 1.37 | 3.61 | 0.008 | 0.004 | 0.145 | 0.240 | 0.012 | 0.002 | 0.000 | 0.411 | 0.62 | 0.54 | -0.05 | -0.05 | 0.06 | -0.05 | 17.00 | 0.84 |
| 8 | 28 | 96 | CR | 10 | 2.36 | 0.77 | 1.52 | 3.94 | 0.008 | 0.004 | 0.174 | 0.234 | 0.011 | 0.002 | 0.001 | 0.401 | 0.57 | 0.54 | -0.05 | -0.05 | 0.08 | -0.05 | 18.50 | 0.94 |
| 8 | 28 | 96 | CR | 20 | 2.29 | 0.75 | 1.50 | 3.98 | 0.009 | 0.004 | 0.260 | 0.194 | 0.040 | 0.013 | 0.001 | 0.494 | 0.34 | 0.23 | -0.05 | -0.05 | 0.10 | -0.05 | 16.50 | 0.78 |
| 8 | 28 | 96 | CR | 30 | 1.91 | 0.55 | 1.14 | 3.21 | 0.012 | 0.008 | 0.227 | 0.333 | 0.056 | 0.015 | 0.007 | 0.573 | 0.61 | 0.46 | -0.05 | -0.05 | 0.08 | -0.05 | 11.50 | 0.80 |
| 8 | 28 | 96 | CR | 40 | 1.95 | 2.99 | 1.16 | 3.13 | 0.017 | 0.013 | 0.269 | 0.214 | 0.008 | 0.050 | 0.011 | 0.559 | 0.64 | 0.76 | -0.05 | -0.05 | 0.08 | -0.05 | 12.00 | 0.64 |
| 8 | 28 | 96 | CR | 50 | 1.88 | 0.52 | 1.25 | 3.35 | 0.019 | 0.016 | 0.251 | 0.214 | 0.010 | 0.053 | 0.014 | 0.595 | 0.53 | 0.74 | -0.05 | -0.05 | 0.24 | -0.05 | 13.00 | 2.30 |
| 8 | 28 | 96 | CR | 60 | 1.90 | 0.53 | 1.24 | 3.37 | 0.019 | 0.019 | 0.165 | 0.216 | 0.010 | 0.043 | 0.013 | 0.589 | 1.24 | 0.63 | -0.05 | -0.05 | 0.34 | 0.05 | 12.50 | 3.20 |
| 8 | 28 | 96 | CR | 70 | 2.00 | 4.89 | 1.29 | 3.40 | 0.022 | 0.017 | 0.194 | 0.177 | 0.008 | 0.041 | 0.014 | 0.619 | 0.67 | 0.71 | -0.05 | -0.05 | 0.34 | 0.05 | 13.00 | 3.50 |
| 8 | 28 | 96 | CR | 80 | 1.98 | 0.51 | 1.23 | 3.41 | 0.022 | 0.017 | 0.188 | 0.123 | 0.005 | 0.046 | 0.014 | 0.667 | 0.66 | 0.74 | -0.05 | -0.05 | 0.57 | -0.05 | 13.00 | 4.20 |
| 8 | 28 | 96 | CR | 90 | 2.11 | 0.51 | 1.30 | 3.69 | 0.025 | 0.018 | 0.240 | 0.232 | 0.008 | 0.078 | 0.010 | 0.719 | 8.35 | 0.86 | -0.05 | -0.05 | 0.66 | 0.06 | 15.00 | 4.80 |
| 8 | 28 | 96 | CR | 100 | 3.12 | 0.52 | 1.47 | 4.42 | 0.034 | 0.016 | 0.199 | 0.256 | 0.030 | 0.106 | 0.005 | 0.950 | 1.73 | 0.76 | -0.05 | -0.05 | 0.73 | 0.07 | 16.00 | 8.00 |
| 8 | 28 | 96 | LC | LC | 2.57 | 0.57 | 1.20 | 3.64 | 0.023 | 0.020 | 0.130 | 0.086 | 0.007 | 0.006 | 0.018 | 0.555 | 0.52 | 0.49 | -0.05 | -0.05 | 0.14 | -0.05 | 15.50 | 0.94 |
| 8 | 28 | 96 | BR | IN | 3.11 | 0.32 | 1.14 | 4.65 | 0.017 | 0.017 | 0.108 | 0.141 | 0.011 | 0.003 | 0.019 | 4.964 | 0.59 | 0.54 | -0.05 | -0.05 | 0.12 | -0.05 | 14.75 | 0.22 |
| 8 | 28 | 96 | BR | OUT | 2.11 | 0.29 | 0.95 | 4.06 | 0.023 | 0.011 | 0.483 | 0.216 | 0.012 | 0.053 | 0.008 | 1.538 | 0.65 | 0.65 | -0.05 | -0.05 | 0.12 | -0.05 | 13.50 | 2.60 |
| 8 | 28 | 96 | SF | IN | 3.08 | 1.15 | 2.00 | 4.89 | 0.039 | 0.039 | 0.108 | 0.141 | 0.007 | 0.002 | 0.038 | 0.406 | -0.12 | -0.19 | -0.05 | -0.05 | 0.21 | -0.05 | 22.75 | 0.16 |
| 8 | 28 | 96 | CR | OUT | 2.02 | 0.53 | 1.16 | 3.18 | 0.017 | 0.013 | 0.199 | 0.121 | 0.014 | 0.043 | 0.012 | 0.525 | 0.67 | 0.60 | -0.05 | -0.05 | 0.21 | -0.05 | 13.50 | 0.63 |
| 8 | 28 | 96 | MR | UP | 4.56 | 1.16 | 2.15 | 4.14 | 0.053 | 0.051 | 0.179 | 0.115 | 0.007 | 0.003 | 0.049 | 2.044 | -0.12 | -0.16 | -0.05 | -0.05 | 0.06 | -0.05 | 23.50 | 0.36 |
| 8 | 28 | 96 | MR | FR | 3.58 | 1.97 | 1.78 | 3.79 | 0.042 | 0.037 | 0.170 | 0.090 | 0.008 | 0.012 | 0.033 | 1.467 | 0.60 | 0.30 | -0.05 | -0.05 | 0.09 | -0.05 | 19.25 | 0.50 |
| 8 | 28 | 96 | MR | LD | 3.63 | 0.93 | 1.78 | 3.82 | 0.044 | 0.037 | 0.126 | 0.245 | 0.008 | 0.007 | 0.031 | 1.501 | 0.31 | 0.35 | -0.05 | -0.05 | 0.09 | -0.05 | 19.75 | 0.48 |
| 8 | 28 | 96 | MR | GS | 3.58 | 0.89 | 1.77 | 3.82 | 0.036 | 0.034 | 0.368 | 0.137 | 0.011 | 0.008 | 0.030 | 1.611 | 2.83 |  | -0.05 | -0.05 | 0.17 | -0.05 | 20.00 | 0.40 |
| 8 | 28 | 96 | MR | HB | 3.65 | 0.90 | 1.81 | 3.91 | 0.034 | 0.031 | 0.256 | 0.099 | 0.014 | 0.007 | 0.022 | 2.395 | 2.43 | 0.22 | -0.05 | -0.05 | 0.12 | -0.05 | 19.50 | 0.50 |

# WATER CHEMISTRY, SEPTEMBER 1996 SUMMARY

| MO | DAY | YR | STA | DEP | K | P | Mg | Ca | TP | TSP | TN | TSN | NH3 | N03 | SRP | SO4 | TOC | DOC | TMN | DMn | TFe | DFe | TALK | TURB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9 | 23 | 96 | BR | 0 | 2.17 | 0.32 | 0.91 | 3.44 | 0.008 | 0.004 | 0.272 | 0.223 | ND | 0.003 | 0.003 | 0.985 | 1.14 | 2.03 | -0.05 | -0.05 | -0.05 | -0.05 | 13.00 | 0.45 |
| 9 | 23 | 96 | BR | 10 | 2.19 | 0.32 | 0.92 | 3.53 | 0.007 | 0.003 | 0.193 | 0.117 | ND | 0.003 | 0.001 | 1.006 | 1.12 | 1.20 | -0.05 | -0.05 | -0.05 | -0.05 | 13.00 | 0.47 |
| 9 | 23 | 96 | BR | 15 | | | | | | | | | ND | | | | 1.09 | 1.00 | | | | | | |
| 9 | 23 | 96 | BR | 20 | 2.01 | 0.28 | 0.89 | 3.91 | 0.006 | 0.004 | 0.216 | 0.193 | 0.010 | 0.017 | 0.002 | 1.130 | 1.02 | 0.93 | -0.05 | -0.05 | -0.05 | -0.05 | 13.50 | 0.50 |
| 9 | 23 | 96 | BR | 30 | 1.88 | 0.25 | 0.83 | 3.58 | 0.005 | 0.004 | 0.178 | 0.139 | 0.012 | 0.027 | 0.002 | 0.998 | 0.96 | 1.01 | -0.05 | -0.05 | 0.07 | -0.05 | 11.50 | 1.00 |
| 9 | 23 | 96 | BR | 40 | 1.96 | 0.28 | 0.80 | 3.09 | 0.009 | 0.006 | 0.139 | 0.180 | 0.018 | 0.021 | 0.004 | 0.698 | 12.56 | 1.10 | -0.05 | -0.05 | 0.27 | -0.05 | 11.50 | 1.40 |
| 9 | 23 | 96 | BR | 50 | 1.97 | 0.28 | 0.89 | 3.64 | 0.019 | 0.007 | -9 | 0.164 | 0.019 | 0.040 | 0.005 | 0.769 | 9.71 | 1.05 | -0.05 | -0.05 | 0.53 | -0.05 | 12.75 | 3.20 |
| 9 | 25 | 96 | CR | 0 | 2.57 | 0.74 | 1.45 | 3.83 | 0.008 | 0.005 | 0.128 | 0.202 | ND | 0.000 | 0.005 | 0.344 | 0.59 | 0.56 | -0.05 | -0.05 | 0.07 | -0.05 | 16.75 | 0.42 |
| 9 | 25 | 96 | CR | 10 | 2.59 | 0.75 | 1.44 | 3.81 | 0.006 | 0.004 | 0.152 | 0.168 | ND | 0.001 | 0.002 | 0.235 | 0.56 | 0.52 | -0.05 | -0.05 | 0.07 | -0.05 | 17.75 | 0.50 |
| 9 | 25 | 96 | CR | 20 | 2.63 | 0.86 | 1.62 | 4.28 | 0.014 | 0.007 | 0.166 | 0.141 | ND | 0.001 | 0.009 | 0.222 | 0.49 | 0.38 | -0.05 | -0.05 | 0.06 | -0.05 | 18.00 | 0.56 |
| 9 | 25 | 96 | CR | 30 | 2.70 | 0.88 | 1.68 | 4.38 | 0.026 | 0.023 | 0.092 | 0.139 | ND | 0.003 | 0.021 | 0.249 | 0.48 | 0.28 | -0.05 | -0.05 | 0.07 | -0.05 | 18.75 | 0.73 |
| 9 | 25 | 96 | CR | 40 | 2.02 | 0.53 | 1.26 | 3.41 | 0.020 | 0.017 | 0.180 | 0.256 | ND | 0.060 | 0.015 | 0.272 | 0.77 | 0.78 | -0.05 | -0.05 | 0.14 | -0.05 | 13.25 | 2.00 |
| 9 | 25 | 96 | CR | 50 | 1.99 | 0.53 | 1.24 | 3.35 | 0.020 | 0.017 | 0.297 | 0.247 | ND | 0.046 | 0.015 | 0.292 | 0.81 | 0.74 | -0.05 | -0.05 | 0.17 | -0.05 | 12.75 | 2.80 |
| 9 | 25 | 96 | CR | 60 | 1.92 | 0.52 | 1.23 | 3.35 | 0.022 | 0.019 | 0.276 | 0.189 | ND | 0.044 | 0.014 | 0.282 | 0.84 | 0.85 | -0.05 | -0.05 | 0.20 | 0.05 | 13.00 | 3.70 |
| 9 | 25 | 96 | CR | 70 | 2.02 | 0.51 | 1.24 | 3.46 | 0.022 | 0.017 | 0.171 | 0.272 | ND | 0.057 | 0.013 | 0.294 | 0.81 | 0.87 | -0.05 | -0.05 | 0.20 | -0.05 | 14.00 | 3.90 |
| 9 | 25 | 96 | CR | 80 | 2.17 | 0.52 | 1.33 | 3.78 | 0.022 | 0.016 | 0.236 | 0.243 | ND | 0.110 | 0.012 | 0.361 | 0.84 | 0.83 | -0.05 | -0.05 | 0.30 | -0.05 | 14.75 | 4.70 |
| 9 | 25 | 96 | CR | 90 | 2.94 | 0.55 | 1.80 | 4.99 | 0.041 | 0.017 | 0.752 | 0.333 | 0.038 | 0.176 | 0.006 | 0.353 | 1.05 | 1.04 | 0.44 | 0.32 | 0.66 | 0.14 | 20.50 | 7.60 |
| 9 | 25 | 96 | CR | LO | 2.47 | 0.51 | 1.21 | 3.66 | 0.020 | 0.018 | 0.213 | 0.157 | ND | 0.005 | 0.017 | 0.298 | 0.61 | 0.60 | -0.05 | -0.05 | -0.05 | -0.05 | 14.00 | 0.30 |
| 9 | 25 | 96 | BR | IN | 2.88 | 0.27 | 1.15 | 4.78 | 0.013 | 0.013 | 0.121 | -9 | ND | 0.005 | 0.010 | 2.212 | 0.67 | 0.55 | -0.05 | -0.05 | -0.05 | -0.05 | 15.00 | 0.16 |
| 9 | 25 | 96 | BR | OUT | 1.91 | 0.29 | 0.89 | 3.45 | 0.016 | 0.007 | 0.263 | 0.254 | ND | 0.026 | 0.004 | 0.668 | 0.98 | 0.84 | -0.05 | -0.05 | 0.40 | -0.05 | 10.00 | 2.80 |
| 9 | 25 | 96 | SF | IN | 3.10 | 1.13 | 1.99 | 4.88 | 0.039 | 0.038 | 0.189 | 0.196 | ND | 0.002 | 0.038 | 0.217 | 0.20 | 0.31 | -0.05 | -0.05 | 0.06 | -0.05 | 21.50 | 0.12 |
| 9 | 25 | 96 | CR | OUT | 2.64 | 0.81 | 1.60 | 4.19 | 0.023 | 0.020 | 0.263 | 0.254 | ND | 0.014 | 0.017 | 0.260 | 3.12 | 0.46 | -0.05 | -0.05 | -0.05 | -0.05 | 16.50 | 0.66 |
| 9 | 25 | 96 | MR | UP | 4.64 | 1.17 | 2.19 | 4.25 | 0.054 | 0.050 | 0.261 | 0.157 | ND | 0.000 | 0.050 | 1.124 | 0.69 | 0.51 | -0.05 | -0.05 | -0.05 | -0.05 | 25.00 | 0.30 |
| 9 | 25 | 96 | MR | FR | 3.51 | 0.88 | 1.73 | 3.98 | 0.041 | 0.037 | 0.229 | 0.195 | ND | 0.007 | 0.028 | 0.764 | 1.09 | 0.61 | -0.05 | -0.05 | 0.12 | -0.05 | 19.50 | 1.50 |
| 9 | 25 | 96 | MR | LD | 3.48 | 0.85 | 1.73 | 3.96 | 0.037 | 0.033 | 0.207 | 0.250 | ND | 0.005 | 0.030 | 0.809 | 0.61 | 0.90 | -0.05 | -0.05 | 0.07 | -0.05 | 20.50 | 0.81 |
| 9 | 25 | 96 | KR | GS | 3.58 | 0.86 | 1.76 | 4.03 | 0.032 | 0.029 | 0.247 | 0.238 | ND | 0.006 | 0.027 | 0.763 | 0.44 | 0.51 | -0.05 | -0.05 | 0.09 | -0.05 | 21.25 | 0.73 |
| 9 | 25 | 96 | MR | HB | 3.49 | 0.86 | 1.80 | 4.15 | 0.031 | 0.027 | 0.218 | 0.175 | ND | 0.006 | 0.022 | 0.826 | 0.60 | 0.51 | -0.05 | -0.05 | 0.11 | -0.05 | 21.75 | 0.85 |

# APPENDIX C

## HYDROLOGY DATA FOR BLUE RIVER AND COUGAR PROJECTS

Note: Data are from the log sheets produced by the project. Cougar had a daily value with one datasheet per month. Blue River had a daily sheet with hourly values. Cougar listed meterological data as well and these were included in that dataset. Metric values were calculated from the project data based on the conversions listed in the table of conversions at the beginning of this report.

| RES | MO | DAY | YR | TIME | STAGE | BR-IN | LC | BR OUT | Elevation (m) | Inflow (cfs) | Inflow (cms) | BR IN (cms) | Outflow (cms) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BR | 1 | 1 | 96 | 0700 | 1246.39 | 956 | 469 | 1608 | 379.899672 | 1425 | 40.3515064 | 27.07090534 | 45.53348932 |
| BR | 1 | 2 | 96 | 0700 | 1251.04 | 579 | 316 | 1599 | 381.316992 | 895 | 25.3435777 | 16.39545418 | 45.2786377 |
| BR | 1 | 2 | 96 | 1030 | | | | 2010 | 0 | 0 | 0 | 0 | 0 |
| BR | 1 | 2 | 96 | 1100 | | | | 2514 | 0 | 0 | 0 | 0 | 0 |
| BR | 1 | 2 | 96 | 1130 | | | | 2936 | 0 | 0 | 0 | 0 | 0 |
| BR | 1 | 3 | 96 | 0700 | 1240.74 | 467 | 269 | 2830 | 378.177552 | 736 | 20.8411991 | 13.22396736 | 80.13667586 |
| BR | 1 | 4 | 96 | 0700 | 1228.48 | 583 | 296 | 2676 | 374.440704 | 879 | 24.8905082 | 16.50872156 | 75.77588148 |
| BR | 1 | 4 | 96 | 0730 | | | | 2381 | 0 | 0 | 0 | 0 | 0 |
| BR | 1 | 5 | 96 | 0700 | 1216.30 | 450 | 243 | 2228 | 370.72824 | 693 | 19.6235747 | 12.74258097 | 63.08993421 |
| BR | 1 | 6 | 96 | 0700 | 1201.70 | 558 | 256 | 2010 | 366.27816 | 814 | 23.0499131 | 15.8008004 | 56.91686165 |
| BR | 1 | 6 | 96 | 1330 | | | | 1357 | 0 | 0 | 0 | 0 | 0 |
| BR | 1 | 6 | 96 | 1400 | | | | 1013 | 0 | 0 | 0 | 0 | 0 |
| BR | 1 | 7 | 96 | 0700 | 1197.52 | 471 | 234 | 1007 | 365.004096 | 705 | 19.9633768 | 13.33723474 | 28.51506452 |
| BR | 1 | 8 | 96 | 0700 | 1206.00 | 1143 | 447 | 1081 | 367.5888 | 1590 | 45.0237861 | 32.36615565 | 30.61051117 |
| BR | 1 | 8 | 96 | 1200 | | | | 1462 | 0 | 0 | 0 | 0 | 0 |
| BR | 1 | 8 | 96 | 1300 | | | | 1846 | 0 | 0 | 0 | 0 | 0 |
| BR | 1 | 8 | 96 | 1400 | | | | 2099 | 0 | 0 | 0 | 0 | 0 |
| BR | 1 | 9 | 96 | 0700 | 1202.98 | 775 | 369 | 2126 | 366.668304 | 1144 | 32.3944725 | 21.94555611 | 60.20161585 |
| BR | 1 | 10 | 96 | 0700 | 1197.79 | 908 | 381 | 2054 | 365.086392 | 1289 | 36.5004153 | 25.71169671 | 58.1628029 |
| BR | 1 | 11 | 96 | 0700 | 1188.11 | 591 | 302 | 1874 | 362.135928 | 893 | 25.286944 | 16.73525634 | 53.06577051 |
| BR | 1 | 11 | 96 | 0110 | | | | 1251 | 0 | 0 | 0 | 0 | 0 |
| BR | 1 | 11 | 96 | 1130 | | | | 887 | 0 | 0 | 0 | 0 | 0 |
| BR | 1 | 11 | 96 | 1200 | | | | 634 | 0 | 0 | 0 | 0 | 0 |
| BR | 1 | 12 | 96 | 0700 | 1189.98 | 414 | 234 | 654 | 362.705904 | 648 | 18.3493166 | 11.72317449 | 18.51921767 |
| BR | 1 | 12 | 96 | 0730 | | | | 949 | 0 | 0 | 0 | 0 | 0 |
| BR | 1 | 13 | 96 | 0700 | 1186.33 | 324 | 192 | 920 | 361.593384 | 516 | 14.6114928 | 9.174658296 | 26.05149886 |
| BR | 1 | 13 | 96 | 0800 | | | | 634 | 0 | 0 | 0 | 0 | 0 |
| BR | 1 | 14 | 96 | 0700 | 1185.39 | 266 | 156 | 630 | 361.306872 | 422 | 11.9497093 | 7.532281193 | 17.83961335 |
| BR | 1 | 14 | 96 | 0800 | | | | 446 | 0 | 0 | 0 | 0 | 0 |
| BR | 1 | 15 | 96 | 0700 | 1190.53 | 611 | 234 | 471 | 362.873544 | 845 | 23.9277354 | 17.30159327 | 13.33723474 |
| BR | 1 | 15 | 96 | 0730 | | | | 597 | 0 | 0 | 0 | 0 | 0 |
| BR | 1 | 15 | 96 | 0800 | | | | 798 | 0 | 0 | 0 | 0 | 0 |
| BR | 1 | 15 | 96 | 0830 | | | | 990 | 0 | 0 | 0 | 0 | 0 |
| BR | 1 | 16 | 96 | 0700 | 1204.37 | 1337 | 419 | 1094 | 367.091976 | 1756 | 49.7243826 | 37.85962389 | 30.97863017 |
| BR | 1 | 16 | 96 | 1200 | | | | 1659 | 0 | 0 | 0 | 0 | 0 |
| BR | 1 | 16 | 96 | 1230 | | | | 2072 | 0 | 0 | 0 | 0 | 0 |
| BR | 1 | 16 | 96 | 1400 | | | | 2540 | 0 | 0 | 0 | 0 | 0 |
| BR | 1 | 17 | 96 | 0700 | 1202.35 | 892 | 353 | 2452 | 366.47628 | 1245 | 35.254474 | 25.25862716 | 69.43290784 |
| BR | 1 | 17 | 96 | 0800 | | | | 1659 | 0 | 0 | 0 | 0 | 0 |
| BR | 1 | 17 | 96 | 0830 | | | | 1151 | 0 | 0 | 0 | 0 | 0 |
| BR | 1 | 18 | 96 | 0700 | 1203.15 | 563 | 269 | 1157 | 366.72012 | 832 | 23.5596164 | 15.94238463 | 32.76259151 |
| BR | 1 | 19 | 96 | 0700 | 1204.19 | 945 | 408 | 1177 | 367.037112 | 1353 | 38.3126934 | 26.75942003 | 33.32892844 |
| BR | 1 | 19 | 96 | 1200 | | | | 1516 | 0 | 0 | 0 | 0 | 0 |
| BR | 1 | 19 | 96 | 1500 | | | | 1007 | 0 | 0 | 0 | 0 | 0 |
| BR | 1 | 19 | 96 | 1530 | | | | 522 | 0 | 0 | 0 | 0 | 0 |
| BR | 1 | 20 | 96 | 0700 | 1216.41 | 733 | 362 | 543 | 370.761768 | 1095 | 31.006947 | 20.75624855 | 15.3760477 |
| BR | 1 | 20 | 96 | 1400 | | | | 1100 | 0 | 0 | 0 | 0 | 0 |
| BR | 1 | 20 | 96 | 1430 | | | | 1477 | 0 | 0 | 0 | 0 | 0 |
| BR | 1 | 21 | 96 | 0700 | 1221.78 | 632 | 391 | 1500 | 372.398544 | 1023 | 28.9681341 | 17.89624705 | 42.47526989 |
| BR | 1 | 22 | 96 | 0700 | 1219.22 | 407 | 267 | 1462 | 371.618256 | 674 | 19.0855546 | 11.52495656 | 41.39922972 |
| BR | 1 | 23 | 96 | 0700 | 1212.50 | 324 | 208 | 1402 | 369.57 | 532 | 15.0645624 | 9.174658296 | 39.70021892 |
| BR | 1 | 23 | 96 | 1200 | | | | 1007 | 0 | 0 | 0 | 0 | 0 |
| BR | 1 | 24 | 96 | 0700 | 1208.08 | 280 | 179 | 995 | 368.222784 | 459 | 12.9974326 | 7.928717046 | 28.17526236 |
| BR | 1 | 25 | 96 | 0700 | 1203.35 | 241 | 148 | 960 | 366.78108 | 389 | 11.0152533 | 6.824360029 | 27.18417273 |
| BR | 1 | 25 | 96 | 0730 | | | | 995 | 0 | 0 | 0 | 0 | 0 |
| BR | 1 | 26 | 96 | 0700 | 1196.44 | 212 | 123 | 949 | 364.674912 | 335 | 9.48614361 | 6.003171478 | 26.87268742 |
| BR | 1 | 26 | 96 | 0800 | | | | 1001 | 0 | 0 | 0 | 0 | 0 |
| BR | 1 | 27 | 96 | 0700 | 1187.68 | 206 | 117 | 935 | 362.004864 | 323 | 9.14634145 | 5.833270398 | 26.47625156 |
| BR | 1 | 27 | 96 | 1000 | | | | 654 | 0 | 0 | 0 | 0 | 0 |
| BR | 1 | 27 | 96 | 1030 | | | | 404 | 0 | 0 | 0 | 0 | 0 |
| BR | 1 | 28 | 96 | 0700 | 1189.38 | 218 | 123 | 416 | 362.523024 | 341 | 9.65604469 | 6.173072557 | 11.77980818 |
| BR | 1 | 29 | 96 | 0700 | 1191.35 | 194 | 113 | 424 | 363.12348 | 307 | 8.6932719 | 5.493468239 | 12.00634296 |
| BR | 1 | 30 | 96 | 0700 | 1191.63 | 175 | 98 | 420 | 363.208824 | 273 | 7.73049912 | 4.955448154 | 11.89307557 |
| BR | 1 | 30 | 96 | 0900 | | | | 301 | 0 | 0 | 0 | 0 | 0 |
| BR | 1 | 31 | 96 | 0700 | 1192.64 | 161 | 89 | 292 | 363.516672 | 250 | 7.07921165 | 4.559012301 | 8.268519205 |
| BR | 1 | 31 | 96 | 1330 | | | | 208 | 0 | 0 | 0 | 0 | 0 |
| BR | 1 | 31 | 96 | 1400 | | | | 135 | 0 | 0 | 0 | 0 | 0 |
| BR | 1 | 31 | 96 | 1430 | | | | 90 | 0 | 0 | 0 | 0 | 0 |
| BR | 1 | 31 | 96 | 1500 | | | | 46 | 0 | 0 | 0 | 0 | 0 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BR | 2 | 1 | 96 | 0700 | 1196.01 | 60 | 82 | 45 | 364.543848 | 142 | 4.02099222 | 1.699010796 | 1.274258097 |
| BR | 2 | 2 | 96 | 0700 | 1199.80 | 139 | 74 | 47 | 365.69904 | 213 | 6.03148832 | 3.936041676 | 1.33089179 |
| BR | 2 | 3 | 96 | 0700 | 1203.02 | 131 | 71 | 47 | 366.680496 | 202 | 5.72000301 | 3.709506904 | 1.33089179 |
| BR | 2 | 4 | 96 | 0700 | 1206.16 | 161 | 86 | 49 | 367.637568 | 247 | 6.99426111 | 4.559012301 | 1.387525483 |
| BR | 2 | 5 | 96 | 0700 | 1211.12 | 287 | 140 | 52 | 369.149376 | 427 | 12.0912935 | 8.126934972 | 1.472476023 |
| BR | 2 | 6 | 96 | 0700 | 1229.48 | 3365 | 981 | 78 | 374.745504 | 4346 | 123.065015 | 95.28618878 | 2.208714034 |
| BR | 2 | 7 | 96 | 0700 | 1286.64 | 7213 | | 127 | 392.167872 | 7213 | 204.249414 | 204.2494145 | 3.596239517 |
| BR | 2 | 7 | 96 | 0730 | | | | 90 | 0 | 0 | 0 | 0 | 0 |
| BR | 2 | 8 | 96 | 0700 | 1324.93 | 2942 | | 55 | 403.838664 | 2942 | 83.3081627 | 83.30816267 | 1.557426563 |
| BR | 2 | 9 | 96 | 0230 | | | | 135 | 0 | 0 | 0 | 0 | 0 |
| BR | 2 | 9 | 96 | 0300 | 1338.90 | | | 301 | 0 | 0 | 0 | 0 | 0 |
| BR | 2 | 9 | 96 | 0400 | | | | 392 | 0 | 0 | 0 | 0 | 0 |
| BR | 2 | 9 | 96 | 0500 | | | | 497 | 0 | 0 | 0 | 0 | 0 |
| BR | 2 | 9 | 96 | 0600 | | | | 592 | 0 | 0 | 0 | 0 | 0 |
| BR | 2 | 9 | 96 | 0700 | 1342.12 | 3708 | | 766 | 409.078176 | 3708 | 104.998867 | 104.9988672 | 21.69070449 |
| BR | 2 | 9 | 96 | 0800 | | | | 1007 | 0 | 0 | 0 | 0 | 0 |
| BR | 2 | 9 | 96 | 1600 | | | | 1203 | 0 | 0 | 0 | 0 | 0 |
| BR | 2 | 9 | 96 | 1700 | | | | 1402 | 0 | 0 | 0 | 0 | 0 |
| BR | 2 | 9 | 96 | 1800 | | | | 1608 | 0 | 0 | 0 | 0 | 0 |
| BR | 2 | 9 | 96 | 1900 | | | | 1791 | 0 | 0 | 0 | 0 | 0 |
| BR | 2 | 9 | 96 | 2000 | | | | 1992 | 0 | 0 | 0 | 0 | 0 |
| BR | 2 | 10 | 96 | 0100 | | | | 2523 | 0 | 0 | 0 | 0 | 0 |
| BR | 2 | 10 | 96 | 0200 | | | | 3007 | 0 | 0 | 0 | 0 | 0 |
| BR | 2 | 10 | 96 | 0300 | | | | 3525 | 0 | 0 | 0 | 0 | 0 |
| BR | 2 | 10 | 96 | 0400 | | | | 3714 | 0 | 0 | 0 | 0 | 0 |
| BR | 2 | 10 | 96 | 0700 | 1348.73 | 1484 | #### | 3714 | 411.092904 | 2500 | 70.7921165 | 42.02220034 | 105.1687682 |
| BR | 2 | 11 | 96 | 0700 | 1344.71 | 806 | 630 | 3689 | 409.867608 | 1436 | 40.6629917 | 22.82337835 | 104.4608471 |
| BR | 2 | 11 | 96 | 0730 | | | | 3714 | 0 | 0 | 0 | 0 | 0 |
| BR | 2 | 12 | 96 | 0700 | 1338.97 | 670 | 503 | 3689 | 408.118056 | 1173 | 33.2156611 | 18.97228722 | 104.4608471 |
| BR | 2 | 12 | 96 | 0800 | | | | 3714 | 0 | 0 | 0 | 0 | 0 |
| BR | 2 | 13 | 96 | 0700 | 1332.84 | 706 | 476 | 3650 | 406.249632 | 1182 | 33.4705127 | 19.99169369 | 103.3564901 |
| BR | 2 | 13 | 96 | 0730 | | | | 3701 | 0 | 0 | 0 | 0 | 0 |
| BR | 2 | 14 | 96 | 0700 | 1326.43 | 679 | 469 | 3638 | 404.295864 | 1148 | 32.5077399 | 19.22713884 | 103.0166879 |
| BR | 2 | 15 | 96 | 0700 | 1319.69 | 648 | 447 | 3650 | 402.241512 | 1095 | 31.006947 | 18.34931659 | 103.3564901 |
| BR | 2 | 16 | 96 | 0700 | 1312.21 | 624 | 436 | 3752 | 399.961608 | 1060 | 30.0158574 | 17.66971227 | 106.2448084 |
| BR | 2 | 17 | 96 | 0700 | 1304.46 | 684 | 473 | 3663 | 397.599408 | 1157 | 32.7625915 | 19.36872307 | 103.7246091 |
| BR | 2 | 17 | 96 | 1300 | | | | 3739 | 0 | 0 | 0 | 0 | 0 |
| BR | 2 | 18 | 96 | 0700 | 1297.81 | 1778 | 702 | 3701 | 395.572488 | 2480 | 70.2257795 | 50.34735324 | 104.8006492 |
| BR | 2 | 18 | 96 | 0800 | | | | 2957 | 0 | 0 | 0 | 0 | 0 |
| BR | 2 | 18 | 96 | 1100 | | | | 1992 | 0 | 0 | 0 | 0 | 0 |
| BR | 2 | 19 | 96 | 0700 | 1294.95 | 1357 | 740 | 2001 | 394.70076 | 2097 | 59.3804273 | 38.42596083 | 56.66201003 |
| BR | 2 | 20 | 96 | 0700 | 1300.06 | 897 | 829 | 2001 | 396.258288 | 1726 | 48.8748772 | 25.40021139 | 56.66201003 |
| BR | 2 | 20 | 96 | 1200 | | | | 2505 | 0 | 0 | 0 | 0 | 0 |
| BR | 2 | 20 | 96 | 1430 | | | | 2876 | 0 | 0 | 0 | 0 | 0 |
| BR | 2 | 20 | 96 | 1500 | | | | 2995 | 0 | 0 | 0 | 0 | 0 |
| BR | 2 | 21 | 96 | 0700 | 1295.68 | 620 | 469 | 2947 | 394.923264 | 1089 | 30.8370459 | 17.55644489 | 83.44974691 |
| BR | 2 | 22 | 96 | 0700 | 1288.97 | 457 | 388 | 2853 | 392.878056 | 845 | 23.9277354 | 12.94079889 | 80.78796333 |
| BR | 2 | 22 | 96 | 0900 | | | | 3007 | 0 | 0 | 0 | 0 | 0 |
| BR | 2 | 22 | 96 | 1200 | | | | 2505 | 0 | 0 | 0 | 0 | 0 |
| BR | 2 | 22 | 96 | 1300 | | | | 2001 | 0 | 0 | 0 | 0 | 0 |
| BR | 2 | 23 | 96 | 0700 | 1283.73 | 394 | 353 | 1992 | 391.280904 | 747 | 21.1526844 | 11.15683756 | 56.40715841 |
| BR | 2 | 23 | 96 | 0800 | | | | 1591 | 0 | 0 | 0 | 0 | 0 |
| BR | 2 | 23 | 96 | 0830 | | | | 1184 | 0 | 0 | 0 | 0 | 0 |
| BR | 2 | 23 | 96 | 0900 | | | | 809 | 0 | 0 | 0 | 0 | 0 |
| BR | 2 | 23 | 96 | 0930 | | | | 620 | 0 | 0 | 0 | 0 | 0 |
| BR | 2 | 23 | 96 | 1000 | | | | 518 | 0 | 0 | 0 | 0 | 0 |
| BR | 2 | 24 | 96 | 0700 | 1284.32 | 311 | 304 | 522 | 391.460736 | 615 | 17.4148607 | 8.80653929 | 14.78139392 |
| BR | 2 | 25 | 96 | 0700 | 1284.74 | 208 | 272 | 522 | 391.588752 | 480 | 13.5920864 | 5.889904091 | 14.78139392 |
| BR | 2 | 26 | 96 | 0700 | 1284.80 | 231 | 251 | 522 | 391.60704 | 482 | 13.6487201 | 6.541191563 | 14.78139392 |
| BR | 2 | 26 | 96 | 1000 | | | | 392 | 0 | 0 | 0 | 0 | 0 |
| BR | 2 | 26 | 96 | 1030 | | | | 301 | 0 | 0 | 0 | 0 | 0 |
| BR | 2 | 26 | 96 | 1100 | | | | 208 | 0 | 0 | 0 | 0 | 0 |
| BR | 2 | 26 | 96 | 1130 | | | | 124 | 0 | 0 | 0 | 0 | 0 |
| BR | 2 | 26 | 96 | 1200 | | | | 49 | 0 | 0 | 0 | 0 | 0 |
| BR | 2 | 27 | 96 | 0700 | 1286.08 | 208 | 231 | 48 | 391.997184 | 439 | 12.4310957 | 5.889904091 | 1.359208636 |
| BR | 2 | 28 | 96 | 0700 | 1287.44 | 188 | 217 | 47 | 392.411712 | 405 | 11.4683229 | 5.323567159 | 1.33089179 |
| BR | 2 | 29 | 96 | 0700 | 1288.64 | 122 | 204 | 47 | 392.777472 | 326 | 9.23129199 | 3.454655284 | 1.33089179 |
| BR | 3 | 1 | 96 | 0700 | 1289.66 | 166 | 195 | 57 | 393.088368 | 361 | 10.2223816 | 4.700596534 | 1.614060256 |
| BR | 3 | 2 | 96 | 0700 | 1290.68 | 172 | 190 | 57 | 393.399264 | 362 | 10.2506985 | 4.870497614 | 1.614060256 |
| BR | 3 | 3 | 96 | 0700 | 1291.80 | 210 | 201 | 58 | 393.74064 | 411 | 11.6382239 | 5.946537784 | 1.642377102 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BR | 3 | 4 | 96 | 0700 | 1293.49 | 332 | 243 | 58 | 394.255752 | 575 | 16.2821868 | 9.401193069 | 1.642377102 |
| BR | 3 | 5 | 96 | 0700 | 1296.09 | 460 | 302 | 60 | 395.048232 | 762 | 21.5774371 | 13.02574943 | 1.699010796 |
| BR | 3 | 6 | 96 | 0700 | 1298.69 | 358 | 285 | 61 | 395.840712 | 643 | 18.2077324 | 10.13743108 | 1.727327642 |
| BR | 3 | 7 | 96 | 0700 | 1300.71 | 319 | 264 | 61 | 396.456408 | 583 | 16.5087216 | 9.033074063 | 1.727327642 |
| BR | 3 | 8 | 96 | 0700 | 1302.55 | 345 | 264 | 60 | 397.01724 | 609 | 17.2449596 | 9.769312074 | 1.699010796 |
| BR | 3 | 8 | 96 | 1100 | | | | 112 | 0 | 0 | 0 | 0 | 0 |
| BR | 3 | 8 | 96 | 1130 | | | | 203 | 0 | 0 | 0 | 0 | 0 |
| BR | 3 | 9 | 96 | 0700 | 1304.30 | 446 | 302 | 203 | 397.55064 | 748 | 21.1810013 | 12.62931358 | 5.748319858 |
| BR | 3 | 10 | 96 | 0700 | 1306.33 | 464 | 325 | 206 | 398.169384 | 789 | 22.341992 | 13.13901682 | 5.833270398 |
| BR | 3 | 11 | 96 | 0700 | 1308.33 | 481 | 353 | 206 | 398.778984 | 834 | 23.6162501 | 13.62040321 | 5.833270398 |
| BR | 3 | 11 | 96 | 0830 | | | | 392 | 0 | 0 | 0 | 0 | 0 |
| BR | 3 | 11 | 96 | 0900 | | | | 583 | 0 | 0 | 0 | 0 | 0 |
| BR | 3 | 11 | 96 | 0930 | | | | 814 | 0 | 0 | 0 | 0 | 0 |
| BR | 3 | 11 | 96 | 1000 | | | | 995 | 0 | 0 | 0 | 0 | 0 |
| BR | 3 | 12 | 96 | 0700 | 1308.41 | 510 | 356 | 984 | 398.803368 | 866 | 24.5223891 | 14.44159176 | 27.86377705 |
| BR | 3 | 13 | 96 | 0700 | 1308.00 | 404 | 319 | 984 | 398.6784 | 723 | 20.4730801 | 11.44000602 | 27.86377705 |
| BR | 3 | 13 | 96 | 0930 | | | | 803 | 0 | 0 | 0 | 0 | 0 |
| BR | 3 | 14 | 96 | 0700 | 1307.62 | 326 | 285 | 809 | 398.562576 | 611 | 17.3015933 | 9.231291989 | 22.90832889 |
| BR | 3 | 14 | 96 | 1330 | | | | 606 | 0 | 0 | 0 | 0 | 0 |
| BR | 3 | 14 | 96 | 1400 | | | | 408 | 0 | 0 | 0 | 0 | 0 |
| BR | 3 | 14 | 96 | 1430 | | | | 298 | 0 | 0 | 0 | 0 | 0 |
| BR | 3 | 15 | 96 | 0700 | 1308.03 | 289 | 264 | 295 | 398.687544 | 553 | 15.6592162 | 8.183568665 | 8.353469745 |
| BR | 3 | 15 | 96 | 1000 | | | | 208 | 0 | 0 | 0 | 0 | 0 |
| BR | 3 | 16 | 96 | 0700 | 1308.94 | 255 | 243 | 206 | 398.964912 | 498 | 14.1017896 | 7.220795881 | 5.833270398 |
| BR | 3 | 17 | 96 | 0700 | 1309.70 | 227 | 229 | 206 | 399.19656 | 456 | 12.912482 | 6.427924176 | 5.833270398 |
| BR | 3 | 18 | 96 | 0700 | 1310.33 | 214 | 217 | 208 | 399.388584 | 431 | 12.2045609 | 6.059805171 | 5.889904091 |
| BR | 3 | 18 | 96 | 1000 | | | | 155 | 0 | 0 | 0 | 0 | 0 |
| BR | 3 | 18 | 96 | 1130 | | | | 101 | 0 | 0 | 0 | 0 | 0 |
| BR | 3 | 18 | 96 | 1200 | | | | 49 | 0 | 0 | 0 | 0 | 0 |
| BR | 3 | 19 | 96 | 0700 | 1311.26 | 212 | 217 | 49 | 399.672048 | 429 | 12.1479272 | 6.003171478 | 1.387525483 |
| BR | 3 | 20 | 96 | 0700 | 1312.29 | 206 | 211 | 49 | 399.985992 | 417 | 11.808125 | 5.833270398 | 1.387525483 |
| BR | 3 | 21 | 96 | 0700 | 1313.19 | 190 | 204 | 49 | 400.260312 | 394 | 11.1568376 | 5.380200852 | 1.387525483 |
| BR | 3 | 22 | 96 | 0700 | 1314.08 | 192 | 211 | 49 | 400.531584 | 403 | 11.4116892 | 5.436834546 | 1.387525483 |
| BR | 3 | 23 | 96 | 0700 | 1314.95 | 177 | 199 | 49 | 400.79676 | 376 | 10.6471343 | 5.012081847 | 1.387525483 |
| BR | 3 | 24 | 96 | 0700 | 1315.72 | 164 | 188 | 49 | 401.031456 | 352 | 9.96753 | 4.643962841 | 1.387525483 |
| BR | 3 | 25 | 96 | 0700 | 1316.40 | 150 | 176 | 49 | 401.23872 | 326 | 9.23129199 | 4.247526989 | 1.387525483 |
| BR | 3 | 26 | 96 | 0700 | 1317.00 | 139 | 170 | 49 | 401.4216 | 309 | 8.7499056 | 3.936041676 | 1.387525483 |
| BR | 3 | 27 | 96 | 0700 | 1317.55 | 130 | 166 | 50 | 401.58924 | 296 | 8.38178659 | 3.681190057 | 1.41584233 |
| BR | 3 | 28 | 96 | 0700 | 1318.10 | 128 | 164 | 50 | 401.75688 | 292 | 8.2685192 | 3.624556364 | 1.41584233 |
| BR | 3 | 29 | 96 | 0700 | 1318.59 | 121 | 158 | 50 | 401.906232 | 279 | 7.9004002 | 3.426338438 | 1.41584233 |
| BR | 3 | 30 | 96 | 0700 | 1319.06 | 115 | 152 | 50 | 402.049488 | 267 | 7.56059804 | 3.256437358 | 1.41584233 |
| BR | 3 | 31 | 96 | 0700 | 1319.51 | 119 | 156 | 50 | 402.186648 | 275 | 7.78713281 | 3.369704744 | 1.41584233 |
| BR | 4 | 1 | 96 | 0700 | 1321.12 | 563 | 313 | 55 | 402.677376 | 876 | 24.8055576 | 15.94238463 | 1.557426563 |
| BR | 4 | 2 | 96 | 0700 | 1323.75 | 464 | 334 | 55 | 403.479 | 798 | 22.5968436 | 13.13901682 | 1.557426563 |
| BR | 4 | 3 | 96 | 0700 | 1325.97 | 385 | 313 | 54 | 404.155656 | 698 | 19.7651589 | 10.90198594 | 1.529109716 |
| BR | 4 | 3 | 96 | 1030 | | | | 108 | 0 | 0 | 0 | 0 | 0 |
| BR | 4 | 3 | 96 | 1100 | | | | 187 | 0 | 0 | 0 | 0 | 0 |
| BR | 4 | 3 | 96 | 1130 | | | | 283 | 0 | 0 | 0 | 0 | 0 |
| BR | 4 | 3 | 96 | 1200 | | | | 404 | 0 | 0 | 0 | 0 | 0 |
| BR | 4 | 3 | 96 | 1230 | | | | 497 | 0 | 0 | 0 | 0 | 0 |
| BR | 4 | 4 | 96 | 0700 | 1326.74 | 301 | 272 | 497 | 404.390352 | 573 | 16.2255531 | 8.523370824 | 14.07347276 |
| BR | 4 | 5 | 96 | 0700 | 1326.91 | 257 | 251 | 497 | 404.442168 | 508 | 14.3849581 | 7.277429574 | 14.07347276 |
| BR | 4 | 5 | 96 | 0900 | | | | 349 | 0 | 0 | 0 | 0 | 0 |
| BR | 4 | 5 | 96 | 1000 | | | | 255 | 0 | 0 | 0 | 0 | 0 |
| BR | 4 | 5 | 96 | 1030 | | | | 185 | 0 | 0 | 0 | 0 | 0 |
| BR | 4 | 5 | 96 | 1100 | | | | 96 | 0 | 0 | 0 | 0 | 0 |
| BR | 4 | 5 | 96 | 1130 | | | | 50 | 0 | 0 | 0 | 0 | 0 |
| BR | 4 | 6 | 96 | 0700 | 1327.91 | 241 | 243 | 49 | 404.746968 | 484 | 13.7053538 | 6.824360029 | 1.387525483 |
| BR | 4 | 7 | 96 | 0700 | 1328.93 | 233 | 243 | 49 | 405.057864 | 476 | 13.478819 | 6.597825256 | 1.387525483 |
| BR | 4 | 8 | 96 | 0700 | 1330.00 | 231 | 251 | 49 | 405.384 | 482 | 13.6487201 | 6.541191563 | 1.387525483 |
| BR | 4 | 8 | 96 | 1100 | | | | 117 | 0 | 0 | 0 | 0 | 0 |
| BR | 4 | 9 | 96 | 0700 | 1330.90 | | | 117 | 405.65832 | 0 | 0 | 0 | 3.313071051 |
| BR | 4 | 10 | 96 | 0700 | 1331.68 | 200 | 236 | 131 | 405.896064 | 436 | 12.3461451 | 5.663369318 | 3.709506904 |
| BR | 4 | 11 | 96 | 0700 | 1332.43 | 198 | 229 | 117 | 406.124664 | 427 | 12.0912935 | 5.606735625 | 3.313071051 |
| BR | 4 | 11 | 96 | 1100 | | | | 147 | 0 | 0 | 0 | 0 | 0 |
| BR | 4 | 12 | 96 | 0700 | 1333.55 | 259 | 238 | 148 | 406.46604 | 497 | 14.0734728 | 7.334063267 | 4.190893296 |
| BR | 4 | 12 | 96 | 1100 | | | | 206 | 0 | 0 | 0 | 0 | 0 |
| BR | 4 | 12 | 96 | 1130 | | | | 300 | 0 | 0 | 0 | 0 | 0 |
| BR | 4 | 13 | 96 | 0700 | | | | 286 | 0.3048 | 0 | 0 | 0 | 8.098618125 |
| BR | 4 | 14 | 96 | 0700 | 1335.30 | 332 | 261 | 303 | 406.99944 | 593 | 16.79189 | 9.401193069 | 8.580004517 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BR | 4 | 15 | 96 | 0700 | 1336.19 | 342 | 267 | 303 | 407.270712 | 609 | 17.2449596 | 9.684361534 | 8.580004517 |
| BR | 4 | 16 | 96 | 0700 | 1337.12 | 329 | 288 | 306 | 407.554176 | 617 | 17.4714943 | 9.316242529 | 8.664955057 |
| BR | 4 | 16 | 96 | 1000 | | | | 390 | 0 | 0 | 0 | 0 | 0 |
| BR | 4 | 16 | 96 | 1030 | | | | 513 | 0 | 0 | 0 | 0 | 0 |
| BR | 4 | 17 | 96 | 0700 | 1337.71 | 458 | 291 | 505 | 407.734008 | 749 | 21.2093181 | 12.96911574 | 14.30000753 |
| BR | 4 | 17 | 96 | 1030 | | | | 704 | 0 | 0 | 0 | 0 | 0 |
| BR | 4 | 18 | 96 | 0700 | 1337.67 | 321 | 272 | 699 | 407.721816 | 593 | 16.79189 | 9.089707756 | 19.79347577 |
| BR | 4 | 19 | 96 | 0700 | 1337.62 | 364 | 283 | 704 | 407.706576 | 647 | 18.3209997 | 10.30733216 | 19.93506 |
| BR | 4 | 20 | 96 | 0700 | 1337.63 | | 283 | 694 | 407.709624 | 283 | 8.01366759 | 0 | 19.65189153 |
| BR | 4 | 21 | 96 | 0700 | 1337.65 | | 280 | 694 | 407.71572 | 280 | 7.92871705 | 0 | 19.65189153 |
| BR | 4 | 22 | 96 | 0700 | 1337.69 | | 310 | 699 | 407.727912 | 310 | 8.77822244 | 0 | 19.79347577 |
| BR | 4 | 22 | 96 | 1500 | | | | 892 | 0 | 0 | 0 | 0 | 0 |
| BR | 4 | 23 | 96 | 0700 | 1340.51 | | 648 | 898 | 408.587448 | 648 | 18.3493166 | 0 | 25.42852824 |
| BR | 4 | 23 | 96 | 0830 | | | | 1107 | 0 | 0 | 0 | 0 | 0 |
| BR | 4 | 23 | 96 | 0900 | | | | 1286 | 0 | 0 | 0 | 0 | 0 |
| BR | 4 | 23 | 96 | 0930 | | | | 1516 | 0 | 0 | 0 | 0 | 0 |
| BR | 4 | 24 | 96 | 0700 | 1346.25 | | #### | 1541 | 410.337 | 1176 | 33.3006116 | 0 | 43.6362606 |
| BR | 4 | 24 | 96 | 0730 | | | | 1031 | 0 | 0 | 0 | 0 | 0 |
| BR | 4 | 24 | 96 | 1200 | | | | 1492 | 0 | 0 | 0 | 0 | 0 |
| BR | 4 | 24 | 96 | 1230 | | | | 1865 | 0 | 0 | 0 | 0 | 0 |
| BR | 4 | 24 | 96 | 1300 | | | | 2191 | 0 | 0 | 0 | 0 | 0 |
| BR | 4 | 24 | 96 | 1330 | | | | 2487 | 0 | 0 | 0 | 0 | 0 |
| BR | 4 | 25 | 96 | 0700 | 1348.77 | | 716 | 2461 | 411.105096 | 716 | 20.2748622 | 0 | 69.68775946 |
| BR | 4 | 26 | 96 | 0700 | 1346.84 | | 529 | 2461 | 410.516832 | 529 | 14.9796118 | 0 | 69.68775946 |
| BR | 4 | 26 | 96 | 1000 | | | | 2117 | 0 | 0 | 0 | 0 | 0 |
| BR | 4 | 26 | 96 | 1030 | | | | 1819 | 0 | 0 | 0 | 0 | 0 |
| BR | 4 | 26 | 96 | 1100 | | | | 1533 | 0 | 0 | 0 | 0 | 0 |
| BR | 4 | 26 | 96 | 1500 | | | | 1031 | 0 | 0 | 0 | 0 | 0 |
| BR | 4 | 27 | 96 | 0700 | 1346.32 | | 419 | 1031 | 410.358336 | 419 | 11.8647587 | 0 | 29.19466884 |
| BR | 4 | 28 | 96 | 0700 | 1345.84 | | 346 | 1031 | 410.212032 | 346 | 9.79762892 | 0 | 29.19466884 |
| BR | 4 | 28 | 96 | 1100 | | | | 806 | 0 | 0 | 0 | 0 | 0 |
| BR | 4 | 29 | 96 | 0700 | 1345.38 | | 299 | 806 | 410.071824 | 299 | 8.46673713 | 0 | 22.82337835 |
| BR | 4 | 29 | 96 | 0930 | | | | 611 | 0 | 0 | 0 | 0 | 0 |
| BR | 4 | 30 | 96 | 0700 | 1345.14 | 255 | 269 | 611 | 409.998672 | 524 | 14.8380276 | 7.220795881 | 17.30159327 |
| BR | 4 | 30 | 96 | 0730 | | | | 509 | 0 | 0 | 0 | 0 | 0 |
| BR | 5 | 1 | 96 | 0700 | 1345.12 | 229 | 254 | 509 | 409.992576 | 483 | 13.6770369 | 6.48455787 | 14.41327492 |
| BR | 5 | 1 | 96 | 1000 | | | | 400 | 0 | 0 | 0 | 0 | 0 |
| BR | 5 | 2 | 96 | 0700 | 1345.16 | 202 | 234 | 400 | 410.004768 | 436 | 12.3461451 | 5.720003012 | 11.32673864 |
| BR | 5 | 3 | 96 | 0700 | 1345.14 | 185 | 215 | 396 | 409.998672 | 400 | 11.3267386 | 5.23861662 | 11.21347125 |
| BR | 5 | 3 | 96 | 1100 | | | | 309 | 0 | 0 | 0 | 0 | 0 |
| BR | 5 | 4 | 96 | 0700 | 1345.21 | 166 | 206 | 309 | 410.020008 | 372 | 10.5338669 | 4.700596534 | 8.749905597 |
| BR | 5 | 5 | 96 | 0700 | 1345.22 | 153 | 192 | 309 | 410.023056 | 345 | 9.76931207 | 4.332477529 | 8.749905597 |
| BR | 5 | 5 | 96 | 0730 | | | | 215 | 0 | 0 | 0 | 0 | 0 |
| BR | 5 | 5 | 96 | 0800 | | | | 114 | 0 | 0 | 0 | 0 | 0 |
| BR | 5 | 5 | 96 | 0900 | | | | 54 | 0 | 0 | 0 | 0 | 0 |
| BR | 5 | 6 | 96 | 0700 | 1345.73 | 139 | 183 | 54 | 410.178504 | 322 | 9.1180246 | 3.936041676 | 1.529109716 |
| BR | 5 | 7 | 96 | 0700 | 1346.21 | 130 | 176 | 54 | 410.324808 | 306 | 8.66495506 | 3.681190057 | 1.529109716 |
| BR | 5 | 8 | 96 | 0700 | 1346.64 | 122 | 168 | 54 | 410.455872 | 290 | 8.21188551 | 3.454655284 | 1.529109716 |
| BR | 5 | 9 | 96 | 0700 | 1347.03 | 115 | 162 | 54 | 410.574744 | 277 | 7.84376651 | 3.256437358 | 1.529109716 |
| BR | 5 | 10 | 96 | 0700 | 1347.39 | 110 | 158 | 54 | 410.684472 | 268 | 7.58891489 | 3.114853125 | 1.529109716 |
| BR | 5 | 11 | 96 | 0700 | 1347.74 | 104 | 154 | 54 | 410.791152 | 258 | 7.30574642 | 2.944952046 | 1.529109716 |
| BR | 5 | 12 | 96 | 0700 | 1348.00 | 102 | 154 | 54 | 410.8704 | 256 | 7.24911273 | 2.888318352 | 1.529109716 |
| BR | 5 | 13 | 96 | 0700 | 1348.40 | 107 | 160 | 54 | 410.99232 | 267 | 7.56059804 | 3.029902585 | 1.529109716 |
| BR | 5 | 14 | 96 | 0700 | 1348.98 | 194 | 226 | 54 | 411.169104 | 420 | 11.8930756 | 5.493468239 | 1.529109716 |
| BR | 5 | 14 | 96 | 1000 | | | | 114 | 0 | 0 | 0 | 0 | 0 |
| BR | 5 | 14 | 96 | 1030 | | | | 199 | 0 | 0 | 0 | 0 | 0 |
| BR | 5 | 14 | 96 | 1200 | | | | 300 | 0 | 0 | 0 | 0 | 0 |
| BR | 5 | 14 | 96 | 1230 | | | | 380 | 0 | 0 | 0 | 0 | 0 |
| BR | 5 | 14 | 96 | 1300 | | | | 444 | 0 | 0 | 0 | 0 | 0 |
| BR | 5 | 15 | 96 | 0700 | 1349.50 | 467 | 299 | 453 | 411.3276 | 766 | 21.6907045 | 13.22396736 | 12.82753151 |
| BR | 5 | 15 | 96 | 0715 | | | | 550 | 0 | 0 | 0 | 0 | 0 |
| BR | 5 | 15 | 96 | 0745 | | | | 723 | 0 | 0 | 0 | 0 | 0 |
| BR | 5 | 15 | 96 | 0800 | | | | 990 | 0 | 0 | 0 | 0 | 0 |
| BR | 5 | 15 | 96 | 0830 | | | | 1197 | 0 | 0 | 0 | 0 | 0 |
| BR | 5 | 15 | 96 | 1200 | | | | 1541 | 0 | 0 | 0 | 0 | 0 |
| BR | 5 | 16 | 96 | 0700 | 1349.11 | 563 | 337 | 1533 | 411.208728 | 900 | 25.4851619 | 15.94238463 | 43.40972583 |
| BR | 5 | 16 | 96 | 0730 | | | | 1197 | 0 | 0 | 0 | 0 | 0 |
| BR | 5 | 16 | 96 | 1100 | | | | 909 | 0 | 0 | 0 | 0 | 0 |
| BR | 5 | 17 | 96 | 0700 | 1349.00 | 433 | 319 | 903 | 411.1752 | 752 | 21.2942686 | 12.26119457 | 25.57011247 |
| BR | 5 | 17 | 96 | 0730 | | | | 714 | 0 | 0 | 0 | 0 | 0 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BR | 5 | 18 | 96 | 0700 | 1350.38 | 747 | 454 | 719 | 411.595824 | 1201 | 34.0085328 | 21.1526844 | 20.3598127 |
| BR | 5 | 18 | 96 | 0830 | | | | 909 | 0 | 0 | 0 | 0 | 0 |
| BR | 5 | 18 | 96 | 0900 | | | | 1197 | 0 | 0 | 0 | 0 | 0 |
| BR | 5 | 18 | 96 | 0930 | | | | 1541 | 0 | 0 | 0 | 0 | 0 |
| BR | 5 | 19 | 96 | 0700 | 1350.49 | 835 | 476 | 1516 | 411.629352 | 1311 | 37.1233859 | 23.6445669 | 42.92833943 |
| BR | 5 | 20 | 96 | 0700 | 1350.13 | 637 | 415 | 1541 | 411.519624 | 1052 | 29.7893226 | 18.03783128 | 43.6362606 |
| BR | 5 | 20 | 96 | 0930 | | | | 1197 | 0 | 0 | 0 | 0 | 0 |
| BR | 5 | 21 | 96 | 0700 | 1349.48 | 453 | 343 | 1190 | 411.321504 | 796 | 22.5402099 | 12.82753151 | 33.69704744 |
| BR | 5 | 21 | 96 | 0730 | | | | 909 | 0 | 0 | 0 | 0 | 0 |
| BR | 5 | 21 | 96 | 1100 | | | | 714 | 0 | 0 | 0 | 0 | 0 |
| BR | 5 | 22 | 96 | 0700 | 1349.79 | 595 | 365 | 714 | 411.415992 | 960 | 27.1841727 | 16.84852372 | 20.21822847 |
| BR | 5 | 22 | 96 | 0800 | | | | 887 | 0 | 0 | 0 | 0 | 0 |
| BR | 5 | 22 | 96 | 1530 | | | | 1087 | 0 | 0 | 0 | 0 | 0 |
| BR | 5 | 23 | 96 | 0700 | 1350.42 | 675 | 401 | 1094 | 411.608016 | 1076 | 30.4689269 | 19.11387145 | 30.97863017 |
| BR | 5 | 23 | 96 | 0730 | | | | 1365 | 0 | 0 | 0 | 0 | 0 |
| BR | 5 | 24 | 96 | 0700 | 1350.01 | 563 | 369 | 1357 | 411.483048 | 932 | 26.391301 | 15.94238463 | 38.42596083 |
| BR | 5 | 24 | 96 | 0800 | | | | 1007 | 0 | 0 | 0 | 0 | 0 |
| BR | 5 | 24 | 96 | 1500 | | | | 914 | 0 | 0 | 0 | 0 | 0 |
| BR | 5 | 25 | 96 | 0700 | 1349.86 | 401 | 328 | 909 | 411.437328 | 729 | 20.6429812 | 11.35505548 | 25.74001355 |
| BR | 5 | 25 | 96 | 1800 | | | | 704 | 0 | 0 | 0 | 0 | 0 |
| BR | 5 | 25 | 96 | 0900 | | | | 513 | 0 | 0 | 0 | 0 | 0 |
| BR | 5 | 26 | 96 | 0700 | 1350.14 | 319 | 288 | 517 | 411.522672 | 607 | 17.1883259 | 9.033074063 | 14.63980969 |
| BR | 5 | 26 | 96 | 1100 | | | | 611 | 0 | 0 | 0 | 0 | 0 |
| BR | 5 | 27 | 96 | 0700 | 1350.08 | 264 | 259 | 611 | 411.504384 | 523 | 14.8097108 | 7.4756475 | 17.30159327 |
| BR | 5 | 27 | 96 | 0730 | | | | 517 | 0 | 0 | 0 | 0 | 0 |
| BR | 5 | 28 | 96 | 0700 | 1349.98 | 227 | 236 | 513 | 411.473904 | 463 | 13.1107 | 6.427924176 | 14.5265423 |
| BR | 5 | 28 | 96 | 0830 | | | | 404 | 0 | 0 | 0 | 0 | 0 |
| BR | 5 | 28 | 96 | 0900 | | | | 312 | 0 | 0 | 0 | 0 | 0 |
| BR | 5 | 29 | 96 | 0700 | 1350.20 | 200 | 220 | 309 | 411.54096 | 420 | 11.8930756 | 5.663369318 | 8.749905597 |
| BR | 5 | 30 | 96 | 0700 | 1350.31 | 179 | 206 | 309 | 411.574488 | 385 | 10.9019859 | 5.06871554 | 8.749905597 |
| BR | 5 | 30 | 96 | 0800 | | | | 215 | 0 | 0 | 0 | 0 | 0 |
| BR | 5 | 30 | 96 | 0900 | | | | 108 | 0 | 0 | 0 | 0 | 0 |
| BR | 5 | 31 | 96 | 0700 | 1350.79 | 161 | 192 | 108 | 411.720792 | 353 | 9.99584685 | 4.559012301 | 3.058219432 |
| BR | 6 | 1 | 96 | 0700 | 1351.23 | 144 | 181 | 108 | 411.854904 | 325 | 9.20297514 | 4.077625909 | 3.058219432 |
| BR | 6 | 1 | 96 | 0730 | | | | 202 | 0 | 0 | 0 | 0 | 0 |
| BR | 6 | 1 | 96 | 0800 | | | | 243 | 0 | 0 | 0 | 0 | 0 |
| BR | 6 | 2 | 96 | 0700 | 1351.32 | 135 | 174 | 243 | 411.882336 | 309 | 8.7499056 | 3.82277429 | 6.880993722 |
| BR | 6 | 3 | 96 | 0700 | 1351.33 | 125 | 164 | 243 | 411.885384 | 289 | 8.18356867 | 3.539605824 | 6.880993722 |
| BR | 6 | 3 | 96 | 1500 | | | | 202 | 0 | 0 | 0 | 0 | 0 |
| BR | 6 | 4 | 96 | 0700 | 1351.36 | 116 | 158 | 202 | 411.894528 | 274 | 7.75881597 | 3.284754205 | 5.720003012 |
| BR | 6 | 5 | 96 | 0700 | 1351.40 | 112 | 154 | 202 | 411.90672 | 266 | 7.53228119 | 3.171486818 | 5.720003012 |
| BR | 6 | 6 | 96 | 0700 | 1351.41 | 102 | 146 | 202 | 411.909768 | 248 | 7.02257795 | 2.888318352 | 5.720003012 |
| BR | 6 | 6 | 96 | 0830 | | | | 19 | 0 | 0 | 0 | 0 | 0 |
| BR | 6 | 6 | 96 | 1200 | | | | 209 | 0 | 0 | 0 | 0 | 0 |
| BR | 6 | 7 | 96 | 0700 | 1351.44 | 97 | 65 | 209 | 411.918912 | 162 | 4.58732915 | 2.746734119 | 5.918220938 |
| BR | 6 | 8 | 96 | 0700 | 1351.37 | 92 | 137 | 206 | 411.897576 | 229 | 6.48455787 | 2.605149886 | 5.833270398 |
| BR | 6 | 8 | 96 | 0730 | | | | 167 | 0 | 0 | 0 | 0 | 0 |
| BR | 6 | 9 | 96 | 0700 | 1351.38 | 88 | 133 | 167 | 411.900624 | 221 | 6.2580231 | 2.4918825 | 4.728913381 |
| BR | 6 | 10 | 96 | 0700 | 1351.37 | 83 | 131 | 167 | 411.897576 | 214 | 6.05980517 | 2.350298267 | 4.728913381 |
| BR | 6 | 11 | 96 | 0700 | 1351.34 | 77 | 120 | 171 | 411.888432 | 197 | 5.57841878 | 2.180397188 | 4.842180767 |
| BR | 6 | 12 | 96 | 0700 | 1351.29 | 77 | 120 | 171 | 411.873192 | 197 | 5.57841878 | 2.180397188 | 4.842180767 |
| BR | 6 | 13 | 96 | 0700 | 1351.27 | 75 | 116 | 154 | 411.867096 | 191 | 5.4085177 | 2.123763494 | 4.360794375 |
| BR | 6 | 13 | 96 | 1000 | | | | 111 | 0 | 0 | 0 | 0 | 0 |
| BR | 6 | 13 | 96 | 1030 | | | | 50 | 0 | 0 | 0 | 0 | 0 |
| BR | 6 | 14 | 96 | 0700 | 1351.41 | 72 | 117 | 54 | 411.909768 | 189 | 5.35188401 | 2.038812955 | 1.529109716 |
| BR | 6 | 15 | 96 | 0700 | 1351.57 | 72 | 116 | 54 | 411.958536 | 188 | 5.32356716 | 2.038812955 | 1.529109716 |
| BR | 6 | 16 | 96 | 0700 | 1351.71 | 67 | 114 | 54 | 412.001208 | 181 | 5.12534923 | 1.897228722 | 1.529109716 |
| BR | 6 | 17 | 96 | 0700 | 1351.85 | 66 | 113 | 54 | 412.04388 | 179 | 5.06871554 | 1.868911875 | 1.529109716 |
| BR | 6 | 18 | 96 | 0700 | 1352.03 | 70 | 116 | 54 | 412.098744 | 186 | 5.26693347 | 1.982179261 | 1.529109716 |
| BR | 6 | 18 | 96 | 0900 | | | | 76 | 0 | 0 | 0 | 0 | 0 |
| BR | 6 | 18 | 96 | 1100 | | | | 77 | 0 | 0 | 0 | 0 | 0 |
| BR | 6 | 19 | 96 | 0700 | 1352.10 | 66 | 111 | 77 | 412.12008 | 177 | 5.01208185 | 1.868911875 | 2.180397188 |
| BR | 6 | 20 | 96 | 0700 | 1352.15 | 61 | 108 | 77 | 412.13532 | 169 | 4.78554707 | 1.727327642 | 2.180397188 |
| BR | 6 | 21 | 96 | 0700 | 1352.18 | 59 | 106 | 77 | 412.144464 | 165 | 4.67227969 | 1.670693949 | 2.180397188 |
| BR | 6 | 22 | 96 | 0700 | 1352.20 | 57 | 105 | 77 | 412.15056 | 162 | 4.58732915 | 1.614060256 | 2.180397188 |
| BR | 6 | 23 | 96 | 0700 | 1352.25 | 61 | 108 | 78 | 412.1658 | 169 | 4.78554707 | 1.727327642 | 2.208714034 |
| BR | 6 | 24 | 96 | 0700 | 1352.52 | 109 | 126 | 78 | 412.248096 | 235 | 6.65445895 | 3.086536279 | 2.208714034 |
| BR | 6 | 24 | 96 | 0900 | | | | 134 | 0 | 0 | 0 | 0 | 0 |
| BR | 6 | 24 | 96 | 0930 | | | | 198 | 0 | 0 | 0 | 0 | 0 |
| BR | 6 | 25 | 96 | 0700 | 1352.56 | 92 | 122 | 189 | 412.260288 | 214 | 6.05980517 | 2.605149886 | 5.351884006 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BR | 6 | 26 | 96 | 0700 | 1352.48 | 86 | 120 | 189 | 412.235904 | 206 | 5.8332704 | 2.435248807 | 5.351884006 |
| BR | 6 | 27 | 96 | 0700 | 1352.36 | 75 | 142 | 189 | 412.199328 | 217 | 6.14475571 | 2.123763494 | 5.351884006 |
| BR | 6 | 28 | 96 | 0700 | 1352.22 | 72 | 131 | 189 | 412.156656 | 203 | 5.74831986 | 2.038812955 | 5.351884006 |
| BR | 6 | 28 | 96 | 1100 | | | | 156 | 0 | 0 | 0 | 0 | 0 |
| BR | 6 | 29 | 96 | 0700 | 1352.12 | 66 | 122 | 154 | 412.126176 | 188 | 5.32356716 | 1.868911875 | 4.360794375 |
| BR | 6 | 30 | 96 | 0700 | 1352.00 | 0.61 | 1.2 | 154 | 412.0896 | 1.8 | 0.05097032 | 0.017273276 | 4.360794375 |
| BR | 7 | 1 | 96 | 0700 | 1351.86 | 58 | 116 | 154 | 412.046928 | 174 | 4.92713131 | 1.642377102 | 4.360794375 |
| BR | 7 | 1 | 96 | 0800 | | | | 97 | 0 | 0 | 0 | 0 | 0 |
| BR | 7 | 1 | 96 | 0830 | | | | 54 | 0 | 0 | 0 | 0 | 0 |
| BR | 7 | 2 | 96 | 0700 | 1351.94 | 56 | 114 | 53 | 412.071312 | 170 | 4.81386392 | 1.585743409 | 1.500792869 |
| BR | 7 | 3 | 96 | 0700 | 1352.00 | 53 | 113 | 53 | 412.0896 | 166 | 4.70059653 | 1.500792869 | 1.500792869 |
| BR | 7 | 4 | 96 | 0700 | 1352.06 | 51 | 111 | 53 | 412.107888 | 162 | 4.58732915 | 1.444159176 | 1.500792869 |
| BR | 7 | 5 | 96 | 0700 | 1352.12 | 49 | 108 | 53 | 412.126176 | 157 | 4.44574491 | 1.387525483 | 1.500792869 |
| BR | 7 | 6 | 96 | 0700 | 1352.15 | 48 | 106 | 53 | 412.13532 | 154 | 4.36079438 | 1.359208636 | 1.500792869 |
| BR | 7 | 7 | 96 | 0700 | 1352.18 | 46 | 103 | 53 | 412.144464 | 149 | 4.21921014 | 1.302574943 | 1.500792869 |
| BR | 7 | 8 | 96 | 0700 | 1352.21 | 46 | 103 | 53 | 412.153608 | 149 | 4.21921014 | 1.302574943 | 1.500792869 |
| BR | 7 | 9 | 96 | 0700 | 1352.23 | 45 | 102 | 53 | 412.159704 | 147 | 4.16257645 | 1.274258097 | 1.500792869 |
| BR | 7 | 10 | 96 | 0700 | 1352.26 | 43 | 101 | 53 | 412.168848 | 144 | 4.07762591 | 1.217624403 | 1.500792869 |
| BR | 7 | 11 | 96 | 0700 | 1352.27 | 40 | 99 | 54 | 412.171896 | 139 | 3.93604168 | 1.132673864 | 1.529109716 |
| BR | 7 | 12 | 96 | 0700 | 1352.28 | 39 | 99 | 56 | 412.174944 | 138 | 3.90772483 | 1.104357017 | 1.585743409 |
| BR | 7 | 13 | 96 | 0700 | 1352.29 | 39 | 99 | 54 | 412.177992 | 138 | 3.90772483 | 1.104357017 | 1.529109716 |
| BR | 7 | 14 | 96 | 0700 | 1352.29 | 38 | 96 | 54 | 412.177992 | 134 | 3.79445744 | 1.07604017 | 1.529109716 |
| BR | 7 | 15 | 96 | 0700 | 1352.30 | 39 | 96 | 54 | 412.18104 | 135 | 3.82277429 | 1.104357017 | 1.529109716 |
| BR | 7 | 16 | 96 | 0700 | 1352.29 | 35 | 95 | 54 | 412.177992 | 130 | 3.68119006 | 0.991089631 | 1.529109716 |
| BR | 7 | 17 | 96 | 0700 | 1352.26 | 35 | 93 | 54 | 412.168848 | 128 | 3.62455636 | 0.991089631 | 1.529109716 |
| BR | 7 | 18 | 96 | 0700 | 1352.32 | 47 | 102 | 54 | 412.187136 | 149 | 4.21921014 | 1.33089179 | 1.529109716 |
| BR | 7 | 19 | 96 | 0700 | 1352.33 | 47 | 98 | 54 | 412.190184 | 145 | 4.10594276 | 1.33089179 | 1.529109716 |
| BR | 7 | 20 | 96 | 0700 | 1352.33 | 38 | 95 | 54 | 412.190184 | 133 | 3.7661406 | 1.07604017 | 1.529109716 |
| BR | 7 | 21 | 96 | 0700 | 1352.31 | 36 | 93 | 54 | 412.184088 | 129 | 3.65287321 | 1.019406477 | 1.529109716 |
| BR | 7 | 22 | 96 | 0700 | 1352.30 | 35 | 92 | 54 | 412.18104 | 127 | 3.59623952 | 0.991089631 | 1.529109716 |
| BR | 7 | 23 | 96 | 0700 | 1352.28 | 35 | 90 | 54 | 412.174944 | 125 | 3.53960582 | 0.991089631 | 1.529109716 |
| BR | 7 | 24 | 96 | 0700 | 1352.26 | 32 | 89 | 54 | 412.168848 | 121 | 3.42633844 | 0.906139091 | 1.529109716 |
| BR | 7 | 25 | 96 | 0700 | 1352.23 | 31 | 89 | 53 | 412.159704 | 120 | 3.39802159 | 0.877822244 | 1.500792869 |
| BR | 7 | 26 | 96 | 0700 | 1352.20 | 30 | 89 | 53 | 412.15056 | 119 | 3.36970474 | 0.849505398 | 1.500792869 |
| BR | 7 | 27 | 96 | 0700 | 1352.16 | 29 | 88 | 53 | 412.138368 | 117 | 3.31307105 | 0.821188551 | 1.500792869 |
| BR | 7 | 28 | 96 | 0700 | 1352.13 | 28 | 87 | 53 | 412.129224 | 115 | 3.25643736 | 0.792871705 | 1.500792869 |
| BR | 7 | 29 | 96 | 0700 | 1352.11 | 30 | 88 | 53 | 412.123128 | 118 | 3.3413879 | 0.849505398 | 1.500792869 |
| BR | 7 | 30 | 96 | 0700 | 1352.06 | 29 | 87 | 54 | 412.107888 | 116 | 3.2847542 | 0.821188551 | 1.529109716 |
| BR | 7 | 31 | 96 | 0700 | 1352.02 | 27 | 86 | 54 | 412.095696 | 113 | 3.19980366 | 0.764554858 | 1.529109716 |
| BR | 8 | 1 | 96 | 0700 | 1351.97 | 27 | 86 | 54 | 412.080456 | 113 | 3.19980366 | 0.764554858 | 1.529109716 |
| BR | 8 | 2 | 96 | 0700 | 1351.92 | 27 | 86 | 54 | 412.065216 | 113 | 3.19980366 | 0.764554858 | 1.529109716 |
| BR | 8 | 2 | 96 | 1200 | | | | 116 | 0 | 0 | 0 | 0 | 0 |
| BR | 8 | 2 | 96 | 1230 | | | | 187 | 0 | 0 | 0 | 0 | 0 |
| BR | 8 | 2 | 96 | 1300 | | | | 318 | 0 | 0 | 0 | 0 | 0 |
| BR | 8 | 2 | 96 | 1330 | | | | 398 | 0 | 0 | 0 | 0 | 0 |
| BR | 8 | 2 | 96 | 1400 | | | | 518 | 0 | 0 | 0 | 0 | 0 |
| BR | 8 | 2 | 96 | 1430 | | | | 589 | 0 | 0 | 0 | 0 | 0 |
| BR | 8 | 2 | 96 | 1500 | | | | 701 | 0 | 0 | 0 | 0 | 0 |
| BR | 8 | 2 | 96 | 1530 | | | | 898 | 0 | 0 | 0 | 0 | 0 |
| BR | 8 | 3 | 96 | 0700 | 1350.51 | 30 | 87 | 898 | 411.635448 | 117 | 3.31307105 | 0.849505398 | 25.42852824 |
| BR | 8 | 3 | 96 | 1200 | | | | 721 | 0 | 0 | 0 | 0 | 0 |
| BR | 8 | 3 | 96 | 1230 | | | | 631 | 0 | 0 | 0 | 0 | 0 |
| BR | 8 | 3 | 96 | 1300 | | | | 574 | 0 | 0 | 0 | 0 | 0 |
| BR | 8 | 3 | 96 | 1330 | | | | 410 | 0 | 0 | 0 | 0 | 0 |
| BR | 8 | 3 | 96 | 1400 | | | | 318 | 0 | 0 | 0 | 0 | 0 |
| BR | 8 | 3 | 96 | 1430 | | | | 208 | 0 | 0 | 0 | 0 | 0 |
| BR | 8 | 3 | 96 | 1500 | | | | 118 | 0 | 0 | 0 | 0 | 0 |
| BR | 8 | 3 | 96 | 1530 | | | | 54 | 0 | 0 | 0 | 0 | 0 |
| BR | 8 | 4 | 96 | 0700 | 1349.91 | 29 | 86 | 50 | 411.452568 | 115 | 3.25643736 | 0.821188551 | 1.41584233 |
| BR | 8 | 5 | 96 | 0700 | 1349.87 | 28 | 84 | 50 | 411.440376 | 112 | 3.17148682 | 0.792871705 | 1.41584233 |
| BR | 8 | 6 | 96 | 0700 | 1349.82 | 27 | 84 | 50 | 411.425136 | 111 | 3.14316997 | 0.764554858 | 1.41584233 |
| BR | 8 | 7 | 96 | 0700 | 1349.77 | 26 | 83 | 50 | 411.409896 | 109 | 3.08653628 | 0.736238011 | 1.41584233 |
| BR | 8 | 8 | 96 | 0700 | 1349.71 | 24 | 83 | 50 | 411.391608 | 107 | 3.02990259 | 0.679604318 | 1.41584233 |
| BR | 8 | 9 | 96 | 0700 | 1349.66 | 24 | 82 | 49 | 411.376368 | 106 | 3.00158574 | 0.679604318 | 1.387525483 |
| BR | 8 | 10 | 96 | 0700 | 1349.61 | 23 | 82 | 49 | 411.361128 | 105 | 2.97326889 | 0.651287472 | 1.387525483 |
| BR | 8 | 11 | 96 | 0700 | 1349.55 | 22 | 80 | 49 | 411.34284 | 102 | 2.88831835 | 0.622970625 | 1.387525483 |
| BR | 8 | 12 | 96 | 0700 | 1349.49 | 22 | 79 | 50 | 411.324552 | 101 | 2.86000151 | 0.622970625 | 1.41584233 |
| BR | 8 | 13 | 96 | 0700 | 1349.44 | 23 | 80 | 50 | 411.309312 | 103 | 2.9166352 | 0.651287472 | 1.41584233 |
| BR | 8 | 14 | 96 | 0700 | 1349.37 | 22 | 79 | 50 | 411.287976 | 101 | 2.86000151 | 0.622970625 | 1.41584233 |
| BR | 8 | 15 | 96 | 0700 | 1349.31 | 21 | 79 | 50 | 411.269688 | 100 | 2.83168466 | 0.594653778 | 1.41584233 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BR | 8 | 16 | 96 | 0700 | 1349.24 | 21 | 79 | 50 | 411.248352 | 100 | 2.83168466 | 0.594653778 | 1.41584233 |
| BR | 8 | 17 | 96 | 0700 | 1349.17 | 21 | 78 | 50 | 411.227016 | 99 | 2.80336781 | 0.594653778 | 1.41584233 |
| BR | 8 | 18 | 96 | 0700 | 1349.10 | 21 | 78 | 50 | 411.20568 | 99 | 2.80336781 | 0.594653778 | 1.41584233 |
| BR | 8 | 19 | 96 | 0700 | 1349.07 | 21 | 78 | 50 | 411.196536 | 99 | 2.80336781 | 0.594653778 | 1.41584233 |
| BR | 8 | 20 | 96 | 0700 | 1348.94 | 21 | 78 | 50 | 411.156912 | 99 | 2.80336781 | 0.594653778 | 1.41584233 |
| BR | 8 | 21 | 96 | 0700 | 1348.87 | 16 | 77 | 50 | 411.135576 | 93 | 2.63346673 | 0.453069545 | 1.41584233 |
| BR | 8 | 22 | 96 | 0700 | 1348.80 | 16 | 77 | 50 | 411.11424 | 93 | 2.63346673 | 0.453069545 | 1.41584233 |
| BR | 8 | 23 | 96 | 0700 | 1348.72 | 16 | 77 | 50 | 411.089856 | 93 | 2.63346673 | 0.453069545 | 1.41584233 |
| BR | 8 | 24 | 96 | 0700 | 1348.65 | 15 | 76 | 50 | 411.06852 | 91 | 2.57683304 | 0.424752699 | 1.41584233 |
| BR | 8 | 25 | 96 | 0700 | 1348.57 | 15 | 76 | 50 | 411.044136 | 91 | 2.57683304 | 0.424752699 | 1.41584233 |
| BR | 8 | 26 | 96 | 0700 | 1348.51 | 15 | 76 | 50 | 411.0261528 | 91 | 2.57683304 | 0.424752699 | 1.41584233 |
| BR | 8 | 27 | 96 | 0700 | 1348.44 | 15 | 76 | 50 | 411.004512 | 91 | 2.57683304 | 0.424752699 | 1.41584233 |
| BR | 8 | 28 | 96 | 0700 | 1348.36 | | | 50 | 410.980128 | 0 | 0 | 0 | 1.41584233 |
| BR | 8 | 29 | 96 | 0700 | 1348.31 | | | 50 | 410.964888 | 0 | 0 | 0 | 1.41584233 |
| BR | 8 | 30 | 96 | 0700 | 1348.26 | | | 50 | 410.949648 | 0 | 0 | 0 | 1.41584233 |
| BR | 8 | 31 | 96 | 0700 | 1348.20 | | | 50 | 410.93136 | 0 | 0 | 0 | 1.41584233 |
| BR | 9 | 1 | 96 | 0700 | 1348.11 | | | 49 | 410.903928 | 0 | 0 | 0 | 1.387525483 |
| BR | 9 | 2 | 96 | 0700 | 1348.03 | | | 49 | 410.879544 | 0 | 0 | 0 | 1.387525483 |
| BR | 9 | 3 | 96 | 0700 | 1347.94 | | | 49 | 410.852112 | 0 | 0 | 0 | 1.387525483 |
| BR | 9 | 4 | 96 | 0700 | 1347.85 | | | 49 | 410.82468 | 0 | 0 | 0 | 1.387525483 |
| BR | 9 | 4 | 96 | 0730 | | | | 95 | 0 | 0 | 0 | 0 | 0 |
| BR | 9 | 4 | 96 | 0800 | | | | 218 | 0 | 0 | 0 | 0 | 0 |
| BR | 9 | 4 | 96 | 0830 | | | | 334 | 0 | 0 | 0 | 0 | 0 |
| BR | 9 | 4 | 96 | 0900 | | | | 402 | 0 | 0 | 0 | 0 | 0 |
| BR | 9 | 4 | 96 | 0930 | | | | 496 | 0 | 0 | 0 | 0 | 0 |
| BR | 9 | 5 | 96 | 0700 | 1346.98 | | | 496 | 410.559504 | 0 | 0 | 0 | 14.04515591 |
| BR | 9 | 6 | 96 | 0700 | 1345.67 | | | 496 | 410.160216 | 0 | 0 | 0 | 14.04515591 |
| BR | 9 | 6 | 96 | 1100 | | | | 548 | 0 | 0 | 0 | 0 | 0 |
| BR | 9 | 7 | 96 | 0700 | 1344.42 | | | 548 | 409.779216 | 0 | 0 | 0 | 15.51763193 |
| BR | 9 | 8 | 96 | 0700 | 1343.14 | | | 543 | 409.389072 | 0 | 0 | 0 | 15.3760477 |
| BR | 9 | 9 | 96 | 0700 | 1341.85 | | | 543 | 408.99588 | 0 | 0 | 0 | 15.3760477 |
| BR | 9 | 10 | 96 | 0700 | 1340.57 | | | 543 | 408.605736 | 0 | 0 | 0 | 15.3760477 |
| BR | 9 | 11 | 96 | 0700 | 1339.28 | | 64 | 540 | 408.212544 | 64 | 1.81227818 | 0 | 15.29109716 |
| BR | 9 | 12 | 96 | 0700 | 1337.96 | | 62 | 540 | 407.810208 | 62 | 1.75564449 | 0 | 15.29109716 |
| BR | 9 | 13 | 96 | 0700 | 1336.67 | | 62 | 540 | 407.417016 | 62 | 1.75564449 | 0 | 15.29109716 |
| BR | 9 | 14 | 96 | 0700 | 1336.36 | | 65 | 535 | 407.322528 | 65 | 1.84059503 | 0 | 15.14951293 |
| BR | 9 | 15 | 96 | 0700 | 1334.31 | | | 534 | 406.697688 | 0 | 0 | 0 | 15.12119608 |
| BR | 9 | 16 | 96 | 0700 | 1334.38 | | | 535 | 406.719024 | 0 | 0 | 0 | 15.14951293 |
| BR | 9 | 17 | 96 | 0700 | 1332.30 | | | 531 | 406.08504 | 0 | 0 | 0 | 15.03624554 |
| BR | 9 | 18 | 96 | 0700 | 1331.08 | 30 | 77 | 531 | 405.713184 | 107 | 3.02990259 | 0.849505398 | 15.03624554 |
| BR | 9 | 19 | 96 | 0700 | 1329.80 | 23 | 73 | 527 | 405.32304 | 96 | 2.71841727 | 0.651287472 | 14.92297815 |
| BR | 9 | 20 | 96 | 0700 | 1328.50 | 22 | 70 | 531 | 404.9268 | 92 | 2.60514989 | 0.622970625 | 15.03624554 |
| BR | 9 | 20 | 96 | 1000 | | | | 594 | 0 | 0 | 0 | 0 | 0 |
| BR | 9 | 21 | 96 | 0700 | 1327.03 | 20 | 68 | 589 | 404.478744 | 88 | 2.4918825 | 0.566336932 | 16.67862264 |
| BR | 9 | 22 | 96 | 0700 | 1325.52 | 19 | 67 | 589 | 404.018496 | 86 | 2.43524881 | 0.538020085 | 16.67862264 |
| BR | 9 | 23 | 96 | 0700 | 1323.99 | 17 | 66 | 589 | 403.552152 | 83 | 2.35029827 | 0.481386392 | 16.67862264 |
| BR | 9 | 23 | 96 | 1000 | | | | 646 | 0 | 0 | 0 | 0 | 0 |
| BR | 9 | 24 | 96 | 0700 | 1322.30 | 16 | 65 | 641 | 403.03704 | 81 | 2.29366457 | 0.453069545 | 18.15109867 |
| BR | 9 | 25 | 96 | 0700 | 1320.57 | 16 | 65 | 641 | 402.509736 | 81 | 2.29366457 | 0.453069545 | 18.15109867 |
| BR | 9 | 26 | 96 | 0700 | 1318.84 | 16 | 65 | 641 | 401.982432 | 81 | 2.29366457 | 0.453069545 | 18.15109867 |
| BR | 9 | 27 | 96 | 0700 | 1317.09 | 16 | 64 | 636 | 401.449032 | 80 | 2.26534773 | 0.453069545 | 18.00951443 |
| BR | 9 | 28 | 96 | 0700 | 1315.33 | 16 | 64 | 631 | 400.912584 | 80 | 2.26534773 | 0.453069545 | 17.8679302 |
| BR | 9 | 29 | 96 | 0700 | 1313.55 | 16 | 64 | 631 | 400.37004 | 80 | 2.26534773 | 0.453069545 | 17.8679302 |
| BR | 9 | 30 | 96 | 0700 | 1311.76 | 14 | 64 | 627 | 399.824448 | 78 | 2.20871403 | 0.396435852 | 17.75466281 |

| RES | MO | DY | YR | POOL EL. (ft.) | OUTFLOW (cms) | INFLOW (cms) | MAX T (°F) | MIN T (°F) | Precip (in) |
|---|---|---|---|---|---|---|---|---|---|
| CR | 1 | 1 | 96 | 1573.15 | 1.151 | 3.241 | 49 | 41 | .09 |
| CR | 1 | 2 | 96 | 1573.00 | 1.640 | 1.582 | 50 | 37 | .00 |
| CR | 1 | 3 | 96 | 1565.20 | 4.667 | 1.720 | 53 | 35 | .33 |
| CR | 1 | 4 | 96 | 1557.70 | 4.866 | 2.125 | 50 | 38 | .66 |
| CR | 1 | 5 | 96 | 1548.80 | 4.619 | 1.477 | 44 | 37 | .14 |
| CR | 1 | 6 | 96 | 1541.75 | 4.182 | 1.775 | 44 | 38 | .50 |
| CR | 1 | 7 | 96 | 1536.40 | 3.407 | 1.672 | 48 | 37 | .11 |
| CR | 1 | 8 | 96 | 1537.30 | 2.477 | 2.772 | 48 | 40 | 1.85 |
| CR | 1 | 9 | 96 | 1536.45 | 2.480 | 2.202 | 53 | 42 | .57 |
| CR | 1 | 10 | 96 | 1536.90 | 2.504 | 2.651 | 48 | 38 | .87 |
| CR | 1 | 11 | 96 | 1536.45 | 2.114 | 1.967 | 49 | 33 | .00 |
| CR | 1 | 12 | 96 | 1536.95 | 1.510 | 1.673 | 50 | 32 | .00 |
| CR | 1 | 13 | 96 | 1537.40 | 1.111 | 1.259 | 51 | 30 | .00 |
| CR | 1 | 14 | 96 | 1537.90 | 1.066 | 1.230 | 48 | 30 | .00 |
| CR | 1 | 15 | 96 | 1539.71 | 1.072 | 1.673 | 48 | 36 | 1.39 |
| CR | 1 | 16 | 96 | 1541.60 | 1.533 | 2.166 | 50 | 42 | 1.40 |
| CR | 1 | 17 | 96 | 1541.00 | 1.926 | 1.724 | 44 | 34 | .45 |
| CR | 1 | 18 | 96 | 1543.10 | 1.080 | 1.788 | 42 | 30 | .04 |
| CR | 1 | 19 | 96 | 1547.00 | 1.099 | 2.430 | 45 | 31 | 2.27 |
| CR | 1 | 20 | 96 | 1549.30 | 1.108 | 1.904 | 44 | 35 | .93 |
| CR | 1 | 21 | 96 | 1552.05 | 1.122 | 2.082 | 41 | 32 | 2.25 |
| CR | 1 | 22 | 96 | 1553.05 | 1.120 | 1.472 | 40 | 31 | .30 |
| CR | 1 | 23 | 96 | 1553.60 | 1.120 | 1.315 | 39 | 31 | .55 |
| CR | 1 | 24 | 96 | 1554.00 | 1.118 | 1.260 | 35 | 31 | 1.67 |
| CR | 1 | 25 | 96 | 1553.78 | 1.113 | 1.035 | 34 | 31 | 1.35 |
| CR | 1 | 26 | 96 | 1553.28 | 1.113 | 0.937 | 39 | 31 | .45 |
| CR | 1 | 27 | 96 | 1553.15 | 1.117 | 1.071 | 38 | 31 | .62 |
| CR | 1 | 28 | 96 | 1552.82 | 1.117 | 1.001 | 38 | 31 | 1.06 |
| CR | 1 | 29 | 96 | 1552.18 | 1.113 | 0.888 | 36 | 31 | 1.30 |
| CR | 1 | 30 | 96 | 1551.90 | 0.899 | 0.801 | 37 | 21 | .18 |
| CR | 1 | 31 | 96 | 1552.10 | 0.746 | 0.816 | 37 | 16 | .00 |
| CR | 2 | 1 | 96 | 1553.00 | 0.391 | 0.708 | 40 | 15 | .00 |
| CR | 2 | 2 | 96 | 1554.20 | 0.304 | 0.729 | 42 | 12 | .00 |
| CR | 2 | 3 | 96 | 1555.30 | 0.300 | 0.691 | 41 | 12 | .00 |
| CR | 2 | 4 | 96 | 1556.80 | 0.306 | 0.842 | 39 | 20 | .47 |
| CR | 2 | 5 | 96 | 1559.20 | 0.302 | 1.166 | 43 | 34 | .18 |
| CR | 2 | 6 | 96 | 1573.45 | 0.330 | 5.650 | 44 | 35 | 2.02 |
| CR | 2 | 7 | 96 | 1606.59 | 0.303 | 14.000 | 46 | 38 | 3.13 |
| CR | 2 | 8 | 96 | 1624.65 | 0.300 | 8.581 | 53 | 39 | .65 |
| CR | 2 | 9 | 96 | 1645.79 | 0.300 | 10.743 | 51 | 39 | 2.78 |
| CR | 2 | 10 | 96 | 1655.10 | 0.300 | 10.056 | 55 | 37 | .00 |
| CR | 2 | 11 | 96 | 1655.50 | 2.673 | 2.887 | 52 | 35 | .00 |
| CR | 2 | 12 | 96 | 1651.80 | 4.998 | 3.035 | 55 | 37 | .00 |
| CR | 2 | 13 | 96 | 1650.88 | 5.693 | 5.209 | 56 | 37 | .00 |
| CR | 2 | 14 | 96 | 1637.11 | 6.533 | 0.500 | 60 | 32 | .00 |
| CR | 2 | 15 | 96 | 1628.55 | 6.477 | 2.288 | 60 | 32 | .00 |
| CR | 2 | 16 | 96 | 1619.30 | 6.486 | 2.106 | 63 | 36 | .00 |
| CR | 2 | 17 | 96 | 1611.20 | 6.479 | 2.771 | 58 | 37 | .52 |
| CR | 2 | 18 | 96 | 1610.85 | 3.001 | 2.844 | 53 | 42 | 1.70 |
| CR | 2 | 19 | 96 | 1612.70 | 1.997 | 2.833 | 52 | 31 | .82 |
| CR | 2 | 20 | 96 | 1612.55 | 2.198 | 2.130 | 50 | 35 | .38 |
| CR | 2 | 21 | 96 | 1611.40 | 2.509 | 1.990 | 57 | 32 | .80 |

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|---|---|---|---|---|---|---|---|---|---|
| CR | 2 | 22 | 96 | 1609.50 | 2.342 | 1.489 | 42 | 32 | .34 |
| CR | 2 | 23 | 96 | 1609.95 | 1.310 | 1.511 | 43 | 31 | .73 |
| CR | 2 | 24 | 96 | 1610.36 | 1.038 | 1.222 | 35 | 31 | 1.12 |
| CR | 2 | 25 | 96 | 1610.55 | 1.032 | 1.118 | 42 | 25 | .02 |
| CR | 2 | 26 | 96 | 1611.20 | 0.802 | 1.094 | 41 | 23 | .00 |
| CR | 2 | 27 | 96 | 1612.15 | 0.504 | 0.933 | 42 | 21 | .00 |
| CR | 2 | 28 | 96 | 1613.10 | 0.509 | 0.940 | 40 | 21 | .00 |
| CR | 2 | 29 | 96 | 1614.00 | 0.373 | 0.782 | 45 | 26 | .00 |
| CR | 3 | 1 | 96 | 1615.30 | 0.301 | 0.895 | 52 | 26 | .00 |
| CR | 3 | 2 | 96 | 1616.45 | 0.302 | 0.830 | 52 | 27 | .00 |
| CR | 3 | 3 | 96 | 1617.75 | 0.300 | 0.900 | 55 | 27 | .16 |
| CR | 3 | 4 | 96 | 1619.60 | 0.307 | 1.166 | 52 | 37 | .30 |
| CR | 3 | 5 | 96 | 1621.35 | 0.342 | 1.160 | 52 | 37 | .82 |
| CR | 3 | 6 | 96 | 1622.67 | 0.499 | 1.120 | 48 | 37 | .06 |
| CR | 3 | 7 | 96 | 1623.75 | 0.496 | 1.007 | 57 | 41 | .00 |
| CR | 3 | 8 | 96 | 1624.97 | 0.491 | 1.070 | 57 | 41 | .00 |
| CR | 3 | 9 | 96 | 1626.76 | 0.491 | 1.345 | 65 | 42 | .00 |
| CR | 3 | 10 | 96 | 1628.91 | 0.490 | 1.523 | 69 | 46 | .00 |
| CR | 3 | 11 | 96 | 1631.45 | 0.492 | 1.724 | 55 | 45 | .40 |
| CR | 3 | 12 | 96 | 1633.45 | 0.834 | 1.812 | 52 | 42 | .40 |
| CR | 3 | 13 | 96 | 1634.55 | 1.019 | 1.560 | 55 | 39 | .00 |
| CR | 3 | 14 | 96 | 1634.95 | 1.020 | 1.217 | 61 | 35 | .00 |
| CR | 3 | 15 | 96 | 1635.80 | 0.750 | 1.170 | 69 | 33 | .00 |
| CR | 3 | 16 | 96 | 1637.10 | 0.484 | 1.129 | 59 | 29 | .00 |
| CR | 3 | 17 | 96 | 1638.10 | 0.486 | 0.984 | 64 | 29 | .00 |
| CR | 3 | 18 | 96 | 1639.35 | 0.380 | 1.006 | 67 | 35 | .00 |
| CR | 3 | 19 | 96 | 1640.60 | 0.300 | 0.928 | 76 | 39 | .03 |
| CR | 3 | 20 | 96 | 1641.87 | 0.300 | 0.942 | 57 | 37 | .02 |
| CR | 3 | 21 | 96 | 1643.03 | 0.300 | 0.889 | 60 | 32 | .00 |
| CR | 3 | 22 | 96 | 1644.41 | 0.300 | 1.004 | 62 | 31 | .59 |
| CR | 3 | 23 | 96 | 1645.63 | 0.300 | 0.926 | 46 | 36 | .17 |
| CR | 3 | 24 | 96 | 1646.67 | 0.300 | 0.836 | 51 | 37 | .03 |
| CR | 3 | 25 | 96 | 1647.57 | 0.303 | 0.768 | 50 | 26 | .00 |
| CR | 3 | 26 | 96 | 1648.50 | 0.300 | 0.783 | 58 | 26 | .00 |
| CR | 3 | 27 | 96 | 1649.26 | 0.300 | 0.696 | 61 | 27 | .00 |
| CR | 3 | 28 | 96 | 1650.10 | 0.304 | 0.743 | 65 | 32 | .30 |
| CR | 3 | 29 | 96 | 1650.80 | 0.303 | 0.670 | 50 | 32 | .02 |
| CR | 3 | 30 | 96 | 1651.55 | 0.302 | 0.697 | 49 | 35 | .07 |
| CR | 3 | 31 | 96 | 1652.45 | 0.301 | 0.776 | 55 | 35 | .31 |
| CR | 4 | 1 | 96 | 1654.85 | 0.302 | 1.575 | 50 | 42 | 1.98 |
| CR | 4 | 2 | 96 | 1657.26 | 0.300 | 1.592 | 59 | 42 | .70 |
| CR | 4 | 3 | 96 | 1659.00 | 0.487 | 1.427 | 50 | 40 | .16 |
| CR | 4 | 4 | 96 | 1659.85 | 0.687 | 1.149 | 60 | 34 | .00 |
| CR | 4 | 5 | 96 | 1660.95 | 0.457 | 1.056 | 70 | 34 | .00 |
| CR | 4 | 6 | 96 | 1662.39 | 0.300 | 1.090 | 77 | 42 | .00 |
| CR | 4 | 7 | 96 | 1663.87 | 0.300 | 1.116 | 80 | 45 | .00 |
| CR | 4 | 8 | 96 | 1665.50 | 0.362 | 1.267 | 82 | 47 | .00 |
| CR | 4 | 9 | 96 | 1667.02 | 0.444 | 1.292 | 80 | 49 | .06 |
| CR | 4 | 10 | 96 | 1668.50 | 0.441 | 1.274 | 55 | 43 | .22 |
| CR | 4 | 11 | 96 | 1669.40 | 0.673 | 1.181 | 51 | 41 | .25 |
| CR | 4 | 12 | 96 | 1670.05 | 0.848 | 1.217 | 50 | 38 | .92 |
| CR | 4 | 13 | 96 | 1670.35 | 0.850 | 1.021 | 45 | 37 | .70 |
| CR | 4 | 14 | 96 | 1670.70 | 0.850 | 1.049 | 62 | 36 | .00 |

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|---|---|---|---|---|---|---|---|---|---|
| CR | 4 | 15 | 96 | 1671.00 | 0.842 | 1.013 | 75 | 42 | .00 |
| CR | 4 | 16 | 96 | 1671.75 | 0.859 | 1.288 | 65 | 44 | .29 |
| CR | 4 | 17 | 96 | 1672.12 | 0.861 | 1.073 | 51 | 34 | .77 |
| CR | 4 | 18 | 96 | 1672.42 | 0.894 | 1.066 | 48 | 34 | .31 |
| CR | 4 | 19 | 96 | 1672.60 | 0.900 | 1.004 | 50 | 35 | .31 |
| CR | 4 | 20 | 96 | 1672.70 | 0.909 | 0.966 | 48 | 35 | .42 |
| CR | 4 | 21 | 96 | 1672.95 | 0.850 | 0.994 | 51 | 35 | .40 |
| CR | 4 | 22 | 96 | 1673.70 | 0.791 | 1.223 | 52 | 36 | .61 |
| CR | 4 | 23 | 96 | 1675.53 | 1.273 | 2.331 | 51 | 44 | 1.07 |
| CR | 4 | 24 | 96 | 1682.20 | 1.041 | 4.966 | 60 | 42 | 2.11 |
| CR | 4 | 25 | 96 | 1684.35 | 2.560 | 3.849 | 51 | 41 | .66 |
| CR | 4 | 26 | 96 | 1684.20 | 2.897 | 2.807 | 64 | 42 | .46 |
| CR | 4 | 27 | 96 | 1684.10 | 2.111 | 2.051 | 59 | 32 | .00 |
| CR | 4 | 28 | 96 | 1684.25 | 1.386 | 1.477 | 60 | 35 | .00 |
| CR | 4 | 29 | 96 | 1684.80 | 1.171 | 1.503 | 75 | 37 | .00 |
| CR | 4 | 30 | 96 | 1685.45 | 0.882 | 1.275 | 74 | 40 | .00 |
| CR | 5 | 1 | 96 | 1685.72 | 1.099 | 1.263 | 72 | 40 | .03 |
| CR | 5 | 2 | 96 | 1685.66 | 1.206 | 1.170 | 72 | 42 | .03 |
| CR | 5 | 3 | 96 | 1685.56 | 1.037 | 0.977 | 55 | 36 | .09 |
| CR | 5 | 4 | 96 | 1685.68 | 0.893 | 0.966 | 48 | 36 | .12 |
| CR | 5 | 5 | 96 | 1686.16 | 0.566 | 0.857 | 63 | 36 | .00 |
| CR | 5 | 6 | 96 | 1687.07 | 0.300 | 0.853 | 63 | 33 | .00 |
| CR | 5 | 7 | 96 | 1687.90 | 0.301 | 0.808 | 66 | 33 | .00 |
| CR | 5 | 8 | 96 | 1688.65 | 0.300 | 0.760 | 60 | 35 | .00 |
| CR | 5 | 9 | 96 | 1689.35 | 0.300 | 0.730 | 61 | 30 | .00 |
| CR | 5 | 10 | 96 | 1689.75 | 0.401 | 0.647 | 64 | 30 | .00 |
| CR | 5 | 11 | 96 | 1689.69 | 0.672 | 0.635 | 71 | 38 | .00 |
| CR | 5 | 12 | 96 | 1689.68 | 0.673 | 0.667 | 81 | 50 | .00 |
| CR | 5 | 13 | 96 | 1689.72 | 0.744 | 0.769 | 83 | 53 | .12 |
| CR | 5 | 14 | 96 | 1689.85 | 1.114 | 1.194 | 61 | 53 | 1.27 |
| CR | 5 | 15 | 96 | 1690.80 | 2.392 | 2.980 | 61 | 50 | 1.46 |
| CR | 5 | 16 | 96 | 1690.95 | 3.002 | 3.095 | 59 | 46 | 1.01 |
| CR | 5 | 17 | 96 | 1690.50 | 2.617 | 2.339 | 68 | 47 | .60 |
| CR | 5 | 18 | 96 | 1690.45 | 2.946 | 2.915 | 59 | 44 | 1.14 |
| CR | 5 | 19 | 96 | 1690.25 | 2.870 | 2.746 | 58 | 43 | 1.00 |
| CR | 5 | 20 | 96 | 1689.90 | 2.457 | 2.241 | 59 | 43 | .14 |
| CR | 5 | 21 | 96 | 1689.65 | 1.974 | 1.820 | 65 | 42 | .12 |
| CR | 5 | 22 | 96 | 1690.20 | 2.342 | 2.681 | 56 | 41 | 1.01 |
| CR | 5 | 23 | 96 | 1690.10 | 2.524 | 2.463 | 52 | 41 | .82 |
| CR | 5 | 24 | 96 | 1690.00 | 2.264 | 2.202 | 59 | 42 | .12 |
| CR | 5 | 25 | 96 | 1690.10 | 1.824 | 1.886 | 75 | 42 | .00 |
| CR | 5 | 26 | 96 | 1690.00 | 1.613 | 1.551 | 80 | 43 | .00 |
| CR | 5 | 27 | 96 | 1689.95 | 1.333 | 1.302 | 69 | 42 | .00 |
| CR | 5 | 28 | 96 | 1690.30 | 0.962 | 1.179 | 63 | 43 | .00 |
| CR | 5 | 29 | 96 | 1690.57 | 0.891 | 1.058 | 59 | 42 | .05 |
| CR | 5 | 30 | 96 | 1690.70 | 0.890 | 0.971 | 63 | 43 | .00 |
| CR | 5 | 31 | 96 | 1690.68 | 0.890 | 0.878 | 66 | 40 | .00 |
| CR | 6 | 1 | 96 | 1690.62 | 0.834 | 0.797 | 74 | 39 | .00 |
| CR | 6 | 2 | 96 | 1690.75 | 0.640 | 0.721 | 86 | 51 | .00 |
| CR | 6 | 3 | 96 | 1690.98 | 0.611 | 0.753 | 95 | 56 | .00 |
| CR | 6 | 4 | 96 | 1691.10 | 0.622 | 0.697 | 83 | 54 | .00 |
| CR | 6 | 5 | 96 | 1691.20 | 0.622 | 0.684 | 73 | 46 | .00 |
| CR | 6 | 6 | 96 | 1691.22 | 0.619 | 0.632 | 88 | 43 | .00 |

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|---|---|---|---|---|---|---|---|---|---|
| CR | 6 | 7 | 96 | 1691.19 | 0.594 | 0.576 | 90 | 50 | .00 |
| CR | 6 | 8 | 96 | 1691.22 | 0.553 | 0.572 | 80 | 50 | .00 |
| CR | 6 | 9 | 96 | 1691.24 | 0.540 | 0.553 | 75 | 51 | .00 |
| CR | 6 | 10 | 96 | 1691.25 | 0.550 | 0.557 | 68 | 42 | .00 |
| CR | 6 | 11 | 96 | 1691.24 | 0.518 | 0.512 | 77 | 42 | .00 |
| CR | 6 | 12 | 96 | 1691.24 | 0.499 | 0.499 | 78 | 44 | .00 |
| CR | 6 | 13 | 96 | 1691.30 | 0.408 | 0.446 | 82 | 44 | .00 |
| CR | 6 | 14 | 96 | 1691.45 | 0.400 | 0.493 | 75 | 43 | .00 |
| CR | 6 | 15 | 96 | 1691.57 | 0.400 | 0.475 | 80 | 45 | .00 |
| CR | 6 | 16 | 96 | 1691.69 | 0.400 | 0.475 | 75 | 45 | .00 |
| CR | 6 | 17 | 96 | 1691.75 | 0.400 | 0.408 | 66 | 43 | .00 |
| CR | 6 | 18 | 96 | 1691.87 | 0.429 | 0.504 | 61 | 42 | .36 |
| CR | 6 | 19 | 96 | 1697.81 | 0.440 | 0.403 | 68 | 41 | .00 |
| CR | 6 | 20 | 96 | 1691.75 | 0.440 | 0.403 | 84 | 40 | .00 |
| CR | 6 | 21 | 96 | 1691.72 | 0.420 | 0.401 | 78 | 45 | .00 |
| CR | 6 | 22 | 96 | 1691.65 | 0.429 | 0.386 | 72 | 44 | .00 |
| CR | 6 | 23 | 96 | 1691.68 | 0.428 | 0.447 | 73 | 45 | .19 |
| CR | 6 | 24 | 96 | 1691.68 | 0.532 | 0.532 | 60 | 50 | .90 |
| CR | 6 | 25 | 96 | 1691.40 | 0.590 | 0.416 | 62 | 48 | .57 |
| CR | 6 | 26 | 96 | 1691.12 | 0.597 | 0.423 | 70 | 47 | .06 |
| CR | 6 | 27 | 96 | 1690.86 | 0.597 | 0.436 | 77 | 41 | .06 |
| CR | 6 | 28 | 96 | 1690.68 | 0.554 | 0.443 | 65 | 50 | .20 |
| CR | 6 | 29 | 96 | 1690.53 | 0.503 | 0.411 | 70 | 45 | .00 |
| CR | 6 | 30 | 96 | 1690.35 | 0.500 | 0.389 | 81 | 46 | .00 |
| CR | 7 | 1 | 96 | 1690.28 | 0.418 | 0.375 | 86 | 48 | .00 |
| CR | 7 | 2 | 96 | 1690.22 | 0.406 | 0.369 | 92 | 47 | .00 |
| CR | 7 | 3 | 96 | 1696.15 | 0.406 | 0.363 | 88 | 52 | .00 |
| CR | 7 | 4 | 96 | 1690.11 | 0.401 | 0.436 | 80 | 52 | .00 |
| CR | 7 | 5 | 96 | 1690.04 | 0.407 | 0.364 | 70 | 41 | .00 |
| CR | 7 | 6 | 96 | 1689.94 | 0.408 | 0.346 | 81 | 40 | .00 |
| CR | 7 | 7 | 96 | 1689.85 | 0.404 | 0.349 | 94 | 45 | .00 |
| CR | 7 | 8 | 96 | 1689.73 | 0.404 | 0.331 | 98 | 54 | .00 |
| CR | 7 | 9 | 96 | 1689.64 | 0.401 | 0.346 | 90 | 54 | .00 |
| CR | 7 | 10 | 96 | 1689.60 | 0.400 | 0.339 | 80 | 47 | .00 |
| CR | 7 | 11 | 96 | 1689.45 | 0.397 | 0.342 | 89 | 47 | .00 |
| CR | 7 | 12 | 96 | 1689.35 | 0.398 | 0.337 | 93 | 51 | .00 |
| CR | 7 | 13 | 96 | 1689.22 | 0.399 | 0.319 | 99 | 56 | .00 |
| CR | 7 | 14 | 96 | 1689.11 | 0.399 | 0.331 | 105 | 63 | .00 |
| CR | 7 | 15 | 96 | 1689.00 | 0.400 | 0.333 | 99 | 60 | .00 |
| CR | 7 | 16 | 96 | 1688.73 | 0.553 | 0.388 | 90 | 50 | .00 |
| CR | 7 | 17 | 96 | 1688.66 | 0.406 | 0.363 | 81 | 49 | .00 |
| CR | 7 | 18 | 96 | 1688.55 | | | 61 | 48 | .40 |
| CR | 7 | 19 | 96 | 1688.39 | 0.400 | 0.302 | 65 | 47 | .06 |
| CR | 7 | 20 | 96 | 1688.25 | 0.400 | 0.315 | 45 | 45 | .00 |
| CR | 7 | 21 | 96 | 1688.13 | 0.400 | 0.326 | 82 | 45 | .00 |
| CR | 7 | 22 | 96 | 1687.98 | 0.400 | 0.309 | 91 | 50 | .00 |
| CR | 7 | 23 | 96 | 1687.83 | 0.400 | 0.308 | 101 | 60 | .00 |
| CR | 7 | 24 | 96 | 1687.67 | 0.400 | 0.303 | 101 | 61 | .00 |
| CR | 7 | 25 | 96 | 1687.50 | 0.400 | 0.297 | 98 | 58 | .00 |
| CR | 7 | 26 | 96 | 1687.33 | 0.400 | 0.296 | 100 | 59 | .00 |
| CR | 7 | 27 | 96 | 1687.15 | 0.400 | 0.290 | 100 | 60 | .00 |
| CR | 7 | 28 | 96 | 1686.99 | 0.400 | 0.303 | 96 | 61 | .00 |
| CR | 7 | 29 | 96 | 1686.83 | 0.400 | 0.303 | 77 | 56 | .00 |

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|---|---|---|---|---|---|---|---|---|---|
| CR | 7 | 30 | 96 | 1686.65 | 0.400 | 0.291 | 95 | 56 | .00 |
| CR | 7 | 31 | 96 | 1686.46 | 0.400 | 0.285 | 95 | 52 | .00 |
| CR | 8 | 1 | 96 | 1685.88 | 0.552 | 0.200 | 91 | 49 | .00 |
| CR | 8 | 2 | 96 | 1684.55 | 0.888 | 0.084 | 82 | 48 | .00 |
| CR | 8 | 3 | 96 | 1683.80 | 0.890 | 0.439 | 65 | 51 | .14 |
| CR | 8 | 4 | 96 | 1682.75 | 0.890 | 0.261 | 72 | 47 | .00 |
| CR | 8 | 5 | 96 | 1681.70 | 0.899 | 0.273 | 78 | 49 | .00 |
| CR | 8 | 6 | 96 | 1680.55 | 0.876 | 0.193 | 70 | 41 | .00 |
| CR | 8 | 7 | 96 | 1679.47 | 0.841 | 0.203 | 87 | 41 | .00 |
| CR | 8 | 8 | 96 | 1678.37 | 0.840 | 0.193 | 98 | 53 | .00 |
| CR | 8 | 9 | 96 | 1677.24 | 0.843 | 0.181 | 97 | 53 | .00 |
| CR | 8 | 10 | 96 | 1676.11 | 0.844 | 0.185 | 102 | 61 | .00 |
| CR | 8 | 11 | 96 | 1674.99 | 0.851 | 0.201 | 101 | 54 | .00 |
| CR | 8 | 12 | 96 | 1673.83 | 0.856 | 0.186 | 83 | 48 | .00 |
| CR | 8 | 13 | 96 | 1672.69 | 0.851 | 0.196 | 97 | 54 | .00 |
| CR | 8 | 14 | 96 | 1671.49 | 0.861 | 0.175 | 99 | 55 | .00 |
| CR | 8 | 15 | 96 | 1670.30 | 0.876 | 0.199 | 91 | 51 | .00 |
| CR | 8 | 16 | 96 | 1669.00 | 0.878 | 0.141 | 90 | 48 | .00 |
| CR | 8 | 17 | 96 | 1667.84 | 0.871 | 0.218 | 87 | 48 | .00 |
| CR | 8 | 18 | 96 | 1666.60 | 0.870 | 0.175 | 75 | 43 | .00 |
| CR | 8 | 19 | 96 | 1665.20 | 0.874 | 0.094 | 77 | 44 | .00 |
| CR | 8 | 20 | 96 | 1664.09 | 0.878 | 0.262 | 78 | 44 | .00 |
| CR | 8 | 21 | 96 | 1662.85 | 0.880 | 0.196 | 79 | 45 | .00 |
| CR | 8 | 22 | 96 | 1661.57 | 0.876 | 0.173 | 87 | 45 | .00 |
| CR | 8 | 23 | 96 | 1660.29 | 0.888 | 0.189 | 97 | 48 | .00 |
| CR | 8 | 24 | 96 | 1658.98 | 0.893 | 0.181 | 102 | 57 | .00 |
| CR | 8 | 25 | 96 | 1657.65 | 0.897 | 0.179 | 101 | 59 | .00 |
| CR | 8 | 26 | 96 | 1656.31 | 0.898 | 0.178 | 81 | 58 | .00 |
| CR | 8 | 27 | 96 | 1655.01 | 0.897 | 0.202 | 77 | 54 | .28 |
| CR | 8 | 28 | 96 | 1654.55 | 0.896 | 0.651 | 71 | 48 | .00 |
| CR | 8 | 29 | 96 | 1652.33 | 0.897 | 0.252 | | 48 | .00 |
| CR | 8 | 30 | 96 | 1650.90 | 0.903 | 0.150 | 97 | 54 | .00 |
| CR | 8 | 31 | 96 | 1649.50 | 0.908 | 0.176 | 78 | 52 | .00 |
| CR | 9 | 1 | 96 | 1648.10 | 0.907 | 0.178 | 79 | 44 | .00 |
| CR | 9 | 2 | 96 | 1646.65 | 0.900 | 0.150 | 82 | 44 | .00 |
| CR | 9 | 3 | 96 | 1645.25 | 0.901 | 0.181 | 80 | 44 | .00 |
| CR | 9 | 4 | 96 | 1644.00 | 0.783 | 0.143 | 74 | 45 | .00 |
| CR | 9 | 5 | 96 | 1643.06 | 0.702 | 0.223 | 68 | 47 | .04 |
| CR | 9 | 6 | 96 | 1642.02 | 0.698 | 0.170 | 69 | 38 | .00 |
| CR | 9 | 7 | 96 | 1641.00 | 0.700 | 0.185 | 77 | 38 | .00 |
| CR | 9 | 8 | 96 | 1639.95 | 0.700 | 0.172 | 82 | 44 | .00 |
| CR | 9 | 9 | 96 | 1638.91 | 0.700 | 0.179 | 85 | 45 | .00 |
| CR | 9 | 10 | 96 | 1637.80 | 0.713 | 0.159 | 85 | 47 | .00 |
| CR | 9 | 11 | 96 | 1636.73 | 0.702 | 0.170 | 94 | 49 | .00 |
| CR | 9 | 12 | 96 | 1635.70 | 0.701 | 0.191 | 85 | 51 | .00 |
| CR | 9 | 13 | 96 | 1634.60 | 0.699 | 0.156 | 67 | 46 | .00 |
| CR | 9 | 14 | 96 | 1633.55 | 0.700 | 0.180 | 62 | 47 | .15 |
| CR | 9 | 15 | 96 | 1633.15 | 0.700 | 0.504 | 63 | 50 | 1.32 |
| CR | 9 | 16 | 96 | 1632.50 | 0.702 | 0.385 | 60 | 47 | 1.04 |
| CR | 9 | 17 | 96 | 1631.75 | 0.703 | 0.337 | 58 | 48 | .45 |
| CR | 9 | 18 | 96 | 1630.73 | 0.700 | 0.204 | 65 | 39 | .00 |
| CR | 9 | 19 | 96 | 1629.77 | 0.700 | 0.235 | 67 | 38 | .04 |
| CR | 9 | 20 | 96 | 1628.71 | 0.700 | 0.188 | 64 | 42 | .01 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| CR | 9 | 21 | 96 | 1627.66 | 0.700 | 0.195 | 65 | 36 | .00 |
| CR | 9 | 22 | 96 | 1626.60 | 0.707 | 0.199 | 65 | 36 | .03 |
| CR | 9 | 23 | 96 | 1625.47 | 0.710 | 0.171 | 65 | 39 | .00 |
| CR | 9 | 24 | 96 | 1624.15 | 0.704 | 0.077 | 76 | 40 | .00 |
| CR | 9 | 25 | 96 | 1623.05 | 0.700 | 0.180 | 74 | 39 | .00 |
| CR | 9 | 26 | 96 | 1622.10 | 0.707 | 0.260 | 78 | 39 | .00 |
| CR | 9 | 27 | 96 | 1621.00 | 0.700 | 0.124 | 84 | 41 | .00 |
| CR | 9 | 28 | 96 | 1619.90 | 0.700 | 0.186 | 85 | 42 | .00 |
| CR | 9 | 29 | 96 | 1618.75 | 0.700 | 0.165 | 87 | 45 | .00 |
| CR | 9 | 30 | 96 | 1617.40 | 0.803 | 0.178 | 86 | 46 | .00 |

# APPENDIX D

## PHYTOPIGMENT DATA FOR BLUE RIVER AND COUGAR PROJECTS

Note: Data are from analyses of samples collected and analyzed using the pheophytin-corrected and the trichromatic method after extraction with organic solvent. The data listed are the calculated concentrations based on spectrophotometric absorbances and the above methods. Negative values may be encountered and these may be interpreted as absence of the noted pigment.

# BLUE RIVER LAKE PHYTOPIGMENT DATA

| Date | Depth | Chlorophyll a (corr) | Pheophytin | Chlorophyll a (tri) | Chlorophyll b | Chlorophyll c |
|---|---|---|---|---|---|---|
| Apr 16, 96 | 0 | 0.427 | 0.113 | 0.717 | 0.063 | 0.229 |
| Apr 16, 96 | 6 | 0.174 | 0.113 | 0.481 | 0.081 | 0.286 |
| Apr 16, 96 | 10 | 0.32 | -0.204 | 0.344 | 0.081 | 0.259 |
| Apr 16, 96 | 20 | 0.013 | 0.045 | 0.274 | 0.294 | 0.481 |
| Apr 16, 96 | 30 | 0.053 | -0.045 | 0.334 | 0.486 | 0.869 |
| Apr 16, 96 | 40 | -0.147 | -0.204 | 0.21 | 0.427 | 0.696 |
| Apr 16, 96 | 50 | -0.107 | -0.136 | 0.158 | 0.054 | 0.246 |
| | | | | | | |
| May 28, 96 | 0 | 1.669 | 0.113 | 1.843 | -0.03 | 0.214 |
| May 28, 96 | 6 | 1.615 | -0.136 | 1.785 | -0.096 | 0.175 |
| May 28, 96 | 10 | 1.682 | 0.136 | 1.942 | -0.073 | 0.257 |
| May 28, 96 | 20 | 0.894 | 0.227 | 1.268 | -0.04 | 0.118 |
| May 28, 96 | 30 | 0.494 | 0.182 | 0.657 | -0.017 | 0.068 |
| May 28, 96 | 40 | 0.454 | 0.091 | 0.594 | 0.04 | 0.172 |
| May 28, 96 | 50 | 0.32 | -0.113 | 0.469 | 0.101 | 0.247 |
| May 28, 96 | 60 | 0.267 | 0.068 | 0.518 | 0.12 | 0.306 |
| | | | | | | |
| Jul 9, 96 | 0 | 1.001 | 0.227 | 1.395 | -0.065 | 0.158 |
| Jul 9, 96 | 7.5 | 3.564 | 0.477 | 4.211 | -0.215 | 0.367 |
| Jul 9, 96 | 10 | 8.964 | 0.681 | 9.949 | -0.656 | 1.037 |
| Jul 9, 96 | 20 | 0.347 | -0.068 | 0.557 | 0.087 | 0.083 |
| Jul 9, 96 | 30 | 0.107 | -0.159 | 0.203 | 0.018 | 0.117 |
| Jul 9, 96 | 40 | 0.013 | -0.113 | 0.145 | 0.024 | 0.133 |
| Jul 9, 96 | 50 | -0.107 | -0.091 | 0.126 | -0.012 | 0.012 |
| Jul 9, 96 | 60 | -0.214 | 0 | 0.141 | 0.012 | 0.08 |
| | | | | | | |
| Aug 26, 96 | 0 | 0.894 | -0.227 | 1.05 | 0.035 | 0.205 |
| Aug 26, 96 | 10 | 0.574 | -0.045 | 0.89 | -0.031 | 0.164 |
| Aug 26, 96 | 20 | 1.308 | 0.068 | 1.722 | 0.028 | 0.382 |
| Aug 26, 96 | 30 | 0.521 | -0.068 | 0.61 | -0.025 | 0.168 |
| Aug 26, 96 | 40 | 0.147 | 0.068 | 0.217 | -0.097 | 0.121 |
| Aug 26, 96 | 50 | 0.013 | -0.113 | 0.028 | -0.14 | -0.002 |
| Aug 26, 96 | 60 | 0.04 | 0.068 | 0.176 | 0.076 | 0.056 |
| | | | | | | |
| Sep 23, 96 | 0 | 1.255 | -0.045 | 1.398 | 0.029 | 0.261 |
| Sep 23, 96 | 10 | 1.375 | -0.091 | 1.604 | -0.052 | 0.286 |
| Sep 23, 96 | 20 | 0.387 | 0.091 | 0.619 | 0.006 | 0.2 |
| Sep 23, 96 | 30 | 0.254 | 0.091 | 0.381 | -0.065 | 0.01 |
| Sep 23, 96 | 40 | 0.227 | -0.182 | 0.297 | -0.028 | 0.128 |
| Sep 23, 96 | 50 | 0.254 | -0.159 | 0.363 | -0.06 | 0.131 |

# COUGAR LAKE PHYTOPIGMENT DATA

| Date | Depth (m) | Chlorophyll a (corr) | Pheophytin | Chlorophyll a (tri) | Chlorphyll b | Chlorphyll c |
|---|---|---|---|---|---|---|
| Apr 17, 96 | 0 | 0.481 | 0.045 | 0.693 | 0.091 | 0.168 |
| Apr 17, 96 | 10 | 1.028 | 0.499 | 1.54 | 0.092 | 0.403 |
| Apr 17, 96 | 20 | 0.32 | -0.182 | 0.53 | -0.011 | 0.118 |
| Apr 17, 96 | 30 | 0.04 | -0.023 | 0.183 | -0.013 | 0.041 |
| Apr 17, 96 | 40 | 0.053 | -0.091 | 0.113 | -0.009 | 0.12 |
| Apr 17, 96 | 50 | -0.08 | 0.136 | 0.087 | 0.046 | 0.096 |
| Apr 17, 96 | 60 | -0.12 | 0.159 | 0.158 | 0.249 | 0.417 |
| Apr 17, 96 | 70 | 0 | -0.023 | 0.152 | 0.186 | 0.397 |
| Apr 17, 96 | 80 | -0.04 | 0.023 | 0.073 | 0.126 | 0.222 |
| Apr 17, 96 | 90 | -0.093 | -0.227 | 0.204 | 0.316 | 0.494 |
| Apr 17, 96 | 100 | -0.067 | -0.182 | 0.297 | 0.467 | 0.759 |
| | | | | | | |
| May 29, 96 | 0 | 15.052 | 0.936 | 16.024 | -0.657 | 1.332 |
| May 29, 96 | 6 | 7.383 | 0.159 | 8.108 | -0.005 | 0.869 |
| May 29, 96 | 10 | 2.937 | 0.409 | 3.633 | 0.03 | 0.362 |
| May 29, 96 | 20 | 0.294 | 0.023 | 0.445 | -0.008 | 0.014 |
| May 29, 96 | 30 | 0.134 | -0.113 | 0.21 | 0.002 | 0.05 |
| May 29, 96 | 40 | 0.067 | -0.113 | 0.215 | 0.079 | 0.124 |
| May 29, 96 | 50 | 0.027 | -0.091 | 0.196 | 0.039 | 0.04 |
| May 29, 96 | 60 | 0.027 | 0.136 | 0.21 | 0.105 | 0.351 |
| May 29, 96 | 70 | -0.027 | -0.023 | 0.113 | 0.144 | 0.155 |
| May 29, 96 | 80 | -0.16 | 0.091 | 0.183 | 0.28 | 0.562 |
| May 29, 96 | 90 | 0 | 0.068 | 0.212 | 0.227 | 0.385 |
| May 29, 96 | 100 | 0.12 | -0.182 | 0.252 | 0.28 | 0.528 |
| | | | | | | |
| Jul 10, 96 | 0 | 0.868 | 0.045 | 1.138 | 0.004 | 0.189 |
| Jul 10, 96 | 10 | 6.101 | 0.613 | 6.812 | -0.326 | 0.699 |
| Jul 10, 96 | 20 | 0.961 | 0.477 | 1.568 | -0.033 | 0.266 |
| Jul 10, 96 | 30 | 0.227 | 0.068 | 0.494 | 0.02 | 0.082 |
| Jul 10, 96 | 40 | 0.24 | -0.204 | 0.358 | 0.005 | 0.096 |
| Jul 10, 96 | 50 | 0.134 | 0.204 | 0.426 | 0.012 | 0.095 |
| Jul 10, 96 | 60 | -0.08 | 0 | 0.309 | 0.105 | 0.19 |
| Jul 10, 96 | 70 | -0.16 | 0.136 | 0.137 | 0.066 | 0.049 |
| Jul 10, 96 | 80 | -0.12 | -0.068 | 0.268 | 0.107 | 0.261 |
| Jul 10, 96 | 90 | -0.187 | -0.091 | 0.264 | 0.216 | 0.349 |
| Jul 10, 96 | 100 | -0.107 | 0.182 | 0.209 | 0.059 | 0.239 |
| Jul 10, 96 | 110 | 0.28 | -0.091 | 0.599 | 0.179 | 0.305 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Aug 27, 96 | 0 | 1.108 | -0.045 | 1.343 | 0.08 | 0.212 |
| Aug 27, 96 | 6 | 0.881 | -0.159 | 1.151 | -0.013 | 0.203 |
| Aug 27, 96 | 10 | 0.788 | -0.091 | 0.924 | 0.105 | 0.289 |
| Aug 27, 96 | 20 | 0.854 | 0.272 | 1.269 | 0.195 | 0.461 |
| Aug 27, 96 | 30 | 0.307 | 0.113 | 0.72 | 0.019 | 0.269 |
| Aug 27, 96 | 40 | 0.227 | -0.272 | 0.263 | -0.016 | 0.075 |
| Aug 27, 96 | 50 | 0.093 | -0.159 | 0.084 | -0.063 | 0.033 |
| Aug 27, 96 | 60 | -0.027 | 0.136 | 0.02 | -0.097 | -0.086 |
| Aug 27, 96 | 70 | 0.107 | 0.159 | 0.058 | -0.023 | 0.049 |
| Aug 27, 96 | 80 | 0.053 | 0.182 | 0.058 | -0.021 | 0.025 |
| Aug 27, 96 | 90 | -0.013 | 0.045 | 0.06 | -0.039 | 0.008 |
| Aug 27, 96 | 100 | 0 | 0.068 | 0.124 | 0.011 | 0.074 |
| | | | | | | |
| Sep 25, 96 | 0 | 0.174 | -0.023 | 0.359 | -0.057 | -0.057 |
| Sep 25, 96 | 10 | 0.627 | -0.113 | 0.675 | -0.033 | 0.045 |
| Sep 25, 96 | 20 | 0.227 | 0.159 | 0.486 | -0.101 | 0.061 |
| Sep 25, 96 | 30 | 0.013 | -0.25 | 0.112 | -0.103 | -0.078 |
| Sep 25, 96 | 40 | 0.027 | -0.227 | 0.09 | -0.071 | 0.081 |
| Sep 25, 96 | 50 | -0.053 | 0.113 | 0.015 | -0.046 | 0.001 |
| Sep 25, 96 | 60 | -0.013 | -0.34 | 0.021 | -0.121 | -0.054 |
| Sep 25, 96 | 70 | -0.067 | -0.023 | 0.044 | 0.007 | 0.101 |
| Sep 25, 96 | 80 | -0.013 | 0.159 | 0.08 | 0.038 | 0.195 |
| Sep 25, 96 | 90 | 0.013 | -0.295 | 0.1 | 0.013 | 0.163 |

# STREAM PHYTOPIGMENTS

| Station | Date | Chlorophyll a (corr) | Pheophytin | Chlorophyll a (tri) | Chlorophyll b | Chlorophyll c |
|---|---|---|---|---|---|---|
| BR-IN | Apr 18, 96 | -0.147 | -0.204 | 0.2 1 | 0.427 | 0.696 |
| BR-IN | May 27, 96 | 0.254 | -0.068 | 0.174 | 0.008 | 0.153 |
| BR-IN | Jul 8, 96 | 0.053 | 0.045 | 0.112 | -0.12 | -0.013 |
| BR-IN | Aug 28, 96 | 0.147 | -0.454 | 0.136 | -0.133 | 0.008 |
| BR-IN | Sep 26, 96 | -0.147 | -0.068 | 0.037 | -0.182 | -0.012 |
| | | | | | | |
| LC | Apr 18, 96 | 0.214 | -0.454 | 0.014 | -0.03 | -0.052 |
| LC | May 27, 96 | 0.267 | 0.068 | 0.518 | 0.12 | 0.306 |
| LC | Jul 8, 96 | -0.067 | 0.113 | 0.054 | -0.099 | -0.038 |
| LC | Aug 28, 96 | 0 | -0.113 | 0.08 | -0.05 | 0.287 |
| LC | Sep 26, 96 | 0 | 0.068 | 0.079 | -0.144 | 0.089 |
| | | | | | | |
| SF-IN | Apr 18, 96 | 0.147 | -0.068 | 0.46 | 0.079 | 0.129 |
| SF-IN | May 27, 96 | 0.174 | 0 | 0.333 | 0.026 | 0.095 |
| SF-IN | Jul 8, 96 | -0.027 | -0.25 | 0.09 | -0.054 | 0.016 |
| SF-IN | Aug 28, 96 | 0.107 | 0.045 | 0.15 | -0.003 | 0.352 |
| SF-IN | Sep 26, 96 | 0.053 | -0.113 | 0.118 | -0.125 | 0.011 |
| | | | | | | |
| BR-OUT | Apr 18, 96 | -0.107 | -0.136 | 0.158 | 0.054 | 0.246 |
| BR-OUT | May 27, 96 | 0.214 | 0 | 0.482 | 0.13 | 0.372 |
| BR-OUT | Jul 8, 96 | -0.053 | -0.182 | 0.159 | -0.021 | 0.216 |
| BR-OUT | Aug 28, 96 | 0.401 | -0.091 | 0.363 | -0.003 | 0.238 |
| BR-OUT | Sep 26, 96 | 0.134 | 0.113 | 0.428 | -0.036 | 0.254 |
| | | | | | | |
| SF-OUT | Apr 18, 96 | 0.147 | -0.113 | 0.194 | 0.037 | 0.241 |
| SF-OUT | May 27, 96 | -0.107 | 0.023 | 0.239 | -0.005 | 0.079 |
| SF-OUT | Jul 8, 96 | 0.267 | -0.136 | 0.389 | 0.048 | 0.105 |
| SF-OUT | Aug 28, 96 | 0.227 | -0.091 | 0.429 | 0.063 | 0.497 |
| SF-OUT | Sep 26, 96 | 0.04 | 0.068 | 0.267 | -0.057 | -0.016 |
| | | | | | | |
| MR-UP | Apr 18, 96 | -0.067 | 0.159 | 0.426 | 0.067 | 0.215 |
| MR-UP | May 27, 96 | -0.027 | 0.023 | 0.255 | 0.021 | 0.04 |
| MR-UP | Jul 9, 96 | 0.067 | -0.045 | 0.332 | 0.047 | 0.088 |
| MR-UP | Aug 28, 96 | 0.36 | -0.295 | 0.387 | 0.038 | 0.285 |
| MR-UP | Sep 24, 96 | 0.401 | 0 | 0.469 | -0.05 | 0.199 |
| | | | | | | |
| MR-FR | Apr 18, 96 | 0.427 | 0.068 | 0.69 | 0.176 | 0.288 |
| MR-FR | May 27, 96 | 0.027 | -0.227 | 0.262 | 0 | 0.023 |
| MR-FR | Jul 9, 96 | 0.067 | 0.159 | 0.386 | 0.087 | 0.114 |
| MR-FR | Aug 28, 96 | 0.334 | -0.023 | 0.447 | 0.02 | 0.191 |
| MR-FR | Sep 24, 96 | 0.481 | -0.113 | 0.718 | -0.021 | 0.191 |

| | | | | | | |
|---|---|---|---|---|---|---|
| MR-LD | Apr 18, 96 | 0.16 | -0.091 | 0.359 | 0.284 | 0.563 |
| MR-LD | May 27, 96 | 0.174 | -0.045 | 0.404 | 0.011 | 0.02 |
| MR-LD | Jul 9, 96 | -0.147 | 0.295 | -0.028 | -0.065 | -0.083 |
| MR-LD | Aug 28, 96 | 0.427 | -0.227 | 0.706 | 0.113 | 0.355 |
| MR-LD | Sep 24, 96 | 0.147 | -0.091 | 0.582 | -0.097 | 0.146 |
| | | | | | | |
| MR-GS | Apr 18, 96 | 0. 441 | 0.182 | 0.849 | 0.107 | 0.323 |
| MR-GS | May 27, 96 | 0.12 | -0.182 | 0.252 | 0.28 | 0.528 |
| MR-GS | Jul 9, 96 | 0.307 | 0.272 | 0.568 | 0.02 | 0.117 |
| MR-GS | Aug 26, 96 | 0.481 | 0.113 | 0.559 | 0.022 | 0.307 |
| MR-GS | Sep 24, 96 | 0.347 | 0.136 | 0.556 | -0.048 | 0.077 |
| | | | | | | |
| MR-HB | Apr 18, 96 | 0.187 | 0.182 | 0.593 | 0.114 | 0.214 |
| MR-HB | May 27, 96 | 0.334 | 0.159 | 0.597 | 0.067 | 0.184 |
| MR-HB | Jul 9, 96 | -0.214 | 0 | 0.141 | 0.012 | 0.08 |
| MR-HB | Aug 26, 96 | 0.414 | 0 | 0.682 | -0.057 | 0.146 |
| MR-HB | Sep 26, 96 | 0.134 | -0.023 | 0.482 | -0.178 | -0.014 |

# APPENDIX E

## PHYTOPLANKTON DATA FOR BLUE RIVER AND COUGAR PROJECTS

# Phytoplankton Population Data for Blue River and Cougar Lakes, 1996
(cells/ml)

| Lake | Month | Depth (m) | April | May | July | August | September |
|---|---|---|---|---|---|---|---|
| BR | 4 | 0 | 3167.0625 | 8598.45 | 5735.625 | 4588.5 | 5097.225 |
| BR | 4 | 10 | 877.8 | 22743 | 5246.85 | 4239.375 | 4189.5 |
| BR | 4 | 20 | 137.15625 | 4004.9625 | 3112.2 | 5765.55 | 2074.8 |
| BR | 4 | 30 | 52.36875 | 301.74375 | 1605.975 | 623.4375 | 820.44375 |
| BR | 4 | 40 | 0 | 0 | 1271.8125 | 0 | 0 |
| BR | 4 | 50 | 0 | 0 | 64.8375 | 0 | 0 |
| BR | 4 | 60 | 0 | 0 | 159.6 | 0 | |

| Lake | Month | Depth (m) | April | May | July | August | September |
|---|---|---|---|---|---|---|---|
| CR | 4 | 0 | 2932.65 | 48438.6 | 5456.325 | 2423.925 | 2428.9125 |
| CR | 4 | 10 | 4957.575 | 8618.4 | 17416.35 | 1855.35 | 1620.9375 |
| CR | 4 | 20 | 2044.875 | 850.36875 | 4189.5 | 1745.625 | 668.325 |
| CR | 4 | 30 | 324.1875 | 139.65 | 264.3375 | 147.13125 | 169.575 |
| CR | 4 | 40 | 0 | 104.7375 | 229.425 | 67.33125 | 79.8 |
| CR | 4 | 50 | 0 | 49.875 | 77.30625 | 59.85 | 57.35625 |
| CR | 4 | 60 | 0 | 87.28125 | 117.20625 | 29.925 | 34.9125 |
| CR | 4 | 70 | 0 | 64.8375 | 49.875 | 0 | 134.6625 |
| CR | 4 | 80 | 0 | 29.925 | 0 | 0 | 0 |
| CR | 4 | 90 | 0 | 69.825 | 0 | 0 | 0 |
| CR | 4 | 100 | 0 | 74.8125 | 0 | 0 | |

# APPENDIX F

# SELECT INPUT OUTPUT FILES FOR COUGAR LAKE PREDICTIONS

```
11000    ***COUGAR LAKE MAY 1996 SELECT
1010     ***DATA SETS   01
1020     ***PRINT INPUT
1030     ***INPUT/OUTPUT USING RUSH CREEK CREST AS SUBMERGED WEIR
1040     ***ENGLISH
1050     ***TABLE       01
1060     ***THICKNESS        5.0
1070     ***INTERVAL    01
1080     ***SURFACE       400.6
1090     ***BOTTOM         0.0
1100     ***WEIR
1110     ***SUBMERGED
1120     ***LENGTH         100.
1130     ***HEIGHT        155.0
1140     ***FLOW          31.5
1150     ***NUMBER OF TEMP       41
1160     ***TEMPERATURE DEGREES CENTIGRADE
1170     ***HEIGHT    TEMP
1180     ***     400.6    14.8
1190     ***     394.0    13.8
1200     ***     387.4    13.1
1210     ***     380.9    11.1
1220     ***     374.3    10.3
1230     ***     367.8     9.9
1240     ***     361.2     9.6
1250     ***     354.6     9.2
1260     ***     348.1     9.1
1270     ***     341.5     9.0
1280     ***     335.0     8.7
1290     ***     328.4     8.6
1300     ***     321.8     8.4
1310     ***     315.3     8.2
1320     ***     308.7     8.1
1330     ***     302.1     8.0
1340     ***     295.6     8.0
1350     ***     289.0     7.9
1360     ***     282.5     7.8
1370     ***     275.9     7.7
1380     ***     269.3     7.7
1390     ***     262.8     7.5
1400     ***     256.2     7.1
1410     ***     249.7     6.8
1420     ***     243.1     6.7
1430     ***     236.5     6.4
1440     ***     230.0     6.1
1450     ***     223.4     5.6
1460     ***     216.8     5.3
1470     ***     210.3     5.2
1480     ***     203.7     5.1
1490     ***     197.2     5.0
1500     ***     190.6     4.9
1510     ***     184.0     4.9
1520     ***     177.5     4.9
1530     ***     170.9     4.8
```

```
1540    ***    151.2    4.8
1550    ***    125.0    4.7
1560    ***     72.5    4.7
1570    ***     40.0    4.7
1580    ***     20.0    4.7
1590    ***QUALTITIES   1
1600    ***NUMBER OF DISSOLVED OXYGEN        41
1610    ***HEIGHT   DISSOLVED OXYGEN
1620    ***    400.6    12.3
1630    ***    394.0    12.4
1640    ***    387.4    12.8
1650    ***    380.9    11.8
1660    ***    374.3    11.3
1670    ***    367.8    11.4
1680    ***    361.2    11.4
1690    ***    354.6    11.1
1700    ***    348.1    11.3
1710    ***    341.5    11.2
1720    ***    335.0    11.2
1730    ***    328.4    11.1
1740    ***    321.8    11.2
1750    ***    315.3    11.2
1760    ***    308.7    11.2
1770    ***    302.1    11.2
1780    ***    295.6    11.2
1790    ***    289.0    11.2
1800    ***    282.5    11.2
1810    ***    275.9    11.3
1820    ***    269.3    11.3
1830    ***    262.8    11.3
1840    ***    256.2    11.3
1850    ***    249.7    11.3
1860    ***    243.1    11.3
1870    ***    236.5    11.3
1880    ***    230.0    11.2
1890    ***    223.4    11.0
1900    ***    216.8    10.9
1910    ***    210.3    10.9
1920    ***    203.7    10.9
1930    ***    197.2    10.9
1940    ***    190.6    10.9
1950    ***    184.0    10.9
1960    ***    177.5    10.9
1970    ***    170.9    10.8
1980    ***    151.2    10.9
1990    ***    125.0    10.8
2000    ***     72.5    10.1
2010    ***     40.0     9.3
2020    ***     20.0     9.0
2030    ***STOP
```

COUGAR LAKE MAY 29, 1996 SELECT

INPUT/OUTPUT USING RUSH CREEK CREST AS SUBMERGED WEIR
UNITS ARE IN FEET

WEIR CREST ELEVATION 155.000
WEIR LENGTH 100.000
DISCHARGE, VOLUME FLOW PER SEC. 31.0000

TOTAL DISCHARGE, VOLUME PER SEC 31.0000

LOWER WITHDRAWAL LIMIT ( ACTUAL ) HEIGHT ABOVE BOTTOM 151.670
ELEVATION 151.670
LOWER WITHDRAWAL LIMIT ( THEORETICAL ) HEIGHT ABOVE BOTTOM 151.670
ELEVATION 151.670
UPPER WITHDRAWAL LIMIT ( ACTUAL ) HEIGHT ABOVE BOTTOM 400.600
ELEVATION 400.600
UPPER WITHDRAWAL LIMIT ( THEORETICAL ) HEIGHT ABOVE BOTTOM 400.600
ELEVATION 400.600
OUTFLOW DENSITY 0.99989 G/CC
OUTFLOW TEMPERATURE 7.31
OUTFLOW CONCENTRATION OF DISSOLVED OXYGEN 11.18

| Elevation | Depth | Density | Norm.Vel. | Flow | Temperature | Dis. Oxygen |
|---|---|---|---|---|---|---|
| 400.300 | 0.30 | 0.99917 | 0.0000 | 0.0000 | 14.75 | 12.30 |
| 397.500 | 3.10 | 0.99923 | 0.1768 | 0.1160 | 14.33 | 12.35 |
| 392.500 | 8.10 | 0.99932 | 0.3943 | 0.2588 | 13.64 | 12.49 |
| 387.500 | 13.10 | 0.99939 | 0.5331 | 0.3498 | 13.11 | 12.79 |
| 382.500 | 18.10 | 0.99957 | 0.7796 | 0.5116 | 11.59 | 12.05 |
| 377.500 | 23.10 | 0.99966 | 0.8716 | 0.5720 | 10.69 | 11.54 |
| 372.500 | 28.10 | 0.99971 | 0.9095 | 0.5968 | 10.19 | 11.33 |
| 367.500 | 33.10 | 0.99974 | 0.9291 | 0.6097 | 9.89 | 11.40 |
| 362.500 | 38.10 | 0.99976 | 0.9422 | 0.6182 | 9.66 | 11.40 |
| 357.500 | 43.10 | 0.99978 | 0.9551 | 0.6267 | 9.38 | 11.23 |
| 352.500 | 48.10 | 0.99980 | 0.9635 | 0.6322 | 9.17 | 11.16 |
| 347.500 | 53.10 | 0.99980 | 0.9673 | 0.6347 | 9.09 | 11.29 |
| 342.500 | 58.10 | 0.99981 | 0.9707 | 0.6370 | 9.02 | 11.22 |
| 337.500 | 63.10 | 0.99982 | 0.9764 | 0.6407 | 8.82 | 11.20 |
| 332.500 | 68.10 | 0.99983 | 0.9804 | 0.6433 | 8.66 | 11.16 |
| 327.500 | 73.10 | 0.99984 | 0.9829 | 0.6449 | 8.57 | 11.11 |
| 322.500 | 78.10 | 0.99985 | 0.9859 | 0.6469 | 8.42 | 11.19 |
| 317.500 | 83.10 | 0.99986 | 0.9885 | 0.6486 | 8.27 | 11.20 |
| 312.500 | 88.10 | 0.99987 | 0.9903 | 0.6498 | 8.16 | 11.20 |
| 307.500 | 93.10 | 0.99987 | 0.9915 | 0.6506 | 8.08 | 11.20 |
| 302.500 | 98.10 | 0.99988 | 0.9926 | 0.6514 | 8.01 | 11.20 |
| 297.500 | 103.10 | 0.99988 | 0.9932 | 0.6517 | 8.00 | 11.20 |
| 292.500 | 108.10 | 0.99988 | 0.9939 | 0.6522 | 7.95 | 11.20 |
| 287.500 | 113.10 | 0.99988 | 0.9948 | 0.6528 | 7.88 | 11.20 |
| 282.500 | 118.10 | 0.99989 | 0.9955 | 0.6533 | 7.80 | 11.20 |
| 277.500 | 123.10 | 0.99989 | 0.9962 | 0.6537 | 7.72 | 11.28 |
| 272.500 | 128.10 | 0.99989 | 0.9966 | 0.6540 | 7.70 | 11.30 |
| 267.500 | 133.10 | 0.99990 | 0.9971 | 0.6543 | 7.64 | 11.30 |
| 262.500 | 138.10 | 0.99991 | 0.9978 | 0.6547 | 7.48 | 11.30 |
| 257.500 | 143.10 | 0.99992 | 0.9986 | 0.6553 | 7.18 | 11.30 |
| 252.500 | 148.10 | 0.99993 | 0.9991 | 0.6556 | 6.93 | 11.30 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 247.500 | 153.10 | 0.99994 | 0.9994 | 0.6558 | 6.77 | 11.30 |
| 242.500 | 158.10 | 0.99994 | 0.9995 | 0.6559 | 6.67 | 11.30 |
| 237.500 | 163.10 | 0.99995 | 0.9997 | 0.6560 | 6.45 | 11.30 |
| 232.500 | 168.10 | 0.99996 | 0.9998 | 0.6561 | 6.22 | 11.24 |
| 227.500 | 173.10 | 0.99997 | 0.9999 | 0.6561 | 5.91 | 11.12 |
| 222.500 | 178.10 | 0.99998 | 1.0000 | 0.6562 | 5.56 | 10.99 |
| 217.500 | 183.10 | 0.99999 | 1.0000 | 0.6562 | 5.33 | 10.91 |
| 212.500 | 188.10 | 0.99999 | 1.0000 | 0.6562 | 5.23 | 10.90 |
| 207.500 | 193.10 | 0.99999 | 1.0000 | 0.6562 | 5.16 | 10.90 |
| 202.500 | 198.10 | 0.99999 | 1.0000 | 0.6562 | 5.08 | 10.90 |
| 197.500 | 203.10 | 0.99999 | 1.0000 | 0.6562 | 5.00 | 10.90 |
| 192.500 | 208.10 | 0.99999 | 1.0000 | 0.6562 | 4.93 | 10.90 |
| 187.500 | 213.10 | 0.99999 | 1.0000 | 0.6562 | 4.90 | 10.90 |
| 182.500 | 218.10 | 0.99999 | 1.0000 | 0.6562 | 4.90 | 10.90 |
| 177.500 | 223.10 | 0.99999 | 1.0000 | 0.6562 | 4.90 | 10.90 |
| 172.500 | 228.10 | 0.99999 | 1.0000 | 0.6562 | 4.82 | 10.82 |
| 167.500 | 233.10 | 0.99999 | 1.0000 | 0.6562 | 4.80 | 10.82 |
| 162.500 | 238.10 | 0.99999 | 1.0000 | 0.6562 | 4.80 | 10.84 |
| 157.500 | 243.10 | 0.99999 | 1.0000 | 0.6562 | 4.80 | 10.87 |
| 152.500 | 248.10 | 0.99999 | 1.0000 | 0.6562 | 4.80 | 10.89 |
| 147.500 | 253.10 | 0.99999 | 0.0000 | 0.0000 | 4.79 | 10.89 |
| 142.500 | 258.10 | 1.00000 | 0.0000 | 0.0000 | 4.77 | 10.87 |
| 137.500 | 263.10 | 1.00000 | 0.0000 | 0.0000 | 4.75 | 10.85 |
| 132.500 | 268.10 | 1.00000 | 0.0000 | 0.0000 | 4.73 | 10.83 |
| 127.500 | 273.10 | 1.00000 | 0.0000 | 0.0000 | 4.71 | 10.81 |
| 122.500 | 278.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 10.77 |
| 117.500 | 283.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 10.70 |
| 112.500 | 288.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 10.63 |
| 107.500 | 293.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 10.57 |
| 102.500 | 298.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 10.50 |
| 97.500 | 303.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 10.43 |
| 92.500 | 308.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 10.37 |
| 87.500 | 313.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 10.30 |
| 82.500 | 318.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 10.23 |
| 77.500 | 323.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 10.17 |
| 72.500 | 328.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 10.10 |
| 67.500 | 333.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 9.98 |
| 62.500 | 338.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 9.85 |
| 57.500 | 343.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 9.73 |
| 52.500 | 348.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 9.61 |
| 47.500 | 353.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 9.48 |
| 42.500 | 358.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 9.36 |
| 37.500 | 363.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 9.26 |
| 32.500 | 368.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 9.19 |
| 27.500 | 373.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 9.11 |
| 22.500 | 378.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 9.04 |
| 17.500 | 383.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 9.00 |
| 12.500 | 388.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 9.00 |
| 7.500 | 393.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 9.00 |
| 2.500 | 398.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 9.00 |

1

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                 VELOCITY ( TIMES 1000 )
   0        200       400       600       800      1000      1200      1400      1600      1800      2000
   I---------I---------I---------I---------I---------I---------I---------I---------I---------I---------I
400.60   0.00 +* D
395.60   5.00 +   D     V
390.60  10.00 +     D            V
385.60  15.00 +     D                  V
380.60  20.00 +      D                         V
375.60  25.00 +       D                            V
370.60  30.00 +        D                             V
365.60  35.00 +        D                              V
360.60  40.00 +        D                              V
355.60  45.00 +        D                              V
350.60  50.00 +        D                               V
345.60  55.00 +         D                              V
340.60  60.00 +         D                              V
335.60  65.00 +         D                              V
330.60  70.00 +         D                               V
325.60  75.00 +         D                               V
320.60  80.00 +         D                               V
315.60  85.00 +         D                               V
310.60  90.00 +         D                               V
305.60  95.00 +         D                               V
300.60 100.00 +         D                               V
295.60 105.00 +         D                               V
290.60 110.00 +         D                               V
285.60 115.00 +         D                               V
280.60 120.00 +         D                               V
275.60 125.00 +         D                               V
270.60 130.00 +         D                               V
265.60 135.00 +         D                               V
260.60 140.00 +          D                              V
255.60 145.00 +          D                              V
250.60 150.00 +          D                              V
245.60 155.00 +          D                              V
240.60 160.00 +          D                              V
235.60 165.00 +          D                              V
230.60 170.00 +          D                              V
225.60 175.00 +          D                              V
220.60 180.00 +          D                              V
215.60 185.00 +          D                              V
210.60 190.00 +          D                              V
205.60 195.00 +          D                              V
200.60 200.00 +          D                              V
195.60 205.00 +          D                              V
190.60 210.00 +          D                              V
185.60 215.00 +          D                              V
180.60 220.00 +          D                              V
175.60 225.00 +          D                               V
170.60 230.00 +          D                               V
165.60 235.00 +          D                               V
160.60 240.00 +          D                               V
155.60 245.00 +          D                               V
150.60 250.00 +          D                               V
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 145.60  255.00 +*          D
 140.60  260.00 +*          D
 135.60  265.00 +*          D
 130.60  270.00 +*          D
 125.60  275.00 +*          D
 120.60  280.00 +*          D
 115.60  285.00 +*          D
 110.60  290.00 +*          D
 105.60  295.00 +*          D
 100.60  300.00 +*          D
  95.60  305.00 +*          D
  90.60  310.00 +*          D
  85.60  315.00 +*          D
  80.60  320.00 +*          D
  75.60  325.00 +*          D
  70.60  330.00 +*          D
  65.60  335.00 +*          D
  60.60  340.00 +*          D
  55.60  345.00 +*          D
  50.60  350.00 +*          D
  45.60  355.00 +*          D
  40.60  360.00 +*          D
  35.60  365.00 +*          D
  30.60  370.00 +*          D
  25.60  375.00 +*          D
  20.60  380.00 +*          D
  15.60  385.00 +*          D
  10.60  390.00 +*          D
5.60  395.00 +*          D
0.60  400.00 +*          D
     I---------I---------I---------I---------I---------I---------I---------I---------I---------I---------I
 0.99900  1.00000  1.00100  1.00200  1.00300  1.00400  1.00500  1.00600  1.00700  1.00800
1.00900
           DENSITY G/CC
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COUGAR LAKE MAY 29, 1996 SELECT

INPUT/OUTPUT USING RUSH CREEK AS SUBMERGED WEIR

UNITS ARE IN FEET

WEIR CREST ELEVATION 155.000
WEIR LENGTH 100.000
DISCHARGE, VOLUME FLOW PER SEC. 31.0000

TOTAL DISCHARGE, VOLUME PER SEC 31.0000

LOWER WITHDRAWAL LIMIT ( ACTUAL ) HEIGHT ABOVE BOTTOM
151.670 ELEVATION 151.670
LOWER WITHDRAWAL LIMIT ( THEORETICAL ) HEIGHT ABOVE BOTTOM
151.670 ELEVATION 151.670
UPPER WITHDRAWAL LIMIT ( ACTUAL ) HEIGHT ABOVE BOTTOM
400.600 ELEVATION 400.600
UPPER WITHDRAWAL LIMIT ( THEORETICAL ) HEIGHT ABOVE BOTTOM
400.600 ELEVATION 400.600
OUTFLOW DENSITY 0.99989 G/CC
OUTFLOW TEMPERATURE 7.31
OUTFLOW CONCENTRATION OF TOTAL ORG CARBON 2.35

| Elevation | Depth | Density | Norm. Vel. | Flow | Temperature | Total Org. C |
|---|---|---|---|---|---|---|
| 400.300 | 0.30 | 0.99917 | 0.0000 | 0.0000 | 14.75 | 5.76 |
| 397.500 | 3.10 | 0.99923 | 0.1768 | 0.1160 | 14.33 | 5.37 |
| 392.500 | 8.10 | 0.99932 | 0.3943 | 0.2588 | 13.64 | 4.69 |
| 387.500 | 13.10 | 0.99939 | 0.5331 | 0.3498 | 13.11 | 4.00 |
| 382.500 | 18.10 | 0.99957 | 0.7796 | 0.5116 | 11.59 | 3.32 |
| 377.500 | 23.10 | 0.99966 | 0.8716 | 0.5720 | 10.69 | 2.63 |
| 372.500 | 28.10 | 0.99971 | 0.9095 | 0.5968 | 10.19 | 1.94 |
| 367.500 | 33.10 | 0.99974 | 0.9291 | 0.6097 | 9.89 | 1.30 |
| 362.500 | 38.10 | 0.99976 | 0.9422 | 0.6182 | 9.66 | 1.27 |
| 357.500 | 43.10 | 0.99978 | 0.9551 | 0.6267 | 9.38 | 1.24 |
| 352.500 | 48.10 | 0.99980 | 0.9635 | 0.6322 | 9.17 | 1.21 |
| 347.500 | 53.10 | 0.99980 | 0.9673 | 0.6347 | 9.09 | 1.18 |
| 342.500 | 58.10 | 0.99981 | 0.9707 | 0.6370 | 9.02 | 1.15 |
| 337.500 | 63.10 | 0.99982 | 0.9764 | 0.6407 | 8.82 | 1.12 |
| 332.500 | 68.10 | 0.99983 | 0.9804 | 0.6433 | 8.66 | 1.40 |
| 327.500 | 73.10 | 0.99984 | 0.9829 | 0.6449 | 8.57 | 1.99 |
| 322.500 | 78.10 | 0.99985 | 0.9859 | 0.6469 | 8.42 | 2.58 |
| 317.500 | 83.10 | 0.99986 | 0.9885 | 0.6486 | 8.27 | 3.17 |
| 312.500 | 88.10 | 0.99987 | 0.9903 | 0.6498 | 8.16 | 3.77 |
| 307.500 | 93.10 | 0.99987 | 0.9915 | 0.6506 | 8.08 | 4.36 |
| 302.500 | 98.10 | 0.99988 | 0.9926 | 0.6514 | 8.01 | 4.95 |
| 297.500 | 103.10 | 0.99988 | 0.9932 | 0.6517 | 8.00 | 4.50 |
| 292.500 | 108.10 | 0.99988 | 0.9939 | 0.6522 | 7.95 | 3.95 |
| 287.500 | 113.10 | 0.99988 | 0.9948 | 0.6528 | 7.88 | 3.40 |
| 282.500 | 118.10 | 0.99989 | 0.9955 | 0.6533 | 7.80 | 2.85 |
| 277.500 | 123.10 | 0.99989 | 0.9962 | 0.6537 | 7.72 | 2.30 |
| 272.500 | 128.10 | 0.99989 | 0.9966 | 0.6540 | 7.70 | 1.75 |
| 267.500 | 133.10 | 0.99990 | 0.9971 | 0.6543 | 7.64 | 1.38 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 262.500 | 138.10 | 0.99991 | 0.9978 | 0.6547 | 7.48 | 1.34 |
| 257.500 | 143.10 | 0.99992 | 0.9986 | 0.6553 | 7.18 | 1.29 |
| 252.500 | 148.10 | 0.99993 | 0.9991 | 0.6556 | 6.93 | 1.25 |
| 247.500 | 153.10 | 0.99994 | 0.9994 | 0.6558 | 6.77 | 1.20 |
| 242.500 | 158.10 | 0.99994 | 0.9995 | 0.6559 | 6.67 | 1.15 |
| 237.500 | 163.10 | 0.99995 | 0.9997 | 0.6560 | 6.45 | 1.11 |
| 232.500 | 168.10 | 0.99996 | 0.9998 | 0.6561 | 6.22 | 1.44 |
| 227.500 | 173.10 | 0.99997 | 0.9999 | 0.6561 | 5.91 | 1.87 |
| 222.500 | 178.10 | 0.99998 | 1.0000 | 0.6562 | 5.56 | 2.30 |
| 217.500 | 183.10 | 0.99999 | 1.0000 | 0.6562 | 5.33 | 2.72 |
| 212.500 | 188.10 | 0.99999 | 1.0000 | 0.6562 | 5.23 | 3.15 |
| 207.500 | 193.10 | 0.99999 | 1.0000 | 0.6562 | 5.16 | 3.58 |
| 202.500 | 198.10 | 0.99999 | 1.0000 | 0.6562 | 5.08 | 3.82 |
| 197.500 | 203.10 | 0.99999 | 1.0000 | 0.6562 | 5.00 | 3.47 |
| 192.500 | 208.10 | 0.99999 | 1.0000 | 0.6562 | 4.93 | 3.11 |
| 187.500 | 213.10 | 0.99999 | 1.0000 | 0.6562 | 4.90 | 2.76 |
| 182.500 | 218.10 | 0.99999 | 1.0000 | 0.6562 | 4.90 | 2.41 |
| 177.500 | 223.10 | 0.99999 | 1.0000 | 0.6562 | 4.90 | 2.06 |
| 172.500 | 228.10 | 0.99999 | 1.0000 | 0.6562 | 4.82 | 1.71 |
| 167.500 | 233.10 | 0.99999 | 1.0000 | 0.6562 | 4.80 | 1.61 |
| 162.500 | 238.10 | 0.99999 | 1.0000 | 0.6562 | 4.80 | 1.63 |
| 157.500 | 243.10 | 0.99999 | 1.0000 | 0.6562 | 4.80 | 1.64 |
| 152.500 | 248.10 | 0.99999 | 1.0000 | 0.6562 | 4.80 | 1.66 |
| 147.500 | 253.10 | 0.99999 | 0.0000 | 0.0000 | 4.79 | 1.67 |
| 142.500 | 258.10 | 1.00000 | 0.0000 | 0.0000 | 4.77 | 1.69 |
| 137.500 | 263.10 | 1.00000 | 0.0000 | 0.0000 | 4.75 | 1.77 |
| 132.500 | 268.10 | 1.00000 | 0.0000 | 0.0000 | 4.73 | 2.31 |
| 127.500 | 273.10 | 1.00000 | 0.0000 | 0.0000 | 4.71 | 2.86 |
| 122.500 | 278.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 3.41 |
| 117.500 | 283.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 3.96 |
| 112.500 | 288.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 4.51 |
| 107.500 | 293.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 5.06 |
| 102.500 | 298.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 4.98 |
| 97.500 | 303.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 4.40 |
| 92.500 | 308.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 3.82 |
| 87.500 | 313.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 3.24 |
| 82.500 | 318.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 2.66 |
| 77.500 | 323.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 2.08 |
| 72.500 | 328.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 1.50 |
| 67.500 | 333.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 1.52 |
| 62.500 | 338.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 1.53 |
| 57.500 | 343.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 1.55 |
| 52.500 | 348.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 1.56 |
| 47.500 | 353.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 1.58 |
| 42.500 | 358.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 1.59 |
| 37.500 | 363.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 1.60 |
| 32.500 | 368.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 1.60 |
| 27.500 | 373.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 1.60 |
| 22.500 | 378.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 1.60 |
| 17.500 | 383.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 1.60 |
| 12.500 | 388.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 1.60 |
| 7.500 | 393.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 1.60 |
| 2.500 | 398.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 1.60 |

COUGAR LAKE MAY 29, 1996 SELECT

INPUT/OUTPUT USING RUSH CREEK CREST AS SUBMERGED WEIR

UNITS ARE IN FEET

WEIR CREST ELEVATION 155.000
WEIR LENGTH 100.000
DISCHARGE, VOLUME FLOW PER SEC. 31.0000

TOTAL DISCHARGE, VOLUME PER SEC 31.0000

LOWER WITHDRAWAL LIMIT ( ACTUAL ) HEIGHT ABOVE BOTTOM 151.670
ELEVATION 151.670
LOWER WITHDRAWAL LIMIT ( THEORETICAL ) HEIGHT ABOVE BOTTOM 151.670
ELEVATION 151.670
UPPER WITHDRAWAL LIMIT ( ACTUAL ) HEIGHT ABOVE BOTTOM 400.600
ELEVATION 400.600
UPPER WITHDRAWAL LIMIT ( THEORETICAL ) HEIGHT ABOVE BOTTOM
400.600 ELEVATION 400.600
OUTFLOW DENSITY 0.99989 G/CC
OUTFLOW TEMPERATURE 7.31
OUTFLOW CONCENTRATION OF DISS ORG CARBON 1.75
1

| Elevation | Depth | Density | Norm. Vel. | Flow | Temperature | Diss. Org. C |
|---|---|---|---|---|---|---|
| 400.300 | 0.30 | 0.99917 | 0.0000 | 0.0000 | 14.75 | 2.19 |
| 397.500 | 3.10 | 0.99923 | 0.1768 | 0.1160 | 14.33 | 2.11 |
| 392.500 | 8.10 | 0.99932 | 0.3943 | 0.2588 | 13.64 | 1.95 |
| 387.500 | 13.10 | 0.99939 | 0.5331 | 0.3498 | 13.11 | 1.80 |
| 382.500 | 18.10 | 0.99957 | 0.7796 | 0.5116 | 11.59 | 1.65 |
| 377.500 | 23.10 | 0.99966 | 0.8716 | 0.5720 | 10.69 | 1.50 |
| 372.500 | 28.10 | 0.99971 | 0.9095 | 0.5968 | 10.19 | 1.34 |
| 367.500 | 33.10 | 0.99974 | 0.9291 | 0.6097 | 9.89 | 1.20 |
| 362.500 | 38.10 | 0.99976 | 0.9422 | 0.6182 | 9.66 | 1.18 |
| 357.500 | 43.10 | 0.99978 | 0.9551 | 0.6267 | 9.38 | 1.17 |
| 352.500 | 48.10 | 0.99980 | 0.9635 | 0.6322 | 9.17 | 1.15 |
| 347.500 | 53.10 | 0.99980 | 0.9673 | 0.6347 | 9.09 | 1.14 |
| 342.500 | 58.10 | 0.99981 | 0.9707 | 0.6370 | 9.02 | 1.12 |
| 337.500 | 63.10 | 0.99982 | 0.9764 | 0.6407 | 8.82 | 1.11 |
| 332.500 | 68.10 | 0.99983 | 0.9804 | 0.6433 | 8.66 | 1.28 |
| 327.500 | 73.10 | 0.99984 | 0.9829 | 0.6449 | 8.57 | 1.65 |
| 322.500 | 78.10 | 0.99985 | 0.9859 | 0.6469 | 8.42 | 2.01 |
| 317.500 | 83.10 | 0.99986 | 0.9885 | 0.6486 | 8.27 | 2.38 |
| 312.500 | 88.10 | 0.99987 | 0.9903 | 0.6498 | 8.16 | 2.74 |
| 307.500 | 93.10 | 0.99987 | 0.9915 | 0.6506 | 8.08 | 3.11 |
| 302.500 | 98.10 | 0.99988 | 0.9926 | 0.6514 | 8.01 | 3.47 |
| 297.500 | 103.10 | 0.99988 | 0.9932 | 0.6517 | 8.00 | 3.19 |
| 292.500 | 108.10 | 0.99988 | 0.9939 | 0.6522 | 7.95 | 2.86 |
| 287.500 | 113.10 | 0.99988 | 0.9948 | 0.6528 | 7.88 | 2.52 |
| 282.500 | 118.10 | 0.99989 | 0.9955 | 0.6533 | 7.80 | 2.19 |
| 277.500 | 123.10 | 0.99989 | 0.9962 | 0.6537 | 7.72 | 1.85 |
| 272.500 | 128.10 | 0.99989 | 0.9966 | 0.6540 | 7.70 | 1.51 |
| 267.500 | 133.10 | 0.99990 | 0.9971 | 0.6543 | 7.64 | 1.30 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 262.500 | 138.10 | 0.99991 | 0.9978 | 0.6547 | 7.48 | 1.30 |
| 257.500 | 143.10 | 0.99992 | 0.9986 | 0.6553 | 7.18 | 1.30 |
| 252.500 | 148.10 | 0.99993 | 0.9991 | 0.6556 | 6.93 | 1.30 |
| 247.500 | 153.10 | 0.99994 | 0.9994 | 0.6558 | 6.77 | 1.30 |
| 242.500 | 158.10 | 0.99994 | 0.9995 | 0.6559 | 6.67 | 1.30 |
| 237.500 | 163.10 | 0.99995 | 0.9997 | 0.6560 | 6.45 | 1.30 |
| 232.500 | 168.10 | 0.99996 | 0.9998 | 0.6561 | 6.22 | 1.43 |
| 227.500 | 173.10 | 0.99997 | 0.9999 | 0.6561 | 5.91 | 1.60 |
| 222.500 | 178.10 | 0.99998 | 1.0000 | 0.6562 | 5.56 | 1.77 |
| 217.500 | 183.10 | 0.99999 | 1.0000 | 0.6562 | 5.33 | 1.94 |
| 212.500 | 188.10 | 0.99999 | 1.0000 | 0.6562 | 5.23 | 2.10 |
| 207.500 | 193.10 | 0.99999 | 1.0000 | 0.6562 | 5.16 | 2.27 |
| 202.500 | 198.10 | 0.99999 | 1.0000 | 0.6562 | 5.08 | 2.37 |
| 197.500 | 203.10 | 0.99999 | 1.0000 | 0.6562 | 5.00 | 2.23 |
| 192.500 | 208.10 | 0.99999 | 1.0000 | 0.6562 | 4.93 | 2.09 |
| 187.500 | 213.10 | 0.99999 | 1.0000 | 0.6562 | 4.90 | 1.96 |
| 182.500 | 218.10 | 0.99999 | 1.0000 | 0.6562 | 4.90 | 1.82 |
| 177.500 | 223.10 | 0.99999 | 1.0000 | 0.6562 | 4.90 | 1.68 |
| 172.500 | 228.10 | 0.99999 | 1.0000 | 0.6562 | 4.82 | 1.54 |
| 167.500 | 233.10 | 0.99999 | 1.0000 | 0.6562 | 4.80 | 1.48 |
| 162.500 | 238.10 | 0.99999 | 1.0000 | 0.6562 | 4.80 | 1.45 |
| 157.500 | 243.10 | 0.99999 | 1.0000 | 0.6562 | 4.80 | 1.42 |
| 152.500 | 248.10 | 0.99999 | 1.0000 | 0.6562 | 4.80 | 1.39 |
| 147.500 | 253.10 | 0.99999 | 0.0000 | 0.0000 | 4.79 | 1.36 |
| 142.500 | 258.10 | 1.00000 | 0.0000 | 0.0000 | 4.77 | 1.33 |
| 137.500 | 263.10 | 1.00000 | 0.0000 | 0.0000 | 4.75 | 1.33 |
| 132.500 | 268.10 | 1.00000 | 0.0000 | 0.0000 | 4.73 | 1.56 |
| 127.500 | 273.10 | 1.00000 | 0.0000 | 0.0000 | 4.71 | 1.78 |
| 122.500 | 278.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 2.01 |
| 117.500 | 283.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 2.24 |
| 112.500 | 288.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 2.47 |
| 107.500 | 293.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 2.70 |
| 102.500 | 298.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 2.68 |
| 97.500 | 303.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 2.47 |
| 92.500 | 308.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 2.25 |
| 87.500 | 313.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 2.04 |
| 82.500 | 318.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 1.83 |
| 77.500 | 323.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 1.61 |
| 72.500 | 328.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 1.40 |
| 67.500 | 333.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 1.42 |
| 62.500 | 338.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 1.43 |
| 57.500 | 343.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 1.45 |
| 52.500 | 348.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 1.46 |
| 47.500 | 353.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 1.48 |
| 42.500 | 358.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 1.49 |
| 37.500 | 363.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 1.50 |
| 32.500 | 368.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 1.50 |
| 27.500 | 373.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 1.50 |
| 22.500 | 378.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 1.50 |
| 17.500 | 383.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 1.50 |
| 12.500 | 388.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 1.50 |
| 7.500 | 393.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 1.50 |
| 2.500 | 398.10 | 1.00000 | 0.0000 | 0.0000 | 4.70 | 1.50 |

```
1000    ***COUGAR LAKE JULY 10, 1996 SELECT
1010    ***DATA SETS   01
1020    ***PRINT INPUT
1030    ***INPUT/OUTPUT USING RUSH CREEK CREST AS SUBMERGED WEIR
1040    ***ENGLISH
1050    ***TABLE       01
1060    ***THICKNESS       5.0
1070    ***INTERVAL    01
1080    ***SURFACE       400.6
1090    ***BOTTOM         0.0
1100    ***WEIR
1110    ***SUBMERGED
1120    ***LENGTH         100.
1130    ***HEIGHT        155.0
1140    ***FLOW          14.1
1150    ***NUMBER OF TEMP        41
1160    ***TEMPERATURE DEGREES CENTIGRADE
1170    ***HEIGHT    TEMP
1180    ***     400.6     21.6
1190    ***     394.0     21.3
1200    ***     387.4     21.1
1210    ***     380.9     17.7
1220    ***     374.3     15.4
1230    ***     367.8     13.4
1240    ***     361.2     12.1
1250    ***     354.6     11.2
1260    ***     348.1     10.7
1270    ***     341.5     10.4
1280    ***     335.0      9.9
1290    ***     328.4      9.7
1300    ***     321.8      9.4
1310    ***     315.3      9.3
1320    ***     308.7      9.1
1330    ***     302.1      9.0
1340    ***     295.6      8.9
1350    ***     289.0      8.9
1360    ***     282.5      8.7
1370    ***     275.9      8.6
1380    ***     269.3      8.6
1390    ***     262.8      8.5
1400    ***     256.2      8.4
1410    ***     249.7      8.3
1420    ***     243.1      8.2
1430    ***     236.5      8.2
1440    ***     230.0      8.1
1450    ***     216.8      7.7
1460    ***     210.3      6.7
1470    ***     203.7      5.8
1480    ***     184.0      5.3
1490    ***     170.9      5.2
1500    ***     153.5      5.1
1510    ***     137.1      5.0
1520    ***     120.7      4.9
1530    ***     104.3      4.9
```

```
1540    ***    87.9    4.8
1550    ***    71.5    4.8
1560    ***    55.1    4.8
1570    ***    38.7    4.8
1580    ***     5.9    4.8
1590    ***QUALTITIES   1
1600    ***NUMBER OF DISSOLVED OXYGEN      41
1610    ***HEIGHT   DISSOLVED OXYGEN
1620    ***   400.6    9.0
1630    ***   394.0    9.0
1640    ***   387.4    9.1
1650    ***   380.9    12.0
1660    ***   374.3    13.5
1670    ***   367.8    12.8
1680    ***   361.2    10.8
1690    ***   354.6    9.8
1700    ***   348.1    9.5
1710    ***   341.5    9.2
1720    ***   335.0    9.2
1730    ***   328.4    9.5
1740    ***   321.8    9.7
1750    ***   315.3    9.9
1760    ***   308.7    10.0
1770    ***   302.1    10.2
1780    ***   295.6    10.2
1790    ***   289.0    10.1
1800    ***   282.5    10.3
1810    ***   275.9    10.3
1820    ***   269.3    10.4
1830    ***   262.8    10.2
1840    ***   256.2    10.4
1850    ***   249.7    10.3
1860    ***   243.1    10.5
1870    ***   236.5    10.5
1880    ***   230.0    10.5
1890    ***   216.8    10.4
1900    ***   210.3    9.9
1910    ***   203.7    10.1
1920    ***   184.0    10.0
1930    ***   170.9    10.1
1940    ***   153.5    10.2
1950    ***   137.1    10.1
1960    ***   120.7    10.0
1970    ***   104.3    10.1
1980    ***    87.9    9.9
1990    ***    71.5    9.5
2000    ***    55.1    9.0
2010    ***    38.7    8.7
2020    ***     5.9    8.1
2030    ***STOP
```

COUGAR LAKE JULY 10, 1996 SELECT

INPUT/OUTPUT USING RUSH CREEK CREST AS SUBMERGED WEIR
UNITS ARE IN FEET

WEIR CREST ELEVATION 155.000
WEIR LENGTH 100.000
DISCHARGE, VOLUME FLOW PER SEC. 14.0000

TOTAL DISCHARGE, VOLUME PER SEC 14.0000

LOWER WITHDRAWAL LIMIT ( ACTUAL ) HEIGHT ABOVE BOTTOM 154.697 ELEVATION 154.697
LOWER WITHDRAWAL LIMIT ( THEORETICAL ) HEIGHT ABOVE BOTTOM 154.697 ELEVATION 154.697
UPPER WITHDRAWAL LIMIT ( ACTUAL ) HEIGHT ABOVE BOTTOM 400.600 ELEVATION 400.600
UPPER WITHDRAWAL LIMIT ( THEORETICAL ) HEIGHT ABOVE BOTTOM 400.600 ELEVATION 400.600
OUTFLOW DENSITY 0.99978 G/CC
OUTFLOW TEMPERATURE 8.67
OUTFLOW CONCENTRATION OF DISSOLVED OXYGEN 10.27
1

| ELEVATION | DEPTH | DENSITY | NORM. VEL. | FLOW | TEMPERATURE | DISSOLVED OX |
|---|---|---|---|---|---|---|
| 400.300 | 0.30 | 0.99789 | 0.0000 | 0.0000 | 21.59 | 9.00 |
| 397.500 | 3.10 | 0.99792 | 0.0653 | 0.0197 | 21.46 | 9.00 |
| 392.500 | 8.10 | 0.99797 | 0.1417 | 0.0427 | 21.25 | 9.02 |
| 387.500 | 13.10 | 0.99800 | 0.2038 | 0.0615 | 21.10 | 9.10 |
| 382.500 | 18.10 | 0.99852 | 0.5862 | 0.1768 | 18.54 | 11.29 |
| 377.500 | 23.10 | 0.99889 | 0.7758 | 0.2340 | 16.52 | 12.77 |
| 372.500 | 28.10 | 0.99915 | 0.8762 | 0.2643 | 14.85 | 13.31 |
| 367.500 | 33.10 | 0.99936 | 0.9336 | 0.2816 | 13.34 | 12.71 |
| 362.500 | 38.10 | 0.99948 | 0.9590 | 0.2893 | 12.36 | 11.19 |
| 357.500 | 43.10 | 0.99957 | 0.9732 | 0.2935 | 11.60 | 10.24 |
| 352.500 | 48.10 | 0.99963 | 0.9811 | 0.2959 | 11.04 | 9.70 |
| 347.500 | 53.10 | 0.99967 | 0.9855 | 0.2973 | 10.67 | 9.47 |
| 342.500 | 58.10 | 0.99969 | 0.9880 | 0.2980 | 10.45 | 9.25 |
| 337.500 | 63.10 | 0.99972 | 0.9909 | 0.2989 | 10.09 | 9.20 |
| 332.500 | 68.10 | 0.99974 | 0.9928 | 0.2995 | 9.82 | 9.31 |
| 327.500 | 73.10 | 0.99976 | 0.9940 | 0.2998 | 9.66 | 9.53 |
| 322.500 | 78.10 | 0.99978 | 0.9952 | 0.3002 | 9.43 | 9.68 |
| 317.500 | 83.10 | 0.99978 | 0.9958 | 0.3004 | 9.33 | 9.83 |
| 312.500 | 88.10 | 0.99979 | 0.9964 | 0.3006 | 9.22 | 9.94 |
| 307.500 | 93.10 | 0.99980 | 0.9969 | 0.3007 | 9.08 | 10.04 |
| 302.500 | 98.10 | 0.99981 | 0.9973 | 0.3008 | 9.01 | 10.19 |
| 297.500 | 103.10 | 0.99981 | 0.9976 | 0.3009 | 8.93 | 10.20 |
| 292.500 | 108.10 | 0.99982 | 0.9979 | 0.3010 | 8.90 | 10.15 |
| 287.500 | 113.10 | 0.99982 | 0.9981 | 0.3011 | 8.85 | 10.15 |
| 282.500 | 118.10 | 0.99983 | 0.9984 | 0.3012 | 8.70 | 10.30 |
| 277.500 | 123.10 | 0.99984 | 0.9987 | 0.3012 | 8.62 | 10.30 |
| 272.500 | 128.10 | 0.99984 | 0.9988 | 0.3013 | 8.60 | 10.35 |
| 267.500 | 133.10 | 0.99984 | 0.9989 | 0.3013 | 8.57 | 10.34 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 262.500 | 138.10 | 0.99984 | 0.9991 | 0.3014 | 8.50 | 10.21 |
| 257.500 | 143.10 | 0.99985 | 0.9992 | 0.3014 | 8.42 | 10.36 |
| 252.500 | 148.10 | 0.99985 | 0.9993 | 0.3014 | 8.34 | 10.34 |
| 247.500 | 153.10 | 0.99986 | 0.9994 | 0.3015 | 8.27 | 10.37 |
| 242.500 | 158.10 | 0.99986 | 0.9995 | 0.3015 | 8.20 | 10.50 |
| 237.500 | 163.10 | 0.99986 | 0.9996 | 0.3015 | 8.20 | 10.50 |
| 232.500 | 168.10 | 0.99987 | 0.9997 | 0.3015 | 8.14 | 10.50 |
| 227.500 | 173.10 | 0.99988 | 0.9997 | 0.3016 | 8.02 | 10.48 |
| 222.500 | 178.10 | 0.99988 | 0.9998 | 0.3016 | 7.87 | 10.44 |
| 217.500 | 183.10 | 0.99989 | 0.9999 | 0.3016 | 7.72 | 10.41 |
| 212.500 | 188.10 | 0.99993 | 0.9999 | 0.3016 | 7.04 | 10.07 |
| 207.500 | 193.10 | 0.99996 | 1.0000 | 0.3016 | 6.32 | 9.98 |
| 202.500 | 198.10 | 0.99998 | 1.0000 | 0.3016 | 5.77 | 10.09 |
| 197.500 | 203.10 | 0.99998 | 1.0000 | 0.3016 | 5.64 | 10.07 |
| 192.500 | 208.10 | 0.99998 | 1.0000 | 0.3016 | 5.52 | 10.04 |
| 187.500 | 213.10 | 0.99998 | 1.0000 | 0.3016 | 5.39 | 10.02 |
| 182.500 | 218.10 | 0.99999 | 1.0000 | 0.3016 | 5.29 | 10.01 |
| 177.500 | 223.10 | 0.99999 | 1.0000 | 0.3016 | 5.25 | 10.05 |
| 172.500 | 228.10 | 0.99999 | 1.0000 | 0.3016 | 5.21 | 10.09 |
| 167.500 | 233.10 | 0.99999 | 1.0000 | 0.3016 | 5.18 | 10.12 |
| 162.500 | 238.10 | 0.99999 | 1.0000 | 0.3016 | 5.15 | 10.15 |
| 157.500 | 243.10 | 0.99999 | 1.0000 | 0.3016 | 5.12 | 10.18 |
| 152.500 | 248.10 | 0.99999 | 1.0000 | 0.3016 | 5.09 | 10.19 |
| 147.500 | 253.10 | 0.99999 | 0.0000 | 0.0000 | 5.06 | 10.16 |
| 142.500 | 258.10 | 0.99999 | 0.0000 | 0.0000 | 5.03 | 10.13 |
| 137.500 | 263.10 | 0.99999 | 0.0000 | 0.0000 | 5.00 | 10.10 |
| 132.500 | 268.10 | 0.99999 | 0.0000 | 0.0000 | 4.97 | 10.07 |
| 127.500 | 273.10 | 0.99999 | 0.0000 | 0.0000 | 4.94 | 10.04 |
| 122.500 | 278.10 | 0.99999 | 0.0000 | 0.0000 | 4.91 | 10.01 |
| 117.500 | 283.10 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 10.02 |
| 112.500 | 288.10 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 10.05 |
| 107.500 | 293.10 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 10.08 |
| 102.500 | 298.10 | 0.99999 | 0.0000 | 0.0000 | 4.89 | 10.08 |
| 97.500 | 303.10 | 0.99999 | 0.0000 | 0.0000 | 4.86 | 10.02 |
| 92.500 | 308.10 | 0.99999 | 0.0000 | 0.0000 | 4.83 | 9.96 |
| 87.500 | 313.10 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 9.89 |
| 82.500 | 318.10 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 9.77 |
| 77.500 | 323.10 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 9.65 |
| 72.500 | 328.10 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 9.52 |
| 67.500 | 333.10 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 9.38 |
| 62.500 | 338.10 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 9.23 |
| 57.500 | 343.10 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 9.07 |
| 52.500 | 348.10 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 8.95 |
| 47.500 | 353.10 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 8.86 |
| 42.500 | 358.10 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 8.77 |
| 37.500 | 363.10 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 8.68 |
| 32.500 | 368.10 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 8.59 |
| 27.500 | 373.10 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 8.50 |
| 22.500 | 378.10 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 8.40 |
| 17.500 | 383.10 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 8.31 |
| 12.500 | 388.10 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 8.22 |
| 7.500 | 393.10 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 8.13 |
| 2.500 | 398.10 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 8.10 |

```
                      VELOCITY ( TIMES 1000 )
               0        200       400       600       800      1000      1200      1400      1600      1800      2000
               I---------I---------I---------I---------I---------I---------I---------I---------I---------I---------I
400.60    0.00 +*                      D
395.60    5.00 +                  V     D
390.60   10.00 +                      V  D
385.60   15.00 +                       DV
380.60   20.00 +                            D           V
375.60   25.00 +                              D               V
370.60   30.00 +                                D                 V
365.60   35.00 +                                  D                 V
360.60   40.00 +                                  D                  V
355.60   45.00 +                                   D                  V
350.60   50.00 +                                    D                 V
345.60   55.00 +                                    D                 V
340.60   60.00 +                                    D                  V
335.60   65.00 +                                     D                 V
330.60   70.00 +                                     D                 V
325.60   75.00 +                                     D                 V
320.60   80.00 +                                     D                 V
315.60   85.00 +                                     D                 V
310.60   90.00 +                                     D                 V
305.60   95.00 +                                     D                 V
300.60  100.00 +                                      D                V
295.60  105.00 +                                      D                V
290.60  110.00 +                                      D                V
285.60  115.00 +                                      D                V
280.60  120.00 +                                      D                V
275.60  125.00 +                                      D                V
270.60  130.00 +                                      D                V
265.60  135.00 +                                      D                V
260.60  140.00 +                                      D                V
255.60  145.00 +                                      D                V
250.60  150.00 +                                      D                V
245.60  155.00 +                                      D                V
240.60  160.00 +                                      D                V
235.60  165.00 +                                      D                V
230.60  170.00 +                                      D                V
225.60  175.00 +                                      D                V
220.60  180.00 +                                      D                V
215.60  185.00 +                                      D                V
210.60  190.00 +                                       D               V
205.60  195.00 +                                       D               V
200.60  200.00 +                                       D               V
195.60  205.00 +                                       D               V
190.60  210.00 +                                       D               V
185.60  215.00 +                                       D               V
180.60  220.00 +                                       D               V
175.60  225.00 +                                       D                V
170.60  230.00 +                                       D                V
165.60  235.00 +                                       D                V
```

```
 160.60  240.00 +                    D                V
 155.60  245.00 +                    D                V
 150.60  250.00 +                    D                V
 145.60  255.00 +*                    D
 140.60  260.00 +*                    D
 135.60  265.00 +*                    D
 130.60  270.00 +*                    D
 125.60  275.00 +*                    D
 120.60  280.00 +*                    D
 115.60  285.00 +*                    D
 110.60  290.00 +*                    D
 105.60  295.00 +*                    D
 100.60  300.00 +*                    D
95.60  305.00 +*                    D
90.60  310.00 +*                    D
85.60  315.00 +*                    D
80.60  320.00 +*                    D
75.60  325.00 +*                    D
70.60  330.00 +*                    D
65.60  335.00 +*                    D
60.60  340.00 +*                    D
55.60  345.00 +*                    D
50.60  350.00 +*                    D
45.60  355.00 +*                    D
40.60  360.00 +*                    D
35.60  365.00 +*                    D
30.60  370.00 +*                    D
25.60  375.00 +*                    D
20.60  380.00 +*                    D
15.60  385.00 +*                    D
10.60  390.00 +*                    D
5.60  395.00 +*                    D
0.60  400.00 +*                    D
      I---------I---------I---------I---------I---------I---------I---------I---------I---------I---------I
  0.99700   0.99800   0.99900   1.00000   1.00100   1.00200   1.00300   1.00400   1.00500
1.00600   1.00700
          DENSITY G/CC
```

```
1000   ***COUGAR LAKE JULY 23, 1996 SELECT
1010   ***DATA SETS   01
1020   ***PRINT INPUT
1030   ***INPUT/OUTPUT USING RUSH CREEK CREST AS SUBMERGED WEIR
1040   ***ENGLISH
1050   ***TABLE      01
1060   ***THICKNESS       5.0
1070   ***INTERVAL    01
1080   ***SURFACE       397.8
1090   ***BOTTOM         0.0
1100   ***WEIR
1110   ***SUBMERGED
1120   ***LENGTH         100.
1130   ***HEIGHT        155.0
1140   ***FLOW         14.1
1150   ***NUMBER OF TEMP        40
1160   ***TEMPERATURE DEGREES CENTIGRADE
1170   ***HEIGHT    TEMP
1180   ***     397.8     22.2
1190   ***     391.2     22.1
1200   ***     384.4     22.0
1210   ***     378.1     17.9
1220   ***     371.6     16.1
1230   ***     365.0     14.4
1240   ***     358.5     13.5
1250   ***     351.9     12.4
1260   ***     345.3     11.6
1270   ***     338.8     10.9
1280   ***     332.2     10.5
1290   ***     325.7     10.2
1300   ***     319.1      9.9
1310   ***     312.5      9.6
1320   ***     306.0      9.4
1330   ***     299.4      9.2
1340   ***     292.8      9.1
1350   ***     286.3      8.9
1360   ***     297.7      8.8
1370   ***     273.2      8.6
1380   ***     266.6      8.6
1390   ***     260.0      8.5
1400   ***     253.5      8.4
1410   ***     246.9      8.3
1420   ***     240.3      8.3
1430   ***     233.8      8.2
1440   ***     217.4      7.0
1450   ***     201.0      5.6
1460   ***     184.6      5.4
1470   ***     168.2      5.2
1480   ***     151.8      5.1
1490   ***     135.4      5.0
1500   ***     119.0      5.0
1510   ***     102.6      4.9
1520   ***      86.2      4.8
1530   ***      69.7      4.8
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1540   ***   53.3   4.8
1550   ***   36.9   4.8
1560   ***   20.5   4.8
1570   ***    7.4   4.8
1580   ***QUALITIES   1
1590   ***NUMBER OF DISSOLVED OXYGEN   40
1600   ***HEIGHT   DISSOLVED OXYGEN
1610   ***   397.8   8.2
1620   ***   391.2   8.2
1630   ***   384.4   7.9
1640   ***   378.1   13.0
1650   ***   371.6   14.9
1660   ***   365.0   13.8
1670   ***   358.5   10.9
1680   ***   351.9   9.7
1690   ***   345.3   8.9
1700   ***   338.8   8.3
1710   ***   332.2   8.1
1720   ***   325.7   8.1
1730   ***   319.1   8.1
1740   ***   312.5   8.6
1750   ***   306.0   8.9
1760   ***   299.4   9.0
1770   ***   292.8   9.1
1780   ***   286.3   9.1
1790   ***   297.7   9.2
1800   ***   273.2   9.6
1810   ***   266.6   9.4
1820   ***   260.0   9.6
1830   ***   253.5   9.5
1840   ***   246.9   9.4
1850   ***   240.3   9.5
1860   ***   233.8   9.7
1870   ***   217.4   9.4
1880   ***   201.0   9.1
1890   ***   184.6   9.2
1900   ***   168.2   9.4
1910   ***   151.8   9.5
1920   ***   135.4   9.5
1930   ***   119.0   9.5
1940   ***   102.6   9.4
1950   ***    86.2   9.3
1960   ***    69.7   9.2
1970   ***    53.3   8.6
1980   ***    36.9   7.3
1990   ***    20.5   2.0
2000   ***     7.4   1.1
2010   ***STOP
```

COUGAR LAKE JULY 23, 1996 SELECT

INPUT/OUTPUT USING RUSH CREEK CREST AS SUBMERGED WEIR
UNITS ARE IN FEET

WEIR CREST ELEVATION 155.000
WEIR LENGTH 100.000
DISCHARGE, VOLUME FLOW PER SEC. 14.0000

TOTAL DISCHARGE, VOLUME PER SEC 14.0000

LOWER WITHDRAWAL LIMIT ( ACTUAL ) HEIGHT ABOVE BOTTOM 154.697
ELEVATION 154.697
LOWER WITHDRAWAL LIMIT ( THEORETICAL ) HEIGHT ABOVE BOTTOM
154.697 ELEVATION 154.697
UPPER WITHDRAWAL LIMIT ( ACTUAL ) HEIGHT ABOVE BOTTOM 397.800
ELEVATION 397.800
UPPER WITHDRAWAL LIMIT ( THEORETICAL ) HEIGHT ABOVE BOTTOM
397.800 ELEVATION 397.800
OUTFLOW DENSITY 0.99976 G/CC
OUTFLOW TEMPERATURE 8.81
OUTFLOW CONCENTRATION OF DISSOLVED OXYGEN 9.54
1

| Elevation | Depth | Density | Norm. Vel. | Flow | Temperature | Diss. Oxygen |
|---|---|---|---|---|---|---|
| 396.400 | 1.40 | 0.99776 | 0.0000 | 0.0000 | 22.18 | 8.20 |
| 392.500 | 5.30 | 0.99777 | 0.0520 | 0.0159 | 22.12 | 8.20 |
| 387.500 | 10.30 | 0.99779 | 0.1048 | 0.0322 | 22.05 | 8.04 |
| 382.500 | 15.30 | 0.99807 | 0.3490 | 0.1071 | 20.76 | 9.44 |
| 377.500 | 20.30 | 0.99867 | 0.7062 | 0.2167 | 17.73 | 13.18 |
| 372.500 | 25.30 | 0.99891 | 0.8126 | 0.2493 | 16.35 | 14.64 |
| 367.500 | 30.30 | 0.99912 | 0.8833 | 0.2711 | 15.04 | 14.22 |
| 362.500 | 35.30 | 0.99927 | 0.9225 | 0.2831 | 14.05 | 12.68 |
| 357.500 | 40.30 | 0.99936 | 0.9447 | 0.2899 | 13.33 | 10.72 |
| 352.500 | 45.30 | 0.99947 | 0.9634 | 0.2956 | 12.50 | 9.81 |
| 347.500 | 50.30 | 0.99954 | 0.9744 | 0.2990 | 11.87 | 9.17 |
| 342.500 | 55.30 | 0.99960 | 0.9819 | 0.3013 | 11.30 | 8.64 |
| 337.500 | 60.30 | 0.99965 | 0.9869 | 0.3028 | 10.82 | 8.26 |
| 332.500 | 65.30 | 0.99968 | 0.9896 | 0.3037 | 10.52 | 8.11 |
| 327.500 | 70.30 | 0.99970 | 0.9915 | 0.3043 | 10.28 | 8.10 |
| 322.500 | 75.30 | 0.99972 | 0.9931 | 0.3047 | 10.05 | 8.10 |
| 317.500 | 80.30 | 0.99974 | 0.9944 | 0.3051 | 9.83 | 8.22 |
| 312.500 | 85.30 | 0.99976 | 0.9956 | 0.3055 | 9.60 | 8.60 |
| 307.500 | 90.30 | 0.99977 | 0.9963 | 0.3057 | 9.45 | 8.83 |
| 302.500 | 95.30 | 0.99979 | 0.9969 | 0.3059 | 9.29 | 8.95 |
| 297.500 | 100.30 | 0.99982 | 0.9981 | 0.3063 | 8.80 | 9.20 |
| 292.500 | 105.30 | 0.99983 | 0.9983 | 0.3063 | 8.76 | 9.28 |
| 287.500 | 110.30 | 0.99983 | 0.9984 | 0.3064 | 8.72 | 9.37 |
| 282.500 | 115.30 | 0.99983 | 0.9986 | 0.3064 | 8.68 | 9.45 |
| 277.500 | 120.30 | 0.99984 | 0.9987 | 0.3065 | 8.64 | 9.53 |
| 272.500 | 125.30 | 0.99984 | 0.9989 | 0.3065 | 8.60 | 9.58 |
| 267.500 | 130.30 | 0.99984 | 0.9990 | 0.3065 | 8.60 | 9.43 |
| 262.500 | 135.30 | 0.99984 | 0.9991 | 0.3066 | 8.54 | 9.52 |
| 257.500 | 140.30 | 0.99985 | 0.9992 | 0.3066 | 8.46 | 9.56 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 252.500 | 145.30 | 0.99985 | 0.9994 | 0.3067 | 8.38 | 9.48 |
| 247.500 | 150.30 | 0.99986 | 0.9995 | 0.3067 | 8.31 | 9.41 |
| 242.500 | 155.30 | 0.99986 | 0.9995 | 0.3067 | 8.30 | 9.47 |
| 237.500 | 160.30 | 0.99986 | 0.9996 | 0.3067 | 8.26 | 9.59 |
| 232.500 | 165.30 | 0.99987 | 0.9997 | 0.3068 | 8.10 | 9.68 |
| 227.500 | 170.30 | 0.99989 | 0.9998 | 0.3068 | 7.74 | 9.58 |
| 222.500 | 175.30 | 0.99991 | 0.9999 | 0.3068 | 7.37 | 9.49 |
| 217.500 | 180.30 | 0.99993 | 0.9999 | 0.3068 | 7.01 | 9.40 |
| 212.500 | 185.30 | 0.99995 | 1.0000 | 0.3068 | 6.58 | 9.31 |
| 207.500 | 190.30 | 0.99996 | 1.0000 | 0.3068 | 6.15 | 9.22 |
| 202.500 | 195.30 | 0.99998 | 1.0000 | 0.3069 | 5.73 | 9.13 |
| 197.500 | 200.30 | 0.99998 | 1.0000 | 0.3069 | 5.56 | 9.12 |
| 192.500 | 205.30 | 0.99998 | 1.0000 | 0.3069 | 5.50 | 9.15 |
| 187.500 | 210.30 | 0.99998 | 1.0000 | 0.3069 | 5.44 | 9.18 |
| 182.500 | 215.30 | 0.99998 | 1.0000 | 0.3069 | 5.37 | 9.23 |
| 177.500 | 220.30 | 0.99999 | 1.0000 | 0.3069 | 5.31 | 9.29 |
| 172.500 | 225.30 | 0.99999 | 1.0000 | 0.3069 | 5.25 | 9.35 |
| 167.500 | 230.30 | 0.99999 | 1.0000 | 0.3069 | 5.20 | 9.40 |
| 162.500 | 235.30 | 0.99999 | 1.0000 | 0.3069 | 5.17 | 9.43 |
| 157.500 | 240.30 | 0.99999 | 1.0000 | 0.3069 | 5.13 | 9.47 |
| 152.500 | 245.30 | 0.99999 | 1.0000 | 0.3069 | 5.10 | 9.50 |
| 147.500 | 250.30 | 0.99999 | 0.0000 | 0.0000 | 5.07 | 9.50 |
| 142.500 | 255.30 | 0.99999 | 0.0000 | 0.0000 | 5.04 | 9.50 |
| 137.500 | 260.30 | 0.99999 | 0.0000 | 0.0000 | 5.01 | 9.50 |
| 132.500 | 265.30 | 0.99999 | 0.0000 | 0.0000 | 5.00 | 9.50 |
| 127.500 | 270.30 | 0.99999 | 0.0000 | 0.0000 | 5.00 | 9.50 |
| 122.500 | 275.30 | 0.99999 | 0.0000 | 0.0000 | 5.00 | 9.50 |
| 117.500 | 280.30 | 0.99999 | 0.0000 | 0.0000 | 4.99 | 9.49 |
| 112.500 | 285.30 | 0.99999 | 0.0000 | 0.0000 | 4.96 | 9.46 |
| 107.500 | 290.30 | 0.99999 | 0.0000 | 0.0000 | 4.93 | 9.43 |
| 102.500 | 295.30 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 9.40 |
| 97.500 | 300.30 | 0.99999 | 0.0000 | 0.0000 | 4.87 | 9.37 |
| 92.500 | 305.30 | 0.99999 | 0.0000 | 0.0000 | 4.84 | 9.34 |
| 87.500 | 310.30 | 0.99999 | 0.0000 | 0.0000 | 4.81 | 9.31 |
| 82.500 | 315.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 9.28 |
| 77.500 | 320.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 9.25 |
| 72.500 | 325.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 9.22 |
| 67.500 | 330.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 9.12 |
| 62.500 | 335.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 8.94 |
| 57.500 | 340.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 8.75 |
| 52.500 | 345.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 8.54 |
| 47.500 | 350.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 8.14 |
| 42.500 | 355.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 7.74 |
| 37.500 | 360.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 7.35 |
| 32.500 | 365.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 5.88 |
| 27.500 | 370.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 4.26 |
| 22.500 | 375.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 2.65 |
| 17.500 | 380.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.79 |
| 12.500 | 385.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.45 |
| 7.500 | 390.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.11 |
| 2.500 | 395.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.10 |

```
        VELOCITY ( TIMES 1000 )
 0        200       400       600       800      1000      1200      1400      1600      1800      2000
 I---------I---------I---------I ---------I---------I---------I---------I---------I---------I---------I
397.80   0.00 +*        D
392.80   5.00 +    V    D
387.80  10.00 +       V D
382.80  15.00 +           D      V
377.80  20.00 +               D               V
372.80  25.00 +                 D                 V
367.80  30.00 +                   D                 V
362.80  35.00 +                    D                  V
357.80  40.00 +                    D                   V
352.80  45.00 +                     D                  V
347.80  50.00 +                      D                 V
342.80  55.00 +                      D                  V
337.80  60.00 +                      D                  V
332.80  65.00 +                      D                  V
327.80  70.00 +                       D                 V
322.80  75.00 +                       D                 V
317.80  80.00 +                       D                 V
312.80  85.00 +                       D                 V
307.80  90.00 +                       D                 V
302.80  95.00 +                       D                 V
297.80 100.00 +                        D                 V
292.80 105.00 +                        D                 V
287.80 110.00 +                        D                 V
282.80 115.00 +                        D                 V
277.80 120.00 +                        D                 V
272.80 125.00 +                        D                 V
267.80 130.00 +                        D                 V
262.80 135.00 +                        D                 V
257.80 140.00 +                        D                 V
252.80 145.00 +                        D                 V
247.80 150.00 +                        D                 V
242.80 155.00 +                        D                 V
237.80 160.00 +                        D                 V
232.80 165.00 +                        D                 V
227.80 170.00 +                        D                 V
222.80 175.00 +                         D                V
217.80 180.00 +                         D                V
212.80 185.00 +                         D                V
207.80 190.00 +                         D                V
202.80 195.00 +                         D                V
197.80 200.00 +                         D                V
192.80 205.00 +                         D                V
187.80 210.00 +                         D                V
182.80 215.00 +                         D                V
177.80 220.00 +                         D                V
172.80 225.00 +                         D                 V
167.80 230.00 +                         D                 V
162.80 235.00 +                         D                 V
157.80 240.00 +                         D                 V
152.80 245.00 +                         D                 V
147.80 250.00 +*                        D
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 142.80  255.00 +*                    D
 137.80  260.00 +*                    D
 132.80  265.00 +*                    D
 127.80  270.00 +*                    D
 122.80  275.00 +*                    D
 117.80  280.00 +*                    D
 112.80  285.00 +*                    D
 107.80  290.00 +*                    D
 102.80  295.00 +*                    D
  97.80  300.00 +*                    D
  92.80  305.00 +*                    D
  87.80  310.00 +*                    D
  82.80  315.00 +*                    D
  77.80  320.00 +*                    D
  72.80  325.00 +*                    D
  67.80  330.00 +*                    D
  62.80  335.00 +*                    D
  57.80  340.00 +*                    D
  52.80  345.00 +*                    D
  47.80  350.00 +*                    D
  42.80  355.00 +*                    D
  37.80  360.00 +*                    D
  32.80  365.00 +*                    D
  27.80  370.00 +*                    D
  22.80  375.00 +*                    D
  17.80  380.00 +*                    D
  12.80  385.00 +*                    D
7.80  390.00 +*                     D
2.80  395.00 +*                     D
     I---------I---------I---------I---------I---------I  --------I---------I---------I---------I---------I
 0.99700  0.99800  0.99900  1.00000  1.00100  1.00200  1.00300  1.00400  1.00500
1.00600  1.00700
           DENSITY G/CC
```

COUGAR LAKE JULY 23, 1996 SELECT

INPUT/OUTPUT USING RUSH CREEK CREST AS SUBMERGED WEIR

UNITS ARE IN FEET

WEIR CREST ELEVATION 155.000
WEIR LENGTH 100.000
DISCHARGE, VOLUME FLOW PER SEC. 14.0000

TOTAL DISCHARGE, VOLUME PER SEC 14.0000

LOWER WITHDRAWAL LIMIT ( ACTUAL ) HEIGHT ABOVE BOTTOM 154.697 ELEVATION 154.697
LOWER WITHDRAWAL LIMIT ( THEORETICAL ) HEIGHT ABOVE BOTTOM 154.697 ELEVATION 154.697
UPPER WITHDRAWAL LIMIT ( ACTUAL ) HEIGHT ABOVE BOTTOM 397.800 ELEVATION 397.800
UPPER WITHDRAWAL LIMIT ( THEORETICAL ) HEIGHT ABOVE BOTTOM 397.800 ELEVATION 397.800
OUTFLOW DENSITY 0.99976 G/CC
OUTFLOW TEMPERATURE 8.81
OUTFLOW CONCENTRATION OF TOTAL ORGCARBON 1.34

| Elevation | Depth | Density | Norm. Vel. | Flow | Temperature | Total Org. C |
|---|---|---|---|---|---|---|
| 396.400 | 1.40 | 0.99776 | 0.0000 | 0.0000 | 22.18 | 1.41 |
| 392.500 | 5.30 | 0.99777 | 0.0520 | 0.0159 | 22.12 | 1.43 |
| 387.500 | 10.30 | 0.99779 | 0.1048 | 0.0322 | 22.05 | 1.46 |
| 382.500 | 15.30 | 0.99807 | 0.3490 | 0.1071 | 20.76 | 1.49 |
| 377.500 | 20.30 | 0.99867 | 0.7062 | 0.2167 | 17.73 | 1.52 |
| 372.500 | 25.30 | 0.99891 | 0.8126 | 0.2493 | 16.35 | 1.55 |
| 367.500 | 30.30 | 0.99912 | 0.8833 | 0.2711 | 15.04 | 1.58 |
| 362.500 | 35.30 | 0.99927 | 0.9225 | 0.2831 | 14.05 | 1.58 |
| 357.500 | 40.30 | 0.99936 | 0.9447 | 0.2899 | 13.33 | 1.53 |
| 352.500 | 45.30 | 0.99947 | 0.9634 | 0.2956 | 12.50 | 1.49 |
| 347.500 | 50.30 | 0.99954 | 0.9744 | 0.2990 | 11.87 | 1.44 |
| 342.500 | 55.30 | 0.99960 | 0.9819 | 0.3013 | 11.30 | 1.39 |
| 337.500 | 60.30 | 0.99965 | 0.9869 | 0.3028 | 10.82 | 1.35 |
| 332.500 | 65.30 | 0.99968 | 0.9896 | 0.3037 | 10.52 | 1.30 |
| 327.500 | 70.30 | 0.99970 | 0.9915 | 0.3043 | 10.28 | 1.30 |
| 322.500 | 75.30 | 0.99972 | 0.9931 | 0.3047 | 10.05 | 1.30 |
| 317.500 | 80.30 | 0.99974 | 0.9944 | 0.3051 | 9.83 | 1.30 |
| 312.500 | 85.30 | 0.99976 | 0.9956 | 0.3055 | 9.60 | 1.30 |
| 307.500 | 90.30 | 0.99977 | 0.9963 | 0.3057 | 9.45 | 1.30 |
| 302.500 | 95.30 | 0.99979 | 0.9969 | 0.3059 | 9.29 | 1.30 |
| 297.500 | 100.30 | 0.99982 | 0.9981 | 0.3063 | 8.80 | 1.30 |
| 292.500 | 105.30 | 0.99983 | 0.9983 | 0.3063 | 8.76 | 1.30 |
| 287.500 | 110.30 | 0.99983 | 0.9984 | 0.3064 | 8.72 | 1.30 |
| 282.500 | 115.30 | 0.99983 | 0.9986 | 0.3064 | 8.68 | 1.30 |
| 277.500 | 120.30 | 0.99984 | 0.9987 | 0.3065 | 8.64 | 1.30 |
| 272.500 | 125.30 | 0.99984 | 0.9989 | 0.3065 | 8.60 | 1.30 |
| 267.500 | 130.30 | 0.99984 | 0.9990 | 0.3065 | 8.60 | 1.30 |
| 262.500 | 135.30 | 0.99984 | 0.9991 | 0.3066 | 8.54 | 1.30 |
| 257.500 | 140.30 | 0.99985 | 0.9992 | 0.3066 | 8.46 | 1.30 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 252.500 | 145.30 | 0.99985 | 0.9994 | 0.3067 | 8.38 | 1.30 |
| 247.500 | 150.30 | 0.99986 | 0.9995 | 0.3067 | 8.31 | 1.30 |
| 242.500 | 155.30 | 0.99986 | 0.9995 | 0.3067 | 8.30 | 1.30 |
| 237.500 | 160.30 | 0.99986 | 0.9996 | 0.3067 | 8.26 | 1.30 |
| 232.500 | 165.30 | 0.99987 | 0.9997 | 0.3068 | 8.10 | 1.30 |
| 227.500 | 170.30 | 0.99989 | 0.9998 | 0.3068 | 7.74 | 1.30 |
| 222.500 | 175.30 | 0.99991 | 0.9999 | 0.3068 | 7.37 | 1.30 |
| 217.500 | 180.30 | 0.99993 | 0.9999 | 0.3068 | 7.01 | 1.30 |
| 212.500 | 185.30 | 0.99995 | 1.0000 | 0.3068 | 6.58 | 1.30 |
| 207.500 | 190.30 | 0.99996 | 1.0000 | 0.3068 | 6.15 | 1.30 |
| 202.500 | 195.30 | 0.99998 | 1.0000 | 0.3069 | 5.73 | 1.30 |
| 197.500 | 200.30 | 0.99998 | 1.0000 | 0.3069 | 5.56 | 1.30 |
| 192.500 | 205.30 | 0.99998 | 1.0000 | 0.3069 | 5.50 | 1.30 |
| 187.500 | 210.30 | 0.99998 | 1.0000 | 0.3069 | 5.44 | 1.30 |
| 182.500 | 215.30 | 0.99998 | 1.0000 | 0.3069 | 5.37 | 1.30 |
| 177.500 | 220.30 | 0.99999 | 1.0000 | 0.3069 | 5.31 | 1.30 |
| 172.500 | 225.30 | 0.99999 | 1.0000 | 0.3069 | 5.25 | 1.30 |
| 167.500 | 230.30 | 0.99999 | 1.0000 | 0.3069 | 5.20 | 1.30 |
| 162.500 | 235.30 | 0.99999 | 1.0000 | 0.3069 | 5.17 | 1.30 |
| 157.500 | 240.30 | 0.99999 | 1.0000 | 0.3069 | 5.13 | 1.30 |
| 152.500 | 245.30 | 0.99999 | 1.0000 | 0.3069 | 5.10 | 1.30 |
| 147.500 | 250.30 | 0.99999 | 0.0000 | 0.0000 | 5.07 | 1.30 |
| 142.500 | 255.30 | 0.99999 | 0.0000 | 0.0000 | 5.04 | 1.30 |
| 137.500 | 260.30 | 0.99999 | 0.0000 | 0.0000 | 5.01 | 1.30 |
| 132.500 | 265.30 | 0.99999 | 0.0000 | 0.0000 | 5.00 | 1.33 |
| 127.500 | 270.30 | 0.99999 | 0.0000 | 0.0000 | 5.00 | 1.37 |
| 122.500 | 275.30 | 0.99999 | 0.0000 | 0.0000 | 5.00 | 1.42 |
| 117.500 | 280.30 | 0.99999 | 0.0000 | 0.0000 | 4.99 | 1.46 |
| 112.500 | 285.30 | 0.99999 | 0.0000 | 0.0000 | 4.96 | 1.51 |
| 107.500 | 290.30 | 0.99999 | 0.0000 | 0.0000 | 4.93 | 1.56 |
| 102.500 | 295.30 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 1.60 |
| 97.500 | 300.30 | 0.99999 | 0.0000 | 0.0000 | 4.87 | 1.60 |
| 92.500 | 305.30 | 0.99999 | 0.0000 | 0.0000 | 4.84 | 1.60 |
| 87.500 | 310.30 | 0.99999 | 0.0000 | 0.0000 | 4.81 | 1.60 |
| 82.500 | 315.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.60 |
| 77.500 | 320.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.60 |
| 72.500 | 325.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.60 |
| 67.500 | 330.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.59 |
| 62.500 | 335.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.56 |
| 57.500 | 340.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.53 |
| 52.500 | 345.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.50 |
| 47.500 | 350.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.47 |
| 42.500 | 355.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.44 |
| 37.500 | 360.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.41 |
| 32.500 | 365.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.41 |
| 27.500 | 370.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.43 |
| 22.500 | 375.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.45 |
| 17.500 | 380.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.46 |
| 12.500 | 385.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.48 |
| 7.500 | 390.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.50 |
| 2.500 | 395.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.50 |

COUGAR LAKE JULY 23, 1996 SELECT

INPUT/OUTPUT USING RUSH CREEK CREST AS SUBMERGED WEIR

UNITS ARE IN FEET

WEIR CREST ELEVATION 155.000
WEIR LENGTH 100.000
DISCHARGE, VOLUME FLOW PER SEC. 14.0000

TOTAL DISCHARGE, VOLUME PER SEC 14.0000

LOWER WITHDRAWAL LIMIT ( ACTUAL ) HEIGHT ABOVE BOTTOM 154.697 ELEVATION 154.697
LOWER WITHDRAWAL LIMIT ( THEORETICAL ) HEIGHT ABOVE BOTTOM 154.697 ELEVATION 154.697
UPPER WITHDRAWAL LIMIT ( ACTUAL ) HEIGHT ABOVE BOTTOM 397.800 ELEVATION 397.800
UPPER WITHDRAWAL LIMIT ( THEORETICAL ) HEIGHT ABOVE BOTTOM 397.800 ELEVATION 397.800
OUTFLOW DENSITY 0.99976 G/CC
OUTFLOW TEMPERATURE 8.81
OUTFLOW CONCENTRATION OF DISS ORGCARBON 1.27

| Elevation | Depth | Density | Norm. Vel. | Flow | Temperature | Diss Org. C |
|---|---|---|---|---|---|---|
| 396.400 | 1.40 | 0.99776 | 0.0000 | 0.0000 | 22.18 | 1.50 |
| 392.500 | 5.30 | 0.99777 | 0.0520 | 0.0159 | 22.12 | 1.48 |
| 387.500 | 10.30 | 0.99779 | 0.1048 | 0.0322 | 22.05 | 1.47 |
| 382.500 | 15.30 | 0.99807 | 0.3490 | 0.1071 | 20.76 | 1.45 |
| 377.500 | 20.30 | 0.99867 | 0.7062 | 0.2167 | 17.73 | 1.44 |
| 372.500 | 25.30 | 0.99891 | 0.8126 | 0.2493 | 16.35 | 1.42 |
| 367.500 | 30.30 | 0.99912 | 0.8833 | 0.2711 | 15.04 | 1.41 |
| 362.500 | 35.30 | 0.99927 | 0.9225 | 0.2831 | 14.05 | 1.38 |
| 357.500 | 40.30 | 0.99936 | 0.9447 | 0.2899 | 13.33 | 1.35 |
| 352.500 | 45.30 | 0.99947 | 0.9634 | 0.2956 | 12.50 | 1.32 |
| 347.500 | 50.30 | 0.99954 | 0.9744 | 0.2990 | 11.87 | 1.29 |
| 342.500 | 55.30 | 0.99960 | 0.9819 | 0.3013 | 11.30 | 1.26 |
| 337.500 | 60.30 | 0.99965 | 0.9869 | 0.3028 | 10.82 | 1.23 |
| 332.500 | 65.30 | 0.99968 | 0.9896 | 0.3037 | 10.52 | 1.20 |
| 327.500 | 70.30 | 0.99970 | 0.9915 | 0.3043 | 10.28 | 1.20 |
| 322.500 | 75.30 | 0.99972 | 0.9931 | 0.3047 | 10.05 | 1.20 |
| 317.500 | 80.30 | 0.99974 | 0.9944 | 0.3051 | 9.83 | 1.20 |
| 312.500 | 85.30 | 0.99976 | 0.9956 | 0.3055 | 9.60 | 1.20 |
| 307.500 | 90.30 | 0.99977 | 0.9963 | 0.3057 | 9.45 | 1.20 |
| 302.500 | 95.30 | 0.99979 | 0.9969 | 0.3059 | 9.29 | 1.20 |
| 297.500 | 100.30 | 0.99982 | 0.9981 | 0.3063 | 8.80 | 1.20 |
| 292.500 | 105.30 | 0.99983 | 0.9983 | 0.3063 | 8.76 | 1.20 |
| 287.500 | 110.30 | 0.99983 | 0.9984 | 0.3064 | 8.72 | 1.20 |
| 282.500 | 115.30 | 0.99983 | 0.9986 | 0.3064 | 8.68 | 1.20 |
| 277.500 | 120.30 | 0.99984 | 0.9987 | 0.3065 | 8.64 | 1.20 |
| 272.500 | 125.30 | 0.99984 | 0.9989 | 0.3065 | 8.60 | 1.20 |
| 267.500 | 130.30 | 0.99984 | 0.9990 | 0.3065 | 8.60 | 1.20 |
| 262.500 | 135.30 | 0.99984 | 0.9991 | 0.3066 | 8.54 | 1.20 |
| 257.500 | 140.30 | 0.99985 | 0.9992 | 0.3066 | 8.46 | 1.20 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 252.500 | 145.30 | 0.99985 | 0.9994 | 0.3067 | 8.38 | 1.20 |
| 247.500 | 150.30 | 0.99986 | 0.9995 | 0.3067 | 8.31 | 1.20 |
| 242.500 | 155.30 | 0.99986 | 0.9995 | 0.3067 | 8.30 | 1.20 |
| 237.500 | 160.30 | 0.99986 | 0.9996 | 0.3067 | 8.26 | 1.20 |
| 232.500 | 165.30 | 0.99987 | 0.9997 | 0.3068 | 8.10 | 1.20 |
| 227.500 | 170.30 | 0.99989 | 0.9998 | 0.3068 | 7.74 | 1.22 |
| 222.500 | 175.30 | 0.99991 | 0.9999 | 0.3068 | 7.37 | 1.23 |
| 217.500 | 180.30 | 0.99993 | 0.9999 | 0.3068 | 7.01 | 1.25 |
| 212.500 | 185.30 | 0.99995 | 1.0000 | 0.3068 | 6.58 | 1.26 |
| 207.500 | 190.30 | 0.99996 | 1.0000 | 0.3068 | 6.15 | 1.28 |
| 202.500 | 195.30 | 0.99998 | 1.0000 | 0.3069 | 5.73 | 1.30 |
| 197.500 | 200.30 | 0.99998 | 1.0000 | 0.3069 | 5.56 | 1.31 |
| 192.500 | 205.30 | 0.99998 | 1.0000 | 0.3069 | 5.50 | 1.33 |
| 187.500 | 210.30 | 0.99998 | 1.0000 | 0.3069 | 5.44 | 1.34 |
| 182.500 | 215.30 | 0.99998 | 1.0000 | 0.3069 | 5.37 | 1.36 |
| 177.500 | 220.30 | 0.99999 | 1.0000 | 0.3069 | 5.31 | 1.37 |
| 172.500 | 225.30 | 0.99999 | 1.0000 | 0.3069 | 5.25 | 1.39 |
| 167.500 | 230.30 | 0.99999 | 1.0000 | 0.3069 | 5.20 | 1.40 |
| 162.500 | 235.30 | 0.99999 | 1.0000 | 0.3069 | 5.17 | 1.38 |
| 157.500 | 240.30 | 0.99999 | 1.0000 | 0.3069 | 5.13 | 1.37 |
| 152.500 | 245.30 | 0.99999 | 1.0000 | 0.3069 | 5.10 | 1.35 |
| 147.500 | 250.30 | 0.99999 | 0.0000 | 0.0000 | 5.07 | 1.34 |
| 142.500 | 255.30 | 0.99999 | 0.0000 | 0.0000 | 5.04 | 1.32 |
| 137.500 | 260.30 | 0.99999 | 0.0000 | 0.0000 | 5.01 | 1.31 |
| 132.500 | 265.30 | 0.99999 | 0.0000 | 0.0000 | 5.00 | 1.44 |
| 127.500 | 270.30 | 0.99999 | 0.0000 | 0.0000 | 5.00 | 1.69 |
| 122.500 | 275.30 | 0.99999 | 0.0000 | 0.0000 | 5.00 | 1.93 |
| 117.500 | 280.30 | 0.99999 | 0.0000 | 0.0000 | 4.99 | 2.17 |
| 112.500 | 285.30 | 0.99999 | 0.0000 | 0.0000 | 4.96 | 2.42 |
| 107.500 | 290.30 | 0.99999 | 0.0000 | 0.0000 | 4.93 | 2.66 |
| 102.500 | 295.30 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 2.90 |
| 97.500 | 300.30 | 0.99999 | 0.0000 | 0.0000 | 4.87 | 2.68 |
| 92.500 | 305.30 | 0.99999 | 0.0000 | 0.0000 | 4.84 | 2.47 |
| 87.500 | 310.30 | 0.99999 | 0.0000 | 0.0000 | 4.81 | 2.26 |
| 82.500 | 315.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 2.04 |
| 77.500 | 320.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.83 |
| 72.500 | 325.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.62 |
| 67.500 | 330.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.50 |
| 62.500 | 335.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.49 |
| 57.500 | 340.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.48 |
| 52.500 | 345.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.47 |
| 47.500 | 350.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.46 |
| 42.500 | 355.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.46 |
| 37.500 | 360.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.45 |
| 32.500 | 365.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.44 |
| 27.500 | 370.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.43 |
| 22.500 | 375.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.42 |
| 17.500 | 380.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.42 |
| 12.500 | 385.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.41 |
| 7.500 | 390.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.40 |
| 2.500 | 395.30 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.40 |

1

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1000 ***COUGAR LAKE AUGUST 27, 1996 SELECT
1010 ***DATA SETS 01
1020 ***PRINT INPUT
1030 ***INPUT/OUTPUT USING RUSH CREEK CREST AS SUBMERGED WEIR
1040 ***ENGLISH
1050 ***TABLE 01
1060 ***THICKNESS 5.0
1070 ***INTERVAL 01
1080 ***SURFACE 365.0
1090 ***BOTTOM 0.0
1100 ***WEIR
1110 ***SUBMERGED
1120 ***LENGTH 100.
1130 ***HEIGHT 155.0
1140 ***FLOW 31.7
1150 ***NUMBER OF TEMP 39
1160 ***TEMPERATURE DEGREES CENTIGRADE
1170 ***HEIGHT TEMP
1180 *** 365.0 21.0
1190 *** 358.4 21.0
1200 *** 351.9 21.0
1210 *** 345.3 20.1
1220 *** 338.8 18.6
1230 *** 332.2 16.6
1240 *** 325.6 15.7
1250 *** 319.1 15.1
1260 *** 312.5 14.6
1270 *** 306.0 14.1
1280 *** 299.4 13.6
1290 *** 292.8 12.7
1300 *** 286.3 12.2
1310 *** 279.7 11.7
1320 *** 273.1 11.2
1330 *** 266.6 10.8
1340 *** 260.0 10.5
1350 *** 253.5 10.3
1360 *** 246.9 10.0
1370 *** 240.3 9.8
1380 *** 233.8 9.4
1390 *** 227.2 9.0
1400 *** 220.7 8.6
1410 *** 214.1 8.0
1420 *** 207.5 6.5
1430 *** 201.0 5.9
1440 *** 194.4 5.6
1450 *** 187.8 5.0
1460 *** 181.3 4.9
1470 *** 174.7 4.9
1480 *** 168.2 4.9
1490 *** 141.9 4.9
1500 *** 115.7 4.8
1510 *** 96.0 4.8
1520 *** 76.3 4.8
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1530    ***   63.2   4.8
1540    ***   50.0   4.8
1550    ***   23.8   4.8
1560    ***   13.9   4.8
1570    ***QUALITIES   1
1580    ***NUMBER OF DISSOLVED OXYGEN     39
1590    ***HEIGHT   DISSOLVED OXYGEN
1600    ***   365.0   8.7
1610    ***   358.4   8.7
1620    ***   351.9   8.7
1630    ***   345.3   11.1
1640    ***   338.8   12.2
1650    ***   332.2   12.7
1660    ***   325.6   11.5
1670    ***   319.1   10.4
1680    ***   312.5   9.6
1690    ***   306.0   9.1
1700    ***   299.4   8.8
1710    ***   292.8   8.5
1720    ***   286.3   8.3
1730    ***   279.7   8.6
1740    ***   273.1   8.5
1750    ***   266.6   8.3
1760    ***   260.0   8.2
1770    ***   253.5   8.4
1780    ***   246.9   8.7
1790    ***   240.3   8.8
1800    ***   233.8   9.0
1810    ***   227.2   9.1
1820    ***   220.7   9.2
1830    ***   214.1   9.2
1840    ***   207.5   8.9
1850    ***   201.0   9.1
1860    ***   194.4   9.6
1870    ***   187.8   10.0
1880    ***   181.3   10.1
1890    ***   174.7   10.0
1900    ***   168.2   9.9
1910    ***   141.9   10.1
1920    ***   115.7   10.0
1930    ***   96.0   9.7
1940    ***   76.3   9.1
1950    ***   63.2   8.1
1960    ***   50.0   6.5
1970    ***   23.8   5.0
1980    ***   13.9   4.3
1990    ***STOP
1
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COUGAR LAKE AUGUST 27, 1996 SELECT
INPUT/OUTPUT USING RUSH CREEK CREST AS SUBMERGED WEIR
UNITS ARE IN FEET

WEIR CREST ELEVATION 155.000
WEIR LENGTH 100.000
DISCHARGE, VOLUME FLOW PER SEC. 31.0000

TOTAL DISCHARGE, VOLUME PER SEC 31.0000

LOWER WITHDRAWAL LIMIT ( ACTUAL ) HEIGHT ABOVE BOTTOM
141.982 ELEVATION 141.982
LOWER WITHDRAWAL LIMIT ( THEORETICAL ) HEIGHT ABOVE BOTTOM
141.982 ELEVATION 141.982
UPPER WITHDRAWAL LIMIT ( ACTUAL ) HEIGHT ABOVE BOTTOM
365.000 ELEVATION 365.000
UPPER WITHDRAWAL LIMIT ( THEORETICAL ) HEIGHT ABOVE BOTTOM
365.000 ELEVATION 365.000
OUTFLOW DENSITY 0.99966 G/CC
OUTFLOW TEMPERATURE 9.57
OUTFLOW CONCENTRATION OF DISSOLVED OXYGEN 9.44
1

| Elevation | Depth | Density | Norm. Vel. | Flow | Temperature | Diss. Oxygen |
|---|---|---|---|---|---|---|
| 362.500 | 2.50 | 0.99802 | 0.0000 | 0.0000 | 21.00 | 8.70 |
| 357.500 | 7.50 | 0.99802 | 0.0449 | 0.0355 | 21.00 | 8.70 |
| 352.500 | 12.50 | 0.99802 | 0.0888 | 0.0702 | 21.00 | 8.70 |
| 347.500 | 17.50 | 0.99815 | 0.2409 | 0.1904 | 20.40 | 10.30 |
| 342.500 | 22.50 | 0.99834 | 0.4219 | 0.3334 | 19.45 | 11.57 |
| 337.500 | 27.50 | 0.99859 | 0.5998 | 0.4740 | 18.21 | 12.30 |
| 332.500 | 32.50 | 0.99886 | 0.7522 | 0.5944 | 16.69 | 12.68 |
| 327.500 | 37.50 | 0.99898 | 0.8126 | 0.6421 | 15.96 | 11.85 |
| 322.500 | 42.50 | 0.99907 | 0.8516 | 0.6729 | 15.41 | 10.98 |
| 317.500 | 47.50 | 0.99913 | 0.8791 | 0.6946 | 14.98 | 10.21 |
| 312.500 | 52.50 | 0.99919 | 0.9003 | 0.7113 | 14.60 | 9.60 |
| 307.500 | 57.50 | 0.99924 | 0.9185 | 0.7257 | 14.22 | 9.22 |
| 302.500 | 62.50 | 0.99930 | 0.9338 | 0.7378 | 13.83 | 8.94 |
| 297.500 | 67.50 | 0.99936 | 0.9491 | 0.7499 | 13.34 | 8.71 |
| 292.500 | 72.50 | 0.99945 | 0.9642 | 0.7618 | 12.68 | 8.49 |
| 287.500 | 77.50 | 0.99949 | 0.9719 | 0.7680 | 12.29 | 8.34 |
| 282.500 | 82.50 | 0.99954 | 0.9782 | 0.7729 | 11.91 | 8.47 |
| 277.500 | 87.50 | 0.99958 | 0.9833 | 0.7769 | 11.53 | 8.57 |
| 272.500 | 92.50 | 0.99962 | 0.9873 | 0.7801 | 11.16 | 8.48 |
| 267.500 | 97.50 | 0.99965 | 0.9901 | 0.7823 | 10.86 | 8.33 |
| 262.500 | 102.50 | 0.99967 | 0.9921 | 0.7839 | 10.61 | 8.24 |
| 257.500 | 107.50 | 0.99969 | 0.9935 | 0.7850 | 10.42 | 8.28 |
| 252.500 | 112.50 | 0.99971 | 0.9947 | 0.7859 | 10.25 | 8.45 |
| 247.500 | 117.50 | 0.99973 | 0.9958 | 0.7868 | 10.03 | 8.67 |
| 242.500 | 122.50 | 0.99974 | 0.9966 | 0.7874 | 9.87 | 8.77 |
| 237.500 | 127.50 | 0.99976 | 0.9974 | 0.7881 | 9.63 | 8.89 |
| 232.500 | 132.50 | 0.99978 | 0.9981 | 0.7887 | 9.32 | 9.02 |
| 227.500 | 137.50 | 0.99981 | 0.9987 | 0.7891 | 9.02 | 9.10 |
| 222.500 | 142.50 | 0.99983 | 0.9991 | 0.7894 | 8.71 | 9.17 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 217.500 | 147.50 | 0.99986 | 0.9994 | 0.7897 | 8.31 | 9.20 |
| 212.500 | 152.50 | 0.99990 | 0.9998 | 0.7899 | 7.64 | 9.13 |
| 207.500 | 157.50 | 0.99995 | 1.0000 | 0.7901 | 6.50 | 8.90 |
| 202.500 | 162.50 | 0.99997 | 1.0000 | 0.7901 | 6.04 | 9.05 |
| 197.500 | 167.50 | 0.99998 | 1.0000 | 0.7901 | 5.74 | 9.37 |
| 192.500 | 172.50 | 0.99998 | 1.0000 | 0.7901 | 5.43 | 9.72 |
| 187.500 | 177.50 | 0.99999 | 1.0000 | 0.7901 | 5.00 | 10.00 |
| 182.500 | 182.50 | 0.99999 | 1.0000 | 0.7901 | 4.92 | 10.08 |
| 177.500 | 187.50 | 0.99999 | 1.0000 | 0.7901 | 4.90 | 10.04 |
| 172.500 | 192.50 | 0.99999 | 1.0000 | 0.7901 | 4.90 | 9.97 |
| 167.500 | 197.50 | 0.99999 | 1.0000 | 0.7901 | 4.90 | 9.91 |
| 162.500 | 202.50 | 0.99999 | 1.0000 | 0.7901 | 4.90 | 9.94 |
| 157.500 | 207.50 | 0.99999 | 1.0000 | 0.7901 | 4.90 | 9.98 |
| 152.500 | 212.50 | 0.99999 | 1.0000 | 0.7901 | 4.90 | 10.02 |
| 147.500 | 217.50 | 0.99999 | 1.0000 | 0.7901 | 4.90 | 10.06 |
| 142.500 | 222.50 | 0.99999 | 1.0000 | 0.7901 | 4.90 | 10.10 |
| 137.500 | 227.50 | 0.99999 | 0.0000 | 0.0000 | 4.88 | 10.08 |
| 132.500 | 232.50 | 0.99999 | 0.0000 | 0.0000 | 4.86 | 10.06 |
| 127.500 | 237.50 | 0.99999 | 0.0000 | 0.0000 | 4.85 | 10.05 |
| 122.500 | 242.50 | 0.99999 | 0.0000 | 0.0000 | 4.83 | 10.03 |
| 117.500 | 247.50 | 0.99999 | 0.0000 | 0.0000 | 4.81 | 10.01 |
| 112.500 | 252.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 9.95 |
| 107.500 | 257.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 9.88 |
| 102.500 | 262.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 9.80 |
| 97.500 | 267.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 9.72 |
| 92.500 | 272.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 9.59 |
| 87.500 | 277.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 9.44 |
| 82.500 | 282.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 9.29 |
| 77.500 | 287.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 9.14 |
| 72.500 | 292.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 8.81 |
| 67.500 | 297.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 8.43 |
| 62.500 | 302.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 8.02 |
| 57.500 | 307.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 7.41 |
| 52.500 | 312.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 6.80 |
| 47.500 | 317.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 6.36 |
| 42.500 | 322.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 6.07 |
| 37.500 | 327.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 5.78 |
| 32.500 | 332.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 5.50 |
| 27.500 | 337.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 5.21 |
| 22.500 | 342.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 4.91 |
| 17.500 | 347.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 4.55 |
| 12.500 | 352.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 4.30 |
| 7.500 | 357.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 4.30 |
| 2.500 | 362.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 4.30 |

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                 VELOCITY ( TIMES 1000 )
           0     200    400    600    800    1000   1200   1400   1600   1800   2000
           I-    ---I --------I---------I  -------I---------I --------I---------I --------I---------I---------I
365.00  [illegible]  +* D
360.00    5.00 +  D V
355.00   10.00 +  D  V
350.00   15.00 +  D       V
345.00   20.00 +    D         V
340.00   25.00 +     D             V
335.00   30.00 +       D               V
330.00   35.00 +        D               V
325.00   40.00 +         D               V
320.00   45.00 +          D               V
315.00   50.00 +          D                V
310.00   55.00 +           D               V
305.00   60.00 +           D                V
300.00   65.00 +            D                V
295.00   70.00 +             D                V
290.00   75.00 +             D                V
285.00   80.00                D               V
280.00   85.00 +              D                V
275.00   90.00 +               D               V
270.00   95.00 +               D               V
265.00  100.00 +               D                V
260.00  105.00 +               D                V
255.00  110.00 +                D               V
250.00  115.00 +                D               V
245.00  120.00 +                D               V
240.00  125.00 +                D               V
235.00  130.00 +                D               V
230.00  135.00 +                 D              V
225.00  1[illegible]0.00 +                 D              V
220.00  [illegible].00 +                 D              V
215.00  [illegible].00 +                 D              V
210.00  [illegible].00 +                  D             V
205.00  160.00 +                  D             V
200.00  165.00 +                  D             V
195.00  170.00 +                  D             V
190.00  175.00 +                  D              V
185.00  180.00 +                  D              V
180.00  185.00 +                  D              V
175.00  190.00 +                  D              V
170.00  195.00 +                  D              V
165.00  200.00 +                  D              V
160.00  205.00 +                  D              V
155.00  21[illegible] +                  D              V
150.00  21[illegible] +                  D              V
145.00  220.[illegible] +                  D              V
140.00  225.00 +*                  D
135.00  230.00 +*                  D
130.00  235.00 +*                  D
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 125.00  240.00 +*                 D
 120.00  245.00 +*                 D
 115.00  250.00 +*                 D
 110.00  255.00 +*                 D
 105.00  260.00 +*                 D
 100.00  265.00 +*                 D
  95.00  270.00 +*                 D
  90.00  275.00 +*                 D
  85.00  280.00 +*                 D
  80.00  285.00 +*                 D
  75.00  290.00 +*                 D
  70.00  295.00 +*                 D
  65.00  300.00 +*                 D
  60.00  305.00 +*                 D
  55.00  310.00 +*                 D
  50.00  315.00 +*                 D
  45.00  320.00 +*                 D
  40.00  325.00 +*                 D
  35.00  330.00 +*                 D
  30.00  335.00 +*                 D
  25.00  340.00 +*                 D
  20.00  345.00 +*                 D
  15.00  350.00 +*                 D
  10.00  355.00 +*                 D
5.00  360.00 +*                D
         I---------I---------I---------I---------I---------I --------I---------I---------I---------I---------I
       0.99800  0.99900  1.00000  1.00100  1.00200  1.00300  1.00400  1.00500  1.00600
1.00700  1.00800
                 DENSITY G/CC
```

COUGAR LAKE AUGUST 28, 1996 SELECT

INPUT/OUTPUT USING RUSH CREEK CREST AS SUBMERGED WEIR

UNITS ARE IN FEET

WEIR CREST ELEVATION 155.000
WEIR LENGTH 100.000
DISCHARGE, VOLUME FLOW PER SEC. 31.0000

TOTAL DISCHARGE, VOLUME PER SEC 31.0000

LOWER WITHDRAWAL LIMIT ( ACTUAL ) HEIGHT ABOVE BOTTOM
141.982 ELEVATION 141.982
LOWER WITHDRAWAL LIMIT ( THEORETICAL ) HEIGHT ABOVE BOTTOM
141.982 ELEVATION 141.982
UPPER WITHDRAWAL LIMIT ( ACTUAL ) HEIGHT ABOVE BOTTOM
365.000 ELEVATION 365.000
UPPER WITHDRAWAL LIMIT ( THEORETICAL ) HEIGHT ABOVE BOTTOM
365.000 ELEVATION 365.000
OUTFLOW DENSITY 0.99966 G/CC
OUTFLOW TEMPERATURE 9.57
OUTFLOW CONCENTRATION OF TOTAL ORG CARB0.64

| Elevation | Depth | Density | Norm. Vel. | Flow | Temperature | Total Org. C |
|---|---|---|---|---|---|---|
| 362.500 | 2.50 | 0.99802 | 0.0000 | 0.0000 | 21.00 | 0.69 |
| 357.500 | 7.50 | 0.99802 | 0.0449 | 0.0355 | 21.00 | 0.68 |
| 352.500 | 12.50 | 0.99802 | 0.0888 | 0.0702 | 21.00 | 0.66 |
| 347.500 | 17.50 | 0.99815 | 0.2409 | 0.1904 | 20.40 | 0.65 |
| 342.500 | 22.50 | 0.99834 | 0.4219 | 0.3334 | 19.45 | 0.63 |
| 337.500 | 27.50 | 0.99859 | 0.5998 | 0.4740 | 18.21 | 0.62 |
| 332.500 | 32.50 | 0.99886 | 0.7522 | 0.5944 | 16.69 | 0.60 |
| 327.500 | 37.50 | 0.99898 | 0.8126 | 0.6421 | 15.96 | 0.56 |
| 322.500 | 42.50 | 0.99907 | 0.8516 | 0.6729 | 15.41 | 0.51 |
| 317.500 | 47.50 | 0.99913 | 0.8791 | 0.6946 | 14.98 | 0.47 |
| 312.5 | 52.50 | 0.99919 | 0.9003 | 0.7113 | 14.60 | 0.42 |
| 307.5 | 57.50 | 0.99924 | 0.9185 | 0.7257 | 14.22 | 0.37 |
| 302.500 | 62.50 | 0.99930 | 0.9338 | 0.7378 | 13.83 | 0.33 |
| 297.500 | 67.50 | 0.99936 | 0.9491 | 0.7499 | 13.34 | 0.32 |
| 292.500 | 72.50 | 0.99945 | 0.9642 | 0.7618 | 12.68 | 0.36 |
| 287.500 | 77.50 | 0.99949 | 0.9719 | 0.7680 | 12.29 | 0.41 |
| 282.500 | 82.50 | 0.99954 | 0.9782 | 0.7729 | 11.91 | 0.45 |
| 277.500 | 87.50 | 0.99958 | 0.9833 | 0.7769 | 11.53 | 0.50 |
| 272.500 | 92.50 | 0.99962 | 0.9873 | 0.7801 | 11.16 | 0.55 |
| 267.500 | 97.50 | 0.99965 | 0.9901 | 0.7823 | 10.86 | 0.59 |
| 262.500 | 102.50 | 0.99967 | 0.9921 | 0.7839 | 10.61 | 0.60 |
| 257.500 | 107.50 | 0.99969 | 0.9935 | 0.7850 | 10.42 | 0.60 |
| 252.500 | 112.50 | 0.99971 | 0.9947 | 0.7859 | 10.25 | 0.60 |
| 247.500 | 117.50 | 0.99973 | 0.9958 | 0.7868 | 10.03 | 0.60 |
| 242.500 | 122.50 | 0.99974 | 0.9966 | 0.7874 | 9.87 | 0.60 |
| 237.500 | 127.50 | 0.99976 | 0.9974 | 0.7881 | 9.63 | 0.60 |
| 232.500 | 132.50 | 0.99978 | 0.9981 | 0.7887 | 9.32 | 0.60 |
| 227.500 | 137.50 | 0.99981 | 0.9987 | 0.7891 | 9.02 | 0.58 |
| 222.500 | 142.50 | 0.99983 | 0.9991 | 0.7894 | 8.71 | 0.57 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 217.500 | 147.50 | 0.99986 | 0.9994 | 0.7897 | 8.31 | 0.55 |
| 212.500 | 152.50 | 0.99990 | 0.9998 | 0.7899 | 7.64 | 0.54 |
| 207.500 | 157.50 | 0.99995 | 1.0000 | 0.7901 | 6.50 | 0.52 |
| 202.500 | 162.50 | 0.99997 | 1.0000 | 0.7901 | 6.04 | 0.50 |
| 197.500 | 167.50 | 0.99998 | 1.0000 | 0.7901 | 5.74 | 0.57 |
| 192.500 | 172.50 | 0.99998 | 1.0000 | 0.7901 | 5.43 | 0.68 |
| 187.500 | 177.50 | 0.99999 | 1.0000 | 0.7901 | 5.00 | 0.79 |
| 182.500 | 182.50 | 0.99999 | 1.0000 | 0.7901 | 4.92 | 0.89 |
| 177.500 | 187.50 | 0.99999 | 1.0000 | 0.7901 | 4.90 | 1.00 |
| 172.500 | 192.50 | 0.99999 | 1.0000 | 0.7901 | 4.90 | 1.11 |
| 167.500 | 197.50 | 0.99999 | 1.0000 | 0.7901 | 4.90 | 1.19 |
| 162.500 | 202.50 | 0.99999 | 1.0000 | 0.7901 | 4.90 | 1.11 |
| 157.500 | 207.50 | 0.99999 | 1.0000 | 0.7901 | 4.90 | 1.04 |
| 152.500 | 212.50 | 0.99999 | 1.0000 | 0.7901 | 4.90 | 0.96 |
| 147.500 | 217.50 | 0.99999 | 1.0000 | 0.7901 | 4.90 | 0.88 |
| 142.500 | 222.50 | 0.99999 | 1.0000 | 0.7901 | 4.90 | 0.81 |
| 137.500 | 227.50 | 0.99999 | 0.0000 | 0.0000 | 4.88 | 0.73 |
| 132.500 | 232.50 | 0.99999 | 0.0000 | 0.0000 | 4.86 | 0.70 |
| 127.500 | 237.50 | 0.99999 | 0.0000 | 0.0000 | 4.85 | 0.70 |
| 122.500 | 242.50 | 0.99999 | 0.0000 | 0.0000 | 4.83 | 0.70 |
| 117.500 | 247.50 | 0.99999 | 0.0000 | 0.0000 | 4.81 | 0.70 |
| 112.500 | 252.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 0.70 |
| 107.500 | 257.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 0.70 |
| 102.500 | 262.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 0.70 |
| 97.500 | 267.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.86 |
| 92.500 | 272.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 3.02 |
| 87.500 | 277.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 4.18 |
| 82.500 | 282.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 5.33 |
| 77.500 | 287.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 6.49 |
| 72.500 | 292.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 7.65 |
| 67.500 | 297.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 7.86 |
| 62.500 | 302.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 6.85 |
| 57.500 | 307.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 5.85 |
| 52.500 | 312.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 4.84 |
| 47.500 | 317.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 3.83 |
| 42.500 | 322.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 2.83 |
| 37.500 | 327.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.82 |
| 32.500 | 332.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.70 |
| 27.500 | 337.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.70 |
| 22.500 | 342.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.70 |
| 17.500 | 347.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.70 |
| 12.500 | 352.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.70 |
| 7.500 | 357.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.70 |
| 2.500 | 362.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 1.70 |

COUGAR LAKE AUGUST 27, 1996 SELECT

INPUT/OUTPUT USING RUSH CREEK CREST AS SUBMERGED WEIR

UNITS ARE IN FEET

WEIR CREST ELEVATION 155.000
WEIR LENGTH 100.000
DISCHARGE, VOLUME FLOW PER SEC. 31.0000

TOTAL DISCHARGE, VOLUME PER SEC 31.0000

LOWER WITHDRAWAL LIMIT ( ACTUAL ) HEIGHT ABOVE BOTTOM
141.982 ELEVATION 141.982
LOWER WITHDRAWAL LIMIT ( THEORETICAL ) HEIGHT ABOVE BOTTOM
141.982 ELEVATION 141.982
UPPER WITHDRAWAL LIMIT ( ACTUAL ) HEIGHT ABOVE BOTTOM
365.000 ELEVATION 365.000
UPPER WITHDRAWAL LIMIT ( THEORETICAL ) HEIGHT ABOVE BOTTOM
365.000 ELEVATION 365.000
OUTFLOW DENSITY 0.99966 G/CC
OUTFLOW TEMPERATURE 9.57
OUTFLOW CONCENTRATION OF DISSOLVED ORGANIC CARBON 0.57

| Elevation | Depth | Density | Norm. Vel. | Flow | Temperature | Diss. Org. C. |
|---|---|---|---|---|---|---|
| 362.500 | 2.50 | 0.99802 | 0.0000 | 0.0000 | 21.00 | 0.59 |
| 357.500 | 7.50 | 0.99802 | 0.0449 | 0.0355 | 21.00 | 0.58 |
| 352.500 | 12.50 | 0.99802 | 0.0888 | 0.0702 | 21.00 | 0.56 |
| 347.500 | 17.50 | 0.99815 | 0.2409 | 0.1904 | 20.40 | 0.55 |
| 342.500 | 22.50 | 0.99834 | 0.4219 | 0.3334 | 19.45 | 0.53 |
| 337.500 | 27.50 | 0.99859 | 0.5998 | 0.4740 | 18.21 | 0.52 |
| 332.500 | 32.50 | 0.99886 | 0.7522 | 0.5944 | 16.69 | 0.50 |
| 327.500 | 37.50 | 0.99898 | 0.8126 | 0.6421 | 15.96 | 0.46 |
| 322.500 | 42.50 | 0.99907 | 0.8516 | 0.6729 | 15.41 | 0.41 |
| 317.500 | 47.50 | 0.99913 | 0.8791 | 0.6946 | 14.98 | 0.37 |
| 312.500 | 52.50 | 0.99919 | 0.9003 | 0.7113 | 14.60 | 0.32 |
| 307.500 | 57.50 | 0.99924 | 0.9185 | 0.7257 | 14.22 | 0.27 |
| 302.500 | 62.50 | 0.99930 | 0.9338 | 0.7378 | 13.83 | 0.23 |
| 297.500 | 67.50 | 0.99936 | 0.9491 | 0.7499 | 13.34 | 0.22 |
| 292.500 | 72.50 | 0.99945 | 0.9642 | 0.7618 | 12.68 | 0.26 |
| 287.500 | 77.50 | 0.99949 | 0.9719 | 0.7680 | 12.29 | 0.31 |
| 282.500 | 82.50 | 0.99954 | 0.9782 | 0.7729 | 11.91 | 0.35 |
| 277.500 | 87.50 | 0.99958 | 0.9833 | 0.7769 | 11.53 | 0.40 |
| 272.500 | 92.50 | 0.99962 | 0.9873 | 0.7801 | 11.16 | 0.45 |
| 267.500 | 97.50 | 0.99965 | 0.9901 | 0.7823 | 10.86 | 0.49 |
| 262.500 | 102.50 | 0.99967 | 0.9921 | 0.7839 | 10.61 | 0.54 |
| 257.500 | 107.50 | 0.99969 | 0.9935 | 0.7850 | 10.42 | 0.58 |
| 252.500 | 112.50 | 0.99971 | 0.9947 | 0.7859 | 10.25 | 0.63 |
| 247.500 | 117.50 | 0.99973 | 0.9958 | 0.7868 | 10.03 | 0.67 |
| 242.500 | 122.50 | 0.99974 | 0.9966 | 0.7874 | 9.87 | 0.72 |
| 237.500 | 127.50 | 0.99976 | 0.9974 | 0.7881 | 9.63 | 0.77 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 232.500 | 132.50 | 0.99978 | 0.9981 | 0.7887 | 9.32 | 0.80 |
| 227.500 | 137.50 | 0.99981 | 0.9987 | 0.7891 | 9.02 | 0.78 |
| 222.500 | 142.50 | 0.99983 | 0.9991 | 0.7894 | 8.71 | 0.77 |
| 217.500 | 147.50 | 0.99986 | 0.9994 | 0.7897 | 8.31 | 0.75 |
| 212.500 | 152.50 | 0.99990 | 0.9998 | 0.7899 | 7.64 | 0.74 |
| 207.500 | 157.50 | 0.99995 | 1.0000 | 0.7901 | 6.50 | 0.72 |
| 202.500 | 162.50 | 0.99997 | 1.0000 | 0.7901 | 6.04 | 0.70 |
| 197.500 | 167.50 | 0.99998 | 1.0000 | 0.7901 | 5.74 | 0.69 |
| 192.500 | 172.50 | 0.99998 | 1.0000 | 0.7901 | 5.43 | 0.67 |
| 187.500 | 177.50 | 0.99999 | 1.0000 | 0.7901 | 5.00 | 0.66 |
| 182.500 | 182.50 | 0.99999 | 1.0000 | 0.7901 | 4.92 | 0.64 |
| 177.500 | 187.50 | 0.99999 | 1.0000 | 0.7901 | 4.90 | 0.63 |
| 172.500 | 192.50 | 0.99999 | 1.0000 | 0.7901 | 4.90 | 0.61 |
| 167.500 | 197.50 | 0.99999 | 1.0000 | 0.7901 | 4.90 | 0.60 |
| 162.500 | 202.50 | 0.99999 | 1.0000 | 0.7901 | 4.90 | 0.62 |
| 157.500 | 207.50 | 0.99999 | 1.0000 | 0.7901 | 4.90 | 0.63 |
| 152.500 | 212.50 | 0.99999 | 1.0000 | 0.7901 | 4.90 | 0.65 |
| 147.500 | 217.50 | 0.99999 | 1.0000 | 0.7901 | 4.90 | 0.66 |
| 142.500 | 222.50 | 0.99999 | 1.0000 | 0.7901 | 4.90 | 0.68 |
| 137.500 | 227.50 | 0.99999 | 0.0000 | 0.0000 | 4.88 | 0.69 |
| 132.500 | 232.50 | 0.99999 | 0.0000 | 0.0000 | 4.86 | 0.70 |
| 127.500 | 237.50 | 0.99999 | 0.0000 | 0.0000 | 4.85 | 0.70 |
| 122.500 | 242.50 | 0.99999 | 0.0000 | 0.0000 | 4.83 | 0.70 |
| 117.500 | 247.50 | 0.99999 | 0.0000 | 0.0000 | 4.81 | 0.70 |
| 112.500 | 252.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 0.70 |
| 107.500 | 257.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 0.70 |
| 102.500 | 262.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 0.70 |
| 97.500 | 267.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 0.73 |
| 92.500 | 272.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 0.76 |
| 87.500 | 277.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 0.79 |
| 82.500 | 282.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 0.82 |
| 77.500 | 287.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 0.85 |
| 72.500 | 292.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 0.88 |
| 67.500 | 297.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 0.89 |
| 62.500 | 302.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 0.88 |
| 57.500 | 307.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 0.86 |
| 52.500 | 312.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 0.85 |
| 47.500 | 317.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 0.83 |
| 42.500 | 322.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 0.82 |
| 37.500 | 327.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 0.80 |
| 32.500 | 332.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 0.80 |
| 27.500 | 337.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 0.80 |
| 22.500 | 342.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 0.80 |
| 17.500 | 347.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 0.80 |
| 12.500 | 352.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 0.80 |
| 7.500 | 357.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 0.80 |
| 2.500 | 362.50 | 0.99999 | 0.0000 | 0.0000 | 4.80 | 0.80 |

1

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1000    ***COUGAR LAKE SEPTEMBER 25, 1996 SELECT
1010    ***DATA SETS   01
1020    ***PRINT INPUT
1030    ***INPUT/OUTPUT USING RUSH CREEK CREST AS SUBMERGED WEIR
1040    ***ENGLISH
1050    ***TABLE       01
1060    ***THICKNESS        5.0
1070    ***INTERVAL    01
1080    ***SURFACE         333.0
1090    ***BOTTOM            0.0
1100    ***WEIR
1110    ***SUBMERGED
1120    ***LENGTH          100.
1130    ***HEIGHT          155.0
1140    ***FLOW          25
1150    ***NUMBER OF TEMP        37
1160    ***TEMPERATURE DEGREES CENTIGRADE
1170    ***HEIGHT    TEMP
1180    ***     333.0     16.6
1190    ***     326.5     16.6
1200    ***     319.9     16.6
1210    ***     313.4     16.5
1220    ***     306.8     16.5
1230    ***     300.2     16.5
1240    ***     293.7     16.4
1250    ***     287.1     15.2
1260    ***     280.6     14.7
1270    ***     274.0     14.4
1280    ***     267.4     14.3
1290    ***     260.9     14.1
1300    ***     254.3     13.8
1310    ***     247.7     13.6
1320    ***     241.2     13.4
1330    ***     234.6     13.2
1340    ***     228.1     12.8
1350    ***     221.5     12.1
1360    ***     214.9     10.0
1370    ***     208.4      7.4
1380    ***     201.8      6.1
1390    ***     195.3      5.5
1400    ***     188.7      5.4
1410    ***     182.1      5.4
1420    ***     175.6      5.3
1430    ***     169.0      5.3
1440    ***     162.4      5.2
1450    ***     155.9      5.2
1460    ***     149.3      5.1
1470    ***     142.8      5.1
1480    ***     123.1      5.0
1490    ***      96.8      5.0
1500    ***      77.1      4.9
1510    ***      64.0      4.9
1520    ***      50.9      4.9
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1530     ***    37.8    4.9
1540     ***    18.1    4.9
1550     ***QUALITIES  1
1560     ***NUMBER OF DISSOLVED OXYGEN      37
1570     ***HEIGHT   DISSOLVED OXYGEN
1580     ***    333.0   9.8
1590     ***    326.5   9.7
1600     ***    319.9   9.7
1610     ***    313.4   9.7
1620     ***    306.8   9.7
1630     ***    300.2   9.7
1640     ***    293.7   9.6
1650     ***    287.1   9.2
1660     ***    280.6   8.9
1670     ***    274.0   8.8
1680     ***    267.4   8.5
1690     ***    260.9   8.8
1700     ***    254.3   8.5
1710     ***    247.7   8.5
1720     ***    241.2   8.7
1730     ***    234.6   8.7
1740     ***    228.1   8.4
1750     ***    221.5   8.1
1760     ***    214.9   7.8
1770     ***    208.4   8.4
1780     ***    201.8   9.1
1790     ***    195.3   9.7
1800     ***    188.7   9.8
1810     ***    182.1   10.0
1820     ***    175.6   9.9
1830     ***    169.0   10.0
1840     ***    162.4   9.9
1850     ***    155.9   9.9
1860     ***    149.3   10.0
1870     ***    142.8   10.0
1880     ***    123.1   10.0
1890     ***    96.8    9.3
1900     ***    77.1    8.8
1910     ***    64.0    8.1
1920     ***    50.9    7.0
1930     ***    37.8    5.2
1940     ***    18.1    2.0
1950     ***STOP
1
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COUGAR LAKE SEPTEMBER 25, 1996 SELECT
INPUT/OUTPUT USING RUSH CREEK CREST AS SUBMERGED WEIR

UNITS ARE IN FEET

WEIR CREST ELEVATION 155.000
WEIR LENGTH 100.000
DISCHARGE, VOLUME FLOW PER SEC. 25.0000

TOTAL DISCHARGE, VOLUME PER SEC 25.0000

LOWER WITHDRAWAL LIMIT ( ACTUAL ) HEIGHT ABOVE BOTTOM
154.697 ELEVATION 154.697
LOWER WITHDRAWAL LIMIT ( THEORETICAL ) HEIGHT ABOVE BOTTOM
154.697 ELEVATION 154.697
UPPER WITHDRAWAL LIMIT ( ACTUAL ) HEIGHT ABOVE BOTTOM
333.000 ELEVATION 333.000
UPPER WITHDRAWAL LIMIT ( THEORETICAL ) HEIGHT ABOVE BOTTOM
333.000 ELEVATION 333.000
OUTFLOW DENSITY 0.99960 G/CC
OUTFLOW TEMPERATURE 10.15
OUTFLOW CONCENTRATION OF DISSOLVED OXYGEN 9.11
1

| Elevation | Depth | Density | Norm. Vel. | Flow | Temperature | Diss. Oxygen |
|---|---|---|---|---|---|---|
| 331.500 | 1.50 | 0.99887 | 0.0000 | 0.0000 | 16.60 | 9.78 |
| 327.500 | 5.50 | 0.99887 | 0.0548 | 0.0491 | 16.60 | 9.72 |
| 322.500 | 10.50 | 0.99887 | 0.1080 | 0.0968 | 16.60 | 9.70 |
| 317.500 | 15.50 | 0.99888 | 0.1691 | 0.1515 | 16.56 | 9.70 |
| 312.500 | 20.50 | 0.99889 | 0.2336 | 0.2092 | 16.50 | 9.70 |
| 307.500 | 25.50 | 0.99889 | 0.2807 | 0.2515 | 16.50 | 9.70 |
| 302.500 | 30.50 | 0.99889 | 0.3264 | 0.2923 | 16.50 | 9.70 |
| 297.500 | 35.50 | 0.99890 | 0.3785 | 0.3390 | 16.46 | 9.66 |
| 292.500 | 40.50 | 0.99894 | 0.4683 | 0.4195 | 16.18 | 9.53 |
| 287.500 | 45.50 | 0.99909 | 0.6328 | 0.5668 | 15.27 | 9.22 |
| 282.500 | 50.50 | 0.99915 | 0.7065 | 0.6328 | 14.85 | 8.99 |
| 277.500 | 55.50 | 0.99919 | 0.7553 | 0.6766 | 14.56 | 8.85 |
| 272.500 | 60.50 | 0.99922 | 0.7892 | 0.7069 | 14.38 | 8.73 |
| 267.500 | 65.50 | 0.99923 | 0.8118 | 0.7271 | 14.30 | 8.50 |
| 262.500 | 70.50 | 0.99925 | 0.8374 | 0.7501 | 14.15 | 8.73 |
| 257.500 | 75.50 | 0.99928 | 0.8631 | 0.7731 | 13.95 | 8.65 |
| 252.500 | 80.50 | 0.99931 | 0.8852 | 0.7929 | 13.75 | 8.50 |
| 247.500 | 85.50 | 0.99933 | 0.9025 | 0.8084 | 13.59 | 8.51 |
| 242.500 | 90.50 | 0.99935 | 0.9178 | 0.8221 | 13.44 | 8.66 |
| 237.500 | 95.50 | 0.99937 | 0.9312 | 0.8341 | 13.29 | 8.70 |
| 232.500 | 100.50 | 0.99940 | 0.9444 | 0.8460 | 13.07 | 8.60 |
| 227.500 | 105.50 | 0.99944 | 0.9578 | 0.8580 | 12.74 | 8.37 |
| 222.500 | 110.50 | 0.99950 | 0.9713 | 0.8700 | 12.21 | 8.15 |
| 217.500 | 115.50 | 0.99965 | 0.9880 | 0.8850 | 10.83 | 7.92 |
| 212.500 | 120.50 | 0.99981 | 0.9970 | 0.8931 | 9.04 | 8.02 |
| 207.500 | 125.50 | 0.99992 | 0.9996 | 0.8954 | 7.22 | 8.50 |
| 202.500 | 130.50 | 0.99996 | 0.9999 | 0.8957 | 6.24 | 9.03 |
| 197.500 | 135.50 | 0.99998 | 1.0000 | 0.8957 | 5.70 | 9.50 |
| 192.500 | 140.50 | 0.99998 | 1.0000 | 0.8957 | 5.46 | 9.74 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 187.500 | 145.50 | 0.99998 | 1.0000 | 0.8957 | 5.40 | 9.84 |
| 182.500 | 150.50 | 0.99998 | 1.0000 | 0.8957 | 5.40 | 9.99 |
| 177.500 | 155.50 | 0.99999 | 1.0000 | 0.8957 | 5.33 | 9.93 |
| 172.500 | 160.50 | 0.99999 | 1.0000 | 0.8957 | 5.30 | 9.95 |
| 167.500 | 165.50 | 0.99999 | 1.0000 | 0.8957 | 5.28 | 9.98 |
| 162.500 | 170.50 | 0.99999 | 1.0000 | 0.8957 | 5.20 | 9.90 |
| 157.500 | 175.50 | 0.99999 | 1.0000 | 0.8957 | 5.20 | 9.90 |
| 152.500 | 180.50 | 0.99999 | 1.0000 | 0.8957 | 5.15 | 9.95 |
| 147.500 | 185.50 | 0.99999 | 0.0000 | 0.0000 | 5.10 | 10.00 |
| 142.500 | 190.50 | 0.99999 | 0.0000 | 0.0000 | 5.10 | 10.00 |
| 137.500 | 195.50 | 0.99999 | 0.0000 | 0.0000 | 5.07 | 10.00 |
| 132.500 | 200.50 | 0.99999 | 0.0000 | 0.0000 | 5.05 | 10.00 |
| 127.500 | 205.50 | 0.99999 | 0.0000 | 0.0000 | 5.02 | 10.00 |
| 122.500 | 210.50 | 0.99999 | 0.0000 | 0.0000 | 5.00 | 9.98 |
| 117.500 | 215.50 | 0.99999 | 0.0000 | 0.0000 | 5.00 | 9.85 |
| 112.500 | 220.50 | 0.99999 | 0.0000 | 0.0000 | 5.00 | 9.72 |
| 107.500 | 225.50 | 0.99999 | 0.0000 | 0.0000 | 5.00 | 9.58 |
| 102.500 | 230.50 | 0.99999 | 0.0000 | 0.0000 | 5.00 | 9.45 |
| 97.500 | 235.50 | 0.99999 | 0.0000 | 0.0000 | 5.00 | 9.32 |
| 92.500 | 240.50 | 0.99999 | 0.0000 | 0.0000 | 4.98 | 9.19 |
| 87.500 | 245.50 | 0.99999 | 0.0000 | 0.0000 | 4.95 | 9.06 |
| 82.500 | 250.50 | 0.99999 | 0.0000 | 0.0000 | 4.93 | 8.94 |
| 77.500 | 255.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 8.81 |
| 72.500 | 260.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 8.55 |
| 67.500 | 265.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 8.29 |
| 62.500 | 270.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 7.97 |
| 57.500 | 275.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 7.55 |
| 52.500 | 280.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 7.13 |
| 47.500 | 285.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 6.53 |
| 42.500 | 290.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 5.85 |
| 37.500 | 295.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 5.15 |
| 32.500 | 300.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 4.34 |
| 27.500 | 305.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 3.53 |
| 22.500 | 310.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 2.71 |
| 17.500 | 315.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 2.00 |
| 12.500 | 320.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 2.00 |
| 7.500 | 325.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 2.00 |
| 2.500 | 330.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 2.00 |

1

```
                      VELOCITY ( TIMES 1000 )
               0        200       400       600       800       1000      1200      1400      1600      1800      2000
               I---------I---------I---------I---------I---------I---------I---------I---------I---------I---------I
333.00    0.00 +*             D
328.00    5.00 +        V     D
323.00   10.00 +           V   D
318.00   15.00 +              B
313.00   20.00 +             D   V
308.00   25.00 +             D     V
303.00   30.00 +             D       V
298.00   35.00 +             D        V
293.00   40.00 +              D           V
288.00   45.00 +               D                V
283.00   50.00 +               D                   V
278.00   55.00 +               D                    V
273.00   60.00 +                D                     V
268.00   65.00 +                D                      V
263.00   70.00 +                D                      V
258.00   75.00 +                D                        V
253.00   80.00 +                 D                        V
248.00   85.00 +                 D                        V
243.00   90.00 +                 D                        V
238.00   95.00 +                 D                         V
233.00  100.00 +                 D                          V
228.00  105.00 +                  D                         V
223.00  110.00 +                   D                         V
218.00  115.00 +                    D                         V
213.00  120.00 +                     D                        V
208.00  125.00 +                      D                       V
203.00  130.00 +                      D                       V
198.00  135.00 +                      D                       V
193.00  140.00 +                      D                       V
188.00  145.00 +                      D                       V
183.00  150.00 +                      D                       V
178.00  155.00 +                      D                       V
173.00  160.00 +                      D                       V
168.00  165.00 +                      D                        V
163.00  170.00 +                      D                        V
158.00  175.00 +                      D                        V
153.00  180.00 +                      D                        V
148.00  185.00 +*                      D
143.00  190.00 +*                      D
138.00  195.00 +*                      D
133.00  200.00 +*                      D
128.00  205.00 +*                      D
123.00  210.00 +*                      D
118.00  215.00 +*                      D
113.00  220.00 +*                      D
108.00  225.00 +*                      D
103.00  230.00 +*                      D
```

```
 98.00  235.00 +*                D
 93.00  240.00 +*                D
 88.00  245.00 +*                D
 83.00  250.00 +*                D
 78.00  255.00 +*                D
 73.00  260.00 +*                D
 68.00  265.00 +*                D
 63.00  270.00 +*                D
 58.00  275.00 +*                D
 53.00  280.00 +*                D
 48.00  285.00 +*                D
 43.00  290.00 +*                D
 38.00  295.00 +*                D
 33.00  300.00 +*                D
 28.00  305.00 +*                D
 23.00  310.00 +*                D
 18.00  315.00 +*                D
 13.00  320.00 +*                D
  8.00  325.00 +*                D
  3.00  330.00 +*                D
          I---------I---------I---------I---------I---------I  --------I---------I---------I---------I---------I
        0.99800   0.99900   1.00000   1.00100   1.00200   1.00300   1.00400   1.00500   1.00600
1.00700   1.00800
               DENSITY G/CC
```

COUGAR LAKE SEPTEMBER 25, 1996 SELECT

INPUT/OUTPUT USING RUSH CREEK CREST AS SUBMERGED WEIR

UNITS ARE IN FEET

WEIR CREST ELEVATION 155.000
WEIR LENGTH 100.000
DISCHARGE, VOLUME FLOW PER SEC. 25.0000

TOTAL DISCHARGE, VOLUME PER SEC 25.0000

LOWER WITHDRAWAL LIMIT ( ACTUAL ) HEIGHT ABOVE BOTTOM
154.697 ELEVATION 154.697
LOWER WITHDRAWAL LIMIT ( THEORETICAL ) HEIGHT ABOVE BOTTOM
154.697 ELEVATION 154.697
UPPER WITHDRAWAL LIMIT ( ACTUAL ) HEIGHT ABOVE BOTTOM
333.000 ELEVATION 333.000
UPPER WITHDRAWAL LIMIT ( THEORETICAL ) HEIGHT ABOVE BOTTOM
333.000 ELEVATION 333.000
OUTFLOW DENSITY 0.99960 G/CC
OUTFLOW TEMPERATURE 10.15
OUTFLOW CONCENTRATION OF TOTAL CARBON 0.66

| Elevation | Depth | Density | Norm. Vel. | Flow | Temperature | Total Org. C |
|---|---|---|---|---|---|---|
| 331.500 | 1.50 | 0.99887 | 0.0000 | 0.0000 | 16.60 | 0.60 |
| 327.500 | 5.50 | 0.99887 | 0.0548 | 0.0491 | 16.60 | 0.60 |
| 322.500 | 10.50 | 0.99887 | 0.1080 | 0.0968 | 16.60 | 0.60 |
| 317.500 | 15.50 | 0.99888 | 0.1691 | 0.1515 | 16.56 | 0.60 |
| 312.500 | 20.50 | 0.99889 | 0.2336 | 0.2092 | 16.50 | 0.60 |
| 307.500 | 25.50 | 0.99889 | 0.2807 | 0.2515 | 16.50 | 0.60 |
| 302.500 | 30.50 | 0.99889 | 0.3264 | 0.2923 | 16.50 | 0.60 |
| 297.500 | 35.50 | 0.99890 | 0.3785 | 0.3390 | 16.46 | 0.59 |
| 292.500 | 40.50 | 0.99894 | 0.4683 | 0.4195 | 16.18 | 0.58 |
| 287.500 | 45.50 | 0.99909 | 0.6328 | 0.5668 | 15.27 | 0.56 |
| 282.500 | 50.50 | 0.99915 | 0.7065 | 0.6328 | 14.85 | 0.55 |
| 277.500 | 55.50 | 0.99919 | 0.7553 | 0.6766 | 14.56 | 0.53 |
| 272.500 | 60.50 | 0.99922 | 0.7892 | 0.7069 | 14.38 | 0.52 |
| 267.500 | 65.50 | 0.99923 | 0.8118 | 0.7271 | 14.30 | 0.50 |
| 262.500 | 70.50 | 0.99925 | 0.8374 | 0.7501 | 14.15 | 0.50 |
| 257.500 | 75.50 | 0.99928 | 0.8631 | 0.7731 | 13.95 | 0.50 |
| 252.500 | 80.50 | 0.99931 | 0.8852 | 0.7929 | 13.75 | 0.50 |
| 247.500 | 85.50 | 0.99933 | 0.9025 | 0.8084 | 13.59 | 0.50 |
| 242.500 | 90.50 | 0.99935 | 0.9178 | 0.8221 | 13.44 | 0.50 |
| 237.500 | 95.50 | 0.99937 | 0.9312 | 0.8341 | 13.29 | 0.50 |
| 232.500 | 100.50 | 0.99940 | 0.9444 | 0.8460 | 13.07 | 0.52 |
| 227.500 | 105.50 | 0.99944 | 0.9578 | 0.8580 | 12.74 | 0.56 |
| 222.500 | 110.50 | 0.99950 | 0.9713 | 0.8700 | 12.21 | 0.61 |
| 217.500 | 115.50 | 0.99965 | 0.9880 | 0.8850 | 10.83 | 0.66 |
| 212.500 | 120.50 | 0.99981 | 0.9970 | 0.8931 | 9.04 | 0.70 |
| 207.500 | 125.50 | 0.99992 | 0.9996 | 0.8954 | 7.22 | 0.75 |
| 202.500 | 130.50 | 0.99996 | 0.9999 | 0.8957 | 6.24 | 0.79 |
| 197.500 | 135.50 | 0.99998 | 1.0000 | 0.8957 | 5.70 | 0.80 |
| 192.500 | 140.50 | 0.99998 | 1.0000 | 0.8957 | 5.46 | 0.80 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 187.500 | 145.50 | 0.99998 | 1.0000 | 0.8957 | 5.40 | 0.80 |
| 182.500 | 150.50 | 0.99998 | 1.0000 | 0.8957 | 5.40 | 0.80 |
| 177.500 | 155.50 | 0.99999 | 1.0000 | 0.8957 | 5.33 | 0.80 |
| 172.500 | 160.50 | 0.99999 | 1.0000 | 0.8957 | 5.30 | 0.80 |
| 167.500 | 165.50 | 0.99999 | 1.0000 | 0.8957 | 5.28 | 0.80 |
| 162.500 | 170.50 | 0.99999 | 1.0000 | 0.8957 | 5.20 | 0.80 |
| 157.500 | 175.50 | 0.99999 | 1.0000 | 0.8957 | 5.20 | 0.80 |
| 152.500 | 180.50 | 0.99999 | 1.0000 | 0.8957 | 5.15 | 0.80 |
| 147.500 | 185.50 | 0.99999 | 0.0000 | 0.0000 | 5.10 | 0.80 |
| 142.500 | 190.50 | 0.99999 | 0.0000 | 0.0000 | 5.10 | 0.80 |
| 137.500 | 195.50 | 0.99999 | 0.0000 | 0.0000 | 5.07 | 0.80 |
| 132.500 | 200.50 | 0.99999 | 0.0000 | 0.0000 | 5.05 | 0.80 |
| 127.500 | 205.50 | 0.99999 | 0.0000 | 0.0000 | 5.02 | 0.80 |
| 122.500 | 210.50 | 0.99999 | 0.0000 | 0.0000 | 5.00 | 0.80 |
| 117.500 | 215.50 | 0.99999 | 0.0000 | 0.0000 | 5.00 | 0.80 |
| 112.500 | 220.50 | 0.99999 | 0.0000 | 0.0000 | 5.00 | 0.80 |
| 107.500 | 225.50 | 0.99999 | 0.0000 | 0.0000 | 5.00 | 0.80 |
| 102.500 | 230.50 | 0.99999 | 0.0000 | 0.0000 | 5.00 | 0.80 |
| 97.500 | 235.50 | 0.99999 | 0.0000 | 0.0000 | 5.00 | 0.80 |
| 92.500 | 240.50 | 0.99999 | 0.0000 | 0.0000 | 4.98 | 0.80 |
| 87.500 | 245.50 | 0.99999 | 0.0000 | 0.0000 | 4.95 | 0.80 |
| 82.500 | 250.50 | 0.99999 | 0.0000 | 0.0000 | 4.93 | 0.80 |
| 77.500 | 255.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 0.80 |
| 72.500 | 260.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 0.80 |
| 67.500 | 265.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 0.80 |
| 62.500 | 270.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 0.82 |
| 57.500 | 275.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 0.87 |
| 52.500 | 280.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 0.93 |
| 47.500 | 285.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 0.99 |
| 42.500 | 290.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 1.05 |
| 37.500 | 295.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 1.10 |
| 32.500 | 300.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 1.10 |
| 27.500 | 305.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 1.10 |
| 22.500 | 310.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 1.10 |
| 17.500 | 315.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 1.10 |
| 12.500 | 320.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 1.10 |
| 7.500 | 325.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 1.10 |
| 2.500 | 330.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 1.10 |

COUGAR LAKE SEPTEMBER 25, 1996 SELECT

INPUT/OUTPUT USING RUSH CREEK CREST AS SUBMERGED WEIR

UNITS ARE IN FEET

WEIR CREST ELEVATION 155.000
WEIR LENGTH 100.000
DISCHARGE, VOLUME FLOW PER SEC. 25.0000

TOTAL DISCHARGE, VOLUME PER SEC 25.0000

LOWER WITHDRAWAL LIMIT ( ACTUAL ) HEIGHT ABOVE BOTTOM
154.697 ELEVATION 154.697
LOWER WITHDRAWAL LIMIT ( THEORETICAL ) HEIGHT ABOVE BOTTOM
154.697 ELEVATION 154.697
UPPER WITHDRAWAL LIMIT ( ACTUAL ) HEIGHT ABOVE BOTTOM
333.000 ELEVATION 333.000
UPPER WITHDRAWAL LIMIT ( THEORETICAL ) HEIGHT ABOVE BOTTOM
333.000 ELEVATION 333.000
OUTFLOW DENSITY 0.99960 G/CC
OUTFLOW TEMPERATURE 10.15
OUTFLOW CONCENTRATION OF DISSOLVED ORCARB 0.57

| Elevation | Depth | Density | Norm. Vel. | Flow | Temperature | Diss. Org. C |
|---|---|---|---|---|---|---|
| 331.500 | 1.50 | 0.99887 | 0.0000 | 0.0000 | 16.60 | 0.60 |
| 327.500 | 5.50 | 0.99887 | 0.0548 | 0.0491 | 16.60 | 0.58 |
| 322.500 | 10.50 | 0.99887 | 0.1080 | 0.0968 | 16.60 | 0.57 |
| 317.500 | 15.50 | 0.99888 | 0.1691 | 0.1515 | 16.56 | 0.55 |
| 312.500 | 20.50 | 0.99889 | 0.2336 | 0.2092 | 16.50 | 0.54 |
| 307.500 | 25.50 | 0.99889 | 0.2807 | 0.2515 | 16.50 | 0.52 |
| 302.500 | 30.50 | 0.99889 | 0.3264 | 0.2923 | 16.50 | 0.51 |
| 297.500 | 35.50 | 0.99890 | 0.3785 | 0.3390 | 16.46 | 0.49 |
| 292.500 | 40.50 | 0.99894 | 0.4683 | 0.4195 | 16.18 | 0.48 |
| 287.500 | 45.50 | 0.99909 | 0.6328 | 0.5668 | 15.27 | 0.46 |
| 282.500 | 50.50 | 0.99915 | 0.7065 | 0.6328 | 14.85 | 0.45 |
| 277.500 | 55.50 | 0.99919 | 0.7553 | 0.6766 | 14.56 | 0.43 |
| 272.500 | 60.50 | 0.99922 | 0.7892 | 0.7069 | 14.38 | 0.42 |
| 267.500 | 65.50 | 0.99923 | 0.8118 | 0.7271 | 14.30 | 0.40 |
| 262.500 | 70.50 | 0.99925 | 0.8374 | 0.7501 | 14.15 | 0.39 |
| 257.500 | 75.50 | 0.99928 | 0.8631 | 0.7731 | 13.95 | 0.37 |
| 252.500 | 80.50 | 0.99931 | 0.8852 | 0.7929 | 13.75 | 0.35 |
| 247.500 | 85.50 | 0.99933 | 0.9025 | 0.8084 | 13.59 | 0.34 |
| 242.500 | 90.50 | 0.99935 | 0.9178 | 0.8221 | 13.44 | 0.32 |
| 237.500 | 95.50 | 0.99937 | 0.9312 | 0.8341 | 13.29 | 0.31 |
| 232.500 | 100.50 | 0.99940 | 0.9444 | 0.8460 | 13.07 | 0.33 |
| 227.500 | 105.50 | 0.99944 | 0.9578 | 0.8580 | 12.74 | 0.41 |
| 222.500 | 110.50 | 0.99950 | 0.9713 | 0.8700 | 12.21 | 0.48 |
| 217.500 | 115.50 | 0.99965 | 0.9880 | 0.8850 | 10.83 | 0.56 |
| 212.500 | 120.50 | 0.99981 | 0.9970 | 0.8931 | 9.04 | 0.64 |
| 207.500 | 125.50 | 0.99992 | 0.9996 | 0.8954 | 7.22 | 0.71 |
| 202.500 | 130.50 | 0.99996 | 0.9999 | 0.8957 | 6.24 | 0.79 |
| 197.500 | 135.50 | 0.99998 | 1.0000 | 0.8957 | 5.70 | 0.79 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 192.500 | 140.50 | 0.99998 | 1.0000 | 0.8957 | 5.46 | 0.77 |
| 187.500 | 145.50 | 0.99998 | 1.0000 | 0.8957 | 5.40 | 0.76 |
| 182.500 | 150.50 | 0.99998 | 1.0000 | 0.8957 | 5.40 | 0.74 |
| 177.500 | 155.50 | 0.99999 | 1.0000 | 0.8957 | 5.33 | 0.73 |
| 172.500 | 160.50 | 0.99999 | 1.0000 | 0.8957 | 5.30 | 0.71 |
| 167.500 | 165.50 | 0.99999 | 1.0000 | 0.8957 | 5.28 | 0.71 |
| 162.500 | 170.50 | 0.99999 | 1.0000 | 0.8957 | 5.20 | 0.73 |
| 157.500 | 175.50 | 0.99999 | 1.0000 | 0.8957 | 5.20 | 0.75 |
| 152.500 | 180.50 | 0.99999 | 1.0000 | 0.8957 | 5.15 | 0.77 |
| 147.500 | 185.50 | 0.99999 | 0.0000 | 0.0000 | 5.10 | 0.79 |
| 142.500 | 190.50 | 0.99999 | 0.0000 | 0.0000 | 5.10 | 0.82 |
| 137.500 | 195.50 | 0.99999 | 0.0000 | 0.0000 | 5.07 | 0.84 |
| 132.500 | 200.50 | 0.99999 | 0.0000 | 0.0000 | 5.05 | 0.86 |
| 127.500 | 205.50 | 0.99999 | 0.0000 | 0.0000 | 5.02 | 0.88 |
| 122.500 | 210.50 | 0.99999 | 0.0000 | 0.0000 | 5.00 | 0.90 |
| 117.500 | 215.50 | 0.99999 | 0.0000 | 0.0000 | 5.00 | 0.90 |
| 112.500 | 220.50 | 0.99999 | 0.0000 | 0.0000 | 5.00 | 0.90 |
| 107.500 | 225.50 | 0.99999 | 0.0000 | 0.0000 | 5.00 | 0.90 |
| 102.500 | 230.50 | 0.99999 | 0.0000 | 0.0000 | 5.00 | 0.90 |
| 97.500 | 235.50 | 0.99999 | 0.0000 | 0.0000 | 5.00 | 0.90 |
| 92.500 | 240.50 | 0.99999 | 0.0000 | 0.0000 | 4.98 | 0.89 |
| 87.500 | 245.50 | 0.99999 | 0.0000 | 0.0000 | 4.95 | 0.87 |
| 82.500 | 250.50 | 0.99999 | 0.0000 | 0.0000 | 4.93 | 0.86 |
| 77.500 | 255.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 0.84 |
| 72.500 | 260.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 0.83 |
| 67.500 | 265.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 0.81 |
| 62.500 | 270.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 0.81 |
| 57.500 | 275.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 0.85 |
| 52.500 | 280.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 0.89 |
| 47.500 | 285.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 0.93 |
| 42.500 | 290.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 0.96 |
| 37.500 | 295.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 1.00 |
| 32.500 | 300.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 1.00 |
| 27.500 | 305.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 1.00 |
| 22.500 | 310.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 1.00 |
| 17.500 | 315.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 1.00 |
| 12.500 | 320.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 1.00 |
| 7.500 | 325.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 1.00 |
| 2.500 | 330.50 | 0.99999 | 0.0000 | 0.0000 | 4.90 | 1.00 |

# REPORT DOCUMENTATION PAGE

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**1. REPORT DATE** *(DD-MM-YYYY)*
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**5a. CONTRACT NUMBER**

**5b. GRANT NUMBER**

**5c. PROGRAM ELEMENT NUMBER**

**6. AUTHOR(S)**
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**12. DISTRIBUTION / AVAILABILITY STATEMENT**

Approved for public release; distribution is unlimited.

**13. SUPPLEMENTARY NOTES**

**14. ABSTRACT**

Blue River and Cougar Reservoirs are proposed for modification to their withdrawal structures to allow selective withdrawal. The purpose of the proposed modifications is to improve downstream temperatures for the coldwater fishery in the McKenzie River. The Corps committed to study water quality at the reservoirs to predict downstream impacts to water quality in the McKenzie River as a result of selective withdrawal.

Proposed modifications to the project structures at Blue River and Cougar Lakes will result in release of warmer surface water during the spring and summer. Assuming that the current limnological structure of the lake is maintained, the present absence of strong chemical trends is unlikely to result in future increases in outflow chemical concentrations. Indeed, turbid releases may be decreased or postponed until later in the season during the release of the deeper water. The chemical trends that exist tend toward greater concentrations with depth. Surface releases may improve the water quality in these outflows.

***(Continued)***

**. SUBJECT TERMS**
Limnology, Reservoir, River, SELECT Model, Temperature, Water Quality

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**14. ABSTRACT (Concluded)**

Proposed modifications will alter the processes contributing to many of the above conditions. The limiting resource for much of the biological activity is the element nitrogen (N) which is also important for many other limnological characteristics. Because of its biological importance, nitrogen metabolism in this system is also important to the water quality effects of the proposed structural modifications.

Water quality concerns which remain regarding the proposed structural modifications are: (a) the unknown extent to which additional particulate organic material may be released from the lakes; (b) the late summer fate of accumulated nutrients in the hypolimnion of the lakes; (c) the additional changes that may occur as a result of increased retention of deeper waters, the turbid materials they contain, the increased hypoxia that can occur, and the potential response of biota when these become available during mixing or during late summer releases.

Although these concerns remain, factors that may mitigate their effect include the fact that much of this response will occur during the late summer when the lake is drawn down and depending on intake design, such waters may be diminished during drawdown. The maximum extent to which these processes may occur does not likely exceed the observed present deep hypolimnion conditions in Cougar Lake. Indeed, the submerged ridge associated with Rush Creed currently provides a model of the likely behavior of Cougar Lake after modification and further changes in water quality as a result of intake modifications may be quite small.