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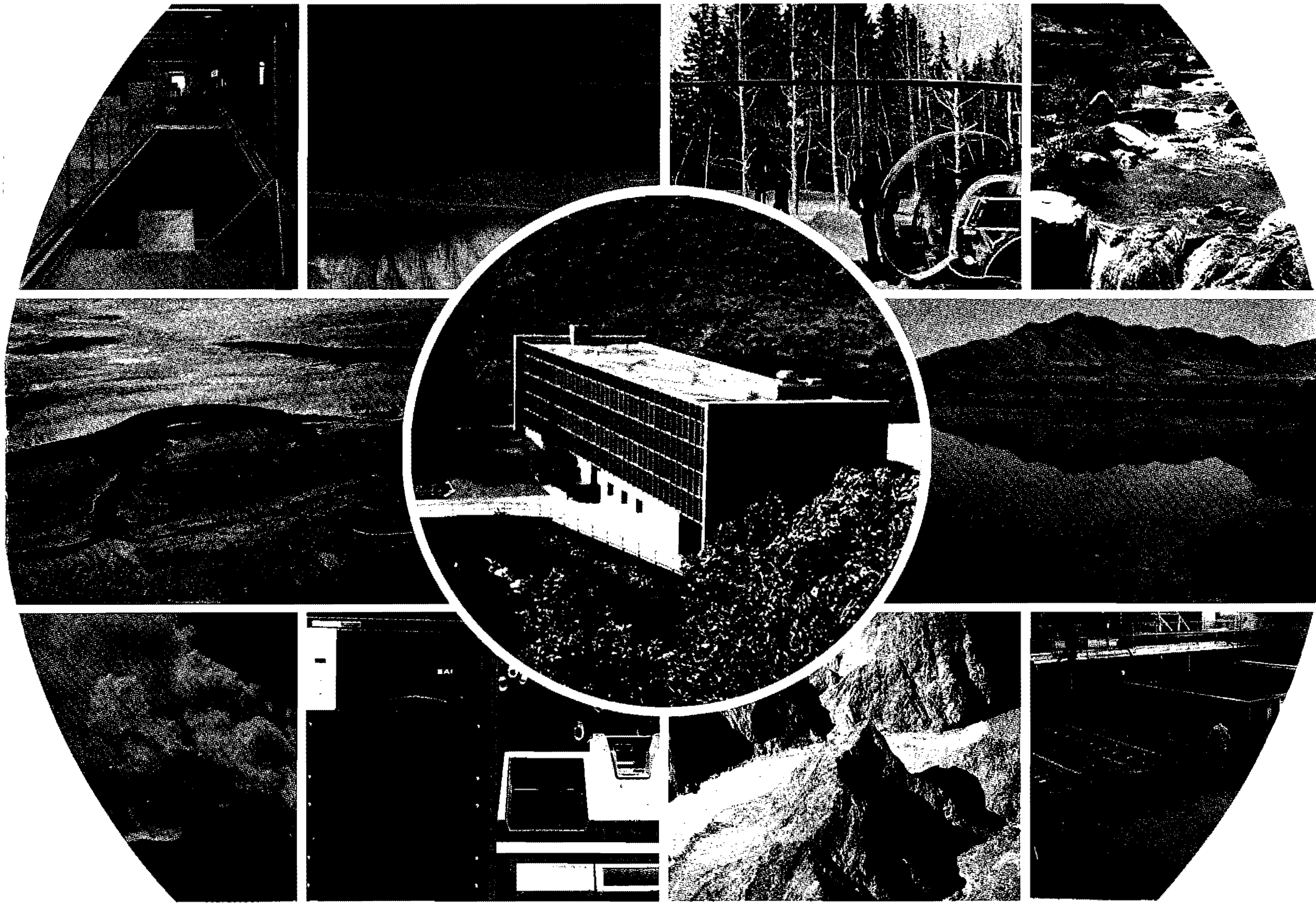

Utah Water Research Laboratory
College of Engineering
Utah State University
Logan, Utah 84322

February 1978

WATER QUALITY SERIES
Report Q-78-001

NATURALLY OCCURRING ORGANIC COMPOUNDS IN EUTROPHIC HYRUM RESERVOIR, UTAH

by

Russell R. Renk
V. Dean Adams
Donald B. Porcella

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ABSTRACT

Methods of collecting, concentrating, separating, and identifying organic compounds in natural water systems were studied. The most appropriate methods were applied to a eutrophic reservoir (Hyrum Reservoir, Utah) and resulted in the identification of 27 volatile, organic compounds:

Alcohols: *tert*-butyl alcohol, methanol, 1-pentanol, 2-methyl-2-pentanol, 3-methyl-2-butanol, 2-methyl-1-butanol, 3-methyl-1-butanol, 1-penten-3-ol, isobutyl alcohol, 1-butanol, 2-methyl-3-buten-2-ol, 2-methyl-2-butanol, 2-butanal, isopropyl alcohol, 1-propanol, ethanol
Ketones: 4-methyl-3-penten-2-one, acetone, methyl ethyl ketone
Aldehydes: acetaldehyde, propanal, 2-buten-1-al
Others: acetonitrile, pyridine, ethyl acetate, 3-methylpyridine, diethyl ether

The concentration level of 13 compounds were established in the reservoir from October 1974 to January 1976:

Alcohols: methanol, ethanol, propanol, isopropyl alcohol, *tert*-butyl alcohol, 1-butanol, isobutyl alcohol, 2-methyl-3-buten-2-ol, 2-methyl-2-butanol
Ketones: acetone, methyl ethyl ketone
Others: acetonitrile, acetaldehyde

The highest concentrations of organics were found in the late summer or early fall as the bloom of *Aphanizomenon flos-aquae* died and the level of bacterial fermentation increased. Other likely sources of organic compounds in the reservoir (besides fermentation) included compounds (acetonitrile and ethanol) at least partially produced at the same time as active algal growth and associated bacteria occurred. Melting snowpack and mountain streams that feed the reservoir also contained similar organic compounds but at lower concentrations than found in the reservoir.

Most of the compounds at low concentrations had no effect on the growth of certain algae tested, however there was some indication that certain organics may have affected the growth of *Aphanizomenon flos-aquae.*

ACKNOWLEDGMENTS

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INTRODUCTION

Aside from serving as energy sources for heterotrophic organisms, simple and complex soluble organic compounds in aquatic ecosystems play important regulatory role and serve as indicators of ecological processes involving species succession, population dynamics, and community structure (Adams et al., 1975). Generally about 90 percent of the organic production of ecosystems is provided by primary producers. In most lakes phytoplankton (algae) dominate primary production. Thus, organic compounds that signify or control algal community changes would most likely be associated with observations of algal species and biomass changes. The organic compounds would be derived directly from secretions (Chang, 1968; Fogg et al., 1964; Forsberg and Taube, 1967; Merz et al., 1962; Moore and Tischer, 1965; Nalewajko and Marin, 1969; Watt, 1969) or indirectly as a result of metabolic breakdown by heterotrophs. Algae can release up to 40 percent of total carbon fixed as organic carbon (Allen, 1956; Fogg, 1966; Lewin, 1956).

Aquatic plant succession has been related to interactions between light, temperature, limiting nutrients, and predation. Recently it has been shown that blue-green algae secretions can stimulate, inhibit, or have no effect on other phytoplankton. Keating (1977) argues for the existence of organic compounds produced by blue-green algae that control algal succession in eutrophic Linsley Pond. Toxins (Gorham, 1960), chelators (Saunders, 1957), and vitamins (Provasoli, 1969; Ohwada and Taga, 1972; Vallentyne, 1957a) have been identified as possible organics that result from or are involved in algal blooms. These groups of compounds participate in controlling metals concentrations and directly inhibit or stimulate aquatic organisms (Figure 1).

Two ecologically different types of organic compounds are hypothesized to be released into eutrophic lakes. The first would be those compounds that indicate the presence of individual species or a breakdown process such as fermentation, enzymatic hydrolysis, etc. The second would include compounds that affect other phytoplankton, i.e. inhibitors and stimulants. Vitamins, chelators, and toxins would occur in the latter category and would likely be larger, less volatile, organic compounds. The first category would more likely be low molecular weight (< 300 g/mole) and be composed of alcohols, ketones, and organic acids. As a first step in understanding organic carbon dynamics at eutrophic Hyrum Reservoir, Utah, research was directed at analyzing low molecular weight volatile organic compounds. Thus, bloom dynamics at Hyrum would be expected to be reflected by the dynamics of specific organics. Specific objectives of the research were: 1) identify the organic compounds present in the reservoir and their possible sources; 2) determine temporal variations of these organic compounds; and 3) determine specific effects of certain organic compounds on certain organisms, namely algae and in particular their possible role in the dynamics of blue-green alga populations.

The results described in this report are an outgrowth of a literature search of organic compounds and preliminary analysis of Hyrum Reservoir organisms (Adams et al., 1975). A summary of the following interactions between organisms and their aqueous environment is presented in that report: 1) organisms affected by known organics; 2) algae known to be capable of utilizing organic substances for energy and growth; 3) known vitamin requirements of algae; and 4) algae affecting the growth of other algae.

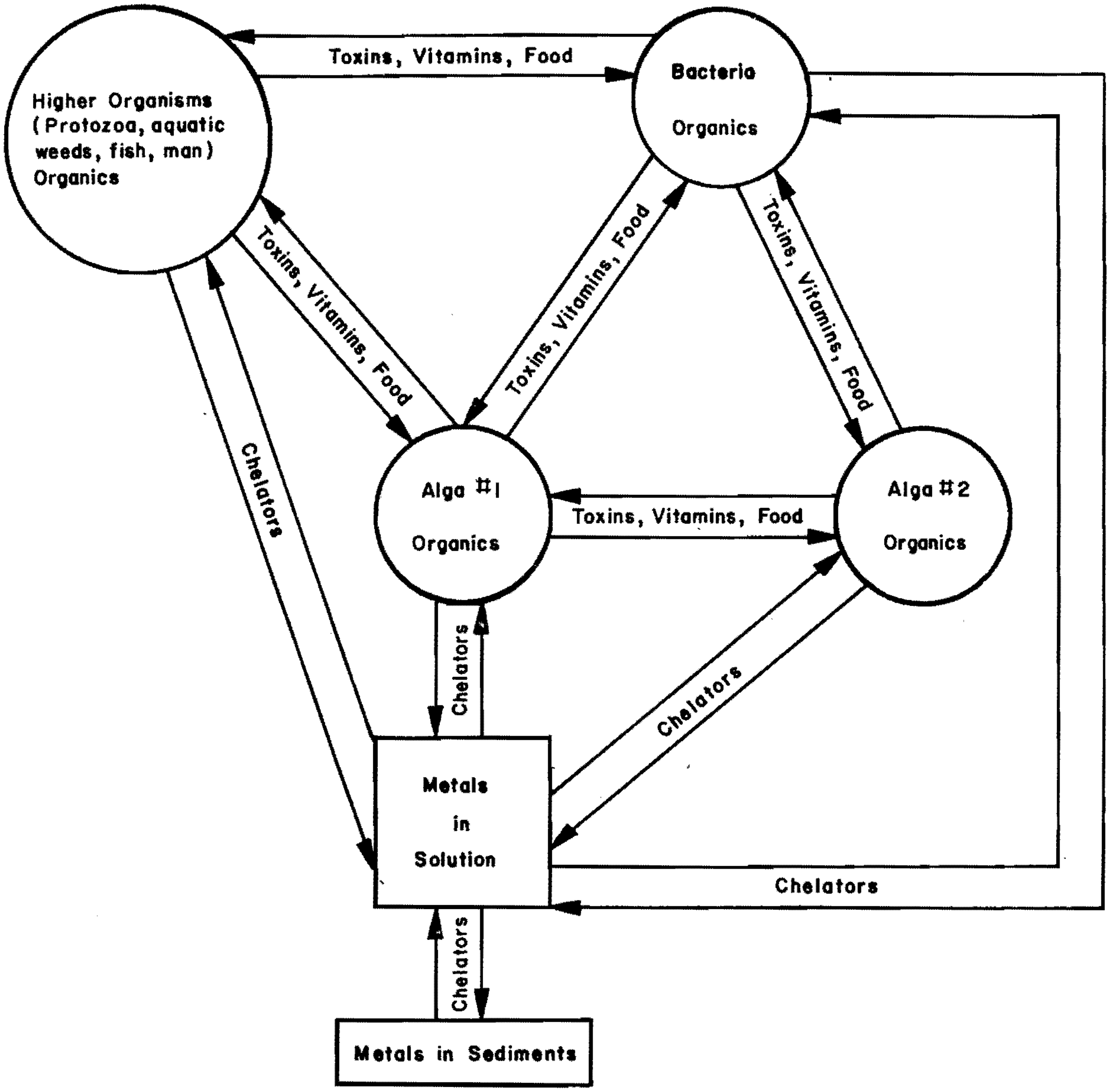


Figure 1. Organic compounds serve as toxins, vitamins, food sources, or chelators. These organic compounds may inhibit or stimulate growth or attract or repel other organisms as interchange arrows indicate. Chelators may transport needed metals into the cells or lower metals in their concentrations around the organism to a non-lethal level.

MATERIALS AND METHODS

Sampling

General procedure

The water (or snow) samples were collected in glassware which had been acid (0.1 M HCl) washed, rinsed three times in deionized, distilled water, covered with aluminum foil, and rinsed again at the sampling site with the water to be collected. All glassware used for collection and subsequent analysis was subject to this procedure and was used only for this purpose to avoid possible laboratory contamination with common laboratory organic compounds.

All water (and snow) samples were filtered to remove particulate matter and thus principally dissolved organic matter was studied. The filters were glass fiber (Whatman GF/C) followed by Millipore (HA 0.45 μm). Both types of filters had been prewashed with hot and cold water and then prerinsed with the sample water before use to remove detergents in accordance with Cahn (1967).

All samples were immediately (within 20 minutes) brought back to the laboratory to begin processing.

Hyrum Reservoir

Water samples were collected from Hyrum Reservoir, Hyrum, Utah, a eutrophic reservoir located 12 miles from the Utah Water Research Laboratory, Logan, Utah (Appendix A). Hyrum Reservoir was built on the Little Bear River in 1935 and is used to store about 16×10^6 m^3 (13,000 ac-ft) of water for summer irrigation (Drury et al., 1975). The reservoir is not subject to industrial or municipal waste; however, runoff from river basin activities appears to have caused an increase in algal activity in the reservoir (Luce, 1974). During the last 10 years, Hyrum Reservoir has been subjected to a summer-fall bloom of *Aphanizomenon flos-aquae.* This has created not only an esthetic problem (murky green water with large clumps of decomposing algae) but the oxygen demand resulting from the decomposing algae has also produced anaerobic water conditions and subsequent trout migration from the reservoir. Before the trout are forced to leave they inhabit an extremely narrow layer in the water column. It is in this narrow layer that the parasitic copepod (*Leinaea*) causes problems with the trout fishing resource (R. Goede, USU, personal communication).

During this late summer bloom of *A. flos-aquae,* dead minnows have been noticed in the reservoir. The cause of dealth is unknown, but there are reported deaths in other aquatic systems of fish, birds, cattle, and sheep resulting from blue-green algae activity (Bishop et al., 1959; Fitch et al., 1934; Gorham, 1960; Hughes et al., 1958; Ingram and Prescott, 1954; Prescott, 1948; Shilo, 1967).

The Hyrum water samples were collected in 9 liter glass carboys capped with aluminum foil covered rubber stoppers. The samples were taken 50 meters off shore, south of a small dock located at the boat launching ramp at Hyrum State Park (Appendix A); during the winter, holes were cut in the ice with an ax at the same site.

Samples from the Little Bear and Logan Rivers

Samples were also collected in 9 liter carboys, by boat, just upstream from the confluence of the Little Bear River and Hyrum Reservoir. Samples were also obtained from the Logan River at the bridge to the Utah Water Research Laboratory in Logan, Utah.

Snow samples

Snow was collected on several occasions from the site of the Utah Water Research Laboratory and from Hyrum Reservoir. Both older snow and freshly fallen snow were collected. The snow was collected in 4 liter beakers and melted on a shaker/hot plate, keeping the solution near 0°C (heating tends to drive the volatile compounds out of the water phase).

Sample Processing

The following techniques for the concentration and isolation of aquatic organic compounds were tried: 1) liquid-liquid extraction; 2) liquid-solid extraction; 3) rotational freeze concentrating; 4) distillation; 5) carbon adsorption; 6) freeze-drying; 7) thin layer and/or column chromatography; and 8) gas chromatography.

Techniques used for identification of aquatic organic compounds were: 1) infrared spectroscopy; 2) thin layer chromatography; 3) gas chromatography; and 4) gas chromatography/mass spectrometry.

Figure 2 shows how these different methods were combined to separate and identify organic compounds. In general, filtered water from Hyrum Reservoir was treated first to concentrate organic compounds present; then separation techniques were applied to obtain pure compounds which finally were identified. Most concentration methods also acted, to some degree, as basic group separation methods. For example, concentration by distillation (heating a solution and distilling its components, which were collected by the use of a water cooled condenser) favored the concentration of volatile organic over less volatile organic compounds. Furthermore, the type of solvent used in liquid-liquid extraction favored concentrating certain organic compounds over others (more polar compounds will favor more polar solvents).

Non-volatile organic molecules

The summer of 1974 was spent in study of non-volatile organic compounds at Hyrum Reservoir. The chief methods used for separating these organic compounds were thin layer and/or column chromatography. However, because of the low concentrations of organic compounds at Hyrum Reservoir during the period of investigation, only limited success was achieved (no compounds were completely identified). For further details see Adams et al. (1975).

Volatile organic molecules

Because of the low concentration of the non-volatile organic compounds, an effort was made to concentrate and identify volatile organic compounds present in Hyrum Reservoir. The heavy arrows in Figure 2 show the most effective means of concentrating, separating, and identifying volatile organic compounds from water solutions. Note that volatile organics could not be concentrated and/or identified by the same methods used for non-volatile organic compounds.

Stored samples

Some of the data from Hyrum Reservoir reported here were obtained from filtered samples of which some were preconcentrated and then frozen until March 1976, at which time the samples were thawed and analyzed. It was necessary to save the samples so that concentrations of various organic compounds in Hyrum Reservoir could be determined when the technology of concentrating, separating, and identifying these compounds had advanced to the state of routine analysis. The frozen samples varied in volume depending on whether they were not preconcentrated (≈ 2 liters) or whether they were preconcentrated (down to 0.5 liters). River and snow samples were concentrated and analyzed immediately.

Rotational freeze concentrating

Some samples were concentrated by freeze rotation (Baker, 1967a, 1967b) before freezing and storing. Concentrating was accomplished in a 2 liter, round-bottom flask containing 500 ml of aqueous solution. This solution was rotated while submersed in a mixture of crushed ice and salt (≈ -12° C). Precooled aqueous solutions and seeded flasks prevented flash freezing. The round-bottom flask was held at about 45° angle during the freezing process. The freeze rotation continued until a predetermined volume had been frozen (usually concentrating by a factor of ten). When the desired volume had been frozen (usually 500 ml of liquid had been frozen to the point where about 40 ml of liquid remained, as determined by elapsed time and judgment), the rotation was stopped and the flask was removed. The liquid contents were poured into a graduated cylinder and the ice was washed with sufficient sample water to bring the concentrated volume to 50 ml (10:1 concentration).

Analysis of samples

Distillation. In March 1976, some 43 stored frozen samples (some concentrated by rotational freezing but all collected and filtered as previously described) were taken a few at a time, thawed and then distilled from their frozen volumes (which varied from 2 to 0.5 liters) collecting the first 10 ml of distillate. The 10 ml of distillate were placed in a 25 ml Bantam Ware® flask and distilled, collecting the first drops in separate vials. Each drop was pipetted into a capillary tube, sealed with Teflon tape and then a rubber cap (Millipore gum rubber No. XX1104711). The samples were refrigerated and analyzed as soon as possible (within a half hour) after being distilled since the organics were quite volatile. The capillary tubes were purposely small (2 mm x 12 mm) to minimize head space and were about 80 percent filled. Volumes of distillate collected were calculated from the cylindrical volume of the tubes.

Gas chromatography. All gas chromatography analyses were performed on a Model 5750 Hewlett-Packard research chromatograph equipped with both flame ionization and thermal conductivity detectors. All the columns (6 ft by 1/8 inch O.D. stainless steel and 4 ft x 2 mm I.D. glass coils) were packed by inserting a glass wool plug (treated or untreated, depending on column packing material) in one end of the column, applying vacuum to that end, and adding the packing material to the other end of the column, with continual vibration (where possible) of the column to facilitate uniform packing. Each column was conditioned for 12 hours at 25°C below the maximum recommended temperature with a flow of 30 ml helium/min (effluent end not connected to detector while conditioning). After conditioning, the column (detector end) was repacked (vacuum and vibration) and reconditioned a second time if necessary.

As mentioned earlier, this study was chiefly limited to volatile organic compounds because of the limited success in concentrating those of the non-volatile type. Low molecular weight (less than C_7) volatile organic compounds of a neutral nature (alcohols, aldehydes, ketones, etc.) were studied. The gas chromatography columns used were not designed for the separation of acids or basic type compounds, either large or small, or of large neutral type compounds.

The three columns used most in the separation and identification of these volatile organic compounds were:

1. Porapak S (80/100 mesh) packed in a 6 foot x 1/8 inch stainless steel column.
2. Porapak QS (80/100 mesh) packed in a 6 foot x 1/8 inch stainless steel column.
3. 0.4 percent Carbowax 1500 on Carbopack A packed in a 6 foot x 1/8 inch stainless steel column.

Gas chromatography/mass spectrography. Four institutions were involved in the identification of these organic compounds by gas chromatography/mass spectrometry work. They were: 1) Material Science Department, University of Utah, Salt Lake City, Utah 84112; 2) Finnigan Corporation, 845 West Maude Avenue, Sunnyvale, California 94086; 3) Hewlett Packard, Scientific Instruments Division, 1601 California Avenue, Palo Alto, California 94304; 4) Ultrachem Corporation, 1150 Civic Drive, Walnut Creek, California 94596.

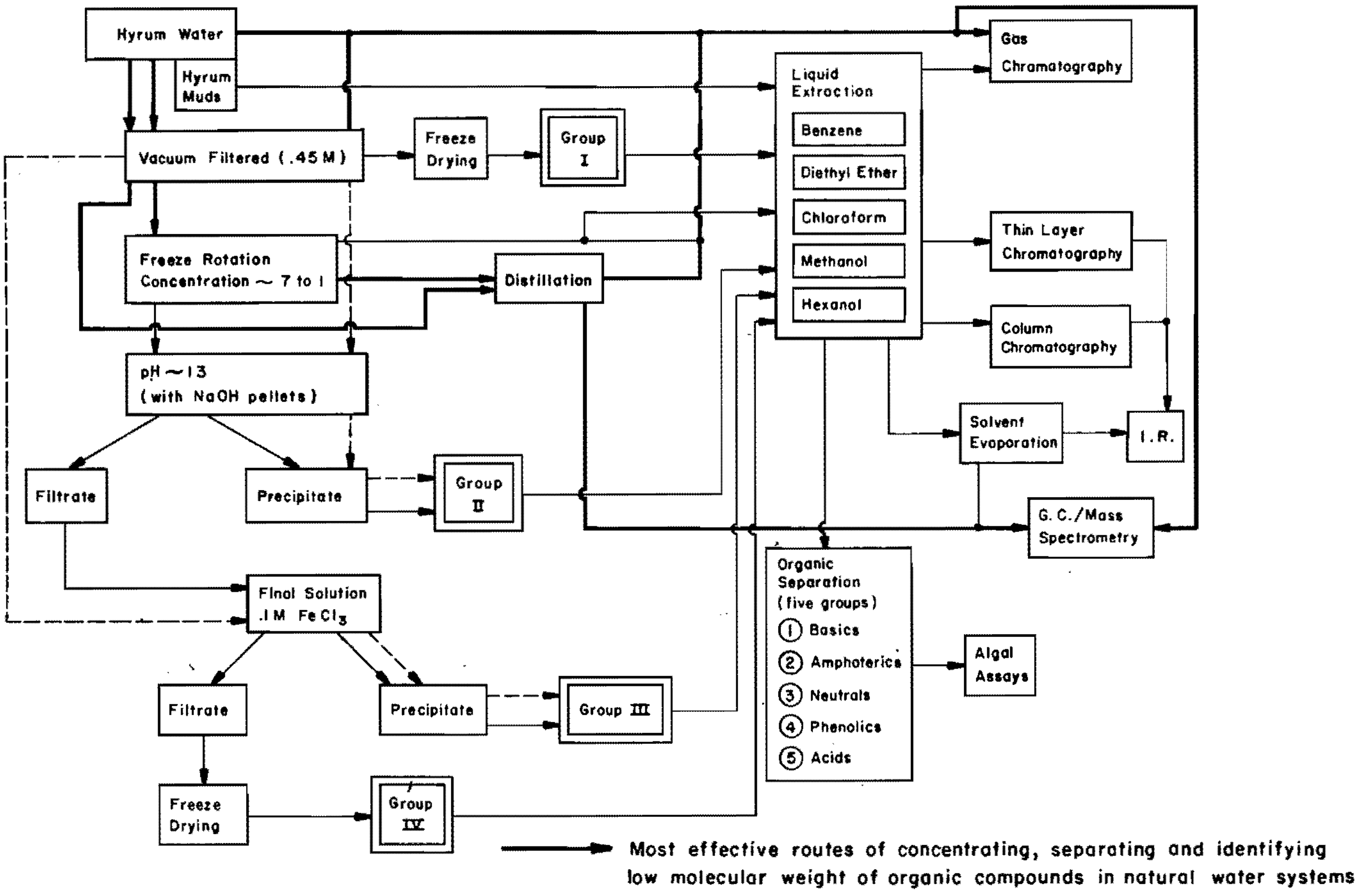


Figure 2. Processing of natural water for the separation and identification of organic compounds.

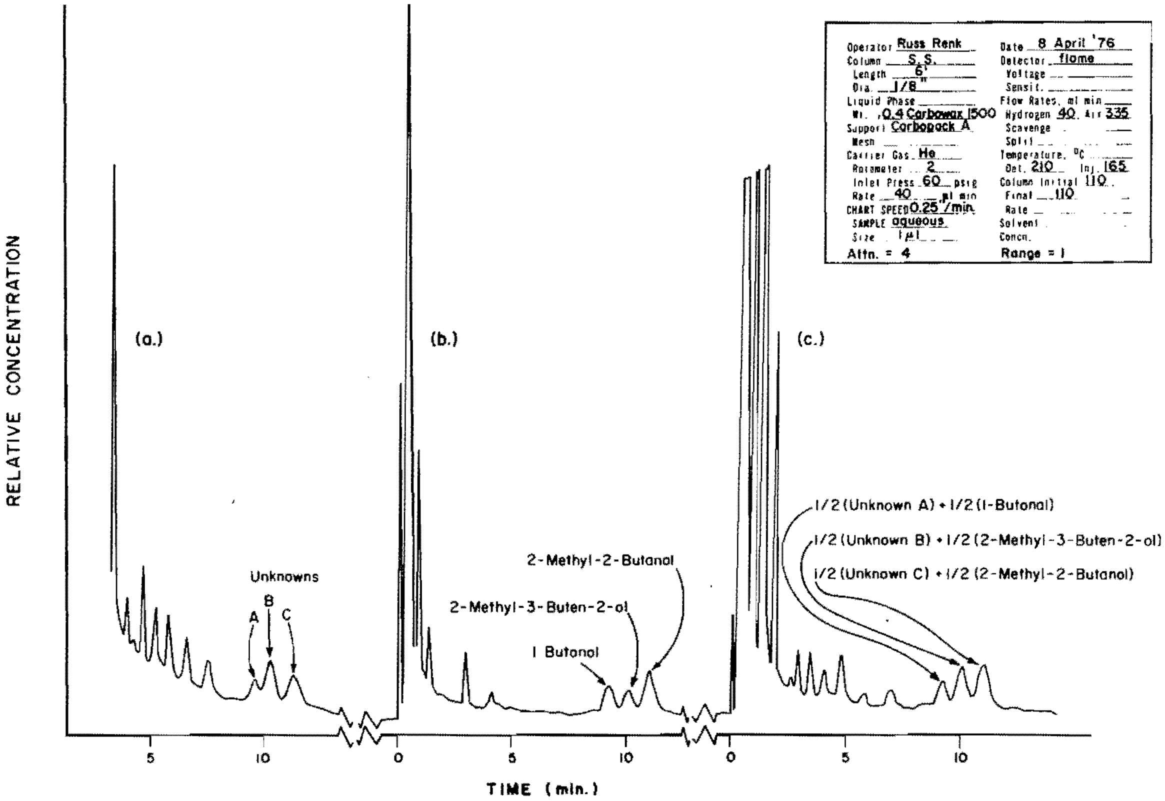
RESULTS I: ANALYTICAL METHODS

Identification of Volatile Organic Compounds Found in Hyrum Reservoir

All identifications were done by gas chromatography and gas chromatography/mass spectrometry.

Identification by gas chromatography

Identification of unknown compounds consisted of recording the retention time of the unknown compound and then recording the retention time of a known compound. If the retention times were the same for both the unknown and the known compounds then solutions containing these compounds were added together to form a solution containing an equal concentration of the two compounds. The retention times of compounds in this new solution were then recorded. If a single peak occurred they were believed to be the same compound. For example, in Figure 3a there are three unknowns: A, B, and C. In Figure 3b there are three compounds having the same retention times as A, B, and C, these are 1-butanol, 2-methyl-3-buten-2-ol, and 2-methyl-2-butanol, respectively. A solution was made by adding equally weight unknowns and knowns together. The resulting solution is shown in Figure 3c.



Operator	Russ Renk	Date	8 April '76
Column	S.S.	Detector	flame
Length	6'	Voltage	
Dia.	1/8"	Sensit.	
Liquid Phase		Flow Rates, ml min	
Wt.	,0.4 Carbowax 1500	Hydrogen	40. Air 335
Support	Carbopack A	Scavenge	
Mesh		Split	
Carrier Gas	He	Temperature, °C	
Rotameter	2	Det.	210 Inj. 165
Inlet Press	60 psig	Column Initial	110
Rate	40 ml min	Final	110
CHART SPEED	0.25"/min.	Rate	
SAMPLE	aqueous	Solvent	
Size	1 µl	Concn.	
Attn. = 4		Range = 1	

Figure 3. Chromatograms of: (a) a concentrated water sample from the surface of Hyrum Reservoir taken on April 22, 1975. It contains unknown compounds A, B, and C; (b) a standard solution containing organic compounds as indicated; (c) a solution containing 1/2 a µl of the water sample from Figure 4a and the other 1/2 a µl containing the solution shown in Figure 4b.

The three peaks all occurred as single peaks. Therefore it was believed that A, B, and C are 1-butanol, 2-methyl-3-buten-2-ol, and 2-methyl-2-butanol, respectively. Verification was achieved by repeating the process at a higher temperature (see Figure 4). If the peaks were again single peaks (having the same retention times) the compound was said to have been identified on that column. Identification on two different column types was usually considered positive compound identification.

Compounds identified by gas chromatography (in accordance with the above procedure) are listed in Table 1 along with the column(s) used for identification. For additional information regarding the retention times of unknowns and known compounds at different temperatures see Appendixes B and C.

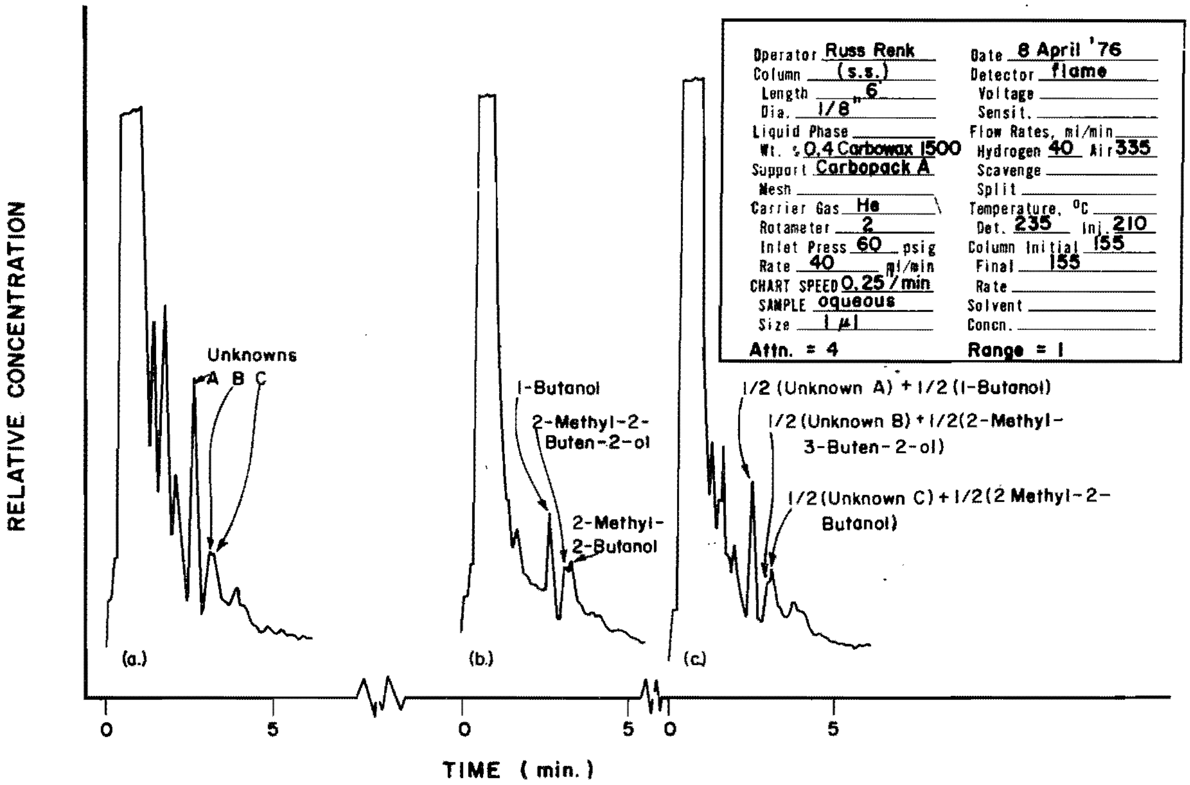
Identification by gas chromatography/mass spectrometry

Four institutions were involved in gas chromatography/mass spectrometry. The names of the institutions and the compounds identified are listed in Table 1. For further information regarding the conditions under which individual mass spectrometry work was done and for computer searches involved, see Appendixes D, E, and F. Also, see Hewlett Packard mass spectral analysis data filed at the Utah Water Research Laboratory Library (Logan, Utah).

Reliability of the identification of the organic compounds investigated

From Table 1 it is evident that some compounds have been repeatedly identified while others have not. For instance, acetone was identified on all three columns and by the four institutions doing mass spectrometry, while 2-methyl-1-butanol was only identified on one column and only an isomer of the compound was found by just one institution doing mass spectrometric analysis.

The compounds fell into three general groups: those that were positively identified, those that were reasonably identified, and those with some question as to their identification. Table 2 classifies the compounds identified into the groups mentioned.



Operator Russ Renk
Column (s.s.)
Length 6'
Dia. 1/8"
Liquid Phase
Wt. % 0.4 Carbowax 1500
Support Carbopack A
Mesh
Carrier Gas He
Rotameter 2
Inlet Press 60 psig
Rate 40 ml/min
CHART SPEED 0.25"/min
SAMPLE aqueous
Size 1 µl
Attn. = 4

Date 8 April '76
Detector flame
Voltage
Sensit.
Flow Rates, ml/min
Hydrogen 40 Air 335
Scavenge
Split
Temperature, °C
Det. 235 Inj. 210
Column Initial 155
Final 155
Rate
Solvent
Concn.
Range = 1

Figure 4. Chromatograms of the same solutions as shown in Figure 3. However the column temperature has been increased from 110°C to 115°C.

Table 1. Organic compounds identified in natural water systems.

Compound	Identified by Gas Chromatography			Identified by Gas Chromatography/Mass Spectrometry			
	Porapak S	Porapak QS	0.4% Carbowax 1500 on Carbopack A	Hewlett Packard Corp.	Ultrachem Corp.	Finnigan Corp.	University of Utah
Methanol		X	X	X			
Acetaldehyde		X	X				
Acetonitrile			X				
Ethanol	X	X	X	X	X	X	
Propanal	X		X				
Acetone	X	X	X	X	X	X	X
Isopropyl alcohol	X	X	X	X	X		
Propanol	X		X	X			
Diethyl ether			X	X			
tert-Butyl alcohol	X		X	X	X		
Methyl ethyl ketone	X		X	X	X		
Ethyl acetate	X		X			X	
2-Butanol[a]			X		X		
Isobutyl alcohol	X		X	X	X		
2-Butenal			X	X			
1-Butanol	X		X	X			
3-Methyl-3-buten-2-ol	X		X		X[b]		
2-Methyl-2-butanol	X		X		X[b]		
3-Methyl-2-butanol	X		X		X[b]		
2-Methyl-1-butanol			X		X[b]		
3-Methyl-1-butanol			X		X[b]		
1-Penten-3-ol				X			
Pyridine			X	X	X		
1-Pentanol			X	X	X		
2-Methyl-2-pentanol	X		X		X[b]		
4-Methyl-3-penten-2-one				X			
3-Methylpyridine				X			

[a] Note ethyl acetate and 2-butanol cannot be separated on the carbowax column (they have the same retention time).

[b] Only an isomer of this compound was established, not which isomer.

Table 2. Reliability of the identification made on the compounds investigated.

Reliability Rating		
Positive	**Strongly Indicated**	**Questionable**
Methanol	Acetaldehyde	3-Methyl-2-butanol
Ethanol	Acetonitrile	2-Methyl-1-butanol
Propanol	Propanal	3-Methyl-1-butanol
Acetone	2-Methyl-2-butanol	Ethyl acetate
Isopropyl alcohol	2-Butanol	2-Methyl-2-pentanol
tert-butyl alcohol	3-Methylpyridine	4-Methyl-3-penten-2-one
Methyl ethyl ketone	2-Butenal	
Pyridine	1-Penten-3-ol	
1-Pentanol		
Isobutyl alcohol		
1-Butanol		
2-Methyl-3-buten-2-ol		
Diethyl ether		

Quantitative Determination of Trace Concentrations of Volatile Organic Compounds in Natural Water Systems

The easiest way to determine trace amounts of volatile organic compounds is to analyze the water sample directly using gas chromatography with flame detection. However, even the best columns and flame ionization detectors have their limits in the μg/l to mg/l range, and unfortunately, most organic compounds in natural water systems are present in concentrations well below this limit. The solution lies in quantitatively concentrating the sample. Volatile organic compounds can be quantitatively concentrated by systematic distillations.

For simplicity assume a water solution containing trace amounts of a volatile organic compound A. From Raoult's Law we have

$$\frac{X_A^{vap}}{X_A} = \frac{P_A^o}{P_A^o X_A + P_w^o X_w} \quad \ldots\ldots\ldots\ldots (1)$$

in which

X_A = the mole fraction of compound A in the solution

X_w = the mole fraction of water present in the solution

X_A^{vap} = the mole fraction of compound A, at equilibrium, in the vapor above the solution

P_A^o = the vapor pressure of pure compound A

P_w^o = the vapor pressure of pure water

Since the organic compound A is present in trace amounts (if A is present in mg/l, X_w is six orders of magnitude greater than X_A), and considering temperatures around the boiling point of water and corresponding P_A^o, Equation 1 becomes:

$$\frac{X_A^{vap}}{X_A} = \frac{P_A^o}{P_A^o X_A + P_w^o X_w} = \frac{P_A^o}{P_w^o} \quad \ldots\ldots (2)$$

as

$$P_A^o X_A \rightarrow \text{zero}$$

and

$$X_w \rightarrow 1$$

Therefore any compound A, whose pure vapor pressure (P_A^o) is greater than that of water, can be repeatedly distilled until the concentration of A is sufficient for detection. The greater the value of the P_A^o/P_w^o, the fewer distillation steps involved in concentrating.

After obtaining a distillate with a concentrate of A which can be measured, it is possible to calculate back to the original water concentration of A if: 1) the number of calculations approach infinity; 2) ideal solution behavior exists (Raoult's Law applies); 3) equilibrium is maintained during the distillation (true as the distillation time approaches infinity); 4) an infinitely small distillation apparatus is used so that there is no material lost in the system. Even if an ideal solution is infinitely distilled, the problem of material loss as droplets in the apparatus cause calculation errors.

A pragmatic solution involves systematically distilling solutions (of varying initial concentrations of volatile organic compounds) and then recording the concentrations obtained in the distillates. The distillation apparatus, the volume distilled, and the volume collected are held constant. The two variables are: 1) the initial concentration and 2) the final concentration of the volatile organic compound. The greater the initial concentration of the compound the greater will be its concentration in the distillate. Because of the difficulty in collecting a constant amount of distillate it is desirable to establish the relationship between the amount of distillate collected and the concentration in that distillate, for a fixed initial concentration of the organic to be distilled. For the fixed initial concentration of 17.2 nl/l of 2-methyl-2-butanol, the relationship between the amount collected (percent volume collected) and the distillate concentration of 2-methyl-2-butanol is shown in Figure 5. All concentrations have the units of volume per volume; this is because of the ease in handling liquids by volume instead of by weight. Mass per unit volume can be obtained by multiplying the volume by the density of the compound (densities are listed in Appendix G).

The line marked 17.2 nl/l, in Figure 5, was generated by placing 2 liters of distilled deionized water which contained 17.2 nl/l of 2-methyl-2-butanol in a 5 liter round-bottom flask, heating the solution, and condensing the vapor in a water jacketed condenser (44 cm long, 1.3 cm in diameter) and then collecting the condensed vapor in a 100 ml graduated cylinder with a ground glass top. Eleven milliliters were collected and placed into a 25 ml Bantam Ware® round-bottom boiling flask (with boiling chips). The first drop, the second drop, and the next six drops of the distillate were collected separately and pipetted into capillary tubes (2 mm in

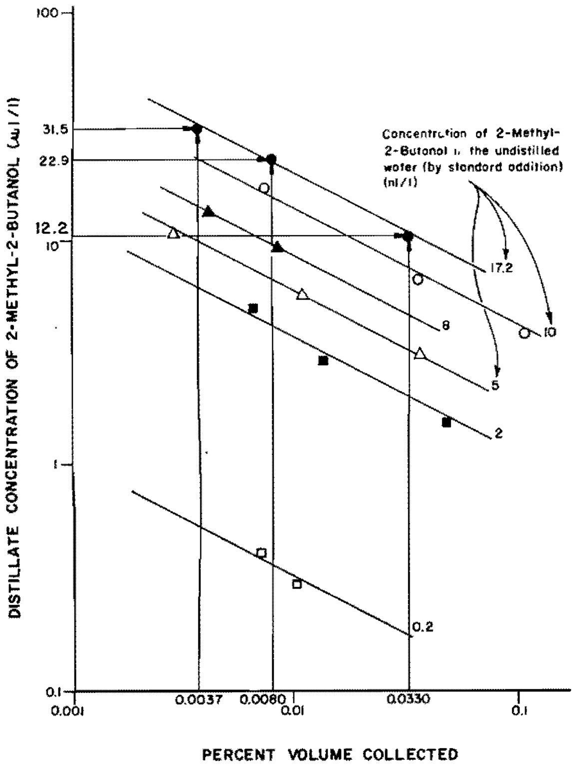


Figure 5. Normal distillation curves for 2-methyl-2-butanol (log-log plot).

diameter and of varying length) which were covered with Teflon tape and then with Millipore gum rubber caps. The samples were immediately analyzed on the gas chromatograph. The three fractions collected had the following volumes and concentrations of 2-methyl-2-butanol:

	Volume (ml)	% Volume Collected	Concentration in Volume Collected µl/l
First fraction collected (1st drop)	0.074	0.0037	31.5
Section fraction collected (2nd crop)	0.086	0.0043	15.5
Third fraction collected (next 6 drops)	0.500	0.0250	8.8

The first drop collected had a volume of 0.074 ml, which was 0.0037 percent of the original 2 liters it was distilled from, and a concentration of 31.5 µl/l. This point was represented in Figure 5, and in Table 3 under the initial concentration of 17.2 nl/l and the volume marked No. 1 (first fraction collected). The second data point on the 17.2 nl/l line in Figure 5 had a percent volume collected of 0.0080 and its concentration was 22.9 µl/l. This point (listed under volume No. 2 in Table 3) was obtained by adding the first and second fractions together. This yielded

$$0.0037\% + 0.0043\% = 0.0080\% \text{ vol}$$

for volume No. 2. The concentration of 2-methyl-2-butanol in this fraction was calculated by mass balance as follows:

$$\frac{(0.0037)(31.5)\,\mu\text{l/l} + (0.0043)\,(15.5)\,\mu\text{l/l}}{0.0037 + 0.0043}$$

$$= 22.9\,\mu\text{l/l}$$

This point was plotted on Figure 5. Similarly, by adding all three fractions collected together, volume No. 3 was obtained:

$$0.0037\% + 0.0043\% + 0.0250\% = 0.0330\%$$

The concentration of 2-methyl-2-butanol in volume No. 3 was determined in a similar manner:

$$\frac{0.0037\,(31.5)\mu\text{l/l}+0.0043\,(15.5)\mu\text{l/l}+0.0250\,(8.8)\mu\text{l/l}}{0.0037+0.0043+0.0250}$$

$$= 12.2\,\mu\text{l/l}$$

This point (0.033 percent, 12.2 µl/l) was also plotted on Figure 5. A relationship, therefore, was established in Figure 5 between the amount of distillate collected and the concentration in that distillate, given a fixed initial concentration of 2-methyl-2-butanol. Thus, by distilling 2 liters of a solution containing 17.2 nl/l of 2-methyl-2-butanol with the apparatus and methods described above and by collecting a distillate volume of 0.0037 percent (0.074 ml), or a volume of 0.008 percent (0.16 ml) or a volume of 0.033 percent (0.66 ml), the concentrations of these distillates would have been 31.5, 22.9, and 12.2 µl/l, respectively.

Once the relationship was established between the amount of distillate collected (percent volume) and the concentration in that distillate for a selected initial concentration of 2-methyl-2-butanol equal to 17.2 nl/l, the next step was to vary the initial concentration and repeat the process. In all, seven different initial concentrations of 2-methyl-2-butanol (17.2, 10.0, 8, 5, 2, 0.2, 0.01 nl/l) were used. The results are listed in Table 3 and plotted in Figure 5, which is a family of distillation curves for 2-methyl-2-butanol.

Table 3. Concentrations of 2-methyl-2-butanol (μl/l) in distillates obtained by collecting various distillate volumes from water with various initial 2-methyl-2-butanol concentrations.

Initial Concentration (nl/l) of 2-methyl-2-butanol in Water to be Distilled	% Volume and Concentration of Distillate	Volumn #1 (1st Fraction Collected)	Volume #2 (1st + 2nd Fractions Collected)	Volume #3 (1st + 2nd + 3rd Fractions Collected)
17.2 nl/l	Vol. (%)	0.0037	0.0080	0.0330
	Conc. (μl/l)	31.5 μl/l	22.9 μl/l	12.2 μl/l
10.0 nl/l	Vol. (%)	0.0074	0.0370	0.1080
	Conc. (μl/l)	17.5 μl/l	6.9 μl/l	3.8 μl/l
8 nl/l	Vol. (%)	0.0042	0.0084	0.0330
	Conc. (μl/l)	13.5 μl/l	9.2 μl/l	3.2 μl/l
5 nl/l	Vol. (%)	0.0029	0.0110	0.0360
	Conc. (μl/l)	10.8 μl/l	5.53 μl/l	3.1 μl/l
2 nl/l	Vol. (%)	0.0065	0.0130	0.048
	Conc. (μl/l)	5.0 μl/l	2.92 μl/l	0.9 μl/l
0.2 nl/l	Vol. (%)	0.0065	0.0130	
	Conc. (μl/l)	0.4 μl/l	0.30 μl/l	
0.01 nl/l	Vol. (%)	0.0070	0.0100	0.0500
	Conc. (μl/l)	0.0 μl/l	0.0 μl/l	0.0 μl/l

$$\% \text{ Vol.} = \frac{\text{Volume (No. 1, No. 2, or No. 3) of Distillate x 100\%}}{\text{Volume of the Initial Water to be Distilled}}$$

Conc. = the concentration of 2-methyl-2-butanol (μl/l) in the distillate collected (volume No. 1, No. 2, or No. 3).

Determining the concentration of 2-methyl-2-butanol in a water solution using distillation curves for 2-methyl-2-butanol

If a water sample has a concentration of 2-methyl-2-butanol which cannot be detected on the gas chromatograph (the limit of detection for 2-methyl-2-butanol is about 0.2 μl/l or 200 nl/l), then by distilling it in the same manner by which the curves in Figure 5 were generated, it is possible to calculate the original concentration of 2-methyl-2-butanol in the aqueous solution with the aid of Figure 5. Two liters of water with an unknown concentration of 2-methyl-2-butanol can be placed in a 5 liter round-bottom flask and distilled collecting the first 11 ml. That volume is distilled in the Bantam Ware® apparatus collecting a known volume of distillate for analysis (for example a final volume of 0.16 ml is collected.

The final distillate (0.16 ml) is then analyzed on the gas chromatograph and yields a reading of 2-methyl-2-butanol, say of 4.2 μl/l. Then calculating the percent volume distillate of the original volume distilled,

$$\frac{0.16\text{ ml}}{2000\text{ ml}} \text{ x } 100\% = 0.008\%$$

finding this value on the abscissa of Figure 5 and reading up the ordinate to the value of 4.2 μl/l, one finds that the original water concentration of 2-methyl-2-butanol was approximately 2 nl/l. Several fractions of the distilled unknowns could have been collected and a line generated using similar calculations to those used to generate the known concentration lines in Figure 5. This line has better reliability than a single point.

It was convenient that the example point (0.0008 percent, 4.2 μl/l) was located so near the 2 nl/l line since the distances between lines (in Figure 5) change nonlinearly. For convenience a plot of the data in Figure 5 (of concentration versus the undistilled aqueous concentration of 2-methyl-2-butanol in nl/l) was used to generate a family of lines or curves for different percent collected values (Figure 6). For example, the ordinate value of 4.2 μl/l intersects with the 0.008 percent volume collected line and this corresponds to an abscissa value of 2.8 nl/l, which is then the original water concentration of 2-methyl-2-butanol (Figure 6).

Since the limit of detection for 2-methyl-2-butanol was about 0.2 μl/l, from Figure 6 it is seen that the limit of this particular system (using 2 liters of water) for this given compound is around 0.05 to 0.1 nl/l; to work below this limit a new system must be used involving larger quantities of water and additional distillation steps. The major limitations are the amount of water available for analysis and the time required to distill that amount.

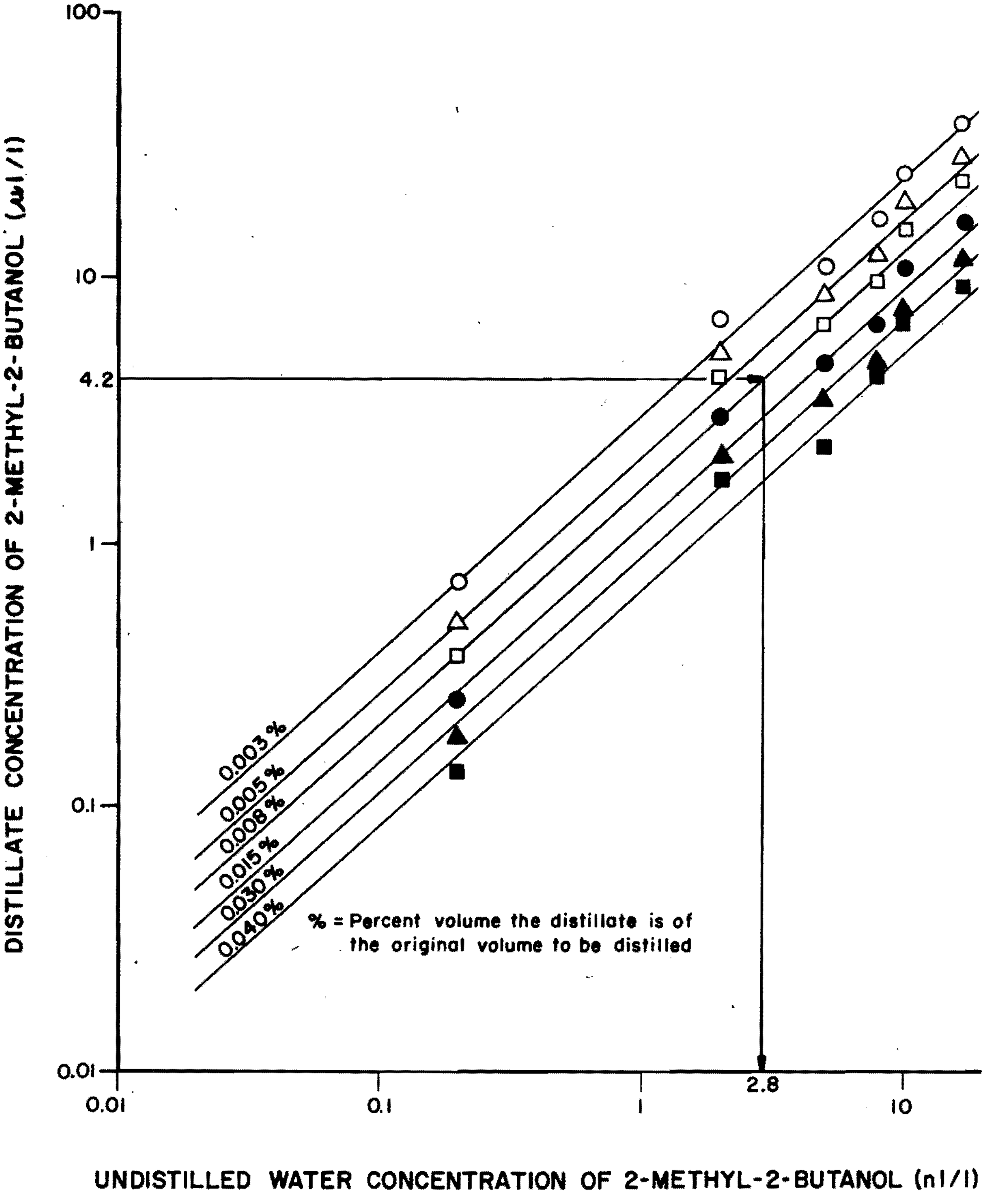


Figure 6. Interpretative distillation curves for 2-methyl-2-butanol (log-log plot).

Generating distillation curves using water already containing trace organics

All water contains organic compounds; the issue is only one of concentration. Freshly fallen snow, mountain streams, distilled deionized, and activated carbon filtered water all contain detectable amounts of organic compounds (in the parts per trillion range). For example, deionized, filtered, activated carbon filtered, mixed bed deionized and membrane filtered water from a Milli-Q Reagent-Grade Water System (Millipore Corp.) was collected and standard amounts of *tert*-butyl alcohol were added to make up ten solutions with concentrations of 0.0, 0.00001, 0.005, 0.010, 0.20, 2, 5, 8, 10, 17.2 nl/l. These solutions were distilled and distillation curves (similar to those of Figure 5) were obtained (Figure 7). It can be observed that the concentration lines for *tert*-butyl alcohol levels of 0.0, 0.00001, 0.005, 0.010 are essentially represented by the same line. This meant that the original water concentration from the Milli-Q system was at least 0.010 nl/l *tert*-butyl alcohol (probably higher) since water containing at least 0.010 nl/l of *tert*-butyl alcohol (the amount added) yielded the same line as obtained from the Milli-Q water. Therefore the 0.2 nl/l concentration was really a 0.2 nl/l + X (where X was

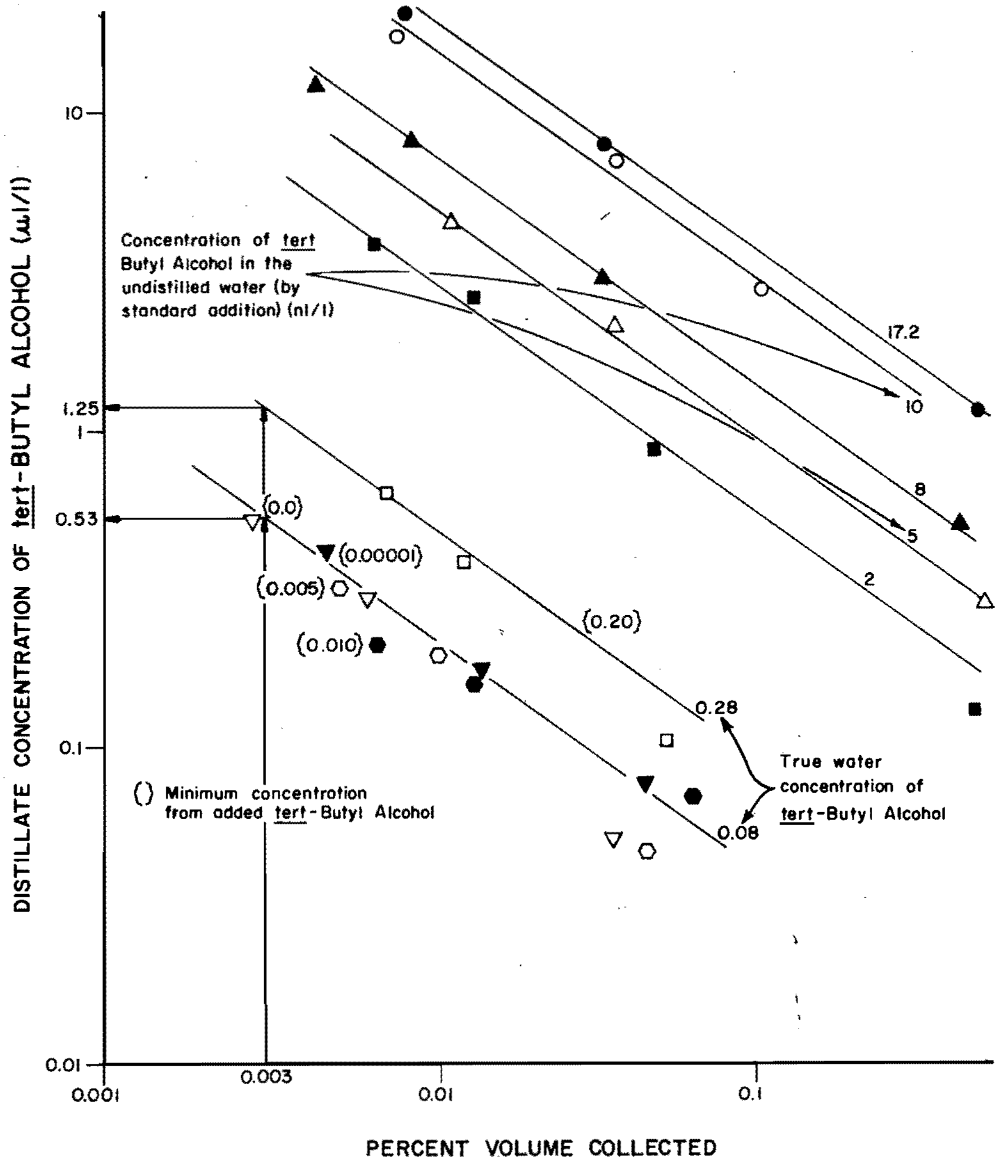


Figure 7. Distillation curves for tert-*butyl alcohol (log-log plot).*

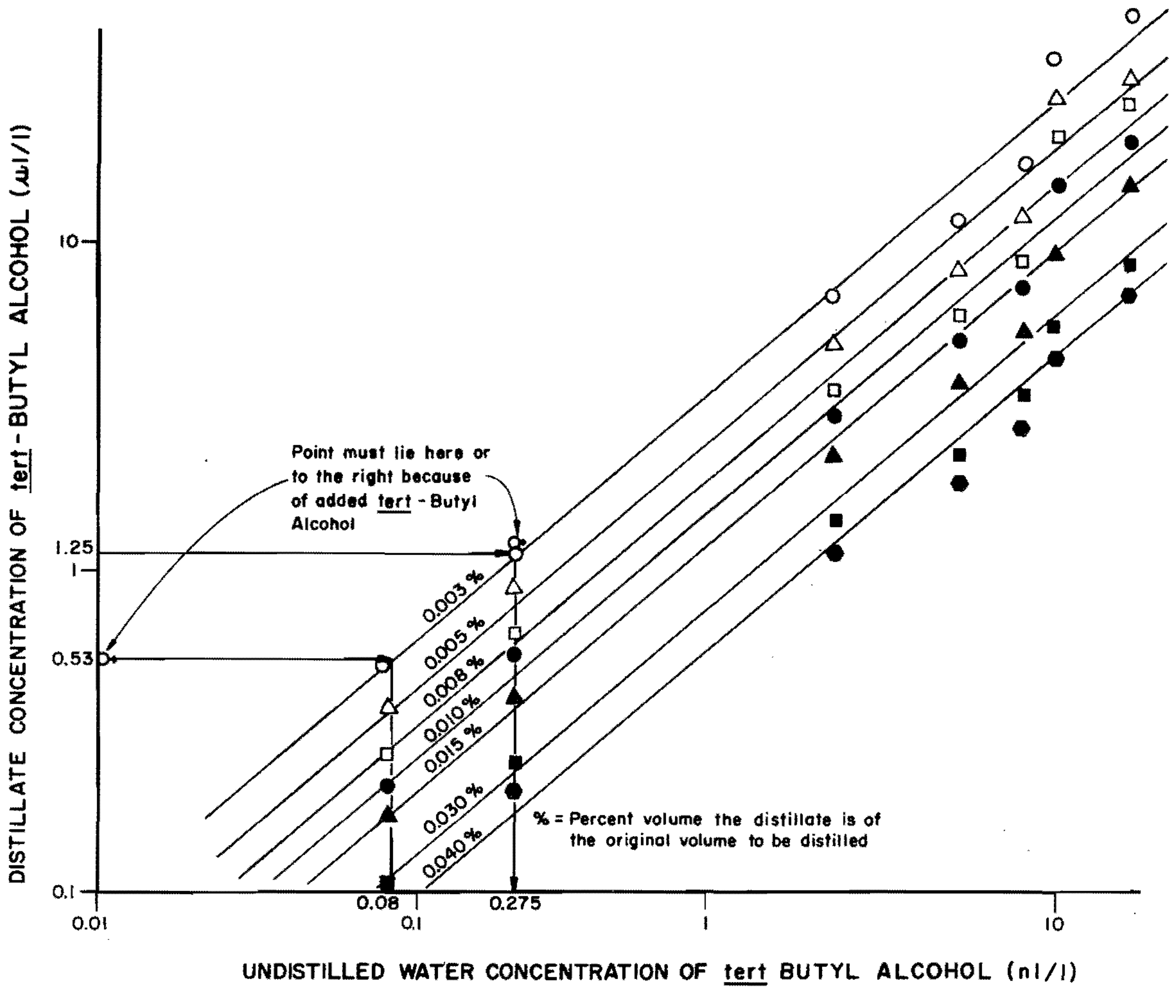


Figure 8. Interpretative distillation curves for tert-*butyl alcohol (log-log plot).*

the concentration of *tert*-butyl alcohol in the original Milli-Q water). As greater concentrations of standards were used, the concentration of *tert*-butyl alcohol (X) in the original water became relatively insignificant. In such cases only the high values (17.2 to 2 nl/l) were used to generate the interpretative distillation curves (the interpretative distillation curves for Figure 7, as shown in Figure 8). The lower values were checked for validity by reading the original water (zero-concentration) line as an unknown (from Figure 8) and adding this value (X) to all the standard concentrations used.

For example, if 2 liters of solution with no added *tert*-butyl alcohol were distilled to 0.006 ml (0.003 percent) as described previously, the concentration of *tert*-butyl alcohol in that 0.006 ml (0.003 percent collected) would have been 0.53 µl/l (from Figure 7). If Figure 8 is valid in the lower concentration regions, then a distillate volume collected of 0.003 percent (0.006 ml) with a 0.53 µl/l concentration of *tert*-butyl alcohol would have come from a solution with an initial concentration of 0.08 nl/l (from Figure 8). If the water did have an initial *tert*-butyl alcohol concentration of 0.08 nl/l, then this value must be added to all the initial distillation concentration values for *tert*-butyl alcohol listed in Figure 7. However, as can be seen in Table 4, the large concentration values (⩾2 nl/l) have little effect on the initial concentration of *tert*-butyl alcohol believed to be present (from Figures 7 and 8) and the small concentrations due to adding *tert*-butyl alcohol (⩽0.01 µl/l) have little effect on the original amount believed to be present (0.08 nl/l). Only the concentration level of 0.2 nl/l will be changed significantly to a value of 0.28 nl/l, the high concentration will be unchanged, the low concentrations will all have a true solution value of about 0.08 nl/l.

Figure 8 was constructed using the high unchanged concentration values of *tert*-butyl alcohol,

Table 4. The effect of various concentrations of tert-*butyl alcohol added to the solution on the initial concentration of* tert-*butyl alcohol present in the solution.*

Initial Concentration (nl/l) Believed to be Present (From Figures 7 and 8)	Concentration (nl/l) Due to Adding *tert*-Butyl alcohol	True Solution Concentration (nl/l)
0.08	0.0	0.08
0.08	0.00001	0.08001
0.08	0.005	0.085
0.08	0.010	0.090
0.08	0.20	0.28
0.08	2.0	2.08
0.08	5.0	5.08
0.08	8.0	8.08
0.08	10.0	10.08
0.08	17.2	17.28

and assuming that the lines were unchanged at low concentration values. The symbols (o→) in Figure 8 represent where the point for the 0.003 percent volume collected line must lie if the initial concentration of *tert*-butyl alcohol present were zero. As the amount present increases the point moves along the abscissa until at an X value of 0.08 nl/l it rests on the 0.003 percent line. If Figure 8 is unchanged at lower concentration values and the initial concentration of *tert*-butyl alcohol is 0.08 nl/l, not only would the concentration lines for values of added *tert*-butyl alcohol of 0.0, 0.00001, 0.005, 0.01 be represented by the 0.08 nl/l line, but the 0.2 nl/l concentration line should yield a value of 0.28 nl/l. From Figure 7 it is seen that by collecting a distillate volume of 0.003 percent of a solution which should have a concentration of 0.28 nl/l, a distillate concentration of 1.25 μl/l is obtained. Using Figure 8 an ordinate value of 1.25 μl/l intersects the 0.003 percent volume collected line to yield an undistilled water concentration of *tert*-butyl alcohol of 0.275 nl/l; therefore Figure 8 is valid at low concentration values and the original water concentration (before adding any *tert*-butyl alcohol) was 0.08 nl/l, a very small yet measurable number.

Non-ideal behavior of trace organic compounds

Previously, Equation 2 was developed from Raoult's Law (Equation 1): and states that in order to concentrate a compound by distillation, the fraction (X_A^{vap}/X_A) has to be greater than one (if the distillate is considered and not the distillation residue and ideal behavior is followed).

$$\frac{X_A^{vap}}{X_A} = \frac{P_A^o}{P_w^o} \quad \ldots\ldots\ldots\ldots\ldots \quad (2)$$

in which

X_A = the mole fraction of compound A in solution

X_A^{vap} = the mole fraction of compound A in the gas above the solution

P_A^o = the vapor pressure of pure compound A

P_w^o = the vapor pressure of pure water

Recalling from Table 2 that beginning with an undetectable amount (direct gas chromatographic injection gives no response) of 2-methyl-2-butanol (A) in the original water (spiked with 17.2 nl/l of 2-methyl-2-butanol) and collecting (through two distillations) 0.0037 percent of the undistilled volume (0.07 ml), the concentration of 2-methyl-2-butanol in the 0.07 ml was 31.5 μl/l. Since controls and blanks were run on all systems and they yielded a zero concentration of 2-methyl-2-butanol, it was assumed that this material was concentrated from the original water spiked with 17.2 nl/l of 2-methyl-2-butanol. In other words the concentration of 2-methyl-2-butanol is higher in the vapor phase above the solution during distillation of 2-methyl-2-butanol and water than in the solution. Calculating from the Handbook of Chemistry and Physics (1976-1977), it is found that under the conditions of the distillation (96.1° C, P_w^o = 660 mm of Hg pressure, P_A^o = 620 mm of Hg pressure), that

$$\frac{X_A^{vap}}{X_A} = \frac{P_A^o}{P_w^o} = \frac{620\text{ mm}}{660\text{ mm}} = 0.94$$

Since this number is less than one the solution should always be more concentrated than the vapor above it and therefore 2-methyl-2-butanol could not be theoretically concentrated in the distillate by distillation. However, during distillation 2-methyl-2-butanol was concentrated in the distillate as 2 liters of water containing 17.2 nl/l of 2-methyl-2-butanol was distilled to 0.07 ml of water containing 31.5 μl/l of 2-methyl-2-butanol.

This experiment established the non-ideal behavior of low concentrations of 2-methyl-2-butanol in water. Ideal behavior of compounds with vapor pressures greater than that of water are shown in Figure 9.

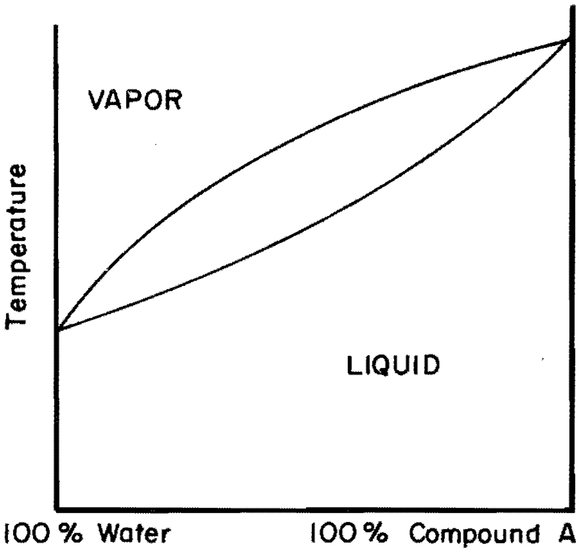


Figure 9. Ideal behavior of compounds with boiling points greater than that of water.

Non-ideal behavior where the forces of attraction between the water and some specific compound are weaker than those between identical molecules result in a positive deviation from Raoult's Law. A compound with a boiling point greater than that of water exhibiting a positive deviation from Raoult's Law is shown in Figure 10. This is called a minimum boiling azeotrope.

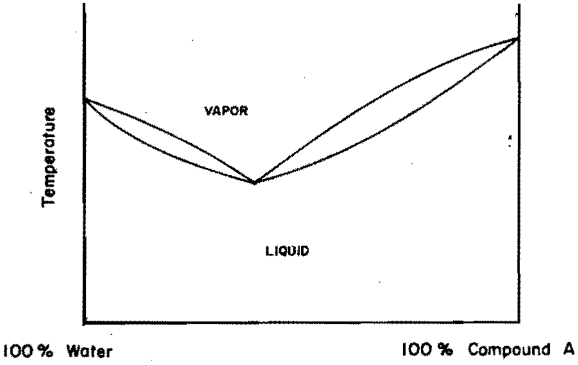


Figure 10. A compound A with a boiling point greater than that of water exhibiting a positive deviation from Raoult's Law.

From Figure 10 it is apparent that dilute solutions of a compound exhibiting a positive deviation from Raoult's Law could be increased in concentration by collection of the vapor; this is not true for dilute solutions of compounds which exhibit a negative deviation from Raoult's Law and forms a maximum boiling azeotrope. Since 2-methyl-2-butanol increased in concentration upon distillation, it exhibited a positive deviation from Raoult's Law.

All the compounds listed in Table 5 should concentrate in the distillate upon distillation because their vapor pressures are greater than 660 mm (value just slightly higher than the mean atmospheric pressure observed at UWRL, Logan, Utah) and/or they form minimum boiling azeotropes with water (Weast, 1976). Four compounds (2-methyl-3-buten-2-ol, 2-methyl-2-butanol, 3-methyl-2-butanol, and 2-methyl-1-butanol) had insufficient information available to determine whether or not they should concentrate (Weast, 1976). Experimental work showed that they do concentrate upon distillation.

Steps to take in quantitatively identifying trace organic compounds in natural water systems

Bearing in mind that the organics present in the water may affect the relative manner in which the organics distill, the same water should be used to generate standard curves that is used in the analysis for the trace amounts of organic compounds.

The following steps should be followed in analyzing water to determine the amounts of trace organic compounds present:

1. Collect some of the water to be analyzed and establish a distillation pattern with as few distillations as possible, yet sufficient to obtain concentrations of the compound easily detected on the gas chroma-

tograph (at least two orders of magnitude above background noise).

2. Using the established distillation pattern, add small amounts of the compound whose concentration is to be measured until an increased concentration in the final distillate over that of the original water sample to which nothing was added is obtained. Concentrations are now near that which is found in the water being analyzed. Standard amounts of this compound are to be added until the concentration reached is at least three orders of magnitude beyond the point of the first increase in the distillate concentration.

3. The data can now be plotted (distillate concentration versus the percent volume collect, on log-log scales) and a figure similar to Figure 5 can be generated. By using the highest concentration of data points (which are orders of magnitude greater than the unknown concentration) a figure similar to Figure 6 can be generated from which the original water concentration of the compound of interest can be estimated. The lines in both figures should be non-intersecting over the area of interest, since intersection implies a greater concentration in the distillate of weaker initial concentrations as opposed to greater initial concentrations.

Table 5. Organic compounds which can be concentrated by ideal or non-ideal behavior (Weast, 1976).

	(mm) Vapor Pressure at 96.1°C	Under Ideal Behavior Should Not Concentrate	Compounds Forming Minimum Boiling Azeotropes (Concentrate Because of Their Non-Ideal Behavior)
Methanol	2100		
Acetaldehyde			
Acetonitrile	760 (at 81.8°C)		X
Ethanol	1200		X
Propanal			X
Acetone	2400		X
Isopropyl alcohol	1100		X
Propanol	590	X	X
Diethyl ether	4300		X
tert. Butyl alcohol	1080		X
Methyl ethyl ketone	760 (at 79.6°C)		X
Ethyl acetate	1110		X
2-Butanol	550	X	X
Isobutyl alcohol	440	X	X
1-Butanol	270	X	X
2-Methyl-3-buten-2-ol			
2-Methyl-2-butanol	620	X	
3-Methyl-2-butanol			
2-Methyl-1-butanol			
3-Methyl-1-butanol	200	X	X
Pyridine	440	X	X
1-Pentanol	150	X	X
2-Methyl-2-Pentanol	340	X	X
Water	660		
2-Butenal			X

RESULTS II: TEMPORAL VARIATIONS OF ORGANIC COMPOUNDS AT HYRUM RESERVOIR

Methods Used in Determining the Temporal Variations of Volatile Organics in Hyrum Reservoir

Frozen versus unfrozen samples

The temporal variations of volatile organics listed in Figure 11 were obtained from the analysis of 43 frozen stored samples. Data were also obtained from fresh samples and a comparison of these two is listed in Table 6. Figure 11 is the only listing of data from frozen stored samples, all other data were from analyses performed shortly after obtaining the sample.

From Figure 11 it can be seen that the five compounds (acetone, acetaldehyde, ethanol, methanol, and isopropyl alcohol) on the average made up 1.45 mg/l of dissolved organic carbon in the surface waters of Hyrum Reservoir. According to Drury et al. (1975) the average dissolved organic content of the surface waters of Hyrum Reservoir was about 2.9 mg/l, therefore the five compounds constitute ≈ 50 percent of the dissolved organic matter in the surface waters assuming the years 1975-76 were similar to 1972-74 with respect to dissolved organic content. The individual percentages would be acetone (17.4 percent), acetaldehyde (13.1 percent), ethanol (10.8 percent), methanol (5.2 percent), and isopropyl alcohol (4.1 percent).

Table 6. Comparison of acetone concentrations in frozen samples with non-frozen samples.

Date	Concentration (μl/l) of Acetone in Hyrum Reservoir Surface Water Frozen Sample (Stored)	Non-Frozen Sample (Analyzed Immediately)
June 10, 1975	0.3	0.1
June 15, 1975	0.4	0.3
June 30, 1976	1.1	0.5
July 25, 1975	0.9	0.9
Aug. 6, 1975	0.8	1.0
Aug. 12, 1975	0.8	0.5
Aug. 19, 1975	0.8	0.6
Aug. 28, 1975	0.9	0.7
Sept. 2, 1975	1.0	0.5
Sept. 4, 1975	1.2	0.5
Sept. 10, 1975	1.0	0.09
Sept. 16, 1975	1.1	0.8
Oct. 1, 1975	0.8	0.02
Oct. 13, 1975	0.8	0.6
Nov. 3, 1975	1.0	0.7

Data from frozen samples

Direct readings of concentrated organic compounds. As stated earlier, all data reported in Figure 11 for Hyrum Reservoir were from the analysis of stored frozen samples. The samples were thawed and analyzed. Some compounds were in high enough concentration to be measured without distilling and were analyzed directly; however, to obtain analytical concentration values for the compounds of lower concentration, all samples were distilled and concentration curves similar to Figure 12 were generated. Note that the concentration measured before distilling (indicated above the line in μl/l) was not always consistent with the relative height of the line (higher values should be at the top, decreasing to the lowest values at the bottom; also note that some lines cross). There are two reasons for this erratic behavior: 1) the inability to accurately measure such high values on the gas chromatograph (by one to two orders of magnitude); 2) not all the distillation steps were the same. Some started out with 2 liters, others with only 500 ml. For these reasons, the undistilled values were used as probable values, and the high concentration curves (similar to Figure 12) were used only to establish minimum and maximum values of the water concentration.

The effect of freeze rotational concentrating on organic compounds

Direct readings on frozen unconcentrated samples were fairly reliable. However, some frozen samples were concentrated by freeze rotation. For these samples, which were high enough for direct readings, the minimum and maximum values had to be further extended to include 100 percent concentration by freeze rotation and zero percent concentration, assuming no concentration due to freeze rotation. Generally, freeze rotation increased the concentration of organic compounds by about 80

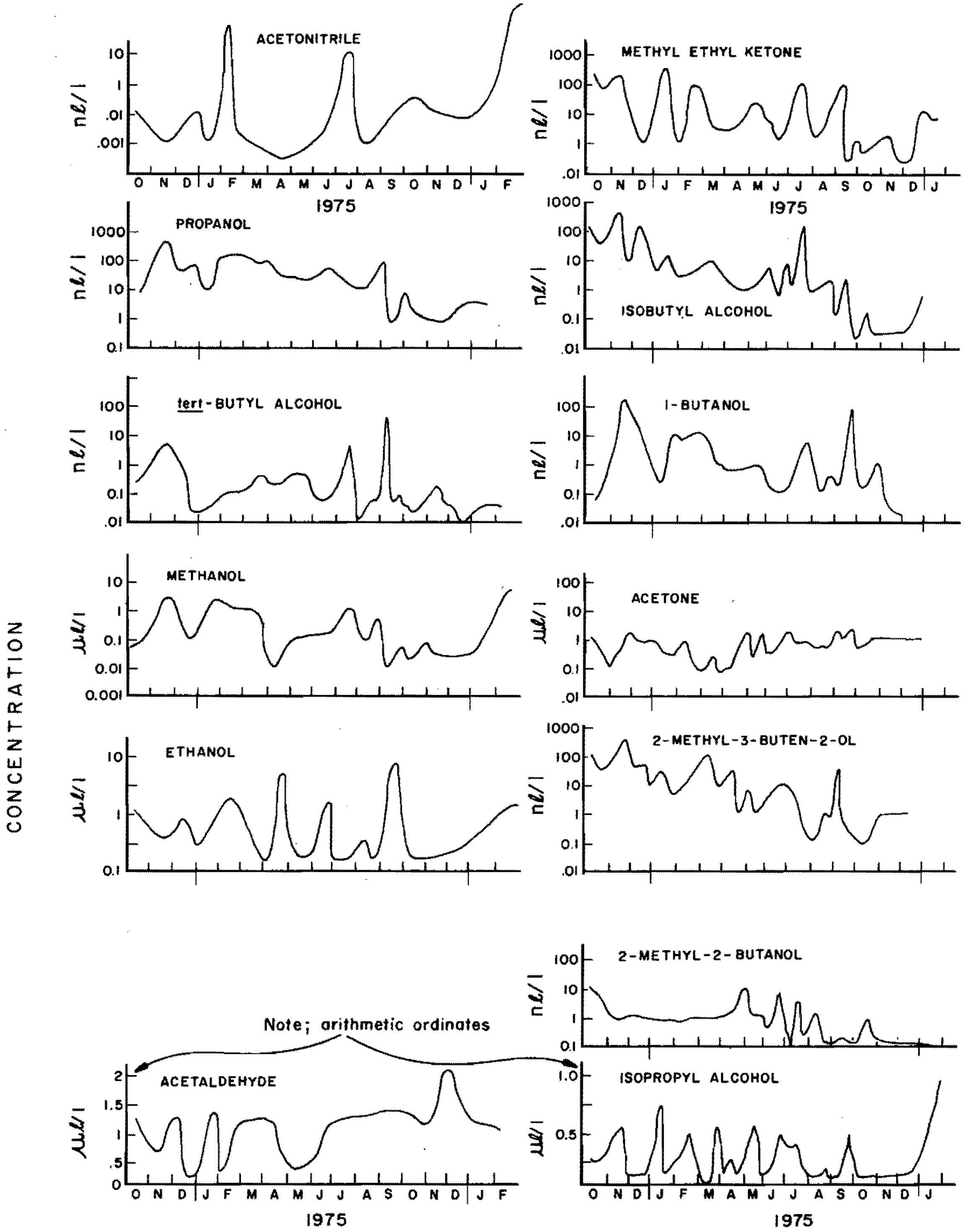


Figure 11. Probable temporal variations of organic compounds at Hyrum Reservoir. (Note: concentrations of other compounds were determined throughout the year and thus are listed only in Appendix I.)

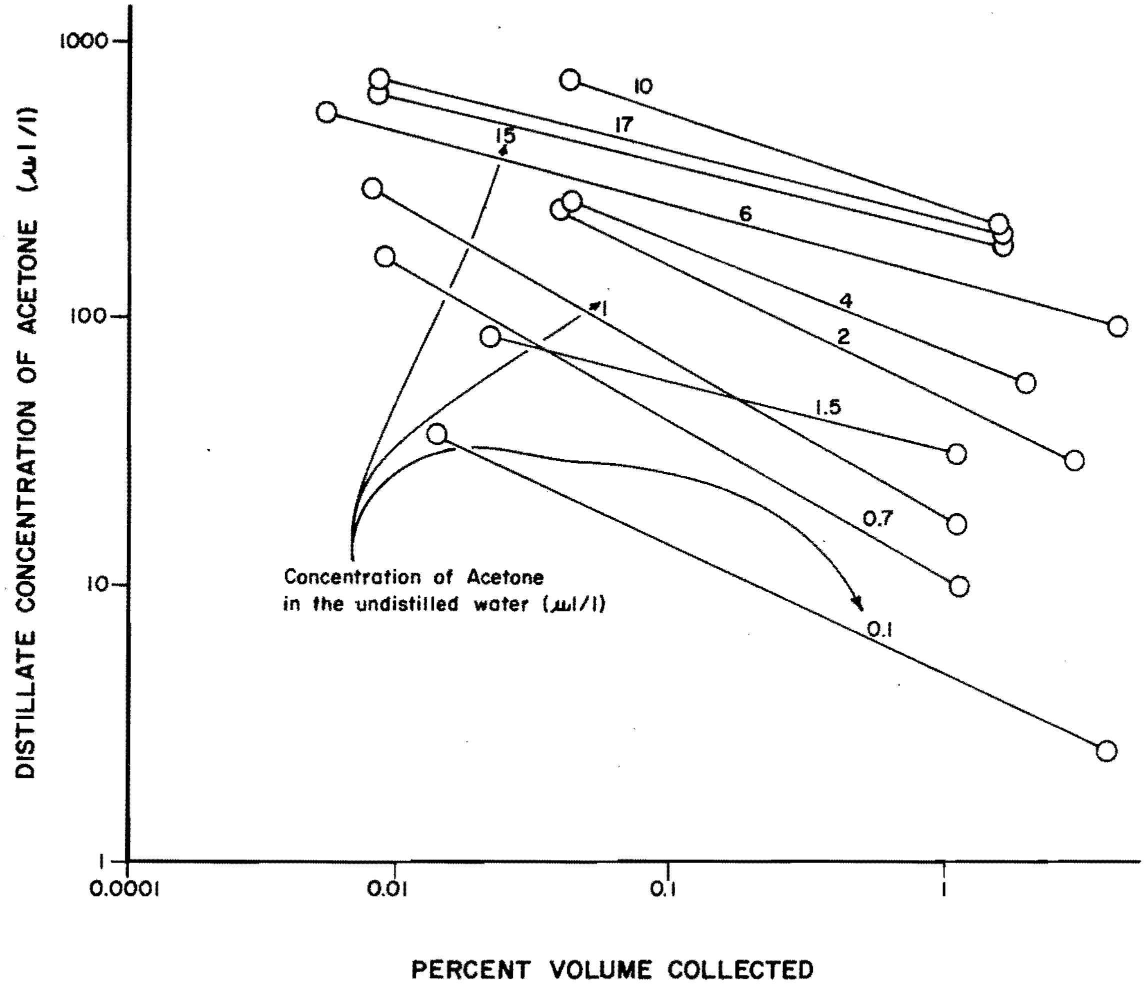


Figure 12. Distillation curves for high concentrations of acetone (log-log plot).

percent. The value varied depending on the concentration of the organic and the extent of the freeze rotation. For the exact numbers involved, see Appendix H.

Indirect readings of concentrated organic compounds

Not all organic compounds were at concentrations sufficient for direct analysis on the gas chromatograph, including some of the samples concentrated by freeze rotation. To obtain data on these compounds, the frozen stored samples were distilled and the concentrations obtained were determined from the use of standard curves similar to Figures 5 and 6. There was some error in these readings, because the first step in the distillation was not always the same. Values obtained from the use of concentration curves were then subject to minimum and maximum values determined by 100 percent concentration and zero percent concentration (if the samples were concentrated by freeze rotation).

Summary of methods used in determining the concentration of organic compounds at Hyrum Reservoir

Frozen samples were thawed and analyzed; direct readings were made and high concentration distillation curves similar to Figure 12 were generated. The thawed samples were distilled to concentrate organic compounds that otherwise could not be detected. Standard distillation curves similar to Figures 5 and 6 were used to determine the concentrations of these compounds.

For those samples that had been concentrated first by freeze rotation, their minimum and maximum values were extended assuming 100 percent and zero percent concentrating effect due to freeze rotation. Normal minimum and maximum values were obtained from variance in gas chromatography analysis and variance of the concentration line in high concentration distillation curves (lines) generated similar to Figure 12.

All curves (of standard and unknowns) used in analysis are listed in Appendix I.

The concentrations obtained from the analysis of the 43 frozen samples are shown in Figure 11. The probable concentration values with their minimum and maximum values are listed in Appendix J.

Possible Sources of Organic Compounds Observed at Hyrum Reservoir

Organic input from rivers and melting snow

The organic compounds in a lake are either transported into the lake, produced in the lake, or some combination of both. In general, most of the compounds found in Hyrum Reservoir were found in the Little Bear River which flows in the reservoir. However, about 80 percent of the time these were lower in concentration (see Table 7) than in the reservoir. The data in Table 7 were obtained from fresh, unconcentrated, unfrozen water samples analyzed directly on the gas chromatograph (Porapak S and at conditions as stated in Figure 4).

The source of the water for the Little Bear River (melting snow) had generally higher values of organic compounds than the river itself. This was also true for the Logan River (see Tables 8 and 9). In many cases the concentrations of organics listed in Table 8 do not reflect a significant difference between that found in the snow and that in the river. However, the accuracy of the measurement was improved by using larger volumes of water in the initial distillation step. A typical gas chromatogram resulting from the analysis of organic compounds concentrated from snow appears in Figure 13.

Organic production in Hyrum Reservoir

Organics produced involving active algae growths. The production of volatile organics by algae and bacteria is well known (Adams et al., 1975; Collins and Kalnins, 1965; Gaines and Collins, 1963). There was some evidence that ethanol may have been

Table 7. Concentrations (μl/l) of some organic compounds in Hyrum Reservoir and the Little Bear River.

	Hyrum Reservoir (Little Bear River)			
	Methanol and/or Acetaldehyde[a]	Ethanol	Propanal	Acetone
June 10, 1975	0.3 (0.3)			0.1 (0.1)
June 15, 1975	1.7 (1.5)	P (P)	(P)	0.3 (0.3)
June 30, 1975	2.4 (1.9)			0.5 (0.6)
July 25, 1975	0.9 (0.8)	0.002 (0.012)	0.004 (P)	0.9 (0.4)
Aug. 6, 1975	2.8 (1.8)	0.02		1.0 (0.7)
Aug. 12, 1975	1.5 (1.3)	0.05 (0.01)		0.5 (0.3)
Aug. 19, 1975	1.2 (1.4)[b]	(0.04)		0.6 (0.5)
Aug. 28, 1975	0.1 (1.1)			0.7 (0.3)
Sept. 2, 1975	2.2 (1.6)			0.5 (0.3)
Sept. 4, 1975	0.9 (0.7)			0.5 (0.5)
Sept. 10, 1975	1.5 (1.8)		P	0.09 (0.3)
Sept. 16, 1975	1.5 (1.8)			0.8 (0.3)
Oct. 1, 1975	1.6 (1.0)			0.02 (0.3)
Oct. 13, 1975	1.8 (0.8)	1.05		0.6 (0.16)
Nov. 3, 1975	P			0.7 (0.5)

P = Present, but in small amount.

( ) = Concentration in the Little Bear River.

[a] Methanol and acetaldehyde do not separate on the column (Porapak S) used for this analysis and they therefore cannot be distinguished.

[b] Underlined values indicate higher concentration values in the Little Bear River than in Hyrum Reservoir for that same date.

Table 8. Concentrations of organic compounds found in snow, the Logan River, and interstitial water from the mud bottom of Hyrum Reservoir.

Compound	Original Water Concentration (nl/l)[a]		
	Snow From Hyrum, Utah 24 Feb. 1976 2 liters ⇒ 0.05 ml	Logan River 24 Feb. 1976 2 liters ⇒ 0.067 ml	Interstitial Mud Water 18 Dec. 1975 0.2 liters ⇒ 0.2 ml
Acetaldehyde	P	P	P
Acetonitrile		10.01	P
Methanol	P	P	P
Ethanol	800	700	P
Acetone	900	800	9000
Isopropyl alcohol	0.1	0.1	1000
1-Propanol	6	1	1000
tert-Butyl alcohol	0.3	0.3	5
Methyl ethyl ketone	0.4	0.1	3
Ethyl acetate/2-Butanol	P	P	P
Isobutyl alcohol	0.1	0.05	2
1-Butanol		0.001	
2-Methyl-3-buten-2-ol	3	0.2	20
2-Methyl-2-butanol	0.1	0.06	
3-Methyl-2-butanol	0.03		0.1
2-Methyl-1-butanol			
2-Methyl-2-pentanol			
1-Pentanol	P	P	P

[a] All concentrations have one significant figure.
P = present, but concentration not determined.
2 liters ⇒ 0.05 ml = 2 liters of water distilled to 0.05 ml.

produced at Hyrum Reservoir by actively growing algae or a result of an algae-bacteria association during active algae growth. During the early winters (January-February) of both 1975 and 1976, the ethanol concentration increased in the reservoir. Higher ethanol concentrations in the water column occurred where the algae were in highest population (Table 10).

Since there was little water movement (16-inch ice cover and a 4°C water temperature on the bottom), the ethanol was probably produced near the top, where the heaviest algal concentration was located. The algae were still actively growing at this time (see Figure 14) and may have been involved in some way in the production of ethanol.

Organics probably produced by bacterial action on detritus material. Analysis of the interstitial water from the bottom muds of Hyrum Reservoir showed consistently higher acetone concentrations than the water above the muds. On all four mud sampling occasions the unconcentrated interstitial mud water was higher in acetone concentration than the water in the reservoir (Figures 15a and 15b). Since there was no algal activity at these depths (microscope examination), it was suspected that bacterial fermentation was taking place. When the interstitial mud water was concentrated, it did show organic compounds to be at higher concentrations than in the water above the muds (see column 4 of Table 8). With little mixing in the reservoir and with the bottom muds acting as a source of some organic compounds, the bottom waters of the reservoir should have been higher in concentration of these organic compounds than the surface waters. This was the case on January 20, 1976 (Figure 16a and 16b and Table 11).

Organics produced by bacterial action on algal material. Since the concentrations of many organic compounds reached their maximum values in the fall while the bloom of *Aphanizomenon flos-aquae* was declining, it was suspected that there was a relation between the two events. *Aphanizomenon flos-aquae* could be found at three positions relative to the water column at Hyrum Reservoir. The organism was either in the water column itself, or on the top or bottom of it. It was not by chance that it occupied these positions, but was related to the well-being of the cells. Microscopic examination showed that the healthiest cells were found in the water column, and that as the cells began to die (lysis), they were unable

Table 9. Concentrations differences between river and snow water from Logan, Utah. Differences established by increasing the sample size distilled.

Compound	Concentration in Distillate (μl/l)			
	3.5 liters ⇒ 0.22 ml		15 liters ⇒ 0.05 ml	
	20 Feb. 1976 Snow (Fresh)	20 Feb. 1976 River	25 Feb. 1976 Snow (Fresh)	19 Feb. 1976 River
Acetaldehyde	47.3	4.8	P	P
Acetonitrile				P
Methanol	1.0	0.01	P	P
Ethanol	2.0	0.9	35.4	11.2
Acetone	16.4	5.3	P	P
Isopropyl alcohol			9.7	3.7
1-Propanol			7.8	1.7
tert-Butyl alcohol			5.4	2.6
Methyl ethyl ketone	3.8	0.1	11.8	6.7
Ethyl acetate/2-Butanol			0.8	0.4
Isobutyl alcohol			3.2	0.2
1-Butanol				0.06
2-Methyl-3-buten-2-ol			2.2	0.35
2-Methyl-2-butanol			5.5	0.75
3-Methyl-2-butanol			7.1	P
2-Methyl-1-butanol			P	
2-Methyl-2-pentanol			P	
1-Pentanol			P	P

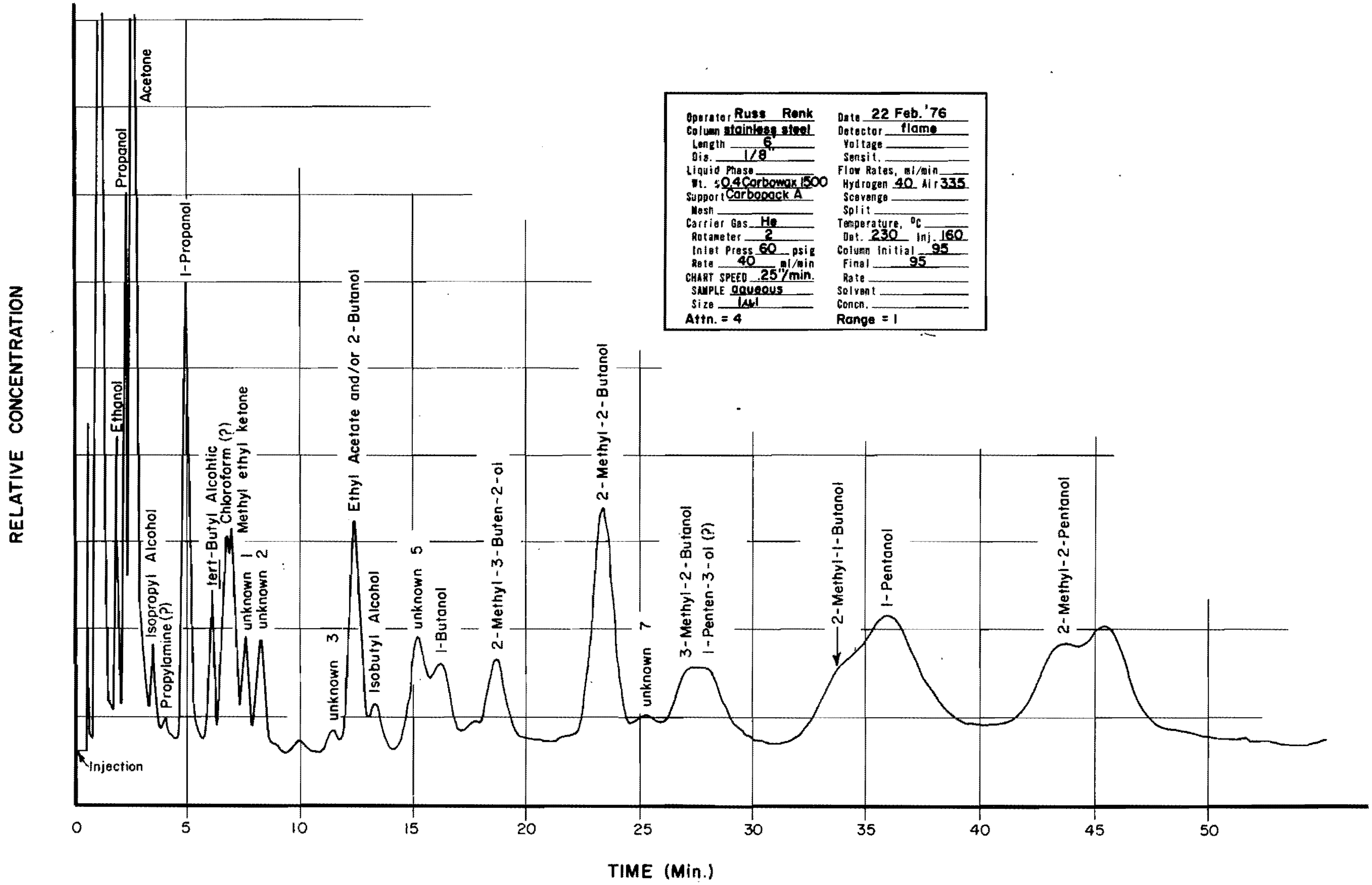
P = present.
15 liters ⇒ 0.05 ml = 15 liters of water distilled to 0.05 ml.

Table 10. Concentration of ethanol and numbers of Stephanodiscus astrea minutula in the water column at Hyrum Reservoir on January 20, 1976.

Depth from Surface (meters)	*S. astrea minutula* Cells/μl	Ethanol Concentration (μl/l) Fresh, Unconc. Water Sample
0	81	0.1
1	78	0.15
2	50	0.1
3	44	0.0
5	40	0.0
7	4	0.0
9	32	0.0
11	6	0.0
13 (bottom)	2	0.0

to maintain this position in the water column and rose to the surface. At the surface, the bundles of *A. flos-aquae* coalesced and upon further decomposition, eventually broke up and settled to the bottom. The algae settled to the bottom because of 1) the loss of entrapped gases (present in the wind blown mats of *A. flos-aquae),* and 2) the formation of akinetes or overwintering spores (decrease in internal gas vacuoles and an increase in cytoplasmic density of the cells thus causing the akinetes to sink) (Wildman et al., 1975) (see Figure 17).

In an effort to study the relationship between the dying algae and the production of organic compounds in the reservoir, algae in varying states of decomposition were collected in 20 liter glass carboys (Figure 18). Algae were collected on September 9, 1975, September 25, 1975, and October 1, 1975. By microscopic examination, it was established that the healthy algae were gathered on October 1, 1975, from the center of the reservoir, and that the most



Operator Russ Renk
Column stainless steel
Length 6'
Dia. 1/8"
Liquid Phase
Wt. % 0.4 Carbowax 1500
Support Carbopack A
Mesh
Carrier Gas He
Rotameter 2
Inlet Press 60 psig
Rate 40 ml/min
CHART SPEED .25"/min.
SAMPLE aqueous
Size 1 μl
Attn. = 4

Date 22 Feb.'76
Detector flame
Voltage
Sensit.
Flow Rates, ml/min
Hydrogen 40 Air 335
Scavenge
Split
Temperature, °C
Det. 230 Inj. 160
Column Initial 95
Final 95
Rate
Solvent
Concn.
Range = 1

Figure 13. Gas chromatogram of 16 liters of melted snow water (Logan, UT, on February 22, 1976) distilled to 0.04 ml. Compounds tentatively identified.

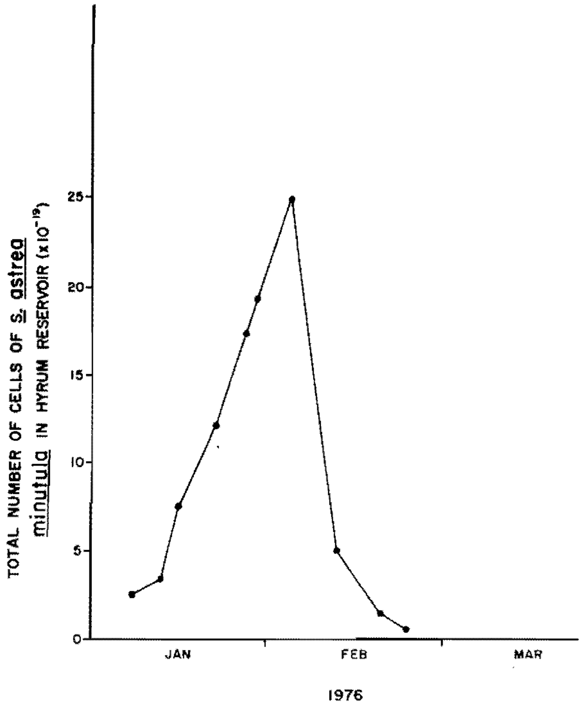


Figure 14. Population of Stephanodiscus astrea minutula *in Hyrum Reservoir, 1976.*

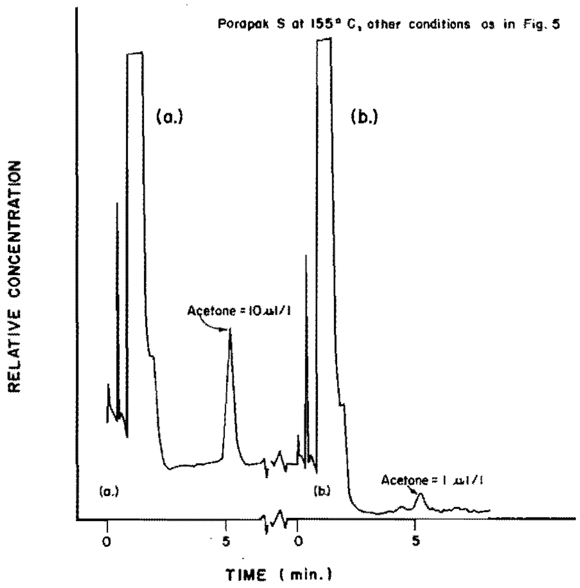


Figure 15. Chromatograms of unconcentrated waters taken from Hyrum Reservoir on January 20, 1976; (a) interstitial water from the bottom muds and (b) 1 meter below the surface.

Table 11. Relative concentrations (area under the peak) of organic compounds are found in higher concentrations near the bottom of Hyrum Reservoir than in the upper waters (January 20, 1976).

Compound	Surface		Bottom	
	Relative Retention Time From Figure 16(a)	Relative Concentration	Relative Retention Time From Figure 16(b)	Relative Concentration
Unknown	0.59	108,309	0.61	86,173
Water	1.00	1,346,927	1.00	1,334,759
Acetonitrile	1.60	45,852	1.59	11,125
Ethanol	1.74	94,122	1.73	93,923
Propanal	2.10	70,580	2.07	34,740
Acetone	2.33	2,425,847	2.30	2,579,177
Isopropyl alcohol	3.12	78,547	3.07	101,551
Propanol (?)	4.59	40,087	4.52	219,671
Diethyl ether (?)	5.41	88,820	5.28	168,060
tert-Butyl alcohol	6.23	92,016	6.08	132,570
Chloroform (?)	6.73	16,425	6.55	13,809
Methyl ethyl ketone	7.29	95,068	7.11	90,332
2-Butanol (?)	8.74	13,671	8.42	436,546
Unknown	9.59	463	9.99	3,283

(?) = Not confirmed at the time of analysis but suspected from later data.

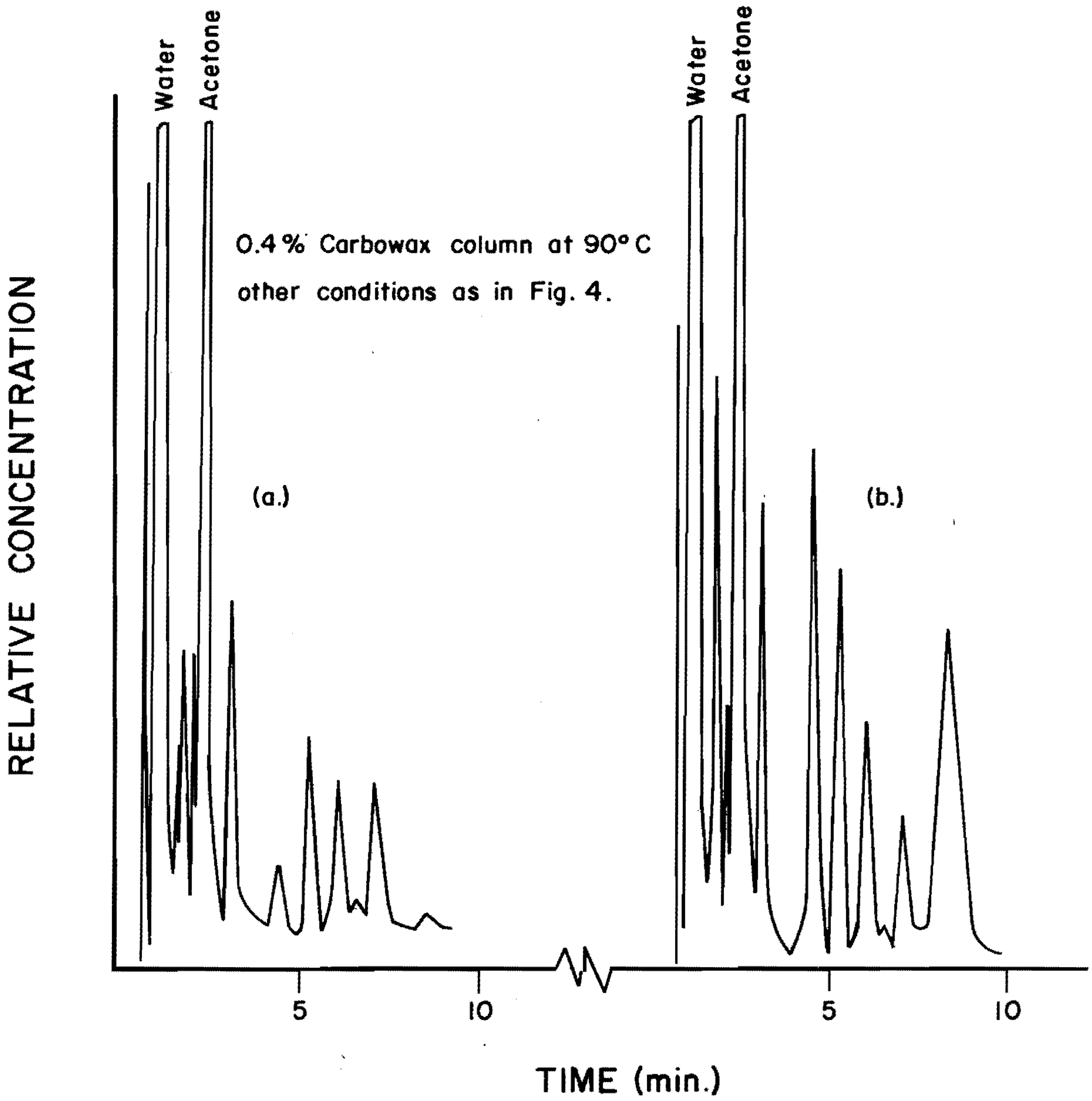


Figure 16. Chromatograms of (a) the distillate (0.2 ml) of 12 liters of water from the surface at Hyrum Reservoir on January 20, 1976, (b) the distillate (0.2 ml) of 6 liters of water taken near the bottom of Hyrum Reservoir on January 20, 1976.

advanced state of decomposition was found to be the algae gathered from along the shoreline on September 25, 1975. Many of these algae had lost their pigment (phycocyanin stains the shoreline of the reservoir in the late fall). Intermediately decomposing algae were gathered on September 9, 1975, from large mats of algae forming on the reservoir surface.

Three water samples were periodically sampled from each carboy. One sample from the top (just under the band of dying algae), a second sample from the middle of the carboy, and a third sample off the bottom (just above the advanced decaying algae). The samples were analyzed by gas chromatography to determine the amounts of acetone, ethanol, and methanol present in each sample.

From Figure 19 (carboy No. 1, healthiest cells) it was observed that there was first an increase in the methanol concentration in the top sample, then a

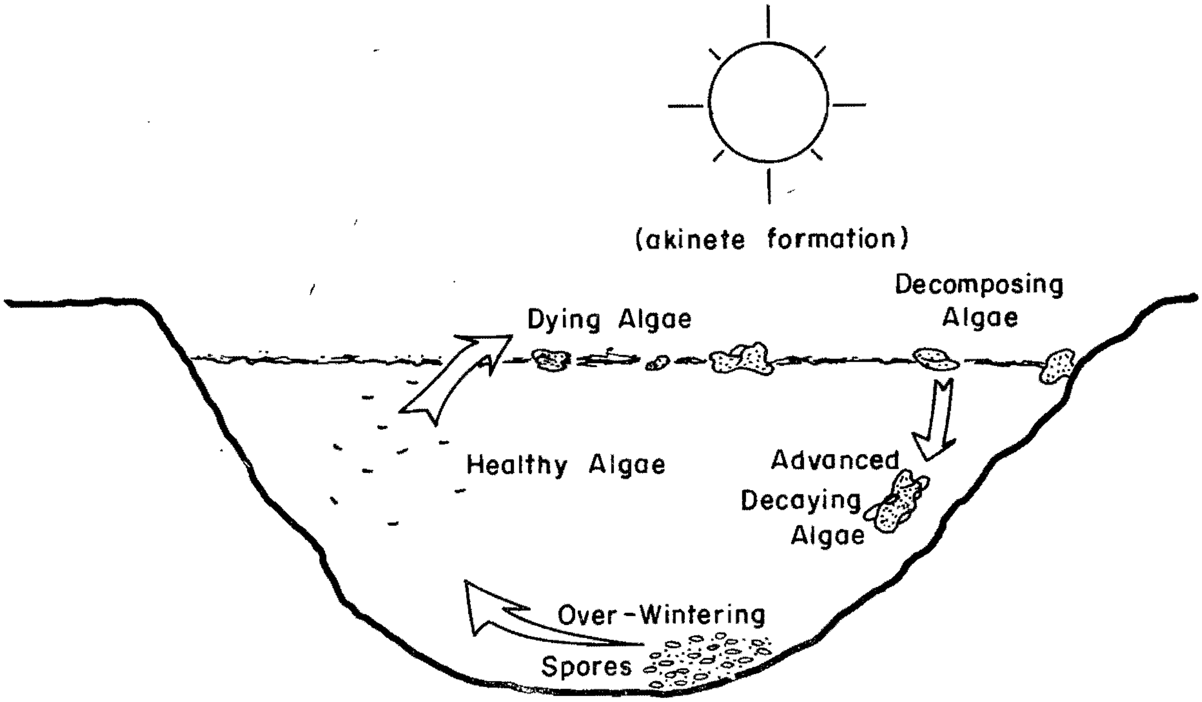


Figure 17. Life cycle of Aphanizomenon flos-aquae *at Hyrum Reservoir.*

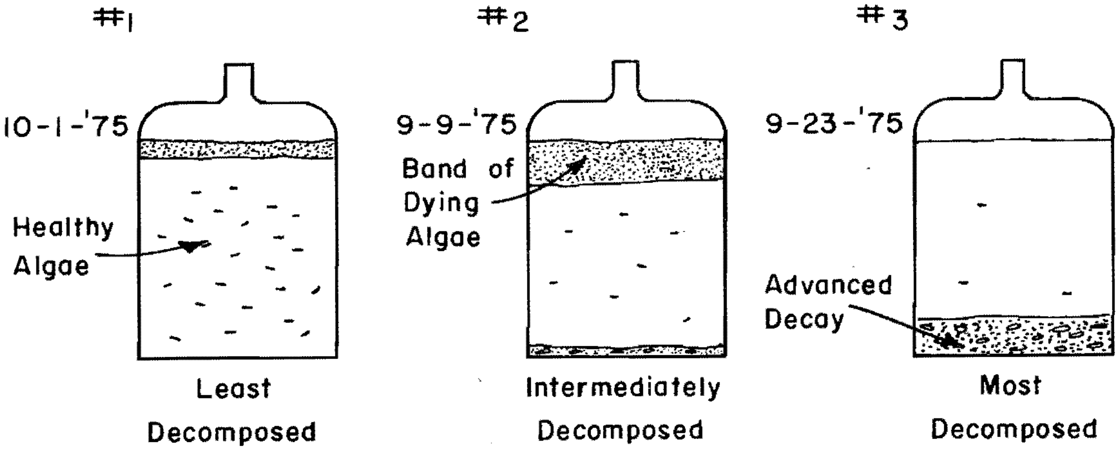


Figure 18. The appearance of carboys filled with algae on October 1, September 9, and September 23 in the fall of 1975 from Hyrum Reservoir. The condition of the algae deteriorated from No. 1 to No. 3.

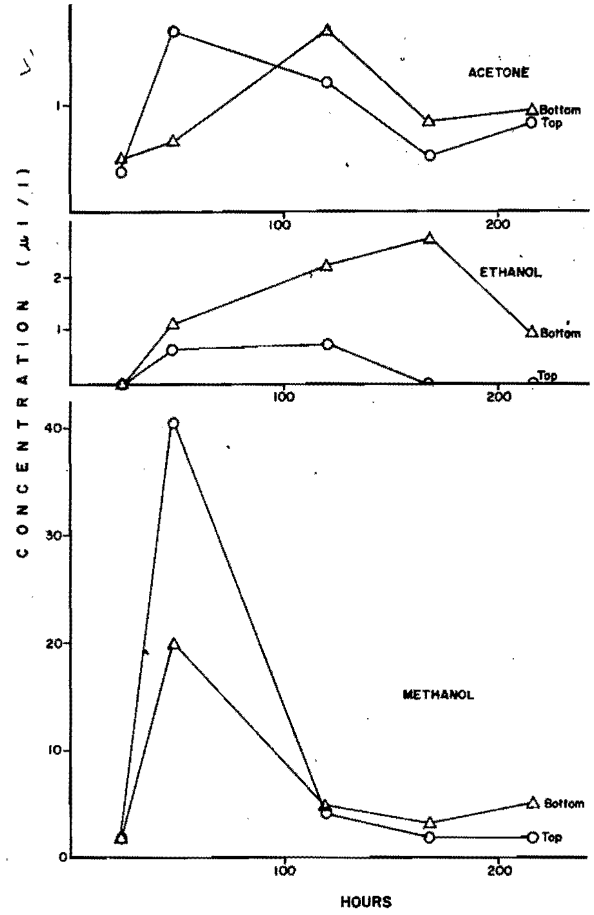


Figure 19. Concentrations of acetone, ethanol, and methanol monitored in carboys filled with algae collected on October 1, 1975, from Hyrum Reservoir.

decrease. Ethanol (in the top and bottom of the carboy) production increased until about 70 to 120 hours into the experiment. It was at this point (70 to 120 hours) that the algae began to drop to the bottom of the carboy. In Figure 20 (carboy No. 2) the top sample again increased in methanol production up to the 100th hour, then decreased. The ethanol concentration (in the top and bottom of the carboy) increased until about 140 hours into the experiment. Again, it was during this time (100 to 200 hours into the experiment) that the algae began to fall to the bottom of the carboy. Results for algae in the advanced stages of decay (Figure 21, carboy No. 3) where most of the algae had already settled to the bottom showed that most of the production of methanol and ethanol was from the bottom. This was also the case in the other carboys (the bottom production of ethanol and methanol was always greater in the more advanced stages of decay, i.e. longer experiment times). The production of acetone had its highest value in the most advanced stages of decay.

Acetone, ethanol, and methanol were most likely the products of fermentation, since the algal cells were in no condition for photosynthesis. However, one must consider that these products could be released directly from cell lysis. If, indeed, they were produced by lysis, then lysing the cells should increase the concentration of ethanol, acetone, and methanol in a solution containing algae cells. Water solutions containing heavy cell populations were taken from the carboys before the experiments had begun and were subjected separately to: 1) centrifugation (33,000 rpm for 20 minutes), 2) sonification, and 3) heating. None of these methods of lysis increased the concentration of acetone, ethanol, or methanol. Therefore the reactions in the carboys were:

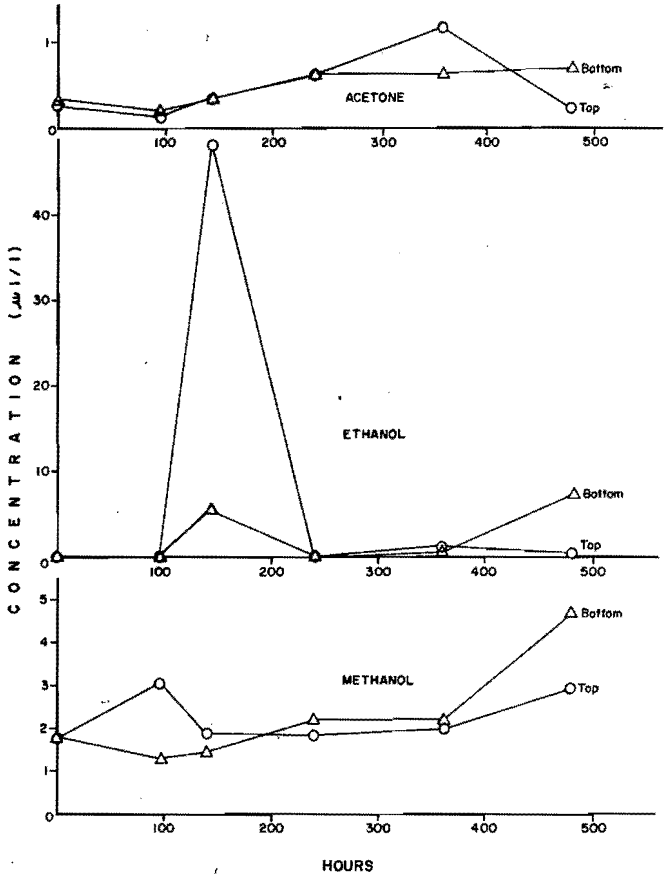


Figure 20. Concentrations of acetone, ethanol, and methanol monitored in carboys filled with algae collected on September 9, 1975, from Hyrum Reservoir.

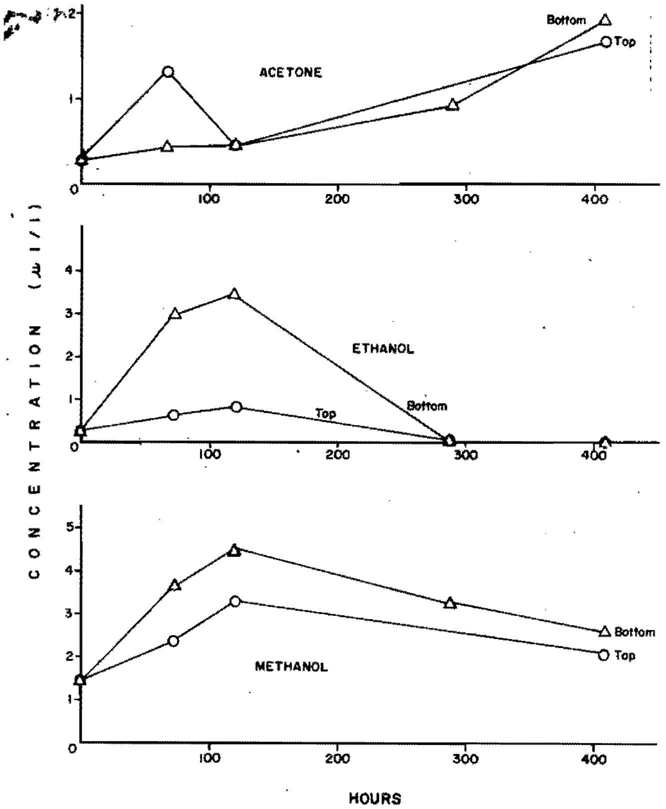


Figure 21. Concentrations of acetone, ethanol, and methanol monitored in carboys filled with algae collected on September 9, 1975, from Hyrum Reservoir.

$$\left.\begin{array}{l}\text{Organic}\\\text{Algal}\\\text{Matter}\end{array}\right\}\xrightarrow[\text{Fermentation}]{\text{Bacterial Action}}\begin{array}{l}\text{Acetone+methanol}\\\text{+ethanol+other organics}\end{array}$$

It also appeared that methanol was first given off as the algae *(A. flos-aquae)* formed dying surface mats, followed by the production of ethanol and finally acetone as the mats settled to the bottom of the reservoir where further decomposition occurred.

This sequence is further supported by observations obtained in the fall of 1974. At the time (early September) large mats of *A. flos-aquae* began to appear throughout the lake and increased concentrations of methanol, ethanol, and acetone were obtained in the surface waters of the reservoir by direct analysis of the water (Table 12).

The highest concentration was of methanol, followed by ethanol and acetone. The methanol peak seemed to occur just before the maximum population (see Figure 22). The same pattern was observed in the late summer and fall of 1975. An increase in methanol occurred in the water prior to the maximum population of *A. flos-aquae* (Figures 11 and 22). Either the dying *A. flos-aquae* excreted methanol or there was a complex algal-bacterial interaction that resulted in its production. The production of methanol, ethanol, and acetone in the more advanced stages of decay (where the algae had no active input) appeared to be a result of bacterial fermentation. Most of the compounds observed were believed to be from this source. Separations of several organic compounds found during the fall are shown in Figure 23.

Table 12. Surface water concentration of methanol, ethanol, and acetone obtained from Hyrum Reservoir (fresh samples) in the fall 1974.

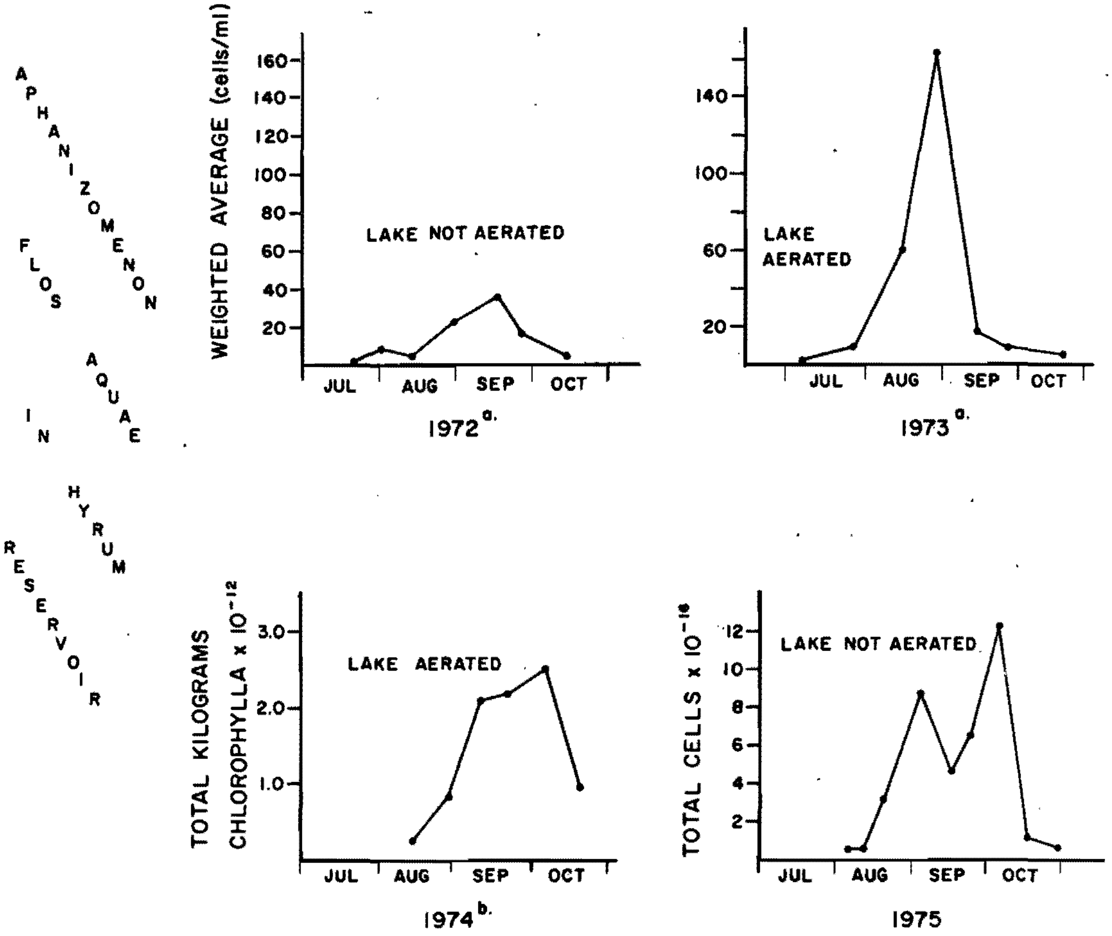
	Methanol	Ethanol	Acetone
Sept. 4, 1974	38.5	0.8	6.1
Sept. 19, 1974	6.1	22.2	34.5
Oct. 1, 1974	<1	0.6	0.8

Effects of Hyrum Organics on Algal Growth

In general there was no change in the growth rate or the cell population when various algae were subjected to the concentration levels of organics found in the reservoir (Adams et al., 1975). Higher orders of magnitude organic compound concentration generally decreased growth (Adams et al., 1975).

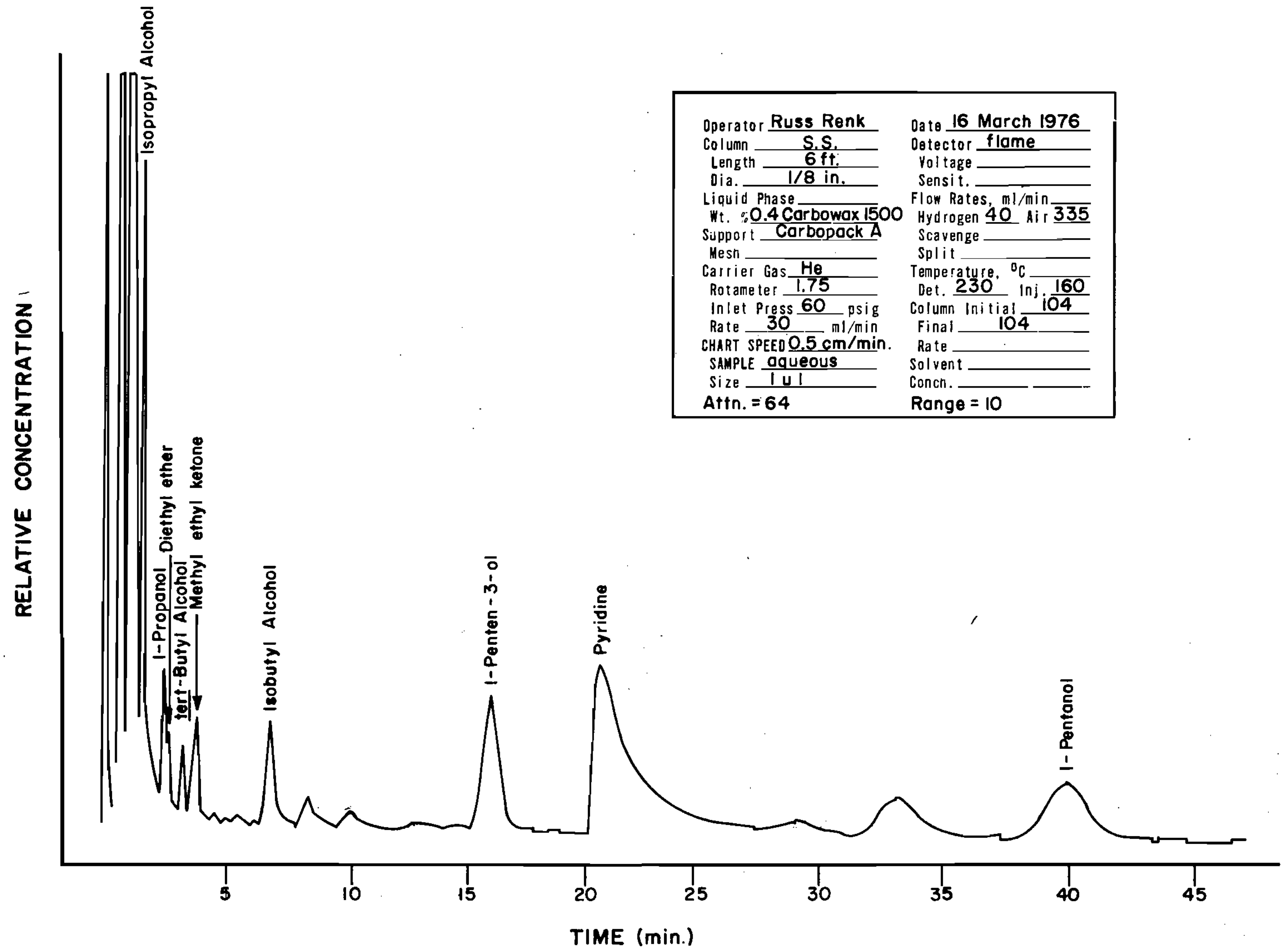
Flakes of *A. flos-aquae* were taken from Hyrum Reservoir on July 22, 1976, and placed under standard (EPA, 1971) bioassay conditions except that the growth medium used was ASM-1 (Carmichael and Gorham, 1974) and air was gently blown through sterile cotton into the solutions. Thirty solutions were prepared; two acted as controls, one was spiked with the volatile distillate from 5 liters of Hyrum Reservoir water, the other 27 had added one of the 27 compounds listed in Table 1 at a concentration of 100 μl/l; 1-methyl-2-pentanone was used in place of 4-methyl-3-penten-2-one.

Within three days the few flakes of *A. flos-aquae* added to each flask had lost its color and broken up, except for four flasks which had increased in their number of cells. The flask with the highest number of cells was that containing *tert*-butyl alcohol, followed by that to which was added the volatile distillate, and then well behind these two were the two flasks containing 1-penten-3-ol and 4-methyl-2-pentanone. This experiment was repeated with the same observations.



a. Data furnished by Dr. Douglas Drury who also set up aeration of the lake (Drury et al., 1975).
b. Data furnished by John Gill, unpublished data, Utah State University.

Figure 22. Relative amounts of Aphanizomenon flos-aquae in Hyrum Reservoir for the years 1972 through 1975.



Operator Russ Renk
Column S.S.
Length 6 ft.
Dia. 1/8 in.
Liquid Phase
Wt. % 0.4 Carbowax 1500
Support Carbopack A
Mesh
Carrier Gas He
Rotameter 1.75
Inlet Press 60 psig
Rate 30 ml/min
CHART SPEED 0.5 cm/min.
SAMPLE aqueous
Size 1 ul
Attn. = 64

Date 16 March 1976
Detector flame
Voltage
Sensit.
Flow Rates, ml/min
Hydrogen 40 Air 335
Scavenge
Split
Temperature, °C
Det. 230 Inj. 160
Column Initial 104
Final 104
Rate
Solvent
Concn.
Range = 10

Figure 23. Gas chromatogram of 3 liters of Hyrum Reservoir surface water (collected on September 4, 1975, filter, frozen and thawed for analysis on March 15, 1976) distilled to 0.037 ml.

DISCUSSION

Twenty-seven low molecular weight, volatile, organic compounds found in Hyrum Reservoir during the course of the year, 1975, were identified. The sources of these compounds were: 1) the Little Bear River (melting snow); 2) active algal growth; 3) bacterial fermentation of the detritus material on the bottom of the reservoir; and 4) bacterial decomposition of algae still in the water column.

Table 13 lists the general sources of low weight organic compounds found in Hyrum Reservoir. It appeared that most volatile organic compounds were produced extensively in the bottom muds. Mountain streams typically had lower concentrations of most of the volatile organics studied than did Hyrum Reservoir. A diagrammatic sketch showing cycling of organic compounds in a natural water system is shown in Figure 24.

Table 13. General sources of low weight organic compounds found in Hyrum Reservoir.

	Compounds Generally Higher in Concentration in Snow Than in Mountain Streams	Compounds Generally Higher in Mountain Streams Than Snow	Compounds Generally Found in Highest Concentration in Interstitial Mud Water	Compounds Generally Associated with Algae Growth	Compounds Generally Associated with an *Aphanizomenon flos-aquae* Bloom Demise
Methanol	X				X
Acetaldehyde	X				
Acetonitrile		X		X	
Ethanol	X			X	X
Propanal	X				
Acetone	X		X		X
Isopropyl alcohol	X		X		X
Propanol	X		X		
Diethyl ether	X				
tert-Butyl alcohol	X		X		
Methyl ethyl ketone	X		X		
Ethyl acetate/2-Butanol	X				
Isobutyl alcohol	X		X		X
1-Butanol		X			X
2-Methyl-3-buten-2-ol	X		X		X
2-Methyl-2-butanol	X				
3-Methyl-2-butanol	X		X		
2-Methyl-1-butanol					
3-Methyl-1-butanol					
1-Penten-3-ol					X
Pyridine					X
1-Pentanol					X
2-Methyl-2-pentanol					X
4-Methyl-3-penten-2-one					X
3-Methylpyridine					X
2-Butenal					X

Only two compounds appeared to be associated with active algal growth, ethanol, and acetonitrile; in particular these seemed to be associated with diatom growth and with a green alga *(Chlamydomonas sp.)*. In Figure 11 there are five peaks for acetonitrile, and each of these corresponds to a dominant diatom population in the water at that time (see Table 14 and Figures 11 and 14). In Figure 12 there are six peaks for ethanol, four of these are associated with algal growth, two with algal breakdown; again diatoms and *Chlamydomonas sp.* growth were dominant (see Table 15).

The ethanol peaks (Figure 11) in August 1975 and September 1975 corresponded to decreases in the *A. flos-aquae* population (see Figure 22). The increase in ethanol was probably due to the breakdown of the *A. flos-aquae.* Other organic compounds which exhibited this pattern (increases in late August 1975 and September 1975) were acetone, methanol, 1-butanol, propanol, isobutyl alcohol, methyl ethyl ketone, 2-methyl-3-buten-2-ol, *tert*-butyl alcohol, and isopropyl alcohol. These 10 compounds, of the 13 shown in Figure 11, all have the double peaks in late August and September of 1975; only two of the 13 monitored compounds did not substantially increase with the algal population decline in September 1975. These two compounds were acetonitrile and acetaldehyde.

Figure 22 indicates that during the years 1973 and 1974 when the lake was mixed by aeration (Drury et al., 1975), the bloom of *A. flos-aquae* reached only a single maximum; in non-mixed years (1972 and 1975), the algae exhibited a bimodal curve. This indicated that there may have been a limiting factor in the reservoir for the growth of this blue-green alga. Larger molecules need to be studied to further explore the possibility that there may be a limiting organic compound in the reservoir or supplied to it.

Table 14. High acetonitrile concentration and the corresponding dominant algae at that time in Hyrum Reservoir.

Acetonitrile Peak	Dominant Algae[a] at That Time in Hyrum Reservoir
December 1974	*Asterionella formosa*
February 1975	1) *Chlamydomonas sp.* 2) *Asterionella formosa*
July 1975	*Asterionella formosa*
September 1975	1) *Aphanizomenon flos-aquae* 2) *Melosira sp.*
February 1976	*Stephanodiscus astrea minutula*

[a] See Appendix K for actual numbers.

Table 15. High ethanol concentrations and the corresponding dominant algae at that time in Hyrum Reservoir.

Ethanol Peak	Dominant Algae at That Time in Hyrum Reservoir
December 1974	*Asterionella formosa*
February 1975	*Chlamydomonas sp.*
April 1975	*Chlamydomonas sp.*
June 1975	*Asterionella formosa*
August 1975	*Aphanizomenon flos-aquae* (breakdown)
September 1975	*Aphanizomenon flos-aquae* (breakdown)

The effects of the compounds found are still largely unknown. Only five compounds have been subjected to bioassays (Adams et al., 1975) and then only on a limited basis and limited species of algae. Some of the compounds, acting singly or in combinations (especially in the fall of the year when concentrations were relatively high), may affect the algae present. One such effect may be the akinete formation of *A. flos-aquae;* the affects of the 27 compounds found at Hyrum Reservoir need to be tested on *Aphanizomenon flos-aquae* singly and in combination. There was some indication that volatile organics increase the net growth of *Aphanizomenon flos-aquae.* In particular *tert*-butyl alcohol and the volatile distillate of water from Hyrum Reservoir seemed to have had this effect (also 1-penten-3-ol and 4-methyl-2-pentanone but to a lesser extent).

The winter bloom of *S. astrea minutula* was of special interest since light, temperature, and pH vary greatly during the bloom time. The bloom has occurred as early as October and as late as May.

In contrast *A. flos-aquae* seemed to always appear in late July after the bottom water temperature was above 12° C, and seemed to finally disappear from the water column in the fall of the year when again the water temperature reached 12° C. Further work needs to be done to demonstrate if this is indeed the case and to observe if certain organic compounds affect the germination of the akinete.

Cause and effect relationships also need to be established regarding the compounds (acetonitrile and ethanol) which appear to be associated with algal activity.

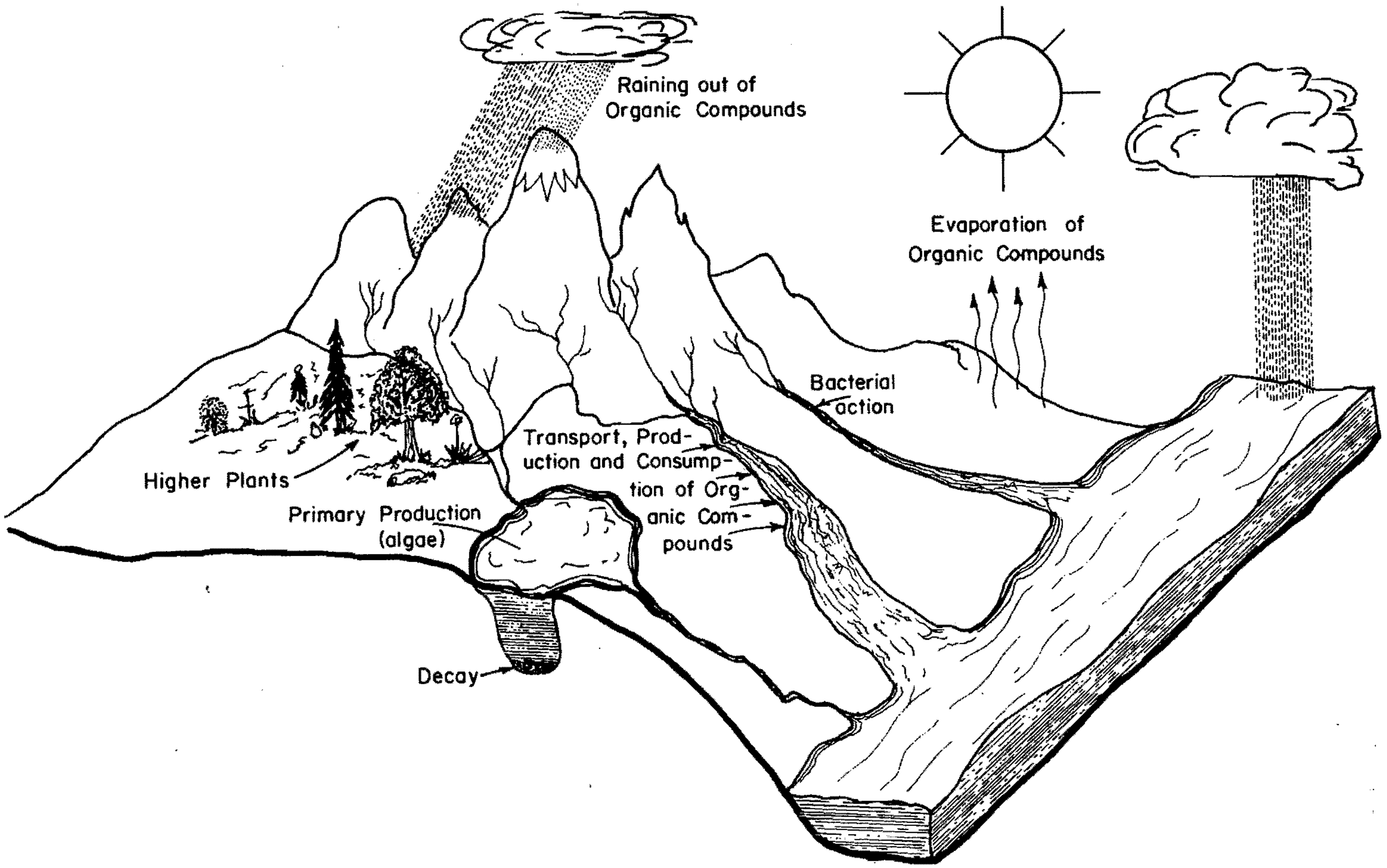


Figure 24. Cycling of organic compounds in a natural water system. Decaying algal material serves as a very large organic input to the system after a large algal bloom.

CONCLUSIONS

1. Twenty-seven volatile organic compounds (listed in Table 13) were found to be present at sometime during the year 1975 in Hyrum Reservoir.

2. Only two of these compounds, acetonitrile and acetaldehyde, did not increase sharply as the algal bloom decreased in the fall.

3. Only two of the compounds, acetonitrile and ethanol, appeared to be associated with active algal growth.

4. The highest concentrations of volatile organic compounds occurred in the late summer or early fall as the bloom of *Aphanizomenon flos-aquae* died.

5. Trace amounts of organic compounds were present in even the purest of water, whether it was freshly fallen snow or water processed by physical-chemical treatment.

6. Trace amounts of volatile organic compounds were quantitatively determined as low as 1 picoliter/liter (1-butanol, Table 8) by the use of standard curves and standard addition of known compounds.

7. It was estimated that five compounds composed over 50 percent of the yearly average dissolved organic matter in Hyrum Reservoir. They were acetone (17.4 percent), acetaldehyde (13.1 percent), ethanol (10.8 percent), methanol (5.2 percent), and isopropyl alcohol (4.1 percent).

8. Organic compounds may affect algal growth at Hyrum because there was some indication that the net growth of *Aphanizomenon flow-aquae* appeared to be affected by volatile organic compounds, particularly, *tert*-butyl alcohol (100 μl/l).

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Appendix A

Physical Characteristics of Hyrum Reservoir (From Drury, 1975)

Hyrum Reservoir	
Storage Began	1935
Capacity	
Maximum Level	23.1 x 10^6 Cubic Meters (≈ 18,700 ac-ft)
At Spillway	16.4 x 10^6 Cubic Meters (≈ 13,300 ac-ft)
Maximum Depth	
Maximum Level	23 Meters (≈ 76 feet)
At Spillway	19 Meters (≈ 62 feet)
Surface Area	
Maximum Level	194 Hectares (≈ 485 Acres)
At Spillway	173 Hectares (≈ 433 Acres)
Average Depth	
Maximum Level	11.9 Meters (≈ 39 feet)
At Spillway	9.4 Meters (≈ 31 feet)
Average Inflow	80 x 10^6 Cubic Meters/Yr (65,000 ac-ft/yr)
Average Residence Time (Volume/Average Inflow)	
Maximum Level	88 Days
At Spillway	79 Days
Watershed Area	570,000 Hectares (≈ 1,400,000 acres)

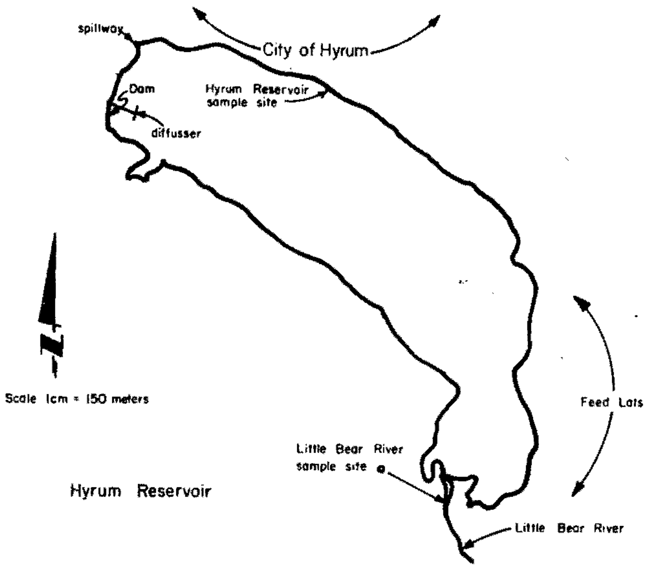
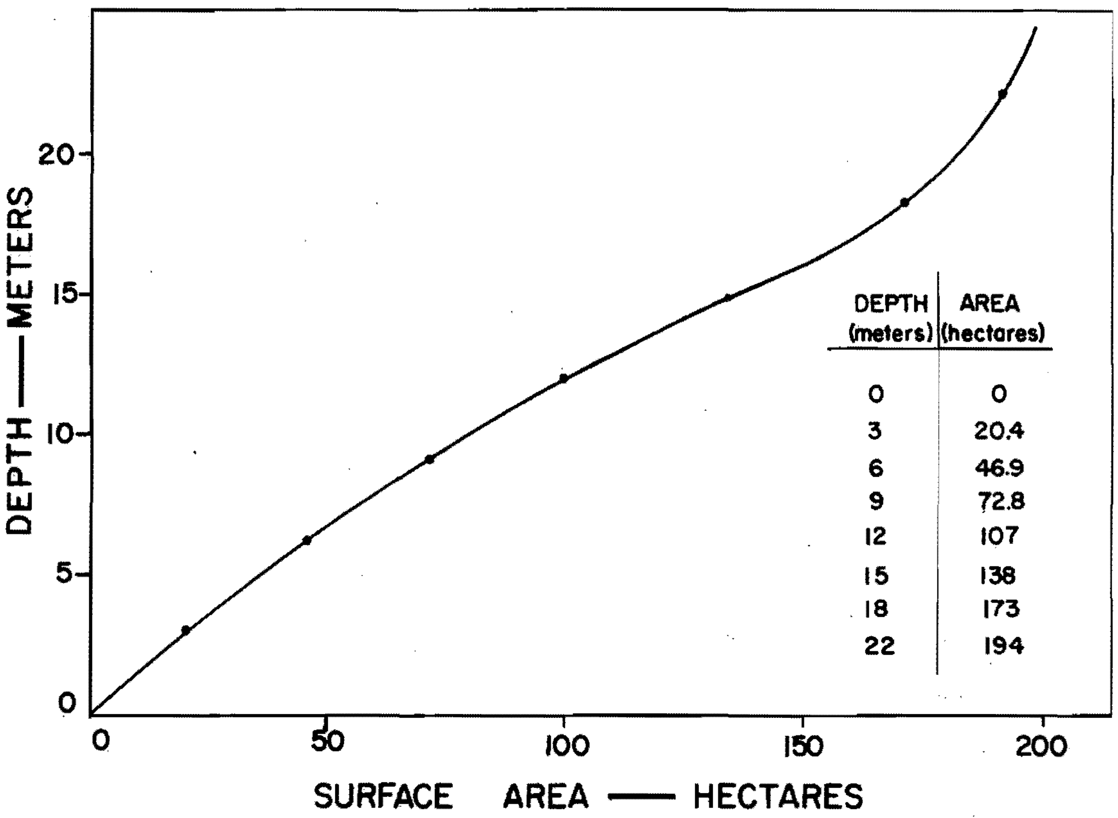
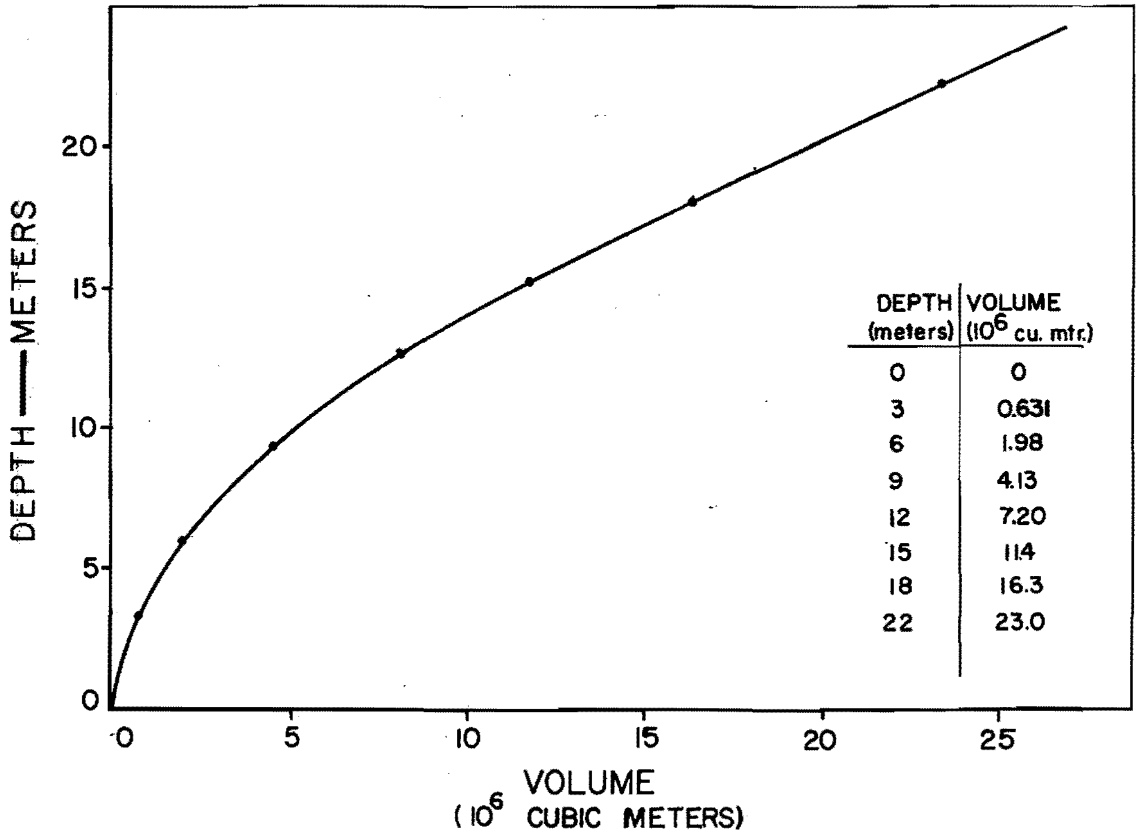


Figure 25. Map of Hyrum Reservoir showing sample sites and location of diffuser.



DEPTH (meters)	AREA (hectares)
0	0
3	20.4
6	46.9
9	72.8
12	107
15	138
18	173
22	194

Figure 26. Surface area of Hyrum Reservoir as a function of depth.



DEPTH (meters)	VOLUME (10^6 cu. mtr.)
0	0
3	0.631
6	1.98
9	4.13
12	7.20
15	11.4
18	16.3
22	23.0

Figure 27. Volume of Hyrum Reservoir as a function of depth.

Appendix B

Relative Retention Times of Known and Unknown Organic Compounds Isolated from Hyrum Reservoir on the Indicated Dates

Table 16. Relative retention times of known and unknown compounds (from Hyrum Reservoir on the indicated date) obtained by analysis on 0.4 percent Carbowax 1500 at conditions as stated in Figure 3.

Compound[a]	Sample Date															
	S	S	S	25 Sept. 1975	S	S	31 July 1975	6 Aug. 1975	S	S	19 Aug. 1975	24 Oct. 1974	S	S	9 July 1975	S
Acetonitrile		105		105	107	106	106		109	108					108	109
Ethanol	113	113	112	115	115	116	116	118	118	118	118	119	115	119	118	119
Propanal		135		136	138		138	140			139				139	
Acetone	150	150	149	149	153	154	152	156	157	156	155	158	150	157	149	158
Isopropyl alcohol	197	196	199	203	202	206	207	207	207	209	209	208	210	210	207	210
Propanol	267	266	272	284	276	281		285	281	285	288	283	287	285		286
Diethyl ether	292	291		297	300		303	305	306		305	305	304	304	306	
tert-Butyl alcohol	338	338	343	348	348	353	356	354	354	358	358	356	360	355	362	360
Methyl ethyl ketone	388	389	391	396	398	401	404	404	405	406	407	407	408	408	409	410
Unknown No. 1							430	430			435		439			
Unknown No. 2				459			470	468			473		473		473	
Unknown No. 3													546			
Ethyl acetate/2-butanol	541	543	544	543	555	558	565	562	558	566	558	561	556	567	574	568
Isobutyl alcohol	646	650	652	658	662	669	677	665	665	678	680	667	683	676	684	677
Unknown No. 4				798			815				818				811	
Unknown No. 5																
1-Butanol	847	853	847		865	867	875	860	864	877	870	866		875	881	880
2-Methyl-3-buten-3-ol	924	934	929	943	945	951	968	940	938	966	972	941	971	963	956	959
2-Methyl-2-butanol	1006	1011	998		1025	1022		1007	1019	1031		1022		1015	1042	1036
Unknown No. 6													1193		1195	
Unknown No. 7								1227			1242		1259		1264	
Unknown No. 8											1338					
3-Methyl-2-butanol	1372	1391	1357		1393	1382	1365	1347	1376	1397		1379		1379	1410	1403
1-Penten-3-ol				1466			1495	1467					1522		1505	
Pyridine																
Cyclopentanol															1712	
1-Pentanol											1958					
2-Methyl-2-pentanol																
4-Methyl-3-penten-2-ol																
3-Methylpyridine																
Unknown No. 14																
Unknown No. 15																

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[a] The column and conditions used are as follows: 0.4% Carbowax 1500 on Carbopak A, 6 ft. x 1/8 in. ODSS, Col. Temp.: 110°C, Inj. Port: 165°C, Det. 210°C, Flow Rate: 40 ml/min. He, Sample Size: 1 μl, Det: FID (Same and conditions as stated in Figure 3). This table (samples collected in 1974 and 1975) has been arranged showing a moderately increasing trend in the retention times of the compounds reported. The slight variations in the retention times are due to small operational differences in the gas chromatographic conditions from one analysis date to another. Known standards (S) where possible were also run routinely. All times were obtained using a 3380A Hewlett Packard reporting integrator. The relatively retention times reported in the table can be converted to seconds elapsed from time 0 (injection of the sample into the gas chromatograph) by multiplying by 0.6.

Table 16. Continued.

Compound[a]	Sample Date															
	15 Jan. 1975	S	17 Nov. 1974	16 Sept. 1975	6 Aug. 1975	8 Jan. 1975	2 July 1975	26 June 1975	S	S	12 Dec. 1974	29 Nov. 1974	17 June 1975	18 Dec. 1975	10 Nov. 1975	1 July 1975
Acetonitrile				108	109	108	108		111	111					110	110
Ethanol	118	118	117	118	121	118	119	118	120	121	121	122	121	120	121	122
Propanal	139		141	139	140	139	140	140			142	143		133	143	
Acetone	151	157	149	156	153	149	151	152	160	160	154	153	156	158	161	153
Isopropyl alcohol	210	209	203	210	214	209	211	211	214	214	214	215	214	215	215	215
Propanol	290	285	288	291	290			293	293	293	298	295	292			
Diethyl ether	307		310	307	309	308	310	309	314		315	313	316	316	316	313
tert-Butyl alcohol	362	360	362	362	368	365	366	365	368	369	367	369	367		369	374
Methyl ethyl ketone	410	411	411	411	413	414	415	415	419	419	419	419	419	420	420	420
Unknown No. 1			444					452								
Unknown No. 2	476		476	478	480	480	481	482			486	486	486		491	
Unknown No. 3												560				573
Ethyl acetate/2-butanol	561	572	577	569	584	581	561	568	586	585	580	580	584	575	583	593
Isobutyl alcohol	689	686	685	690	702	698	698	697	705	702	697	697	694	697	698	717
Unknown No. 4			811				830	844							840	
Unknown No. 5												857				862
1-Butanol	874	896	883	896	902	894	901	874	912	912	895	897	902	897	897	892
2-Methyl-3-buten-3-ol	982	980	969		1004		972	998	1005	1001		998	981	989	996	993
2-Methyl-2-butanol		1060	1011	1011		1062	1061	1038	1074	1076		1065	1041	1030	1040	1086
Unknown No. 6					1206	1218	1221								1167	1235
Unknown No. 7	1272		1270			1296	1280	1294			1294	1295	1237		1287	1304
Unknown No. 8	1392		1386				1410	1399							1367	
3-Methyl-2-butanol		1447							1457	1463		1423		1440		1454
1-Penten-3-ol			1502		1529	1550	1545				1537	1552	1520			1574
Pyridine	1677		1675								1709					
Cyclopentanol	1927		2010													
1-Pentanol	2092		2326	2202							2210					
2-Methyl-2-pentanol			2636													
4-Methyl-3-penten-2-ol	2395		3024													
3-Methylpyridine			3541													
Unknown No. 14			4693													
Unknown No. 15			5246													

[a] The column and conditions used are as follows: 0.4% Carbowax 1500 on Carbopak A, 6 ft. x 1/8 in. ODSS, Col. Temp.: 110°C, Inj. Port: 165°C, Det. 210°C, Flow Rate: 40 ml/min. He, Sample Size: 1 μl, Det: FID (Same and conditions as stated in Figure 3). This table (samples collected in 1974 and 1975) has been arranged showing a moderately increasing trend in the retention times of the compounds reported. The slight variations in the retention times are due to small operational differences in the gas chromatographic conditions from one analysis date to another. Known standards (S) where possible were also run routinely. All times were obtained using a 3380A Hewlett Packard reporting integrator. The relatively retention times reported in the table can be converted to seconds elapsed from time 0 (injection of the sample into the gas chromatograph) by multiplying by 0.6.

Table 16. Continued.

Compound[a]	Sample Date															
	15 July 1975	22 Feb. 1975	20 March 1975	8 Jan. 1975	2 Apr. 1975	3 Dec. 1975	S	S	23 Oct. 1975	3 June 1975	23 Dec. 1974	S	11 Oct. 1974	3 Nov. 1975	25 July 1975	4 Sept. 1975
Acetonitrile						111	112	111	111			112		112		
Ethanol	120	122	120	120	122	122	122	121	122	122	122	123	121	123	123	119
Propanal	141	145	142	142	144	145			144	145	143	146	143	146	145	
Acetone	152	155	153	159	158	162	162	162	162	157	161	163	155	162	162	159
Isopropyl alcohol	210	216	216	216	217	217	218	215	218	217	217	218		218	217	218
Propanol				298	300		298	294		301	300	298			301	299
Diethyl ether	314	316	314	315	316	319		318	318	319	316	320	318	320	320	
tert-Butyl alcohol	372	370	372	371	373	373	374	371	375	373	375	374	375	374	374	376
Methyl ethyl ketone	421	422	422	422	423	424	424	424	425	425	425	426	426	426	426	427
Unknown No. 1				450	456	455				456	458		459		456	
Unknown No. 2	489	490	491	490	491	482			495	494	498		494	495	496	538
Unknown No. 3									558							
Ethyl acetate/2-butanol	593	580	578		574	582	593	588	584	586	587	591	601	590	588	599
Isobutyl alcohol	712	703	712		711		712	702	716	708	718	710	716	708	710	714
Unknown No. 4	849				850									848		
Unknown No. 5		868	863		870					866			864		860	864
1-Butanol	919	898	917		910		921	914		906	916	920	904	908	910	
2-Methyl-3-buten-3-ol	1013	992	1014	1028	1067		1016	997		1007	1022	1088	1020	1009	1004	1015
2-Methyl-2-butanol	1085	1063					1083	1079	1044	1047		1085		1040	1040	
Unknown No. 6	1241	1242	1239		1238					1260				1172		
Unknown No. 7	1314	1314	1313							1320	1314		1251	1242		1257
Unknown No. 8													1321	1312	1311	1332
3-Methyl-2-butanol	1464						1471	1460		1452		1472	1441	1442		1440
1-Penten-3-ol	1576	1545	1539		1571					1522			1588			1570
Pyridine	1720															1882
Cyclopentanol	1780															
1-Pentanol	2106	1987														2719
2-Methyl-2-pentanol										2392						
4-Methyl-3-penten-2-ol																3085
3-Methylpyridine																3729
Unknown No. 14																
Unknown No. 15																

[a] The column and conditions used are as follows: 0.4% Carbowax 1500 on Carbopak A, 6 ft. x 1/8 in. ODSS, Col. Temp.: 110°C, Inj. Port: 165°C, Det. 210°C, Flow Rate: 40 ml/min. He, Sample Size: 1 μl, Det: FID (Same and conditions as stated in Figure 3). This table (samples collected in 1974 and 1975) has been arranged showing a moderately increasing trend in the retention times of the compounds reported. The slight variations in the retention times are due to small operational differences in the gas chromatographic conditions from one analysis date to another. Known standards (S) where possible were also run routinely. All times were obtained using a 3380A Hewlett Packard reporting integrator. The relatively retention times reported in the table can be converted to seconds elapsed from time 0 (injection of the sample into the gas chromatograph) by multiplying by 0.6.

Table 16. Continued.

Compound	23 Nov. 1974	27 May 1975	17 Apr. 1975	30 Oct. 1975	S	8 May 1975	1 Oct. 1975	S	13 Oct. 1975	23 Nov. 1974	11 Oct. 1974	2 Sept. 1975	9 Sept. 1975	S	30 Dec. 1974	22 Apr. 1975
Acetonitrile				110	112		113	114	113			115	115		121	120
Ethanol	123	123	119	121	123	123	124	125	124	123	125	126	127	129	134	134
Propanal		145		142			147	148	147		147	149	150		157	156
Acetone	156	156	157	160	163	157	164	163	165	157	158	162	168	171	174	170
Isopropyl alcohol	218	218	218	218	219	219	221	222	222	219	223	224	227	231	241	243
Propanol	301	301	301		301	300	307	305		308	306	312		320	331	335
Diethyl ether	321	320	321	318		322	325	325	326	327	327	329	334	343	350	352
tert-Butyl alcohol	376	375	375	377	378	377	381	382	384	384	384	387	392	402	417	424
Methyl ethyl ketone	428	428	428	428	430	430	434	435	436	438	438	440	446	458	473	477
Unknown No. 1		456	457	454			466					472	482		508	515
Unknown No. 2	498	496	497	494		498	504	504	502	508	508	512	512		549	559
Unknown No. 3										590						
Ethyl acetate/2-butanol	598	585	598	589	599	585	599	599	602	614	617	613	619	641	652	665
Isobutyl alcohol	714	719	714	728	719	717	726	728	729	736	737	741	755	774	801	829
Unknown No. 4		857									860					
Unknown No. 5		897	862			866	870		897	885	880	889				914
1-Butanol	920	917	922	928	931	919	930	941	937	949	943	955			972	1014
2-Methyl-3-buten-3-ol	1014	1022	1014	1045	1021	1019	1034	1044	1039	1049	1051	1057	1070			
2-Methyl-2-butanol		1042			1098	1079		1082	1079					1111	1143	1192
Unknown No. 6				1161			1186							1187		
Unknown No. 7	1252		1242			1270					1310	1311				1252
Unknown No. 8	1324	1340	1322			1332				1365	1371	1374	1384			1448
3-Methyl-2-butanol		1449		1402	1491	1452	1461	1481			1480	1490		1617	1572	1550
1-Penten-3-ol	1581	1584	1582			1585	1598			1638	1629	1648				1674
Pyridine	1825															
Cyclopentanol	2244															
1-Pentanol	2428									2590	2590	2530				
2-Methyl-2-pentanol																
4-Methyl-3-penten-2-ol												3250				
3-Methylpyridine																
Unknown No. 14																
Unknown No. 15																

[a] The column and conditions used are as follows: 0.4% Carbowax 1500 on Carbopak A, 6 ft. x 1/8 in. ODSS, Col. Temp.: 110°C, Inj. Port: 165°C, Det. 210°C, Flow Rate: 40 ml/min. He, Sample Size: 1 μl, Det: FID (Same and conditions as stated in Figure 3). This table (samples collected in 1974 and 1975) has been arranged showing a moderately increasing trend in the retention times of the compounds reported. The slight variations in the retention times are due to small operational differences in the gas chromatographic conditions from one analysis date to another. Known standards (S) where possible were also run routinely. All times were obtained using a 3380A Hewlett Packard reporting integrator. The relatively retention times reported in the table can be converted to seconds elapsed from time 0 (injection of the sample into the gas chromatograph) by multiplying by 0.6.

Appendix C

Relative Retention Times of Known and Unknown Organic Compounds Isolated from Hyrum Reservoir on the Indicated Dates

Table 17. Relative retention times of known and unknown compounds (from Hyrum Reservoir on the indicated date) obtained by analysis of 0.4 percent Carbowax 1500 at conditions as stated in Figure 4.

Compound[a]	Sample Date																
	S	2 Sept. 1975	2 Apr. 1975	S	30 Jan. 1975	9 Sept. 1975	S	4 Sept. 1975	16 Sept. 1975	29 Nov. 1974	22 Feb. 1975	S	3 Dec. 1975	S	23 Nov. 1974	6 Jan. 1975	18 Dec. 1975
Water	44	45	44	45		45	44	46	45	46		46		46	43	47	44
Ethanol (& acetonitrile)	66	67	67	69	64	67	66	65	67	66	68	70	68	70	64	68	68
Acetone	88	89	88	91	84	89	88	88		87	87	92	90	92	84	90	89
Isopropyl alcohol	98			102		100	98	97	100	97		104		103		101	
Propanol (& diethyl ether)	118			122			118	121				125		125			
tert-Butyl alcohol	147	149	149	153	148	150	147	151	151	151	147	156	148	156	149	152	147
Methyl ethyl ketone	172	175	175	180	173	177	172	176	177	177	179	184	180	184	176	179	179
Unknowns No. 1,2,3		191	192		190	193			194	195			196		194		
Ethyl acetate/2-butanol	204	206		213	206		204	209		211	211	217		218	210	213	
Isobutyl alcohol		227	229	225	228	229		234	231	233	234	229	235	230	232	235	235
Unknowns No. 4,5		246	249			249			251				255				255
1-Butanol (& 2-methyl-3-buten-2-ol)	285	289	291	296	292	293	285	294	295	296	298	303	299	304	297	299	299
2-Methyl-2-butanol	332	339	344	346	342	342	332	344	347	349	349	354	351	356	349	350	
Unknowns No. 6,7	364	374	376		378	381	364	381	382	390	392		390		389	385	386
Cyclopentanol No. 8	416																
3-Methyl-2-butanol		436	441	433	440	447	416	447	449	451	451	445	455	447	452	455	454
Unknown No. 9																489	489
3-Pentanol				510	524	533						524		527		527	
Unknown No. 10						565											
2-Pentanol				558			575					574		576			
2-Methyl-1-butanol	575		597	593				598	604	611	610	611	611	614	610	620	
3-Methyl-1-butanol	626			644	646		626	652		662	660	664		666	667		
1-Penten-3-ol								706	710								
Pyridine				712	732						744	753		759	755	750	749
1-Pentanol	770	798	808	808	810	811	818	820	821	830	831	833	835	837	838	838	839
3-Methyl-3-pentanol				848								872		878			
2-Methyl-2-pentanol				942	935	946	903					971		976			
4-Methyl-3-penten-2-ol		1054	1070		1072	1073	1030	1081	1090	1095	1101		1108		1109	1106	1110
3-Methylpyridine								1191							1183		
2-Hexanone				1226								1264		1272			
Unknown No. 11								1330									
Unknown No. 12																	
Unknown No. 13					1656												
Unknown No. 14			1854														
Unknown No. 15								2128		2561					2597		

[a] The column and conditions used are as follows: 0.4% Carbowax 1500 on Carbopak A, 6 ft. x 1/8 in. ODSS, Col. Temp.: 155°C, Inj Port: 210°C, Det. 235°C, Flow Rate: 40 ml/min. He, Sample Size: 1 μl Det.: FID (same conditions as stated in Figure 4). This table (samples collected in 1974 and 1975) has been arranged showing a moderately increasing trend in the retention times of the compounds reported. The slight variations in the retention times are due to small operational differences in the gas chromatographic conditions from one analysis date to another. Known standards (S) where possible were also run routinely. All times were obtained using a 3380A Hewlett Packard reporting integrator. The relatively retention times reported in the table can be converted to seconds elapsed from time 0 (injection of the sample into the gas chromatograph) by multiplying by 0.6.

Table 17. Continued.

Compound[a]	Sample Date																
	19 Mar. 1975	10 Nov. 1975	17 June 1975	12 Dec. 1974	S	6 Aug. 1975	1 Oct. 1975	3 Nov. 1975	17 Apr. 1975	25 July 1975	S	22 Apr. 1975	1 July 1975	19 Nov. 1975	11 Oct. 1974	17 Nov. 1974	S
Water	46	45	47	47	45	45	47	44	47	43	45	46		44	47	48	47
Ethanol (& acetonitrile)	67	68	68	68	69	68	68	67	67	66	68	68	64	67	68	68	70
Acetone	89	89	89	89	91	90	90	89	88	88	90	90	83	89	87	87	93
Isopropyl alcohol					103						102	102					104
Propanol (& diethyl ether)					124	122					123						126
tert-Butyl alcohol	152	147	152	148	155	153	153	153	148	146	154	154	144	147		154	157
Methyl ethyl ketone	179	179	179	180	184	180	180	179	180	178	180	180	177	180	181	182	186
Unknowns No. 1, 2, 3	196	196	197	197		197	198	197		196		198		197			
Ethyl acetate/2-butanol	212		213	214	218	214	214		214		215	215			215	216	220
Isobutyl alcohol	235	235	235	236	230	236	236	235	236	235	236	237	234	236	237	237	
Unknowns No. 4, 5		255						255		254	30	257		257			
1-Butanol (& 2-methyl-3-buten-2-ol)	300	299	300	301	305	302	301	300	302	300	303	303	301	301	303	302	308
2-Methyl-2-butanol	350	352	352	352	357	353	355	349	354	354	354	354	352	341	355	356	361
Unknowns No. 6, 7	387	389	393	389		391	393	391	391	392	388	390	385	393	389	395	
Cyclopentanol No. 8		434											444				
3-Methyl-2-butanol	457	458	455	456	448	455	459	460	456	461	445	458		465	456	458	452
Unknown No. 9			496								485						
3-Pentanol					528			543			504						533
Unknown No. 10																	
2-Pentanol					579				575								583
2-Methyl-1-butanol	624				617	611	620	633		615	620	618		623	619	622	622
3-Methyl-1-butanol			672		670	641	663	651	676		670	663			672	675	674
1-Penten-3-ol										725							
Pyridine		747	753	752	763	757			758		777		753		756	764	766
1-Pentanol	839	839	840	841	841	843	844	845	846	846		847	847	848	848	848	848
3-Methyl-3-pentanol					881						879						885
2-Methyl-2-pentanol					981	980		988			974		991			982	985
4-Methyl-3-penten-2-ol	1107	1113	1111	1113		1120	1122	1119	1119	1119				1120	1121	1117	
3-Methylpyridine			1190										1193		1197	1199	
2-Hexanone					1277												1284
Unknown No. 11									1386			1378	1373		1377		
Unknown No. 12						1632			1547			1544					
Unknown No. 13						1678											
Unknown No. 14																	
Unknown No. 15								2631	2621	2632					2615	2624	

[a] The column and conditions used are as follows: 0.4% Carbowax 1500 on Carbopak A, 6 ft. x 1/8 in. ODSS, Col. Temp.: 155°C, Inj Port: 210°C, Det. 235°C, Flow Rate: 40 ml/min. He, Sample Size: 1 µl Det.: FID (same conditions as stated in Figure 4). This table (samples collected in 1974 and 1975) has been arranged showing a moderately increasing trend in the retention times of the compounds reported. The slight variations in the retention times are due to small operational differences in the gas chromatographic conditions from one analysis date to another. Known standards (S) where possible were also run routinely. All times were obtained using a 3380A Hewlett Packard reporting integrator. The relatively retention times reported in the table can be converted to seconds elapsed from time 0 (injection of the sample into the gas chromatograph) by multiplying by 0.6.

Table 17. Continued.

Compound[a]	23 Oct. 1975	23 Dec. 1974	S	23 Nov. 1975	17 Apr. 1975	3 June 1975	16 Sept. 1975	S	28 Aug. 1975	8 Jan. 1976	8 May 1975	30 Oct. 1975	25 Sept. 1975	15 July 1975	13 Oct. 1975	13 Oct. 1975	S
	Sample Date																
Water			45		47	46	45			44	46	45			47	46	45
Ethanol (& acetonitrile)	68	67	68	68	67	68	69	70	68	68	68	69	66	66	68	68	68
Acetone	89	89	90	86	88	90	91	93	90	90	88	91	87	84	90	90	
Isopropyl alcohol		101						104									98
Propanol (& diethyl ether)								126		123							
tert-Butyl alcohol	154	153	149	153	149	149	153	157	154	147	153	154	146	152	149	154	148
Methyl ethyl ketone	180	180	181	180	180	181	181	187	181	180	181	182	179	178	183	181	
Unknowns No. 1,2,3	197		198	196	197	198	198				199	199	196		199		
Ethyl acetate/2-butanol	216		216	214	214			220	214			216	215	215			215
Isobutyl alcohol	237	237	238	237	237	237	237	232	238	238	237	238	237	236	238	238	238
Unknowns No. 4, 5					256	258	258		258	257	258	258				257	
1-Butanol (& 2-methyl-3-buten-2-ol)	304	303	304	303	302	302	302	307	305	303	303	304	302	304	304	303	303
2-Methyl-2-butanol	355	355	356	355	356	355	357	360	356	355	357		355	356	358	362	360
Unknowns No. 6, 7	392	391	391	387	394	390	391		392	393	390	393	391		397	396	410
Cyclopentanol No. 8		439								448	449						
3-Methyl-2-butanol	447	462	463	457	461	462	460	452	462		461	456	461	456	469	467	
Unknown No. 9							492										
3-Pentanol								534						528			
Unknown No. 10				566	558				569	566				577	556		
2-Pentanol								584								588	
2-Methyl-1-butanol	615	621		617		620	618	632			623			623		633	625
3-Methyl-1-butanol				671		679		677						680			675
1-Penten-3-ol						724											
Pyridine	744		762	759	759	760		773			759	754		767	765		
1-Pentanol	849	849	849	850	850	850	850	851	851	851	851	852	853	853	853	854	846
3-Methyl-3-pentanol								889									883
2-Methyl-2-pentanol	930					981		991						983			977
4-Methyl-3-penten-2-ol			1118		1122	1121	1123				1126			1084	1116	1118	
3-Methylpyridine				1199										1207			
2-Hexanone								1289									
Unknown No. 11						1376											
Unknown No. 12					1555												
Unknown No. 13																	
Unknown No. 14																	
Unknown No. 15					2637	2626									2641		

[a] The column and conditions used are as follows: 0.4% Carbowax 1500 on Carbopak A, 6 ft. x 1/8 in. ODSS, Col. Temp.: 155°C, Inj Port: 210°C, Det. 235°C, Flow Rate: 40 ml/min. He, Sample Size: 1 μl Det.: FID (same conditions as stated in Figure 4). This table (samples collected in 1974 and 1975) has been arranged showing a moderately increasing trend in the retention times of the compounds reported. The slight variations in the retention times are due to small operational differences in the gas chromatographic conditions from one analysis date to another. Known standards (S) where possible were also run routinely. All times were obtained using a 3380A Hewlett Packard reporting integrator. The relatively retention times reported in the table can be converted to seconds elapsed from time 0 (injection of the sample into the gas chromatograph) by multiplying by 0.6.

Table 17. Continued.

Compound[a]	Sample Date																
	S	S	S	25 Sept. 1975	20 Mar. 1975	11 Oct. 1974	24 Oct. 1974	20 June 1975	27 May 1975	8 Jan. 1975	S	27 May 1975	30 Dec. 1974	28 Aug. 1975	2 July 1975	9 July 1975	S
Water		47		45			45		46		45	46					46
Ethanol (& acetonitrile)	68	70	70	69	67	68	67	69	68	67	69	69	68	69	69	69	70
Acetone	89	93	93	91	87	87	89	89	90	86	91	91	90	91	88	92	93
Isopropyl alcohol	98	105	105				101				102		101			104	105
Propanol (& diethyl ether)	123	126	127				122				125		124				127
tert-Butyl alcohol	155	158	103	155	153	147	153	155		153	156	154	155		155	157	159
Methyl ethyl ketone	181	187	191	182	180	182	185	182	182	180	182	183	181	182	182	184	187
Unknowns No. 1,2,3				199			197	200	198			200	198				
Ethyl acetate/2-butanol	224	222	225		215	216				216	218					220	222
Isobutyl alcohol	237		237	239	238	238	238	239	239	238	239	241	239	241	241	242	
Unknowns No. 4, 5														261	260	263	
1-Butanol (& 2-methyl-3-buten-2-ol)	307	309	311	304	303	304	304	306	305	306	307	307	306	306	310	311	312
2-Methyl-2-butanol	357	363	365	355	356	357		358	357	357	359	361	359		360	362	365
Unknowns No. 6,7				394	390	392	396	393	396	392	400	394	398	396	399	403	
Cyclopentanol No. 8	449							445									
3-Methyl-2-butanol		455	456		456	461	461		466	459		469	468	471		467	459
Unknown No. 9																	
3-Pentanol		537	538													536	542
Unknown No. 10																	
2-Pentanol		588	589													580	595
2-Methyl-1-butanol	625	627	627		626	627	629			625	629	631	635	637	636	633	635
3-Methyl-1-butanol	681	681	681	679	682	686	685			686	684	685	689	689	687	688	690
1-Penten-3-ol																	
Pyridine		781	777		762	767		768		770	761		770		771		789
1-Pentanol	847	855	855	856	856	858	859	859	860	860	854	862	863	864	864	865	869
3-Methyl-3-pentanol	884	892	892														
2-Methyl-2-pentanol	985	996	995			994		993		975	986				981	1001	1010
4-Methyl-3-penten-2-ol							1094		1085		1091		1093			1099	
3-Methylpyridine					1216	1198				1217							
2-Hexanone		1297	1292														1319
Unknown No. 11										1383							
Unknown No. 12						1558										1559	
Unknown No. 13					1712					1753							
Unknown No. 14																	
Unknown No. 15																	

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[a] The column and conditions used are as follows: 0.4% Carbowax 1500 on Carbopak A, 6 ft. x 1/8 in. ODSS, Col. Temp.: 155°C, Inj Port: 210°C, Det. 235°C, Flow Rate: 40 ml/min. He, Sample Size: 1 μl Det.: FID (same conditions as stated in Figure 4). This table (samples collected in 1974 and 1975) has been arranged showing a moderately increasing trend in the retention times of the compounds reported. The slight variations in the retention times are due to small operational differences in the gas chromatographic conditions from one analysis date to another. Known standards (S) where possible were also run routinely. All times were obtained using a 3380A Hewlett Packard reporting integrator. The relatively retention times reported in the table can be converted to seconds elapsed from time 0 (injection of the sample into the gas chromatograph) by multiplying by 0.6.

Appendix D

Gas Chromatograph/Mass Spectral Analysis, Finnigan Corporation, Sunnyvale, California

The analysis was done on a Finnigan 3300 GC/MS with a 6100 Data System under the following conditions:

Gas Chromatography

Column Packing:	Porapak P, 80/100 mesh
Column Type:	Glass U-tube, 1/8" i.d. x 5'
Column Temperature:	Programmed from 80°C to 180°C at 10°/min.
Injector Temperature:	200°C

GC/MS Interface

Glass Jet Separator:	230°C
Glass-lined Transfer Line:	210°C

Electron Impact Mass Spectrometry

Analyzer Temperature:	60°C
Analyzer Pressure Reading:	5 x 10^{-5} torr
Electron Energy:	70 eV
Ion Energy:	Programmed
Filament Current:	1 ma.
Electron Multiplier Voltage:	2.3 kV
Preamplifier Setting:	10^{-8} amps/volts

Data System

Calibration of Mass Set:	FC-43 (perfluorotributylamine)
Mass Range Scanned:	10 - 500
Integration Time:	8 msec/amu
Scans/second:	1
Threshold:	1

Three microliters of sample were used for analysis. In the interpretation of the data extensive use of limited mass searches were made to locate and identify the various compounds. Such plots are with the corresponding mass spectra so that it may be seen how the technique is used.

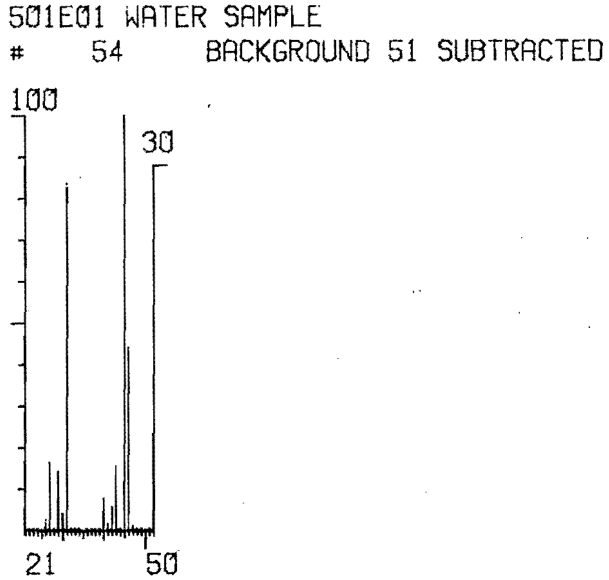


Figure 28. Mass spectrography of an unknown compound with a parent ion peak mass of 46 amu which from Figure 29 was identified as ethanol.

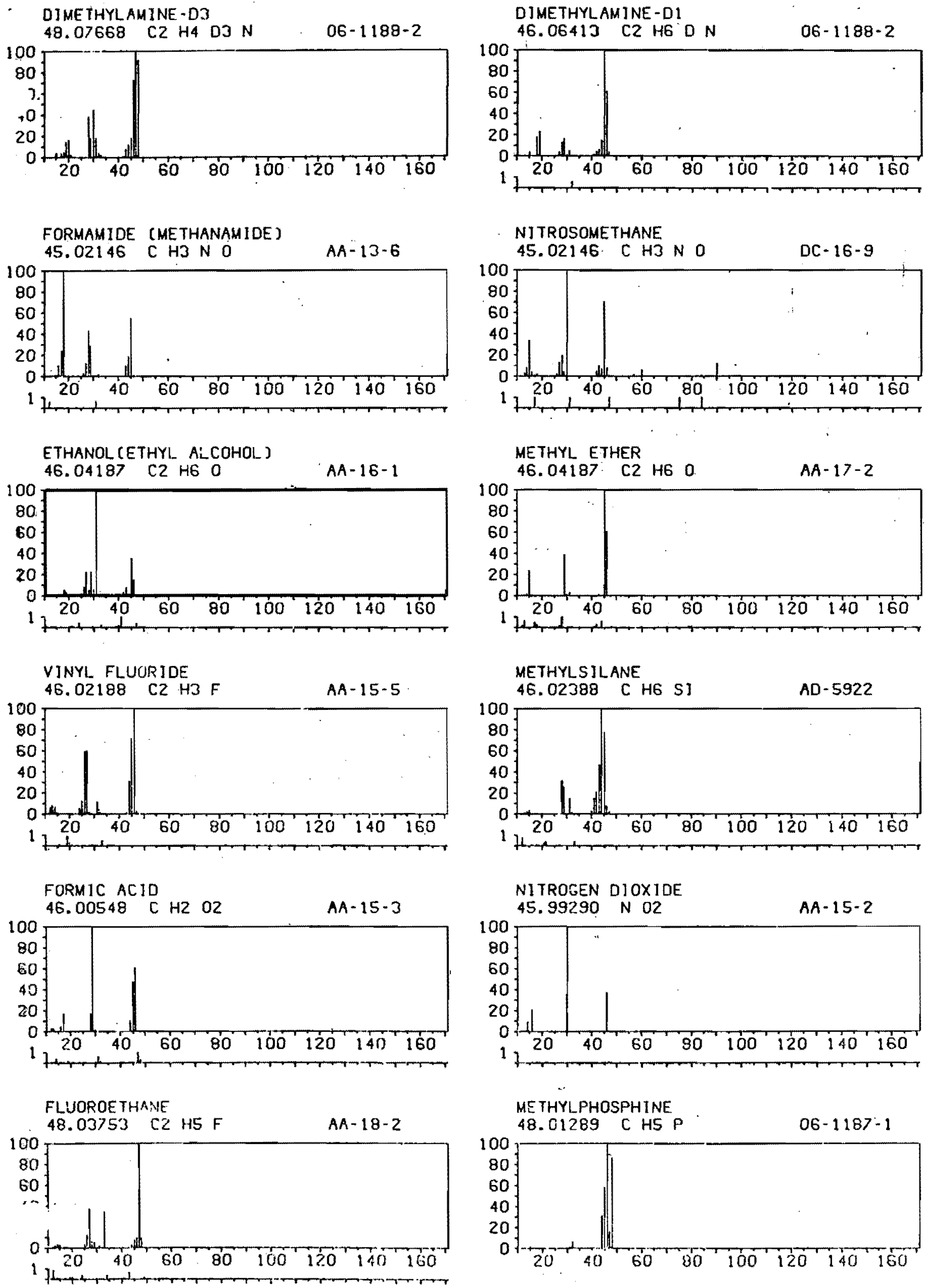


Figure 29. Compounds (from the 6100 data system) having mass spectral characteristics similar to the compound in Figure 28, with the ethanol mass spectrograph matching the one in Figure 28.

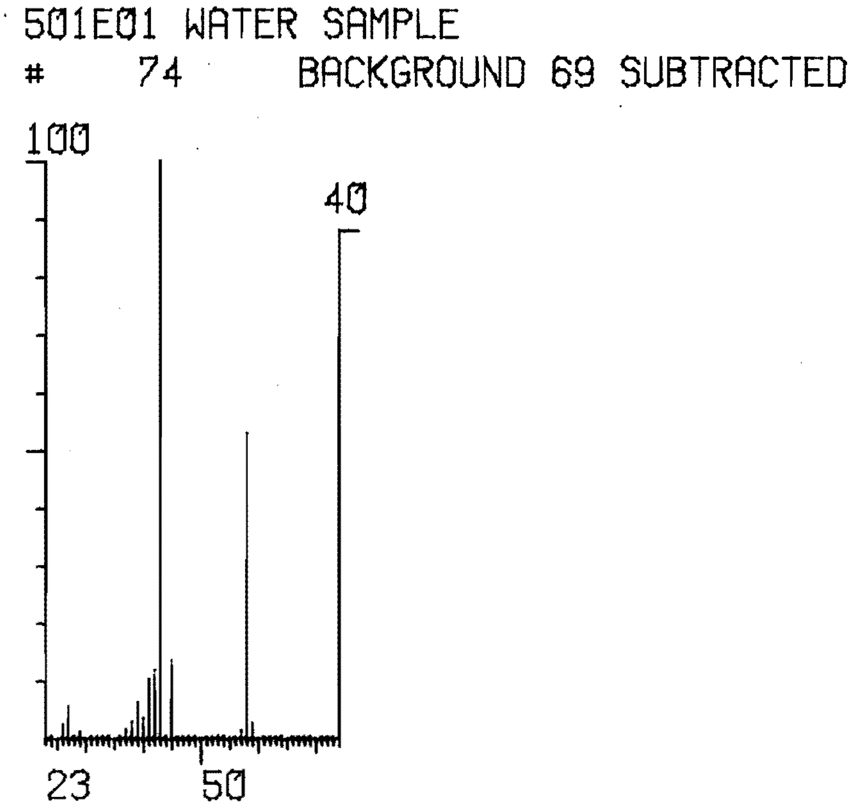
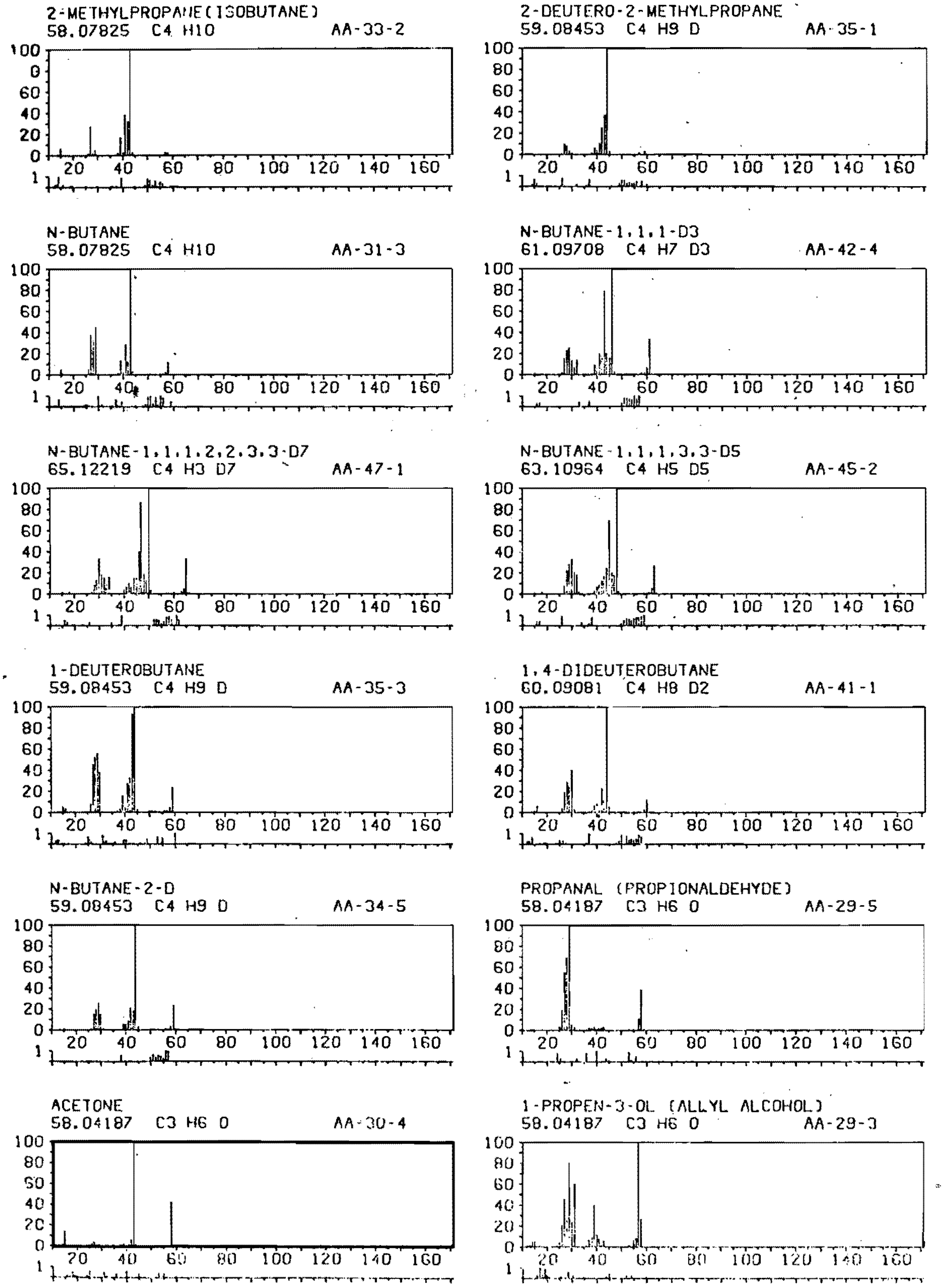


Figure 30. Mass spectrograph of an unknown with a parent ion peak mass of 58 amu which from Figure 31 was identified as acetone.



2-METHYLPROPANE(ISOBUTANE)
58.07825 C4 H10 AA-33-2

2-DEUTERO-2-METHYLPROPANE
59.08453 C4 H9 D AA-35-1

N-BUTANE
58.07825 C4 H10 AA-31-3

N-BUTANE-1,1,1-D3
61.09708 C4 H7 D3 AA-42-4

N-BUTANE-1,1,1,2,2,3,3-D7
65.12219 C4 H3 D7 AA-47-1

N-BUTANE-1,1,1,3,3-D5
63.10964 C4 H5 D5 AA-45-2

1-DEUTEROBUTANE
59.08453 C4 H9 D AA-35-3

1,4-DIDEUTEROBUTANE
60.09081 C4 H8 D2 AA-41-1

N-BUTANE-2-D
59.08453 C4 H9 D AA-34-5

PROPANAL (PROPIONALDEHYDE)
58.04187 C3 H6 O AA-29-5

ACETONE
58.04187 C3 H6 O AA-30-4

1-PROPEN-3-OL (ALLYL ALCOHOL)
58.04187 C3 H6 O AA-29-3

Figure 31. Compounds (from the 6100 data system) having mass spectral characteristics similar to compound in Figure 30, with the acetone mass spectrograph matching the one in Figure 30.

Appendix E

Gas Chromatograph/Mass Spectral Analysis, Material Science Department, University of Utah, Salt Lake City, Utah

The analysis was done on a Hewlett Packard 7620 GC/5930AMS with a 5933A data system under the following conditions:

Gas Chromatography

Column Packing:	Porapak S, 100/120 mesh
Column Type:	1/8" x 5' stainless steel
Column Temperature:	Programmed from 70°C to 190°C at 10°C/min
Injector Temperature:	200°C

GC/MS Interface

Dimethyl silicone membrane:	170°C

Electron Impact Mass Spectrometry

Source Temperature:	200°C
Mass Filter Temperature:	170°C
Inlet Lines:	180°C
Pressure Reading:	3 x 10^{-5} to RR
Electron Energy:	70 eV

Data System

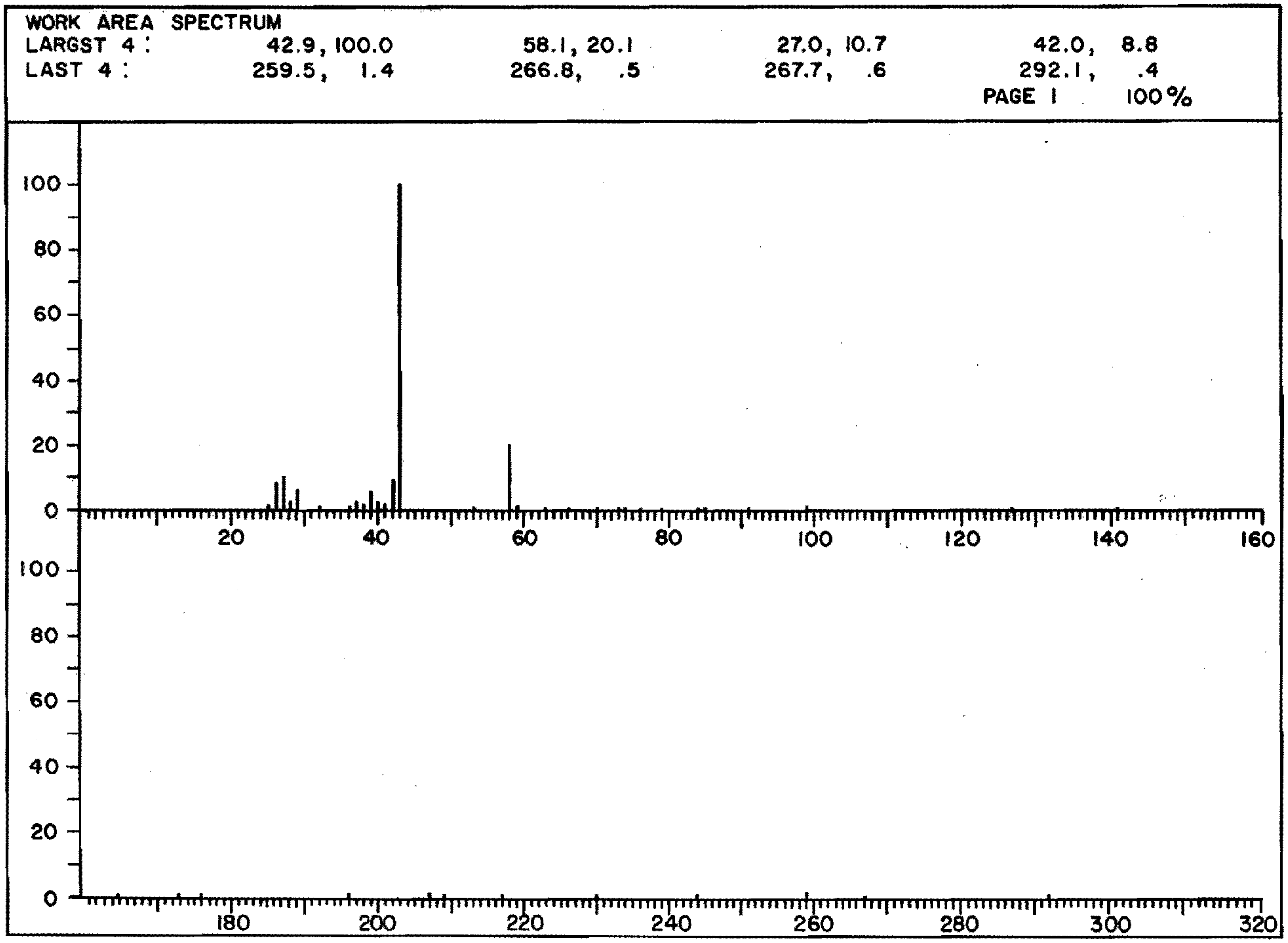
Mass Range Scanned:	23-200

A five microliter aqueous sample was injected using a Hamilton syringe.

Table 18. List of compounds having mass spectral characteristics similar to the unknown compound in Figure 32.

SAMPLE 13007 SPECTRUM 28 RET 1 9 HITS 83

12	9	AZOMETHANE 58
12	8	VINYL METHYL ETHER 58
8	5	ACETIC ANHYDRIDE 102
8	5	HYDRAZOIC ACID (AZOIMIDE) 43
8	5	ACETIC ANHYDRICE 102
8	5	5-METHOXYCARBONYL-5-METHYLISOXAZOLIDINE 145
12	6	2-PROPANONE (ACETONE) 58
12	6	1,2-EPOXYPROPANE (PROPYLENE OXIDE) 58
12	6	TRIMETHYLENE OXIDE 58
12	6	OXETAN 58
16	7	N-METHYLACETAMIDE 73



WORK AREA SPECTRUM

LARGST 4 :	42.9, 100.0	58.1, 20.1	27.0, 10.7	42.0, 8.8
LAST 4 :	259.5, 1.4	266.8, .5	267.7, .6	292.1, .4
				PAGE 1 100%

Figure 32. Mass spectrograph of an unknown with a mass of 58 amu which from Table 18 was identified as acetone.

Appendix F

Gas Chromatograph/Mass Spectral Analysis, Ultrachem Corp., Walnut Creek, California

The analysis was performed on a Finnigan 9500 gas chromatograph connected via a single stage glass jet separator, to a Finnigan Model 3100D quadruple mass spectrometer controlled by a Systems Industries/250 computer system.

Five μl was injected onto a 5 foot stainless steel carbowax 1500 on carbopak A or a Porapak S column. The column was temperature programmed from 90°C to 110°C at 4°C/min. while the mass range of 20 to 200 atomic mass units was scanned in a cyclic continuous recording.

Appendix G

Physical Constants of Organic Compounds (from CRC, Handbook of Chemistry and Physics, 1976-1977)

Table 19. Physical constants of organic compounds (from CRC, Handbook of Chemistry and Physics, 1976-1977).

Compound	Molecular Weight	Melting Point (°C)	Boiling Point (°C) (at 760 mm)	Density at 20°C and Based on Water at 4°C (Unless Otherwise Listed)	Vapor Pressure at 96.1°C (mm)	Solubility in Water
Methanol (carbinol, methyl alcohol, wood alcohol)	32.04	- 97.8	64.96	0.7914	2100	∞
Acetaldehyde (acetic aldehyde, ethanol)	44.05	-121	20.8	0.7834		∞
Acetonitrile (cyanomethane, ethanenitrile, methyl-cyanide)	41.05	- 45.72	80.06	0.7856	800 (at 81.1°C)	∞
Ethanol (alcohol, ethyl alcohol, methyl carbinol)	41.07	-117.3	78.5	0.7893	1200	∞
Propanal (propionaldehyde, propional)	58.08	- 81	48.8	0.8058		slightly
Acetone (2-propanone, dimethyl ketone)	58.08	- 95.35	56.2	0.7899	2400	∞
Isopropanol (2-propanol, isopropyl alcohol)	60.11	- 89.5	82.4	0.7855	1100	∞
1-Propanol (n-propyl alcohol)	60.11	-126.5	97.4	0.8035	590	∞
Diethyl-ether (ether, ethyl ether, ethoxyethane)	74.12	-116.2	34.51	0.71378	4300	slightly
tert-butyl alcohol (2-methyl-2-propanol)	74.12	25.5	82.2	0.7887	1080	∞
Methyl ethyl ketone (2-butanone)	72.12	- 86.35	79.6	0.8054	830 (at 79.6°C)	very
Ethyl acetate (ethyl ether of acetic acid)	88.12	- 83.578	77.06	0.9003	1110	slightly
2-Butanol	74.12	-114.7	99.5	0.808	550	very
Isobutyl alcohol (2-methyl-1-propanol, isopropyl-carbinol)	74.12	-108	108	0.802	440	10 g/100 g H_2O
1-Butanol	74.12	- 89.53	117.25	0.8098	270	slightly
2-Methyl-3-buten-2-ol						
2-Methyl-2-butanol (*tert*-amyl alcohol)	88.15	- 8.4	102	0.8059	620	slightly
3-Methyl-2-butanol	88.15		112	0.8225		slightly
2-Methyl-1-butanol (iso-amyl alcohol)	88.15		128	0.829		slightly
3-Methyl-1-butanol (isopentyl alcohol)	88.15		128.5	0.8092	200	slightly
1-penten-3-ol (ethyl vinyl carbinol)	86.14		114.6	0.8395		slightly
Pyridine (azine)	79.10	- 42	115.5	0.9819	440	∞
Cyclopentanol	86.14	- 19	140.85	0.9478		slightly
1-Pentanol (butyl carbinol, n-amyl alcohol)	88.15	- 79	137.3	0.8144	150	insoluble
2-Methyl-2-pentanol (dimethyl-n-propyl carbinol)	102.18	-103	120.5-1.5	0.8350		slightly
4-Methyl-3-penten-2-ol						
3-Methylpyridine (β-picoline)	93.13	-18.3	144.1	0.9566		∞

Appendix H

Freeze Rotation and Distillation Concentration of Logan River Water Demonstrating Standard Addition Techniques

Water from a mountain stream (Logan River) was collected, filtered, concentrated, and analyzed as described in Materials and Methods section. Water which had no additional organic material added (Table 20, two samples concentrated to two different volumes by freeze rotation, distillation of that volumn collecting the first 10 ml and then distilling that 10 ml volumn, collecting fractions #1, #2, and #3) shows no natural concentration of certain compounds, at detectable levels. However when the samples were enriched with as little as 10 pl/l of these materials, the organic compounds could be concentrated and thus detected (GC) by this scheme (Table 22). The general concept in this appendix was thus used to generate the minimum-maximum concentrations of the various organic compounds (Appendix J) and shows the applicability of the concentrating techniques.

Table 20. Logan River water (3/23/76) with no additional organic enrichment by standard addition.[a]

Concentrating / Compound	Concentrations of Organic Compounds (μl/l)					
	2.79 l	R => 310 ml	=> 10 ml	#1 +0.047 ml	#2 +0.079 ml	#3 =>0.4 ml
Acetonitrile				0.9	0.05	0.03
Ethanol				9.9	3.0	1.8
Acetone				179	48.8	16.9
Isopropyl alcohol				12.7	3.4	1.9
Propanol				4.7	1.5	0.6
tert-Butyl alcohol				0.4	0.09	0.04
Methyl ethyl ketone				26.7	6.4	2.0
Ethyl acetate/2-butanol				6.3	1.3	0.3
Isobutyl alcohol				109	20.3	9.2
1-Butanol						
2-Methyl-3-buten-2-ol						
2-Methyl-2-butanol						

Concentrating / Compound	2.55 l	R =>170 ml	=> 10 ml	#1 +0.063 ml	#2 +0.11 ml	#3 =>0.4 ml
Acetonitrile				0.34	0.1	0.05
Ethanol	0.3	0.67	0.78	8.9	4.0	2.3
Acetone	0.7	1.02	3.86	165	51.2	6.7
Isopropyl alcohol	0.08	0.2	0.28	6.8	2.11	0.73
Propanol		0.01	0.02	2.4	0.8	0.4
tert-Butyl alcohol				0.58	0.16	0.02
Methyl ethyl ketone	0.16	0.23	0.48	11.6	2.9	0.51
Ethyl acetate/2-butanol				3.0	0.8	
Isobutyl alcohol			0.86	45.5	12.7	2.7
1-Butanol						
2-Methyl-3-buten-2-ol						
2-Methyl-2-butanol						

R
=> (Concentrated by freeze rotation)
=> (Concentrated by distillation)

[a] Some small concentration differences can be observed between samples due to the non-uniformity in the starting sample volumes, different degrees of freeze rotation concentration, distillation collection volume variability and the non-linear nature of concentration due to the chemical and physical characteristics of each individual compound.

Table 21. Logan River water (3/23/76) with organic compound concentrations of at least 0.01 pl/l, by standard addition.[a]

Concentrating Compound	Concentrations of Organic Compounds (μl/l)					
	3.1 l	R =>395 ml	=> 10 ml	#1 +0.083 ml	#2 +0.15 ml	#3 =>0.9 ml
Acetonitrile						
Ethanol	0.4	1.15	1.1	9.4	4.3	1.7
Acetone	0.8	1.64	5.2	196	76	12.3
Isopropyl alcohol	0.09	0.72	2.17	95.8	20	8.3
Propanol		0.04	0.1	1.3	0.6	0.13
tert-Butyl alcohol				0.4	0.09	0.02
Methyl ethyl ketone	0.14	0.21	0.5	8.4	2.5	0.54
Ethyl acetate/2-Butanol				2.6	0.8	
Isobutyl alcohol		0.14		44.6	9.0	2.5
1-Butanol				0.005		
2-Methyl-3-buten-2-ol						
2-Methyl-2-butanol						
Concentrating Compound	2.89 l	R =>152 ml	=> 11 ml	#1 +0.068 ml	#2 +0.1 ml	#3 =>0.4 ml
Acetonitrile						
Ethanol	0.4	0.6	1.0	16.6	8.5	5.5
Acetone	0.8	1.1	6.35	220	134	40.5
Isopropyl alcohol	0.09	0.8	1.35	13.6	5.8	3.2
Propanol	0.09	0.15	0.25	2.3	1.1	0.4
tert-Butyl alcohol				0.46	0.2	0.07
Methyl ethyl ketone	0.14	0.24	0.55	7.7	3.5	1.0
Ethyl acetate/2-Butanol			0.07	2.3	1.9	0.16
Isobutyl alcohol		0.1	1.3	65	40	7.5
1-Butanol						
2-Methyl-3-buten-2-ol						
2-Methyl-2-butanol						
3-Methyl-2-butanol						

R
=> (Concentrated by freeze rotation)
=> (Concentrated by distillation)

[a] Some small concentration differences can be observed between samples due to the non-uniformity in the starting sample volumes, different degrees of freeze rotation concentration, distillation collection volume variability and the non-linear nature of concentration due to the chemical and physical characteristics of each individual compound.

Table 22. Logan River water (3/23/76) with organic compound concentrations of at least 10 pl/l, by standard addition.[a]

Compound / Concentrating	Concentrations of Organic Compounds (μl/l)					
	2.53 l	R => 453 ml	=> 13 ml	#1 +0.083 ml	#2 +0.15 ml	#3 =>0.5 ml
Acetonitrile		0.04	0.4	20.0	8.5	6.0
Ethanol	0.4	0.75	1.1	21.5	8.3	6.5
Acetone	0.8	1.4	1.7	59.2	19.4	8.6
Isopropyl alcohol	0.09	0.62	1.1	40.1	12.5	7.6
Propanol		0.08	0.7	34.9	12.0	5.9
tert-Butyl alcohol			0.8	71.2	20.4	5.0
Methyl ethyl ketone	0.14	0.28	1.0	49.5	18.6	3.6
Ethyl acetate/2-Butanol			1.5	96.7	30.2	7.7
Isobutyl alcohol		0.13	0.93	69.6	19.5	5.8
1-Butanol			0.66	72.3	19.6	5.1
2-Methyl-3-buten-2-ol		0.3	0.58	46.9	16.1	7.1
2-Methyl-2-butanol			0.59	72.1	20.5	4.9
3-Methyl-2-butanol			0.81	85.8	23.2	4.5
Compound / Concentrating	3.06 l	R => 197 ml	=> 11 ml	#1 +0.083 ml	#2 +0.18 ml	#3 =>0.9 ml
Acetonitrile		0.08	1.1	24.6	9.7	4.8
Ethanol	0.4	0.33	1.1	20.33	8.4	5.2
Acetone	0.8	0.65	2.9	89.0	9.8	10.7
Isopropyl alcohol	0.09	0.1	1.3	33	11.2	4.5
Propanol			1.4	24.8	9.1	4.3
tert-Butyl alcohol		0.08	1.6	50.6	14.2	4.8
Methyl ethyl ketone	0.14	0.2	1.7	52.6	16.6	2.9
Ethyl acetate/2-butanol		0.13	3.1	93.3	29.11	8.8
Isobutyl alcohol		0.006	1.6	50.5	15.0	4.9
1-Butanol			1.0	54.0	22.6	4.9
2-Methyl-3-buten-2-ol			1.6	36.1	12.1	5.0
2-Methyl-2-butanol			2.1	48.2	13.3	4.6
3-Methyl-2-butanol			1.7	63	15.6	4.7
Compound / Concentrating	3.58 l	R =>347 ml	=> 11 ml	#1 +0.083 ml	#2 +0.11 ml	#3 =>0.4 ml
Acetonitrile		0.029	0.8	31.8	14.1	6.9
Ethanol	0.3	0.7	1.1	29.7	13.5	8.1
Acetone	0.7	3.4	3.7	158.7	60.7	21.1
Isopropyl alcohol	0.08	0.3	1.0	50.5	16.8	7.2
Propanol		0.3	1.0	46.0	16.3	7.5
tert-Butyl alcohol		0.06	1.2	85.7	24.6	8.8
Methyl ethyl ketone	0.12	0.52	1.7	83.1	27.9	7.2
Ethyl acetate/2-Butanol		0.21	2.6	144.3	46.0	14.1
Isobutyl alcohol		1.6	1.8	86.5	25.9	10.1
1-Butanol			2.9	87.5	25.0	8.5
2-Methyl-3-buten-2-ol		0.5	7.2	61	20.5	9.0
2-Methyl-2-butanol			6.7	85	25.2	8.8
3-Methyl-2-butanol			1.2	101.8	31.2	10.5

R
=> (Concentrated by freeze rotation)
=> (Concentrated by distillation)

[a] Some small concentration differences can be observed between samples due to the non-uniformity in the starting sample volumes, different degrees of freeze rotation concentration, distillation collection volume variability and the non-linear nature of concentration due to the chemical and physical characteristics of each individual compound.

Appendix I

Concentration Curves

Section 1. High Concentration Curves

These curves were not used in a strict sense but only in a general way to assist in generating the minimum and maximum concentration values listed in Appendix J. The concentrate steps used here varied greatly with sample size (see page 19).

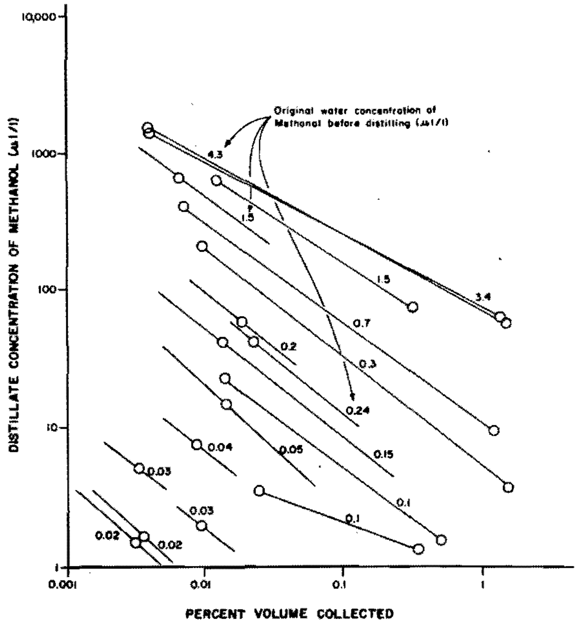


Figure 33. High concentration curves for methanol.

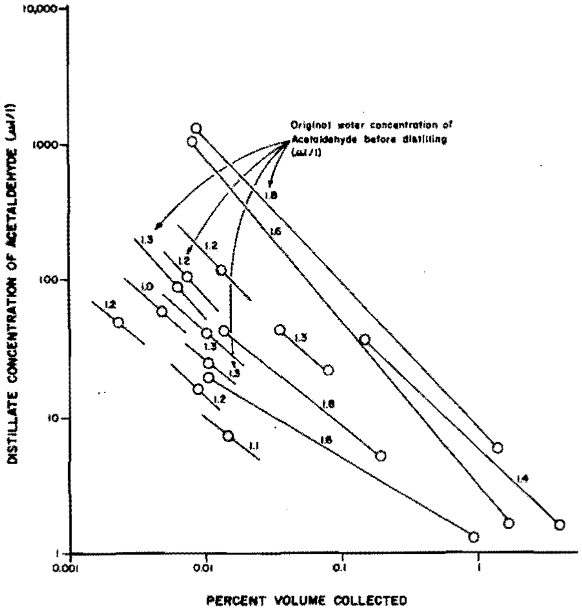


Figure 34. High concentration curves for acetaldehyde.

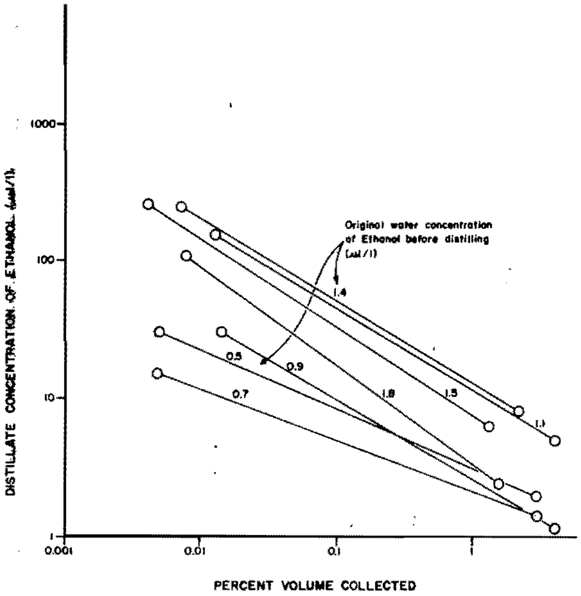


Figure 35. High concentration curves for ethanol.

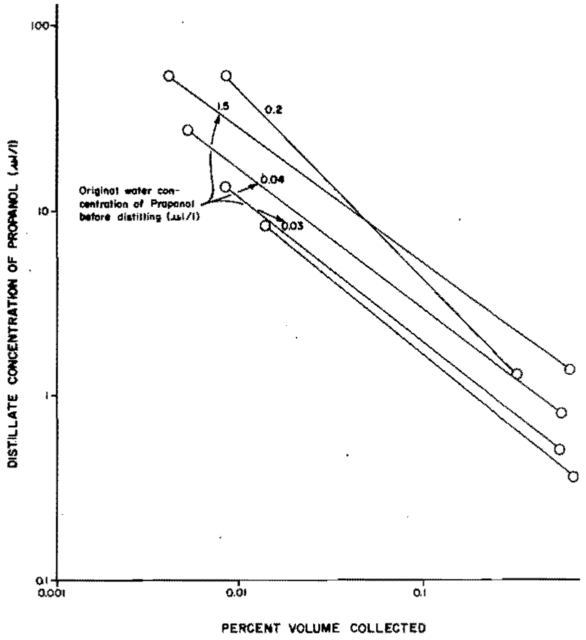


Figure 37. High concentration curves for propanol.

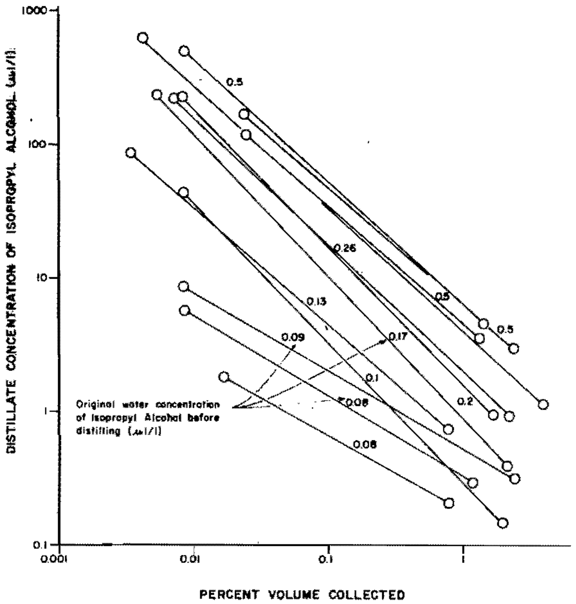


Figure 36. High concentration curves for isopropanol.

Section 2. Concentration Curves

These curves are quantitative when using the steps outlined in Quantative Determinations section.

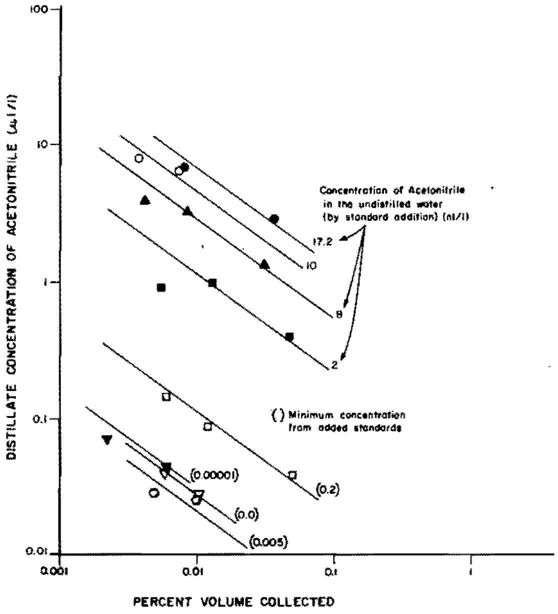


Figure 38. Concentration curves for acetonitrile.

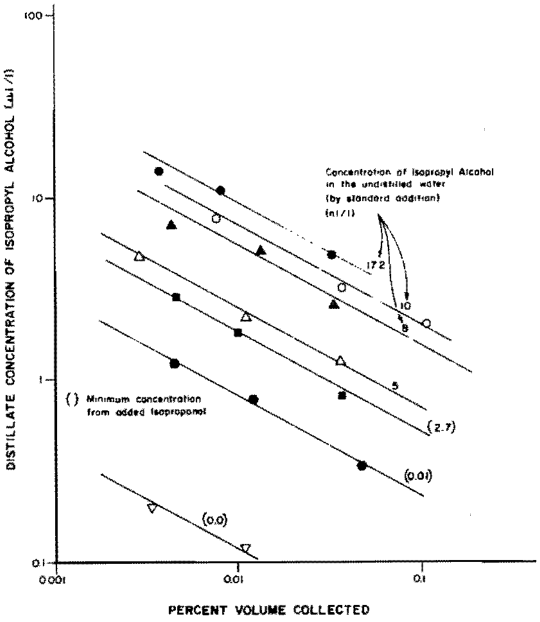


Figure 39. Concentration curves for isopropanol.

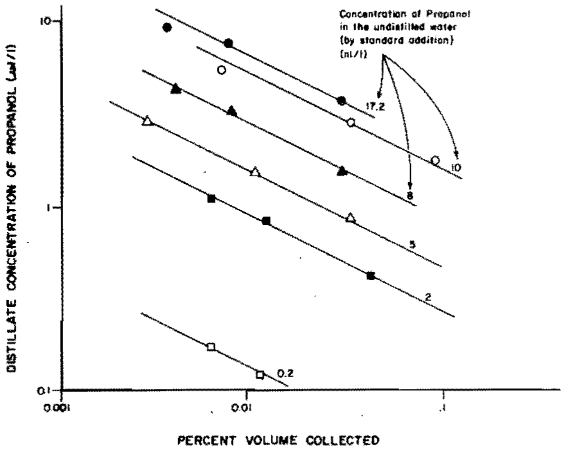


Figure 40. Concentration curves for propanol.

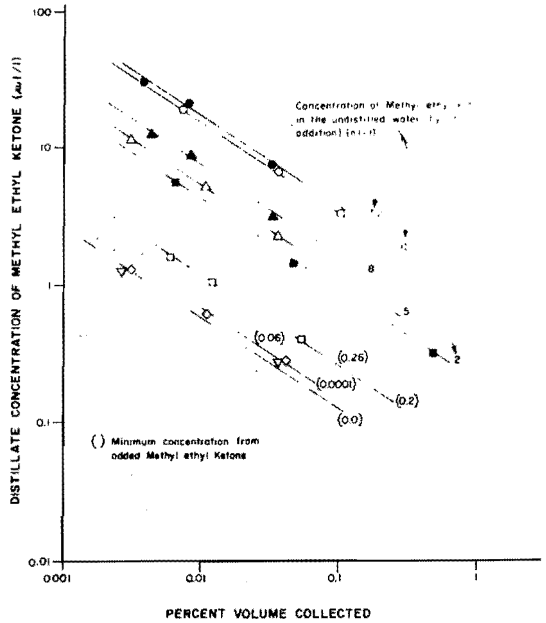


Figure 41. Concentration curves for methyl-ethyl-ketone.

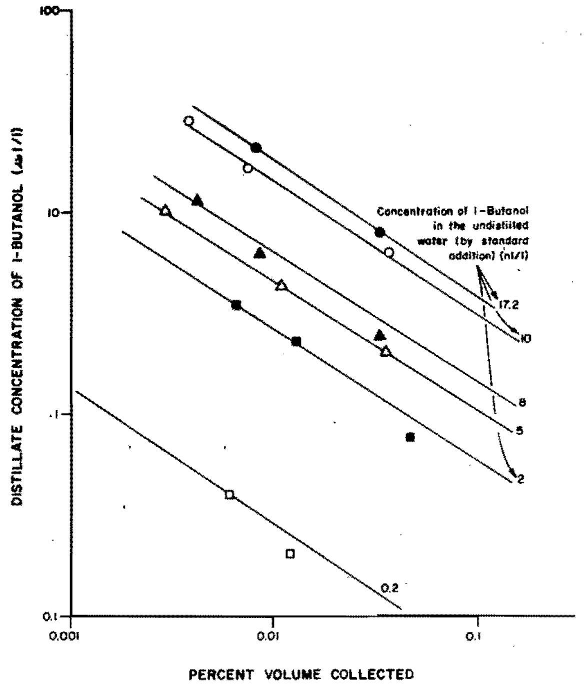


Figure 42. Concentration curves for 1-butanol.

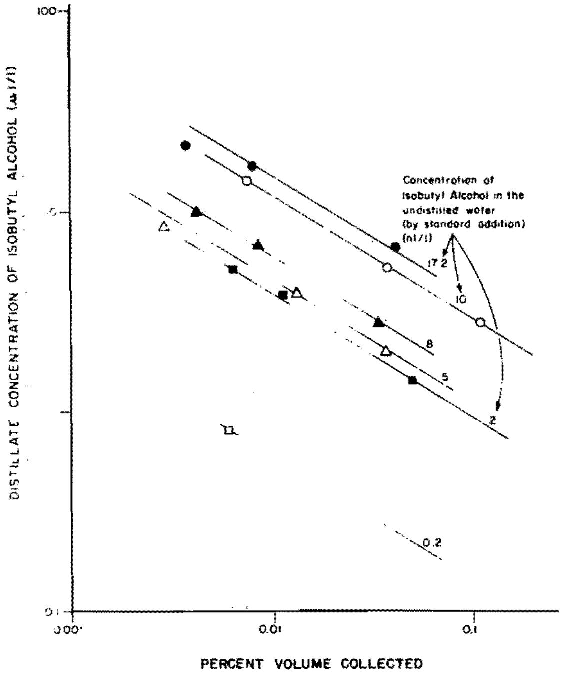


Figure 43. Concentration curve for isobutyl alcohol.

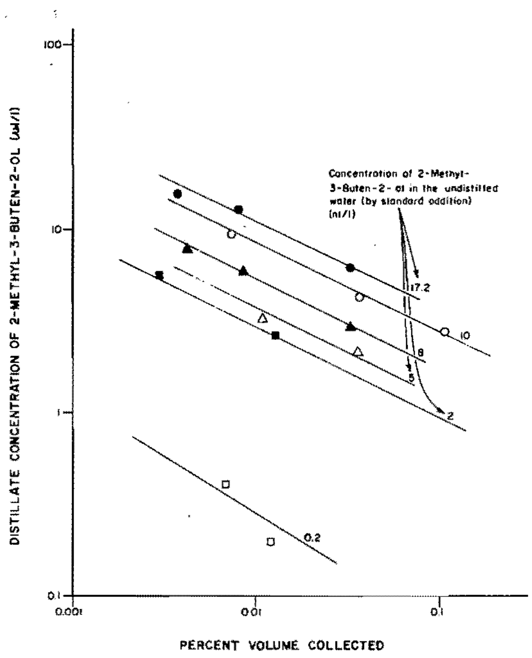


Figure 44. Concentration curve for 2-methyl-3-buten-2-ol.

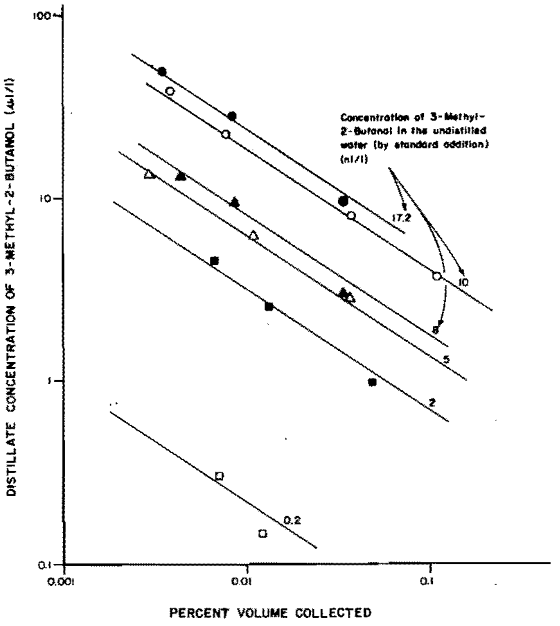


Figure 45. Concentration curves for 3-methyl-2-butanol.

Section 3. Interpretative Concentration Curves

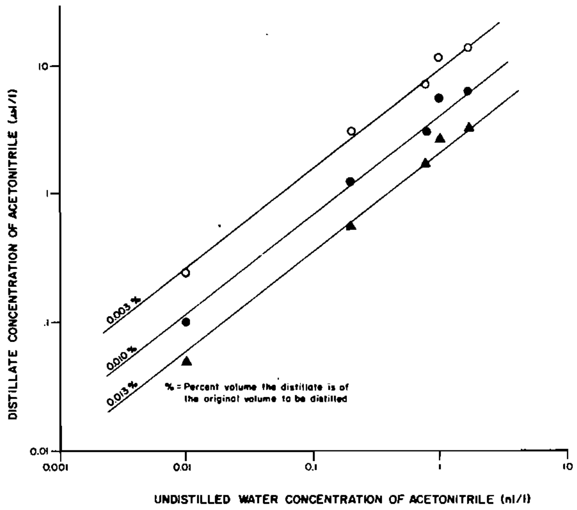


Figure 46. Interpretative concentration curves for acetonitrile.

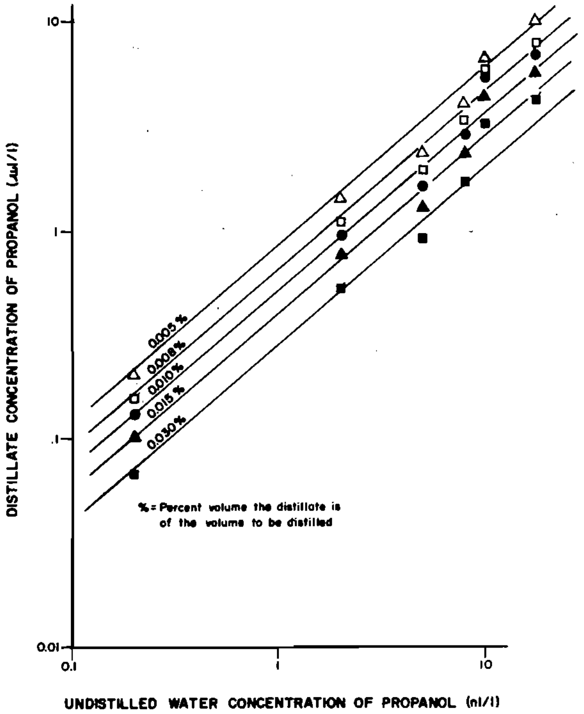


Figure 48. Interpretative concentration curves for propanol.

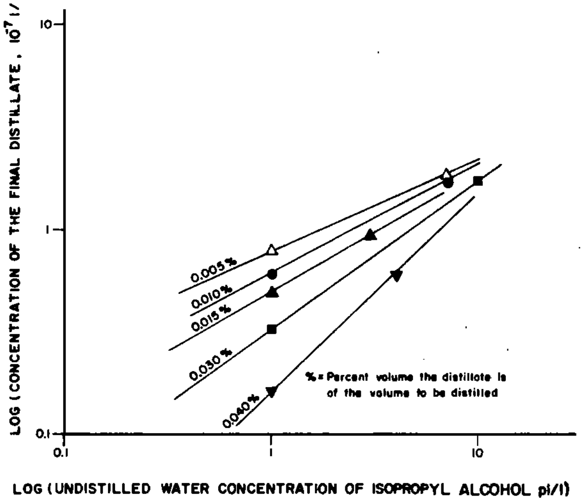


Figure 47. Interpretative concentration curves for isopropyl alcohol.

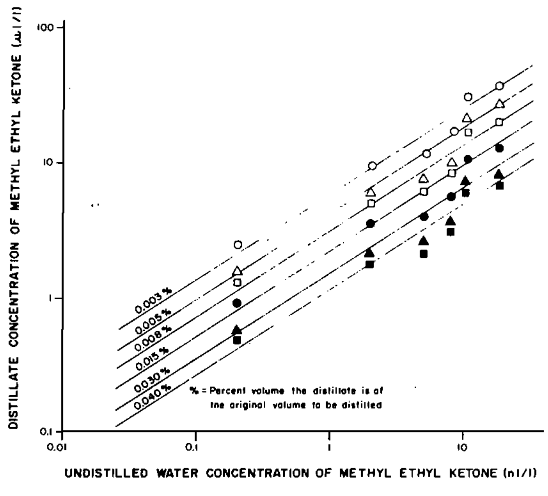


Figure 49. Interpretative concentration curves for methyl-ethyl-ketone.

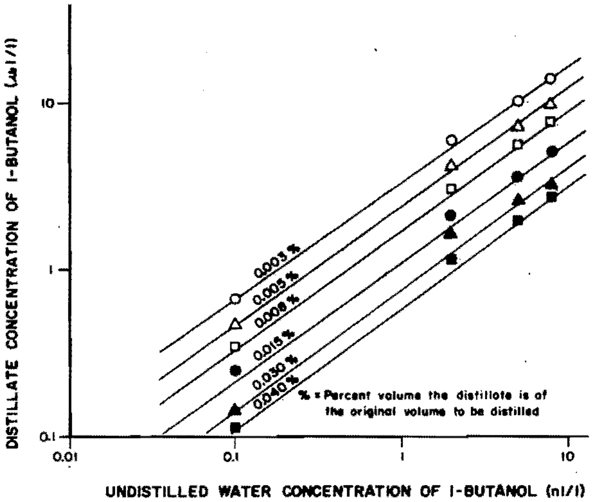


Figure 50. Interpretative concentration curves for 1-butanol.

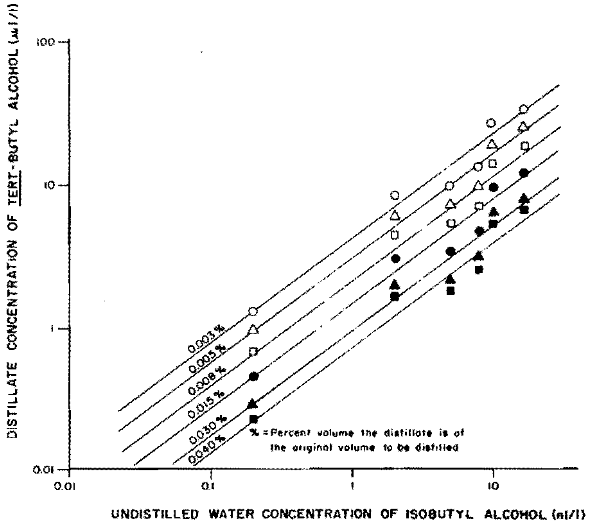


Figure 51. Interpretative concentration curves for isobutyl alcohol.

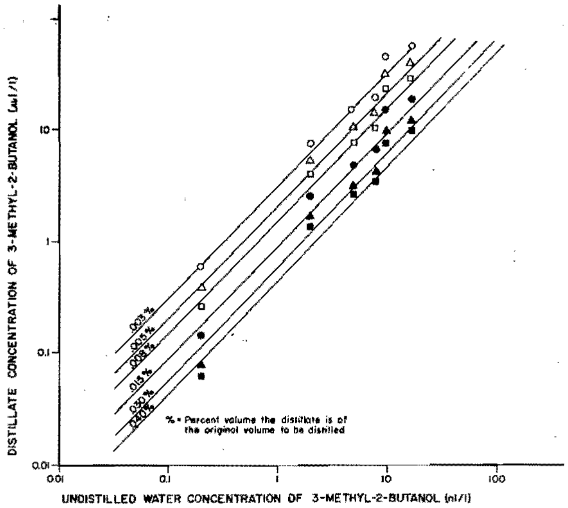


Figure 52. Interpretative concentration curves for 2-methyl-3-buten-2-ol.

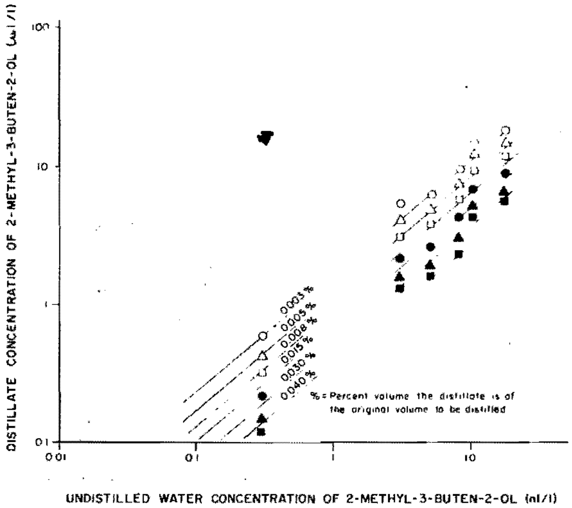


Figure 53. Interpretative concentration curves for 3-methyl-2-butanol.

Appendix J

Temporal Variation of Organics at Hyrum Reservoir

Table 23. Temporal variation of organics at Hyrum Reservoir.

Compound	October 11, 1974			October 24, 1974			November 17, 1974			November 23, 1974			November 29, 1974		
	P	Min	Max	P	Min	Max	P	Min	Max	P	Min	Max	P	Min	Max
Methanol	800	100	1,500	500	100	1,000	2,000	300	4,000	3,000	400	5,000	800	100	1,500
Acetaldehyde	1,000	100	2,000	1,000	100	2,000	1,200	20	2,000	1,000	100	1,500	1,000	100	1,500
Acetonitrile	0.1	0.01	1				< 0.01	< 0.01	0.1	< 0.01	< 0.01	0.1	0.1	0.01	1
Ethanol	1,000	200	4,000	1,000	100	2,000	500	50	2,000	1,600	80	2,500	400	40	1,000
Propanal		p			p			p			p			p	
Acetone	1,300	1,200	14,000	2,200	1,500	2,500	1,000	600	1,200	1,800	1,600	3,500	500	1,800	2,000
Isopropyl alcohol	200	30	300	200	60	700	400	50	500	400	50	500	100	10	200
Propanol	10	3	50	5	0.7	7	150	10	200	200	10	300	40	4	60
Diethyl ether		p						p			p			p	
tert-Butyl alcohol	0.5	0.1	2	0.4	0.01	2	10	1	20	10	1	20	5	1	20
Methyl ethyl ketone	150	10	400	50	1	300	100	10	500	150	10	300	100	10	300
Unknown No. 1								p							
Unknown No. 2								p			p			p	
Unknown No. 3					p						p				
2-Butanol		p			p			p			p			p	
Isobutyl alcohol	80	1	100	20	1	100	400	40	600	50	1	100	100	10	300
Unknown No. 4		p			p			p							
Unknown No. 5		p									p			p	
1-Butanol				< 0.01	< 0.01	1	10	1	100				10	1	100
2-Methyl-3-buten-2-ol	100	10	200	40	1	100	500	50	700	40	1	100	40	0.1	200
2-Methyl-2-butanol													10	1	100
3-Methyl-2-butanol		p			p			p			p			p	
Unknown No. 9															
3-Pentanol															
Unknown No. 10															
2-Pentanol															
2-Methyl-1-butanol		p			p			p			p			p	
3-Methyl-1-butanol		p			p			p			p			p	
1-Penten-3-ol															
Pyridine		p									p				
Cyclopentanol								p							
1-Pentanol		p			p			p			p			p	
3-Methyl-3-pentanol															
2-Methyl-2-pentanol								p							
4-Methyl-3-penten-2-ol		p			p			p			p			p	
3-Methylpyridine		p						p			p				
Unknown No. 11		p													
Unknown No. 12		p													
Unknown No. 13															
Unknown No. 14															
Unknown No. 15		p									p				

p = present but concentration undetermined
P = probable concentration ($\mu l/l$) of the organic compound
Min = minimum concentration ($\mu l/l$) of the organic compound
Max = maximum concentration ($\mu l/l$) of the organic compound

Table 23. Continued.

Compound	December 12, 1974			December 23, 1974			December 30, 1974			January 9, 1975			January 16, 1975		
	P	Min	Max	P	Min	Max	P	Min	Max	P	Min	Max	P	Min	Max
Methanol	150	10	300	50	5	100	100	10	400	1,300	500	2,000	500	50	1,000
Acetaldehyde	900	100	2,000	1,000	100	1,500	1,200	100	2,000	1,100	100	2,000	1,100	100	2,000
Acetonitrile				0.1	0.01	1	0.1	0.01	1	0.1	0.01	1	< 0.01	< 0.01	0.1
Ethanol	600	60	2,000	600	60	2,000	800	100	2,000	800	100	2,000	1,000	100	2,000
Propanal		p			p			p			p			p	
Acetone	800	200	1,800	800	200	1,600	800	100	1,000	700	200	1,000	500	300	1,000
Isopropyl alcohol	100	10	200	100	20	200	100	50	500	100	50	500	100	20	300
Propanol	30	2	50	40	1	60	50	3	200	10	0.1	20	150	20	300
Diethyl ether		p			p			p			p			p	
tert-Butyl alcohol	0.5	0.1	10	0.02	0.01	10	0.5	0.01	10	3	0.03	10	3	0.3	10
Methyl ethyl ketone	40	1	300	1	0.1	300	3	0.1	300	200	10	400	50	1	100
Unknown No. 1					p			p							
Unknown No. 2		p			p			p			p			p	
Unknown No. 3															
2-Butanol		p			p			p			p			p	
Isobutyl alcohol	20	1	50				2	0.1	100	50	1	100	10	1	50
Unknown No. 4															
Unknown No. 5															
1-Butanol	4	0.1	10	1	0.1	10	< 0.01	< 0.01	1	5	0.1	10	< 0.01	< 0.01	1
2-Methyl-3-buten-2-ol				10	1	50	20	1	100	30	1	100	20	1	100
2-Methyl-2-butanol							< 0.1	< 0.1	10	1	0.1	10			
3-Methyl-2-butanol		p			p									p	
Unknown No. 9														p	
3-Pentanol														p	
Unknown No. 10															
2-Pentanol															
2-Methyl-1-butanol					p			p						p	
3-Methyl-1-butanol								p							
1-Penten-3-ol															
Pyridine		p						p						p	
Cyclopentanol															
1-Pentanol		p						p						p	
3-Methyl-3-pentanol															
2-Methyl-2-pentanol					p						p				
4-Methyl-3-penten-2-ol		p						p						p	
3-Methylpyridine															
Unknown No. 11															
Unknown No. 12															
Unknown No. 13															
Unknown No. 14															
Unknown No. 15															

p = present but concentration undetermined
P = probable concentration (μl/l) of the organic compound
Min = minimum concentration (μl/l) of the organic compound
Max = maximum concentration (μl/l) of the organic compound

Table 23. Continued.

Compound	January 30, 1975			February 22, 1975			March 20, 1975			April 2, 1975			April 17, 1975		
	P	Min	Max	P	Min	Max	P	Min	Max	P	Min	Max	P	Min	Max
Methanol	200	20	500	180	10	500	100	10	800	10	1	200	300	30	700
Acetaldehyde	1,200	100	2,000	1,000	100	3,000	1,000	100	2,000	1,100	100	2,000	1,200	100	2,500
Acetonitrile	800	10	2,000	< 0.01	<0.01	0.1	<0.01	< 0.01	0.1	<0.01	<0.01	0.1	<0.001	<0.001	1
Ethanol	1,500	100	2,500	600	60	1,500	1,000	100	2,000	200	20	5,000	4,000	400	6,000
Propanal		p			p			p			p			p	
Acetone	300	10	600	800	50	1,000	200	100	1,000	40	10	100	100	50	200
Isopropyl alcohol	200	30	400	400	50	500	400	30	500	100	80	200	200	20	300
Propanol	40	2	60	<1	<1	10	100	10	200	20	1	50	2	0.3	100
Diethyl ether		p			p			p			p			p	
tert-Butyl alcohol	3	0.3	10	3	0.1	10	1	0.1	10	0.3	0.01	10	1	0.1	10
Methyl ethyl ketone	1	0.1	300	3	0.1	10	1	0.1	10	0.3	0.01	10	1	0.1	10
Unknown No. 1											p			p	
Unknown No. 2					p			p			p			p	
Unknown No. 3															
2-Butanol		p			p			p			p			p	
Isobutyl alcohol	2	0.1	10	10	1	20	10	1	20	1	0.1	10	1	0.1	10
Unknown No. 4		p									p				
Unknown No. 5					p			p			p			p	
1-Butanol	1	0.1	10	10	1	50	1	0.1	50	1	0.1	50	0.8	0.01	50
2-Methyl-3-buten-2-ol	4	0.1	10	10	1	10	100	10	200	10	1	100	30	1	100
2-Methyl-2-butanol	1	0.1	10	1	0.1	10									
3-Methyl-2-butanol		p			p			p			p			p	
Unknown No. 9															
3-Pentanol		p													
Unknown No. 10															
2-Pentanol														p	
2-Methyl-1-butanol					p			p			p				
3-Methyl-1-butanol		p			p			p						p	
1-Penten-3-ol															
Pyridine					p			p						p	
Cyclopentanol		p													
1-Pentanol		p			p			p			p			p	
3-Methyl-3-pentanol															
2-Methyl-2-pentanol		p													
4-Methyl-3-penten-2-ol		p			p						p			p	
3-Methylpyridine								p							
Unknown No. 11														p	
Unknown No. 12														p	
Unknown No. 13		p						p							
Unknown No. 14											p				
Unknown No. 15														p	

p = present but concentration undetermined
P = probable concentration (μl/l) of the organic compound
Min = minimum concentration (μl/l) of the organic compound
Max = maximum concentration (μl/l) of the organic compound

Table 23. Continued.

Compound	April 22, 1975			May 8, 1975			May 27, 1975			June 3, 1975			June 17, 1975		
	P	Min	Max	P	Min	Max	P	Min	Max	P	Min	Max	P	Min	Max
Methanol	100	10	500	80	1	200	140	10	200	120	10	300	100	10	300
Acetaldehyde	1,300	100	2,000	1,000	100	2,000	1,000	100	2,000	1,000	100	2,000	1,400	100	2,000
Acetonitrile							< 0.01	< 0.01	1	< 1	< 1	10	100	0.1	1,000
Ethanol	600	50	1,500	500	50	2,000	500	50	2,000	500	50	2,000	1,500	100	5,000
Propanal		p			p			p			p			p	
Acetone	100	50	200	2,500	300	3,000	800	500	1,000	300	10	500	400	300	1,000
Isopropyl alcohol	100	20	500	500	50	600	100	10	200	200	20	300	400	50	900
Propanol	10	1	20	5	0.2	10	5	1	10	5	0.8	10	50	9	100
Diethyl ether		p			p			p			p			p	
tert-Butyl alcohol	1	0.1	10	1	0.1	10	0.1	0.01	1	0.1	0.01	1	1	0.1	300
Methyl ethyl ketone	1	0.1	10	1	0.1	10	0.1	0.01	1	0.1	0.01	1	1	0.01	300
Unknown No. 1		p						p			p				
Unknown No. 2		p			p			p						p	
Unknown No. 3											p				
2-Butanol		p			p			p			p			p	
Isobutyl alcohol	1	0.1	10	2	0.1	10	5	0.1	10	0.2	0.01	1	5	0.1	10
Unknown No. 4								p			p				
Unknown No. 5		p			p			p							
1-Butanol	0.6	0.01	50	1	0.1	10	0.1	0.01	10	0.1	0.01	10	0.1	0.01	10
2-Methyl-3-buten-2-ol				5	0.1	10	1	0.1	10	4	0.1	10	10	1	100
2-Methyl-2-butanol	1	0.1	10	1	0.1	10	0.8	0.1	10	0.4	0.01	1	10	1	100
3-Methyl-2-butanol		p			p			p			p			p	
Unknown No. 9														p	
3-Pentanol															
Unknown No. 10															
2-Pentanol															
2-Methyl-1-butanol		p			p			p			p				
3-Methyl-1-butanol		p						p			p			p	
1-Penten-3-ol											p				
Pyridine					p						p				
Cyclopentanol														p	
1-Pentanol		p			p			p			p			p	
3-Methyl-3-pentanol															
2-Methyl-2-pentanol											p				
4-Methyl-3-penten-2-ol					p			p			p			p	
3-Methylpyridine														p	
Unknown No. 11		p									p				
Unknown No. 12		p													
Unknown No. 13															
Unknown No. 14															
Unknown No. 15											p				

p = present but concentration undetermined
P = probable concentration (μl/l) of the organic compound
Min = minimum concentration (μl/l) of the organic compound
Max = maximum concentration (μl/l) of the organic compound

Table 23. Continued.

Compound	July 25, 1975			July 31, 1975			August 6, 1975			August 19, 1975			August 28, 1975		
	P	Min	Max	P	Min	Max	P	Min	Max	P	Min	Max	P	Min	Max
Methanol	<30	<30	100	<40	<40	100	<50	<50	100	<30	<30	100	<30	<30	100
Acetaldehyde	1,100	100	2,000	1,100	100	2,000	1,100	100	2,500	1,200	100	2,000	1,000	500	2,000
Acetonitrile	10	0.1	1,000	10	0.1	1,000	10	0.1	1,000	10	0.1	2,000	10	0.1	1,000
Ethanol	300	30	800	200	20	800	1,000	100	1,500	300	30	1,000	500	10	1,000
Propanal		p			p			p			p				
Acetone	800	500	1,000	600	100	1,000	1,000	500	1,300	800	100	2,000	700	300	1,000
Isopropyl alcohol	20	1	400	40	10	200	30	20	200	100	10	600	30	20	200
Propanol	5	1	20	5	1	10	5	0.1	10	5	0.5	10	1	0.3	100
Diethyl ether		p			p			p			p			p	
tert-Butyl alcohol	0.03	0.001	1	0.1	0.01	1	0.2	0.01	100	0.2	0.01	10	0.1	0.01	10
Methyl ethyl ketone	1	0.1	200	3	0.1	200	1	0.1	300	1	0.1	300	1	0.1	300
Unknown No. 1		p			p						p				
Unknown No. 2		p			p			p			p				
Unknown No. 3															
2-Butanol		p			p			p			p			p	
Isobutyl alcohol	0.1	0.01	0.4	1	0.1	10	1	0.1	10	0.1	0.01	1	0.1	0.01	1
Unknown No. 4					p						p			p	
Unknown No. 5		p													
1-Butanol	<0.01	<0.01	1	0.1	0.01	1	0.3	0.01	1	0.2	0.01	1	0.1	10^{-2}	1
2-Methyl-3-buten-2-ol	2	0.5	4	1	0.1	10	0.1	0.01	1	1	0.1	10	1	0.1	10
2-Methyl-2-butanol	2	0.5	4	1	0.1	10							1	0.1	10
3-Methyl-2-butanol		p						p			p			p	
Unknown No. 9															
3-Pentanol															
Unknown No. 10														p	
2-Pentanol															
2-Methyl-1-butanol		p						p			p			p	
3-Methyl-1-butanol								p						p	
1-Penten-3-ol		p													
Pyridine								p							
Cyclopentanol															
1-Pentanol		p			p			p			p			p	
3-Methyl-3-pentanol															
2-Methyl-2-pentanol								p							
4-Methyl-3-penten-2-ol		p						p							
3-Methylpyridine											p				
Unknown No. 11															
Unknown No. 12								p							
Unknown No. 13								p							
Unknown No. 14															
Unknown No. 15		p													

p = present but concentration undetermined
P = probable concentration (μl/l) of the organic compound
Min = minimum concentration (μl/l) of the organic compound
Max = maximum concentration (μl/l) of the organic compound

Table 23. Continued.

Compound	June 26, 1975			July 1, 1975			July 2, 1975			July 9, 1975			July 15, 1975		
	P	Min	Max	P	Min	Max	P	Min	Max	P	Min	Max	P	Min	Max
Methanol	50	1	200	80	10	200	80	10	200	800	20	1,500	1,500	100	2,000
Acetaldehyde	1,100	100	2,000	900	100	2,000	1,100	100	2,000	900	100	2,000	1,100	100	2,000
Acetonitrile	< 0.1	<0.1	100	20	0.1	1,000	200	0.1	1,000	1	0.1	100	0.01	0.001	100
Ethanol	400	40	500	200	20	500	200	20	500	100	10	500	500	50	800
Propanal		p			p			p			p			p	
Acetone	500	100	1,000	1,500	500	3,000	1,500	500	3,000	1,000	500	2,000	1,000	500	3,000
Isopropyl alcohol	100	10	200	400	30	600	300	30	800	300	40	500	300	50	600
Propanol	3	0.3	10	< 0.1	< 0.1	1	< 0.1	< 0.1	10	< 0.1	< 0.1	10	0.5	0.1	30
Diethyl ether		p			p			p			p			p	
tert-Butyl alcohol	0.1	0.01	1	3	0.1	10	2	0.1	10	10	1	100	10	1	100
Methyl ethyl ketone	2	0.1	100	100	10	200	10	1	300	100	10	200	10	1	100
Unknown No. 1		p													
Unknown No. 2		p						p			p			p	
Unknown No. 3					p										
2-Butanol		p			p			p			p			p	
Isobutyl alcohol	5	0.1	10	10	1	20	0.6	0.01	1	10	0.01	20	100	10	200
Unknown No. 4		p						p			p			p	
Unknown No. 5					p										
1-Butanol	0.5	0.01	10	4	0.1	10	3	0.1	10	5	0.1	10			
2-Methyl-3-buten-2-ol	4	0.1	10	10	1	30	8	1	30	5	1	30	10	1	30
2-Methyl-2-butanol	4	0.1	10	10	1	30	8	1	30	5	1	30	10	1	30
3-Methyl-2-butanol					p						p			p	
Unknown No. 9															
3-Pentanol											p			p	
Unknown No. 10														p	
2-Pentanol											p				
2-Methyl-1-butanol								p			p			p	
3-Methyl-1-butanol								p			p			p	
1-Penten-3-ol															
Pyridine		p			p			p						p	
Cyclopentanol															
1-Pentanol		p			p			p			p			p	
3-Methyl-3-pentanol															
2-Methyl-2-pentanol		p			p			p			p			p	
4-Methyl-3-penten-2-ol											p			p	
3-Methylpyridine					p									p	
Unknown No. 11					p										
Unknown No. 12											p				
Unknown No. 13															
Unknown No. 14															
Unknown No. 15															

p = present but concentration undetermined
P = probable concentration (μl/l) of the organic compound
Min = minimum concentration (μl/l) of the organic compound
Max = maximum concentration (μl/l) of the organic compound

Table 23. Continued.

Compound	September 2, 1975			September 4, 1975			September 9, 1975			September 16, 1975			September 25, 1975		
	P	Min	Max	P	Min	Max	P	Min	Max	P	Min	Max	P	Min	Max
Methanol	100	10	500	200	20	1,500	20	20	150	10	1	50	30	20	100
Acetaldehyde	1,300	100	2,000	1,500	200	2,000	1,000	500	1,500	1,500	80	3,000	1,200	500	2,000
Acetonitrile	10	0.1	1,000	< 0.1	< 0.1	10	0.1	0.01	1	0.1	0.001	10	<0.001	<0.001	10
Ethanol	300	30	1,000	6,000	1,000	20,000	200	100	500	600	300	900	300	100	800
Propanal		p			p			p			p			p	
Acetone	500	400	800	500	50	900	1,500	100	5,000	1,000	500	2,000	1,500	800	3,000
Isopropyl alcohol	40	20	200	300	20	400	4	1	10	6	1	12	0.2	0.1	10
Propanol	5	1	10	80	5	100	1	0.1	10	1	0.1	10	3	0.1	10
Diethyl ether		p						p			p			p	
tert-Butyl alcohol	0.3	0.01	10	100	10	200	0.1	0.01	10	0.1	0.01	10	0.2	0.1	10
Methyl ethyl ketone	10	1	300	100	0.1	200	0.2	0.1	200	0.2	0.1	200	1	0.1	200
Unknown No. 1		p						p							
Unknown No. 2		p			p			p			p			p	
Unknown No. 3															
2-Butanol		p			p			p			p			p	
Isobutyl alcohol	0.1	0.01	1	2	0.1	10	<0.01	<0.01	0.1	<0.01	<0.01	0.1	<0.01	<0.01	0.1
Unknown No. 4														p	
Unknown No. 5		p			p										
1-Butanol	0.1	0.01	1												
2-Methyl-3-buten-2-ol	1	0.1	10	30	1	100	1	0.1	10				0.3	0.1	1
2-Methyl-2-butanol													0.3	0.1	1
3-Methyl-2-butanol		p			p			p			p			p	
Unknown No. 9											p				
3-Pentanol								p							
Unknown No. 10								p							
2-Pentanol															
2-Methyl-1-butanol					p						p				
3-Methyl-1-butanol					p									p	
1-Penten-3-ol					p										
Pyridine															
Cyclopentanol															
1-Pentanol		p			p			p			p			p	
3-Methyl-3-pentanol															
2-Methyl-3-pentanol								p							
4-Methyl-3-penten-2-ol		p			p			p			p				
3-Methylpyridine					p										
Unknown No. 11					p										
Unknown No. 12															
Unknown No. 13															
Unknown No. 14					p										
Unknown No. 15					p										

p = present but concentration undetermined
P = probable concentration (μl/l) of the organic compound
Min = minimum concentration (μl/l) of the organic compound
Max = maximum concentration (μl/l) of the organic compound

Table 23. Continued.

Compound	October 1, 1975			October 13, 1975			October 23, 1975			October 30, 1975			November 3, 1975		
	P	Min	Max	P	Min	Max	P	Min	Max	P	Min	Max	P	Min	Max
Methanol	40	20	100	20	5	50	30	10	80	20	10	80	100	30	300
Acetaldehyde	1,500	500	3,000	1,300	800	2,000	1,100	800	2,000	900	500	2,000	2,000	1,000	3,000
Acetonitrile	< 0.1	< 0.1	10	0.1	0.001	10	40	1	100	10	0.01	100	2	0.1	10
Ethanol	200	100	500	200	80	500	600	300	1,000	500	100	1,000	300	100	600
Propanal		p			p			p			p			p	
Acetone	500	20	1,000	600	300	1,000	1,300	300	2,000	1,100	500	2,000	800	500	1,500
Isopropyl alcohol	10	1	30	0.03	0.01	1	0.01	0.001	1	0.01	0.001	1	1.2	0.1	5
Propanol	2	1	10	< 1	< 1	10				1	0.1	20	< 0.1	< 0.1	10
Diethyl ether		p			p			p			p			p	
tert-Butyl alcohol	0.1	0.01	1	0.05	0.01	10				0.1	0.01	10	0.5	0.1	10
Methyl ethyl ketone	1	0.1	200	0.3	0.01	100				1	0.1	300	2	0.1	100
Unknown No. 1		p			p						p				
Unknown No. 2		p						p			p			p	
Unknown No. 3					p			p							
2-Butanol		p			p			p			p			p	
Isobutyl alcohol	0.1	0.01	1	0.01	0.001	0.1				0.01	0.001	0.1	0.1	0.01	1
Unknown No. 4					p									p	
Unknown No. 5		p													
1-Butanol	0.01	0.001	0.1							0.01	0.001	0.1	0.01	0.001	0.1
2-Methyl-3-buten-2-ol	3	1	10	0.1	0.01	1				0.1	0.001	10	1	0.1	10
2-Methyl-2-butanol				0.1	0.01	1							1	0.1	10
3-Methyl-2-butanol		p			p			p			p			p	
Unknown No. 9															
3-Pentanol															
Unknown No. 10															
2-Pentanol					p									p	
2-Methyl-1-butanol		p			p			p							
3-Methyl-1-butanol		p													
1-Penten-3-ol														p	
Pyridine					p			p			p				
Cyclopentanol														p	
1-Pentanol		p			p			p			p			p	
3-Methyl-3-pentanol															
2-Methyl-2-pentanol								p						p	
4-Methyl-3-penten-2-ol		p			p									p	
3-Methylpyridine															
Unknown No. 11															
Unknown No. 12															
Unknown No. 13															
Unknown No. 14															
Unknown No. 15					p										

p = present but concentration undetermined
P = probable concentration (μl/l) of the organic compound
Min = minimum concentration (μl/l) of the organic compound
Max = maximum concentration (μl/l) of the organic compound

Table 23. Continued.

Compound	November 10, 1975			November 19, 1975			December 3, 1975			December 18, 1975			January 8, 1976			February 4, 1976		
	P	Min	Max	P	Min	Max	P	Min	Max	P	Min	Max	P	Min	Max	P	Min	Max
Methanol	40	10	200	20	10	80	30	10	80	30	10	80	30	10	80	600	100	1,000
Acetaldehyde	1,800	1,500	2,500	1,200	1,000	2,000	1,400	1,000	2,000	1,000	500	2,000						
Acetonitrile	5	0.1	10	0.1	0.001	10	0.1	0.001	10	0.1	0.001	10	0.1	0.001	10	1	0.1	10
Ethanol	300	100	800	300	100	2,000	300	100	1,500	500	100	800	600	200	1,200	1,500	1,000	2,000
Propanal		p			p			p			p			p				
Acetone	900	300	1,500	1,000	500	2,000	500	200	1,500	700	400	1,000	800	400	1,000			
Isopropyl alcohol	1.2	0.1	5	0.00	0.01	1	0.05	0.01	1	8	1	15	1	0.1	10			
Propanol	<0.2	<0.2	10				< 3	<0.1	10	3	0.1	10	2	1	10			
Diethyl ether		p			p			p			p			p				
tert-Butyl alcohol	0.2	0.1	10				0.01	0.001	10	0.1	0.01	100	0.05	0.01	10			
Methyl ethyl ketone	2	0.1	100				0.1	0.01	100	10	1	200	3	0.1	300			
Unknown No. 1								p						p				
Unknown No. 2		p						p						p				
Unknown No. 3																		
2-Butanol		p			p			p			p							
Isobutyl alcohol	0.1	0.01	1				0.01	0.001	0.1	0.7	0.1	1						
Unknown No. 4		p			p													
Unknown No. 5																		
1-Butanol	0.01	0.001	0.1							<0.01	< 0.01	0.1						
2-Methyl-3-buten-2-ol	1	0.1	10							1	0.1	10						
2-Methyl-2-butanol	1	0.1	10															
3-Methyl-2-butanol		p			p			p			p			p				
Unknown No. 9											p							
3-Pentanol																		
Unknown No. 10														p				
2-Pentanol																		
2-Methyl-1-butanol					p			p						p				
3-Methyl-1-butanol														p				
1-Penten-3-ol																		
Pyridine											p			p				
Cyclopentanol		p																
1-Pentanol		p			p			p			p			p				
3-Methyl-3-pentanol																		
2-Methyl-2-pentanol														p				
4-Methyl-3-penten-2-ol		p			p			p			p							
3-Methylpyridine														p				
Unknown No. 11														p				
Unknown No. 12																		
Unknown No. 13														p				
Unknown No. 14																		
Unknown No. 15																		

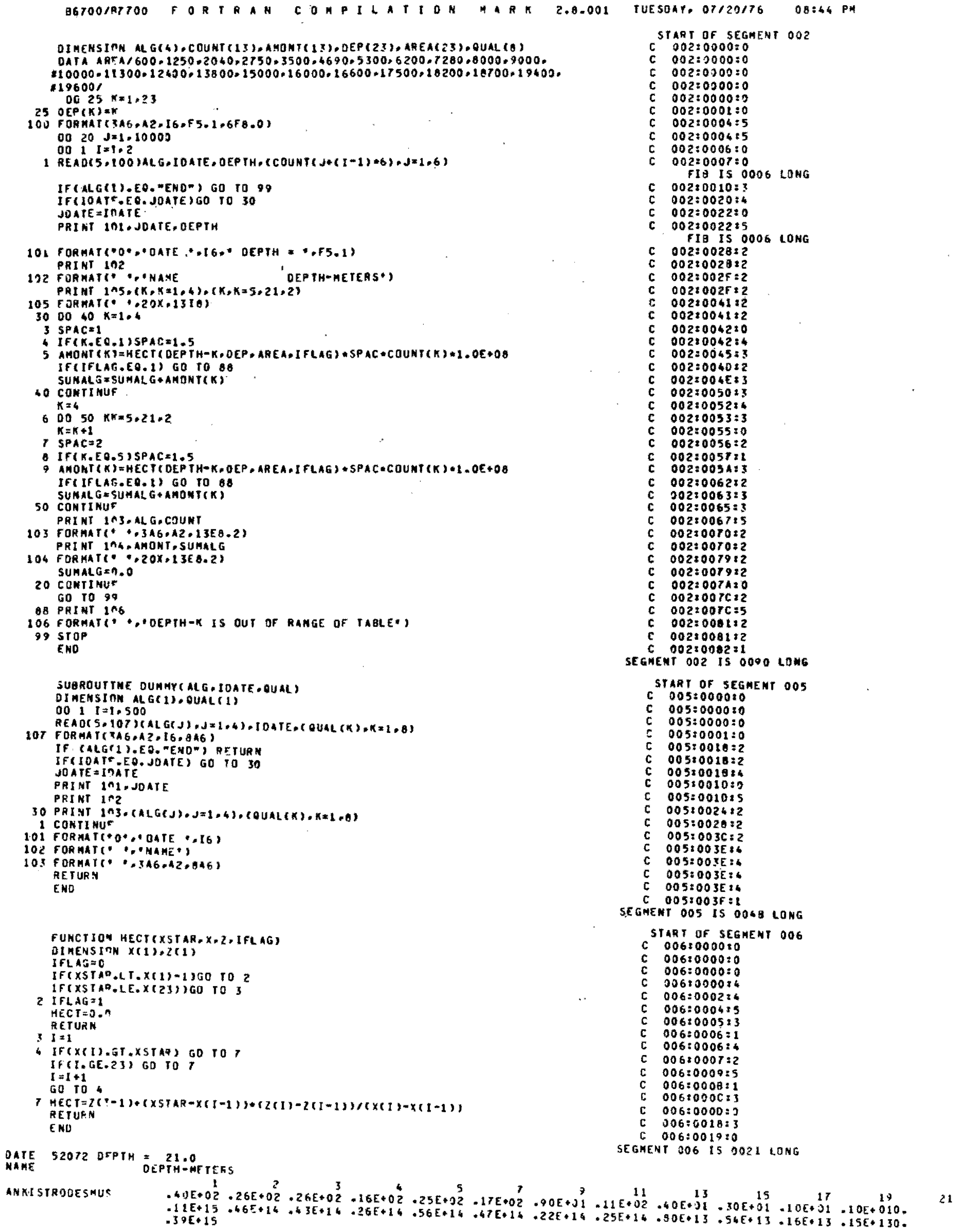
p = present but concentration undetermined
P = probable concentration (μl/l) of the organic compound
Min = minimum concentration (μl/l) of the organic compound
Max = maximum concentration (μl/l) of the organic compound

Appendix K

Algae Present in Hyrum Reservoir 1972-1976

The first row to the right of the algae species listed indicates the concentration of the organism in cells/ml; the second row under the organism name indicates the total number or organism in that layer of water throughout the reservoir, the third rows in the total number of organism in the reservoir on that day. For example on May 20, 1972, the reservoir was 21 meters deep at the deepest point in the reservoir, the *Ankistrodesmus sp.* population. This point and 1 meter below the surface was 0.4×10^2 cells/ml, the total number of cells in the reservoir between the surface and 1.5 meters below the surface was 0.11×10^{15} and the total number of cells in the reservoir on that day was 0.39×10^{15}. Note the data are all based on one collection site and assumes a homogeneous distribution about each data point dividing equally the distances between data points.

Table 24. Algae present in Hyrum Reservoir 1972-1976.



```
      B6700/B7700   F O R T R A N   C O M P I L A T I O N   M A R K   2.8.001   TUESDAY, 07/20/76    08:44 PM
                                                                                  START OF SEGMENT 002
      DIMENSION ALG(4),COUNT(13),AMONT(13),DEP(23),AREA(23),QUAL(8)            C  002:0000:0
      DATA AREA/600,1250,2040,2750,3500,4690,5300,6200,7280,8000,9000,         C  002:0000:0
     #10000,11300,12400,13800,15000,16000,16600,17500,18200,18700,19400,       C  002:0000:0
     #19600/                                                                   C  002:0000:0
      DO 25 K=1,23                                                             C  002:0000:0
   25 DEP(K)=K                                                                 C  002:0001:0
  100 FORMAT(3A6,A2,I6,F5.1,6F8.0)                                             C  002:0004:5
      DO 20 J=1,10000                                                          C  002:0004:5
      DO 1 I=1,2                                                               C  002:0006:0
    1 READ(5,100)ALG,IDATE,DEPTH,(COUNT(J+(I-1)*6),J=1,6)                      C  002:0007:0
                                                                                     FIB IS 0006 LONG
      IF(ALG(1).EQ."END") GO TO 99                                             C  002:0010:3
      IF(IDATE.EQ.JDATE)GO TO 30                                               C  002:0020:4
      JDATE=IDATE                                                              C  002:0022:0
      PRINT 101,JDATE,DEPTH                                                    C  002:0022:5
                                                                                     FIB IS 0006 LONG
  101 FORMAT('0','DATE ',I6,' DEPTH = ',F5.1)                                  C  002:0028:2
      PRINT 102                                                                C  002:0028:2
  102 FORMAT(' ','NAME                    DEPTH-METERS')                       C  002:002F:2
      PRINT 105,(K,K=1,4),(K,K=5,21,2)                                         C  002:002F:2
  105 FORMAT(' ',20X,13I8)                                                     C  002:0041:2
   30 DO 40 K=1,4                                                              C  002:0041:2
    3 SPAC=1                                                                   C  002:0042:0
    4 IF(K.EQ.1)SPAC=1.5                                                       C  002:0042:4
    5 AMONT(K)=HECT(DEPTH-K,DEP,AREA,IFLAG)*SPAC*COUNT(K)*1.0E+08              C  002:0045:3
      IF(IFLAG.EQ.1) GO TO 88                                                  C  002:004D:2
      SUMALG=SUMALG+AMONT(K)                                                   C  002:004E:3
   40 CONTINUE                                                                 C  002:0050:3
      K=4                                                                      C  002:0052:4
    6 DO 50 KK=5,21,2                                                          C  002:0053:3
      K=K+1                                                                    C  002:0055:0
    7 SPAC=2                                                                   C  002:0056:2
    8 IF(K.EQ.5)SPAC=1.5                                                       C  002:0057:1
    9 AMONT(K)=HECT(DEPTH-K,DEP,AREA,IFLAG)*SPAC*COUNT(K)*1.0E+08              C  002:005A:3
      IF(IFLAG.EQ.1) GO TO 88                                                  C  002:0062:2
      SUMALG=SUMALG+AMONT(K)                                                   C  002:0063:3
   50 CONTINUE                                                                 C  002:0065:3
      PRINT 103,ALG,COUNT                                                      C  002:0067:5
  103 FORMAT(' ',3A6,A2,13E8.2)                                                C  002:0070:2
      PRINT 104,AMONT,SUMALG                                                   C  002:0070:2
  104 FORMAT(' ',20X,13E8.2)                                                   C  002:0079:2
      SUMALG=0.0                                                               C  002:0079:2
   20 CONTINUE                                                                 C  002:007A:0
      GO TO 99                                                                 C  002:007C:2
   88 PRINT 106                                                                C  002:007C:5
  106 FORMAT(' ','DEPTH-K IS OUT OF RANGE OF TABLE')                           C  002:0081:2
   99 STOP                                                                     C  002:0081:2
      END                                                                      C  002:0082:1
                                                                              SEGMENT 002 IS 0090 LONG

      SUBROUTINE DUMMY(ALG,IDATE,QUAL)                                            START OF SEGMENT 005
      DIMENSION ALG(1),QUAL(1)                                                 C  005:0000:0
      DO 1 I=1,500                                                             C  005:0000:0
      READ(5,107)(ALG(J),J=1,4),IDATE,(QUAL(K),K=1,8)                          C  005:0000:0
  107 FORMAT(3A6,A2,I6,8A6)                                                    C  005:0001:0
      IF (ALG(1).EQ."END") RETURN                                              C  005:0018:2
      IF(IDATE.EQ.JDATE) GO TO 30                                              C  005:0018:2
      JDATE=IDATE                                                              C  005:0018:4
      PRINT 101,JDATE                                                          C  005:001D:0
      PRINT 102                                                                C  005:001D:5
   30 PRINT 103,(ALG(J),J=1,4),(QUAL(K),K=1,8)                                 C  005:0024:2
    1 CONTINUE                                                                 C  005:0028:2
  101 FORMAT('0','DATE ',I6)                                                   C  005:003C:2
  102 FORMAT(' ','NAME')                                                       C  005:003E:4
  103 FORMAT(' ',3A6,A2,8A6)                                                   C  005:003E:4
      RETURN                                                                   C  005:003E:4
      END                                                                      C  005:003E:4
                                                                               C  005:003F:1
                                                                              SEGMENT 005 IS 0048 LONG

      FUNCTION HECT(XSTAR,X,Z,IFLAG)                                              START OF SEGMENT 006
      DIMENSION X(1),Z(1)                                                      C  006:0000:0
      IFLAG=0                                                                  C  006:0000:0
      IF(XSTAR.LT.X(1)-1)GO TO 2                                               C  006:0000:0
      IF(XSTAR.LE.X(23))GO TO 3                                                C  006:0000:4
    2 IFLAG=1                                                                  C  006:0002:4
      HECT=0.0                                                                 C  006:0004:5
      RETURN                                                                   C  006:0005:3
    3 I=1                                                                      C  006:0006:1
    4 IF(X(I).GT.XSTAR) GO TO 7                                                C  006:0006:4
      IF(I.GE.23) GO TO 7                                                      C  006:0007:2
      I=I+1                                                                    C  006:0009:5
      GO TO 4                                                                  C  006:0008:1
    7 HECT=Z(I-1)+(XSTAR-X(I-1))*(Z(I)-Z(I-1))/(X(I)-X(I-1))                   C  006:000C:3
      RETURN                                                                   C  006:000D:0
      END                                                                      C  006:0018:3
                                                                               C  006:0019:0
                                                                              SEGMENT 006 IS 0021 LONG
DATE  52072 DEPTH =  21.0
NAME                    DEPTH-METERS
                               1       2       3       4       5       7       9      11      13      15      17      19      21
ANKISTRODESMUS           .40E+02 .26E+02 .26E+02 .16E+02 .25E+02 .17E+02 .90E+01 .11E+02 .40E+01 .30E+01 .10E+01 .10E+010.
                         .11E+15 .46E+14 .43E+14 .26E+14 .56E+14 .47E+14 .22E+14 .25E+14 .90E+13 .54E+13 .16E+13 .15E+130.
                         .39E+15
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CHLAMYDOMONAS        .50E+04 .40E+04 .36E+04 .28E+03 .31E+03 .23E+03 .29E+03 .36E+03 .19E+03 .18E+03 .15E+03 .13E+030.
                     .14E+17 .69E+16 .59E+16 .44E+15 .69E+15 .64E+15 .72E+15 .81E+15 .38E+15 .32E+15 .24E+15 .19E+150.
                     .31E+17
UNKNOWN              .22E+03 .26E+03 .16E+03 .19E+02 .16E+02 .12E+02 .90E+01 .40E+01 .70E+01 .80E+01 .40E+01 .70E+010.
                     .61E+15 .46E+15 .26E+15 .30E+14 .36E+14 .33E+14 .22E+14 .90E+13 .14E+14 .14E+14 .64E+13 .10E+140.
                     .15E+16
TRACHELAMONAS       0.      0.      0.       .30E+01 .40E+01 .30E+01 .70E+01 .90E+01 .15E+02 .70E+01 .50E+01 .12E+020.
                    0.      0.      0.       .48E+13 .90E+13 .83E+13 .17E+14 .20E+14 .30E+14 .13E+14 .80E+13 .17E+140.
                     .13E+15
CRYPTOMONAS          .11E+04 .52E+03 .21E+03 .54E+02 .73E+02 .41E+02 .75E+02 .40E+02 .36E+02 .22E+02 .19E+02 .13E+020.
                     .29E+16 .90E+15 .35E+15 .86E+14 .16E+15 .11E+15 .19E+15 .90E+14 .72E+14 .40E+14 .30E+14 .19E+140.
                     .50E+16
MALLOMONAS           .26E+02 .13E+020.       .30E+010.      0.       .30E+01 .10E+010.       .10E+010.      0.      0.
                     .71E+14 .23E+140.       .48E+130.      0.       .74E+13 .23E+130.       .18E+130.      0.      0.
                     .11E+15
ASTERIONELLA         .49E+03 .79E+03 .36E+03 .41E+03 .45E+03 .30E+03 .22E+03 .23E+03 .21E+03 .11E+03 .91E+02 .81E+020.
                     .13E+16 .14E+15 .59E+15 .66E+15 .10E+16 .82E+15 .53E+15 .52E+15 .41E+15 .19E+15 .15E+15 .12E+150.
                     .77E+16
FRAGILARIA           .15E+03 .21E+03 .11E+03 .16E+02 .21E+020.      0.      0.      0.      0.      0.      0.      0.
                     .40E+15 .37E+15 .18E+15 .26E+14 .47E+140.      0.      0.      0.      0.      0.      0.      0.
                     .10E+16
MELOSIRA            0.      0.      0.      0.      0.      0.      0.       .30E+010.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.      0.      0.       .68E+130.      0.      0.      0.      0.
                     .68E+13
NAVICULA            0.      0.      0.      0.      0.      0.      0.       .10E+010.       .10E+010.       .10E+010.
                    0.      0.      0.      0.      0.      0.      0.       .23E+130.       .18E+130.       .15E+130.
                     .55E+13
UNKNOWN             0.      0.      0.       .10E+01 .30E+01 .10E+010.       .30E+01 .10E+010.       .30E+01 .10E+010.
                    0.      0.      0.       .16E+13 .68E+13 .28E+130.       .68E+13 .20E+130.       .48E+13 .15E+130.
                     .26E+14
UNKNOWN(T)          0.      0.      0.      0.      0.       .30E+01 .50E+01 .40E+01 .10E+01 .50E+01 .90E+01 .16E+020.
                    0.      0.      0.      0.      0.       .83E+13 .12E+14 .90E+13 .20E+13 .90E+13 .14E+14 .23E+140.
                     .78E+14

DATE  60972 DEPTH =  22.0
NAME              DEPTH-METERS
                           1       2       3       4       5       7       9      11      13      15      17      19      21
ANKISTRODESMUS       .13E+03 .55E+02 .14E+03 .13E+03 .55E+02 .41E+02 .39E+02 .80E+01 .30E+010.       .10E+01 .30E+010.
                     .36E+15 .10E+15 .24E+15 .22E+15 .13E+15 .12E+15 .11E+15 .20E+14 .68E+130.       .18E+13 .48E+130.
                     .13E+16
CHLAMYDOMONAS        .23E+03 .14E+03 .13E+03 .90E+02 .79E+02 .65E+02 .41E+02 .40E+02 .20E+02 .13E+02 .17E+02 .50E+010.
                     .65E+15 .26E+15 .22E+15 .15E+15 .19E+15 .20E+15 .11E+15 .99E+14 .45E+14 .26E+14 .31E+14 .80E+130.
                     .20E+16
OOCYSTIS             .50E+010.      0.      0.      0.       .50E+01 .50E+010.      0.      0.      0.      0.      0.
                     .14E+140.      0.      0.      0.       .15E+14 .14E+140.      0.      0.      0.      0.      0.
                     .43E+14
PLANKTOSPHAERIA     0.       .11E+020.       .26E+020.      0.      0.      0.      0.      0.      0.      0.      0.
                    0.       .20E+140.       .43E+140.      0.      0.      0.      0.      0.      0.      0.      0.
                     .63E+14
SCHROEDERIA          .58E+03 .19E+03 .33E+03 .22E+03 .24E+03 .13E+03 .65E+02 .24E+02 .19E+02 .12E+02 .50E+01 .30E+010.
                     .16E+16 .34E+15 .57E+15 .37E+15 .57E+15 .39E+15 .18E+15 .60E+14 .43E+14 .24E+14 .90E+13 .48E+130.
                     .42E+16
SELENASTERUM         .90E+01 .40E+01 .30E+01 .70E+01 .70E+01 .11E+02 .90E+01 .25E+02 .15E+02 .11E+02 .50E+01 .40E+010.
                     .25E+14 .73E+13 .53E+13 .12E+14 .17E+14 .33E+14 .25E+14 .62E+14 .34E+14 .22E+14 .90E+13 .64E+130.
                     .26E+15
SPHAEROCYSTIS       0.      0.      0.      0.       .19E+030.      0.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.       .46E+150.      0.      0.      0.      0.      0.      0.      0.
                     .46E+15
UNKNOWN              .24E+02 .19E+02 .40E+01 .11E+02 .30E+02 .21E+02 .36E+02 .21E+02 .32E+02 .12E+02 .40E+01 .40E+010.
                     .67E+14 .35E+14 .70E+13 .18E+14 .72E+14 .63E+14 .99E+14 .52E+14 .72E+14 .24E+14 .72E+13 .64E+130.
                     .52E+15
CERATIUM             .10E+010.       .10E+010.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .28E+130.       .18E+130.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .46E+13
CRYPTOMONAS          .94E+02 .65E+02 .15E+03 .10E+03 .17E+03 .12E+03 .46E+02 .70E+01 .40E+010.      0.      0.      0.
                     .26E+15 .12E+15 .26E+15 .17E+15 .42E+15 .35E+15 .13E+15 .17E+14 .90E+130.      0.      0.      0.
                     .17E+16
MALLOMONAS          0.      0.      0.      0.      0.      0.      0.       .30E+01 .10E+01 .10E+010.      0.      0.
                    0.      0.      0.      0.      0.      0.      0.       .74E+13 .23E+13 .20E+130.      0.      0.
                     .12E+14
ASTERIONELLA         .10E+01 .10E+010.      0.      0.       .90E+01 .17E+02 .22E+02 .46E+02 .19E+02 .24E+02 .21E+020.
                     .28E+13 .18E+130.      0.      0.       .27E+14 .47E+14 .55E+14 .10E+15 .38E+14 .43E+14 .34E+140.
                     .35E+15
FRAGILARIA          0.      0.      0.      0.      0.      0.      0.      0.      0.      0.       .16E+020.      0.
                    0.      0.      0.      0.      0.      0.      0.      0.      0.      0.       .29E+140.      0.
                     .29E+14
MELOSIRA             .24E+02 .80E+01 .36E+02 .63E+02 .49E+02 .65E+02 .96E+02 .90E+02 .36E+02 .70E+010.       .90E+010.
                     .67E+14 .15E+14 .63E+14 .10E+15 .12E+15 .20E+15 .26E+15 .22E+15 .81E+14 .14E+140.       .14E+140.
                     .12E+16
NAVICULA            0.      0.      0.      0.      0.      0.      0.       .40E+01 .10E+010.      0.      0.      0.
                    0.      0.      0.      0.      0.      0.      0.       .99E+13 .23E+130.      0.      0.      0.
                     .12E+14
RHOPALODIA           .80E+01 .70E+01 .30E+01 .13E+02 .22E+02 .19E+02 .15E+02 .50E+01 .10E+01 .10E+010.      0.      0.
                     .22E+14 .13E+14 .53E+13 .22E+14 .53E+14 .57E+14 .41E+14 .12E+14 .23E+13 .20E+130.      0.      0.
                     .23E+15
UNKNOWN              .30E+01 .40E+01 .10E+01 .90E+01 .13E+02 .20E+02 .15E+02 .40E+01 .30E+010.      0.       .30E+010.
                     .84E+13 .73E+13 .18E+13 .15E+14 .31E+14 .60E+14 .41E+14 .99E+13 .68E+130.      0.       .48E+130.
                     .19E+15
UNKNOWN(T)           .70E+01 .40E+01 .50E+01 .40E+01 .30E+01 .10E+01 .70E+01 .50E+01 .90E+01 .70E+01 .40E+01 .10E+010.
                     .20E+14 .73E+13 .88E+13 .66E+13 .72E+13 .30E+13 .19E+14 .12E+14 .20E+14 .14E+14 .72E+13 .16E+130.
                     .13E+15

DATE  62272 DEPTH =  22.0
NAME              DEPTH-METERS
                           1       2       3       4       5       7       9      11      13      15      17      19      21
ANKISTRODESMUS       .70E+01 .30E+01 .40E+01 .30E+01 .50E+01 .40E+01 .30E+01 .30E+01 .50E+01 .70E+01 .30E+01 .30E+010.
                     .20E+14 .55E+13 .70E+13 .50E+13 .12E+14 .12E+14 .83E+13 .74E+13 .11E+14 .14E+14 .54E+13 .48E+130.
                     .11E+15
CHLAMYDOMONAS        .14E+03 .19E+03 .24E+03 .20E+03 .28E+03 .22E+03 .70E+02 .44E+02 .50E+02 .33E+02 .40E+02 .19E+020.
                     .49E+15 .34E+15 .41E+15 .33E+15 .66E+15 .66E+15 .19E+15 .11E+15 .11E+15 .66E+14 .72E+14 .39E+140.
                     .34E+16
OOCYSTIS            0.       .50E+020.      0.      0.       .11E+02 .50E+010.       .11E+02 .50E+010.       .50E+010.
                    0.       .91E+140.      0.      0.       .33E+14 .14E+140.       .25E+14 .10E+140.       .80E+130.
                     .18E+15
PLANKTOSPHAERIA      .63E+02 .32E+02 .84E+02 .32E+02 .16E+02 .21E+02 .11E+02 .16E+02 .11E+02 .21E+02 .50E+01 .37E+020.
                     .18E+15 .58E+14 .15E+15 .53E+14 .38E+14 .63E+14 .30E+14 .40E+14 .25E+14 .42E+14 .90E+13 .59E+140.
                     .74E+15
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SCHROEDERIA         .86E+02 .84E+02 .62E+02 .42E+02 .39E+02 .53E+02 .15E+02 .17E+02 .13E+02 .15E+02 .20E+02 .90E+010.
                    .24E+15 .15E+15 .11E+15 .70E+14 .94E+14 .16E+15 .41E+14 .42E+14 .29E+14 .30E+14 .36E+14 .14E+140.
                    .10E+16
SELENASTRUM        0.      0.      0.      0.      0.       .40E+01 .30E+01 .30E+01 .40E+01 .40E+01 .30E+01 .40E+010.
                   0.      0.      0.      0.      0.       .12E+14 .83E+13 .74E+13 .90E+13 .80E+13 .54E+13 .64E+130.
                    .57E+14
SPHAEROCYSTIS       .48E+020.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    .13E+150.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    .13E+15
UNKNOWN             .22E+02 .40E+01 .40E+01 .40E+01 .30E+01 .40E+01 .40E+01 .40E+01 .50E+01 .10E+010.      0.      0.
                    .62E+14 .73E+13 .70E+13 .66E+13 .72E+13 .12E+14 .11E+14 .99E+13 .11E+14 .20E+130.      0.      0.
                    .14E+15
CRYPTOMONAS         .22E+02 .51E+02 .63E+02 .95E+02 .50E+02 .88E+02 .46E+02 .42E+02 .21E+02 .12E+02 .22E+02 .30E+010.
                    .62E+14 .93E+14 .11E+15 .16E+15 .12E+15 .26E+15 .13E+15 .10E+15 .47E+14 .24E+14 .40E+14 .48E+130.
                    .12E+15
ASTERIONELLA        .12E+02 .10E+01 .10E+01 .30E+010.      0.      0.      0.      0.      0.       .30E+010.      0.
                    .34E+14 .18E+13 .18E+13 .50E+130.      0.      0.      0.      0.      0.       .54E+130.      0.
                    .48E+14
MELOSIRA            .30E+010.       .70E+01 .40E+01 .30E+010.      0.      0.       .70E+01 .24E+02 .25E+02 .22E+020.
                    .84E+130.       .12E+14 .66E+13 .72E+130.      0.      0.       .16E+14 .48E+14 .45E+14 .35E+140.
                    .18E+15
NAVICULA           0.      0.      0.      0.      0.       .10E+01 .10E+01 .10E+010.       .10E+01 .30E+01 .10E+010.
                   0.      0.      0.      0.      0.       .30E+13 .28E+13 .25E+130.       .20E+13 .54E+13 .16E+130.
                    .17E+14
RHOPALODIA          .10E+01 .30E+01 .80E+01 .80E+01 .70E+01 .10E+01 .70E+01 .80E+01 .70E+01 .10E+01 .30E+01 .10E+010.
                    .28E+13 .55E+13 .14E+14 .13E+14 .17E+14 .30E+13 .19E+14 .20E+14 .16E+14 .20E+13 .54E+13 .16E+130.
                    .12E+15
UNKNOWN            0.       .10E+01 .13E+02 .99E+01 .50E+01 .30E+01 .80E+01 .90E+01 .11E+02 .30E+01 .10E+01 .30E+010.
                   0.       .18E+13 .23E+14 .15E+14 .12E+14 .90E+13 .22E+14 .22E+14 .25E+14 .60E+13 .18E+13 .48E+130.
                    .14E+15
MERISMOPEDIA       0.      0.      0.      0.      0.      0.      0.      0.      0.      0.       .42E+020.      0.
                   0.      0.      0.      0.      0.      0.      0.      0.      0.      0.       .76E+140.      0.
                    .76E+14
UNKNOWN(T)          .11E+02 .70E+01 .90E+01 .80E+01 .30E+01 .50E+01 .70E+01 .40E+01 .30E+01 .10E+01 .50E+01 .90E+010.
                    .31E+14 .13E+14 .16E+14 .13E+14 .72E+13 .15E+14 .19E+14 .99E+13 .68E+13 .20E+13 .90E+13 .14E+140.
                    .16E+15

DATE  70572 DEPTH =  21.0
NAME             DEPTH-METERS
                          1       2       3       4       5       7       9      11      13      15      17      19      21
ANKISTRODESMUS      .10E+01 .40E+010.      0.      0.      0.       .10E+010.      0.      0.      0.      0.      0.
                    .27E+13 .70E+130.      0.      0.      0.       .25E+130.      0.      0.      0.      0.      0.
                    .12E+14
CHLAMYDOMONAS       .34E+03 .16E+03 .32E+03 .30E+03 .24E+03 .20E+03 .14E+03 .99E+02 .75E+02 .11E+03 .82E+02 .34E+020.
                    .93E+15 .28E+15 .54E+15 .48E+15 .54E+15 .54E+15 .35E+15 .22E+15 .15E+15 .19E+15 .13E+15 .50E+140.
                    .44E+16
PLANKTOSPHAERTA     .11E+02 .20E+03 .21E+020.       .49E+020.      0.      0.      0.       .11E+020.      0.      0.
                    .30E+14 .35E+15 .35E+140.       .11E+150.      0.      0.      0.       .20E+140.      0.      0.
                    .55E+15
SCHROEDERIA         .58E+02 .65E+02 .70E+020.       .83E+02 .36E+02 .22E+02 .19E+02 .12E+02 .19E+02 .50E+01 .13E+020.
                    .16E+15 .11E+15 .12E+150.       .19E+15 .99E+14 .55E+14 .43E+14 .24E+14 .34E+14 .80E+13 .19E+140.
                    .86E+15
SELENASTRUM         .20E+02 .80E+01 .17E+020.       .15E+02 .34E+02 .29E+02 .12E+02 .25E+02 .15E+02 .11E+02 .20E+020.
                    .55E+14 .14E+14 .28E+140.       .34E+14 .96E+14 .72E+14 .27E+14 .50E+14 .27E+14 .18E+14 .29E+140.
                    .45E+15
SPHAEROCYSTIS      0.       .48E+020.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                   0.       .84E+140.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    .84E+14
UNKNOWN             .12E+02 .21E+02 .90E+010.       .50E+01 .19E+02 .25E+02 .26E+02 .19E+02 .11E+02 .50E+01 .70E+010.
                    .33E+14 .37E+14 .15E+140.       .11E+14 .52E+14 .62E+14 .59E+14 .38E+14 .20E+14 .80E+13 .10E+140.
                    .34E+15
CERATIUM           0.      0.       .10E+010.       .10E+01 .10E+010.       .10E+010.      0.      0.      0.      0.
                   0.      0.       .17E+130.       .23E+13 .28E+130.       .23E+130.      0.      0.      0.      0.
                    .89E+13
CRYPTOMONAS         .91E+02 .73E+02 .10E+030.       .74E+02 .44E+02 .12E+02 .70E+01 .80E+01 .15E+02 .50E+01 .30E+010.
                    .25E+15 .13E+15 .17E+150.       .17E+15 .12E+15 .30E+14 .16E+14 .16E+14 .27E+14 .80E+13 .44E+130.
                    .93E+15
ASTERIONELLA        .87E+02 .51E+02 .73E+020.       .16E+03 .79E+02 .59E+02 .42E+02 .33E+02 .90E+01 .50E+01 .10E+010.
                    .24E+15 .89E+14 .12E+150.       .36E+15 .22E+15 .15E+15 .95E+14 .66E+14 .16E+14 .80E+13 .15E+130.
                    .14E+16
MELOSIRA           0.      0.      0.      0.      0.       .30E+01 .30E+01 .30E+010.      0.      0.      0.      0.
                   0.      0.      0.      0.      0.       .83E+13 .74E+13 .68E+130.      0.      0.      0.      0.
                    .23E+14
NAVICULA            .30E+010.       .10E+010.      0.       .10E+01 .10E+01 .10E+01 .10E+01 .30E+010.      0.      0.
                    .82E+130.       .17E+130.      0.       .28E+13 .25E+13 .23E+13 .20E+13 .54E+130.      0.      0.
                    .25E+14
RHOPALODIA          .19E+01 .10E+010.      0.      0.       .30E+01 .10E+010.       .10E+01 .10E+010.      0.      0.
                    .27E+13 .18E+130.      0.      0.       .83E+13 .25E+130.       .20E+13 .18E+130.      0.      0.
                    .19E+14
UNKNOWN             .30E+01 .30E+01 .30E+010.       .40E+01 .10E+01 .10E+01 .10E+01 .30E+01 .10E+01 .10E+01 .10E+010.
                    .82E+13 .53E+13 .50E+130.       .90E+13 .28E+13 .25E+13 .23E+13 .60E+13 .18E+13 .16E+13 .15E+130.
                    .46E+14
MERISMOPEDIA        .42E+02 .63E+02 .21E+020.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    .11E+15 .11E+15 .35E+140.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    .26E+15
UNKNOWN(T)          .12E+02 .50E+01 .90E+010.       .70E+01 .15E+02 .90E+01 .80E+01 .50E+01 .40E+01 .30E+01 .90E+010.
                    .33E+14 .98E+13 .15E+140.       .16E+14 .41E+14 .22E+14 .18E+14 .10E+14 .72E+13 .48E+13 .13E+140.
                    .19E+15

DATE  71972 DEPTH =  20.0
NAME             DEPTH-METERS
                          1       2       3       4       5       7       9      11      13      15      17      19      21
ANKISTRODESMUS      .10E+01 .13E+02 .13E+020.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    .26E+13 .22E+14 .21E+140.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    .45E+14
CHLAMYDOMONAS       .63E+03 .92E+03 .90E+03 .85E+03 .12E+04 .45E+03 .69E+02 .28E+02 .28E+02 .90E+01 .15E+02 .70E+010.
                    .16E+16 .15E+16 .14E+16 .13E+16 .25E+16 .11E+16 .16E+15 .56E+14 .50E+14 .14E+14 .22E+14 .87E+130.
                    .98E+16
OOCYSTIS            .38E+03 .32E+03 .48E+03 .50E+03 .90E+03 .53E+02 .67E+02 .51E+02 .90E+01 .38E+02 .90E+01 .90E+010.
                    .10E+16 .53E+15 .76E+15 .73E+15 .19E+16 .13E+15 .15E+15 .10E+15 .16E+14 .61E+14 .13E+14 .11E+140.
                    .54E+16
PLANKTOSPHAERTA     .13E+03 .25E+03 .22E+03 .36E+03 .33E+030.       .53E+02 .21E+020.      0.       .19E+02 .37E+020.
                    .34E+15 .42E+15 .36E+15 .53E+15 .68E+150.       .12E+15 .42E+140.      0.       .28E+14 .46E+140.
                    .26E+16
SCHROEDERIA         .40E+02 .66E+02 .40E+02 .66E+02 .13E+030.       .50E+010.      0.      0.      0.      0.      0.
                    .11E+15 .11E+15 .64E+14 .99E+14 .27E+140.       .11E+140.      0.      0.      0.      0.      0.
                    .42E+15
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SELENASTRUM         .11E+02 .26E+02 .13E+020.       .13E+020.       .30E+01 .40E+01 .30E+01 .10E+01 .10E+01 .10E+010.
                    .29E+14 .43E+14 .21E+140.       .27E+140.       .68E+13 .80E+13 .54E+13 .16E+13 .15E+13 .12E+130.
                    .14E+15
SPHAEROCYSTES       .42E+020.       .48E+03 .12E+040.      0.      0.       .48E+020.      0.      0.      0.      0.
                    .11E+150.       .76E+15 .18E+160.      0.      0.       .96E+140.      0.      0.      0.      0.
                    .28E+16
UNKNOWN             .12E+03 .19E+03 .15E+03 .79E+02 .12E+03 .53E+02 .16E+02 .11E+02 .80E+01 .50E+01 .80E+01 .50E+010.
                    .33E+15 .31E+15 .23E+15 .12E+15 .25E+15 .13E+15 .36E+14 .22E+14 .14E+14 .80E+13 .17E+14 .62E+130.
                    .15E+16
TRACHELAMONAS       .13E+02 .13E+02 .13E+020.       .13E+020.      0.      0.      0.      0.      0.      0.      0.
                    .34E+14 .22E+14 .21E+140.       .27E+140.      0.      0.      0.      0.      0.      0.      0.
                    .10E+15
GYMNODINIUM         .30E+010.       .13E+020.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    .79E+130.       .21E+140.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    .29E+14
CRYPTOMONAS         .16E+02 .40E+02 .40E+02 .26E+02 .40E+02 .26E+02 .50E+01 .30E+01 .10E+01 .10E+01 .10E+010.      0.
                    .42E+14 .66E+14 .64E+14 .39E+14 .83E+14 .64E+14 .11E+14 .60E+13 .18E+13 .16E+13 .15E+130.      0.
                    .38E+15
ASTERIONELLA        .34E+020.       .26E+02 .13E+02 .26E+02 .13E+02 .24E+02 .80E+01 .19E+02 .12E+02 .90E+01 .30E+010.
                    .89E+140.       .42E+14 .20E+14 .54E+14 .32E+14 .54E+14 .16E+14 .34E+14 .19E+14 .13E+14 .37E+130.
                    .38E+15
FRAGILARIA          .59E+03 .96E+03 .36E+030.       .36E+03 .20E+03 .19E+03 .20E+03 .33E+03 .19E+03 .21E+03 .69E+020.
                    .13E+16 .16E+16 .57E+150.       .74E+15 .49E+15 .44E+15 .40E+15 .59E+15 .31E+15 .31E+15 .86E+140.
                    .68E+16
MELOSIRA            .50E+010.      0.       .53E+020.      0.       .17E+02 .13E+02 .15E+02 .90E+01 .90E+01 .37E+020.
                    .13E+140.      0.       .80E+140.      0.       .38E+14 .26E+14 .27E+14 .14E+14 .13E+14 .46E+140.
                    .26E+15
UNKNOWN            0.      0.      0.      0.      0.       .26E+02 .40E+01 .10E+01 .30E+01 .10E+01 .10E+010.      0.
                   0.      0.      0.      0.      0.       .64E+14 .90E+13 .20E+13 .54E+13 .16E+13 .15E+130.      0.
                    .84E+14
APHANIZOMENON       .21E+03 .21E+04 .40E+04 .11E+04 .11E+030.      0.       .61E+040.      0.      0.      0.      0.
                    .56E+15 .35E+16 .63E+16 .16E+16 .22E+150.      0.       .12E+170.      0.      0.      0.      0.
                    .24E+17
UNKNOWN(T)          .30E+01 .26E+02 .66E+02 .40E+02 .40E+02 .66E+02 .80E+01 .40E+01 .50E+01 .40E+01 .10E+01 .19E+020.
                    .79E+13 .43E+14 .11E+15 .60E+14 .83E+14 .16E+15 .18E+14 .80E+13 .90E+13 .64E+13 .15E+13 .24E+140.
                    .53E+15

DATE  80272 DEPTH =  20.0
NAME              DEPTH-METERS
                           1       2       3       4       5       7       9      11      13      15      17      19      21
ANKISTRODESMUS      .13E+02 .13E+020.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    .34E+14 .22E+140.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    .56E+14
CHLAMYDOMONAS       .12E+04 .82E+03 .18E+04 .10E+04 .11E+04 .71E+03 .28E+03 .16E+03 .19E+03 .26E+03 .20E+03 .24E+030.
                    .32E+16 .14E+15 .28E+16 .15E+16 .23E+16 .18E+16 .63E+15 .32E+15 .33E+15 .42E+15 .29E+15 .29E+150.
                    .15E+17
OOCYSTIS            .12E+04 .30E+04 .27E+04 .41E+04 .26E+04 .19E+04 .95E+03 .11E+03 .13E+03 .53E+02 .21E+03 .16E+030.
                    .30E+16 .49E+16 .44E+16 .62E+16 .55E+16 .47E+16 .21E+16 .21E+15 .24E+15 .85E+14 .31E+15 .20E+150.
                    .32E+17
PLANKTOSPHAERIA     .20E+05 .16E+05 .16E+05 .20E+05 .95E+04 .52E+04 .31E+04 .11E+04 .12E+04 .14E+04 .13E+04 .53E+030.
                    .51E+17 .27E+17 .25E+17 .29E+17 .20E+17 .13E+17 .69E+16 .22E+16 .22E+16 .22E+16 .19E+16 .65E+150.
                    .18E+18
SCHROEDERIA         .13E+02 .17E+03 .19E+03 .17E+03 .13E+03 .12E+03 .40E+02 .26E+02 .66E+02 .26E+02 .40E+02 .66E+020.
                    .34E+14 .28E+15 .30E+15 .26E+15 .27E+15 .30E+15 .90E+14 .52E+14 .12E+15 .42E+14 .58E+14 .82E+140.
                    .19E+16
SELENASTRUM         .25E+02 .13E+02 .26E+020.       .13E+02 .13E+02 .53E+02 .12E+03 .26E+020.      0.       .13E+020.
                    .68E+14 .22E+14 .42E+140.       .27E+14 .32E+14 .12E+15 .24E+15 .47E+140.      0.       .16E+140.
                    .61E+15
SPHAEROCYSTIS       .65E+04 .40E+04 .14E+05 .55E+04 .55E+04 .17E+04 .19E+04 .17E+04 .42E+03 .17E+04 .84E+03 .42E+030.
                    .17E+17 .67E+16 .22E+17 .82E+16 .11E+17 .42E+16 .43E+16 .34E+16 .76E+15 .27E+16 .12E+16 .52E+150.
                    .82E+17
UNKNOWN             .79E+02 .19E+03 .79E+02 .12E+03 .20E+03 .15E+03 .79E+02 .53E+02 .66E+02 .26E+02 .53E+02 .66E+020.
                    .21E+15 .31E+15 .13E+15 .18E+15 .41E+15 .36E+15 .18E+15 .11E+15 .12E+15 .42E+14 .77E+14 .82E+140.
                    .22E+16
CRYPTOMONAS         .53E+02 .92E+02 .12E+03 .19E+03 .12E+03 .20E+03 .79E+02 .13E+020.       .13E+020.      0.      0.
                    .14E+15 .15E+15 .19E+15 .28E+15 .25E+15 .49E+15 .18E+15 .26E+140.       .21E+140.      0.      0.
                    .17E+16
ASTERIONELLA        .13E+020.      0.      0.      0.       .13E+02 .26E+020.      0.      0.      0.      0.      0.
                    .34E+140.      0.      0.      0.       .32E+14 .59E+140.      0.      0.      0.      0.      0.
                    .13E+15
FRAGILARIA          .61E+03 .48E+03 .11E+030.       .30E+030.       .17E+03 .26E+03 .22E+030.       .21E+030.      0.
                    .16E+15 .79E+15 .17E+150.       .63E+150.       .39E+15 .53E+15 .40E+150.       .31E+150.      0.
                    .48E+16
MELOSIRA           0.      0.      0.      0.      0.      0.      0.       .53E+020.      0.      0.       .13E+020.
                   0.      0.      0.      0.      0.      0.      0.       .11E+150.      0.      0.       .16E+140.
                    .12E+15
NAVICULA           0.      0.      0.      0.      0.      0.      0.       .13E+020.      0.      0.      0.      0.
                   0.      0.      0.      0.      0.      0.      0.       .26E+140.      0.      0.      0.      0.
                    .26E+14
UNKNOWN            0.      0.       .26E+02 .13E+02 .13E+020.       .13E+02 .13E+020.      0.      0.       .13E+020.
                   0.      0.       .42E+14 .20E+14 .27E+140.       .29E+14 .26E+140.      0.      0.       .16E+140.
                    .16E+15
APHANIZOMENON       .61E+04 .14E+05 .22E+05 .13E+05 .11E+05 .37E+04 .24E+04 .19E+04 .26E+03 .29E+04 .79E+030.      0.
                    .16E+17 .23E+17 .35E+17 .19E+17 .23E+17 .92E+16 .54E+16 .37E+16 .48E+15 .46E+16 .12E+160.      0.
                    .14E+18
APHANIZOMENON(H)    .26E+02 .13E+02 .26E+02 .66E+02 .26E+020.      0.      0.      0.      0.      0.      0.      0.
                    .68E+14 .22E+14 .42E+14 .99E+14 .54E+140.      0.      0.      0.      0.      0.      0.      0.
                    .28E+15
MERISMOPEDIA        .59E+04 .10E+05 .51E+04 .69E+04 .34E+04 .63E+03 .17E+04 .84E+03 .63E+03 .21E+030.      0.      0.
                    .16E+17 .17E+17 .91E+16 .19E+17 .70E+16 .15E+16 .38E+16 .17E+15 .11E+16 .34E+150.      0.      0.
                    .66E+17
UNKNOWN(T)         0.       .13E+02 .53E+02 .40E+02 .26E+02 .40E+02 .53E+02 .26E+02 .40E+02 .66E+02 .26E+02 .92E+020.
                   0.       .22E+14 .85E+14 .60E+14 .54E+14 .99E+14 .12E+15 .52E+14 .72E+14 .11E+15 .38E+14 .11E+150.
                    .82E+15

DATE  81472 DEPTH =  19.0
NAME              DEPTH-METERS
                           1       2       3       4       5       7       9      11      13      15      17      19      21
ANKISTRODESMUS      .40E+02 .26E+02 .13E+02 .40E+02 .92E+02 .40E+02 .13E+020.      0.      0.      0.      0.      0.
                    .10E+15 .42E+14 .20E+14 .55E+14 .17E+15 .90E+14 .26E+140.      0.      0.      0.      0.      0.
                    .53E+15
CHLAMYDOMONAS       .16E+04 .14E+04 .15E+04 .17E+04 .13E+04 .71E+03 .50E+03 .44E+02 .22E+02 .21E+02 .20E+02 .42E+020.
                    .40E+16 .22E+16 .23E+16 .23E+16 .25E+16 .16E+16 .10E+16 .79E+14 .35E+14 .31E+14 .25E+14 .45E+140.
                    .15E+17
OOCYSTIS            .11E+04 .10E+04 .84E+03 .67E+03 .81E+03 .22E+03 .41E+03 .49E+02 .17E+02 .15E+02 .17E+02 .15E+030.
                    .27E+15 .16E+15 .13E+16 .33E+15 .15E+16 .51E+15 .82E+15 .88E+14 .27E+14 .22E+14 .21E+14 .16E+150.
                    .95E+16
PEDIASTRUM         0.      0.      0.      0.      0.      0.      0.      0.       .42E+020.      0.      0.      0.
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                    0.      0.      0.      0.      0.      0.      0.      0.       .67E+140.      0.      0.      0.
                     .67E+14
PLANKTOSPHAERTA      .55E+04 .50E+04 .44E+04 .28E+04 .26E+04 .11E+04 .63E+03 .54E+02 .15E+02 .21E+02 .26E+02 .83E+020.
                     .14E+17 .79E+16 .56E+16 .38E+16 .48E+16 .25E+16 .13E+16 .97E+14 .24E+14 .31E+14 .32E+14 .88E+140.
                     .41E+17
SCHROEDERIA          .26E+02 .13E+02 .13E+020.      0.      0.      0.       .10E+010.      0.      0.       .30E+010.
                     .65E+14 .21E+14 .20E+140.      0.      0.      0.       .18E+130.      0.      0.       .32E+130.
                     .11E+15
SELENASTRUM          .16E+03 .40E+02 .92E+02 .53E+02 .13E+020.      0.      0.       .10E+010.      0.      0.      0.
                     .39E+15 .54E+14 .14E+15 .73E+14 .24E+140.      0.      0.       .16E+130.      0.      0.      0.
                     .69E+15
UNKNOWN              .26E+02 .40E+02 .66E+02 .66E+02 .13E+02 .26E+02 .13E+02 .50E+01 .30E+01 .70E+01 .90E+01 .20E+020.
                     .65E+14 .64E+14 .99E+14 .91E+14 .24E+14 .59E+14 .26E+14 .90E+13 .48E+13 .10E+14 .11E+14 .21E+140.
                     .48E+15
CERATIUM            0.      0.      0.      0.      0.      0.       .13E+020.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.      0.       .26E+140.      0.      0.      0.      0.      0.
                     .26E+14
CRYPTOMONAS          .21E+03 .28E+03 .40E+02 .40E+02 .13E+02 .26E+02 .66E+02 .80E+01 .10E+01 .40E+01 .50E+01 .40E+010.
                     .53E+15 .44E+15 .60E+14 .55E+14 .24E+14 .59E+14 .13E+15 .14E+14 .16E+13 .58E+13 .62E+13 .42E+130.
                     .13E+16
DINOBRYON            .54E+03 .36E+03 .79E+03 .30E+03 .94E+03 .20E+03 .40E+02 .12E+02 .10E+01 .12E+02 .15E+02 .30E+010.
                     .13E+16 .57E+15 .12E+16 .42E+15 .17E+16 .45E+15 .80E+14 .22E+14 .16E+13 .17E+14 .19E+14 .32E+130.
                     .59E+16
ASTERIONELLA        0.      0.       .17E+03 .53E+02 .26E+02 .13E+02 .26E+02 .30E+01 .10E+01 .30E+010.       .40E+010.
                    0.      0.       .26E+15 .73E+14 .48E+14 .29E+14 .52E+14 .54E+13 .16E+13 .44E+130.       .42E+130.
                     .47E+15
FRAGILARIA          0.      0.      0.      0.      0.      0.       .11E+03 .20E+03 .29E+03 .33E+03 .26E+03 .62E+030.
                    0.      0.      0.      0.      0.      0.       .21E+15 .36E+15 .47E+15 .48E+15 .33E+15 .66E+150.
                     .25E+16
MELOSIRA            0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.       .28E+020.
                    0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.       .30E+140.
                     .30E+14
UNKNOWN             0.      0.      0.      0.      0.      0.      0.      0.       .30E+01 .10E+01 .30E+01 .40E+010.
                    0.      0.      0.      0.      0.      0.      0.      0.       .48E+13 .15E+13 .37E+13 .42E+130.
                     .14E+14
APHANIZOMENON        .40E+04 .82E+04 .11E+04 .79E+03 .34E+04 .71E+04 .61E+04 .12E+04 .53E+02 .11E+03 .19E+03 .45E+030.
                     .99E+16 .13E+17 .16E+16 .11E+16 .64E+16 .16E+17 .12E+17 .22E+16 .85E+14 .15E+15 .23E+15 .47E+150.
                     .63E+17
APHANIZOMENON(H)    0.       .26E+020.      0.      0.       .66E+020.      0.      0.      0.      0.      0.      0.
                    0.       .42E+140.      0.      0.       .15E+150.      0.      0.      0.      0.      0.      0.
                     .19E+15
MERISMOPEDIA         .10E+05 .67E+05 .87E+05 .59E+05 .55E+05 .21E+05 .51E+04 .59E+03 .84E+02 .11E+03 .84E+020.      0.
                     .25E+17 .11E+18 .13E+18 .82E+17 .10E+18 .48E+17 .10E+17 .11E+16 .13E+15 .15E+15 .10E+150.      0.
                     .51E+18
UNKNOWN(T)          0.      0.       .13E+02 .26E+02 .26E+02 .13E+02 .26E+02 .40E+02 .26E+02 .53E+02 .13E+02 .26E+030.
                    0.      0.       .20E+14 .36E+14 .48E+14 .29E+14 .52E+14 .72E+14 .42E+14 .77E+14 .16E+14 .28E+150.
                     .67E+15

DATE   83072 DEPTH =  18.0
NAME              DEPTH-METERS
                           1       2       3       4       5       7       9      11      13      15      17      19      21
CHLAMYDOMONAS        .17E+04 .92E+03 .10E+04 .75E+03 .75E+03 .21E+03 .44E+03 .48E+03 .50E+03 .51E+02 .26E+020.      0.
                     .40E+16 .14E+16 .14E+16 .93E+15 .13E+16 .42E+15 .78E+15 .76E+15 .73E+15 .63E+14 .28E+140.      0.
                     .12E+17
KIRCHNERIELLA        .12E+05 .36E+03 .66E+020.      0.       .92E+020.      0.      0.      0.      0.      0.      0.
                     .30E+17 .53E+15 .91E+140.      0.       .18E+150.      0.      0.      0.      0.      0.      0.
                     .30E+17
OOCYSTIS             .12E+03 .79E+02 .16E+03 .92E+02 .66E+02 .16E+03 .17E+030.       .19E+03 .12E+02 .50E+010.      0.
                     .29E+15 .12E+15 .22E+15 .11E+15 .11E+15 .32E+15 .31E+150.       .27E+15 .15E+14 .53E+130.      0.
                     .18E+16
PLANKTOSPHAERTA      .32E+03 .12E+03 .79E+02 .16E+03 .53E+020.       .11E+030.       .53E+020.      0.      0.      0.
                     .76E+15 .18E+15 .11E+15 .20E+15 .90E+140.       .19E+150.       .77E+140.      0.      0.      0.
                     .16E+16
SCHROEDERIA          .17E+03 .24E+03 .12E+03 .16E+03 .53E+02 .40E+02 .26E+020.       .40E+02 .10E+010.      0.      0.
                     .41E+15 .36E+15 .16E+15 .20E+15 .90E+14 .80E+14 .47E+140.       .58E+14 .12E+130.      0.      0.
                     .14E+16
UNKNOWN              .26E+02 .13E+020.      0.       .13E+02 .26E+02 .53E+020.       .50E+01 .10E+010.      0.      0.
                     .62E+14 .20E+140.      0.       .22E+14 .52E+14 .95E+140.       .73E+13 .12E+130.      0.      0.
                     .26E+15
CERATIUM             .13E+020.       .13E+020.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .31E+140.       .18E+140.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .49E+14
CRYPTOMONAS          .15E+03 .66E+02 .92E+02 .54E+03 .24E+03 .17E+03 .11E+030.       .12E+03 .21E+02 .70E+010.      0.
                     .35E+15 .99E+14 .13E+15 .67E+15 .40E+15 .34E+15 .19E+150.       .17E+15 .26E+14 .74E+130.      0.
                     .24E+16
DINOBRYON            .15E+04 .38E+04 .44E+04 .27E+04 .34E+04 .14E+04 .91E+030.       .49E+03 .11E+03 .22E+030.      0.
                     .36E+16 .57E+16 .61E+16 .34E+16 .58E+16 .28E+16 .16E+160.       .71E+15 .14E+15 .23E+150.      0.
                     .30E+17
ASTERIONELLA        0.      0.      0.      0.      0.      0.      0.      0.      0.       .30E+010.      0.      0.
                    0.      0.      0.      0.      0.      0.      0.      0.      0.       .37E+130.      0.      0.
                     .37E+13
MELOSIRA             .40E+020.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .96E+140.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .96E+14
UNKNOWN             0.      0.       .13E+020.      0.      0.      0.      0.      0.       .19E+010.      0.      0.
                    0.      0.       .18E+140.      0.      0.      0.      0.      0.       .12E+130.      0.      0.
                     .19E+14
APHANIZOMENON        .16E+05 .11E+05 .31E+05 .27E+05 .88E+05 .16E+05 .79E+030.       .53E+030.      0.      0.      0.
                     .38E+17 .17E+17 .43E+17 .33E+17 .15E+18 .32E+17 .14E+160.       .77E+150.      0.      0.      0.
                     .31E+18
APHANIZOMENON(H)    0.       .13E+02 .92E+02 .13E+02 .22E+02 .26E+020.      0.      0.      0.      0.      0.      0.
                    0.       .20E+14 .13E+15 .16E+14 .37E+14 .52E+140.      0.      0.      0.      0.      0.      0.
                     .25E+15
MERISMOPEDIA         .22E+05 .38E+05 .13E+05 .35E+05 .25E+05 .14E+05 .71E+040.       .59E+04 .15E+04 .25E+040.      0.
                     .52E+17 .57E+17 .18E+17 .44E+17 .42E+17 .29E+17 .13E+170.       .86E+16 .19E+16 .27E+160.      0.
                     .27E+18
UNKNOWN(T)          0.       .26E+02 .15E+03 .12E+03 .15E+03 .53E+02 .21E+030.       .20E+03 .16E+02 .11E+020.      0.
                    0.       .39E+14 .20E+15 .15E+15 .25E+15 .11E+15 .38E+150.       .29E+15 .20E+14 .12E+140.      0.
                     .14E+16

DATE   91372 DEPTH =  18.0
NAME              DEPTH-METERS
                           1       2       3       4       5       7       9      11      13      15      17      19      21
CHLAMYDOMONAS        .54E+03 .45E+03 .40E+03 .33E+03 .50E+03 .17E+03 .25E+03 .25E+03 .92E+02 .50E+02 .90E+010.      0.
                     .13E+16 .67E+15 .55E+15 .41E+15 .85E+15 .34E+15 .45E+15 .40E+15 .13E+15 .62E+14 .95E+130.      0.
                     .52E+16
CLOSTERIUM          0.      0.      0.      0.      0.      0.      0.      0.       .30E+010.      0.      0.      0.
                    0.      0.      0.      0.      0.      0.      0.      0.       .44E+130.      0.      0.      0.
                     .44E+13
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OOCYSTIS           0.      0.      0.      0.      0.      0.       .53E+020.      0.      0.      0.      0.      0.
                   0.      0.      0.      0.      0.      0.       .95E+140.      0.      0.      0.      0.      0.
                    .95E+14
PLANKTOSPHAERTA     .21E+030.      0.      0.      0.      0.      0.      0.       .21E+020.      0.      0.      0.
                    .51E+150.      0.      0.      0.      0.      0.      0.       .31E+140.      0.      0.      0.
                    .54E+15
SCHROEDERIA         .13E+03 .79E+02 .13E+03 .92E+02 .66E+02 .66E+02 .66E+02 .40E+02 .32E+020.       .50E+010.      0.
                    .32E+15 .12E+15 .18E+15 .11E+15 .11E+15 .13E+15 .12E+15 .64E+14 .47E+140.       .53E+130.      0.
                    .12E+16
SELENASTRUM        0.       .13E+02 .40E+02 .13E+02 .13E+02 .13E+02 .13E+020.       .30E+010.      0.      0.      0.
                   0.       .20E+14 .55E+14 .16E+14 .22E+14 .26E+14 .23E+140.       .44E+130.      0.      0.      0.
                    .17E+15
UNKNOWN            0.      0.       .26E+020.      0.      0.       .13E+02 .66E+02 .19E+020.       .80E+010.      0.
                   0.      0.       .36E+140.      0.      0.       .23E+14 .11E+15 .28E+140.       .85E+130.      0.
                    .20E+15
CRYPTOMONAS         .26E+02 .53E+02 .26E+02 .53E+02 .53E+02 .53E+02 .40E+02 .40E+02 .21E+020.       .30E+010.      0.
                    .62E+14 .80E+14 .36E+14 .66E+14 .90E+14 .11E+15 .72E+14 .64E+14 .31E+140.       .32E+130.      0.
                    .61E+15
MALLOMONAS         0.      0.      0.      0.      0.      0.      0.       .13E+020.      0.      0.      0.      0.
                   0.      0.      0.      0.      0.      0.      0.       .21E+140.      0.      0.      0.      0.
                    .21E+14
ASTERIONELLA       0.      0.      0.       .26E+020.       .13E+020.      0.      0.      0.       .30E+010.      0.
                   0.      0.      0.       .32E+140.       .26E+140.      0.      0.      0.       .32E+130.      0.
                    .61E+14
MELOSIRA           0.       .21E+030.      0.      0.      0.      0.      0.      0.      0.       .50E+010.      0.
                   0.       .32E+150.      0.      0.      0.      0.      0.      0.      0.       .53E+130.      0.
                    .32E+15
NAVICULA           0.      0.      0.      0.      0.      0.       .13E+020.      0.      0.      0.      0.      0.
                   0.      0.      0.      0.      0.      0.       .23E+140.      0.      0.      0.      0.      0.
                    .23E+14
STEPHANODISCUS(LG) 0.      0.      0.      0.      0.      0.      0.      0.      0.      0.       .30E+010.      0.
                   0.      0.      0.      0.      0.      0.      0.      0.      0.      0.       .32E+130.      0.
                    .32E+13
UNKNOWN            0.      0.      0.      0.      0.      0.      0.      0.      0.      0.       .80E+010.      0.
                   0.      0.      0.      0.      0.      0.      0.      0.      0.      0.       .85E+130.      0.
                    .85E+13
APHANIZOMENON       .37E+05 .37E+05 .43E+05 .64E+05 .28E+05 .41E+05 .24E+05 .15E+05 .44E+04 .30E+04 .16E+040.      0.
                    .90E+17 .56E+17 .59E+17 .79E+17 .47E+17 .92E+17 .43E+17 .23E+17 .65E+16 .37E+16 .17E+160.      0.
                    .49E+18
APHANIZOMENON(H)    .45E+03 .22E+03 .36E+03 .34E+03 .16E+03 .28E+03 .20E+03 .92E+02 .19E+020.       .80E+010.      0.
                    .11E+16 .34E+15 .49E+15 .43E+15 .27E+15 .55E+15 .36E+15 .15E+15 .28E+140.       .85E+130.      0.
                    .37E+16
MERISMOPEDIA        .37E+04 .33E+04 .21E+04 .85E+03 .42E+03 .53E+02 .16E+03 .16E+03 .84E+020.      0.      0.      0.
                    .89E+16 .49E+16 .29E+16 .10E+16 .72E+15 .11E+15 .28E+15 .25E+15 .12E+150.      0.      0.      0.
                    .19E+17

DATE  92972 DEPTH =  18.5
NAME             DEPTH-METERS
                          1       2       3       4       5       7       9      11      13      15      17      19      21
ANKISTRODESMUS      .53E+02 .10E+01 .10E+010.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    .13E+15 .16E+13 .14E+130.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    .13E+15
CHLAMYDOMONAS       .65E+03 .22E+03 .28E+03 .74E+03 .11E+04 .71E+03 .13E+03 .15E+03 .79E+02 .53E+02 .17E+020.      0.
                    .16E+16 .35E+15 .40E+15 .96E+15 .20E+16 .15E+16 .25E+15 .25E+15 .12E+15 .71E+14 .20E+140.      0.
                    .75E+16
CLOSTERIUM         0.      0.      0.      0.      0.      0.       .10E+010.      0.      0.      0.      0.      0.
                   0.      0.      0.      0.      0.      0.       .19E+130.      0.      0.      0.      0.      0.
                    .19E+13
PLANKTOSPHAERTA    0.      0.      0.      0.      0.      0.       .11E+020.      0.      0.      0.      0.      0.
                   0.      0.      0.      0.      0.      0.       .21E+140.      0.      0.      0.      0.      0.
                    .21E+14
SCHROEDERIA        0.       .50E+01 .30E+010.      0.      0.      0.      0.      0.      0.       .80E+010.      0.
                   0.       .78E+13 .43E+130.      0.      0.      0.      0.      0.      0.       .92E+130.      0.
                    .21E+14
SELENASTRUM        0.      0.      0.      0.      0.      0.      0.       .10E+01 .30E+01 .10E+010.      0.      0.
                   0.      0.      0.      0.      0.      0.      0.       .17E+13 .46E+13 .13E+130.      0.      0.
                    .76E+13
CRYPTOMONAS         .13E+02 .29E+02 .53E+02 .66E+02 .13E+02 .15E+03 .70E+01 .28E+02 .90E+01 .12E+02 .50E+010.      0.
                    .32E+14 .45E+14 .76E+14 .86E+14 .23E+14 .31E+15 .13E+14 .48E+14 .14E+14 .16E+14 .58E+130.      0.
                    .67E+15
MALLOMONAS         0.      0.       .30E+01 .10E+010.      0.      0.      0.      0.      0.      0.      0.      0.
                   0.      0.       .43E+13 .13E+130.      0.      0.      0.      0.      0.      0.      0.      0.
                    .56E+13
STEPHANODISCUS(SM)  .92E+02 .13E+02 .90E+01 .26E+02 .16E+03 .21E+03 .17E+02 .12E+02 .70E+01 .40E+010.      0.      0.
                    .22E+15 .20E+14 .12E+14 .34E+14 .28E+15 .45E+15 .32E+14 .20E+14 .11E+14 .54E+130.      0.      0.
                    .11E+16
ASTERIONELLA       0.      0.       .30E+010.      0.      0.       .40E+010.      0.       .30E+01 .40E+010.      0.
                   0.      0.       .43E+130.      0.      0.       .76E+130.      0.       .40E+13 .46E+130.      0.
                    .21E+14
NAVICULA           0.      0.      0.      0.      0.      0.      0.      0.      0.      0.       .10E+010.      0.
                   0.      0.      0.      0.      0.      0.      0.      0.      0.      0.       .12E+130.      0.
                    .12E+13
RHOPALODIA         0.       .30E+010.      0.      0.       .13E+020.      0.      0.       .10E+010.      0.      0.
                   0.       .47E+130.      0.      0.       .28E+140.      0.      0.       .13E+130.      0.      0.
                    .34E+14
STEPHANODISCUS(LG) 0.       .40E+010.      0.      0.      0.       .30E+01 .10E+01 .30E+01 .10E+010.      0.      0.
                   0.       .62E+130.      0.      0.      0.       .57E+13 .17E+13 .46E+13 .13E+130.      0.      0.
                    .20E+14
UNKNOWN            0.       .10E+01 .30E+01 .53E+02 .13E+02 .26E+02 .70E+01 .40E+01 .40E+01 .30E+01 .50E+010.      0.
                   0.       .16E+13 .43E+13 .69E+14 .23E+14 .55E+14 .13E+14 .68E+13 .61E+13 .40E+13 .58E+130.      0.
                    .19E+15
APHANIZOMENON       .14E+05 .22E+04 .88E+04 .20E+05 .46E+05 .27E+05 .47E+04 .99E+04 .19E+05 .71E+03 .92E+030.      0.
                    .33E+17 .35E+16 .13E+17 .26E+17 .81E+17 .57E+17 .90E+16 .17E+17 .28E+17 .96E+15 .11E+160.      0.
                    .27E+18
APHANIZOMENON(H)    .66E+02 .30E+01 .34E+02 .26E+02 .92E+02 .13E+03 .12E+02 .22E+02 .61E+020.      0.      0.      0.
                    .16E+15 .47E+13 .49E+14 .34E+14 .16E+15 .28E+15 .23E+14 .37E+14 .93E+140.      0.      0.      0.
                    .85E+15
UNKNOWN(T)         0.      0.      0.      0.       .66E+02 .26E+020.       .40E+01 .10E+01 .43E+01 .18E+030.      0.
                   0.      0.      0.      0.       .12E+15 .55E+140.       .68E+13 .15E+13 .54E+13 .20E+150.      0.
                    .39E+15

DATE 101872 DEPTH =  18.5
NAME             DEPTH-METERS
                          1       2       3       4       5       7       9      11      13      15      17      19      21
ANKISTRODESMUS      .40E+02 .13E+02 .20E+020.       .90E+01 .40E+01 .10E+010.      0.      0.      0.      0.      0.
                    .98E+14 .20E+14 .29E+140.       .16E+14 .85E+13 .19E+130.      0.      0.      0.      0.      0.
                    .17E+15
CHLAMYDOMONAS       .41E+03 .34E+03 .26E+03 .25E+03 .25E+03 .24E+03 .16E+03 .17E+030.      0.      0.      0.      0.
                    .10E+16 .53E+15 .38E+15 .33E+15 .44E+15 .51E+15 .30E+15 .29E+150.      0.      0.      0.      0.
                    .38E+16
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SCHROEDERIA         .66E+02 .26E+02 .50E+010.       .80E+01 .70E+01 .70E+01 .90E+010.       0.      0.      0.      0.
                    .16E+15 .40E+14 .72E+130.       .14E+14 .19E+14 .13E+14 .15E+140.       0.      0.      0.      0.
                    .27E+15
SELENASTRUM         0.      0.      .30E+010.       .10E+01 .30E+01 .10E+010.       0.      0.      0.      0.      0.
                    0.      0.      .43E+130.       .18E+13 .64E+13 .19E+130.       0.      0.      0.      0.      0.
                    .14E+14
UNKNOWN             .53E+02 .26E+02 .70E+010.       .10E+01 .40E+01 .30E+01 .30E+010.       0.      0.      0.      0.
                    .13E+15 .40E+14 .10E+140.       .18E+13 .95E+13 .57E+13 .51E+130.       0.      0.      0.      0.
                    .20E+15
TRACHELAMONAS       .26E+02 .13E+020.       0.      0.      0.      0.      .30E+010.       0.      0.      0.      0.
                    .64E+14 .20E+140.       0.      0.      0.      0.      .51E+130.       0.      0.      0.      0.
                    .89E+14
CRYPTOMONAS         .25E+03 .29E+03 .82E+020.       .69E+02 .71E+02 .77E+02 .38E+020.       0.      0.      0.      0.
                    .61E+15 .44E+15 .12E+150.       .12E+15 .15E+15 .15E+15 .65E+140.       0.      0.      0.      0.
                    .17E+16
MALLOMONAS          .13E+02 .13E+020.       0.      0.      0.      .30E+01 .10E+010.       0.      0.      0.      0.
                    .32E+14 .20E+140.       0.      0.      0.      .57E+13 .17E+130.       0.      0.      0.      0.
                    .59E+14
STEPHANODISCUS(SM)  0.      0.      .70E+01 .11E+02 .17E+02 .19E+02 .50E+01 .80E+010.       0.      0.      0.      0.
                    0.      0.      .10E+14 .14E+14 .30E+14 .40E+14 .95E+13 .14E+140.       0.      0.      0.      0.
                    .12E+15
ASTERIONELLA        .26E+020.       .40E+010.       .10E+010.       0.      0.      0.      0.      0.      0.      0.
                    .64E+140.       .58E+130.       .18E+130.       0.      0.      0.      0.      0.      0.      0.
                    .71E+14
RHOPALODIA          .13E+020.       0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    .32E+140.       0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    .32E+14
UNKNOWN             .13E+02 .13E+02 .10E+010.       .40E+01 .70E+01 .50E+01 .30E+010.       0.      0.      0.      0.
                    .32E+14 .20E+14 .14E+130.       .71E+13 .15E+14 .95E+13 .51E+130.       0.      0.      0.      0.
                    .90E+14
APHANIZOMENON       .24E+05 .15E+05 .31E+04 .20E+04 .11E+04 .29E+03 .32E+040.       0.      0.      0.      0.      0.
                    .58E+17 .24E+17 .44E+16 .26E+16 .20E+16 .62E+15 .60E+160.       0.      0.      0.      0.      0.
                    .97E+17
APHANIZOMENON(H)    .26E+02 .40E+02 .40E+010.       .10E+01 .10E+010.       0.      0.      0.      0.      0.      0.
                    .64E+14 .62E+14 .58E+130.       .18E+13 .21E+130.       0.      0.      0.      0.      0.      0.
                    .14E+15
UNKNOWN(T)          0.      0.      0.      0.      .30E+01 .30E+01 .10E+010.       0.      0.      0.      0.      0.
                    0.      0.      0.      0.      .53E+13 .64E+13 .19E+130.       0.      0.      0.      0.      0.
                    .14E+14

DATE 110372 DEPTH =  18.5
NAME              DEPTH-METERS
                           1       2       3       4       5       7       9      11      13      15      17      19      21
ANKISTRODESMUS      .90E+01 .17E+02 .70E+01 .80E+01 .50E+01 .90E+01 .16E+02 .11E+02 .80E+01 .70E+01 .10E+010.       0.
                    .22E+14 .26E+14 .10E+14 .10E+14 .89E+13 .19E+14 .30E+14 .19E+14 .12E+14 .94E+13 .12E+130.       0.
                    .17E+15
CHLAMYDOMONAS       .26E+03 .22E+03 .16E+03 .12E+03 .13E+03 .14E+03 .12E+03 .80E+02 .65E+02 .22E+02 .10E+010.       0.
                    .64E+15 .35E+15 .23E+15 .15E+15 .23E+15 .30E+15 .22E+15 .14E+15 .99E+14 .30E+14 .12E+130.       0.
                    .24E+16
CLOSTERIUM          0.      0.      0.      .30E+01 .30E+010.       .10E+010.       0.      0.      .10E+010.       0.
                    0.      0.      0.      .39E+13 .53E+130.       .19E+130.       0.      0.      .12E+130.       0.
                    .12E+14
PLANKTOSPHAERIA     .26E+020.       0.      0.      0.      0.      .11E+020.       0.      0.      0.      0.      0.
                    .64E+140.       0.      0.      0.      0.      .21E+140.       0.      0.      0.      0.      0.
                    .84E+14
SCHROEDERIA         .12E+02 .90E+01 .50E+01 .11E+02 .70E+01 .80E+01 .12E+02 .70E+01 .50E+01 .40E+01 .10E+010.       0.
                    .29E+14 .14E+14 .72E+13 .14E+14 .12E+14 .17E+14 .23E+14 .12E+14 .76E+13 .54E+13 .12E+130.       0.
                    .14E+15
SELENASTRUM         0.      .40E+01 .10E+01 .10E+01 .40E+01 .40E+01 .40E+01 .10E+01 .10E+01 .30E+010.       0.      0.
                    0.      .62E+13 .14E+13 .13E+13 .71E+13 .85E+13 .76E+13 .17E+13 .15E+13 .40E+130.       0.      0.
                    .39E+14
UNKNOWN             .70E+01 .30E+01 .80E+01 .50E+01 .50E+01 .70E+01 .19E+02 .80E+01 .26E+02 .70E+01 .10E+010.       0.
                    .17E+14 .47E+13 .12E+14 .66E+13 .89E+13 .15E+14 .36E+14 .14E+14 .40E+14 .94E+13 .12E+130.       0.
                    .16E+15
TRACHELAMONAS       0.      .10E+010.       0.      .10E+010.       .10E+010.       0.      0.      0.      0.      0.
                    0.      .16E+130.       0.      .18E+130.       .19E+130.       0.      0.      0.      0.      0.
                    .52E+13
CRYPTOMONAS         .49E+02 .66E+02 .52E+02 .62E+02 .67E+02 .90E+02 .48E+02 .52E+02 .22E+02 .90E+01 .30E+010.       0.
                    .12E+15 .10E+15 .75E+14 .81E+14 .12E+15 .19E+15 .91E+14 .88E+14 .34E+14 .12E+14 .35E+130.       0.
                    .92E+15
MALLOMONAS          .10E+010.       0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    .24E+130.       0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    .24E+13
STEPHANODISCUS(SM)  .90E+01 .30E+01 .90E+01 .40E+01 .15E+02 .40E+01 .80E+01 .30E+01 .30E+010.       0.      0.      0.
                    .22E+14 .47E+13 .13E+14 .52E+13 .27E+14 .85E+13 .15E+14 .51E+13 .46E+130.       0.      0.      0.
                    .10E+15
ASTERIONELLA        .90E+01 .30E+01 .30E+01 .10E+01 .13E+02 .50E+01 .12E+02 .10E+010.       .80E+01 .50E+010.       0.
                    .22E+14 .47E+13 .43E+13 .13E+13 .23E+14 .11E+14 .23E+14 .17E+130.       .11E+14 .58E+130.       0.
                    .11E+15
MELOSIRA            0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      .30E+010.       0.
                    0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      .35E+130.       0.
                    .35E+13
NAVICULA            0.      .10E+01 .30E+010.       .10E+01 .10E+010.       .10E+010.       0.      0.      0.      0.
                    0.      .16E+13 .43E+130.       .18E+13 .21E+130.       .17E+130.       0.      0.      0.      0.
                    .11E+14
STEPHANODISCUS(LG)  .30E+010.       0.      0.      .10E+01 .10E+01 .30E+01 .10E+010.       0.      .10E+010.       0.
                    .73E+130.       0.      0.      .18E+13 .21E+13 .57E+13 .17E+130.       0.      .12E+130.       0.
                    .20E+14
UNKNOWN             .70E+01 .40E+01 .70E+01 .40E+01 .10E+01 .70E+01 .50E+01 .50E+01 .11E+02 .30E+01 .40E+010.       0.
                    .17E+14 .62E+13 .10E+14 .52E+13 .18E+13 .15E+14 .95E+13 .85E+13 .17E+14 .40E+13 .46E+130.       0.
                    .99E+14
UNKNOWN(T)          0.      0.      .30E+01 .10E+01 .10E+010.       0.      .10E+010.       .10E+010.       0.      0.
                    0.      0.      .43E+13 .13E+13 .18E+130.       0.      .17E+130.       .13E+130.       0.      0.
                    .10E+14

DATE 111772 DEPTH =  18.5
NAME              DEPTH-METERS
                           1       2       3       4       5       7       9      11      13      15      17      19      21
ANKISTRODESMUS      0.      .11E+03 .40E+02 .25E+02 .13E+02 .30E+01 .40E+01 .11E+02 .15E+02 .90E+01 .30E+010.       0.
                    0.      .16E+15 .58E+14 .33E+14 .23E+14 .64E+13 .76E+13 .19E+14 .23E+14 .12E+14 .35E+130.       0.
                    .35E+15
CHLAMYDOMONAS       .14E+04 .99E+03 .98E+03 .33E+03 .28E+03 .32E+03 .22E+03 .26E+03 .13E+03 .44E+02 .16E+020.       0.
                    .33E+16 .15E+16 .14E+16 .43E+15 .50E+15 .68E+15 .42E+15 .45E+15 .19E+15 .59E+14 .18E+140.       0.
                    .90E+16
CLOSTERIUM          0.      0.      0.      .40E+01 .10E+01 .10E+010.       0.      .30E+01 .10E+010.       0.      0.
                    0.      0.      0.      .52E+13 .18E+13 .21E+130.       0.      .46E+13 .13E+130.       0.      0.
                    .15E+14
PLANKTOSPHAERIA     0.      0.      0.      0.      0.      .12E+02 .30E+01 .40E+010.       0.      0.      0.      0.
                    0.      0.      0.      0.      0.      .26E+14 .15E+14 .68E+130.       0.      0.      0.      0.
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                    .48E+14
SCHROEDERIA         0.      0.      .13E+02 .40E+01 .30E+01 .10E+01 .30E+01 .50E+01 .10E+010.       0.      0.      0.
                    0.      0.      .19E+14 .52E+13 .53E+13 .21E+13 .57E+13 .85E+13 .15E+130.       0.      0.      0.
                    .47E+14
UNKNOWN             .53E+02 .40E+02 .26E+02 .90E+01 .80E+01 .50E+01 .40E+01 .10E+01 .30E+010.       .10E+010.       0.
                    .13E+15 .62E+14 .37E+14 .12E+14 .14E+14 .11E+14 .76E+13 .17E+13 .46E+130.       .12E+130.       0.
                    .28E+15
TRACHELAMONAS       .13E+02 .13E+02 .13E+020.       .40E+01 .40E+01 .70E+01 .30E+01 .10E+010.       .10E+010.       0.
                    .32E+14 .20E+14 .19E+140.       .71E+13 .85E+13 .13E+14 .51E+13 .15E+130.       .12E+130.       0.
                    .11E+15
CRYPTOMONAS         .17E+03 .11E+03 .79E+02 .61E+02 .22E+02 .39E+02 .26E+02 .38E+02 .24E+02 .70E+010.       0.      0.
                    .42E+15 .16E+15 .11E+15 .80E+14 .39E+14 .83E+14 .49E+14 .65E+14 .37E+14 .94E+130.       0.      0.
                    .11E+16
MALLOMONAS          0.      0.      0.      .10E+01 .40E+01 .10E+01 .10E+01 .30E+01 .10E+01 .30E+010.       0.      0.
                    0.      0.      0.      .13E+13 .71E+13 .21E+13 .19E+13 .51E+13 .15E+13 .40E+130.       0.      0.
                    .23E+14
STEPHANODISCUS(SM)  .70E+03 .44E+03 .37E+03 .14E+03 .45E+02 .26E+02 .40E+02 .28E+02 .26E+02 .10E+01 .70E+010.       0.
                    .17E+16 .68E+15 .53E+15 .19E+15 .80E+14 .55E+14 .76E+14 .48E+14 .40E+14 .13E+13 .81E+130.       0.
                    .34E+16
ASTERIONELLA        .12E+03 .26E+02 .40E+02 .16E+02 .70E+01 .20E+02 .11E+02 .70E+01 .10E+01 .12E+02 .90E+010.       0.
                    .29E+15 .40E+14 .56E+14 .21E+14 .12E+14 .43E+14 .21E+14 .12E+14 .15E+13 .16E+14 .10E+140.       0.
                    .53E+15
NAVICULA            .26E+020.       .13E+02 .10E+010.       .30E+010.       0.      .30E+01 .10E+010.       0.      0.
                    .64E+140.       .19E+14 .13E+130.       .64E+130.       0.      .46E+13 .13E+130.       0.      0.
                    .96E+14
RHOPALODIA          0.      0.      .13E+02 .30E+01 .30E+010.       0.      0.      .40E+01 .10E+010.       0.      0.
                    0.      0.      .19E+14 .39E+13 .53E+130.       0.      0.      .61E+13 .13E+130.       0.      0.
                    .35E+14
STEPHANODISCUS(LG)  0.      .13E+020.       .50E+01 .10E+01 .30E+010.       .40E+01 .30E+01 .80E+01 .50E+010.       0.
                    0.      .20E+140.       .66E+13 .18E+13 .64E+130.       .68E+13 .46E+13 .11E+14 .58E+130.       0.
                    .63E+14
UNKNOWN             .13E+02 .26E+02 .26E+02 .50E+01 .40E+01 .30E+01 .50E+01 .30E+01 .50E+01 .90E+010.       0.      0.
                    .32E+14 .40E+14 .37E+14 .66E+13 .71E+13 .64E+13 .95E+13 .51E+13 .76E+13 .12E+140.       0.      0.
                    .16E+15
UNKNOWN(T)          .66E+02 .11E+03 .20E+03 .80E+01 .11E+02 .12E+02 .30E+01 .13E+02 .25E+02 .24E+02 .40E+010.       0.
                    .16E+15 .16E+15 .29E+15 .10E+14 .20E+14 .26E+14 .57E+13 .22E+14 .38E+14 .32E+14 .46E+130.       0.
                    .77E+15

DATE 122072 DEPTH =  18.5
NAME              DEPTH-METERS
                           1       2       3       4       5       7       9      11      13      15      17      19      21
ANKISTRODESMUS      0.      0.      .26E+020.       .90E+01 .24E+02 .15E+02 .11E+02 .90E+01 .16E+02 .12E+020.       0.
                    0.      0.      .37E+140.       .16E+14 .51E+14 .29E+14 .19E+14 .14E+14 .22E+14 .14E+140.       0.
                    .20E+15
CHLAMYDOMONAS       .24E+04 .19E+04 .99E+03 .60E+03 .27E+03 .26E+03 .91E+02 .69E+02 .79E+02 .54E+02 .42E+020.       0.
                    .59E+16 .29E+16 .14E+16 .79E+15 .49E+15 .54E+15 .17E+15 .12E+15 .12E+15 .73E+14 .48E+140.       0.
                    .13E+17
UNKNOWN             .26E+020.       .53E+020.       .70E+01 .13E+02 .40E+01 .50E+01 .30E+01 .10E+01 .10E+010.       0.
                    .64E+140.       .76E+140.       .12E+14 .28E+14 .76E+13 .85E+13 .46E+13 .13E+13 .12E+130.       0.
                    .20E+15
TRACHELAMONAS       0.      0.      0.      0.      .40E+01 .80E+01 .30E+01 .40E+01 .30E+010.       0.      0.      0.
                    0.      0.      0.      0.      .71E+13 .17E+14 .57E+13 .68E+13 .46E+130.       0.      0.      0.
                    .41E+14
CRYPTOMONAS         .53E+020.       .40E+020.       .20E+02 .12E+02 .40E+01 .30E+010.       .40E+01 .10E+010.       0.
                    .13E+150.       .58E+140.       .36E+14 .26E+14 .76E+13 .51E+130.       .54E+13 .12E+130.       0.
                    .27E+15
STEPHANODISCUS(SM)  .12E+04 .10E+04 .70E+03 .40E+03 .20E+03 .21E+03 .62E+02 .62E+02 .84E+02 .50E+02 .32E+020.       0.
                    .29E+16 .16E+16 .10E+16 .52E+15 .35E+15 .46E+15 .12E+15 .11E+15 .13E+15 .67E+14 .37E+140.       0.
                    .72E+16
ASTERIONELLA        .22E+030.       .13E+030.       .11E+03 .99E+02 .40E+02 .33E+02 .70E+01 .70E+01 .19E+020.       0.
                    .55E+150.       .19E+150.       .20E+15 .21E+15 .76E+14 .56E+14 .11E+14 .94E+13 .22E+140.       0.
                    .13E+16
NAVICULA            0.      0.      0.      0.      0.      0.      0.      0.      0.      .40E+01 .10E+010.       0.
                    0.      0.      0.      0.      0.      0.      0.      0.      0.      .54E+13 .12E+130.       0.
                    .65E+13
STEPHANODISCUS(LG)  0.      0.      0.      0.      0.      0.      0.      0.      0.      .10E+010.       0.      0.
                    0.      0.      0.      0.      0.      0.      0.      0.      0.      .13E+130.       0.      0.
                    .13E+13
UNKNOWN             0.      0.      .66E+020.       .12E+02 .70E+01 .79E+01 .30E+01 .30E+01 .30E+01 .70E+010.       0.
                    0.      0.      .95E+140.       .21E+14 .15E+14 .13E+14 .51E+13 .46E+13 .40E+13 .81E+130.       0.
                    .17E+15

DATE  10673 DEPTH =  18.5
NAME              DEPTH-METERS
                           1       2       3       4       5       7       9      11      13      15      17      19      21
ANKISTRODESMUS      0.      0.      0.      0.      .26E+02 .11E+02 .90E+01 .70E+01 .40E+01 .80E+01 .12E+020.       0.
                    0.      0.      0.      0.      .46E+14 .23E+14 .17E+14 .12E+14 .61E+13 .11E+14 .14E+140.       0.
                    .13E+15
CHLAMYDOMONAS       .51E+04 .40E+04 .30E+04 .20E+04 .86E+03 .38E+03 .23E+03 .14E+03 .69E+02 .67E+02 .32E+020.       0.
                    .12E+17 .52E+16 .43E+16 .26E+16 .15E+16 .80E+15 .44E+15 .24E+15 .11E+15 .90E+14 .37E+140.       0.
                    .29E+17
UNKNOWN             .26E+030.       0.      0.      .26E+02 .11E+02 .40E+01 .90E+01 .13E+02 .50E+01 .40E+010.       0.
                    .65E+150.       0.      0.      .46E+14 .23E+14 .76E+13 .15E+14 .20E+14 .67E+13 .46E+130.       0.
                    .77E+15
CRYPTOMONAS         .32E+030.       0.      0.      .26E+02 .80E+010.       .10E+01 .50E+01 .10E+010.       0.      0.
                    .78E+150.       0.      0.      .46E+14 .17E+140.       .17E+13 .76E+13 .13E+130.       0.      0.
                    .85E+15
STEPHANODISCUS(SM)  .28E+04 .20E+04 .14E+04 .10E+04 .94E+03 .35E+03 .17E+03 .16E+03 .15E+03 .13E+03 .78E+020.       0.
                    .68E+16 .31E+16 .20E+16 .13E+16 .17E+16 .75E+15 .32E+15 .28E+15 .23E+15 .17E+15 .90E+140.       0.
                    .17E+17
ASTERIONELLA        .32E+030.       0.      0.      .51E+03 .30E+03 .95E+02 .61E+02 .62E+02 .40E+02 .28E+020.       0.
                    .78E+150.       0.      0.      .91E+15 .64E+15 .18E+15 .10E+15 .95E+14 .54E+14 .32E+140.       0.
                    .28E+16
UNKNOWN             .13E+020.       0.      0.      0.      0.      .10E+010.       .30E+010.       .40E+010.       0.
                    .32E+140.       0.      0.      0.      0.      .19E+130.       .46E+130.       .46E+130.       0.
                    .43E+14

DATE  12773 DEPTH =  18.5
NAME              DEPTH-METERS
                           1       2       3       4       5       7       9      11      13      15      17      19      21
ANKISTRODESMUS      0.      0.      0.      0.      0.      0.      0.      0.      0.      .40E+01 .30E+010.       0.
                    0.      0.      0.      0.      0.      0.      0.      0.      0.      .54E+13 .35E+130.       0.
                    .88E+13
CHLAMYDOMONAS       .34E+04 .30E+04 .24E+04 .15E+04 .98E+03 .45E+03 .22E+03 .62E+02 .24E+02 .36E+02 .22E+020.       0.
                    .82E+16 .46E+16 .34E+16 .20E+16 .17E+16 .95E+15 .43E+15 .11E+15 .37E+14 .49E+14 .25E+140.       0.
                    .21E+17
UNKNOWN             .11E+03 .12E+03 .15E+030.       .66E+02 .13E+02 .80E+01 .80E+01 .10E+010.       0.      0.      0.
                    .26E+15 .18E+15 .21E+150.       .12E+15 .28E+14 .15E+14 .14E+14 .15E+130.       0.      0.      0.
                    .83E+15
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TRACHELAMONAS        .66E+02 .40E+02 .13E+020.       .79E+02 .13E+02 .50E+01 .10E+010.       .40E+010.      0.      0.
                     .16E+15 .62E+14 .19E+140.       .14E+15 .28E+14 .95E+13 .17E+130.       .54E+130.      0.      0.
                     .43E+15
CRYPTOMONAS          .22E+03 .92E+02 .53E+020.      0.      0.      0.      0.       .10E+010.      0.      0.      0.
                     .55E+15 .14E+15 .76E+140.      0.      0.      0.      0.       .15E+130.      0.      0.      0.
                     .77E+15
MALLOMONAS           .11E+03 .53E+02 .26E+020.       .13E+020.      0.       .50E+01 .30E+010.      0.      0.      0.
                     .26E+15 .82E+14 .37E+140.       .23E+140.      0.       .85E+13 .46E+130.      0.      0.      0.
                     .41E+15
STEPHANODISCUS(SM)   .12E+05 .15E+05 .11E+05 .50E+04 .14E+04 .41E+03 .27E+03 .90E+02 .17E+03 .78E+02 .44E+020.      0.
                     .30E+17 .23E+17 .15E+17 .66E+16 .25E+16 .87E+15 .51E+15 .15E+15 .26E+15 .11E+15 .51E+140.      0.
                     .79E+17
ASTERIONELLA         .53E+02 .25E+03 .48E+030.       .96E+03 .48E+03 .25E+03 .83E+02 .94E+02 .37E+02 .33E+020.      0.
                     .13E+15 .39E+15 .68E+150.       .17E+16 .10E+16 .48E+15 .14E+15 .14E+15 .50E+14 .38E+140.      0.
                     .48E+16
NAVICULA            0.      0.      0.      0.      0.      0.      0.      0.       .10E+010.       .30E+010.      0.
                    0.      0.      0.      0.      0.      0.      0.      0.       .15E+130.       .35E+130.      0.
                     .50E+13
UNKNOWN             0.      0.      0.      0.      0.      0.      0.      0.       .10E+01 .30E+01 .20E+020.      0.
                    0.      0.      0.      0.      0.      0.      0.      0.       .15E+13 .40E+13 .23E+140.      0.
                     .29E+14

DATE  21073 DEPTH =  18.5
NAME              DEPTH-METERS
                           1       2       3       4       5       7       9      11      13      15      17      19      21
CHLAMYDOMONAS        .70E+03 .57E+03 .66E+03 .30E+03 .49E+02 .45E+02 .69E+02 .16E+02 .17E+02 .16E+02 .80E+010.      0.
                     .17E+16 .10E+16 .95E+15 .39E+15 .87E+14 .95E+14 .13E+15 .27E+14 .26E+14 .22E+14 .92E+130.      0.
                     .45E+16
PLANKTOSPHAERTA      .40E+020.      0.      0.       .13E+020.      0.      0.      0.      0.      0.      0.      0.
                     .98E+140.      0.      0.       .23E+140.      0.      0.      0.      0.      0.      0.      0.
                     .12E+15
UNKNOWN              .44E+030.       .92E+020.       .80E+01 .40E+01 .10E+01 .10E+01 .30E+01 .10E+01 .10E+010.      0.
                     .11E+160.       .13E+150.       .14E+14 .85E+13 .19E+13 .17E+13 .46E+13 .13E+13 .12E+130.      0.
                     .12E+16
TRACHELAMONAS        .54E+030.       .11E+030.       .12E+020.       .10E+010.      0.       .30E+01 .10E+010.      0.
                     .13E+160.       .15E+150.       .21E+140.       .19E+130.      0.       .40E+13 .12E+130.      0.
                     .15E+16
CRYPTOMONAS          .33E+030.       .26E+020.       .40E+010.      0.       .10E+01 .40E+01 .30E+01 .10E+010.      0.
                     .81E+150.       .37E+140.       .71E+130.      0.       .17E+13 .61E+13 .40E+13 .12E+130.      0.
                     .86E+15
MALLOMONAS           .38E+030.       .26E+020.       .50E+01 .10E+01 .10E+010.      0.      0.      0.      0.      0.
                     .94E+150.       .37E+140.       .89E+13 .21E+13 .19E+130.      0.      0.      0.      0.      0.
                     .99E+15
STEPHANODISCUS(SM)   .89E+04 .60E+04 .28E+04 .10E+04 .39E+03 .54E+02 .17E+03 .53E+02 .82E+02 .53E+02 .32E+020.      0.
                     .22E+17 .93E+16 .40E+16 .13E+16 .70E+15 .12E+15 .31E+15 .90E+14 .13E+15 .71E+14 .37E+140.      0.
                     .38E+17
ASTERIONELLA         .26E+020.       .66E+020.       .11E+03 .29E+02 .32E+02 .50E+01 .30E+02 .15E+02 .70E+010.      0.
                     .64E+140.       .95E+140.       .20E+15 .62E+14 .12E+15 .85E+13 .46E+14 .20E+14 .81E+130.      0.
                     .62E+15
UNKNOWN             0.      0.      0.      0.      0.      0.       .30E+01 .10E+010.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.      0.       .57E+13 .17E+130.      0.      0.      0.      0.
                     .74E+13

DATE  22473 DEPTH =  18.5
NAME              DEPTH-METERS
                           1       2       3       4       5       7       9      11      13      15      17      19      21
CHLAMYDOMONAS        .12E+04 .10E+04 .94E+03 .75E+03 .55E+03 .10E+03 .61E+02 .33E+02 .12E+02 .12E+02 .50E+010.      0.
                     .28E+16 .16E+16 .13E+16 .98E+15 .98E+15 .22E+15 .12E+15 .56E+14 .18E+14 .16E+14 .58E+130.      0.
                     .81E+16
PLANKTOSPHAERTA     0.      0.      0.      0.      0.       .80E+010.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.       .17E+140.      0.      0.      0.      0.      0.      0.
                     .17E+14
UNKNOWN              .13E+020.       .26E+020.       .79E+02 .50E+01 .30E+010.       .10E+01 .30E+010.      0.      0.
                     .32E+140.       .37E+140.       .14E+15 .11E+14 .57E+130.       .15E+13 .40E+130.      0.      0.
                     .23E+15
TRACHELAMONAS        .13E+020.      0.      0.      0.       .10E+010.      0.      0.      0.      0.      0.      0.
                     .32E+140.      0.      0.      0.       .21E+130.      0.      0.      0.      0.      0.      0.
                     .34E+14
CRYPTOMONAS          .19E+030.       .26E+020.      0.       .30E+01 .30E+01 .30E+010.       .10E+01 .10E+010.      0.
                     .45E+150.       .37E+140.      0.       .64E+13 .57E+13 .51E+130.       .13E+13 .12E+130.      0.
                     .51E+15
MALLOMONAS          0.      0.       .13E+020.      0.       .40E+010.      0.      0.      0.      0.      0.      0.
                    0.      0.       .19E+140.      0.       .85E+130.      0.      0.      0.      0.      0.      0.
                     .27E+14
STEPHANODISCUS(SM)   .46E+04 .35E+04 .29E+04 .18E+04 .87E+03 .69E+02 .30E+02 .20E+02 .10E+01 .10E+010.      0.      0.
                     .11E+17 .54E+16 .41E+16 .24E+16 .15E+16 .15E+15 .57E+14 .34E+14 .15E+13 .13E+130.      0.      0.
                     .25E+17
ASTERIONELLA        0.      0.       .13E+020.       .13E+02 .33E+02 .17E+02 .50E+01 .10E+01 .40E+01 .40E+010.      0.
                    0.      0.       .19E+140.       .23E+14 .70E+14 .32E+14 .85E+13 .15E+13 .54E+13 .46E+130.      0.
                     .16E+15
NAVICULA            0.      0.      0.      0.      0.       .10E+010.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.       .21E+130.      0.      0.      0.      0.      0.      0.
                     .21E+13
UNKNOWN             0.      0.      0.      0.      0.       .90E+01 .30E+010.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.       .19E+14 .57E+130.      0.      0.      0.      0.      0.
                     .25E+14

DATE  31073 DEPTH =  18.5
NAME              DEPTH-METERS
                           1       2       3       4       5       7       9      11      13      15      17      19      21
CHLAMYDOMONAS        .95E+02 .14E+03 .18E+03 .18E+03 .21E+03 .13E+03 .88E+02 .46E+02 .20E+02 .16E+02 .90E+010.      0.
                     .23E+15 .21E+15 .25E+15 .24E+15 .37E+15 .28E+15 .17E+15 .78E+14 .31E+14 .22E+14 .10E+140.      0.
                     .19E+16
UNKNOWN              .16E+020.       .57E+020.       .19E+02 .50E+01 .70E+01 .40E+01 .10E+01 .40E+010.      0.      0.
                     .39E+140.       .82E+140.       .34E+14 .11E+14 .13E+14 .68E+13 .15E+13 .54E+130.      0.      0.
                     .19E+15
TRACHELAMONAS       0.      0.      0.      0.       .10E+01 .30E+010.       .10E+010.      0.       .10E+010.      0.
                    0.      0.      0.      0.       .18E+13 .64E+130.       .17E+130.      0.       .12E+130.      0.
                     .11E+14
CRYPTOMONAS          .42E+020.       .88E+020.       .28E+02 .70E+01 .40E+01 .10E+010.       .19E+010.      0.      0.
                     .10E+150.       .13E+150.       .50E+14 .15E+14 .76E+13 .17E+130.       .13E+130.      0.      0.
                     .30E+15
MALLOMONAS          0.      0.       .40E+010.       .40E+010.       .30E+01 .10E+01 .30E+010.      0.      0.      0.
                    0.      0.       .53E+130.       .71E+130.       .57E+13 .17E+13 .46E+130.      0.      0.      0.
                     .25E+14
STEPHANODISCUS(SM)   .81E+03 .90E+03 .80E+03 .50E+03 .30E+03 .17E+03 .12E+03 .87E+02 .50E+02 .38E+02 .12E+020.      0.
                     .29E+16 .12E+16 .12E+16 .66E+15 .54E+15 .37E+15 .22E+15 .15E+15 .76E+14 .51E+14 .14E+140.      0.
                     .65E+16
ASTERIONELLA         .80E+010.       .20E+020.       .90E+01 .11E+02 .80E+01 .40E+01 .30E+010.       .10E+010.      0.
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                     .20E+140.       .29E+140.       .16E+14 .23E+14 .15E+14 .68E+13 .46E+130.       .12E+130.      0.
                     .12E+15
NAVICULA            0.      0.      0.      0.      0.      0.      0.      0.      0.       .10E+010.      0.      0.
                    0.      0.      0.      0.      0.      0.      0.      0.      0.       .13E+130.      0.      0.
                     .13E+13
UNKNOWN             0.      0.      0.      0.       .30E+01 .10E+01 .40E+01 .10E+01 .30E+01 .10E+01 .10E+010.      0.
                    0.      0.      0.      0.       .53E+13 .21E+13 .76E+13 .17E+13 .46E+13 .13E+13 .12E+130.      0.
                     .24E+14

DATE   32773 DEPTH =  18.5
NAME              DEPTH-METERS
                           1       2       3       4       5       7       9      11      13      15      17      19      21
CHLAMYDOMONAS        .45E+02 .60E+02 .90E+02 .15E+03 .23E+03 .11E+03 .74E+02 .36E+02 .33E+02 .34E+02 .70E+010.      0.
                     .11E+15 .93E+14 .13E+15 .20E+15 .41E+15 .24E+15 .14E+15 .61E+14 .50E+14 .46E+14 .81E+130.      0.
                     .15E+16
PLANKTOSPHAERTA      .70E+010.      0.      0.      0.       .12E+020.      0.      0.      0.       .50E+010.      0.
                     .17E+140.      0.      0.      0.       .26E+140.      0.      0.      0.       .58E+130.      0.
                     .48E+14
SELENASTRUM          .30E+010.       .40E+010.      0.       .30E+010.      0.      0.      0.      0.      0.      0.
                     .73E+130.       .58E+130.      0.       .64E+130.      0.      0.      0.      0.      0.      0.
                     .19E+14
UNKNOWN              .32E+020.       .32E+020.       .40E+02 .38E+02 .20E+02 .13E+02 .70E+01 .80E+010.      0.      0.
                     .78E+140.       .46E+140.       .71E+14 .81E+14 .38E+14 .22E+14 .11E+14 .11E+140.      0.      0.
                     .36E+15
TRACHELAMONAS        .30E+020.       .29E+020.       .29E+02 .49E+02 .17E+02 .12E+02 .70E+01 .70E+010.      0.      0.
                     .73E+140.       .42E+140.       .52E+14 .10E+15 .32E+14 .20E+14 .11E+14 .94E+130.      0.      0.
                     .34E+15
CRYPTOMONAS          .30E+020.       .13E+020.       .24E+02 .80E+01 .50E+010.       .10E+010.      0.      0.      0.
                     .73E+140.       .19E+140.       .43E+14 .17E+14 .95E+130.       .15E+130.      0.      0.      0.
                     .16E+15
MALLOMONAS           .11E+020.       .10E+010.       .50E+010.       .40E+01 .10E+01 .30E+01 .10E+010.      0.      0.
                     .27E+140.       .14E+130.       .89E+130.       .76E+13 .17E+13 .46E+13 .13E+130.      0.      0.
                     .52E+14
STEPHANODISCUS(SM)   .74E+03 .60E+03 .46E+03 .38E+03 .31E+03 .26E+03 .13E+03 .71E+02 .55E+02 .53E+02 .26E+020.      0.
                     .18E+16 .93E+15 .66E+15 .50E+15 .55E+15 .54E+15 .24E+15 .12E+15 .84E+14 .71E+14 .30E+140.      0.
                     .55E+16
ASTERIONELLA        0.      0.      0.      0.       .40E+010.       .40E+010.       .30E+010.      0.      0.      0.
                    0.      0.      0.      0.       .71E+130.       .76E+130.       .46E+130.      0.      0.      0.
                     .19E+14
NAVICULA            0.      0.      0.      0.      0.      0.      0.      0.       .10E+01 .30E+010.      0.      0.
                    0.      0.      0.      0.      0.      0.      0.      0.       .15E+13 .40E+130.      0.      0.
                     .56E+13
RHOPALODIA          0.      0.       .10E+010.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    0.      0.       .14E+130.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .14E+13

DATE   41773 DEPTH =  18.5
NAME              DEPTH-METERS
                           1       2       3       4       5       7       9      11      13      15      17      19      21
CHLAMYDOMONAS        .95E+03 .85E+03 .75E+03 .65E+03 .53E+03 .66E+03 .78E+03 .65E+03 .88E+03 .53E+03 .12E+030.      0.
                     .23E+16 .13E+16 .11E+16 .85E+15 .94E+15 .14E+16 .15E+16 .11E+16 .14E+16 .71E+15 .14E+150.      0.
                     .13E+17
UNKNOWN              .41E+030.       .23E+030.       .25E+03 .40E+03 .30E+03 .38E+03 .29E+03 .15E+03 .92E+020.      0.
                     .10E+160.       .33E+150.       .44E+15 .84E+15 .58E+15 .65E+15 .44E+15 .20E+15 .11E+150.      0.
                     .46E+16
TRACHELAMONAS        .40E+020.      0.      0.      0.      0.      0.      0.      0.       .13E+020.      0.      0.
                     .98E+140.      0.      0.      0.      0.      0.      0.      0.       .18E+140.      0.      0.
                     .12E+15
CRYPTOMONAS          .66E+020.       .13E+020.       .12E+03 .26E+02 .40E+02 .53E+02 .13E+02 .13E+020.      0.      0.
                     .16E+150.       .19E+140.       .21E+15 .55E+14 .76E+14 .90E+14 .20E+14 .18E+140.      0.      0.
                     .65E+15
STEPHANODISCUS(SM)   .41E+04 .41E+04 .42E+04 .38E+04 .35E+04 .33E+04 .39E+04 .34E+04 .35E+04 .24E+04 .63E+030.      0.
                     .10E+17 .64E+16 .61E+16 .50E+16 .62E+16 .71E+16 .75E+16 .57E+16 .53E+16 .32E+16 .73E+150.      0.
                     .63E+17
ASTERIONELLA        0.      0.      0.      0.       .13E+020.      0.      0.      0.      0.       .53E+020.      0.
                    0.      0.      0.      0.       .23E+140.      0.      0.      0.      0.       .61E+140.      0.
                     .84E+14
NAVICULA            0.      0.      0.      0.      0.      0.      0.       .13E+020.       .13E+020.      0.      0.
                    0.      0.      0.      0.      0.      0.      0.       .22E+140.       .18E+140.      0.      0.
                     .40E+14
UNKNOWN              .13E+020.      0.      0.       .13E+02 .13E+020.       .13E+020.       .26E+020.      0.      0.
                     .32E+140.      0.      0.       .23E+14 .28E+140.       .22E+140.       .35E+140.      0.      0.
                     .14E+15

DATE   42873 DEPTH =  19.0
NAME              DEPTH-METERS
                           1       2       3       4       5       7       9      11      13      15      17      19      21
CHLAMYDOMONAS        .50E+03 .20E+03 .14E+03 .11E+03 .65E+02 .50E+02 .61E+02 .54E+02 .46E+02 .50E+02 .28E+02 .80E+010.
                     .12E+16 .32E+15 .22E+15 .15E+15 .12E+15 .11E+15 .12E+15 .97E+14 .74E+14 .73E+14 .35E+14 .85E+130.
                     .26E+16
PLANKTOSPHAERTA      .21E+02 .30E+010.       .70E+010.      0.      0.       .50E+010.       .40E+010.      0.      0.
                     .52E+14 .48E+130.       .97E+130.      0.      0.       .90E+130.       .58E+130.      0.      0.
                     .82E+14
SELENASTRUM         0.      0.       .10E+010.      0.      0.      0.      0.      0.      0.       .10E+010.      0.
                    0.      0.       .15E+130.      0.      0.      0.      0.      0.      0.       .12E+130.      0.
                     .27E+13
UNKNOWN              .70E+02 .55E+02 .54E+02 .30E+02 .38E+02 .32E+02 .32E+02 .29E+02 .36E+02 .22E+02 .29E+02 .24E+020.
                     .17E+15 .88E+14 .81E+14 .41E+14 .71E+14 .72E+14 .64E+14 .52E+14 .58E+14 .32E+14 .36E+14 .25E+140.
                     .79E+15
TRACHELAMONAS        .41E+02 .53E+02 .61E+02 .55E+02 .38E+02 .41E+02 .49E+02 .53E+02 .46E+02 .36E+02 .34E+02 .28E+020.
                     .10E+15 .85E+14 .92E+14 .76E+14 .71E+14 .93E+14 .98E+14 .95E+14 .74E+14 .52E+14 .42E+14 .30E+140.
                     .91E+15
CRYPTOMONAS          .54E+02 .90E+01 .15E+02 .20E+02 .22E+02 .70E+01 .50E+01 .10E+01 .30E+010.       .10E+010.      0.
                     .13E+15 .14E+14 .23E+14 .28E+14 .41E+14 .16E+14 .10E+14 .18E+13 .48E+130.       .12E+130.      0.
                     .27E+15
MALLOMONAS           .20E+02 .80E+01 .15E+02 .16E+02 .30E+01 .50E+01 .80E+01 .12E+02 .15E+02 .17E+02 .16E+02 .13E+020.
                     .50E+14 .13E+14 .23E+14 .22E+14 .56E+13 .11E+14 .16E+14 .22E+14 .24E+14 .25E+14 .20E+14 .14E+140.
                     .24E+15
ASTERIONELLA        0.       .10E+01 .10E+01 .30E+010.      0.      0.      0.      0.       .40E+010.      0.      0.
                    0.       .16E+13 .15E+13 .41E+130.      0.      0.      0.      0.       .58E+130.      0.      0.
                     .13E+14
NAVICULA            0.       .30E+01 .10E+010.      0.      0.      0.      0.       .10E+01 .40E+01 .10E+010.      0.
                    0.       .48E+13 .15E+130.      0.      0.      0.      0.       .16E+13 .58E+13 .12E+130.      0.
                     .15E+14
UNKNOWN             0.       .40E+01 .30E+01 .10E+01 .80E+01 .40E+010.       .80E+01 .40E+01 .30E+010.       .50E+010.
                    0.       .54E+13 .45E+13 .14E+13 .15E+14 .90E+130.       .14E+14 .64E+13 .44E+130.       .53E+130.
                     .67E+14
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DATE  51273 DEPTH =  20.0
NAME              DEPTH-METERS
                           1       2       3       4       5       7       9      11      13      15      17      19      21
ANKISTRODESMUS       .40E+01 .10E+01 .10E+01 .50E+01 .40E+010.       .10E+010.       .10E+010.      0.      0.      0.
                     .11E+14 .17E+13 .16E+13 .75E+13 .83E+130.       .23E+130.       .18E+130.      0.      0.      0.
                     .34E+14
CHLAMYDOMONAS        .24E+03 .54E+03 .24E+03 .12E+03 .45E+02 .62E+02 .28E+02 .19E+02 .21E+02 .19E+02 .16E+02 .70E+010.
                     .62E+15 .90E+15 .38E+15 .18E+15 .93E+14 .15E+15 .63E+14 .38E+14 .38E+14 .30E+14 .23E+14 .87E+130.
                     .25E+16
PLANKTOSPHAERTA      .40E+01 .70E+01 .80E+01 .40E+01 .10E+01 .50E+01 .30E+01 .40E+010.       .40E+010.      0.      0.
                     .11E+14 .12E+14 .13E+14 .60E+13 .21E+13 .12E+14 .68E+13 .80E+130.       .64E+130.      0.      0.
                     .77E+14
SCHROEDERIA          .70E+01 .30E+01 .30E+010.      0.      0.      0.      0.      0.       .30E+010.      0.      0.
                     .18E+14 .50E+13 .48E+130.      0.      0.      0.      0.      0.       .48E+130.      0.      0.
                     .33E+14
SELENASTRUM          .10E+010.      0.       .10E+01 .10E+01 .10E+010.      0.       .10E+010.      0.      0.      0.
                     .26E+130.      0.       .15E+13 .21E+13 .25E+130.      0.       .18E+130.      0.      0.      0.
                     .10E+14
UNKNOWN              .90E+01 .70E+01 .30E+01 .70E+01 .30E+01 .50E+01 .30E+01 .10E+01 .40E+01 .40E+01 .50E+01 .40E+010.
                     .24E+14 .12E+14 .48E+13 .11E+14 .62E+13 .12E+14 .68E+13 .20E+13 .72E+13 .64E+13 .73E+13 .50E+130.
                     .10E+15
CRYPTOMONAS          .19E+02 .45E+02 .24E+02 .90E+01 .50E+01 .40E+01 .40E+010.       .40E+01 .30E+01 .10E+010.      0.
                     .50E+14 .75E+14 .38E+14 .14E+14 .10E+14 .99E+13 .90E+130.       .72E+13 .48E+13 .15E+130.      0.
                     .22E+15
MALLOMONAS          0.      0.      0.      0.       .30E+01 .70E+01 .40E+01 .10E+010.       .10E+01 .40E+01 .30E+010.
                    0.      0.      0.      0.       .62E+13 .17E+14 .90E+13 .20E+130.       .16E+13 .58E+13 .37E+130.
                     .46E+14
ASTERIONELLA        0.      0.      0.       .30E+010.      0.       .10E+010.      0.      0.      0.       .30E+010.
                    0.      0.      0.       .45E+130.      0.       .23E+130.      0.      0.      0.       .37E+130.
                     .10E+14
MELOSIRA             .30E+010.      0.      0.       .10E+010.      0.       .30E+01 .10E+010.      0.      0.      0.
                     .79E+130.      0.      0.       .21E+130.      0.       .60E+13 .18E+130.      0.      0.      0.
                     .18E+14
NAVICULA             .50E+01 .40E+01 .50E+01 .10E+01 .80E+01 .40E+01 .50E+01 .30E+01 .30E+01 .10E+010.       .30E+010.
                     .13E+14 .66E+13 .80E+13 .15E+13 .17E+14 .99E+13 .11E+14 .60E+13 .54E+13 .16E+130.       .37E+130.
                     .84E+14
RHOPALODIA          0.      0.      0.      0.       .30E+010.      0.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.       .62E+130.      0.      0.      0.      0.      0.      0.      0.
                     .62E+13
UNKNOWN              .70E+01 .80E+01 .40E+01 .30E+01 .30E+01 .50E+01 .40E+01 .10E+01 .80E+01 .50E+010.       .30E+010.
                     .18E+14 .13E+14 .64E+13 .45E+13 .62E+13 .12E+14 .90E+13 .20E+13 .14E+14 .80E+130.       .37E+130.
                     .98E+14
UNKNOWN(T)          0.      0.      0.      0.      0.      0.      0.      0.      0.      0.       .10E+01 .40E+010.
                    0.      0.      0.      0.      0.      0.      0.      0.      0.      0.       .15E+13 .50E+130.
                     .64E+13

DATE  53073 DEPTH =  22.5
NAME              DEPTH-METERS
                           1       2       3       4       5       7       9      11      13      15      17      19      21
ANKISTRODESMUS       .40E+02 .26E+02 .26E+02 .53E+02 .13E+02 .10E+01 .10E+01 .30E+01 .40E+01 .30E+01 .10E+01 .70E+010.
                     .11E+15 .48E+14 .46E+14 .90E+14 .32E+14 .31E+13 .29E+13 .79E+13 .95E+13 .64E+13 .19E+13 .12E+140.
                     .37E+15
CHLAMYDOMONAS        .50E+04 .51E+04 .47E+04 .32E+03 .14E+04 .65E+02 .58E+02 .99E+02 .37E+03 .15E+03 .38E+02 .12E+030.
                     .14E+17 .95E+16 .84E+16 .55E+15 .34E+16 .20E+15 .17E+15 .26E+15 .88E+15 .32E+15 .72E+14 .21E+150.
                     .38E+17
PEDIASTRUM          0.      0.      0.      0.      0.      0.      0.      0.      0.       .20E+020.      0.      0.
                    0.      0.      0.      0.      0.      0.      0.      0.      0.       .43E+140.      0.      0.
                     .43E+14
SCHROEDERIA          .53E+02 .40E+02 .92E+02 .40E+02 .26E+02 .30E+01 .10E+01 .30E+010.       .40E+01 .10E+01 .10E+010.
                     .15E+15 .74E+14 .16E+15 .68E+14 .64E+14 .93E+13 .29E+13 .79E+130.       .85E+13 .19E+13 .17E+130.
                     .55E+15
UNKNOWN              .91E+03 .70E+03 .71E+03 .26E+03 .22E+03 .13E+02 .90E+01 .16E+02 .26E+02 .21E+02 .11E+02 .25E+020.
                     .26E+16 .13E+16 .13E+16 .45E+15 .55E+15 .40E+14 .26E+14 .42E+14 .62E+14 .45E+14 .21E+14 .43E+140.
                     .64E+16
TRACHELAMONAS        .15E+03 .66E+02 .12E+03 .24E+02 .13E+03 .19E+02 .16E+02 .16E+02 .19E+02 .16E+02 .12E+02 .17E+020.
                     .41E+15 .12E+15 .21E+15 .41E+14 .32E+15 .59E+14 .46E+14 .42E+14 .45E+14 .34E+14 .23E+14 .29E+140.
                     .14E+16
CRYPTOMONAS          .28E+03 .36E+03 .42E+03 .57E+03 .66E+02 .11E+02 .21E+02 .16E+02 .40E+02 .24E+02 .40E+01 .24E+020.
                     .79E+15 .66E+15 .75E+15 .97E+15 .16E+15 .34E+14 .60E+14 .42E+14 .95E+14 .51E+14 .76E+13 .41E+140.
                     .37E+16
MALLOMONAS          0.      0.      0.      0.      0.      0.      0.       .30E+01 .30E+010.      0.       .30E+010.
                    0.      0.      0.      0.      0.      0.      0.       .79E+13 .71E+130.      0.       .51E+130.
                     .20E+14
ASTERIONELLA         .53E+02 .21E+03 .21E+03 .20E+03 .66E+02 .13E+02 .90E+01 .19E+02 .21E+02 .12E+02 .40E+01 .17E+020.
                     .15E+15 .39E+15 .38E+15 .34E+15 .16E+15 .40E+14 .26E+14 .50E+14 .50E+14 .26E+14 .76E+13 .29E+140.
                     .16E+16
MELOSIRA             .26E+020.      0.      0.      0.      0.      0.      0.      0.       .30E+010.      0.      0.
                     .74E+140.      0.      0.      0.      0.      0.      0.      0.       .64E+130.      0.      0.
                     .81E+14
NAVICULA            0.      0.      0.      0.      0.      0.      0.      0.      0.       .10E+010.       .10E+010.
                    0.      0.      0.      0.      0.      0.      0.      0.      0.       .21E+130.       .17E+130.
                     .38E+13
UNKNOWN             0.      0.      0.      0.      0.      0.      0.       .40E+01 .30E+01 .40E+01 .10E+01 .30E+010.
                    0.      0.      0.      0.      0.      0.      0.       .10E+14 .71E+13 .85E+13 .19E+13 .51E+130.
                     .33E+14

DATE  60973 DEPTH =  22.0
NAME              DEPTH-METERS
                           1       2       3       4       5       7       9      11      13      15      17      19      21
ANKISTRODESMUS       .26E+02 .40E+02 .48E+02 .55E+02 .36E+02 .29E+02 .12E+02 .90E+01 .50E+010.      0.      0.      0.
                     .73E+14 .73E+14 .94E+14 .91E+14 .86E+14 .87E+14 .33E+14 .22E+14 .11E+140.      0.      0.      0.
                     .56E+15
CHLAMYDOMONAS        .49E+03 .40E+03 .31E+03 .26E+03 .15E+03 .13E+03 .11E+03 .53E+02 .13E+020.      0.      0.      0.
                     .11E+16 .72E+15 .54E+15 .42E+15 .37E+15 .38E+15 .31E+15 .13E+15 .29E+140.      0.      0.      0.
                     .40E+16
PLANKTOSPHAERTA     0.      0.       .50E+010.       .50E+01 .21E+02 .30E+01 .50E+01 .80E+010.      0.      0.      0.
                    0.      0.       .88E+130.       .12E+14 .63E+14 .83E+13 .12E+14 .18E+140.      0.      0.      0.
                     .12E+15
SCHROEDERIA          .27E+03 .39E+03 .25E+03 .20E+03 .14E+03 .70E+02 .48E+02 .48E+02 .38E+020.      0.      0.      0.
                     .77E+15 .72E+15 .43E+15 .32E+15 .33E+15 .21E+15 .13E+15 .12E+15 .86E+140.      0.      0.      0.
                     .31E+16
SELENASTRUM         0.       .10E+01 .10E+010.       .30E+010.       .10E+01 .10E+01 .10E+010.      0.      0.      0.
                    0.       .18E+13 .18E+130.       .72E+130.       .28E+13 .25E+13 .23E+130.      0.      0.      0.
                     .18E+14
UNKNOWN              .70E+01 .50E+01 .50E+01 .70E+01 .40E+010.       .40E+01 .10E+01 .30E+010.      0.      0.      0.
                     .20E+14 .91E+13 .88E+13 .12E+14 .96E+130.       .11E+14 .25E+13 .68E+130.      0.      0.      0.
                     .79E+14
GYMNODINIUM         0.       .10E+01 .10E+01 .30E+01 .10E+010.      0.      0.      0.      0.      0.      0.      0.
                    0.       .18E+13 .18E+13 .50E+13 .24E+130.      0.      0.      0.      0.      0.      0.      0.
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                       .11E+14
CRYPTOMONAS            .22E+02 .90E+01 .70E+01 .50E+01 .90E+01 .80E+01 .12E+02 .70E+01 .40E+010.      0.      0.      0.
                       .62E+14 .16E+14 .12E+14 .83E+13 .22E+14 .24E+14 .33E+14 .17E+14 .90E+130.      0.      0.      0.
                       .20E+15
MALLOMONAS            0.      0.      0.      0.      0.      0.      0.      0.       .30E+010.      0.      0.      0.
                      0.      0.      0.      0.      0.      0.      0.      0.       .68E+130.      0.      0.      0.
                       .68E+13
ASTERIONELLA           .21E+02 .21E+02 .42E+02 .25E+02 .38E+02 .45E+02 .48E+02 .63E+02 .46E+020.      0.      0.      0.
                       .59E+14 .38E+14 .74E+14 .42E+14 .91E+14 .14E+15 .13E+15 .16E+15 .10E+150.      0.      0.      0.
                       .83E+15
MELOSIRA               .15E+02 .30E+010.       .10E+010.      0.      0.      0.       .12E+020.      0.      0.      0.
                       .42E+14 .55E+130.       .17E+130.      0.      0.      0.       .27E+140.      0.      0.      0.
                       .76E+14
NAVICULA               .10E+010.       .10E+010.       .30E+010.      0.      0.      0.      0.      0.      0.      0.
                       .28E+130.       .18E+130.       .72E+130.      0.      0.      0.      0.      0.      0.      0.
                       .12E+14
RHOPALODIA            0.      0.       .80E+01 .80E+01 .80E+01 .30E+010.       .10E+010.      0.      0.      0.      0.
                      0.      0.       .14E+14 .13E+14 .19E+14 .90E+130.       .25E+130.      0.      0.      0.      0.
                       .58E+14
STEPHANODISCUS(LG)    0.      0.      0.       .10E+010.      0.      0.      0.      0.      0.      0.      0.      0.
                      0.      0.      0.       .17E+130.      0.      0.      0.      0.      0.      0.      0.      0.
                       .17E+13
UNKNOWN                .30E+01 .70E+01 .24E+02 .70E+01 .70E+01 .40E+01 .40E+01 .40E+01 .30E+010.      0.      0.      0.
                       .84E+13 .13E+14 .42E+14 .12E+14 .17E+14 .12E+14 .11E+14 .99E+13 .68E+130.      0.      0.      0.
                       .13E+15
MICROCYSTIS(C)        0.      0.       .30E+01 .10E+010.       .10E+010.      0.       .10E+010.      0.      0.      0.
                      0.      0.       .53E+13 .17E+130.       .30E+130.      0.       .23E+130.      0.      0.      0.
                       .12E+14

DATE  62573 DEPTH =  22.0
NAME              DEPTH-METERS
                             1       2       3       4       5       7       9      11      13      15      17      19      21
ANKISTRODESMUS         .42E+02 .12E+03 .62E+02 .46E+02 .29E+02 .30E+02 .25E+02 .26E+02 .32E+02 .21E+02 .24E+02 .38E+020.
                       .12E+15 .21E+15 .11E+15 .76E+14 .70E+14 .90E+14 .69E+14 .64E+14 .72E+14 .42E+14 .43E+14 .61E+140.
                       .10E+16
CHLAMYDOMONAS          .68E+03 .84E+03 .76E+03 .44E+03 .15E+03 .16E+03 .17E+03 .13E+03 .11E+03 .10E+03 .11E+03 .81E+020.
                       .19E+16 .15E+16 .13E+16 .73E+15 .36E+15 .49E+15 .46E+15 .31E+15 .26E+15 .20E+15 .19E+15 .13E+150.
                       .79E+16
PLANKTOSPHAERTA        .10E+03 .48E+02 .57E+02 .11E+02 .71E+02 .62E+02 .49E+02 .90E+02 .74E+02 .79E+02 .45E+02 .29E+020.
                       .29E+15 .87E+14 .10E+15 .18E+14 .17E+15 .19E+15 .14E+15 .22E+15 .17E+15 .16E+15 .81E+14 .46E+140.
                       .17E+16
SCHROEDERIA            .41E+02 .51E+02 .29E+02 .37E+02 .26E+02 .25E+02 .12E+02 .80E+01 .70E+01 .11E+02 .16E+02 .12E+020.
                       .12E+15 .93E+14 .51E+14 .61E+14 .62E+14 .75E+14 .33E+14 .20E+14 .16E+14 .22E+14 .29E+14 .19E+140.
                       .60E+15
SELENASTRUM           0.       .10E+01 .10E+01 .10E+010.       .30E+010.       .10E+010.       .10E+010.      0.      0.
                      0.       .18E+13 .18E+13 .17E+130.       .90E+130.       .25E+130.       .20E+130.      0.      0.
                       .19E+14
UNKNOWN                .10E+010.       .30E+010.      0.      0.       .30E+01 .30E+01 .10E+010.       .30E+010.      0.
                       .28E+130.       .53E+130.      0.      0.       .83E+13 .74E+13 .23E+130.       .54E+130.      0.
                       .31E+14
CRYPTOMONAS            .61E+02 .24E+02 .29E+02 .13E+02 .48E+02 .48E+02 .25E+02 .17E+02 .19E+02 .80E+01 .90E+01 .90E+010.
                       .17E+15 .44E+14 .51E+14 .22E+14 .12E+15 .14E+15 .69E+14 .42E+14 .43E+14 .16E+14 .16E+14 .14E+140.
                       .75E+15
MELOSIRA               .30E+01 .90E+01 .11E+02 .80E+01 .50E+01 .90E+01 .46E+02 .20E+02 .40E+01 .10E+01 .22E+02 .70E+010.
                       .84E+13 .16E+14 .19E+14 .13E+14 .12E+14 .27E+14 .13E+15 .50E+14 .90E+13 .20E+13 .40E+14 .11E+140.
                       .33E+15
NAVICULA               .40E+010.      0.       .40E+010.       .80E+01 .70E+01 .16E+02 .80E+01 .40E+01 .50E+01 .30E+010.
                       .11E+140.      0.       .66E+130.       .24E+14 .19E+14 .40E+14 .18E+14 .80E+13 .90E+13 .48E+130.
                       .14E+15
RHOPALODIA             .21E+02 .22E+02 .90E+01 .11E+02 .70E+01 .80E+01 .70E+01 .12E+02 .17E+02 .13E+02 .19E+02 .19E+020.
                       .59E+14 .40E+14 .16E+14 .18E+14 .17E+14 .24E+14 .19E+14 .30E+14 .38E+14 .26E+14 .34E+14 .30E+140.
                       .35E+15
UNKNOWN                .11E+02 .15E+02 .30E+01 .30E+01 .24E+02 .90E+01 .70E+01 .12E+02 .17E+02 .24E+02 .80E+01 .19E+020.
                       .31E+14 .27E+14 .53E+13 .50E+13 .58E+14 .27E+14 .19E+14 .30E+14 .38E+14 .48E+14 .14E+14 .30E+140.
                       .33E+15

DATE  71273 DEPTH =  20.0
NAME              DEPTH-METERS
                             1       2       3       4       5       7       9      11      13      15      17      19      21
ANKISTRODESMUS         .17E+02 .41E+02 .17E+02 .53E+02 .30E+01 .10E+01 .30E+01 .40E+01 .10E+01 .10E+010.      0.      0.
                       .45E+14 .68E+14 .27E+14 .80E+14 .62E+13 .25E+13 .68E+13 .80E+13 .18E+13 .16E+130.      0.      0.
                       .25E+15
CHLAMYDOMONAS          .18E+03 .15E+03 .19E+03 .25E+03 .26E+03 .22E+03 .24E+03 .20E+03 .13E+03 .15E+03 .67E+02 .45E+020.
                       .48E+15 .25E+15 .30E+15 .37E+15 .53E+15 .54E+15 .55E+15 .39E+15 .23E+15 .24E+15 .98E+14 .56E+140.
                       .40E+16
PEDIASTRUM             .42E+020.       .42E+020.      0.      0.       .74E+02 .36E+02 .70E+010.      0.      0.      0.
                       .11E+150.       .67E+140.      0.      0.       .17E+15 .72E+14 .13E+140.      0.      0.      0.
                       .43E+15
PLANKTOSPHAERTA       0.      0.      0.      0.       .11E+02 .19E+02 .11E+02 .58E+020.       .50E+010.       .80E+010.
                      0.      0.      0.      0.       .23E+14 .47E+14 .25E+14 .12E+150.       .80E+130.       .99E+130.
                       .23E+15
SCHROEDERIA            .70E+01 .50E+01 .13E+02 .11E+02 .20E+02 .16E+02 .80E+01 .90E+01 .70E+01 .90E+010.      0.      0.
                       .18E+14 .83E+13 .21E+14 .17E+14 .41E+14 .40E+14 .18E+14 .18E+14 .13E+14 .14E+140.      0.      0.
                       .21E+15
SELENASTRUM           0.       .30E+01 .50E+01 .30E+01 .30E+01 .10E+01 .10E+01 .40E+01 .30E+01 .90E+01 .30E+01 .10E+010.
                      0.       .50E+13 .80E+13 .45E+13 .62E+13 .25E+13 .23E+13 .80E+13 .54E+13 .14E+14 .44E+13 .12E+130.
                       .62E+14
UNKNOWN                .50E+01 .11E+02 .80E+01 .11E+02 .12E+02 .15E+02 .90E+01 .25E+02 .20E+02 .21E+02 .70E+01 .11E+020.
                       .13E+14 .18E+14 .13E+14 .17E+14 .25E+14 .37E+14 .20E+14 .50E+14 .36E+14 .34E+14 .10E+14 .14E+140.
                       .29E+15
CERATIUM              0.      0.       .10E+01 .10E+010.      0.      0.      0.      0.      0.      0.      0.      0.
                      0.      0.       .16E+13 .15E+130.      0.      0.      0.      0.      0.      0.      0.      0.
                       .31E+13
CRYPTOMONAS            .19E+02 .11E+02 .17E+02 .40E+02 .19E+02 .90E+01 .70E+01 .90E+01 .70E+01 .80E+01 .10E+010.      0.
                       .50E+14 .18E+14 .27E+14 .60E+14 .39E+14 .22E+14 .16E+14 .18E+14 .13E+14 .13E+14 .15E+130.      0.
                       .28E+15
ASTERIONELLA           .12E+03 .10E+03 .13E+03 .13E+03 .29E+02 .51E+02 .36E+02 .58E+02 .28E+02 .30E+02 .80E+01 .70E+010.
                       .32E+15 .17E+15 .21E+15 .19E+15 .60E+14 .13E+15 .81E+14 .12E+15 .50E+14 .48E+14 .12E+14 .87E+130.
                       .14E+16
MELOSIRA              0.      0.      0.      0.      0.      0.      0.       .10E+010.      0.      0.       .30E+010.
                      0.      0.      0.      0.      0.      0.      0.       .20E+130.      0.      0.       .37E+130.
                       .57E+13
NAVICULA              0.      0.      0.      0.      0.       .10E+01 .10E+01 .10E+01 .33E+010.      0.       .10E+010.
                      0.      0.      0.      0.      0.       .25E+13 .23E+13 .20E+13 .54E+130.      0.       .12E+130.
                       .13E+14
RHOPALODIA            0.      0.      0.      0.      0.      0.      0.       .20E+02 .30E+01 .30E+010.      0.      0.
                      0.      0.      0.      0.      0.      0.      0.       .40E+14 .54E+13 .48E+130.      0.      0.
                       .50E+14
UNKNOWN                .50E+01 .40E+01 .10E+01 .80E+01 .10E+01 .10E+01 .30E+01 .50E+01 .40E+01 .10E+01 .50E+010.      0.
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                    .13E+14 .66E+13 .16E+13 .12E+14 .21E+13 .25E+13 .68E+13 .10E+14 .72E+13 .16E+13 .73E+130.       0.
                    .71E+14
APHANIZOMENON       0.      0.      0.      .19E+030.       0.      0.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      .29E+150.       0.      0.      0.      0.      0.      0.      0.      0.
                    .28E+15
APHANIZOMENON(H)    0.      0.      0.      .40E+010.       0.      0.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      .60E+130.       0.      0.      0.      0.      0.      0.      0.      0.
                    .60E+13
MICROCYSTIS(C)      .15E+02 .11E+02 .80E+01 .70E+01 .40E+01 .80E+01 .50E+01 .40E+01 .70E+01 .70E+01 .80E+01 .30E+010.
                    .39E+14 .18E+14 .13E+14 .11E+14 .83E+13 .20E+14 .11E+14 .80E+13 .13E+14 .11E+14 .12E+14 .37E+130.
                    .17E+15
UNKNOWN(T)          0.      0.      0.      0.      0.      0.      .13E+020.       0.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.      0.      .29E+140.       0.      0.      0.      0.      0.
                    .29E+14

DATE  72873 DEPTH =  19.0
NAME              DEPTH-METERS
                           1       2       3       4       5       7       9      11      13      15      17      19      21
ANKISTRODESMUS      .13E+020.       0.      0.      0.      .13E+02 .90E+01 .11E+02 .11E+02 .11E+02 .80E+010.       0.
                    .32E+140.       0.      0.      0.      .29E+14 .18E+14 .20E+14 .18E+14 .16E+14 .99E+130.       0.
                    .14E+15
CHLAMYDOMONAS       .10E+04 .15E+04 .94E+03 .57E+03 .59E+03 .16E+03 .19E+03 .18E+03 .88E+02 .79E+02 .15E+030.       0.
                    .26E+16 .25E+16 .14E+16 .78E+15 .11E+16 .36E+15 .38E+15 .32E+15 .14E+15 .12E+15 .18E+150.       0.
                    .98E+16
PEDIASTRUM          .85E+03 .42E+03 .85E+03 .85E+030.       .85E+03 .85E+02 .13E+030.       .85E+020.       0.      0.
                    .21E+16 .68E+15 .13E+16 .12E+160.       .19E+16 .17E+15 .23E+150.       .12E+150.       0.      0.
                    .76E+16
PLANKTOSPHAERTA     .34E+03 .13E+02 .13E+02 .24E+03 .29E+03 .79E+02 .28E+02 .13E+02 .44E+02 .25E+02 .75E+020.       0.
                    .85E+13 .21E+14 .20E+14 .33E+15 .52E+15 .18E+15 .56E+14 .23E+14 .70E+14 .36E+14 .93E+140.       0.
                    .22E+16
UNKNOWN             .92E+02 .13E+03 .79E+02 .40E+02 .13E+02 .13E+02 .10E+010.       .30E+01 .12E+02 .40E+010.       0.
                    .23E+15 .21E+15 .12E+15 .55E+14 .24E+14 .29E+14 .20E+130.       .48E+13 .17E+14 .50E+130.       0.
                    .70E+15
CERATIUM            0.      .13E+020.       .26E+020.       0.      0.      0.      0.      0.      0.      0.      0.
                    0.      .21E+140.       .36E+140.       0.      0.      0.      0.      0.      0.      0.      0.
                    .57E+14
CRYPTOMONAS         .53E+02 .11E+03 .66E+02 .92E+02 .26E+02 .13E+02 .30E+02 .12E+02 .11E+02 .90E+01 .15E+020.       0.
                    .13E+15 .17E+15 .99E+14 .13E+15 .48E+14 .29E+14 .60E+14 .22E+14 .18E+14 .13E+14 .19E+140.       0.
                    .74E+15
ASTERIONELLA        .10E+04 .22E+04 .18E+04 .16E+04 .13E+04 .10E+04 .64E+03 .48E+03 .57E+03 .43E+03 .29E+030.       0.
                    .25E+16 .35E+16 .27E+16 .22E+16 .25E+16 .23E+16 .13E+16 .86E+15 .92E+15 .62E+15 .36E+150.       0.
                    .20E+17
FRAGILARIA          .15E+04 .15E+04 .14E+04 .79E+02 .11E+04 .12E+04 .31E+03 .22E+03 .43E+03 .19E+03 .27E+030.       0.
                    .36E+16 .23E+16 .20E+16 .11E+15 .21E+16 .26E+16 .62E+15 .39E+15 .68E+15 .27E+15 .33E+150.       0.
                    .15E+17
NAVICULA            0.      0.      0.      0.      0.      0.      .10E+01 .30E+01 .10E+01 .40E+01 .10E+010.       0.
                    0.      0.      0.      0.      0.      0.      .20E+13 .54E+13 .16E+13 .58E+13 .12E+130.       0.
                    .16E+14
STEPHANODISCUS(LG)  0.      0.      0.      .13E+020.       0.      0.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      .18E+140.       0.      0.      0.      0.      0.      0.      0.      0.
                    .18E+14
UNKNOWN             0.      0.      0.      0.      0.      .26E+02 .40E+01 .50E+01 .11E+02 .80E+01 .80E+010.       0.
                    0.      0.      0.      0.      0.      .59E+14 .80E+13 .90E+13 .18E+14 .12E+14 .99E+130.       0.
                    .11E+15
APHANIZOMENON       .17E+05 .20E+05 .14E+05 .14E+05 .55E+04 .40E+04 .53E+030.       .77E+030.       .47E+030.       0.
                    .41E+17 .33E+17 .21E+17 .19E+17 .10E+17 .89E+16 .11E+160.       .12E+160.       .59E+150.       0.
                    .14E+18
APHANIZOMENON(H)    .66E+02 .25E+03 .16E+03 .20E+03 .26E+02 .26E+02 .80E+010.       .30E+010.       .70E+010.       0.
                    .16E+15 .40E+15 .24E+15 .27E+15 .48E+14 .59E+14 .16E+140.       .48E+130.       .87E+130.       0.
                    .12E+16
MERISMOPEDIA        .63E+03 .37E+03 .11E+03 .26E+03 .53E+030.       .42E+020.       0.      0.      0.      0.      0.
                    .16E+16 .59E+15 .16E+15 .36E+15 .98E+150.       .84E+140.       0.      0.      0.      0.      0.
                    .38E+16

DATE  81573 DEPTH =  19.0
NAME              DEPTH-METERS
                           1       2       3       4       5       7       9      11      13      15      17      19      21
ANKISTRODESMUS      0.      .13E+020.       .26E+020.       .40E+01 .40E+01 .40E+010.       0.      .10E+010.       0.
                    0.      .21E+140.       .36E+140.       .90E+13 .80E+13 .72E+130.       0.      .12E+130.       0.
                    .82E+14
CHLAMYDOMONAS       .62E+03 .34E+03 .50E+03 .44E+03 .33E+03 .23E+03 .17E+03 .12E+03 .18E+03 .22E+03 .53E+020.       0.
                    .15E+16 .55E+15 .75E+15 .60E+15 .61E+15 .52E+15 .34E+15 .21E+15 .28E+15 .33E+15 .66E+140.       0.
                    .58E+15
OOCYSTIS            .26E+020.       0.      .26E+020.       .10E+01 .80E+01 .11E+02 .10E+01 .10E+01 .50E+010.       0.
                    .65E+140.       0.      .36E+140.       .23E+13 .16E+14 .20E+14 .16E+13 .15E+13 .62E+130.       0.
                    .15E+15
PLANKTOSPHAERTA     0.      0.      .11E+030.       .11E+03 .42E+02 .37E+02 .11E+02 .37E+020.       .11E+020.       0.
                    0.      0.      .16E+150.       .20E+15 .95E+14 .74E+14 .20E+14 .59E+140.       .14E+140.       0.
                    .62E+15
SPHAEROCYSTIS       0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      .74E+020.       0.
                    0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      .92E+140.       0.
                    .92E+14
UNKNOWN             .26E+02 .26E+02 .26E+02 .40E+02 .26E+02 .11E+02 .50E+01 .90E+010.       .70E+01 .50E+010.       0.
                    .65E+14 .42E+14 .39E+14 .55E+14 .48E+14 .25E+14 .10E+14 .16E+140.       .10E+14 .62E+130.       0.
                    .32E+15
CRYPTOMONAS         .26E+02 .13E+02 .26E+020.       .13E+02 .11E+02 .70E+01 .50E+010.       .30E+01 .10E+010.       0.
                    .65E+14 .21E+14 .39E+140.       .24E+14 .25E+14 .14E+14 .90E+130.       .44E+13 .12E+130.       0.
                    .20E+15
ASTERIONELLA        0.      0.      0.      0.      0.      .40E+01 .70E+01 .10E+010.       0.      .30E+010.       0.
                    0.      0.      0.      0.      0.      .90E+13 .14E+14 .18E+130.       0.      .37E+130.       0.
                    .29E+14
FRAGILARIA          0.      0.      0.      0.      0.      0.      0.      .21E+020.       0.      .38E+020.       0.
                    0.      0.      0.      0.      0.      0.      0.      .38E+140.       0.      .47E+140.       0.
                    .85E+14
NAVICULA            0.      0.      0.      0.      0.      0.      .10E+010.       0.      0.      .10E+010.       0.
                    0.      0.      0.      0.      0.      0.      .20E+130.       0.      0.      .12E+130.       0.
                    .32E+13
STEPHANODISCUS(LG)  0.      0.      0.      0.      0.      0.      .19E+010.       0.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.      0.      .20E+130.       0.      0.      0.      0.      0.
                    .20E+13
UNKNOWN             .13E+02 .13E+02 .13E+020.       0.      0.      .10E+01 .30E+01 .40E+010.       .30E+010.       0.
                    .32E+14 .21E+14 .20E+140.       0.      0.      .20E+13 .54E+13 .64E+130.       .37E+130.       0.
                    .90E+14
APHANIZOMENON       .16E+06 .21E+06 .49E+05 .95E+05 .29E+05 .13E+05 .19E+05 .42E+03 .24E+03 .53E+04 .51E+040.       0.
                    .40E+18 .34E+18 .13E+18 .13E+18 .54E+17 .30E+17 .38E+17 .76E+15 .38E+15 .78E+16 .63E+160.       0.
                    .11E+19
APHANIZOMENON(H)    .19E+03 .42E+03 .19E+03 .32E+03 .16E+03 .26E+03 .62E+02 .10E+010.       .44E+02 .80E+010.       0.
                    .46E+15 .58E+15 .28E+15 .44E+15 .29E+15 .60E+15 .12E+15 .18E+130.       .64E+14 .99E+130.       0.
                    .29E+16
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MERISMOPEDIA        0.      0.      0.      0.      0.      .21E+02 .21E+02 .21E+020.               .48E+02 .42E+020.       0.
                    0.      0.      0.      0.      0.      .47E+14 .42E+14 .38E+140.               .70E+14 .52E+140.       0.
                    .25E+15
UNKNOWN(T)          .40E+02 .13E+02 .13E+020.       0.      0.      0.      0.      0.      0.      0.      0.      0.
                    .10E+15 .21E+14 .20E+140.       0.      0.      0.      0.      0.      0.      0.      0.      0.
                    .14E+15

DATE  82873 DEPTH =  18.0
NAME              DEPTH-METERS
                           1       2       3       4       5       7       9      11      13      15      17      19      21
ANKISTRODESMUS      0.      0.      .13E+020.       .26E+02 .25E+020.       .13E+020.       0.      0.      0.      0.
                    0.      0.      .18E+140.       .44E+14 .52E+140.       .21E+140.       0.      0.      0.      0.
                    .13E+15
CHLAMYDOMONAS       .38E+03 .22E+03 .17E+03 .16E+03 .25E+03 .19E+03 .22E+03 .12E+03 .11E+03 .36E+020.       0.      0.
                    .92E+15 .34E+15 .24E+15 .20E+15 .43E+15 .37E+15 .40E+15 .19E+15 .15E+15 .45E+140.       0.      0.
                    .33E+16
PEDIASTRUM          0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      .26E+020.       0.
                    0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      .28E+140.       0.
                    .28E+14
PLANKTOSPHAERIA     0.      0.      0.      0.      0.      0.      0.      0.      0.      .32E+02 .42E+020.       0.
                    0.      0.      0.      0.      0.      0.      0.      0.      0.      .40E+14 .45E+140.       0.
                    .84E+14
UNKNOWN             0.      0.      .40E+020.       0.      .26E+02 .40E+020.       0.      .40E+01 .16E+020.       0.
                    0.      0.      .55E+140.       0.      .52E+14 .72E+140.       0.      .50E+13 .17E+140.       0.
                    .20E+15
CERATIUM            .13E+020.       0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    .31E+140.       0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    .31E+14
CRYPTOMONAS         .13E+02 .79E+02 .26E+02 .26E+020.       .13E+02 .13E+020.       0.      .10E+010.       0.      0.
                    .31E+14 .12E+15 .36E+14 .32E+140.       .26E+14 .23E+140.       0.      .12E+130.       0.      0.
                    .27E+15
FRAGILARIA          0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      .50E+010.       0.
                    0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      .53E+130.       0.
                    .53E+13
NAVICULA            0.      0.      0.      .13E+020.       0.      .13E+020.       0.      .10E+01 .30E+010.       0.
                    0.      0.      0.      .16E+140.       0.      .23E+140.       0.      .12E+13 .32E+130.       0.
                    .44E+14
STEPHANODISCUS(LG)  0.      0.      0.      0.      0.      0.      0.      .13E+020.       0.      0.      0.      0.
                    0.      0.      0.      0.      0.      0.      0.      .21E+140.       0.      0.      0.      0.
                    .21E+14
APHANIZOMENON       .31E+06 .32E+06 .22E+06 .20E+06 .22E+06 .16E+06 .66E+05 .31E+05 .17E+05 .22E+04 .22E+050.       0.
                    .75E+18 .48E+18 .31E+18 .25E+18 .38E+18 .31E+18 .12E+18 .49E+17 .25E+17 .28E+16 .23E+170.       0.
                    .27E+19
APHANIZOMENON(H)    .16E+03 .24E+03 .16E+03 .19E+03 .11E+03 .60E+02 .39E+020.       .53E+02 .10E+01 .32E+020.       0.
                    .38E+15 .36E+15 .22E+15 .23E+15 .18E+15 .12E+15 .70E+140.       .77E+14 .12E+13 .34E+140.       0.
                    .17E+16

DATE  91273 DEPTH =  18.0
NAME              DEPTH-METERS
                           1       2       3       4       5       7       9      11      13      15      17      19      21
ANKISTRODESMUS      0.      .13E+02 .13E+020.       .13E+020.       0.      .10E+01 .10E+010.       .10E+010.       0.
                    0.      .20E+14 .18E+140.       .22E+140.       0.      .16E+13 .15E+130.       .11E+130.       0.
                    .64E+14
CHLAMYDOMONAS       .22E+03 .44E+03 .19E+03 .15E+03 .12E+03 .30E+010.       0.      0.      0.      0.      0.      0.
                    .54E+15 .65E+15 .26E+15 .18E+15 .20E+15 .60E+130.       0.      0.      0.      0.      0.      0.
                    .18E+16
CLOSTERIUM          0.      0.      .13E+02 .13E+020.       0.      0.      .10E+010.       .30E+010.       0.      0.
                    0.      0.      .18E+14 .16E+140.       0.      0.      .16E+130.       .37E+130.       0.      0.
                    .39E+14
UNKNOWN             0.      0.      0.      0.      0.      .30E+01 .30E+010.       0.      .10E+01 .10E+010.       0.
                    0.      0.      0.      0.      0.      .60E+13 .54E+130.       0.      .12E+13 .11E+130.       0.
                    .14E+14
CRYPTOMONAS         .11E+03 .40E+02 .53E+02 .12E+03 .53E+02 .80E+01 .40E+01 .10E+01 .10E+01 .10E+01 .30E+010.       0.
                    .25E+15 .60E+14 .73E+14 .15E+15 .90E+14 .16E+14 .72E+13 .16E+13 .15E+13 .12E+13 .32E+130.       0.
                    .66E+15
FRAGILARIA          0.      0.      0.      0.      0.      0.      0.      0.      0.      .30E+01 .70E+010.       0.
                    0.      0.      0.      0.      0.      0.      0.      0.      0.      .37E+13 .74E+130.       0.
                    .11E+14
NAVICULA            0.      0.      0.      0.      0.      .30E+01 .10E+010.       .10E+01 .10E+01 .10E+010.       0.
                    0.      0.      0.      0.      0.      .60E+13 .18E+130.       .15E+13 .12E+13 .11E+130.       0.
                    .12E+14
UNKNOWN             0.      0.      0.      0.      0.      .10E+010.       0.      .10E+01 .10E+010.       0.      0.
                    0.      0.      0.      0.      0.      .20E+130.       0.      .15E+13 .12E+130.       0.      0.
                    .47E+13
APHANIZOMENON       .43E+05 .78E+05 .57E+05 .98E+05 .51E+05 .11E+05 .34E+04 .67E+04 .40E+04 .46E+04 .58E+030.       0.
                    .10E+18 .12E+18 .78E+17 .12E+18 .86E+17 .22E+17 .62E+16 .11E+17 .58E+16 .57E+16 .62E+150.       0.
                    .56E+18
APHANIZOMENON(H)    .12E+03 .21E+03 .19E+03 .92E+02 .11E+03 .17E+020.       .50E+01 .10E+01 .40E+010.       0.      0.
                    .29E+15 .32E+15 .26E+15 .11E+15 .18E+15 .34E+140.       .80E+13 .15E+13 .50E+130.       0.      0.
                    .12E+16

DATE  92973 DEPTH =  18.5
NAME              DEPTH-METERS
                           1       2       3       4       5       7       9      11      13      15      17      19      21
ANKISTRODESMUS      0.      .30E+01 .10E+01 .30E+01 .30E+01 .40E+010.       0.      0.      0.      0.      0.      0.
                    0.      .47E+13 .14E+13 .39E+13 .53E+13 .85E+130.       0.      0.      0.      0.      0.      0.
                    .24E+14
CHLAMYDOMONAS       .13E+02 .44E+02 .32E+02 .33E+02 .17E+02 .11E+02 .10E+01 .70E+01 .10E+01 .30E+01 .10E+010.       0.
                    .32E+14 .68E+14 .46E+14 .43E+14 .30E+14 .23E+14 .19E+13 .12E+14 .15E+13 .40E+13 .12E+130.       0.
                    .26E+15
CLOSTERIUM          .10E+010.       0.      0.      0.      .10E+010.       0.      0.      .10E+01 .10E+010.       0.
                    .24E+130.       0.      0.      0.      .21E+130.       0.      0.      .13E+13 .12E+130.       0.
                    .71E+13
UNKNOWN             .30E+01 .30E+010.       .30E+010.       .10E+010.       0.      0.      0.      0.      0.      0.
                    .73E+13 .47E+130.       .39E+130.       .21E+130.       0.      0.      0.      0.      0.      0.
                    .18E+14
CERATIUM            .10E+01 .30E+010.       0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    .24E+13 .47E+130.       0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    .71E+13
CRYPTOMONAS         .17E+02 .25E+02 .15E+02 .90E+01 .15E+02 .40E+01 .10E+01 .30E+010.       .10E+010.       0.      0.
                    .42E+14 .39E+14 .22E+14 .12E+14 .27E+14 .85E+13 .19E+13 .51E+130.       .13E+130.       0.      0.
                    .16E+15
MELOSIRA            0.      0.      0.      0.      0.      0.      0.      0.      .10E+01 .10E+010.       0.      0.
                    0.      0.      0.      0.      0.      0.      0.      0.      .15E+13 .13E+130.       0.      0.
                    .29E+13
NAVICULA            0.      0.      0.      0.      0.      0.      0.      .30E+01 .10E+01 .30E+010.       0.      0.
                    0.      0.      0.      0.      0.      0.      0.      .51E+13 .15E+13 .40E+130.       0.      0.
                    .11E+14
STEPHANODISCUS(LG)  0.      .10E+010.       .10E+010.       0.      0.      .30E+010.       0.      0.      0.      0.
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                    0.      .16E+130.       .13E+130.       0.      0.      .51E+130.       0.      0.      0.      0.
                    .80E+13
UNKNOWN             0.      0.      0.      0.      0.      0.      0.      0.      .10E+01 .10E+010.       0.      0.
                    0.      0.      0.      0.      0.      0.      0.      0.      .15E+13 .13E+130.       0.      0.
                    .29E+13
APHANIZOMENON       .14E+05 .91E+04 .69E+04 .71E+04 .59E+04 .53E+04 .33E+04 .77E+04 .92E+04 .13E+04 .42E+030.       0.
                    .33E+17 .14E+17 .10E+17 .94E+16 .10E+17 .11E+17 .63E+16 .13E+17 .14E+17 .17E+16 .49E+150.       0.
                    .12E+18
APHANIZOMENON(H)    .21E+02 .90E+01 .30E+01 .70E+01 .80E+010.       .30E+010.       .13E+02 .10E+010.       0.      0.
                    .51E+14 .14E+14 .43E+13 .92E+13 .14E+140.       .57E+130.       .20E+14 .13E+130.       0.      0.
                    .12E+15
MICROCYSTIS(C)      0.      0.      0.      0.      .10E+010.       0.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.      .18E+130.       0.      0.      0.      0.      0.      0.      0.
                    .18E+13

DATE 101373 DEPTH =  18.5
NAME              DEPTH-METERS
                          1       2       3       4       5       7       9      11      13      15      17      19      21
ANKISTRODESMUS      .40E+01 .30E+01 .10E+010.       0.      .10E+010.       0.      .70E+01 .30E+010.       0.      0.
                    .98E+13 .47E+13 .14E+130.       0.      .21E+130.       0.      .11E+14 .40E+130.       0.      0.
                    .33E+14
CHLAMYDOMONAS       .36E+02 .13E+02 .26E+02 .21E+02 .13E+02 .22E+02 .20E+02 .13E+02 .28E+02 .30E+02 .70E+010.       0.
                    .88E+14 .20E+14 .37E+14 .28E+14 .23E+14 .47E+14 .38E+14 .22E+14 .43E+14 .40E+14 .81E+130.       0.
                    .39E+15
CLOSTERIUM          0.      0.      .30E+010.       .30E+010.       0.      0.      0.      0.      0.      0.      0.
                    0.      0.      .43E+130.       .53E+130.       0.      0.      0.      0.      0.      0.      0.
                    .97E+13
PLANKTOSPHAERTA     0.      0.      0.      .12E+020.       0.      0.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      .16E+140.       0.      0.      0.      0.      0.      0.      0.      0.
                    .16E+14
UNKNOWN             0.      0.      0.      .10E+010.       0.      0.      .10E+010.       0.      0.      0.      0.
                    0.      0.      0.      .13E+130.       0.      0.      .17E+130.       0.      0.      0.      0.
                    .30E+13
CRYPTOMONAS         .15E+02 .25E+02 .22E+02 .20E+02 .15E+02 .11E+02 .12E+02 .50E+01 .11E+02 .80E+010.       0.      0.
                    .37E+14 .39E+14 .32E+14 .26E+14 .27E+14 .23E+14 .23E+14 .85E+13 .17E+14 .11E+140.       0.      0.
                    .24E+15
ASTERIONELLA        0.      0.      0.      .30E+010.       0.      0.      0.      0.      0.      .10E+010.       0.
                    0.      0.      0.      .39E+130.       0.      0.      0.      0.      0.      .12E+130.       0.
                    .51E+13
MELOSIRA            0.      .50E+010.       0.      0.      0.      0.      0.      .50E+01 .30E+010.       0.      0.
                    0.      .78E+130.       0.      0.      0.      0.      0.      .76E+13 .40E+130.       0.      0.
                    .19E+14
NAVICULA            .10E+010.       .10E+01 .30E+01 .40E+01 .40E+01 .10E+010.       0.      .40E+01 .70E+010.       0.
                    .24E+130.       .14E+13 .39E+13 .71E+13 .85E+13 .19E+130.       0.      .54E+13 .81E+130.       0.
                    .39E+14
STEPHANODISCUS(LG)  0.      0.      0.      0.      0.      0.      .10E+010.       .10E+01 .10E+010.       0.      0.
                    0.      0.      0.      0.      0.      0.      .19E+130.       .15E+13 .13E+130.       0.      0.
                    .48E+13
UNKNOWN             0.      .10E+01 .30E+01 .40E+01 .30E+01 .40E+01 .10E+010.       0.      .50E+01 .50E+010.       0.
                    0.      .16E+13 .43E+13 .52E+13 .53E+13 .85E+13 .19E+130.       0.      .67E+13 .58E+130.       0.
                    .39E+14
APHANIZOMENON       .11E+05 .80E+04 .50E+04 .19E+030.       .71E+03 .84E+030.       0.      0.      0.      0.      0.
                    .27E+17 .12E+17 .71E+16 .24E+150.       .15E+16 .16E+160.       0.      0.      0.      0.      0.
                    .49E+17
APHANIZOMENON(H)    .30E+01 .80E+01 .30E+010.       0.      0.      .10E+010.       0.      0.      0.      0.      0.
                    .73E+13 .12E+14 .43E+130.       0.      0.      .19E+130.       0.      0.      0.      0.      0.
                    .26E+14

DATE 110373 DEPTH =  18.5
NAME              DEPTH-METERS
                          1       2       3       4       5       7       9      11      13      15      17      19      21
ANKISTRODESMUS      .90E+01 .40E+01 .40E+010.       .30E+01 .30E+01 .30E+01 .40E+01 .10E+01 .30E+01 .50E+010.       0.
                    .22E+14 .62E+13 .58E+130.       .53E+13 .64E+13 .57E+13 .68E+13 .15E+13 .40E+13 .58E+130.       0.
                    .70E+14
CHLAMYDOMONAS       .90E+01 .40E+02 .38E+020.       .90E+01 .80E+01 .24E+02 .40E+02 .13E+02 .12E+02 .50E+010.       0.
                    .22E+14 .62E+14 .55E+140.       .16E+14 .17E+14 .46E+14 .68E+14 .20E+14 .16E+14 .58E+130.       0.
                    .33E+15
CLOSTERIUM          0.      .10E+010.       0.      0.      .40E+010.       .10E+010.       0.      0.      0.      0.
                    0.      .16E+130.       0.      0.      .85E+130.       .17E+130.       0.      0.      0.      0.
                    .12E+14
PLANKTOSPHAERTA     0.      0.      0.      0.      0.      0.      0.      0.      0.      .37E+020.       0.      0.
                    0.      0.      0.      0.      0.      0.      0.      0.      0.      .50E+140.       0.      0.
                    .50E+14
UNKNOWN             .30E+010.       0.      0.      0.      0.      .30E+01 .30E+01 .10E+01 .10E+010.       0.      0.
                    .73E+130.       0.      0.      0.      0.      .57E+13 .51E+13 .15E+13 .13E+130.       0.      0.
                    .21E+14
CRYPTOMONAS         .30E+01 .11E+02 .70E+010.       .40E+01 .30E+01 .40E+01 .10E+01 .30E+01 .10E+010.       0.      0.
                    .73E+13 .17E+14 .10E+140.       .71E+13 .64E+13 .76E+13 .17E+13 .46E+13 .13E+130.       0.      0.
                    .63E+14
FRAGILARIA          0.      .40E+01 .10E+010.       0.      0.      0.      0.      .50E+010.       .40E+010.       0.
                    0.      .62E+13 .14E+130.       0.      0.      0.      0.      .76E+130.       .46E+130.       0.
                    .20E+14
MELOSIRA            0.      0.      .15E+020.       .30E+01 .10E+01 .10E+010.       .10E+01 .40E+01 .50E+010.       0.
                    0.      0.      .22E+140.       .53E+13 .21E+13 .19E+130.       .15E+13 .54E+13 .58E+130.       0.
                    .44E+14
NAVICULA            .10E+01 .30E+01 .50E+010.       .70E+01 .80E+01 .10E+01 .10E+01 .10E+01 .10E+01 .40E+010.       0.
                    .24E+13 .47E+13 .72E+130.       .12E+14 .17E+14 .19E+13 .17E+13 .15E+13 .13E+13 .46E+130.       0.
                    .55E+14
STEPHANODISCUS(LG)  .40E+010.       .50E+01 .30E+01 .30E+01 .50E+01 .70E+01 .50E+01 .50E+01 .30E+01 .11E+020.       0.
                    .98E+130.       .72E+13 .39E+13 .53E+13 .11E+14 .13E+14 .85E+13 .76E+13 .40E+13 .13E+140.       0.
                    .83E+14
UNKNOWN             .30E+01 .10E+01 .40E+010.       .40E+01 .40E+01 .40E+01 .30E+01 .30E+01 .10E+01 .40E+010.       0.
                    .73E+13 .16E+13 .59E+130.       .71E+13 .85E+13 .76E+13 .51E+13 .46E+13 .13E+13 .46E+130.       0.
                    .54E+14
APHANIZOMENON       0.      .53E+020.       0.      0.      0.      0.      0.      0.      0.      .53E+020.       0.
                    0.      .82E+140.       0.      0.      0.      0.      0.      0.      0.      .61E+140.       0.
                    .14E+15

DATE 111773 DEPTH =  18.5
NAME              DEPTH-METERS
                          1       2       3       4       5       7       9      11      13      15      17      19      21
ANKISTRODESMUS      .70E+01 .80E+01 .16E+020.       0.      .11E+02 .17E+02 .80E+01 .10E+01 .11E+02 .13E+020.       0.
                    .17E+14 .12E+14 .23E+140.       0.      .23E+14 .32E+14 .14E+14 .15E+13 .15E+14 .15E+140.       0.
                    .15E+15
CHLAMYDOMONAS       .15E+03 .28E+02 .77E+02 .10E+03 .12E+03 .51E+02 .10E+03 .58E+02 .30E+02 .36E+02 .24E+020.       0.
                    .37E+15 .43E+14 .11E+15 .13E+15 .22E+15 .11E+15 .13E+15 .99E+14 .46E+14 .49E+14 .28E+140.       0.

                    .14E+16
CLOSTERIUM          .10E+01 .30E+010.       0.      .10E+010.       0.      0.      0.      0.      0.      .30E+010.
                    .24E+13 .47E+130.       0.      .18E+130.       0.      0.      0.      0.      0.      .30E+130.
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                    .12E+14
UNKNOWN             .30E+01 .10E+01 .10E+010.       .30E+01 .30E+010.      0.       .10E+010.       .10E+010.      0.
                    .73E+13 .16E+13 .14E+130.       .53E+13 .64E+130.      0.       .15E+130.       .12E+130.      0.
                    .25E+14
CRYPTOMONAS         .24E+02 .30E+01 .13E+020.       .40E+02 .80E+01 .40E+01 .10E+01 .30E+010.      0.      0.      0.
                    .59E+14 .47E+13 .19E+140.       .71E+14 .17E+14 .76E+13 .17E+13 .46E+130.      0.      0.      0.
                    .18E+15
ASTERIONELLA       0.      0.      0.      0.      0.      0.      0.      0.      0.       .70E+010.      0.      0.
                   0.      0.      0.      0.      0.      0.      0.      0.      0.       .94E+130.      0.      0.
                    .94E+13
FRAGILARIA         0.      0.      0.      0.       .40E+010.      0.      0.      0.      0.      0.      0.      0.
                   0.      0.      0.      0.       .71E+130.      0.      0.      0.      0.      0.      0.      0.
                    .71E+13
NAVICULA            .40E+01 .50E+01 .50E+010.       .40E+01 .50E+01 .10E+010.       .30E+01 .30E+01 .10E+010.      0.
                    .98E+13 .78E+13 .72E+130.       .71E+13 .11E+14 .19E+130.       .46E+13 .40E+13 .12E+130.      0.
                    .54E+14
STEPHANODISCUS(LG)  .12E+02 .10E+010.       .50E+01 .90E+010.       .22E+02 .30E+01 .10E+01 .10E+01 .40E+010.      0.
                    .29E+14 .16E+130.       .66E+13 .16E+140.       .42E+14 .51E+13 .15E+13 .13E+13 .46E+130.      0.
                    .11E+15
UNKNOWN             .30E+01 .10E+01 .50E+010.      0.       .30E+01 .30E+01 .10E+01 .10E+01 .30E+010.      0.      0.
                    .73E+13 .16E+13 .72E+130.      0.       .64E+13 .57E+13 .17E+13 .15E+13 .40E+130.      0.      0.
                    .35E+14
APHANIZOMENON      0.      0.      0.      0.      0.      0.       .11E+03 .26E+020.      0.       .26E+020.      0.
                   0.      0.      0.      0.      0.      0.       .21E+15 .44E+140.      0.       .30E+140.      0.
                    .29E+15
APHANIZOMENON(H)   0.      0.      0.      0.      0.      0.       .70E+010.      0.      0.      0.      0.      0.
                   0.      0.      0.      0.      0.      0.       .13E+140.      0.      0.      0.      0.      0.
                    .13E+14

DATE 121673 DEPTH =  18.5
NAME             DEPTH-METERS
                          1       2       3       4       5       7       9      11      13      15      17      19      21
ANKISTRODESMUS      .24E+02 .16E+02 .15E+020.       .16E+02 .16E+02 .17E+02 .11E+02 .11E+02 .22E+02 .17E+020.      0.
                    .59E+14 .25E+14 .22E+140.       .28E+14 .34E+14 .32E+14 .19E+14 .17E+14 .30E+14 .20E+140.      0.
                    .28E+15
CHLAMYDOMONAS       .13E+03 .14E+03 .10E+03 .10E+03 .10E+03 .11E+03 .13E+03 .12E+03 .11E+03 .13E+03 .11E+030.      0.
                    .32E+15 .21E+15 .15E+15 .13E+15 .18E+15 .23E+15 .25E+15 .20E+15 .17E+15 .17E+15 .12E+150.      0.
                    .21E+16
CLOSTERIUM         0.       .10E+010.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                   0.       .16E+130.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    .16E+13
OOCYSTIS           0.       .40E+01 .30E+010.       .50E+010.       .30E+01 .40E+01 .10E+01 .50E+01 .10E+010.      0.
                   0.       .62E+13 .43E+130.       .89E+130.       .57E+13 .68E+13 .15E+13 .67E+13 .12E+130.      0.
                    .41E+14
UNKNOWN             .50E+010.       .40E+010.       .10E+01 .10E+01 .30E+010.       .10E+01 .10E+01 .12E+020.      0.
                    .12E+140.       .58E+130.       .18E+13 .21E+13 .57E+130.       .15E+13 .13E+13 .14E+140.      0.
                    .44E+14
CRYPTOMONAS         .16E+02 .12E+02 .12E+020.       .11E+02 .90E+01 .70E+01 .40E+01 .30E+010.       .10E+010.      0.
                    .39E+14 .19E+14 .17E+140.       .20E+14 .19E+14 .13E+14 .68E+13 .46E+130.       .12E+130.      0.
                    .14E+15
ASTERIONELLA        .17E+02 .19E+02 .70E+010.       .13E+02 .13E+02 .50E+01 .70E+01 .12E+020.       .80E+010.      0.
                    .42E+14 .29E+14 .10E+140.       .23E+14 .28E+14 .95E+13 .12E+14 .18E+140.       .92E+130.      0.
                    .18E+15
NAVICULA            .80E+01 .10E+01 .10E+010.      0.       .30E+01 .70E+01 .10E+010.       .50E+01 .50E+010.      0.
                    .20E+14 .16E+13 .14E+130.      0.       .64E+13 .13E+14 .17E+130.       .67E+13 .58E+130.      0.
                    .56E+14
STEPHANODISCUS(LG)  .80E+01 .90E+01 .15E+02 .13E+02 .12E+02 .19E+02 .50E+01 .16E+02 .16E+02 .11E+02 .21E+020.      0.
                    .20E+14 .14E+14 .22E+14 .17E+14 .21E+14 .40E+14 .95E+13 .27E+14 .24E+14 .15E+14 .24E+140.      0.
                    .23E+15
UNKNOWN             .10E+01 .50E+010.      0.      0.       .10E+01 .10E+01 .10E+010.       .30E+01 .10E+010.      0.
                    .24E+13 .78E+130.      0.      0.       .21E+13 .19E+13 .17E+130.       .40E+13 .12E+130.      0.
                    .21E+14
UNKNOWN(T)          .10E+010.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    .24E+130.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    .24E+13

DATE  11274 DEPTH =  18.5
NAME             DEPTH-METERS
                          1       2       3       4       5       7       9      11      13      15      17      19      21
ANKISTRODESMUS      .13E+02 .13E+02 .20E+020.       .16E+02 .21E+02 .16E+02 .90E+01 .90E+01 .17E+02 .11E+020.      0.
                    .32E+14 .20E+14 .29E+140.       .28E+14 .45E+14 .30E+14 .15E+14 .14E+14 .23E+14 .13E+140.      0.
                    .25E+15
CHLAMYDOMONAS       .46E+04 .10E+04 .49E+03 .35E+03 .25E+03 .18E+03 .14E+03 .90E+02 .96E+02 .79E+02 .29E+020.      0.
                    .11E+17 .16E+16 .71E+15 .45E+15 .44E+15 .39E+15 .26E+15 .15E+15 .15E+15 .11E+15 .33E+140.      0.
                    .16E+17
GOLENKINIA         0.       .26E+020.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                   0.       .40E+140.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    .40E+14
UNKNOWN            0.      0.       .11E+020.       .21E+02 .17E+02 .24E+02 .30E+01 .10E+01 .10E+010.      0.      0.
                   0.      0.       .16E+140.       .37E+14 .35E+14 .46E+14 .51E+13 .15E+13 .13E+130.      0.      0.
                    .14E+15
GYMNODINIUM         .13E+020.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    .32E+140.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    .32E+14
CRYPTOMONAS         .24E+03 .12E+03 .19E+020.       .11E+02 .40E+01 .30E+01 .10E+010.       .10E+010.      0.      0.
                    .59E+15 .18E+15 .27E+140.       .20E+14 .85E+13 .57E+13 .17E+130.       .13E+130.      0.      0.
                    .83E+15
STEPHANODISCUS(SM)  .40E+02 .26E+02 .58E+02 .70E+02 .77E+02 .94E+02 .73E+02 .73E+02 .73E+02 .69E+02 .17E+020.      0.
                    .98E+14 .40E+14 .84E+14 .92E+14 .14E+15 .20E+15 .14E+15 .12E+15 .11E+15 .93E+14 .20E+140.      0.
                    .11E+16
ASTERIONELLA       0.      0.       .84E+020.       .30E+02 .25E+02 .79E+02 .41E+02 .34E+02 .11E+02 .70E+010.      0.
                   0.      0.       .12E+150.       .53E+14 .53E+14 .15E+15 .70E+14 .52E+14 .15E+14 .81E+130.      0.
                    .52E+15
STEPHANODISCUS(LG) 0.      0.      0.      0.       .80E+01 .20E+02 .80E+01 .40E+01 .30E+01 .40E+01 .10E+010.      0.
                   0.      0.      0.      0.       .14E+14 .43E+14 .15E+14 .68E+13 .46E+13 .54E+13 .12E+130.      0.
                    .90E+14
UNKNOWN             .13E+020.       .37E+020.       .70E+01 .40E+01 .40E+010.       .30E+01 .10E+010.      0.      0.
                    .32E+140.       .53E+140.       .12E+14 .85E+13 .76E+130.       .46E+13 .13E+130.      0.      0.
                    .12E+15
GOMPHOSPHAERIA     0.      0.      0.      0.      0.      0.       .11E+02 .21E+020.      0.      0.      0.      0.
                   0.      0.      0.      0.      0.      0.       .21E+14 .36E+140.      0.      0.      0.      0.
                    .57E+14

DATE  12674 DEPTH =  18.5
NAME             DEPTH-METERS
                          1       2       3       4       5       7       9      11      13      15      17      19      21
ANKISTRODESMUS      .13E+02 .50E+010.      0.      0.      0.      0.               .10E+01 .10E+01 .10E+010.      0.
                    .32E+14 .78E+130.      0.      0.      0.      0.               .17E+13 .15E+13 .13E+130.      0.
                    .44E+14
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CHLAMYDOMONAS       .15E+04 .74E+03 .43E+03 .25E+03 .15E+03 .53E+02 .42E+02 .40E+02 .36E+02 .33E+02 .90E+010.       0.
                    .37E+16 .12E+16 .52E+15 .33E+15 .27E+15 .11E+15 .80E+14 .68E+14 .55E+14 .44E+14 .10E+140.       0.
                    .65E+16
PLANKTOSPHAERTA     .79E+020.       0.      0.      0.      .11E+020.       0.      .16E+020.       0.      0.      0.
                    .19E+130.       0.      0.      0.      .23E+140.       0.      .24E+140.       0.      0.      0.
                    .24E+15
SCHROEDERIA         .13E+02 .30E+01 .11E+020.       .30E+01 .40E+01 .10E+01 .70E+01 .30E+01 .30E+010.       0.      0.
                    .32E+14 .47E+13 .16E+140.       .53E+13 .95E+13 .19E+13 .12E+14 .46E+13 .40E+130.       0.      0.
                    .89E+14
UNKNOWN             .13E+02 .80E+01 .80E+010.       .90E+01 .90E+01 .80E+01 .80E+01 .40E+01 .50E+01 .10E+010.       0.



                    .32E+14 .12E+14 .12E+140.       .16E+14 .17E+14 .15E+14 .14E+14 .61E+13 .67E+13 .12E+130.       0.
                    .13E+15
CRYPTOMONAS         .17E+03 .66E+02 .48E+020.       .10E+01 .30E+01 .30E+01 .40E+01 .50E+01 .10E+01 .30E+010.       0.
                    .43E+15 .10E+15 .69E+140.       .18E+13 .64E+13 .57E+13 .68E+13 .76E+13 .13E+13 .35E+130.       0.
                    .63E+15
STEPHANODISCUS(SM)  .53E+03 .42E+03 .34E+03 .25E+03 .18E+03 .83E+02 .74E+02 .67E+02 .79E+02 .58E+02 .70E+010.       0.
                    .13E+16 .65E+15 .49E+15 .33E+15 .32E+15 .18E+15 .14E+15 .11E+15 .12E+15 .78E+14 .81E+130.       0.
                    .37E+16
ASTERIONELLA        .40E+02 .18E+03 .26E+030.       .16E+02 .10E+03 .65E+02 .11E+03 .65E+02 .46E+02 .21E+020.       0.
                    .98E+14 .28E+15 .38E+150.       .28E+14 .21E+15 .12E+15 .18E+15 .99E+14 .62E+14 .24E+140.       0.
                    .15E+16
NAVICULA            0.      0.      0.      0.      0.      .10E+01 .30E+010.       .10E+01 .30E+010.       0.      0.
                    0.      0.      0.      0.      0.      .21E+13 .57E+130.       .15E+13 .40E+130.       0.      0.
                    .13E+14
STEPHANODISCUS(LG)  0.      .30E+010.       0.      0.      .10E+01 .30E+01 .10E+010.       0.      .10E+010.       0.
                    0.      .47E+130.       0.      0.      .21E+13 .57E+13 .17E+130.       0.      .12E+130.       0.
                    .15E+14
UNKNOWN             0.      0.      0.      0.      0.      0.      0.      .40E+01 .50E+01 .30E+010.       0.      0.
                    0.      0.      0.      0.      0.      0.      0.      .68E+13 .76E+13 .40E+130.       0.      0.
                    .18E+14

DATE  20974 DEPTH =  18.5
NAME              DEPTH-METERS
                           1       2       3       4       5       7       9      11      13      15      17      19      21
ANKISTRODESMUS      0.      0.      0.      0.      0.      0.      0.      0.      .50E+010.       0.      0.      0.
                    0.      0.      0.      0.      0.      0.      0.      0.      .76E+130.       0.      0.      0.
                    .76E+13
CHLAMYDOMONAS       .16E+05 .53E+04 .25E+04 .17E+04 .11E+04 .77E+03 .39E+03 .22E+03 .18E+03 .13E+03 .91E+020.       0.
                    .38E+17 .82E+16 .36E+16 .22E+16 .19E+16 .16E+16 .74E+15 .38E+15 .28E+15 .18E+15 .10E+150.       0.
                    .58E+17
GOLENKINIA          .26E+02 .53E+02 .13E+020.       0.      .13E+020.       0.      0.      0.      0.      0.      0.
                    .64E+14 .82E+14 .19E+140.       0.      .28E+140.       0.      0.      0.      0.      0.      0.
                    .19E+15
UNKNOWN             .79E+02 .26E+02 .13E+020.       0.      .13E+02 .80E+01 .50E+01 .50E+01 .80E+01 .70E+010.       0.
                    .19E+15 .40E+14 .19E+140.       0.      .28E+14 .15E+14 .85E+13 .76E+13 .11E+14 .81E+130.       0.
                    .33E+15
TRACHELAMONAS       0.      0.      0.      0.      .13E+020.       0.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.      .23E+140.       0.      0.      0.      0.      0.      0.      0.
                    .23E+14
CRYPTOMONAS         .28E+03 .45E+03 .15E+030.       0.      0.      .50E+01 .50E+010.       .40E+010.       0.      0.
                    .68E+15 .69E+15 .21E+150.       0.      0.      .95E+13 .85E+130.       .54E+130.       0.      0.
                    .16E+16
MALLOMONAS          0.      0.      0.      0.      .13E+020.       0.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.      .23E+140.       0.      0.      0.      0.      0.      0.      0.
                    .23E+14
STEPHANODISCUS(SM)  .20E+04 .26E+04 .16E+04 .13E+04 .11E+04 .59E+03 .53E+03 .42E+03 .23E+03 .20E+03 .10E+030.       0.
                    .49E+16 .41E+16 .24E+16 .17E+16 .20E+16 .13E+16 .10E+16 .72E+15 .35E+15 .27E+15 .12E+150.       0.
                    .19E+17
ASTERIONELLA        .21E+03 .11E+04 .11E+040.       .92E+03 .78E+02 .48E+03 .28E+03 .31E+03 .21E+03 .14E+030.       0.
                    .52E+15 .17E+16 .15E+160.       .16E+16 .17E+15 .91E+15 .47E+15 .47E+15 .28E+15 .16E+150.       0.
                    .79E+16
FRAGILARIA          0.      0.      0.      0.      0.      0.      0.      0.      0.      .70E+010.       0.      0.
                    0.      0.      0.      0.      0.      0.      0.      0.      0.      .94E+130.       0.      0.
                    .94E+13
NAVICULA            0.      0.      0.      0.      0.      .13E+020.       .30E+01 .50E+01 .10E+010.       0.      0.
                    0.      0.      0.      0.      0.      .28E+140.       .51E+13 .76E+13 .13E+130.       0.      0.
                    .42E+14
STEPHANODISCUS(LG)  0.      0.      0.      0.      0.      0.      0.      0.      0.      .10E+010.       0.      0.
                    0.      0.      0.      0.      0.      0.      0.      0.      0.      .13E+130.       0.      0.
                    .13E+13
UNKNOWN             0.      0.      0.      0.      0.      0.      .50E+01 .30E+01 .30E+01 .10E+010.       0.      0.
                    0.      0.      0.      0.      0.      0.      .95E+13 .51E+13 .46E+13 .13E+130.       0.      0.
                    .21E+14
UNKNOWN(T)          0.      0.      0.      0.      0.      0.      0.      0.      0.      .30E+01 .30E+010.       0.
                    0.      0.      0.      0.      0.      0.      0.      0.      0.      .40E+13 .35E+130.       0.
                    .75E+13

DATE  22374 DEPTH =  18.5
NAME              DEPTH-METERS
                           1       2       3       4       5       7       9      11      13      15      17      19      21
CHLAMYDOMONAS       .44E+04 .14E+04 .14E+04 .70E+03 .13E+03 .49E+02 .15E+02 .20E+02 .17E+02 .36E+02 .50E+010.       0.
                    .11E+17 .22E+16 .19E+16 .92E+15 .23E+15 .10E+15 .29E+14 .34E+14 .26E+14 .49E+14 .58E+130.       0.
                    .16E+17
GOLENKINIA          0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      .10E+010.
                    0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      .10E+130.
                    .10E+13
PLANKTOSPHAERTA     .11E+030.       0.      0.      .50E+010.       0.      0.      0.      0.      0.      0.      0.
                    .26E+150.       0.      0.      .89E+130.       0.      0.      0.      0.      0.      0.      0.
                    .27E+15
UNKNOWN             .11E+04 .24E+03 .17E+030.       .36E+02 .17E+02 .90E+01 .13E+02 .13E+02 .13E+02 .10E+010.       0.
                    .26E+16 .37E+15 .25E+150.       .64E+14 .36E+14 .17E+14 .22E+14 .20E+14 .18E+14 .12E+130.       0.
                    .34E+16
TRACHELAMONAS       .19E+03 .53E+02 .53E+020.       .50E+01 .80E+010.       .10E+01 .10E+01 .30E+010.       0.      0.
                    .45E+15 .82E+14 .76E+140.       .89E+13 .17E+140.       .17E+13 .15E+13 .40E+130.       0.      0.
                    .64E+15
CRYPTOMONAS         .50E+03 .37E+03 .79E+020.       .15E+02 .50E+01 .10E+01 .10E+01 .10E+01 .40E+010.       0.      0.
                    .12E+16 .57E+15 .11E+150.       .27E+14 .11E+14 .19E+13 .17E+13 .15E+13 .54E+130.       0.      0.
                    .29E+15
MALLOMONAS          0.      0.      0.      0.      .10E+010.       0.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.      .18E+130.       0.      0.      0.      0.      0.      0.      0.
                    .18E+13
STEPHANODISCUS(SM)  .19E+05 .88E+04 .53E+04 .25E+04 .12E+03 .45E+02 .59E+02 .46E+02 .38E+02 .54E+02 .21E+020.       0.
                    .46E+17 .14E+17 .76E+16 .33E+16 .21E+15 .95E+14 .11E+15 .78E+14 .58E+14 .73E+14 .24E+140.       0.
                    .72E+17
```

```
ASTERIONELLA        .40E+03 .25E+04 .38E+040.       .47E+03 .26E+03 .11E+03 .91E+02 .13E+03 .95E+02 .70E+020.       0.
                    .97E+15 .39E+16 .54E+160.       .83E+15 .55E+15 .21E+15 .15E+15 .20E+15 .13E+15 .81E+140.       0.
                    .12E+17
STEPHANODISCUS(LG)  0.      0.      0.      0.      0.      .30E+010.       .10E+010.       0.      0.      0.      0.
                    0.      0.      0.      0.      0.      .64E+130.       .17E+130.       0.      0.      0.      0.
                    .81E+13
UNKNOWN             0.      0.      0.      0.      0.      .10E+010.       .10E+01 .30E+010.       0.      0.      0.
                    0.      0.      0.      0.      0.      .21E+130.       .17E+13 .46E+130.       0.      0.      0.
                    .84E+13

DATE  31974 DEPTH =  19.0
NAME              DEPTH-METERS
                           1       2       3       4       5       7       9      11      13      15      17      19      21
ANKISTRODESMUS      0.      0.      .40E+010.       .50E+01 .30E+010.       .30E+01 .10E+010.       0.      0.      0.
                    0.      0.      .60E+130.       .93E+13 .68E+130.       .54E+13 .16E+130.       0.      0.      0.
                    .29E+14
CHLAMYDOMONAS       .13E+04 .65E+03 .26E+03 .25E+03 .25E+03 .38E+03 .43E+03 .48E+03 .31E+03 .27E+03 .22E+030.       0.
                    .32E+16 .10E+16 .39E+15 .35E+15 .46E+15 .86E+15 .86E+15 .86E+15 .49E+15 .40E+15 .27E+150.       0.
                    .91E+16
UNKNOWN             .13E+02 .50E+01 .13E+020.       .50E+01 .70E+01 .30E+01 .50E+01 .12E+02 .90E+01 .50E+010.       0.
                    .32E+14 .80E+13 .20E+140.       .93E+13 .16E+14 .60E+13 .90E+13 .19E+14 .13E+14 .62E+130.       0.
                    .14E+15
TRACHELAMONAS       .30E+03 .12E+03 .88E+020.       .74E+02 .10E+03 .66E+02 .40E+02 .34E+02 .29E+02 .32E+020.       0.
                    .76E+15 .20E+15 .13E+150.       .14E+15 .23E+15 .13E+15 .72E+14 .54E+14 .42E+14 .40E+140.       0.
                    .18E+16
CRYPTOMONAS         .20E+03 .62E+02 .55E+020.       .44E+02 .70E+02 .55E+02 .28E+02 .20E+02 .15E+02 .11E+020.       0.
                    .49E+15 .99E+14 .83E+140.       .82E+14 .16E+15 .11E+15 .50E+14 .32E+14 .22E+14 .14E+140.       0.
                    .11E+16



ASTERIONELLA        .48E+03 .46E+03 .35E+030.       .49E+03 .40E+03 .39E+03 .27E+03 .19E+03 .18E+03 .14E+030.       0.
                    .12E+16 .74E+15 .53E+150.       .91E+15 .89E+15 .77E+15 .49E+15 .31E+15 .26E+15 .17E+150.       0.
                    .63E+16
MELOSIRA            0.      .70E+01 .40E+010.       0.      0.      0.      0.      0.      0.      0.      0.      0.
                    0.      .11E+14 .60E+130.       0.      0.      0.      0.      0.      0.      0.      0.      0.
                    .17E+14
NAVICULA            0.      0.      .50E+010.       .30E+01 .40E+01 .30E+01 .10E+01 .10E+01 .40E+01 .30E+010.       0.
                    0.      0.      .75E+130.       .56E+13 .90E+13 .60E+13 .18E+13 .16E+13 .58E+13 .37E+130.       0.
                    .41E+14
RHOPALODIA          0.      0.      0.      0.      .10E+01 .10E+010.       0.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.      .19E+13 .23E+130.       0.      0.      0.      0.      0.      0.
                    .41E+13
UNKNOWN             0.      .80E+01 .30E+010.       .50E+01 .30E+01 .50E+01 .30E+01 .40E+01 .70E+01 .40E+010.       0.
                    0.      .13E+14 .45E+130.       .93E+13 .68E+13 .10E+14 .54E+13 .64E+13 .10E+14 .50E+130.       0.
                    .70E+14
UNKNOWN(T)          .26E+02 .90E+01 .70E+010.       .11E+02 .80E+01 .70E+01 .40E+01 .30E+010.       0.      0.      0.
                    .65E+14 .14E+14 .11E+140.       .20E+14 .18E+14 .14E+14 .72E+13 .48E+130.       0.      0.      0.
                    .15E+15
      B6700/B7700   F O R T R A N   C O M P I L A T I O N   M A R K   2.8.001   TUESDAY, 07/20/76   08:52 PM

                                                                                     START OF SEGMENT 002
      DIMENSION ALG(4),COUNT(13),AMONT(13),DEP(23),AREA(23),QUAL(8)                 C  002:0000:0
      DATA AREA/600,1250,2040,2750,3500,4690,5300,6200,7280,8000,9000,              C  002:0000:0
     #10000,11300,12400,13800,15000,16000,16600,17500,18200,18700,19400,            C  002:0000:0
     #19600/                                                                        C  002:0000:0
       DO 25 K=1,23                                                                 C  002:0000:0
   25 DEP(K)=K                                                                      C  002:0001:0
      CALL DUMMY(ALG,IDATE,QUAL)                                                    C  002:0004:5
  100 FORMAT(3A6,A2,I6,F5.1,6F8.0)                                                  C  002:0007:2
      DO 20 J=1,10000                                                               C  002:0007:2
      DO 1 I=1,2                                                                    C  002:0008:0
    1 READ(5,100)ALG,IDATE,DEPTH,(COUNT(J+(I-1)*6),J=1,6)                           C  002:0009:0
                                                                                         FIB IS 0006 LONG
      IF(ALG(1).EQ."END") GO TO 99                                                  C  002:001F:3
      IF(IDATF.EQ.JDATE)GO TO 30                                                    C  002:0022:4
      JDATE=IDATE                                                                   C  002:0024:0
      PRINT 101,JDATE,DEPTH                                                         C  002:0024:5
                                                                                         FIB IS 0006 LONG
  101 FORMAT("0","DATE ",I6," DEPTH = ",F5.1)                                       C  002:0020:2
      PRINT 102                                                                     C  002:002D:2
  102 FORMAT(" ","NAME              DEPTH-METERS")                                  C  002:0031:2
  105 FORMAT(" ",20X,13I8)                                                          C  002:0031:2
      PRINT 105,(K-1,K=1,3),(K-1,K=4,21,2)                                          C  002:0031:2
   30 DO 40 K=1,2                                                                   C  002:0044:2
    3 SPAC=1                                                                        C  002:0045:0
    4 IF(K-1.FQ.0)SPAC=.5                                                           C  002:0045:4
    5 AMONT(K)=HECT(DEPTH-K-1,DEP,AREA,IFLAG)*SPAC*COUNT(K)*1.0E+08                 C  002:0049:3
      IF(IFLAG.EQ.1) GO TO 88                                                       C  002:0052:2
      SUMALG=SUMALG+AMONT(K)                                                        C  002:0053:3
   40 CONTINUF                                                                      C  002:0055:3
      K=2                                                                           C  002:0057:4
    6 DO 50 KK=3,21,2                                                               C  002:0058:3
      K=K+1                                                                         C  002:005A:0
    7 SPAC=2                                                                        C  002:005B:2
    8 IF(K.EQ.3)SPAC=1.5                                                            C  002:005C:1
    9 AMONT(K)=HECT(DEPTH-K-1,DEP,AREA,IFLAG)*SPAC*COUNT(K)*1.0E+08                 C  002:005F:3
      IF(IFLAG.EQ.1) GO TO 88                                                       C  002:0068:2
      SUMALG=SUMALG+AMONT(K)                                                        C  002:0069:3
   50 CONTINUF                                                                      C  002:006B:3
      PRINT 103,ALG,COUNT                                                           C  002:006D:5
  103 FORMAT(" ",3A6,A2,13E8.2)                                                     C  002:0076:2
      PRINT 104,AMONT,SUMALG                                                        C  002:0076:2
  104 FORMAT(" ",20X,13E8.2)                                                        C  002:007F:2
      SUMALG=0.0                                                                    C  002:007F:2
   20 CONTINUF                                                                      C  002:0080:0
      GO TO 99                                                                      C  002:0082:2
   88 PRINT 106                                                                     C  002:0082:5
  106 FORMAT(" ","DEPTH-K IS OUT OF RANGE OF TABLE")                                C  002:0087:2
   99 STOP                                                                          C  002:0087:2
      END                                                                           C  002:0088:1
                                                                                SEGMENT 002 IS 0097 LONG

                                                                                    START OF SEGMENT 005
      SUBROUTINE DUMMY(ALG,IDATE,QUAL)                                              C  005:0000:0
      DIMENSION ALG(1),QUAL(1)                                                      C  005:0000:0
```

```
      DO 1 I=1,500                                                          C  005:0000:0
      READ(5,107)(ALG(J),J=1,4),IDATE,(QUAL(K),K=1,8)                       C  005:0001:0
  107 FORMAT(3A6,A2,I6,8A6)                                                 C  005:0018:2
      IF (ALG(1).EQ."END") RETURN                                           C  005:0018:2
      IF(IDATF.EQ.JDATE) GO TO 30                                           C  005:0018:4
      JDATE=IDATE                                                           C  005:001D:0
      PRINT 101,JDATE                                                       C  005:0010:5
      PRINT 102                                                             C  005:0024:2
   30 PRINT 103,(ALG(J),J=1,4),(QUAL(K),K=1,8)                              C  005:0028:2
    1 CONTINUF                                                              C  005:003C:2
  101 FORMAT('0','DATE ',I6)                                                C  005:003E:4
  102 FORMAT(' ','NAME')                                                    C  005:003E:4
  103 FORMAT(' ',3A6,A2,8A6)                                                C  005:003E:4
      RETURN                                                                C  005:003E:4
      END                                                                   C  005:003F:1
                                                                          SEGMENT 005 IS 0C48 LONG

      FUNCTION HECT(XSTAR,X,Z,IFLAG)                                         START OF SEGMENT 006
      DIMENSION X(1),Z(1)                                                   C  006:0000:0
      IFLAG=0                                                               C  006:0000:0
      IF(XSTAR.LT.X(1)-1)GO TO 2                                            C  006:0000:0
      IF(XSTAR.LE.X(23))GO TO 3                                             C  006:0000:4
    2 IFLAG=1                                                               C  006:0002:4
      HECT=0.0                                                              C  006:0004:5
      RETURN                                                                C  006:0005:3
    3 I=1                                                                   C  006:0006:1
    4 IF(X(I).GT.XSTAR) GO TO 7                                             C  006:0006:4
      IF(I.GE.23) GO TO 7                                                   C  006:0007:2
      I=I+1                                                                 C  006:0009:5
      GO TO 4                                                               C  006:0008:1
    7 HECT=Z(I-1)+(XSTAR-X(I-1))*(Z(I)-Z(I-1))/(X(I)-X(I-1))                C  006:000C:3
      RETURN                                                                C  006:000D:0
      END                                                                   C  006:0018:3
                                                                            C  006:0019:0
                                                                          SEGMENT 006 IS 0021 LONG
```

```
DATE 100174
NAME
PHACOTOS                  M = MEDIUM POPULATION (1 to 49%; BASED ON TOTAL ALGAL NUMBERS)
SPHEROCYSTIS              M
CYLINDROCYSTIS            M
CERATIUM                  M
FRAGILARIA                L = LOW POPULATION ( ≥  10%)
NAVICULA                  L
STEPHANODISCUS(LG)        M
ANABAENA                  M
APHANIZOMENON FLOSAQ      H = HIGH POPULATION ( ≥  50%)

DATE 101174
NAME
PEDIASTRUM                M
PHACOTOS                  H
SPHEROCYSTIS              M
CYLINDROCYSTIS            M
CERATIUM                  H
FRAGILARIA                M
STEPHANODISCUS(LG)        H
APHANOTHECE               H

DATE 102474
NAME
PEDIASTRUM                M
PHACOTOS                  H
CERATIUM                  M
ASTERIONELLA FORMOSA      M
MELOSIRA                  M
STEPHANODISCUS(LG)        H
APHANIZOMENON FLOSAQ      H
OTHER PROTIST*            M

DATE 110774
NAME
PHACOTOS                  M
UNKNOWN                   M
CERATIUM                  M
ASTERIONELLA FORMOSA      M
NAVICULA                  M
APHANIZOMENON FLOSAQ      H

DATE 111674
NAME
ASTERIONELLA FORMOSA      H
STEPHANODISCUS(LG)        M
APHANIZOMENON FLOSAQ      H

DATE 112374
NAME
UNKNOWN                   M
ASTERIONELLA FORMOSA      M
NAVICULA                  L
APHANIZOMENON FLOSAQ      M

DATE 112974
NAME
UNKNOWN                   M
CERATIUM                  M
ASTERIONELLA FORMOSA      M
APHANIZOMENON FLOSAQ      M
```

```
DATE 121274
NAME
ANKISTRODESMUS             L
PHACOTOS                   L
OPEPHORA                   L
CERATIUM                   M
ASTERIONELLA FORMOSA       M
NAVICULA                   L
DIATOMA                    M
UNKNOWN                    L

DATE 122374
NAME
SPHEROCYSTIS               L
UNKNOWN                    L
CERATIUM                   M
ASTERIONELLA FORMOSA       H
NAVICULA                   L
NITZIA                     L
STEPHANODISCUS(LG)         L
DIATOMA                    L

DATE 123074
NAME
CERATIUM                   L
ASTERIONELLA FORMOSA       H
NAVICULA                   L
NITZIA                     L

DATE  23074
NAME
STEPHANODISCUS(LG)         L
DIATOMA                    M
APHANIZOMENON FLOSAQ       L

DATE  10975
NAME
ANKISTRODESMUS             L
UNKNOWN                    L
ASTERIONELLA FORMOSA       M
MELOSIRA                   L
NITZIA                     M
UNKNOWNS                   L

DATE  11675
NAME
CHLAMYDAMONAS              M
UNKNOWN                    M
NAVICULA                   L
NITZIA                     M
DIATOMA                    L
UNKNOWNS                   L
OTHER PROTISTA             L

DATE  13075
NAME
CHLAMYDAMONAS              H
SCENEDESMUS INCASSUL       M
ASTERIONELLA FORMOSA       L
NITZIA                     L
CYMBELLA                   L
UNKNOWN                    L
OTHER PROTISTA             M

DATE  21275
NAME
CHLAMYDAMONAS              H
UNKNOWN                    M
ASTERIONELLA FORMOSA       L
NAVICULA                   L
NITZIA                     L
OPEPHORA                   L
CYMBELLA                   L
DIATOMA                    L
MICROCYSTIS                L

DATE  22275
NAME
CHLAMYDAMONAS              H
UNKNOWN                    M
ASTERIONELLA FORMOSA       L
STEPHANODISCUS(SM)         L
DIATOMA                    L
OTHER PROTISTA             M

DATE  31175
NAME
CHLAMYDAMONAS              L
UNKNOWN                    L
TURBELLARIA                L
NITZIA                     L
STEPHANODISCUS(SM)         M

DATE  32175
NAME
CHLAMYDAMONAS              M
UNKNOWN                    L
NAVICULA                   L
STEPHANODISCUS(LG)         M

DATE  40275
NAME
UNKNOWN                    M
STEPHANODISCUS(LG)         M

DATE  41775
NAME
CHLAMYDAMONAS              M
```

```
UNKNOWN                   L
NAVICULA                  L
CYMBELLA                  L

DATE  42975
NAME
CHLAMYDAMONAS             M
UNKNOWN                   M
NAVICULA                  H
CYMBELLA                  L




UNKNOWN                   L

DATE  50875
NAME
CHLAMYDAMONAS             M
ASTERIONELLA FORMOSA      L
NITZIA                    L
STEPHANODISCUS(SM)        H

DATE  51375
NAME
ASTERIONELLA FORMOSA      M
STEPHANODISCUS(SM)        H
DIATOMA                   L
CRUCIGLUDOIDES            L
MICROCYSTIS               L

DATE  52775
NAME
NAVICULA                  M
STEPHANODISCUS(SM)        M
CYMBELLA                  M

DATE  60375
NAME
CRYPTOMONAS               M
STEPHANODISCUS(SM)        M
UNKNOWN                   M

DATE  61075
NAME
CHLAMYDAMONAS             M
PALMELLA                  M
ASTERIONELLA FORMOSA      H

DATE  61775 DEPTH =  22.0
NAME                DEPTH-METERS
                            0     1        2        3        5        7        9        11       13       15       17       19
CHLAMYDAMONAS        .22E+030.    0.       0.       0.       0.       0.       .14E+030.         0.       0.       0.       0.
                     .20E+150.    0.       0.       0.       0.       0.       .31E+150.         0.       0.       0.       0.
                     .51E+15
SCHROEDERIA          .39E+020.    0.       0.       0.       0.       0.       .20E+020.         0.       0.       0.       0.
                     .35E+140.    0.       0.       0.       0.       0.       .45E+140.         0.       0.       0.       0.
                     .81E+14
SPHEROCYSTIS         .31E+030.    0.       0.       0.       0.       0.       .59E+020.         0.       0.       0.       0.
                     .28E+150.    0.       0.       0.       0.       0.       .13E+150.         0.       0.       0.       0.
                     .42E+15
CERATIUM             .20E+010.    0.       0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
                     .18E+130.    0.       0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
                     .18E+13
CRYPTOMONAS          .16E+030.    0.       0.       0.       0.       0.       .20E+020.         0.       0.       0.       0.
                     .14E+150.    0.       0.       0.       0.       0.       .45E+140.         0.       0.       0.       0.
                     .19E+15
MALLAMONAS           .12E+030.    0.       0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
                     .11E+150.    0.       0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
                     .11E+15
ASTERIONELLA FORMOSA .21E+040.    0.       0.       0.       0.       0.       .53E+030.         0.       0.       0.       0.
                     .19E+160.    0.       0.       0.       0.       0.       .12E+160.         0.       0.       0.       0.
                     .31E+16
STEPHANODISCUS(LG)   .20E+010.    0.       0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
                     .18E+130.    0.       0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
                     .18E+13
DIATOMA              .20E+010.    0.       0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
                     .18E+130.    0.       0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
                     .18E+13

DATE  62675 DEPTH =  22.0
NAME                DEPTH-METERS
                            0     1        2        3        5        7        9        11       13       15       17       19
SCHROEDERIA          .98E+020.    0.       0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
                     .89E+140.    0.       0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
                     .89E+14
SPHEROCYSTIS         .20E+010.    0.       0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
                     .18E+130.    0.       0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
                     .18E+13
UNKNOWN              .39E+030.    0.       0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
                     .36E+150.    0.       0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
                     .36E+15
ULOTHRIX             .20E+010.    0.       0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
                     .18E+130.    0.       0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
                     .18E+13
CRYPTOMONAS          .63E+030.    0.       0.       0.       0.       .39E+020.         0.       0.       0.       0.       0.
                     .57E+150.    0.       0.       0.       0.       .97E+140.         0.       0.       0.       0.       0.
                     .67E+15
MALLAMONAS           .59E+020.    0.       0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
                     .54E+140.    0.       0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
                     .54E+14
ASTERIONELLA FORMOSA .19E+040.    0.       0.       0.       0.       .55E+030.         0.       0.       0.       0.       0.
                     .17E+160.    0.       0.       0.       0.       .14E+160.         0.       0.       0.       0.       0.
                     .31E+16
FRAGILARIA           .20E+010.    0.       0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
                     .18E+130.    0.       0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
                     .18E+13
MELOSIRA             .20E+010.    0.       0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
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                     .18E+130.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .18E+13
STEPHANODISCUS(LG)   .20E+020.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .18E+140.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .18E+14

DATE  70175 DEPTH =  22.0
NAME              DEPTH-METERS
                           0       1       2       3       5       7       9      11      13      15      17      19
SCHROEDERIA          .26E+03 .31E+030.      0.      0.      0.      .98E+020.       0.      0.      0.      0.      0.
                     .23E+15 .55E+150.      0.      0.      0.      .24E+150.       0.      0.      0.      0.      0.
                     .10E+16
SPHEROCYSTIS         .39E+02 .22E+030.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .35E+14 .38E+150.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .41E+15
UNKNOWN             0.      0.      0.      0.      0.      0.      .78E+020.       0.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.      0.      .19E+150.       0.      0.      0.      0.      0.
                     .19E+15
CRYPTOMONAS          .39E+02 .59E+020.      0.      0.      0.      .98E+020.       0.      0.      0.      0.      0.
                     .35E+14 .10E+150.      0.      0.      0.      .24E+150.       0.      0.      0.      0.      0.
                     .38E+15
MALLAMONAS           .20E+020.      0.      0.      0.      0.      0.      0.      0.      0.      0.     .20E+020.
                     .18E+140.      0.      0.      0.      0.      0.      0.      0.      0.      0.     .29E+140.
                     .47E+14
FRAGILARIA           .29E+020.      0.      0.      0.      0.      0.      0.      0.      0.      0.     .12E+040.
                     .26E+140.      0.      0.      0.      0.      0.      0.      0.      0.      0.     .17E+160.
                     .17E+16
HANNAEA ORCUS        .20E+020.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.



                     .18E+140.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .18E+14
STEPHANODISCUS(LG)  0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.     .20E+020.
                    0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.     .29E+140.
                     .29E+14

DATE  70975 DEPTH =  22.0
NAME              DEPTH-METERS
                           0       1       2       3       5       7       9      11      13      15      17      19
CHLAMYDAMONAS        .98E+020.      0.      0.       .39E+020.      0.      0.      0.      .20E+020.       0.      0.
                     .89E+140.      0.      0.       .12E+150.      0.      0.      0.      .36E+140.       0.      0.
                     .24E+15
SCHROEDERIA          .24E+030.      0.      0.       .20E+030.      0.      0.      0.      0.      0.      0.      0.
                     .21E+150.      0.      0.       .59E+150.      0.      0.      0.      0.      0.      0.      0.
                     .80E+15
SPHEROCYSTIS         .39E+030.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .36E+150.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .36E+15
CRYPTOMONAS          .26E+030.      0.      0.       .67E+030.      0.      0.      0.      0.      0.      0.      0.
                     .23E+150.      0.      0.       .20E+160.      0.      0.      0.      0.      0.      0.      0.
                     .22E+16
FRAGILARIA          0.      0.      0.      0.       .39E+020.      0.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.       .12E+150.      0.      0.      0.      0.      0.      0.      0.
                     .12E+15
NAVICULA            0.      0.      0.      0.      0.      0.      0.      0.      0.      .20E+020.       0.      0.
                    0.      0.      0.      0.      0.      0.      0.      0.      0.      .36E+140.       0.      0.
                     .36E+14
STEPHANODISCUS(SM)   .20E+020.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .18E+140.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .18E+14
SYNEDRO INCISO       .20E+020.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .18E+140.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .18E+14

DATE  72575 DEPTH =  22.0
NAME              DEPTH-METERS
                           0       1       2       3       5       7       9      11      13      15      17      19
ANKISTRODESMUS      0.      0.      0.      0.      0.       .20E+020.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.       .55E+140.      0.      0.      0.      0.      0.      0.
                     .55E+14
CHLAMYDAMONAS        .16E+030.      0.      0.      0.       .59E+020.      0.      0.      0.      0.      0.      0.
                     .14E+150.      0.      0.      0.       .16E+150.      0.      0.      0.      0.      0.      0.
                     .31E+15
OOCYSTIS             .24E+030.      0.      0.      0.       .59E+020.      0.      0.      0.      0.      0.      0.
                     .21E+150.      0.      0.      0.       .16E+150.      0.      0.      0.      0.      0.      0.
                     .38E+15
SPHEROCYSTIS         .12E+040.      0.      0.      0.       .10E+040.      0.      0.      0.      0.      0.      0.
                     .11E+160.      0.      0.      0.       .28E+160.      0.      0.      0.      0.      0.      0.
                     .38E+16
CRYPTOMONAS          .14E+030.      0.      0.      0.       .98E+020.      0.      0.      0.      0.      0.      0.
                     .12E+150.      0.      0.      0.       .27E+150.      0.      0.      0.      0.      0.      0.
                     .40E+15

DATE  73175 DEPTH =  20.0
NAME              DEPTH-METERS
                           0       1       2       3       5       7       9      11      13      15      17      19
ANKISTRODESMUS      0.      0.      0.       .39E+020.      0.      0.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.       .11E+150.      0.      0.      0.      0.      0.      0.      0.      0.
                     .11E+15
CHLAMYDAMONAS        .39E+02 .39E+020.       .12E+03 .20E+020.      0.       .22E+030.      0.      0.      0.      0.
                     .32E+14 .62E+140.       .33E+15 .50E+140.      0.       .39E+150.      0.      0.      0.      0.
                     .86E+15
OOCYSTIS            0.      0.      0.       .20E+02 .39E+020.      .20E+02 .20E+020.      .22E+03 .20E+020.     0.
                    0.      0.      0.       .55E+14 .97E+140.      .40E+14 .36E+140.      .31E+15 .25E+140.     0.
                     .57E+15
SPHEROCYSTIS         .29E+03 .69E+030.       .59E+020.      0.      0.      0.      0.      0.      0.      0.      0.
                     .24E+15 .11E+160.       .16E+150.      0.      0.      0.      0.      0.      0.      0.      0.
                     .15E+16
CRYPTOMONAS          .16E+03 .20E+020.       .20E+02 .39E+020.      0.       .20E+020.      0.      0.      0.      0.
                     .13E+15 .32E+140.       .55E+14 .97E+140.      0.       .36E+140.      0.      0.      0.      0.
                     .35E+15
DINOBRYON            .29E+03 .47E+030.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .24E+15 .75E+150.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .10E+16
ASTERIONELLA        0.      0.      0.      0.       .39E+020.      0.      0.      0.      .10E+020.       0.      0.
                    0.      0.      0.      0.       .97E+140.      0.      0.      0.      .15E+140.       0.      0.
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                    .11E+15
FRAGILARIA          0.      0.      0.      0.      .20E+020.       .20E+020.       0.      0.      0.      0.      0.
                    0.      0.      0.      0.      .50E+140.       .40E+140.       0.      0.      0.      0.      0.
                    .90E+14
SYNEDRO INCISA      0.      0.      0.      0.      .39E+020.       0.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.      .97E+140.       0.      0.      0.      0.      0.      0.      0.
                    .97E+14

DATE  80675 DEPTH =  19.0
NAME                DEPTH-METERS
                           0       1       2       3       5       7       9      11      13      15      17      19
ACTINASTRUM         0.      0.      0.      0.      .20E+020.       .20E+02 .20E+020.       0.      0.      0.      0.
                    0.      0.      0.      0.      .45E+140.       .36E+14 .32E+140.       0.      0.      0.      0.
                    .11E+15
CHLAMYDAMONAS       .20E+02 .98E+020.       0.      .20E+020.       .39E+02 .59E+020.       0.      0.      0.      0.
                    .16E+14 .15E+150.       0.      .45E+140.       .70E+14 .94E+140.       0.      0.      0.      0.
                    .37E+15
GOLENKINIA          0.      0.      0.      .20E+020.       0.      0.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      .50E+140.       0.      0.      0.      0.      0.      0.      0.      0.
                    .50E+14
OOCYSTIS            .98E+02 .20E+020.       .18E+03 .12E+030.       .98E+02 .78E+020.       0.      0.      0.      0.
                    .78E+14 .30E+140.       .44E+15 .27E+150.       .18E+15 .12E+150.       0.      0.      0.      0.
                    .11E+16
PEDIASTRUM          0.      0.      0.      0.      0.      0.      0.      .20E+020.       0.      0.      0.      0.
                    0.      0.      0.      0.      0.      0.      0.      .32E+140.       0.      0.      0.      0.
                    .32E+14
SCHROEDERIA         .20E+02 .39E+020.       .78E+02 .20E+020.       0.      .39E+020.       0.      0.      0.      0.
                    .16E+14 .59E+140.       .19E+15 .45E+140.       0.      .62E+140.       0.      0.      0.      0.
                    .38E+15
CERATIUM            0.      0.      0.      .20E+02 .20E+020.       0.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      .50E+14 .45E+140.       0.      0.      0.      0.      0.      0.      0.
                    .95E+14
CRYPTOMONAS         .59E+02 .59E+020.       .78E+02 .39E+020.       0.      .39E+020.       0.      0.      0.      0.
                    .47E+14 .89E+140.       .19E+15 .88E+140.       0.      .62E+140.       0.      0.      0.      0.
                    .48E+15
DINOBRYON           .98E+02 .14E+030.       .20E+02 .16E+030.       .20E+020.       0.      0.      0.      0.      0.
                    .78E+14 .21E+150.       .50E+14 .35E+150.       .36E+140.       0.      0.      0.      0.      0.
                    .72E+15
ASTERIONELLA        0.      0.      0.      0.      0.      0.      0.      .39E+020.       0.      0.      0.      0.
                    0.      0.      0.      0.      0.      0.      0.      .62E+140.       0.      0.      0.      0.
                    .62E+14
MELOSIRA            .20E+03 .65E+030.       0.      0.      0.      .33E+030.       0.      0.      0.      0.      0.
                    .16E+15 .97E+150.       0.      0.      0.      .60E+150.       0.      0.      0.      0.      0.
                    .17E+16
NAVICULA            0.      0.      0.      0.      0.      0.      .39E+020.       0.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.      0.      .70E+140.       0.      0.      0.      0.      0.
                    .70E+14
APHANIZOMENON       0.      .31E+030.       .20E+020.       0.      .39E+02 .20E+020.       0.      0.      0.      0.
                    0.      .47E+150.       .50E+140.       0.      .70E+14 .32E+140.       0.      0.      0.      0.
                    .62E+15

DATE  81275 DEPTH =  19.0
NAME                DEPTH-METERS
                           0       1       2       3       5       7       9      11      13      15      17      19
ACTINASTRUM         .20E+020.       0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    .16E+140.       0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    .16E+14
CHLAMYDAMONAS       .98E+02 .20E+020.       .20E+020.       0.      0.      0.      0.      0.      0.      0.      0.
                    .78E+14 .30E+140.       .50E+140.       0.      0.      0.      0.      0.      0.      0.      0.
                    .16E+15
LAGERHEINIA         0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      .20E+020.       0.
                    0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      .21E+140.       0.
                    .21E+14
OOCYSTIS            0.      0.      0.      .20E+02 .39E+020.       0.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      .50E+14 .88E+140.       0.      0.      0.      0.      0.      0.      0.
                    .14E+15
SCHROEDERIA         .20E+02 .20E+020.       .20E+020.       0.      0.      .20E+020.       0.      0.      0.      0.
                    .16E+14 .30E+140.       .50E+140.       0.      0.      .32E+140.       0.      0.      0.      0.
                    .13E+15
UNKNOWN             0.      0.      0.      0.      0.      .16E+030.       .14E+030.       0.      0.      0.      0.
                    0.      0.      0.      0.      0.      .31E+150.       .22E+150.       0.      0.      0.      0.
                    .53E+15
CRYPTOMONAS         .98E+02 .14E+030.       .27E+03 .78E+020.       0.      0.      0.      0.      0.      0.      0.
                    .78E+14 .21E+150.       .68E+15 .18E+150.       0.      0.      0.      0.      0.      0.      0.
                    .11E+16
DINOBRYON           0.      0.      0.      .20E+02 .20E+02 .18E+030.       0.      .24E+03 .78E+020.       0.      0.
                    0.      0.      0.      .50E+14 .45E+14 .35E+150.       0.      .34E+15 .97E+140.       0.      0.
                    .89E+15
RHIZOCHRYSIS        0.      .20E+020.       0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    0.      .30E+140.       0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    .30E+14
ASTERIONELLA        0.      .20E+020.       0.      .16E+030.       0.      0.      0.      0.      0.      0.      0.
                    0.      .30E+140.       0.      .35E+150.       0.      0.      0.      0.      0.      0.      0.
                    .38E+15
MELOSIRA            0.      0.      0.      0.      0.      0.      0.      0.      .55E+030.       0.      0.      0.
                    0.      0.      0.      0.      0.      0.      0.      0.      .80E+150.       0.      0.      0.
                    .80E+15
NITZIA              0.      .20E+020.       0.      0.      0.      0.      0.      0.      0.      .39E+020.       0.
                    0.      .30E+140.       0.      0.      0.      0.      0.      0.      0.      .41E+140.       0.
                    .71E+14
STEPHANODISCUS(LG)  0.      .20E+020.       .20E+020.       0.      0.      0.      0.      0.      0.      0.      0.
                    0.      .30E+140.       .50E+140.       0.      0.      0.      0.      0.      0.      0.      0.
                    .80E+14
SYNEDRO INCISA      0.      0.      0.      0.      0.      0.      0.      0.      0.      .20E+020.       0.      0.
                    0.      0.      0.      0.      0.      0.      0.      0.      0.      .25E+140.       0.      0.
                    .25E+14
APHANOTHECE         .39E+020.       0.      0.      0.      .39E+020.       0.      0.      0.      0.      0.      0.
                    .31E+140.       0.      0.      0.      .78E+140.       0.      0.      0.      0.      0.      0.
                    .11E+15
APHANIZOMENON       .73E+030.       0.      0.      0.      .10E+010.       0.      .39E+020.       0.      0.      0.
                    .58E+150.       0.      0.      0.      .20E+130.       0.      .57E+140.       0.      0.      0.
                    .64E+15

DATE  81975 DEPTH =  18.0
NAME                DEPTH-METERS
                           0       1       2       3       5       7       9      11      13      15      17      19
CHLAMYDAMONAS       .59E+02 .20E+020.       0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
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                     .44E+14 .28E+140.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .72E+14
OOCYSTIS            0.      0.      0.      0.      0.       .18E+030.       .59E+020.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.       .32E+150.       .86E+140.      0.      0.      0.      0.
                     .40E+15
PEDIASTRUM          0.       .59E+030.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    0.       .81E+150.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .81E+15
SCHROEDERIA          .20E+020.      0.       .59E+030.      0.      0.      0.      0.      0.      0.      0.      0.
                     .15E+140.      0.       .13E+150.      0.      0.      0.      0.      0.      0.      0.      0.
                     .15E+15
ULOTHRIX             .16E+030.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .12E+150.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .12E+15
CRYPTOMONAS          .16E+03 .12E+030.       .18E+03 .98E+020.      0.      0.      0.      0.      0.      0.      0.
                     .12E+15 .16E+150.       .40E+15 .20E+150.      0.      0.      0.      0.      0.      0.      0.
                     .87E+15
DINOBRYON            .59E+02 .53E+030.       .31E+030.       .16E+03 .39E+020.      0.       .20E+020.      0.      0.
                     .44E+14 .73E+150.       .71E+150.       .28E+15 .62E+140.      0.       .21E+140.      0.      0.
                     .19E+16
ASTERIONELLA         .31E+03 .41E+030.       .57E+03 .12E+03 .20E+02 .20E+02 .27E+030.      0.      0.      0.      0.
                     .24E+15 .57E+150.       .13E+16 .24E+15 .36E+14 .32E+14 .40E+150.      0.      0.      0.      0.
                     .28E+16
MELOSIRA            0.      0.      0.      0.      0.      0.      0.      0.      0.       .24E+030.      0.      0.
                    0.      0.      0.      0.      0.      0.      0.      0.      0.       .25E+150.      0.      0.
                     .25E+15
NAVICULA            0.      0.      0.      0.      0.       .20E+02 .39E+020.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.       .36E+14 .62E+140.      0.      0.      0.      0.      0.
                     .98E+14
NITZIA              0.      0.      0.      0.      0.      0.       .20E+020.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.      0.       .32E+140.      0.      0.      0.      0.      0.
                     .32E+14
STEPHANODISCUS(LG)   .39E+020.      0.       .20E+02 .39E+02 .39E+02 .20E+020.      0.      0.      0.      0.      0.
                     .29E+140.      0.       .45E+14 .78E+14 .70E+14 .32E+140.      0.      0.      0.      0.      0.
                     .25E+15
ANABAENA             .39E+020.      0.       .39E+020.      0.      0.      0.      0.      0.      0.      0.      0.
                     .29E+140.      0.       .88E+140.      0.      0.      0.      0.      0.      0.      0.      0.
                     .12E+15
APHANOTHECE         0.      0.      0.       .78E+020.      0.      0.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.       .18E+150.      0.      0.      0.      0.      0.      0.      0.      0.
                     .18E+15
APHANIZOMENON        .86E+03 .14E+030.       .14E+04 .12E+03 .39E+04 .24E+03 .20E+020.      0.      0.      0.      0.
                     .65E+15 .19E+150.       .31E+16 .24E+15 .71E+16 .38E+15 .29E+140.      0.      0.      0.      0.
                     .12E+17
GYROTHECA            .12E+03 .20E+020.       .20E+020.      0.      0.      0.      0.      0.      0.      0.      0.
                     .88E+14 .28E+140.       .45E+140.      0.      0.      0.      0.      0.      0.      0.      0.
                     .16E+15

DATE  90275 DEPTH =  18.0
NAME              DEPTH-METERS
                           0       1       2       3       5       7       9      11      13      15      17      19
CHLAMYOAMONAS       0.      0.      0.      0.      0.      0.       .59E+02 .20E+02 .20E+020.      0.      0.      0.
                    0.      0.      0.      0.      0.      0.       .94E+14 .29E+14 .25E+140.      0.      0.      0.
                     .15E+15
FRANCEIA            0.      0.      0.      0.      0.      0.      0.       .20E+02 .20E+020.      0.      0.      0.
                    0.      0.      0.      0.      0.      0.      0.       .29E+14 .25E+140.      0.      0.      0.
                     .54E+14
OOCYSTIS             .20E+020.      0.       .20E+020.      0.      0.       .20E+020.      0.      0.      0.      0.
                     .15E+140.      0.       .45E+140.      0.      0.       .29E+140.      0.      0.      0.      0.
                     .89E+14
PALMELLA             .20E+02 .20E+020.      0.       .39E+020.      0.      0.      0.      0.      0.      0.      0.
                     .15E+14 .28E+140.      0.       .78E+140.      0.      0.      0.      0.      0.      0.      0.
                     .12E+15
SCHROEDERIA          .20E+02 .20E+020.       .20E+020.       .39E+02 .39E+020.      0.      0.      0.      0.      0.
                     .15E+14 .28E+140.       .45E+140.       .70E+14 .62E+140.      0.      0.      0.      0.      0.
                     .22E+15
SPHEROCYSTIS         .43E+03 .10E+040.       .75E+03 .57E+03 .63E+03 .11E+04 .10E+04 .53E+030.      0.      0.      0.
                     .32E+15 .14E+160.       .17E+16 .11E+16 .11E+16 .18E+16 .15E+16 .66E+150.      0.      0.      0.
                     .96E+16
CERATIUM            0.      0.      0.      0.      0.       .20E+020.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.       .35E+140.      0.      0.      0.      0.      0.      0.
                     .36E+14
CRYPTOMONAS          .18E+03 .39E+020.       .20E+02 .78E+02 .20E+03 .31E+03 .39E+02 .58E+020.      0.      0.      0.
                     .13E+15 .54E+140.       .45E+14 .16E+15 .35E+15 .50E+15 .57E+14 .72E+140.      0.      0.      0.
                     .14E+16
ASTERIONELLA         .88E+03 .12E+040.       .67E+03 .18E+03 .53E+03 .61E+03 .67E+03 .61E+030.      0.      0.      0.
                     .66E+15 .17E+160.       .15E+16 .35E+15 .95E+15 .97E+15 .97E+15 .75E+150.      0.      0.      0.
                     .79E+16
FRAGILARIA          0.      0.      0.      0.      0.      0.      0.       .78E+020.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.      0.      0.       .11E+150.      0.      0.      0.      0.
                     .11E+15
MELOSIRA             .12E+04 .10E+040.       .71E+03 .14E+03 .78E+03 .15E+04 .96E+03 .47E+030.      0.      0.      0.
                     .89E+15 .14E+160.       .16E+16 .27E+15 .14E+16 .24E+16 .14E+16 .58E+150.      0.      0.      0.
                     .10E+17
NAVICULA            0.       .39E+020.      0.      0.       .39E+020.      0.       .39E+020.      0.      0.      0.
                    0.       .54E+140.      0.      0.       .70E+140.      0.       .48E+140.      0.      0.      0.
                     .17E+15
NITZIA              0.      0.      0.      0.      0.      0.      0.       .51E+030.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.      0.      0.       .74E+150.      0.      0.      0.      0.
                     .74E+15
STEPHANODISCUS(LG)   .78E+02 .39E+020.       .98E+02 .98E+02 .16E+03 .78E+02 .59E+02 .14E+030.      0.      0.      0.
                     .59E+14 .54E+140.       .22E+15 .20E+15 .28E+15 .12E+15 .86E+14 .17E+150.      0.      0.      0.
                     .12E+16
ANABAENA            0.      0.      0.      0.      0.       .39E+02 .39E+02 .20E+020.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.       .70E+14 .62E+14 .29E+140.      0.      0.      0.      0.
                     .16E+15
APHANIZOMENON        .54E+04 .90E+030.       .31E+03 .30E+04 .40E+04 .51E+04 .23E+04 .23E+040.      0.      0.      0.
                     .40E+16 .12E+160.       .71E+15 .60E+16 .72E+16 .82E+16 .34E+16 .29E+160.      0.      0.      0.
                     .34E+17
MICROCYSTIS          .27E+03 .16E+030.       .39E+02 .20E+02 .78E+02 .20E+020.      0.      0.      0.      0.      0.
                     .21E+15 .22E+150.       .88E+14 .40E+14 .14E+15 .32E+140.      0.      0.      0.      0.      0.
                     .72E+15
OSCILLATORIA         .39E+02 .58E+020.       .39E+02 .20E+02 .20E+020.      0.      0.      0.      0.      0.      0.
                     .29E+14 .80E+140.       .88E+14 .40E+14 .35E+140.      0.      0.      0.      0.      0.      0.
                     .27E+15

DATE  90975 DEPTH =  18.0
NAME              DEPTH-METERS
                           0       1       2       3       5       7       9      11      13      15      17      19
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ANKISTRODESMUS      0.       .39E+020.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    0.       .54E+140.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .54E+14
CHLAMYDAMONAS        .39E+02 .78E+020.       .98E+02 .14E+03 .14E+03 .20E+02 .78E+02 .59E+02 .39E+020.      0.      0.
                     .29E+14 .11E+150.       .22E+15 .27E+15 .25E+15 .32E+14 .11E+15 .73E+14 .41E+140.      0.      0.
                     .11E+16
OOCYSTIS            0.      0.      0.       .20E+020.       .20E+020.       .78E+02 .78E+02 .20E+020.      0.      0.
                    0.      0.      0.       .45E+140.       .36E+140.       .11E+15 .97E+14 .21E+140.      0.      0.
                     .31E+15
PALMELLA            0.       .20E+020.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    0.       .28E+140.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .28E+14
SCHROEDERIA          .59E+02 .78E+020.       .20E+020.       .59E+020.      0.      0.      0.      0.      0.      0.
                     .44E+14 .11E+150.       .45E+140.       .11E+150.      0.      0.      0.      0.      0.      0.
                     .30E+15
SPHEROCYSTIS         .47E+03 .12E+030.       .35E+030.       .20E+02 .76E+03 .20E+03 .37E+03 .20E+030.      0.      0.
                     .35E+15 .16E+150.       .80E+150.       .36E+14 .12E+16 .29E+15 .46E+15 .21E+150.      0.      0.
                     .35E+16
ZOOCHLORELLA         .14E+03 .16E+030.       .39E+02 .20E+02 .20E+020.       .20E+020.      0.      0.      0.      0.
                     .10E+15 .22E+150.       .88E+14 .40E+14 .36E+140.       .29E+140.      0.      0.      0.      0.
                     .51E+15
UNKNOWN             0.       .20E+020.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    0.       .28E+140.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .28E+14
CRYPTOMONAS          .14E+03 .78E+020.       .78E+02 .78E+02 .20E+02 .39E+02 .20E+02 .20E+020.      0.      0.      0.
                     .10E+15 .11E+150.       .18E+15 .16E+15 .36E+14 .62E+14 .29E+14 .25E+140.      0.      0.      0.
                     .69E+15
DINOBRYON           0.      0.      0.      0.      0.      0.      0.       .39E+020.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.      0.      0.       .57E+140.      0.      0.      0.      0.
                     .57E+14
ASTERIONELLA        0.       .12E+040.       .73E+03 .20E+030.       .45E+03 .33E+03 .45E+03 .59E+020.      0.      0.
                    0.       .16E+160.       .16E+16 .39E+150.       .72E+15 .48E+15 .56E+15 .63E+140.      0.      0.
                     .55E+16
FRAGILARIA           .41E+030.      0.      0.      0.      0.      0.      0.       .63E+030.      0.      0.      0.
                     .31E+150.      0.      0.      0.      0.      0.      0.       .78E+150.      0.      0.      0.
                     .11E+16
MELOSIRA             .53E+03 .17E+040.       .20E+04 .12E+04 .65E+03 .10E+04 .14E+04 .12E+04 .59E+030.      0.      0.
                     .40E+15 .23E+160.       .46E+16 .24E+16 .12E+16 .16E+16 .20E+16 .15E+16 .62E+150.      0.      0.
                     .17E+17
NAVICULA            0.       .39E+020.      0.      0.      0.       .20E+020.      0.      0.      0.      0.      0.
                    0.       .54E+140.      0.      0.      0.       .32E+140.      0.      0.      0.      0.      0.
                     .86E+14
STEPHANODISCUS(SM)  0.      0.      0.      0.       .20E+02 .39E+02 .20E+02 .39E+02 .39E+02 .12E+030.      0.      0.
                    0.      0.      0.      0.       .40E+14 .70E+14 .32E+14 .57E+14 .48E+14 .13E+150.      0.      0.
                     .37E+15
ANABAENA             .37E+030.      0.       .78E+02 .22E+030.      0.       .20E+020.      0.      0.      0.      0.
                     .28E+150.      0.       .18E+15 .43E+150.      0.       .29E+140.      0.      0.      0.      0.
                     .92E+15
APHANIZOMENON        .18E+03 .17E+040.       .86E+03 .36E+04 .61E+03 .98E+02 .78E+02 .12E+03 .18E+030.      0.      0.
                     .13E+15 .23E+160.       .19E+16 .72E+16 .11E+16 .16E+15 .11E+15 .15E+15 .19E+150.      0.      0.
                     .13E+17
MICROCYSTIS         0.       .20E+020.       .20E+020.       .18E+030.      0.      0.       .20E+020.      0.      0.
                    0.       .28E+140.       .45E+140.       .32E+150.      0.      0.       .21E+140.      0.      0.
                     .41E+15

DATE  91675 DEPTH =  18.5
NAME              DEPTH-METERS
                           0       1       2       3       5       7       9      11      13      15      17      19
ANKISTRODESMUS      0.      0.      0.      0.      0.       .39E+020.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.       .74E+140.      0.      0.      0.      0.      0.      0.
                     .74E+14
CHLAMYDAMONAS        .16E+03 .14E+030.       .39E+02 .12E+03 .98E+02 .59E+02 .59E+020.      0.      0.      0.      0.
                     .12E+15 .20E+150.       .92E+14 .25E+15 .19E+15 .10E+15 .90E+140.      0.      0.      0.      0.
                     .10E+16
OOCYSTIS            0.      0.      0.      0.      0.       .78E+020.      0.       .98E+02 .20E+020.      0.      0.
                    0.      0.      0.      0.      0.       .15E+150.      0.       .13E+15 .23E+140.      0.      0.
                     .30E+15
SCHROEDERIA          .39E+02 .59E+020.       .39E+020.      0.      0.       .20E+02 .20E+020.      0.      0.      0.
                     .30E+14 .85E+140.       .92E+140.      0.      0.       .31E+14 .27E+140.      0.      0.      0.
                     .27E+15
SPHEROCYSTIS         .20E+03 .59E+020.      0.       .20E+03 .29E+03 .18E+03 .16E+03 .20E+02 .20E+020.      0.      0.
                     .15E+15 .85E+140.      0.       .42E+15 .56E+15 .30E+15 .24E+15 .27E+14 .23E+140.      0.      0.
                     .18E+16
UNKNOWN              .98E+020.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

                     .76E+140.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .76E+14
EUGLENA             0.      0.      0.      0.      0.       .20E+020.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.       .38E+140.      0.      0.      0.      0.      0.      0.
                     .38E+14
CRYPTOMONAS          .18E+03 .98E+020.       .18E+03 .12E+03 .22E+030.      0.       .20E+02 .39E+020.      0.      0.
                     .14E+15 .14E+150.       .42E+15 .25E+15 .41E+150.      0.       .27E+14 .45E+140.      0.      0.
                     .14E+16
ASTERIONELLA         .59E+020.      0.      0.      0.      0.      0.      0.      0.       .20E+020.      0.      0.
                     .46E+140.      0.      0.      0.      0.      0.      0.      0.       .23E+140.      0.      0.
                     .69E+14
MELOSIRA             .26E+03 .14E+030.       .24E+03 .22E+03 .51E+03 .43E+03 .71E+030.       .26E+030.      0.      0.
                     .20E+15 .20E+150.       .56E+15 .46E+15 .97E+15 .73E+15 .11E+160.       .29E+150.      0.      0.
                     .45E+16
NAVICULA             .39E+020.      0.       .20E+020.      0.      0.      0.      0.      0.      0.      0.      0.
                     .30E+140.      0.       .47E+140.      0.      0.      0.      0.      0.      0.      0.      0.
                     .78E+14
NITZIA              0.       .20E+020.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    0.       .29E+140.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .29E+14
SYNEDRA INCISA       .20E+020.      0.       .20E+020.      0.      0.      0.      0.      0.      0.      0.      0.
                     .16E+140.      0.       .47E+140.      0.      0.      0.      0.      0.      0.      0.      0.
                     .63E+14
ANABAENA            0.      0.      0.       .20E+02 .20E+02 .20E+020.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.       .47E+14 .43E+14 .38E+140.      0.      0.      0.      0.      0.      0.
                     .13E+15
APHANIZOMENON        .20E+04 .26E+040.       .15E+04 .10E+04 .27E+04 .28E+04 .26E+03 .73E+03 .10E+040.      0.      0.
                     .16E+16 .38E+160.       .35E+16 .22E+16 .50E+16 .48E+16 .39E+15 .98E+15 .12E+160.      0.      0.
                     .23E+17
UNKNOWN             0.      0.      0.      0.       .29E+030.      0.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.       .63E+150.      0.      0.      0.      0.      0.      0.      0.
                     .63E+15
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DATE 100175 DFPTH =  18.5
NAME              DEPTH-METERS
                           0       1       2       3       5       7       9      11      13      15      17      19
ANKISTRODESMUS      0.       .20E+020.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    0.       .29E+140.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .29E+14
CHLAMYDAMONAS        .55E+03 .51E+030.       .27E+030.       .59E+02 .20E+02 .59E+020.      0.      0.      0.      0.
                     .43E+15 .73E+150.       .65E+150.       .11E+15 .34E+14 .90E+140.      0.      0.      0.      0.
                     .20E+16
PANDORINA           0.      0.      0.       .78E+030.      0.       .20E+020.      0.      0.      0.      0.      0.
                    0.      0.      0.       .19E+160.      0.       .34E+140.      0.      0.      0.      0.      0.
                     .19E+16
SCHROEDERIA          .20E+02 .39E+020.       .59E+02 .39E+02 .20E+02 .14E+030.      0.      0.      0.      0.      0.
                     .16E+14 .56E+140.       .14E+15 .83E+14 .38E+14 .23E+150.      0.      0.      0.      0.      0.
                     .57E+15
SPHEROCYSTIS         .24E+030.      0.       .22E+030.      0.      0.      0.      0.      0.      0.      0.      0.
                     .18E+150.      0.       .51E+150.      0.      0.      0.      0.      0.      0.      0.      0.
                     .69E+15
EUGLENA              .20E+02 .39E+020.       .20E+02 .78E+020.      0.      0.      0.      0.      0.      0.      0.
                     .16E+14 .56E+140.       .47E+14 .17E+150.      0.      0.      0.      0.      0.      0.      0.
                     .29E+15
CERATIUM            0.      0.      0.       .20E+02 .39E+02 .39E+02 .39E+020.      0.      0.      0.      0.      0.
                    0.      0.      0.       .47E+14 .83E+14 .74E+14 .66E+140.      0.      0.      0.      0.      0.
                     .27E+15
FRAGILARIA          0.      0.      0.       .39E+020.      0.      0.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.       .92E+140.      0.      0.      0.      0.      0.      0.      0.      0.
                     .92E+14
MELOSIRA             .16E+030.      0.      0.      0.       .39E+020.      0.       .29E+03 .39E+020.      0.      0.
                     .12E+150.      0.      0.      0.       .74E+140.      0.       .40E+15 .45E+140.      0.      0.
                     .64E+15
NAVICULA             .39E+020.      0.      0.      0.      0.      0.      0.      0.       .20E+020.      0.      0.
                     .30E+140.      0.      0.      0.      0.      0.      0.      0.       .23E+140.      0.      0.
                     .53E+14
STEPHANODISCUS(SM)  0.      0.      0.      0.      0.      0.      0.       .20E+02 .20E+020.      0.      0.      0.
                    0.      0.      0.      0.      0.      0.      0.       .31E+14 .27E+140.      0.      0.      0.
                     .58E+14
APHANIZOMENON        .75E+04 .24E+030.       .23E+04 .11E+05 .88E+03 .14E+04 .29E+03 .20E+03 .39E+030.      0.      0.
                     .58E+16 .34E+150.       .54E+16 .24E+17 .17E+16 .24E+16 .45E+15 .26E+15 .45E+150.      0.      0.
                     .41E+17
MICROCYSTIS          .59E+02 .20E+020.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .46E+14 .29E+140.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .75E+14

DATE 101375 DFPTH =  18.5
NAME              DEPTH-METERS
                           0       1       2       3       5       7       9      11      13      15      17      19
CHLAMYDAMONAS        .39E+02 .39E+020.      0.       .20E+020.      0.       .39E+02 .20E+020.      0.      0.      0.
                     .30E+14 .56E+140.      0.       .43E+140.      0.       .60E+14 .27E+140.      0.      0.      0.
                     .22E+15
SCHROEDERIA          .20E+020.      0.      0.      0.       .20E+020.      0.      0.      0.       .20E+020.      0.
                     .16E+140.      0.      0.      0.       .38E+140.      0.      0.      0.       .20E+140.      0.
                     .73E+14
SPHEROCYSTIS        0.      0.      0.      0.       .78E+020.      0.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.       .17E+150.      0.      0.      0.      0.      0.      0.      0.
                     .17E+15
CERATIUM            0.       .20E+020.      0.      0.      0.      0.      0.       .20E+020.      0.      0.      0.
                    0.       .29E+140.      0.      0.      0.      0.      0.       .27E+140.      0.      0.      0.
                     .56E+14
FRAGILARIA          0.      0.      0.      0.      0.       .16E+030.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.       .30E+150.      0.      0.      0.      0.      0.      0.
                     .30E+15
MELOSIRA            0.      0.      0.      0.      0.      0.       .59E+020.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.      0.       .19E+150.      0.      0.      0.      0.      0.
                     .10E+15
NAVICULA             .39E+020.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .30E+140.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .30E+14
STEPHANODISCUS(LG)  0.       .78E+020.      0.       .20E+020.      0.       .20E+02 .39E+02 .39E+02 .20E+020.      0.
                    0.       .11E+150.      0.       .43E+140.      0.       .31E+14 .53E+14 .45E+14 .20E+140.      0.
                     .30E+15
APHANIZOMENON        .20E+02 .69E+030.       .35E+03 .39E+020.       .20E+030.       .20E+02 .49E+03 .39E+020.      0.
                     .16E+14 .99E+150.       .84E+15 .83E+140.       .33E+150.       .27E+14 .56E+15 .39E+140.      0.
                     .29E+16

DATE 102375 DFPTH =  18.5
NAME              DEPTH-METERS
                           0       1       2       3       5       7       9      11      13      15      17      19
ANKISTRODESMUS       .20E+02 .20E+020.       .20E+020.      0.      0.      0.      0.      0.      0.      0.      0.
                     .16E+14 .29E+140.       .47E+140.      0.      0.      0.      0.      0.      0.      0.      0.
                     .92E+14
CHLAMYDAMONAS        .29E+03 .78E+020.       .98E+02 .59E+02 .16E+030.      0.      0.      0.      0.      0.      0.
                     .23E+15 .11E+150.       .23E+15 .13E+15 .30E+150.      0.      0.      0.      0.      0.      0.
                     .10E+16
OOCYSTIS             .27E+03 .20E+020.       .78E+02 .39E+02 .39E+020.      0.      0.      0.      0.      0.      0.
                     .21E+15 .29E+140.       .18E+15 .83E+14 .74E+140.      0.      0.      0.      0.      0.      0.
                     .58E+15
SCHROEDERIA          .20E+020.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .16E+140.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .16E+14
SPHEROCYSTIS        0.       .78E+020.       .73E+03 .78E+020.      0.      0.      0.      0.      0.      0.      0.
                    0.       .11E+150.       .17E+16 .17E+150.      0.      0.      0.      0.      0.      0.      0.
                     .20E+16
EUGLENA             0.       .20E+020.      0.       .39E+02 .39E+020.      0.      0.      0.      0.      0.      0.
                    0.       .29E+140.      0.       .83E+14 .74E+140.      0.      0.      0.      0.      0.      0.
                     .19E+15
CERATIUM            0.       .39E+020.      0.       .20E+020.      0.      0.      0.      0.      0.      0.      0.
                    0.       .56E+140.      0.       .43E+140.      0.      0.      0.      0.      0.      0.      0.
                     .99E+14
CRYPTOMONAS          .59E+020.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .46E+140.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .46E+14
MALLAMONAS           .20E+020.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .16E+140.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .16E+14
MELOSIRA            0.      0.      0.      0.       .78E+020.      0.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.       .17E+150.      0.      0.      0.      0.      0.      0.      0.
                     .17E+15
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NAVICULA             .39E+020.      0.      0.       .20E+020.      0.      0.      0.      0.      0.      0.      0.
                     .30E+140.      0.      0.       .43E+140.      0.      0.      0.      0.      0.      0.      0.
                     .73E+14
NITZIA               .39E+020.      0.      0.       .20E+020.      0.      0.      0.      0.      0.      0.      0.
                     .30E+140.      0.      0.       .43E+140.      0.      0.      0.      0.      0.      0.      0.
                     .73E+14
STEPHANODISCUS(LG)   .20E+020.      0.       .59E+02 .78E+020.      0.      0.      0.      0.      0.      0.      0.
                     .16E+140.      0.       .14E+15 .17E+150.      0.      0.      0.      0.      0.      0.      0.
                     .32E+15

DATE 103075 DEPTH =  18.5
NAME              DEPTH-METERS
                           0       1       2       3       5       7       9      11      13      15      17      19
ANKISTRODESMUS      0.      0.      0.      0.      0.       .39E+02 .20E+02 .20E+020.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.       .74E+14 .34E+14 .31E+140.      0.      0.      0.      0.
                     .14E+15
CHLAMYDAMONAS        .69E+03 .65E+03 .33E+03 .27E+03 .26E+03 .59E+02 .14E+03 .59E+020.      0.      0.      0.      0.
                     .53E+15 .93E+15 .65E+15 .65E+15 .54E+15 .11E+15 .23E+15 .90E+140.      0.      0.      0.      0.
                     .37E+16
OOCYSTIS             .33E+03 .18E+030.       .22E+03 .59E+020.       .20E+020.      0.      0.      0.      0.      0.
                     .26E+15 .25E+150.       .51E+15 .13E+150.       .34E+140.      0.      0.      0.      0.      0.
                     .12E+16
SCHROEDERIA          .20E+02 .39E+020.       .20E+020.      0.      0.      0.      0.      0.      0.      0.      0.
                     .16E+14 .56E+140.       .47E+140.      0.      0.      0.      0.      0.      0.      0.      0.
                     .12E+15
SPHEROCYSTIS         .59E+020.      0.      0.      0.      0.      0.       .16E+030.      0.      0.      0.      0.
                     .46E+140.      0.      0.      0.      0.      0.       .24E+150.      0.      0.      0.      0.
                     .29E+15
EUGLENA              .14E+030.       .59E+02 .98E+020.      0.      0.      0.      0.      0.      0.      0.      0.
                     .11E+150.       .12E+15 .23E+150.      0.      0.      0.      0.      0.      0.      0.      0.
                     .45E+15
CERATIUM             .20E+02 .20E+02 .20E+02 .20E+020.      0.       .20E+020.      0.      0.      0.      0.      0.
                     .16E+14 .29E+14 .39E+14 .47E+140.      0.       .34E+140.      0.      0.      0.      0.      0.
                     .17E+15
CRYPTOMONAS          .12E+03 .78E+02 .60E+02 .39E+02 .39E+020.       .20E+02 .20E+020.      0.      0.      0.      0.
                     .91E+14 .11E+15 .12E+15 .92E+14 .83E+140.       .34E+14 .31E+140.      0.      0.      0.      0.
                     .56E+15
ASTERIONELLA        0.      0.      0.      0.      0.      0.      0.       .20E+020.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.      0.      0.       .31E+140.      0.      0.      0.      0.
                     .31E+14
DENTICULA           0.      0.      0.      0.      0.      0.       .20E+020.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.      0.       .34E+140.      0.      0.      0.      0.      0.
                     .34E+14
HANNAEA ORCUS       0.      0.      0.       .59E+020.      0.       .61E+030.      0.      0.      0.      0.      0.
                    0.      0.      0.       .14E+150.      0.       .10E+160.      0.      0.      0.      0.      0.
                     .12E+16
MELOSIRA            0.      0.       .39E+020.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    0.      0.       .77E+140.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .77E+14
NAVICULA             .59E+020.      0.      0.      0.      0.       .20E+020.      0.      0.      0.      0.      0.
                     .46E+140.      0.      0.      0.      0.       .34E+140.      0.      0.      0.      0.      0.
                     .80E+14
NITZIA               .39E+02 .20E+020.      0.      0.      0.      0.       .39E+020.      0.      0.      0.      0.
                     .30E+14 .29E+140.      0.      0.      0.      0.       .60E+140.      0.      0.      0.      0.
                     .12E+15
STEPHANODISCUS(LG)  0.      0.      0.      0.      0.      0.       .39E+020.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.      0.       .66E+140.      0.      0.      0.      0.      0.
                     .66E+14
ANABAENA            0.      0.      0.       .41E+030.      0.      0.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.       .97E+150.      0.      0.      0.      0.      0.      0.      0.      0.
                     .97E+15
APHANIZOMENON        .20E+02 .24E+03 .78E+02 .20E+02 .14E+03 .39E+020.       .78E+020.      0.      0.      0.      0.
                     .16E+14 .34E+15 .15E+15 .47E+14 .29E+15 .74E+140.       .12E+150.      0.      0.      0.      0.
                     .10E+16
MICROCYSTIS         0.      0.       .39E+020.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    0.      0.       .77E+140.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .77E+14

DATE 110375 DEPTH =  18.5
NAME              DEPTH-METERS
                           0       1       2       3       5       7       9      11      13      15      17      19
ANKISTRODESMUS       .39E+020.      0.      0.      0.       .20E+02 .58E+02 .58E+020.      0.      0.      0.      0.
                     .30E+140.      0.      0.      0.       .38E+14 .99E+14 .89E+140.      0.      0.      0.      0.
                     .26E+15
CHLAMYDAMONAS        .59E+03 .75E+03 .33E+030.      0.       .39E+02 .39E+02 .58E+020.      0.      0.      0.      0.
                     .46E+15 .11E+16 .65E+150.      0.       .74E+14 .66E+14 .89E+140.      0.      0.      0.      0.
                     .24E+16
OOCYSTIS            0.       .20E+020.      0.      0.      0.       .20E+02 .20E+020.      0.      0.      0.      0.
                    0.       .29E+140.      0.      0.      0.       .34E+14 .31E+140.      0.      0.      0.      0.
                     .93E+14
SCHROEDERIA          .20E+020.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .16E+140.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .16E+14
SPHEROCYSTIS        0.      0.      0.      0.      0.      0.       .20E+02 .20E+020.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.      0.       .34E+14 .31E+140.      0.      0.      0.      0.
                     .65E+14
EUGLENA              .20E+02 .59E+020.      0.      0.       .20E+020.      0.      0.      0.      0.      0.      0.
                     .16E+14 .85E+140.      0.      0.       .38E+140.      0.      0.      0.      0.      0.      0.
                     .14E+15
CERATIUM            0.      0.      0.      0.      0.      0.      0.       .39E+020.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.      0.      0.       .60E+140.      0.      0.      0.      0.
                     .60E+14
CRYPTOMONAS          .20E+02 .20E+02 .39E+020.      0.       .20E+020.       .20E+020.      0.      0.      0.      0.
                     .16E+14 .29E+14 .77E+140.      0.       .38E+140.       .31E+140.      0.      0.      0.      0.
                     .19E+15
ASTERIONELLA         .20E+020.       .20E+020.      0.       .20E+030.       .20E+020.      0.      0.      0.      0.
                     .16E+140.       .39E+140.      0.       .37E+150.       .31E+140.      0.      0.      0.      0.
                     .46E+15
FRAGILARIA          0.       .27E+03 .63E+030.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    0.       .39E+15 .12E+160.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .16E+16
NAVICULA             .39E+02 .20E+020.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .30E+14 .29E+140.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .59E+14
NITZIA              0.      0.      0.      0.      0.       .20E+02 .20E+020.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.       .38E+14 .34E+140.      0.      0.      0.      0.      0.
                     .72E+14
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>TEPHANDDISCUS(LG)  0.      0.      0.      0.      0.      0.       .20E+020.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.      0.       .34E+140.      0.      0.      0.      0.      0.
                     .34E+14
APHANIZOMENON       0.      0.       .39E+020.      0.       .11E+040.      0.      0.      0.      0.      0.      0.
                    0.      0.       .77E+140.      0.       .20E+160.      0.      0.      0.      0.      0.      0.
                     .21E+16

DATE 111375 DFPTH =  18.5
NAME              DEPTH-METERS
                           0       1       2       3       5       7       9     11      13      15      17      19
ANKISTRODESMUS       .20E+020.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .16E+140.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .16E+14
CHLAMYDAMONAS        .39E+030.      0.       .29E+03 .16E+03 .20E+03 .98E+02 .39E+02 .20E+020.      0.      0.      0.
                     .30E+150.      0.       .70E+15 .33E+15 .37E+15 .17E+15 .60E+14 .27E+140.      0.      0.      0.
                     .20E+16
OOCYSTIS            0.      0.      0.      0.      0.      0.       .39E+020.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.      0.       .66E+140.      0.      0.      0.      0.      0.
                     .66E+14
PHACOTOS            0.      0.      0.      0.      0.       .20E+020.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.       .38E+140.      0.      0.      0.      0.      0.      0.
                     .38E+14
SCHROEDERIA         0.      0.      0.      0.      0.      0.       .20E+02 .20E+02 .20E+020.      0.      0.      0.
                    0.      0.      0.      0.      0.      0.       .34E+14 .31E+14 .27E+140.      0.      0.      0.
                     .92E+14
SPHEROCYSTIS        0.      0.      0.       .16E+030.       .82E+030.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.       .37E+150.       .16E+160.      0.      0.      0.      0.      0.      0.
                     .19E+16
EUGLENA              .39E+020.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .30E+140.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .30E+14
CERATIUM            0.      0.      0.      0.      0.       .20E+020.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.       .38E+140.      0.      0.      0.      0.      0.      0.
                     .38E+14
CRYPTOMONAS          .39E+020.      0.       .98E+02 .59E+020.      0.      0.      0.      0.      0.      0.      0.
                     .30E+140.      0.       .23E+15 .13E+150.      0.      0.      0.      0.      0.      0.      0.
                     .39E+15
MALLAMONAS          0.      0.      0.      0.      0.       .20E+020.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.       .38E+140.      0.      0.      0.      0.      0.      0.
                     .38E+14
ASTERIONELLA        0.      0.      0.      0.      0.      0.       .29E+030.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.      0.       .50E+150.      0.      0.      0.      0.      0.
                     .50E+15
FRAGILLARIA         0.      0.      0.       .51E+03 .27E+030.      0.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.       .12E+16 .58E+150.      0.      0.      0.      0.      0.      0.      0.
                     .18E+16
MELOSIRA            0.      0.      0.       .31E+030.      0.      0.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.       .74E+150.      0.      0.      0.      0.      0.      0.      0.      0.
                     .74E+15
NAVICULA             .20E+020.      0.      0.       .20E+02 .98E+020.      0.       .39E+02 .20E+020.      0.      0.
                     .16E+140.      0.      0.       .43E+14 .19E+150.      0.       .53E+14 .23E+140.      0.      0.
                     .32E+15
STEPHANODISCUS(LG)  0.      0.      0.      0.      0.       .20E+020.       .20E+020.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.       .38E+140.       .31E+140.      0.      0.      0.      0.
                     .69E+14
APHANIZOMENON       0.      0.      0.      0.      0.      0.      0.       .20E+020.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.      0.      0.       .31E+140.      0.      0.      0.      0.
                     .31E+14
DATE 111975 DFPTH =  18.5
NAME              DEPTH-METERS
                           0       1       2       3       5       7       9     11      13      15      17      19
CHLAMYDAMONAS        .20E+020.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .16E+140.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .16E+14
SCHROEDERIA          .20E+020.      0.       .20E+020.       .20E+02 .20E+020.      0.      0.      0.      0.      0.
                     .16E+140.      0.       .47E+140.       .38E+14 .34E+140.      0.      0.      0.      0.      0.
                     .13E+15
UNKNOWN             0.       .20E+02 .14E+03 .98E+02 .78E+020.       .20E+020.       .20E+020.      0.      0.      0.
                    0.       .29E+14 .27E+15 .23E+15 .17E+150.       .34E+140.       .27E+140.      0.      0.      0.
                     .76E+15
CERATIUM             .20E+020.      0.      0.      0.       .20E+020.      0.      0.      0.      0.      0.      0.
                     .16E+140.      0.      0.      0.       .38E+140.      0.      0.      0.      0.      0.      0.
                     .54E+14
CRYPTOMONAS          .59E+02 .78E+02 .39E+02 .20E+03 .78E+02 .39E+020.       .20E+02 .20E+02 .20E+020.      0.      0.
                     .46E+14 .11E+15 .77E+14 .46E+15 .17E+15 .74E+140.       .31E+14 .27E+14 .23E+140.      0.      0.
                     .10E+16
MALLAMONAS          0.      0.       .59E+02 .20E+020.      0.      0.      0.      0.      0.      0.      0.      0.
                    0.      0.       .12E+15 .47E+140.      0.      0.      0.      0.      0.      0.      0.      0.
                     .16E+15
ASTERIONELLA         .20E+030.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .15E+150.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .15E+15
MELOSIRA            0.      0.      0.      0.      0.      0.      0.      0.      0.       .39E+020.      0.      0.
                    0.      0.      0.      0.      0.      0.      0.      0.      0.       .45E+140.      0.      0.
                     .45E+14
APHANIZOMENON        .20E+020.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .16E+140.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .16E+14

DATE 112275 DFPTH =  18.5
NAME              DEPTH-METERS
                           0       1       2       3       5       7       9     11      13      15      17      19
CHLAMYDAMONAS        .12E+03 .14E+030.       .18E+030.       .14E+030.       .98E+020.      0.      0.      0.      0.
                     .91E+14 .20E+150.       .42E+150.       .26E+150.       .15E+150.      0.      0.      0.      0.
                     .11E+16
SCHROEDERIA          .20E+020.      0.       .20E+020.      0.      0.      0.      0.      0.      0.      0.      0.
                     .16E+140.      0.       .47E+140.      0.      0.      0.      0.      0.      0.      0.      0.
                     .63E+14
EUGLENA             0.       .20E+020.      0.      0.       .20E+020.       .20E+020.      0.      0.      0.      0.
                    0.       .29E+140.      0.      0.       .38E+140.       .31E+140.      0.      0.      0.      0.
                     .97E+14
CRYPTOMONAS         0.       .59E+020.       .59E+020.       .59E+020.      0.      0.      0.      0.      0.      0.
                    0.       .85E+140.       .14E+150.       .11E+150.      0.      0.      0.      0.      0.      0.
                     .34E+15
MALLAMONAS          0.      0.      0.      0.      0.       .20E+020.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.       .38E+140.      0.      0.      0.      0.      0.      0.
                     .38E+14
ASTERIONELLA        0.       .18E+030.       .20E+020.      0.      0.       .20E+020.       .18E+030.      0.      0.
                    0.       .25E+150.       .47E+140.      0.      0.       .31E+140.       .20E+150.      0.      0.
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                     .53E+15
FRAGILARIA           .12E+040.      0.       .61E+030.      0.      0.      0.      0.      0.       .14E+040.      0.      0.
                     .93E+150.      0.       .14E+160.      0.      0.      0.      0.      0.       .16E+160.      0.      0.
                     .40E+16
NITZIA              0.       .20E+020.       .20E+020.       .20E+020.      0.      0.       .98E+020.      0.      0.
                    0.       .29E+140.       .47E+140.       .38E+140.      0.      0.       .11E+150.      0.      0.
                     .23E+15
STEPHANODISCUS(LG)  0.      0.      0.      0.      0.      0.      0.      0.      0.      0.       .59E+020.      0.
                    0.      0.      0.      0.      0.      0.      0.      0.      0.      0.       .59E+140.      0.
                     .59E+14
DATE 120475 DFPTH =  18.5
NAME              DEPTH-METERS
                           0       1       2       3       5       7       9      11      13      15      17      19
CHLAMYDAMONAS        .59E+02 .20E+030.       .20E+02 .98E+02 .14E+03 .20E+03 .16E+03 .12E+03 .22E+030.      0.      0.
                     .46E+14 .28E+150.       .47E+14 .21E+15 .26E+15 .33E+15 .24E+15 .16E+15 .25E+150.      0.      0.
                     .18E+16
OOCYSTIS            0.      0.      0.       .20E+020.      0.      0.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.       .47E+140.      0.      0.      0.      0.      0.      0.      0.      0.
                     .47E+14
SCHROEDERIA          .20E+02 .20E+030.       .39E+02 .20E+02 .20E+02 .39E+02 .39E+02 .20E+020.      0.      0.      0.
                     .16E+14 .29E+140.       .92E+14 .43E+14 .38E+14 .66E+14 .60E+14 .27E+140.      0.      0.      0.
                     .37E+15
SPHEROCYSTIS        0.      0.      0.      0.       .16E+03 .20E+03 .24E+030.       .20E+02 .39E+020.      0.      0.
                    0.      0.      0.      0.       .33E+15 .37E+15 .40E+150.       .27E+14 .45E+140.      0.      0.
                     .12E+16
EUGLENA             0.       .20E+020.      0.      0.      0.       .20E+020.      0.       .20E+020.      0.      0.
                    0.       .29E+140.      0.      0.      0.       .34E+140.      0.       .23E+140.      0.      0.
                     .86E+14
CRYPTOMONAS          .20E+020.      0.      0.       .39E+02 .59E+020.       .39E+02 .39E+02 .14E+030.      0.      0.
                     .16E+140.      0.      0.       .83E+14 .11E+150.       .60E+14 .53E+14 .16E+150.      0.      0.
                     .48E+15
ASTERIONELLA FORMOSA .20E+020.      0.      0.      0.      0.      0.      0.       .39E+02 .16E+030.      0.      0.
                     .16E+140.      0.      0.      0.      0.      0.      0.       .53E+14 .18E+150.      0.      0.
                     .25E+15
FRAGILLARIA          .39E+030.      0.      0.       .45E+03 .23E+04 .35E+030.       .55E+03 .75E+030.      0.      0.
                     .30E+150.      0.      0.       .96E+15 .43E+16 .60E+150.       .74E+15 .86E+150.      0.      0.
                     .78E+16
MELOSIRA            0.      0.      0.      0.      0.      0.      0.      0.       .59E+020.      0.      0.      0.
                    0.      0.      0.      0.      0.      0.      0.      0.       .80E+140.      0.      0.      0.
                     .80E+14
NAVICULA            0.      0.      0.       .20E+020.      0.      0.      0.       .39E+020.      0.      0.      0.
                    0.      0.      0.       .47E+140.      0.      0.      0.       .53E+140.      0.      0.      0.
                     .10E+15
NITZIA              0.      0.      0.      0.      0.      0.       .20E+020.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.      0.       .34E+140.      0.      0.      0.      0.      0.
                     .34E+14
STEPHANODISCUS(LG)   .20E+020.      0.      0.      0.      0.      0.      0.       .20E+020.      0.      0.      0.
                     .16E+140.      0.      0.      0.      0.      0.      0.       .27E+140.      0.      0.      0.
                     .42E+14

DATE 121075 DFPTH =  18.5
NAME              DEPTH-METERS
                           0       1       2       3       5       7       9      11      13      15      17      19
CHLAMYDAMONAS        .49E+03 .57E+03 .43E+03 .31E+03 .55E+03 .53E+030.       .37E+03 .35E+030.      0.      0.      0.
                     .38E+15 .82E+15 .85E+15 .74E+15 .12E+16 .10E+160.       .57E+15 .48E+150.      0.      0.      0.
                     .60E+16
OOCYSTIS            0.       .78E+020.       .98E+02 .59E+02 .59E+020.       .59E+02 .20E+020.      0.      0.      0.
                    0.       .11E+150.       .23E+15 .13E+15 .11E+150.       .90E+14 .27E+140.      0.      0.      0.
                     .70E+15
SCHROEDERIA         0.       .59E+02 .78E+02 .98E+020.       .59E+020.       .59E+02 .39E+020.      0.      0.      0.
                    0.       .85E+14 .15E+15 .23E+150.       .11E+150.       .90E+14 .53E+140.      0.      0.      0.
                     .73E+15
SPHEROCYSTIS         .51E+03 .16E+030.      0.       .12E+030.      0.       .14E+03 .37E+030.      0.      0.      0.
                     .40E+15 .23E+150.      0.       .25E+150.      0.       .21E+15 .50E+150.      0.      0.      0.
                     .16E+16
EUGLENA             0.       .20E+020.       .59E+020.      0.      0.       .20E+020.      0.      0.      0.      0.
                    0.       .29E+140.       .14E+150.      0.      0.       .31E+140.      0.      0.      0.      0.
                     .20E+15
CRYPTONOMAS          .39E+020.       .59E+02 .20E+02 .39E+02 .39E+020.       .20E+02 .78E+020.      0.      0.      0.
                     .30E+140.       .12E+15 .47E+14 .83E+14 .74E+140.       .31E+14 .11E+150.      0.      0.      0.
                     .49E+15

MALLAMONAS          0.      0.      0.      0.      0.      0.      0.       .20E+020.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.      0.      0.       .31E+140.      0.      0.      0.      0.
                     .31E+14
ASTERIONELLA FORMOSA0.      0.       .39E+02 .20E+020.      0.      0.       .20E+020.      0.      0.      0.      0.
                    0.      0.       .77E+14 .47E+140.      0.      0.       .31E+140.      0.      0.      0.      0.
                     .15E+15
FRAGILARIA          0.       .78E+020.       .61E+03 .14E+030.      0.       .25E+04 .15E+040.      0.      0.      0.
                    0.       .11E+150.       .14E+16 .29E+150.      0.       .38E+16 .20E+160.      0.      0.      0.
                     .77E+16
NITZIA              0.      0.      0.      0.       .11E+04 .78E+020.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.       .23E+16 .15E+150.      0.      0.      0.      0.      0.      0.
                     .24E+16
STEPHANODISCUS(LG)  0.      0.      0.      0.      0.       .20E+020.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.       .38E+140.      0.      0.      0.      0.      0.      0.
                     .38E+14
APHANIZOMENON FLOSAQ .10E+08 .12E+030.       .20E+020.      0.      0.      0.      0.      0.      0.      0.      0.
                     .78E+19 .17E+150.       .47E+140.      0.      0.      0.      0.      0.      0.      0.      0.
                     .78E+19

DATE 121875 DFPTH =  18.5
NAME              DEPTH-METERS
                           0       1       2       3       5       7       9      11      13      15      17      19
CHLAMYDAMONAS       0.      0.      0.      0.      0.      0.       .55E+03 .31E+03 .39E+02 .37E+03 .31E+03 .27E+030.
                    0.      0.      0.      0.      0.      0.       .93E+15 .48E+15 .53E+14 .43E+15 .31E+15 .22E+150.
                     .24E+16
CHLAMYDAMONAS       0.       .39E+020.      0.      0.      0.       .33E+03 .39E+030.      0.      0.      0.      0.
                    0.       .56E+140.      0.      0.      0.       .57E+15 .60E+150.      0.      0.      0.      0.
                     .12E+16
OOCYSTIS             .20E+02 .20E+020.       .20E+020.      0.      0.      0.      0.      0.      0.      0.      0.
                     .16E+14 .29E+140.       .47E+140.      0.      0.      0.      0.      0.      0.      0.      0.
                     .92E+14
SCHROEDERIA          .39E+02 .39E+02 .39E+02 .59E+02 .39E+02 .20E+02 .39E+02 .78E+020.      0.      0.      0.      0.
                     .30E+14 .56E+14 .77E+14 .14E+15 .83E+14 .38E+14 .66E+14 .12E+150.      0.      0.      0.      0.
                     .61E+15
SPHEROCYSTIS        0.       .26E+03 .12E+030.       .31E+03 .39E+02 .14E+03 .16E+030.      0.      0.      0.      0.
                    0.       .37E+15 .23E+150.       .67E+15 .74E+14 .23E+15 .24E+150.      0.      0.      0.      0.
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                    .18E+16
HAEMATOCOCCUS       .59E+02 .20E+020.       0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    .46E+14 .29E+140.       0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    .75E+14
EUGLENA             0.      0.      .20E+020.       0.      .20E+020.       0.      0.      0.      0.      0.      0.
                    0.      0.      .39E+140.       0.      .38E+140.       0.      0.      0.      0.      0.      0.
                    .77E+14
CRYPTOMONAS         .59E+02 .20E+02 .39E+02 .12E+03 .59E+02 .78E+02 .98E+02 .39E+020.       0.      0.      0.      0.
                    .46E+14 .29E+14 .77E+14 .28E+15 .13E+15 .15E+15 .17E+15 .60E+140.       0.      0.      0.      0.
                    .93E+15
ASTERIONELLA FORMOSA0.      0.      .31E+030.       0.      .20E+020.       0.      0.      0.      0.      0.      0.
                    0.      0.      .62E+150.       0.      .38E+140.       0.      0.      0.      0.      0.      0.
                    .66E+15
FRAGILARIA          0.      .26E+03 .11E+040.       .67E+030.       .14E+03 .16E+040.       0.      0.      0.      0.
                    0.      .37E+15 .21E+160.       .14E+160.       .23E+15 .24E+160.       0.      0.      0.      0.
                    .65E+16
NAVICULA            0.      .20E+020.       .20E+020.       .20E+020.       0.      0.      0.      0.      0.      0.
                    0.      .29E+140.       .47E+140.       .38E+140.       0.      0.      0.      0.      0.      0.
                    .11E+15
NITZIA              0.      .20E+020.       0.      0.      0.      .20E+02 .20E+020.       0.      0.      0.      0.
                    0.      .29E+140.       0.      0.      0.      .34E+14 .31E+140.       0.      0.      0.      0.
                    .93E+14
MICROCYSTIS         0.      0.      0.      0.      0.      .20E+020.       0.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.      .38E+140.       0.      0.      0.      0.      0.      0.
                    .38E+14
OTHER PROTISTA      .20E+020.       0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    .16E+140.       0.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    .16E+14

DATE  10876 DEPTH =  18.5
NAME              DEPTH-METERS
                           0       1       2       3       5       7       9      11      13      15      17      19
CHLAMYDAMONAS       .17E+04 .98E+03 .47E+03 .27E+03 .16E+03 .39E+02 .39E+02 .39E+020.       0.      0.      0.      0.
                    .13E+16 .14E+16 .92E+15 .65E+15 .33E+15 .74E+14 .66E+14 .60E+140.       0.      0.      0.      0.
                    .48E+16
OOCYSTIS            0.      0.      0.      0.      0.      0.      .78E+02 .39E+020.       0.      0.      0.      0.
                    0.      0.      0.      0.      0.      0.      .13E+15 .60E+140.       0.      0.      0.      0.
                    .19E+15
SCHROEDERIA         0.      0.      .20E+020.       0.      0.      0.      0.      0.      0.      0.      0.      0.
                    0.      0.      .39E+140.       0.      0.      0.      0.      0.      0.      0.      0.      0.
                    .39E+14
CRYPTOMONAS         .14E+04 .16E+03 .20E+03 .12E+03 .59E+02 .78E+020.       0.      0.      0.      0.      0.      0.
                    .11E+16 .23E+15 .39E+15 .28E+15 .13E+15 .15E+150.       0.      0.      0.      0.      0.      0.
                    .22E+16
FRAGILARIA          0.      0.      .24E+03 .78E+03 .13E+04 .22E+04 .47E+03 .12E+040.       0.      0.      0.      0.
                    0.      0.      .46E+15 .19E+16 .28E+16 .41E+16 .80E+15 .18E+160.       0.      0.      0.      0.
                    .12E+17
STEPHANODISCUS(SM)  .10E+05 .10E+05 .11E+05 .12E+05 .11E+05 .43E+04 .17E+04 .18E+040.       0.      0.      0.      0.
                    .79E+16 .15E+17 .21E+17 .28E+17 .23E+17 .82E+16 .29E+16 .27E+160.       0.      0.      0.      0.
                    .11E+18
APHANIZOMENON FLOSAQ0.      0.      .20E+020.       0.      0.      0.      0.      0.      0.      0.      0.      0.
                    0.      0.      .39E+140.       0.      0.      0.      0.      0.      0.      0.      0.      0.
                    .39E+14
OTHER PROTISTA      .75E+03 .47E+03 .24E+030.       .12E+030.       0.      0.      0.      0.      0.      0.      0.
                    .58E+15 .68E+15 .46E+150.       .25E+150.       0.      0.      0.      0.      0.      0.      0.
                    .20E+16

DATE  11376 DEPTH =  18.5
NAME              DEPTH-METERS
                           0       1       2       3       5       7       9      11      13      15      17      19
CHLAMYDAMONAS       .19E+04 .14E+04 .86E+03 .24E+03 .16E+03 .11E+04 .31E+030.       0.      0.      0.      0.      0.
                    .15E+16 .20E+16 .17E+16 .56E+15 .33E+15 .21E+16 .53E+150.       0.      0.      0.      0.      0.
                    .87E+16
OOCYSTIS            0.      0.      0.      0.      .78E+020.       .78E+020.       0.      0.      0.      0.      0.
                    0.      0.      0.      0.      .17E+150.       .13E+150.       0.      0.      0.      0.      0.
                    .30E+15
SCHROEDERIA         0.      0.      0.      0.      .16E+030.       0.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.      .33E+150.       0.      0.      0.      0.      0.      0.      0.
                    .33E+15
EUGLENA             0.      0.      0.      .78E+020.       0.      0.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      .18E+150.       0.      0.      0.      0.      0.      0.      0.      0.
                    .18E+15
GLENODINIUM         .14E+03 .16E+030.       0.      .78E+02 .24E+030.       0.      0.      0.      0.      0.      0.
                    .11E+15 .23E+150.       0.      .17E+15 .45E+150.       0.      0.      0.      0.      0.      0.
                    .94E+15
CRYPTOMONAS         .53E+03 .31E+03 .16E+03 .39E+020.       .16E+030.       0.      0.      0.      0.      0.      0.
                    .41E+15 .45E+15 .31E+15 .92E+140.       .30E+150.       0.      0.      0.      0.      0.      0.
                    .16E+16
MALLAMONAS          0.      0.      0.      0.      .78E+020.       0.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.      .17E+150.       0.      0.      0.      0.      0.      0.      0.
                    .17E+15
FRAGILARIA          0.      0.      0.      0.      .10E+040.       0.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.      .22E+160.       0.      0.      0.      0.      0.      0.      0.
                    .22E+16
NAVICULA            0.      0.      0.      .78E+020.       0.      0.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      .18E+150.       0.      0.      0.      0.      0.      0.      0.      0.
                    .18E+15
NITZIA              0.      0.      0.      0.      0.      .78E+020.       0.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.      .15E+150.       0.      0.      0.      0.      0.      0.
                    .15E+15
STEPHANODISCUS(SM)  .17E+05 .24E+05 .22E+05 .71E+04 .54E+04 .13E+05 .36E+040.       0.      0.      0.      0.      0.
                    .13E+17 .35E+17 .43E+17 .17E+17 .12E+17 .25E+17 .61E+160.       0.      0.      0.      0.      0.
                    .15E+18
OTHER PROTISTA      .49E+03 .47E+03 .55E+030.       0.      .78E+02 .78E+020.       0.      0.      0.      0.      0.
                    .30E+15 .68E+15 .11E+160.       0.      .15E+15 .13E+150.       0.      0.      0.      0.      0.
                    .24E+16

DATE  11576 DEPTH =  18.5
NAME              DEPTH-METERS
                           0       1       2       3       5       7       9      11      13      15      17      19
CHLAMYDAMONAS       .34E+04 .14E+04 .39E+03 .24E+030.       .78E+02 .24E+030.       0.      0.      0.      0.      0.
                    .26E+16 .20E+16 .77E+15 .56E+150.       .15E+15 .43E+150.       0.      0.      0.      0.      0.
                    .65E+16
OOCYSTIS            0.      0.      0.      .16E+030.       0.      0.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      .37E+150.       0.      0.      0.      0.      0.      0.      0.      0.
                    .37E+15
SCHROEDERIA         0.      .78E+020.       0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
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                    0.       .11E+150.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .11E+15
SPHEROCYSTIS        0.      0.      0.      0.      0.      0.       .63E+030.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.      0.       .11E+160.      0.      0.      0.      0.      0.
                     .11E+16
EUGLENA              .24E+03 .27E+03 .78E+020.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .18E+15 .39E+15 .15E+150.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .73E+15
GLENODINIUM         0.      0.      0.      0.       .78E+020.       .78E+020.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.       .17E+150.       .13E+150.      0.      0.      0.      0.      0.
                     .30E+15
CRYPTOMONAS          .94E+03 .86E+03 .31E+030.      0.      0.       .24E+030.      0.      0.      0.      0.      0.
                     .73E+15 .12E+16 .62E+150.      0.      0.       .40E+150.      0.      0.      0.      0.      0.
                     .30E+16
ASTERIONELLA FORMOSA0.      0.      0.      0.       .78E+020.      0.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.       .17E+150.      0.      0.      0.      0.      0.      0.      0.
                     .17E+15
FRAGILARIA          0.      0.      0.      0.      0.       .63E+030.       .98E+030.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.       .12E+160.       .15E+160.      0.      0.      0.      0.
                     .27E+16
NITZIA              0.      0.      0.      0.       .78E+020.      0.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.       .17E+150.      0.      0.      0.      0.      0.      0.      0.
                     .17E+15
STEPHANODISCUS(SM)   .45E+05 .58E+05 .40E+05 .17E+05 .11E+05 .46E+04 .18E+05 .18E+04 .75E+030.      0.      0.      0.
                     .35E+17 .83E+17 .79E+17 .41E+17 .23E+17 .86E+16 .31E+17 .28E+16 .10E+160.      0.      0.      0.
                     .30E+18
OTHER PROTISTA       .28E+04 .31E+03 .78E+020.      0.       .78E+020.      0.      0.      0.      0.      0.      0.
                     .22E+16 .45E+15 .15E+150.      0.       .15E+150.      0.      0.      0.      0.      0.      0.
                     .29E+16

DATE  12076 DEPTH =  18.5
NAME              DEPTH-METERS
                            0       1       2       3       5       7       9       11      13      15      17      19
CHLAMYDAMONAS        .39E+03 .39E+030.       .78E+02 .43E+030.       .12E+03 .39E+02 .12E+030.      0.      0.      0.
                     .30E+15 .56E+150.       .18E+15 .92E+150.       .20E+15 .60E+14 .16E+150.      0.      0.      0.
                     .24E+16
UNKNOWN              .12E+030.       .78E+02 .31E+03 .12E+030.      0.      0.      0.      0.      0.      0.      0.
                     .91E+140.       .15E+15 .74E+15 .25E+150.      0.      0.      0.      0.      0.      0.      0.
                     .12E+16
CRYPTOMONAS         0.       .78E+020.      0.       .16E+030.      0.      0.      0.      0.      0.      0.      0.
                    0.       .11E+150.      0.       .33E+150.      0.      0.      0.      0.      0.      0.      0.
                     .45E+15
FRAGILARIA          0.       .47E+030.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    0.       .68E+150.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .68E+15
STEPHANODISCUS(SM)   .79E+05 .76E+05 .49E+05 .43E+05 .40E+05 .14E+05 .32E+05 .64E+04 .20E+040.      0.      0.      0.
                     .61E+17 .11E+18 .96E+17 .10E+18 .85E+17 .26E+17 .55E+17 .97E+16 .27E+160.      0.      0.      0.
                     .55E+18
OTHER PROTISTA      0.      0.       .78E+02 .78E+020.       .78E+030.      0.      0.      0.      0.      0.      0.
                    0.      0.       .15E+15 .18E+150.       .15E+160.      0.      0.      0.      0.      0.      0.
                     .18E+16

DATE  12476 DEPTH =  18.5
NAME              DEPTH-METERS
                            0       1       2       3       5       7       9       11      13      15      17      19
CHLAMYDAMONAS        .20E+04 .39E+03 .47E+030.       .31E+030.      0.      0.      0.      0.      0.      0.      0.
                     .16E+16 .56E+15 .92E+150.       .67E+150.      0.      0.      0.      0.      0.      0.      0.
                     .37E+16
OOCYSTIS            0.      0.      0.      0.       .16E+030.      0.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.       .33E+150.      0.      0.      0.      0.      0.      0.      0.
                     .33E+15
EUGLENA             0.       .78E+020.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    0.       .11E+150.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .11E+15
GLENODINIUM          .31E+03 .31E+030.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .24E+15 .45E+150.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .70E+15
CRYPTOMONAS          .78E+03 .71E+03 .31E+03 .12E+03 .31E+030.      0.      0.      0.      0.      0.      0.      0.
                     .61E+15 .10E+16 .62E+15 .28E+15 .67E+150.      0.      0.      0.      0.      0.      0.      0.
                     .32E+16

DATE  17476 DEPTH =  18.5
NAME              DEPTH-METERS
                            0       1       2       3       5       7       9       11      13      15      17      19
ASTERIONELLA FORMOSA0.      0.       .63E+030.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    0.      0.       .12E+160.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .12E+16
NAVICULA            0.       .78E+020.      0.      0.       .16E+030.       .16E+030.      0.      0.      0.      0.
                    0.       .11E+150.      0.      0.       .30E+150.       .24E+150.      0.      0.      0.      0.
                     .65E+15
NITZIA              0.       .78E+020.      0.      0.       .12E+030.      0.      0.      0.      0.      0.      0.
                    0.       .11E+150.      0.      0.       .22E+150.      0.      0.      0.      0.      0.      0.
                     .34E+15

DATE  12476 DEPTH =  18.5
NAME              DEPTH-METERS
                            0       1       2       3       5       7       9       11      13      15      17      19
STEPHANODISCUS(SM)   .94E+05 .10E+06 .65E+05 .61E+05 .76E+05 .41E+05 .27E+05 .96E+040.      0.      0.      0.      0.
                     .73E+17 .15E+18 .13E+18 .15E+18 .16E+18 .78E+17 .45E+17 .15E+170.      0.      0.      0.      0.
                     .79E+18
OTHER PROTISTA       .78E+020.      0.      0.       .78E+020.      0.       .16E+030.      0.      0.      0.      0.
                     .60E+140.      0.      0.       .17E+150.      0.       .24E+150.      0.      0.      0.      0.
                     .47E+15

DATE  12976 DEPTH =  18.5
NAME              DEPTH-METERS
                            0       1       2       3       5       7       9       11      13      15      17      19
CHLAMYDAMONAS        .16E+03 .47E+03 .31E+03 .63E+030.      0.      0.      0.      0.      0.      0.      0.      0.
                     .12E+15 .68E+15 .62E+15 .15E+160.      0.      0.      0.      0.      0.      0.      0.      0.
                     .29E+16
EUGLENA             0.       .16E+030.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    0.       .23E+150.      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                     .23E+15
GLENODINIUM          .16E+03 .16E+03 .16E+030.      0.      0.       .16E+030.      0.      0.      0.      0.      0.
                     .12E+15 .23E+15 .31E+150.      0.      0.       .27E+150.      0.      0.      0.      0.      0.
                     .92E+15
CRYPTOMONAS         0.       .94E+03 .47E+03 .31E+03 .78E+020.      0.      0.      0.      0.      0.      0.      0.
                    0.       .14E+16 .92E+15 .74E+15 .17E+150.      0.      0.      0.      0.      0.      0.      0.
                     .32E+16
FRAGILARIA          0.      0.      0.      0.      0.      0.       .47E+030.      0.      0.      0.      0.      0.
                    0.      0.      0.      0.      0.      0.       .80E+150.      0.      0.      0.      0.      0.
                     .80E+15
STEPHANODISCUS(SM)   .79E+04 .17E+06 .88E+05 .94E+05 .39E+05 .20E+05 .27E+05 .23E+05 .30E+050.      0.      0.      0.
                     .61E+16 .17E+18 .17E+18 .22E+18 .83E+17 .37E+17 .46E+17 .35E+17 .40E+170.      0.      0.      0.
                     .81E+18
OTHER PROTISTA      0.      0.      0.       .16E+030.      0.      0.      0.      0.      0.      0.      0.      0.
                    0.      0.      0.       .37E+150.      0.      0.      0.      0.      0.      0.      0.      0.
                     .37E+15
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