SENIOR THESIS

Water Quality Analysis of the North Palisade Glacier Sierra Nevada Mountians, California

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Prepared for

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

WATER QUALITY ANAYSIS OF THE NORTH PALISADE GLACIER, SIERRA NEVADA MOUNTAINS, CALIFORNIA

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0.0 Abstract

North Palisade Glacier, the largest glacier in the Sierra Nevada Mountains located in Inyo County, California, is the focus of a water quality analysis of the glacier ice found throughout the glacier body itself. This analysis sampled the glacier surface, a crevasse exposure that allows sampling of the glacier ice to 40 feet in-depth, and finally the meltwater and fluvial runoff. The results have found that there are several different sources that contribute to varying concentrations of volatile organic compounds (VOC's) such as acetone, benzene, and naphthalene as well as varying concentrations of trace metals such as chromium, arsenic, and cadmium. The sources of the VOC's stems from human development in the Owens Valley located 12 miles east of North Palisade glacier and is likely due to use of pesticides and herbicides that become airborne during use and drift onto the glacier surface becoming trapped in the ice column. Trace metal contaminants in the glacial ice are likely sourced from the fine dust particulates that lifted high in the atmosphere from the dry briny, Owens Lake bed, also located within the vicinity of North Palisade Glacier. Volcanism is also considered as a source of trace metals found in the deeper ice samples. Global events of volcanic ash fallout can create deposits of ash onto the glacier and therefore create short episodes of metal concentrations to accumulate.

1.0 INTRODUCTION

For the last 2 to 3 million years major portions of the Sierra Nevada have been covered in glaciers during which they have dramatically altered and sculptured the mountain landscape. The warm climate of the last 10,000 years has destroyed the once vast expanses of glaciers leaving behind only small alpine glaciers dotted throughout the Sierra Nevada.

Of these 497 alpine glaciers, North Palisade glacier is the largest (Matthes, 1933). It is located at elevations from 12,000 feet to 13,400 feet, within a shadowy cirque below Mt. Sill, and covers an area of one half square mile. The high elevations produce a scene of rock, ice and snow with no vegetation; not even lichen can grow in this harsh climate (Camp, 1958).

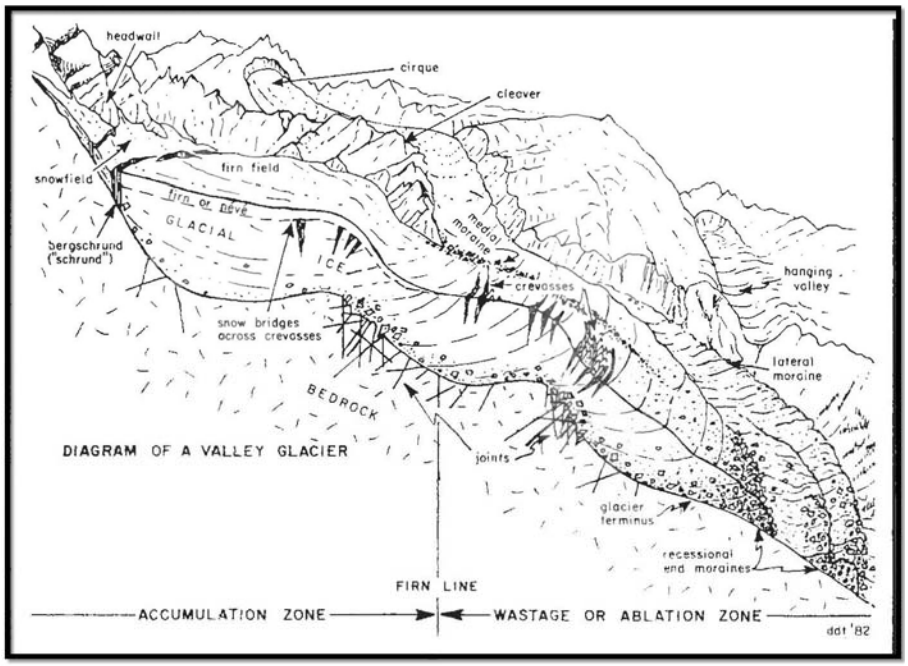


Figure courtesy of Trent, D.D. 1982

Palisade glacier provides a unique opportunity to produce a record of naturally occurring and manmade chemicals, along with trace metals, that may have been precipitated from the annual snowfall. This annual snowfall consolidates into glacier ice over time, preserving a record of atmospheric conditions. Recent age estimates from moraine deposits, indicate that the oldest ice located at the base of the glacier spans age from 1,400 yrs old, whereas the younger ice accumulations nearer the surface of the glacier are only 200 years old (Bowerman, 2005).

This report analyzes the chemical content of the North Palisade glacier ice for volatile organic compounds (VOC's) such as benzene and methyl tertiary-butyl ether (MTBE), and trace metals such as arsenic and cadmium in a comprehensive sample area. This sample area covers 3 prime locations: the first area covers the glacier surface itself. A second area, which contains the

bulk of the sampling, covers a crevasse that exposes, in depth, the upper half portion of the glacier mass, allowing a chronological record. Lastly, a sample collection of the glacier melt water as it feeds into the North Big Pine Creek.

The results show most importantly, an accumulation (in the parts-per-billions) of VOC's and trace metals in the more recent glacier ice formations. With deeper, older ice, the levels of VOC's and trace metals decrease in concentration. The cause of this recent increase can be attributed to a variety of sources. One example is an airborne source of pollution such as nearby agricultural use of pesticides. Another cause is the dryer conditions along the adjacent Owens Lake that allow for more particulate dust to be carried and transported. Overall, this trend of contaminates does not appear to be decreasing. Another source to be considered is volcanism. Volcano eruptions can spread ash and other airborne particulates worldwide. This can contribute to trace metal accumulations as well.

2.0 GLACIER DESCRIPTION

2.1 PHYSIOGRAPHY

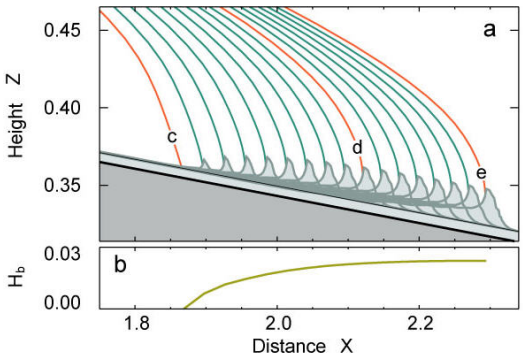
The North Palisade Glacier is the largest and one of several glaciers that lie within a cluster of other glaciers along the High Eastern Sierra crest, located approximately at 37° 06' North, and 118° 31' West. Since 1925, geologists have observed the glacier to have an area of 1.3 km^2 (Camp, 1958). Several other reports since then show the glacier to have a fluctuating area and volume (McIntyre, 1946). North Palisade glacier is one of 10 ice bodies that lie along the northeast slope of the Palisades for a distance of 16 km. It lies in a double North-facing cirque at the head of the North Fork Big Pine Creek. Surrounding this glacier are three peaks; Mt. Thunderbolt (14,060 ft, 4216m), Mt Sill (14,100 ft, 4230m) and North Palisade (14,254 ft, 4276m). The glacier is divided into an east and west lobe, with the eastern lobe being the main body of the glacier and the western lobe covered under moraine (Lehr, 1975). In July 1955, hydrology measurements indicated that the glacier is producing a meltwater flow of 26 ft^3/sec from the lake, directly adjacent to the glacier, into the North Fork Big Pine Creek (Camp, 1958) .

Overall, modern glacier activity is minimal. Observations from 1925 through the present have shown that the glacier ice budget fluctuates frequently (Camp, 1958, Blake, 2001). Observations and records show the glacier has been losing volume with the exception of positive gain from 1970 thru 1978 due to an above average snowfall period.

Table I: Volume Loss of Palisade Glacier

(Matthes, 1933; Camp, 1958; Lehr, 1975; Blake, 2001)

Year	Meters Lowered	Average Lowering per Year
1925-1933	9.0	1.13
1933-1946	7.2	0.56
1946-1955	8.7	0.96
1955-1968	2.0	0.17
1968-1978	Gained 4.6	Gained 0.46



The alpine glacier flow follows the plug-flow model shown here with a horizontal flow rate of 0.5-2.0 cm/day. The surface ice is curved towards the base of the glacier front as time and ice deposition progresses. North Palisade glacier terminates at a small lake producing a vertical cliff as ice segments periodically break off into the lake below. This allows an exposure of older ice deposits to be accessible for sampling. (Leysinger, 2003)

2.2 Dynamics and Kinematics

Crevasses present on North Palisade Glacier are the result of shear stresses generated between the moving glacier and the stationary valley walls (Trent, 1983). These crevasses are more abundant in the upper region of the glacier known as the accumulation zone where new snow and ice mass accrue. This added weight causes increased velocities and thus increased shear. Typically crevasses rarely exceed 100 ft in depth because below that depth the brittle behavior of ice gives way to a more ductile and plastic flow. Plastic flow is one method that glaciers move. Under pressure, ice will flow plastically, whereas the uppermost part of ice sheet (zone of fracture) is not under pressure and cracks as the ice below it moves, locally producing deep crevasses (cracks). (Green, 2002)

Palisade glacier crevasses usually range from 5 to 40 ft in depth (Leysinger, 2003). Measurement of actual glacier thickness has been attempted with a seismograph that responds to a plate and hammer but results have been inconclusive. The more accurate measurements of glacier thickness come from the meltwater pond at the glacier terminus. (Adjacent to the crevasse sample location, see Figure 4). By measuring from the glacier surface down to the

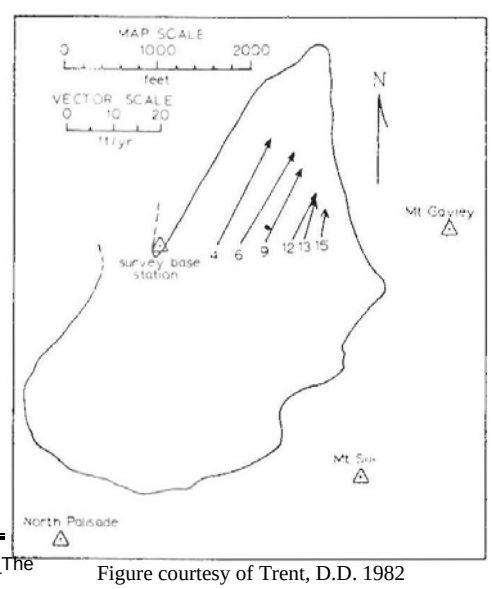


Figure courtesy of Trent, D.D. 1982

base of the meltwater pond, an accurate glacier thickness of 59 to 72 feet in thickness has been produced (Trent, 1983).

Glacier velocities have also been measured. Starting in 1976, a series of plates have been anchored into the glacier ice and surveyed for their current position (Trent, 1983). The following year, the plates were resurveyed and were able to provide enough information for velocity distribution along the glacier surface. The maximum measured velocity was 23ft/yr (7m/yr) with the central area flowing rapidly indicating a true plastic flow in the glacier. Basal slip is assumed to occur but the amount is unknown. (Basal slip is caused as the base of the glacier moves slowest because of friction. Friction then produces meltwater which then lubricates the ice mass, allowing it to slip when under enough pressure.) (Trent, 1983)

2.3 GEOLOGIC HISTORY

The Sierra Nevada Mountains is a strongly asymmetrical mountain range formed as a result of fault block tilting. The Western side consists of a gentle upland surface rising 3900m over 96 km. Whereas the Eastern side forms a steep escarpment with a drop of 1950m in 8-12 km due to normal fault displacement along the Owens valley (Wahrhaftig, 1962). The North Palisade Glacier is situated along the crest of the Sierra Nevada Mountains where past glaciations have produced a crest line that trends northeast. Palisade Glaciers are like most glaciers in the Sierra Nevada that either lie in deep shady cirques or at the base of north and northeast facing cliffs, where large quantities of snow driven by winds during winter can accumulate and are protected from the sun during the summer (Matthes, 1933).

The geology of the Sierra Nevada consists of a monzonite-to-granite pluton that formed in the Cretaceous period during various episodes of magmatic cooling as the Farallon oceanic plate subducted beneath North America. This period was called the Nevadan Oregeny. By 65 Ma the Sierra Nevada pluton was well formed and several thousand feet thick. The onset of Basin and Range extension 25 Ma began to tilt the Sierra Nevada block and raise the eastern side. Beginning about 2 Ma, the Pleistocene Ice Ages created a series of worldwide glaciation that shaped the geomorphology of the Sierra Nevada into its present form.

Geologic evidence in the Sierra Nevada suggests at least five major alpine glacial periods took place during the Pleistocene: McGee, Sherwin, Tahoe, Tioga, and Recess Peak (Blackwelder, 1931; Bailey, 1990; and Clark and Gillespie, 1997). These 5 Sierra glaciations took place during the broader worldwide glacial stage period called the Wisconsin Ice Age which actually consists of several glaciatal episodes. These glaciations produced the cirques, u-shaped valleys, and hanging valleys, seen leading out from Palisade glaciers to the North Fork Big Pine Creek. The last glaciation retreated 10,000 years ago at the end of the Wisconsin Ice Age bringing all the alpine glaciers to a retreat. At this time, the Holocene followed the Pleistocene epoch and the North Palisade Glacier remained in retreat until the climate began to cool around 1350 AD, during which time it began to grow in size. This cool period, referred to as the Little Ice Age, persisted roughly through 1850 AD when glaciers are thought to have reached their maximum extent for the Little Ice Age (Matthes, 1940). Since that time mountain glaciers in California and throughout most of the world have exhibited signs of overall recession.

Table II: North American Glaciations

Glacial Index	N. American	Inter/Glacial	Period (ka)	Epoch
		interglacial	present – 12	Holocene
1st	Wisconsinian	glacial period	12 – 110	Pleistocene
	Sangamon	interglacial	110 – 130	
2nd	Illinoian	glacial period	130 – 200	
	Yarmouth	interglacial(s)	200 – 300/380	
3rd – 6th	Kansan	glacial period(s)	300/380 – 455	
	Aftonian	interglacial(s)	455 – 620	
7th	Nebraskan	glacial period	620 – 680	

3.0 PREVIOUS WORKS

The table below provides a chronological summary of previous investigations and research activities on the North Palisade Glacier and adjacent areas.

Summary of Previous Research Publications

Year	Title	Summary
1933	Geography and Geology of the Sierra Nevada; *F. Matthes*	Among one of Matthes many publications in the Sierra Nevada, this one describes the physical features of the Palisade glacier and Sierra Nevada Mountains.
1958	Sierra Nevada Glacier Measured; *F.A. Camp*	Camp provides observations on extent of glaciations on the Sierra Nevada, including moraine fields
1975	Glaciers of the Sierra Nevada; *Paula Lehr*	This Publication describes various glaciers throughout the Sierra Nevada and includes ecology, physiology, and new glacier trends in respect to size increase or decrease.
2000	Glacier Meltwater Hydrochemistry *Giles H. Brown*	Brown demonstrates how glacier meltwater chemistry can be an indicator into glacier activity and atmospheric pollutant deposition.

Year	Title	Summary
2003	Owens Valley Air Pollution; *Ellen Hardebeck*,	A comprehensive report illustrating the extent of pollution arising from the dry lake bed of Owens Lake and remediation proposals.
2004	New Age Constraints on Holocene Glaciations; *N. Bowerman*	Bowerman uses moraine borings form downstream lake beds to interpret the past glaciations of North Palisade Glacier.
1957*	Core logs from Owens Lake *Smith and Pratt*	Smith bores 275 feet down into the Owens Lake bed and reveals that the water bed has been a perennial water body throughout most of the Holocene.

3.1 Publications

These publications shown in the above table are only a few of the many publications that have been done on North Palisade Glacier. Other publications have been added to include the environmental impact of Owens Lake. (Owens Lake is included as a primary source of fine dust particulates that have been deposited on North Palisade Glacier as evident in the results.)

Refer to the Reference Section for more publications and sources used.

4.0 SAMPLE METHODS

To assess the water quality of North Palisade Glacier, samples were collected at various locations and taken back to the Orange County Water District Lab to analyze for volatile organic compounds (VOC's) and trace dissolved metals. Sample were collected from three different parts of the glacier: 1) the glacier surface, 2) a crevasses at the glacial front, and 3) the glacial meltwater.

The first sampling area was the glacier surface itself. The Glacier surface was safe enough to traverse on foot without any crevasses. The surface consisted of wind eroded troughs that varied from 1-2 ft deep and 3-4 ft long creating an uneven cratered surface. Figure 4 and table 5 show the sample locations along the surface of the glacier. The map in Figure 4 shows the route used for the sampling which that traces from the perimeter of the glacier and then follows down the center of the eastern lobe of the glacier body. Each GPS way-point (Datum NAD 27) is a sample location. Way-point 25 is the location where a crevasse marks the terminal end of the glacier. The sampling was performed using a hand auger with a 1/2inch diameter bit that was inserted into the glacier ice at a depth of 5". The ice core was removed and placed into an amber 40 ml vial and sealed. To prevent contamination between samples, Nitrile gloves were worn and replaced at each sample location and the hand auger tool was rinsed repeatedly with DI water to remove any contaminates. The sealed samples were then labeled and stored in a secure container at a temperature of 2 Celsius.

The second area of sampling was at Waypoint 25 (Figure 4), the crevasse at the glacier front. This crevasse was approximately 40 ft in height with enough footholds to safely maneuver down to collect samples. At the bottom was a boulder size moraine field. Figure 5 shows a cross-view of how 72 samples were collected at half foot intervals down the face of this crevasse. These samples were collected in the same fashion as the surface samples except the immediate surface on the crevasse was removed with an ice axe to minimize any residual meltwater that was flowing downward from the glacier surface. Periodically boulders that were entrapped in ice, would fall from the crevasse face as the glacier melted making sampling a dangerous ordeal.

The third and last sample locations targeted the actual meltwater from the glacier. These samples tested the VOC and metal content (as in the previous samples) at 8 separate locations.

Figure 3 shows the sample locations which varied from the direct meltwater from the glacier front to locations along the North Fork Big Pine Creek. 500 ml samples were obtained using the same techniques as the previous samples and tested for VOC and trace dissolved metals. Table 6-1 shows the GPS locations and field parameters such as temperature, conductivity, turbidity, and pH.

All of the sampling was done over a two day period Sept 24-25th, 2005. A U.S. Forestry Permit was required due to restrictions of glacier access and removing samples (Appendix D). After collection, the samples transported to the Orange County Water District lab while maintaining a 2 degree Celsius temperature. Appendix B presents actual laboratory procedures for the prescribed analysis of VOC's and metals.

4.1 SURVEY AND QUALITY CONTROL ACTIVITIES

GPS

Sample locations were surveyed with a Garmin GPSMAP 60Cx GPS handheld receiver unit on NAD 27 Datum settings.

Laboratory Analysis Program

Groundwater samples were analyzed for VOCs by EPA Method 8260B by Orange County Water District, a California DHS-certified laboratory. Quality assurance/quality control reporting and sampling was incorporated into the field program. The procedures that were used to assure that the information collected was valid and representative of conditions present at the project site included the following:

1) Use of chain-of-custody forms in all sample submittals to the laboratories;
2) Performance of all laboratory analyses within the required holding time for the various analyses;
3) Use of EPA methodology for all sample analyses;
4) Use of proper minimum detection levels for the analytical procedures employed;

5) Use of an independent state-certified laboratory to conduct the required analyses; and

6) Laboratory reporting of the following information for all samples submitted for this project:

- method blank data;
- surrogate, tuning, and calibration data; and
- signed laboratory reports indicating the sample designation, date of sample receipt, date of sample analysis, laboratory analytical method employed, dilution factor, and minimum detection limit.

Decontamination Procedures

Equipment used during sampling was decontaminated prior to use at each sampling point to reduce the potential for the introduction of contamination and cross-contamination in accordance with the guidelines and procedures discussed below. These procedures were necessary to ensure quality control in decontamination of field equipment and to serve as a means to identify and correct potential errors in the sample collection and sample handling procedures.

5.0 DATA & RESULTS

The data and results from the samples can be divided into 3 different sections: Glacier Surface Data, Glacier Crevasse Data, and Fluvial Runoff Data. All three sections were analyzed for volatile organic compounds (VOC's) and trace dissolved metals. The results were tabulated into tables and graphed showing areas of significant detection.

5.1 GLACIER SURFACE

The glacier surface samples extended from an elevation of 12,710 ft to 12,190 ft from the eastern perimeter leading into the center of the glacier body (refer to fig 4). The glacier surface is uneven with many wind blown indentions measuring 1-2ft deep and 3-4ft wide. The ice consistency is a 3inch deep layer of granular ice grains 3-5mm wide that partially melts in the noon sun. Below this layer is more consolidated layer of compact ice grains.

The VOC analysis tests 66 different substances. Of these 66 only 10 were found within detection levels: Acetone, Benzene, 2-Butanone (MEK), 1,4-Dichlorobenzene, 1,1-Dichloroethene, Naphthalene, Toluene, 1,2,3-Trichlorobenzene, Vinyl Chloride, Methyl-t-Butyl Ether (MTBE). A detailed description of how these chemicals produced and their environmental impact can be found in Section 5.5, Table III. Two of the substances Acetone and Benzene have natural sources such as forest fires and volcano emissions and are found through out the glacier surface. As a whole, the distribution of the found VOC's are equally distributed which can be seen on Figure 7A. Acetone showed the greatest concentrations at 0.63 ug/L and Benzene showed the least concentrations at 0.01 ug/L.

The Metal analysis tested 17 different trace metals on the glacier surface with all of the metals being detected at minute concentrations. Figure 7B illustrates that the distribution of the metals were also equally distributed on the glacier surface. Nickel showed the greatest concentrations at 362.10 ug/L and Molybdenum showed the least concentrations at 0.23 ug/L.

5.2 GLACIER CREVASSE

The glacier crevasse sample site is located at Waypoint 25 on Figure 3. This crevasse is actually the glacier terminus with an exposed face of approximately 40feet of vertical ice. Figure 5 illustrates a cross-view of this crevasse and the sample locations. The sample locations followed a vertical line down the face of the crevasse at every half foot interval. The crevasse ice was composed of consolidated ice sporadically infused with 1-5mm bubbles. Within this ice mass, bands of rock fragments ranging 1-10mm were present forming horizontal strata. These rock fragment bands exhibited folds that ranged from 10cm to 100cm in length, possibly evident of a plastic ice flow. Towards the lower region of the crevasse, large boulders from 1-2ft in width were entrapped in the ice. Some of these boulders would periodically fall from their position as ice melted. Adjacent to this crevasse, the glacier body becomes submerged below an elevated moraine field and debris from a talus slope directly east.

VOC analysis of the crevasse ice revealed a variety of results. (Refer to Tables 3-1 thru 3-3 and figures 8A,B) Again, the same 10 VOC's that were detected in the glacier surface were present in the crevasse ice. However, instead of being equally distributed throughout the samples, the VOC trends show an increase in concentration towards the upper levels of the crevasse ice. As the samples proceed to deep depths, the concentrations become minimal. For example, acetone results show 0.67 ug/L at 0.5ft depth and then decrease to 0.05 ug/L at 35.5ft depth. MTBE, Benzene, and other VOC's follow this pattern although they are present in less concentration than acetone.

Metal analysis also showed this trend of increasing concentration with shallower depths (Refer to Tables 4-1 thru 4-3 and figures 8C,D). However the results show 2 spikes of concentrations of metals. The first spike is located at 14feet of depth with elevated levels of Arsenic (324.61 ug/L), Chromium (306.81 ug/L), Molybdenum (308.28ug/L) among others. At 19ft of depth, a second spike is formed of Silver (320.86 ug/L), Arsenic (305.11 ug/L), and Molybdenum (300.05ug/L). Beyond these two spikes the metal concentrations decrease as the depth increases.

5.3 FLUVIAL RUNOFF

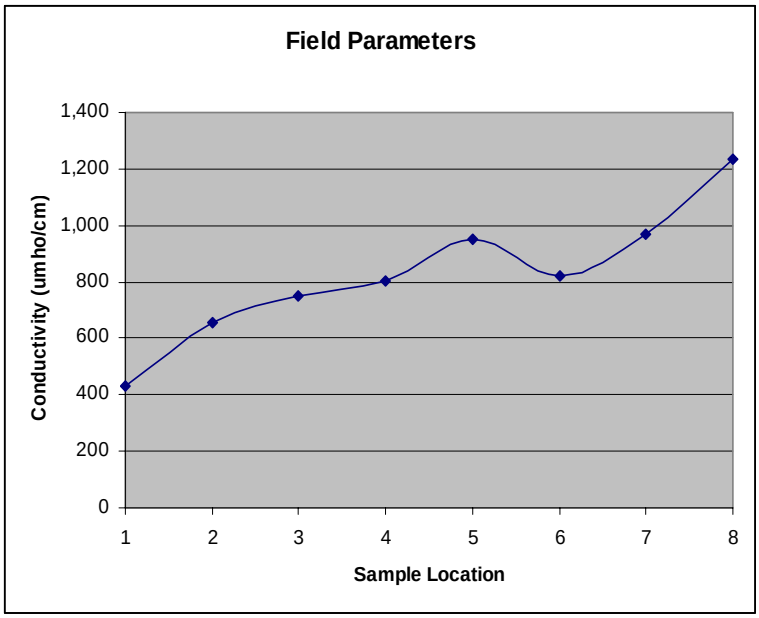
Fluvial Runoff samples consisted of only 8 sample locations. The first of which was at the base of the glacier where there was active melting of ice. The second sample was obtained ½ mile downstream of Sam Mack Lake a tributary of the North Fork Big Pine Creek that drains the Palisade Glacier group. The Third sample was located 100yds upstream of Third Lake with the fourth sample 300yds upstream of Second Lake. The fifth sample was located 150yds upstream of First Lake. The remaining sample locations were on the remaining length of the North Fork Big Pine Creek (refer to Figure 3).

The VOC results of the fluvial runoff (Refer to figure 6A) show a similar concentration of all VOC's at sample #1 (which was the direct meltwater from the glacier crevasse) to the VOC concentration of the crevasse ice. As the Sample locations proceed further downstream the VOC concentrations decrease.

The metal results show high levels of mercury and arsenic at the first and second sample location (Glacier meltwater and Sam Mack Lake). The remaining sample locations show metal concentrations similar to what was found in the crevasse ice with exceptions of high concentrations of Arsenic in First Lake (498.07 ug/L), Selenium in Second Lake (656.56 ug/L) and Cadmium through out the North Fork Big Pine Creek (116.61 to 447.56 ug/L)

5.4 FLUVIAL FIELD PARAMETERS

As the water samples were being collected, field parameters such as temperature, conductivity, turbidity, and pH were recorded (refer to table 6-1). The water temperature range was from 2.23 to 4.61 degrees Celsius. The turbidity was minimal with samples ranging from 1.3 to 6.2 $_{NTU.}$ The exception was an increase of conductivity as the samples progressed downstream.



5.5 ANALYTE DESCRIPTION

Table III: Description of Primary VOC's Found in Samples

Analyte	Source Natural/Manmade	Environmental Impact
Acetone	It occurs naturally in plants, trees, volcanic gases, and forest fires. It is present in vehicle exhaust, tobacco smoke, and landfill sites..	• A large percentage (97%) of the acetone released during its manufacture or use goes into the air. • In air, about one-half of the total amount breaks down from sunlight or other chemicals every 22 days. • It moves from the atmosphere into the water and soil by rain and snow. It also moves quickly from soil and water back to air. • Acetone is broken down in water and soil, but the time required for this to happen varies.
Benzene	Natural sources of benzene include volcanoes and forest fires. Benzene is also a natural part of crude oil, gasoline, and cigarette smoke.	• Benzene can pass into the air from water and soil. • It reacts with other chemicals in the air and breaks down within a few days. • Benzene in the air can attach to rain or snow and be carried back down to the ground. • It breaks down more slowly in water and soil, and can pass through the soil into underground water.
1,4-Dichlorobenzene	1,4- Dichlorobenzene is a colorless liquid used to make herbicides, insecticides, medicine, and dyes. Dichlorobenzenes do not occur naturally	• Some 1,2- and 1,4-dichlorobenzenes are released into the environment when used to make herbicides • Dichlorobenzenes do not dissolve easily in water; the small amounts that enter water quickly evaporate into the air. • Sometimes, dichlorobenzenes bind to soil and sediment. Dichlorobenzenes in soil usually are not easily broken down by soil organisms.

1,1-Dichloroethene	1,1-Dichloroethene is an industrial chemical that is not found naturally in the environment.	• 1,1-Dichloroethene enters the environment from industries that make or use it. • 1,1-Dichloroethene evaporates very quickly from water and soil to the air. • In the air, it takes about 4 days for it to break down. • 1,1-Dichloroethene breaks down very slowly in water.
Naphthalene	Burning tobacco or wood produces naphthalene Fuels such as petroleum and coal contain naphthalene.	• Naphthalene enters the environment from industrial and domestic sources, and from accidental spills. • Naphthalene can dissolve in water to a limited degree and may be present in drinking water from wells close to hazardous waste sites and landfills. • In air, moisture and sunlight break it down within 1 day. In water, bacteria break it down or it evaporates into the air.
Toluene	Toluene occurs naturally in crude oil and in the tolu tree. It is also produced in the process of making gasoline.	• Toluene enters the environment when you use materials that contain it. • Toluene does not usually stay in the environment long
1,2,3-Trichlorobenzene	It is used as a solvent for some pesticide formulations.	• Trichlorobenzene released to air is slowly broken down by reactions with other chemicals and sunlight or can be removed by rain. • When released to soil, it is broken down rapidly by bacteria, but some will evaporate to the air and some may filter into the groundwater.
Vinyl Chloride	Vinyl chloride is a colorless gas.. It is a manufactured substance that does not occur naturally	• Liquid vinyl chloride evaporates easily. Vinyl chloride in water or soil evaporates rapidly if it is near the surface. • Vinyl chloride in the air breaks down in a few days to other substances, some of which can be harmful. • Small amounts of vinyl chloride can dissolve in water.
Methyl-t-Butyl Ether **(MTBE)**	(MTBE) is a flammable liquid which is used as an additive in unleaded gasoline	• MTBE quickly evaporates from open containers and surface water, so it is commonly found as a vapor in the air. • Small amounts of MTBE may dissolve in water and get into underground water. • It remains in underground water for a long time.

5.6 METAL DESCRIPTIONS

Table IV: Description of Trace Metals Found in Samples

Analyte	Source Natural/Manmade	Environmental Impact
Lead	Lead is a naturally occurring bluish-gray metal found in small amounts in the earth's crust.	• A large percentage (97%) of the acetone released during its manufacture or use goes into the air. • In air, about one-half of the total amount breaks down from sunlight or other chemicals every 22 days. • It moves from the atmosphere into the water and soil by rain and snow. It also moves quickly from soil and water back to air. • Acetone is broken down in water and soil, but the time required for this to happen varies.
Antimony	Antimony is a silvery-white metal that is found in the earth's crust. Antimony is a by-product of smelting lead and other metals.	• Antimony is released to the environment from natural sources and from industry. • In the air, antimony is attached to very small particles that may stay in the air for many days. • Most antimony ends up in soil, where it attaches strongly to particles that contain iron, manganese, or aluminum. • Antimony is found at low levels in some rivers, lakes, and streams.
Arsenic	Arsenic is a naturally occurring element widely distributed in the earth's crust. Organic arsenic compounds are used as pesticides.	• Arsenic occurs naturally in soil and minerals and it therefore may enter the air, water, and land from wind-blown dust and may get into water from runoff and leaching. • Arsenic cannot be destroyed in the environment. It can only change its form. • Rain and snow remove arsenic dust particles from the air. • Many common arsenic compounds can dissolve in water. Most of the arsenic in water will ultimately end up in soil or sediment.
Barium	Barium is a silvery-white metal which exists in nature only in ores containing mixtures of elements	• Barium gets into the air during the mining, refining, and production of barium compounds, and from the burning of coal and oil. • The length of time that barium will last in air, land, water, or sediments depends on the form of barium released. • Barium compounds, such as barium sulfate and barium carbonate that do not dissolve well in water can last a long time in the environment.

Beryllium	Beryllium is a hard, grayish metal naturally found in mineral rocks, coal, soil, and volcanic dust	• Beryllium dust enters the air from burning coal and oil. This beryllium dust will eventually settle over the land and water. • It enters water from erosion of rocks and soil, and from industrial waste. Some beryllium compounds will dissolve in water, but most stick to particles and settle to the bottom. • Most beryllium in soil does not dissolve in water and remains bound to soil.
Cadmium	All soils and rocks, including coal and mineral fertilizers, contain some cadmium.	• Cadmium enters air from mining, industry, and burning coal and household wastes. • Cadmium particles in air can travel long distances before falling to the ground or water. • It enters water and soil from waste disposal and spills or leaks at hazardous waste sites. . • Some cadmium dissolves in water. • It doesn't break down in the environment, but can change forms.
Chromium	Chromium is a naturally occurring element found in rocks, animals, plants, soil, and in volcanic dust and gases	• Chromium enters the air, water, and soil mostly in the chromium(III) and chromium(VI) forms. • In air, chromium compounds are present mostly as fine dust particles which eventually settle over land and water. • Chromium can strongly attach to soil
Cobalt	Cobalt is a naturally occurring element found in rocks, soil, water, plants, and animals	• Cobalt enters the environment from natural sources and the burning of coal or oil or the production of cobalt alloys. • In the air, cobalt will be associated with particles that settle to the ground within a few days. • Cobalt released into water or soil will stick to particles. Some cobalt compounds may dissolve.
Copper	Copper is a metal that occurs naturally throughout the environment. Copper compounds are commonly used in agriculture and water treatment	• Copper is released into the environment by mining, farming, and manufacturing operations and through waste water releases into rivers and lakes. Copper is also released from natural sources, like volcanoes, windblown dusts, decaying vegetation, and forest fires. • Copper released into the environment usually attaches to particles made of organic matter, clay, soil, or sand. • Copper does not break down in the environment. Copper compounds can break down and release free copper into the air, water, and foods.

Mercury	Mercury is a naturally occurring metal which has several forms.	• Inorganic mercury (metallic mercury and inorganic mercury compounds) enters the air from mining ore deposits, burning coal and waste, and from manufacturing plants. • It enters the water or soil from natural deposits, disposal of wastes, and volcanic activity.
Molybdenum	Molybdenum is mined as a principal ore, and is also recovered as a byproduct of copper and tungsten mining.	• Molybdenum particles in air can travel long distances before falling to the ground or water.
Nickel	Nickel is found in all soil and is emitted from volcanoes	• Nickel is released into the atmosphere by industries that make or use nickel, nickel alloys, or nickel compounds. It is also released into the atmosphere by oil-burning power plants, coal-burning power plants, and trash incinerators. • In the air, it attaches to small particles of dust that settle to the ground or are taken out of the air in rain or snow; this usually takes many days.
Selenium	Selenium is a naturally occurring mineral element that is distributed widely in nature in most rocks and soils Used in the preparation of pharmaceuticals; additive for poultry and livestock; in pesticide formulations	• Selenium occurs naturally in the environment and can be released by both natural and manufacturing processes. • Selenium dust can enter the air from burning coal and oil. This selenium dust will eventually settle over the land and water. • It also enters water from rocks and soil, and from agricultural and industrial waste. Some selenium compounds will dissolve in water, and some will settle to the bottom as particles. • Insoluble forms of selenium will remain in soil, but soluble forms are very mobile and may enter surface water from soils.
Silver	Silver is found in the environment combined with other elements such as sulfide, chloride, and nitrate. Used to make jewelry, silverware, electronic equipment, and dental fillings	• Silver may be released into the air and water through natural processes such as the weathering of rocks. • Human activities such as the processing of ores, cement manufacture, and the burning of fossil fuel may release silver into the air. • It may be released into water from photographic processing. • Rain may wash silver out of soil into the groundwater.

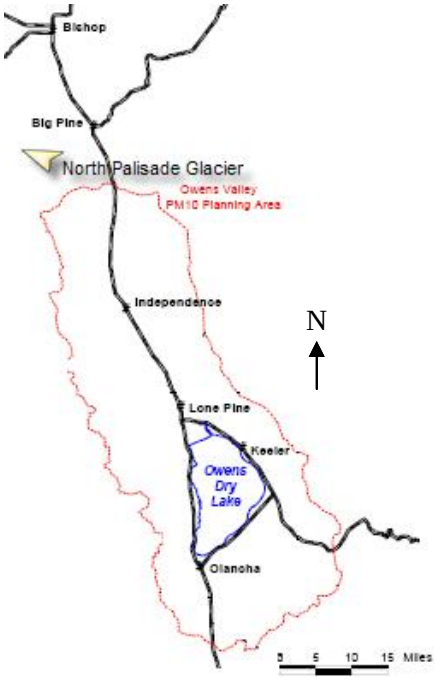
Thallium	Pure thallium is a bluish-white metal that is found in trace amounts in the earth's crust Thallium is used mostly in the semiconductor industry	• Thallium enters the environment primarily from coal-burning and smelting, in which it is a trace contaminant of the raw materials. • It stays in the air, water, and soil for a long time and is not broken down. • Some thallium compounds are removed from the atmosphere in rain and snow.
Vanadium	Vanadium and vanadium compounds can be found in the earth's crust and in rocks, some iron ores, and crude petroleum deposits.	• Vanadium mainly enters the environment from natural sources and from the burning of fuel oils. • It stays in the air, water, and soil for a long time. • It does not dissolve well in water.
Zinc	Zinc is one of the most common elements in the earth's crust. It is found in air, soil, and water	• Some is released into the environment by natural processes, but most comes from human activities like mining, steel production, coal burning, and burning of waste. • It attaches to soil, sediments, and dust particles in the air. • Rain and snow remove zinc dust particles from the air. • Depending on the type of soil, some zinc compounds can move into the groundwater and into lakes, streams, and rivers.

6.0 DISCUSSION

The North Palisade glacier is the largest glacial body currently in the Sierra Nevada Mountains that has been extensively studied. The results of water quality analysis from three separate sample locations reveal that volatile organic compounds (VOC's) and trace metals, although in very small concentrations (parts-per-billion), are present in the North Palisade Glacier ice and fluvial runoff. These contaminants appear to have been transported from nearby source areas by atmospheric winds.

6.1 OVERVIEW OF RESULTS

The sampling results from the glacier surface showed an equal distribution in both VOC's and metals across the entire surface. No increasing or decreasing trend was observed along the sampling trajectory from the upper to lower glacier surface. However, the results from the glacier crevasse which exposes a vertical section of older ice to recent ice revealed an increase in concentration of VOC's and metals towards the more recent ice. However due to the deformation of glacial ice by plastic flow and basal slippage, it is difficult to use the ice column as an accurate record of time. Some estimates put the glacier ice age from 200 to 1,400 yrs old (Bowerman, 2005). Therefore it is only assumed that the deeper ice samples are from older ice. The fluvial runoff results showed mixed trends in which concentrations of VOC's would decrease with distance downstream from the glacier, whereas the metal concentrations seem to increase and decrease between the alpine lakes of North Fork Big Pine Creek.



6.2 OWENS LAKE

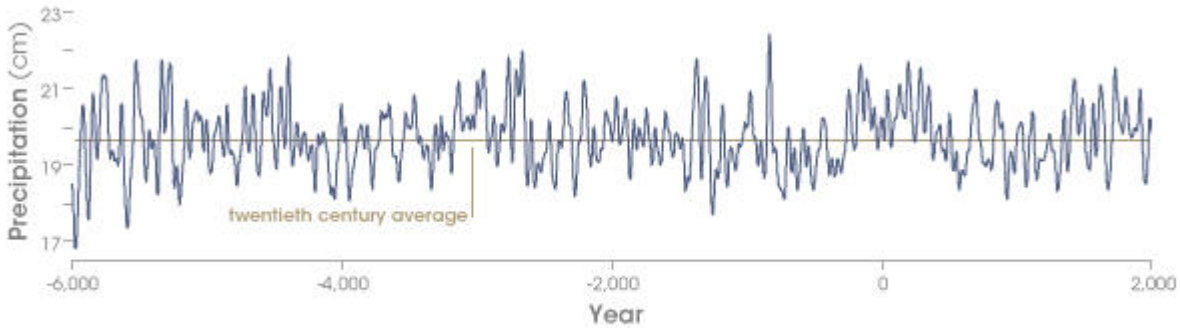
The dry lake bed of Owens Lake, 43 miles southeast of North Palisade glacier, has been recognized as a source of air pollution. Owens Lake consists mostly of a dry playa that has lost water volume due to rerouting of the natural water inlets that once fed this lake. In the early 1900's, the Los Angeles department of water and power (DWP) gained water rights over these feeder streams and diverted this water towards the growing population of Los Angeles.

Within about 10 years, the lake dried up and uncovered 28,500 hectares of briny silt that's tainted with arsenic, cadmium and other trace metals. Today the Owens Lake is the biggest single dust source in the United States. (Gillette, 2001) Often, 24-hour-average concentrations of arsenic-laced soil blowing from Owens Lake into the nearby town of Keeler are frequently 150 micrograms per cubic meter. During big storms, concentrations of the fine dust can skyrocket to 40,000 micrograms per cubic meter. While the majority of the fine dust is blown towards the southern region of Owens Valley, shifts in the wind are common, directing the dust clouds to the north towards Palisade glacier. These dust clouds consist of fine particulate matter, and contain cadmium, chromium, chlorine and iron. It is therfore reasonable to expect the increase of these metals in young Palisade Glacier ice deposits. This trend was seen in the crevasse ice samples with an increase of trace metals in the upper more recent ice strata and a decrease in the older, deeper, ice.

The modern, human induced dry conditions at Owens Lake provide an analogue of what past conditions may have been like during paleo-droughts over the past several thousand years. With this in mind, the changing contaminant concentrations may provide a proxy record of climate conditions.

6.3 VOLCANISM AS A SOURCE OF TRACE METALS

Figure 8B, which is a graph of trace metal concentrations vs. depth of crevasse ice, not only shows the upward trend of concentrations of metals in more recent ice, but also illustrates two spikes of arsenic, cadmium, chromium, and molybdenum. These are all naturally occurring elements in trace amounts, but the significant increase indicates an outside source. The source of these spikes could be the result of a severe drought period that allowed Owens Lake to dry up and produce airborne dust deposits on the glacier ice. This is a possibility. Below is a graph that



Graph from Hughs 1996

illustrates the short- and long-term variability of rainfall along the eastern margin of the Sierra Nevada as recorded in bristlecone tree rings. Several long and intense droughts that appear in the tree-rings have also found in sediments in nearby Mono Lake. However these droughts were not sufficient enough to dry up Owens Lake. Borings into the lake bed have been analyzed and have shown a perennial body of water since the Pleistocene. (Smith and Pratt, 1957)

That leaves the source of the trace metal spikes to have been derived from volcanic activity. The nearest volcanic active area to Palisade Glaciers is the Long Valley caldera, but has had minimal recent activity and would be unlikely to have any effect. The alternative would be a global distribution of volcanic ash from a large eruption that would leave ash particles aloft for an extended period of time. The Palisade Glaciers are at latitude (35 degrees) with an east to west trade wind. This would mean trans-pacific ash clouds would deposit ash and trace metals on the Palisade Glaciers in a short amount of time creating a spike in the ice deposits. However, being unable to age the ice to the corresponding depth, only speculation could determine the exact volcano eruption responsible for the spike of trace metals. Further studies would be needed to verify this.

6.4 Agriculture and Volatile Organic Compounds

The volatile organic compounds (VOC's) found in the glacier ice, are of particular interest. These compounds are easily destroyed by UV light and have a short lifespan in which they can be transported by airborne means, therefore, these VOC's need to be derived from a local source. The majority of these VOC's such as Dichlorobenzene and Trichlorobenzene are the products of insecticides and herbicides. Owens Valley has increased land use towards agriculture since the 1900's with hundreds of acres of land being used to farm crops and livestock. Consequently, this would account for the increased exposure of pesticides into the environment and atmosphere.

Petroleum compounds such as MTBE, toluene, and Naphthalene, are likely the result of the usage of automobiles throughout Owens Valley. All of these compounds have increased in recent age glacier ice samples and therefore reasonable to correlate to the increase of vehicle traffic.

7.0 SUMMARY

The results of the Palisade Glacier water analysis demonstrate the mobility of dust particulates from the nearby agriculture and industrial sources along Owens Valley, the Owens Lake dry lake bed, and even from trans-pacific volcanic eruptions which can then be deposited in the Sierra Nevada snowfall and trapped in glacier ice.

The overall results show that these concentrations of VOC's and trace metals are increasing with the more recently formed glacier ice, and is indicative to the increase of development in Owens Valley. While these concentrations are only in the parts-per-billion, and do not represent an environmental risk. The source of these contaminates, such as Owens Lake, are undergoing extensive remediation to curb the amount of human exposure to arsenic and cadmium, and to reduce the ability of lakebed dust to enter the atmosphere.

More study would be needed to further the conclusions of these results. Knowing the age of the ice samples would greatly help to match up exact sources of the particulate matter. Also, having the time constraints could also indicate Holocene climate fluctuations as far as dry and wet periods. Dry periods would have more dust accumulations and wet periods would have less.

In addition, further study could be used to analyze the water quality of other glacier bodies throughout the Sierra Nevada. It would be significant to observe the trend of increasing contamination was occurring elsewhere and for the same reasons or possibly for others.

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APPENDIX A

LABORATORATORY ANALYTICAL REPORTS

APPENDIX B

E.P.A. LABORATORY METHODS

ORANGE COUNTY WATER DISTRICT
STANDARD OPERATING PROCEDURE

EPA Method 524.2 Rev. 6

DETERMINATION OF VOLATILE ORGANIC COMPOUNDS IN WATER
BY PURGE AND TRAP AND CAPILLARY COLUMN
GAS CHROMATOGRAPHY/ MASS SPECTROMETRY

File Name:	M:\SOP\Organic\epa method sop\524_2_0219.doc	Effective Date:	8/1/2004
Revision:	6	Supersedes:	2/19/2003

1. SUMMARY OF METHOD

EPA method 524.2 is used in the District's monitoring of volatile organic compounds (VOCs) throughout the basin. The method is used as the primary source of data in the analysis of VOCs for the District's main laboratory. Measurement of low levels of VOCs in finished drinking water requires an extensive QA/QC procedure. VOCs are purged from a 25ml sample and trapped onto an absorbent material. This material is then rapidly heated to desorb the VOCs into the system. The column is temperature programmed to separate the target analytes required of the method. Analytes are detected using a mass spectrometer. A data system is used to convert responses into actual concentrations of all analytes. Identification is based on the comparison of the mass spectra and retention time of an unknown to a library of reference mass spectral data of the target analytes. Quantification is based on internal standard. The District's laboratory uses spike samples for additional QA/QC documentation for this method.

2. ANALYTES

2.1 This is a gas chromatographic mass spectrometry (GC/MS) method, applicable to the determination of a wide range of volatile organic compounds. The following compounds can be determined using this method:

Lims code	Analyte
BENZ	**Benzene**
BRBENZ	Bromobenzene
CH2BrC	Bromochloromethane
CHBrCl	**Bromodichloromethane**
CHBr3	**Bromoform**
CH3Br	Bromomethane
nBBENZ	n-Butylbenzene
sBBENZ	sec-Butylbenzene
tBBENZ	tert-Butylbenzene
CCl4	**Carbon tetrachloride**

CLBENZ	Chlorobenzene
ClETHA	Chloroethane
CHCl3	**Chloroform**
CH3Cl	Chloromethane
2ClTOL	2-Chlorotoluene
4ClTOL	4-Chlorotoluene
CHBr2C	**Dibromochloromethane**
DBCP	1,2-Dibromo-3-chloropropane
EDB	1,2-Dibromoethane
CH2Br2	Dibromomethane
12DCB	1,2-Dichlorobenzene
13DCB	1,3-Dichlorobenzene
14DCB	**1,4-Dichlorobenzene**
CCl2F2	**Dichlorodifluoromethane**
11DCA	1,1-Dichloroethane
12DCA	**1,2-Dichloroethane**
11DCE	**1,1-Dichloroethene**
c-12DCE	**cis-1,2-Dichloroethene**
t-12DCE	trans-1,2-Dichloroethene
12DCP	1,2-Dichloropropane
13DCP	1,3-Dichloropropane
22DCP	2,2-Dichloropropane
11DCP	1,1-Dichloropropene
c13DCP	cis-1,3-Dichloropropene
t13DCP	trans-1,3-Dichloropropene
EtBENZ	Ethylbenzene
HclBut	Hexachlorobutadiene
ISPBNZ	Isopropylbenzene
4IPTOL	4-Isopropyltoluene
CH2Cl2	**Methylene chloride**
NAP	Naphthalene
NBENZ	**Nitrobenzene**
PRBNZ	Propylbenzene
STYR	Styrene
1112PC	1,1,1,2-Tetrachloroethane
1122PC	1,1,2,2-Tetrachloroethane
PCE	**Tetrachloroethene**
TOLU	Toluene
123TCB	1,2,3-Trichlorobenzene
124TCB	1,2,4-Trichlorobenzene
111TCA	**1,1,1-Trichloroethane**
112TCA	1,1,2-Trichloroethane
TCE	**Trichloroethene**
CCl3F	**Trichlorofluoromethane**
123TCP	1,2,3-Trichloropropane
124TMB	1,2,4-Trimethylbenzene
135TMB	1,3,5-Trimethylbenzene
VNYLCL	**Vinyl chloride**

o-XYL	o-Xylene
mp-XYL	m,p-Xylene
Cl3F3E	**Trichlorotrifluoroethane**
TOTALX	Total Xylenes
THMS	Total THMs
MEK	MEK (2-Butanone)
MIBK	MIBK (4-Methyl 2-pentanone)
2ClEVE	2-chloroethyl vinyl ether
B2CLEE	bis(2-Chloroethyl)ether
MTBE	**Methyl-t-butyl ether**
DIPE	Diisopropyl Ether
TAME	Tert Amyl Methyl Ether
ETBE	Ethyl tert Butyl Ether
TBA	Tert-butyl alcohol

(targets in bold represent the custom "EPA-100" mix)

The following analytes do not have a lims code but can be analyzed by 524.2.

Acetone
Acrylonitrile
Allyl chloride
Carbon disulfide
Chloroacetonitrile
trans-1,4-Dichloro-2-butene
1,1-Dichloropropanone
Diethyl ether
Ethyl methacrylate
2-Hexanone
Methacrylonitrile
Methyl acrylate
Methyl iodide
Methylmethacrylate
2-Nitropropane
Pentachloroethane
Propionitrile
Tetrahydrofuran

3. APPARATUS AND EQUIPMENT

3.1 Sample Bottles - 250 ml amber glass bottles & 40 ml amber vials - fitted with an open top screw cap lined with Teflon.

3.2 Purge and Trap unit – Varian Archon Autosampler and Tekmar 3000/3100 Purge and Trap. Use a Vocarb 4000 trap – "I" trap from Supelco.

3.3 Varian Model 3400/ 3800 gas chromatograph with a Varian Saturn 2000 GC/MS

system.

3.4 Column: Fused Silica Capillary column, 60 meter x 0.32 mm ID DB-VRX with 1.8 micron film thickness.

3.5 Volumetric flasks (1000ml, 500ml, 200ml, 100ml, and 10ml), and Hamilton micro syringes - 10ul to 250ul.

4. REAGENTS AND CONSUMABLE MATERIALS

4.1 Reagent Water - Millipore Milli-Q System or equivalent.

4.2 Standard stock VOCs - 200 ug/ml volatile Aromatics and Haloalkanes mix (Ultra Scientific, Accustandard) and a Custom EPA-100 Mix (Accu-std), TBA Custom std mix, Custom – MEK mix MEK, MIBK, B2ClEE, Custom-Oxy std mix – (Ultra Scientific).

4.3 Internal and Surrogate (1 & 2) mixture (Ultra Scientific) 2000 ug/ml.

4.4 Tune standard – 4-Bromofluorobenzene –diluted to give a 25ng/ul solution. Used to pass EPA tune specifications.

4.5 GC^2 Methanol - Burdick and Jackson.

4.6 Ascorbic acid - ACS grade – if source water is chlorinated.

4.7 UHP grade Helium carrier gas.

4.8 Hydrochloric acid (1+1) - carefully add a measured volume of concentrated HCl to an equal volume of reagent water.

5. SAMPLE COLLECTION, PRESERVATION AND HANDLING

5.1 All samples must be collected in four amber 40ml vials while spikes are collected in 250 mL amber bottles. The 40ml vials and the 250ml amber glass bottles should be filled just to overflowing. If the concentration of the Trihalomethanes is important and the sample is known to be from a chlorinated source, ascorbic acid (25mg/40ml vial) must be added to the sample prior to collection. Do not flush out the rapidly dissolving ascorbic acid. Adjust the pH of all samples to <2 by carefully adding one drops of 1:1 HCl to each 40 ml vial of sample. Mix the sample for 1 min. All samples must be chilled to 4^oC at the time of collection, and they must be maintained at that temperature until ready for analysis. Samples must be stored away from all contaminating organic solvent vapors. Total hold time from sample collection to analysis is 14 days. If the samples are not analyzed by this period, they must be

discarded. The Water Quality Department must be informed in order to resample the site. A travel blank of the volatile free reagent water must accompany each set of samples brought into the laboratory.

6. ANALYSIS

6.1 Tuning with BFB:

The Saturn 2000 must meet the BFB criteria before analyses are performed. Inject 1.0 ul of a 25ng/ul Bromofluorobenzene (BFB) standard directly into the column. Obtain a background corrected mass spectrum of BFB peak and confirm that all the key M/Z criteria in Table A are achieved. If the tune does not pass, adjust the tune parameters and rerun BFB. Hardcopy the BFB report.

6.2 Calibration Curve:

A three to five point standard calibration curve must be run containing all method analytes, depending upon the concentration range desired. Examples of concentrations used in the curve are: 0.5, 2.0, 5.0, 10.0, 20.0, and 30.0 ppb. You may increase the range of the calibration curve, however a 0.5 ppb standard must be run to confirm the RDL of all analytes. A concentration of 2.0 ppb of the internal is injected into every sample and standard via the Archon/Tekmar purge/trap unit. The recoveries and area counts are tracked to insure a properly running instrument. The standard calibration curve for each analyte must be within a +/- 20% relative standard deviation. If not, the analytes which failed (or the entire calibration curve) should be re-analyzed. Once the calibration curve has been established, it must be verified on each working day by analyzing the continuous calibration check standard. Typically, a standard calibration curve can last approximately 2 months.

6.3 Standard Preparation:

Calibration standards are prepared from separate stock solutions. Three separated calibration mixture are prepared based on the co-elution problems with each other.

1. VOC Cali include: the Aromatic mix, the Haloalkane mix, and the custom MEK mix are combined into one solution.
2. Oxy Cali include: Oxy mix, TBA and Nitrobenzene.
3. TIC Cali include: Acetone, Acrolein, Acrylonitrile, Carbon disulfide, 2-Hexanone and Vinylacetate.

The calibration check solution is analyzed at 2.0ppb – it is the second source standard from Supelco. The custom EPA-100 mix with MTBE added is used for spikes, low and high LFB check solutions – contains 20 targets which are both regulated by the state and have been detected within the District's basin. Working standards shall be made up in batches and verified against the working calibration.

Working standards are valid for 14 days from the day they are made. Stock standards are good for one month or when QA/QC data shows they need to be replaced.

Preparing internal and surrogate standards for the Archon:

The internal, surrogate standard mix from Ultra Scientific – is at 2000 ug/mL. Add 250uL of this to a 10 ml volumetric flask containing GC grade methanol. Bring to a final volume of 10mls of GC^2 methanol. We have found that this internal is stable and does not interfere with any of the other targets.

Baking the column:

Bake the column whenever any changes are made to the system that introduces air into the system such as cutting the ends of the column or installing a new column, or any work done on the Archon autosampler or Tekmar purge and trap. The system – both purge & trap and the GC/MS, should be periodically baked to remove water vapor and organic interferences.

Notes:

1. Scan numbers of the key targets and the internal standard should be documented so as to monitor the life of the column. The column should be replaced when resolution has dropped below an acceptable level. The early gases are good indicators of the column's age and performance.

2. Data is collected for each run under specific file names within the software system. Mass spectral data are obtained with electron impact (EI) ionization at 70 eV electron energy. For samples that have ion abundance over the system's working range, a dilution with reagent water is necessary. Tentatively identified samples by comparison of mass spectrum (after background subtraction) to a reference spectrum in a user library. Ions above 10% relative abundance in the mass spectrum of the standard must be present in the spectrum of the component and should agree within absolute 10%. The GC retention time of the sample component must be within 10 scans of the time observed for that same compound when a calibration solution was analyzed.

3. Samples should be analyzed as soon as possible after collection –but have a 14 day holding time. Communication between the lab and the water quality department is important to understand each sample. There may be specific conditions or problems associated with each sample – an example would be frothing or very high levels. The more a chemist knows about the sample, the better he or she can provide quality assurance and processes, which can produce reliable results. If data shows that the value of the result is outside the calibration range – the sample must be diluted or additional standards analyzed to bracket the value within +/-20% of the value.

TABLE A

BFB KEY M/Z ABUNDANCE CRITERIA

MASS	CRITERIA
50	15 to 40% of mass 95
75	30 to 80% of mass 95
95	base peak, 100% relative abundance
96	5 to 9% of mass 95
173	<2% of mass 174
174	>50% of mass 95
175	5 to 9% of mass 174
176	>95% but <101% of mass 174
177	5 to 9% of mass 176

In order to achieve proper results, a system must be within target analyte contamination or interferences. To this goal, it is mandatory that both a travel blank and a reagent water blank be run with each set of samples. Conditions for the GC/MS system are as follows:

MS and GC Conditions:

1.	Initial column temperature:	35°C		
2.	Hold time:	2 minutes		
3.	Final temperature:	82°C	178°C	220°C
4.	Rate:	4°C/min	4.5°C/min	50°C/min
5.	Hold time:	0 min.	0 min.	5 min.
6.	Helium flow rate:	1.0 ml/minute		
7.	Total run time:	41 minutes		
8.	Head pressure:	5 PSI		
9.	Injector temperature:	220°C		
10.	Transfer line GC/MS:	220°C		
11.	Trap GC/MS:	150°C		
12.	Manifold GC/MS:	80°C		
13.	Total scan time	0.7 seconds		
14.	Mass range:	46 to 260 AMU and 35 to 260 AMU		
15.	Fil/Mult delay:	3.00 minute		

Tekmar ALS/3000/3100 Purge and Trap Conditions:

1.	Purge Time:	11.00 minutes
2.	Bake Time:	10.00 minutes
3.	Pre-Heat:	245°C
4.	Desorb:	250°C
5.	Bake:	260°C

Archon Conditions:

1.	Internal Standard:	1 ul
2.	Sample Volume	25 ml
3.	Desorb Time:	4 minutes
4.	Syringe Flush:	1 time
5.	Rinse Volume:	5 ml

7. QA/QC REQUIREMENTS

7.1 Laboratory Reagent Blank - Run before samples. Use to demonstrate that all glassware and reagent interference are under control. If any contamination peaks are produced, determine source of contamination and eliminate interference.

7.2 Laboratory Fortified Blank - The fortification concentration of each analyte should confirm the ability to detect at the reportable level. If the recovery of any analyte falls outside the control limits, +/-30%, the source of the problem must be identified and corrected.

7.3 Standards - Verify calibration standards quarterly by analyzing a standard prepared from reference material obtained from an independent or second source. EPA performance evaluations are an excellent process to determine the validity of the method. Results must be within +/- 30% of those used to routinely check calibration. Daily, run a low level standard to check the reportable detection level, RDL. **% RSD of each calibration curve should be less than 20%. If one or more calibration curve has more than 20% RSD, re-integrate the peak and verify peak integration. If the problems are not solved by reprocess, rerun new calibration curve using freshly made standards to meet the 20% requirement.**

7.4 Samples - Samples must be analyzed within 14 days after collection. Samples must be stored at 4°C or below until ready for analysis. Duplicates are run on 5% of samples, or once during run, whichever is greater. Results should be within +/- 20%.

7.5 Spike Recoveries - The laboratory must add a known concentration of spike solution, the same as used for LFB, to at least 5% of samples or once per analytical run, whichever is greater. Recoveries should be within the acceptable range, +/- 30%. Wherever possible, run a second source standard for spikes.

7.6 QC Requirements - Analyze EPA QC check sample with known values if available. The results for each analyte must be within the EPA acceptance criteria. Semi-annually, analyze EPA Performance Evaluation samples. Analyze additional check samples whenever major maintenance to the system occurs to ensure the validity of the method.

7.7 Continuous Calibration Check Standard: Daily analyze a 2 ppb continuous calibration check standard. Also, confirm the RDL. The

concentration measured using the calibration curve must be within +/-30% of the true value of the concentration in the calibration solution. If this condition is not met, recalibration may be required.

7.8 **If samples fail any of the above QC requirements, resample request will be followed to re-analyze the sample. Also verify tuning compound, BFB and proceed the system diagnostics to investigate any malfunction of the system**

8. PREVENTIVE MAINTENANCE AND CORRECTIVE ACTIONS

8.1 Glassware - Glassware must be carefully cleaned. Do not heat volumetric glassware above 220°C.

8.2 Reagents - The use of high purity solvents and reagents will help to minimize contamination problems.

8.3 Carryover - Contamination carryover may occur when a sample containing a low concentration of analytes is analyzed immediately following a sample containing a high concentration. Use volatile free reagent water rinses between samples to minimize carryover.

8.4 All reagents and apparatus must be routinely demonstrated to be free from interference under the conditions of the analysis by running laboratory method blanks. Minimize contact of the samples and reagents with solvent vapors (methylene chloride). This well help reduce contamination.

8.5 A refrigerator blank should be run at least once a month. This blank, volatile free reagent water, is sealed in a 40 ml vial and placed in the VOC storage refrigerator for one month. Analyzed each month, it should be free of any organic contamination. Freons are the most likely interference to be picked up by this blank.

8.6 Record all corrective actions in the maintenance log book. Include a complete description of the problem and what action were taken to correct it.

ORANGE COUNTY WATER DISTRICT
STANDARD OPERATING PROCEDURE

TRACE ELEMENTS AND METALS SAMPLE HANDLING AND PREPARATION

File Name:	M:\SOP\INORGNIC\TraceMetalsPrep(NEW).doc	Effective Date:	12/14/2001
Revision:	4	Supersedes:	3 (11/28/2001)

1. REFERENCES

1.1 EPA *Methods for the Determination of Metals in Environmental Samples* (June 1991), 200.1; Supplement I (May 1994), 200.2, 200.15 and 200.7

1.2 *Methods for Analysis of Water and Wastes* (1979, rev. 1983), 200.0.

1.3 *Code of Federal Regulations 40* (July 1, 2000), Part 136, Appendix C

1.4 *Standard Methods*, 18th, 19th, and 20th Eds., #3010-3030.

2. SCOPE AND APPLICATION

2.1 This method may be used for the sampling, sample handling and preparation of dissolved, suspended, total, or total recoverable elements in drinking water, surface water, domestic and industrial wastewaters. Analysis is to be performed by ICP/MS, ICP-OES,or other trace metal analysis technique. Hexavalent chromium (Cr^{+6}) analysis has its own unique requirements; see the Cr^{+6} SOP for details.

3. SUMMARY OF METHOD

3.1 The sample is collected and preserved in such a way as to maintain the concentrations of elements in solution to the levels in existence at the time of collection, and in a form compatible with recovery by the analytical technique used. An acidic environment is to be maintained at all times in the sample solution, and additional heat/acid treatment steps and acid matrix matching is specified, where appropriate.

4. DEFINITIONS

4.1 Dissolved--Those elements that will pass through a 0.45 µm membrane filter.

4.2 Suspended--Those elements that are retained by a 0.45 µm membrane filter.

4.3 Total--The concentration determined on an unfiltered sample following vigorous digestion (9.3)

4.4 Total recoverable--The concentration determined on an unfiltered sample following treatment with hot, dilute mineral acid (9.4).

5. SAFETY

5.1 The toxicity or carcinogenicity of each reagent used in this method has not been precisely defined; however, each chemical compound should be treated as a potential health hazard. From this viewpoint, exposure to these chemicals must be reduced to the lowest possible level by whatever means available. The laboratory is responsible for maintaining a current awareness file of OSHA regulations regarding the safe handling of the chemicals specified in this method. A reference file of material data handling sheets is available to all personnel involved in chemical analyses.

6. REAGENTS AND STANDARDS

6.1 Acids used in the preparation of standards and for sample processing must be ultra-high purity grade (Baker-Mallinckrodt ULTREX) or equivalent. Redistilled acids are acceptable.

6.1.1 Hydrochloric acid, conc. (sp gr 1.19).

6.1.2 Hydrochloric acid, (1+1): Add 500 mL conc. HCl (sp gr 1.19) to 400 mL deionized water and dilute to 1 liter.

6.1.3 Nitric acid, conc. (sp gr 1.41).

6.1.4 Nitric acid (1+1): Add 500 mL conc. HNO_3 (sp. gr 1.41) to 400 mL deionized water and dilute to 1 liter.

6.2 Deionized water—produced by Milli-Q Gradient A-10 System (Millipore) fed by whole-lab deionization system. Use Milli-Q water for the preparation of all reagents, calibration standards and as dilution water.

6.3 Hydrogen Peroxide solution, 30% H_2O_2, ACS Reagent Grade.

7. APPARATUS AND EQUIPMENT

7.1 Labware—since contamination is of prime consideration, work in a clean laboratory area designed for trace metal handling. All reusable labware (glass, plastic, Teflon) should be cleaned prior to use. After thorough cleaning with detergent and water, soak labware for at least 4 hrs. in 1+1 nitric acid, followed by rinsing with water and oven drying.

7.2 Assorted class "A" pipets.

7.3 *Environmental Express* 50 mL metals-free centrifuge tubes.

7.4 *Environmental Express* heated block digestion system. See system instruction manual for details.

7.5 Membrane filtration apparatus.

7.6 Membrane filters, nylon, HPLC grade, 0.45 µm pore. Do not use "bacti"-type filters.

8. SAMPLE HANDLING AND PRESERVATION

8.1 For the determination of trace elements, contamination and loss are of prime concern. Dust in the laboratory environment, impurities in reagents and impurities on laboratory apparatus that the sample contacts are all sources of potential contamination. Sample containers can introduce either positive or negative errors in the measurement of trace elements by (a) contributing contaminants through leaching or surface desorption and (b) by depleting concentrations through adsorption. Thus the collection and treatment of the sample prior to analysis requires particular attention. Laboratory glassware including the sample bottle (whether polyethylene, polypropylene or FEP-fluorocarbon) should be thoroughly washed with detergent and tap water; rinsed with (1+1) nitric acid, tap water, (1+1) hydrochloric acid, tap and finally deionized distilled water in that order (See Notes 2 and 3). NOTE 2: Use caution if considering using chromic acid to remove organic deposits from glassware; (normally unnecessary for OCWD laboratory samples). A commercial product, NOCHROMIX, available from Godax Laboratories, 6 Varick St., New York, NY 10013, may be used in place of chromic acid. Chromic acid should not be used with plastic bottles. NOTE 3: If it can be documented through an active analytical quality control program using spiked samples and reagent blanks, that certain steps in the cleaning procedure are not required for routine samples, those steps may be eliminated from the procedure.

8.2 Before collection of the sample a decision must be made as to the type of data desired, that is dissolved, suspended, total recoverable or total, so that the appropriate preservation and pretreatment steps may be accomplished. Filtration, acid preservation, etc., are to be performed at the time the sample is collected or as soon as possible, thereafter.

8.2.1 Samples for metals analysis must always be collected in a separate, metal-free container provided by the laboratory to sampling personnel. The container will typically be a disposable, certified, pre-cleaned plastic bottle supplied by I-Chem, Eagle-Picher, or other vendor, and will either contain nitric acid suitable for preserving the sample, or not, as appropriate (see below).

8.2.2 For the determination of **dissolved elements** the sample must be filtered through a 0.45 µm membrane filter as soon as practical after collection. (Glass or plastic filtering apparatus are recommended to avoid possible contamination.) Use the first 50 - 100 mL to rinse the filter flask. Discard this portion and collect the required volume of filtrate. Acidify the filtrate with (1+1) HNO_3 to a pH of 2 or less. Normally, 3 mL of (1+1) acid per liter should be sufficient to preserve the sample. **NOTE: To date, the OCWD Water Quality Department has consistently requested that <u>ALL</u> surface water (Santa Ana River, Anaheim Lake, etc.) samples be filtered for dissolved trace metal analysis. In most cases, the unpreserved sample will have been prefiltered through a glass fiber filter prior to membrane filtration. No exceptions to this procedure will be made unless specifically requested otherwise.**

8.2.3 Suspended elements are rarely specified for analysis by the OCWD laboratory. Refer to full EPA Method 200.7 for details if necessary.

8.2.4 For determination of **total recoverable elements** in aqueous samples, the samples must be acid preserved prior to aliquoting for either sample processing or determination by direct spectrochemical analysis. For proper preservation samples are not filtered, but acidified with (1+1) nitric acid to pH < 2. Preservation is to be done at the time of sample collection for total and total recoverable elements. If for some reason field preservation is impossible, it is recommended that the samples be returned to the laboratory as soon as possible after collection and acid preserved upon receipt in the laboratory. In either case, following acidification, the sample should be mixed and held for sixteen hours. (Normally, 3 mL of (1+1) nitric acid per liter of sample is sufficient for most ambient and drinking water samples). The pH of all aqueous samples must be tested immediately prior to withdrawing an aliquot for processing to ensure the sample has been properly preserved. If for some reason such as high alkalinity the sample pH is verified to be > 2, more acid must be be added and the sample held for sixteen hours, and the acidification and holding process repeated until the sample is verified to be pH < 2. If properly acid preserved, the sample can be held up to 6 months before analysis. NOTE: When the nature of the sample is either unknown or is known to be hazardous, acidification should be done in a fume hood**.**

9. SAMPLE PREPARATION

9.1 For the determinations of **dissolved elements**, the filtered, preserved sample may often be analyzed as received. The acid matrix and concentration of the samples and calibration standards must be the same. (See Note 6.) If a precipitate formed upon acidification of the sample or during transit or storage, it must be redissolved before the analysis by adding additional acid and/or by heat as described in 9.3. With the exception of silver, where this method is approved for the determination of certain metal and metalloid contaminants in drinking water,

samples may be analyzed directly by pneumatic nebulization without acid digestion if the sample has been properly preserved with acid and has turbidity of < 1 NTU at the time of analysis. This total recoverable determination procedure is referred to as "direct analysis". Check all drinking water samples for turbidity before analysis, and submit all those having an NTU value of 1 or greater to the Total Recoverable or Total Element procedures.

9.2 Suspended elements are rarely specified for analysis by the OCWD laboratory. Refer to full appropriate analytical method for details if necessary. NOTE 4: In place of filtering, the sample after diluting and mixing may be centrifuged or allowed to settle by gravity overnight to remove insoluble material.

9.3 Total elements are rarely specified for analysis by the OCWD laboratory. Refer to full appropriate analytical method for details if necessary. NOTE 5: When determining boron in aqueous samples, only plastic, PTFE or quartz labware should be used from time of sample collection to completion of analysis. When possible, borosilicate glass should be avoided to prevent contamination of these analytes. NOTE 6: If the sample analysis solution has a different acid concentration from that given in 9.4, but does not introduce a physical interference or affect the analytical result, the same calibration standards may be used.

9.4 For the determination of **total recoverable elements**, choose a measured volume of a well mixed, acid preserved sample appropriate for the expected level of elements and digest in *Environmental Express* block digestion system according to manufacturer's instructions. Concentrations so determined shall be reported as "Total." For details of other methods, see specific method.

9.5 Sample preparation for **ICP-OES analysis**:

9.5.1 For samples not needing digestion (i.e. Title 22, most groundwater, boron, Na, K, Ca, Mg), measure 97 mL sample into a clean 250-mL wide-mouth plastic bottle. Add 2 mL of (1+1) nitric acid and 1 mL of (1+1) hydrochloric acid.

9.5.2 For samples needing digestion (i.e. WF-21, Prado, surface water, deep wells), measure 50 mL of sample into an *Environmental Express* 50 mL metals-free centrifuge tube. Place tubes in *Environmental Express* digestion system and follow procedures spelled out in digestion block SOP. After the digestion procedure has finished and samples have cooled, bring digested sample back up to the 50 mL initial volume with DI water. Samples are now ready for analysis.

9.5.3 For samples needing filtration prior to sample preparation, use nylon membrane filter that has been thoroughly rinsed with ASTM Type I water before filtering sample.

9.6 Sample Preparation for ICP/MS Analysis: see OCWD SOP for ICP/MS for special sample prep requirements.

9.7 All samples prepared for metals analysis must be recorded in a Prep Logbook. There are two, one for ICP-OES preps and one for ICP/MS preps. Use the following procedure to create a Prep Log.

9.7.1 Enter ASPEN and click on the USER EXTENSION button. Under the ACTIVE/ARCHIVE REPORTS banner click on the INORGANIC DIGESTION LOG button.

9.7.2 Choose the correct test method.

9.7.2.1 X200.7 for ICP-OES.
9.7.2.2 X200.7D for dissolved ICP-OES.
9.7.2.3 X200.8 for ICP/MS.
9.7.2.4 X200.8D for dissolved ICP/MS.

9.7.3 Highlight sample of interest by clicking any point within that row. Doing so will change NO to YES in the SELECTED column. Continue this step until you have selected all pertinent samples.

9.7.4 If the sample has a corresponding duplicate or spike that was prepped, click on the DUPLICATE and/or SPIKE buttons to the right of the sample list.

9.7.5 When finished selecting samples, duplicates and spikes, click on the OPEN LOG button.

A preview of your prep log will appear. If you need to change the acid lot number, do so at this time. Verify the PREP BY and PREP DATE information. Click ALL buttons to fill columns.

9.7.6 If the sample was digested using microwave or manually by open vessel, click the appropriate boxes.

9.7.7 Then click the SAVE FORM button. Shortly, a message box will appear stating ‘Form Successfully Updated’. Click OK.

9.7.8 To print your Prep Log, click on PRINT FORM button at top.

APPENDIX C

U.S. FORESTRY PERMITS

Authorization ID: WMD050053T
Contact ID:, MCINTYRE, EATHAN
Expiration Date: 10/1/2005
Use Code: 422

FS-2700-25 (02/99)
OMB NO. 0596-0082

U.S. DEPARTMENT OF AGRICULTURE
Forest Service
TEMPORARY SPECIAL - USE PERMIT
(FSH 2709.11, sec. 54.6)
AUTHORITY:
ORGANIC ADMINISTRATION ACT June 4, 1897

Eathan McIntyre, CAL POLY POMONA UNIVERSITY, hereinafter called the Holder, is hereby authorized to use, subject to the terms and conditions of this permit, National Forest System land identified within the unit area and described as Sec. 7, T. 10 S., R. 32 E., MT. DIABLO PRINCIPAL MERIDIAN as shown on the attached Exhibit(s) N/A. This authorization covers approximately .1 acres and/or 0 miles.

The holder is authorized to conduct the following activities and/ or install the following temporary improvements on the permitted area:

Research in support of Senior Thesis to study the hydro-chemistry of the Palisade Glacier. Small samples of ice will be taken from the glacier using hand chisels and hammers. This research will take place over one weekend, sometime in September.

A crew of three is authorized. Permittee and crew must camp in the Fourth Lake area. Permitee shall practice Leave no Trace skills and ethics in the wilderness. Proper food storage is required.

A valid wilderness permit must be obtained for any overnight stays in the wilderness. Wilderness permits must be obtained at the Inyo National Forest Wilderness Reservation Office at 351 Pacu Lane or by faxing a request for a permit to the Wilderness Reservation Office (760) 873-2484 with a copy of the front page of this permit. This use is considered administrative and therefore not subject to trailhead quotas.

Permit must be in possession while conducting research.

TERMS AND CONDITIONS

1. Use under this permit shall begin on 9/1/2005 and end on 9/30/2005. The permit shall not be extended.

2. The fee for this use is free use per 36 CFR 251.57(b)(2). It shall be paid in advance and is not refundable.

3. The holder shall conduct the authorized activities according to the attached approved plans and specifications, Exhibit(s) N/A.

4. The holder shall not install any improvements not specifically identified and approved above.

5. No soil, trees, or other vegetation may be destroyed or removed from National Forest System lands without specific prior written permission from the authorized officer.

6. The holder shall comply with all Federal, State, county, and municipal laws, ordinances, and regulations which are applicable to the area or operations covered by this permit.

7. The holder shall maintain the improvements and premises to standards of repair, orderliness, neatness, sanitation, and safety acceptable to the authorized officer. The holder shall fully repair and bear the expense for all damage, other than ordinary wear and tear, to National Forest System lands, roads and trails caused by the holder's activities.

8. The holder has the responsibility of inspecting the use area and adjoining areas for dangerous trees, hanging limbs, and other evidence of hazardous conditions which would pose a risk of injury to individuals. After securing permission from the authorized officer, the holder shall remove such hazards.

9. The holder shall be liable for any damage suffered by the United States resulting from or related to use of this permit, including damages to National Forest resources and costs of fire suppression.

10. The holder shall hold harmless the United States from any liability from damage to life or property arising from the holder's occupancy or use of National Forest lands under this permit.

11. The holder agrees to permit the free and unrestricted access to and upon the premises at all times for all lawful and proper purposes not inconsistent with the intent of the permit or with the reasonable exercise and enjoyment by the holder of the privileges thereof.

12. This permit is subject to all valid existing rights and claims outstanding in third parties.

13. This permit may be revoked upon breach of any of the conditions herein or at the discretion of the authorized officer. Upon expiration or revocation of this permit, the holder shall immediately remove all improvements except those owned by the United States, and shall restore the site within one day(s), unless otherwise agreed upon in writing. If the holder fails to remove the improvements, they shall become the property of the United States, but that will not relieve the holder of liability for the cost of their removal and restoration of the site.

14. This permit is a license for the use of federally owned land. It does not grant any interest in real property. This permit is not transferable. The holder shall not enter into any agreements with third parties for occupancy of the authorized premises and improvements.

15. Appeal of any provisions of this permit or any requirements thereof shall be subject to the appeal regulations at 36 CFR 251, Subpart C, or revisions thereof.

16. This permit is accepted subject to the conditions set forth herein, condition(s) N/A and Exhibit(s) N/A attached to and made a part of this permit.

17. The above clauses shall control if they conflict with additional clauses or provisions.

18. Submit Reports (X87). The holder shall provide the authorized officer with a copy of all reports and publications resulting from the project including theses, dissertations, articles, monographs, etc. The final report on work performed shall be submitted in two copies to the Forest Service no later than 1 year following the completion of the research.

TABLES

TABLE 1-1
Palisade Glacier
Fluvial Runoff VOC DATA
Sierra Nevada Mtns, CA

Sample ID:		R1	R2	R3	R4	R5	R6	R7	R8
Type:		Hand Collected	Hand Collected	Hand Collected	Hand Collected	Hand Collected	Hand Collected	Hand Collected	Hand Collected
Depth Below Ground Surface (ft):		na	na	na	na	na	na	na	na
Sample Date:		9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005
Analytical Lab		OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD
Volatile Organic Compounds (EPA 8260B)									
Acetone	µg/L	1.08	0.67	0.58	0.31	0.24	0.18	0.14	0.05
Benzene	µg/L	0.03	0.01	0.01	0.02	0.01	0.02	0.01	0.01
Bromobenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.3)
Bromochloromethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<3.4)
Bromodichloromethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.4)
Bromoform	µg/L	ND (<0.50) UJI	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<3.1)
Bromomethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<15)
2-Butanone (MEK)	µg/L	0.05	0.04	0.02	0.01	0.01	0.02	0.03	0.01
n-Butylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)
sec-Butylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)
tert-Butylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.87)
Carbon Disulfide	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<5.2)
Carbon Tetrachloride	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.1)
Chlorobenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.8)
Chloroethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.6)
Chloroform	µg/L	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<2.7) J/Ux
Chloromethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<8.9)
2-Chlorotoluene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.2)
4-Chlorotoluene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)
Dibromochloromethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.3)
1,2-Dibromo-3-Chloropropane	µg/L	ND (<1.0)	ND (<1.0)	ND (<2.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<12)
1,2-Dibromoethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<4.0)
Dibromomethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.1)
1,2-Dichlorobenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.2)
1,3-Dichlorobenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.9)
1,4-Dichlorobenzene	µg/L	0.01	0.03	0.07	0.02	0.05	0.04	0.01	0.02
Dichlorodifluoromethane (Freon-12)	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.3)
1,1-Dichloroethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.6)
1,2-Dichloroethane (EDC)	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)
1,1-Dichloroethene	µg/L	**0.31**	0.11	0.14	0.27	0.3	0.12	0.08	0.04
c-1,2-Dichloroethene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)
t-1,2-Dichloroethene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)
1,2-Dichloropropane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.4)
1,3-Dichloropropane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)
2,2-Dichloropropane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.0)
1,1-Dichloropropene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.1)
c-1,3-Dichloropropene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.3)
t-1,3-Dichloropropene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)
Ethylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.87)
2-Hexanone (MBK)	µg/L	ND (<10)	ND (<10)	ND (<20)	ND (<10)	ND (<10)	ND (<10)	ND (<10)	ND (<9.3)
Isopropylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.2)
4-Isopropyltoluene	µg/L	ND (<1.0)	ND (<1.0)	ND (<2.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)
4-Methyl-2-pentanone	µg/L	ND (<5.0)	ND (<5.0)	ND (<10.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<12)
Methylene Chloride	µg/L	ND (<5.0) UJI	ND (<5.0)	ND (<10.0) UJI	ND (<5.0) UJI	ND (<5.0)	ND (<5.0)	ND (<5.0) UJI	ND (<32) J/Uxy
Naphthalene	µg/L	0.21	0.17	0.15	0.20	0.19	0.17	0.11	0.12
n-Propylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)
Styrene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.4)
1,1,1,2-Tetrachloroethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.9)
1,1,2,2-Tetrachloroethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.8)
Tetrachloroethene (PCE)	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)
Toluene	µg/L	0.04	**0.02**	0.03	0.02	0.01	0.03	0.01	0.01
1,2,3-Trichlorobenzene	µg/L	0.07	0.04	0.05	0.09	0.06	0.04	0.05	0.02
1,2,4-Trichlorobenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.7)
1,1,1-Trichloroethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.6)
1,1,2-Trichloroethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND	ND (<0.50)	ND (<2.7)
Trichloroethene (TCE)	µg/L	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)
Trichlorofluoromethane (Freon-11)	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.8)
1,2,3-Trichloropropane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<11)
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon-113)	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.7)
1,2,4-Trimethylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.3)
1,3,5-Trimethylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.94)
Vinyl Acetate	µg/L	0.05	0.15	0.23	0.26	0.16	0.13	0.09	0.04
m,p-Xylene	µg/L	ND (<1.0)	ND (<1.0)	ND (<2.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<0.50)	ND (<1.9)
o-Xylene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)
Methyl-t-Butyl Ether (MTBE)	µg/L	0.70	0.64	0.09	0.05	0.08	0.15	0.09	0.02
1,4-Dioxane	µg/L	na	na	na	na	na	na	--	ND (<0.40)

Notes:

µg/L = Micrograms/liter.

Analytes detected in at least one sample shown in bold.

ND = Not detected above method detection limit shown in parentheses.

na = Not analyzed.

B = The analyte was detected in the laboratory method blank corresponding to that batch of samples.

E = The concentration indicated is an estimated value above the calibration range of the instrument. The value shown is considered an estimate.

J = The analyte was positively identified above the method detection limit but below the reporting limit. The reported numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

I = Laboratory control sample recovery failure.

x = Field blank contamination.

y = Method blank contamination.

TABLE 1-2
Palisade Glacier
Fluvial Runoff Metal Data
Sierra Nevada Mtns, CA

Sample ID:		R1	R2	R3	R4	R5	R6	R7	R8
Type:		Hand Collected	Hand Collected	Hand Collected	Hand Collected	Hand Collected	Hand Collected	Hand Collected	Hand Collected
Depth Below Ground Surface (ft):		na	na	na	na	na	na	na	na
Sample Date:		9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/25/2005	9/25/2005	9/25/2005	9/25/2005
Analytical Lab		OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD
Metals by EPA 200.8									
Total Lead µg/L	µg/L	5.99	3.65	2.24	1.36	1.98	0.20	0.62	0.59
Aluminum (µg/L)	µg/L	2.80	2.75	0.64	5.55	5.36	3.79	2.66	2.58
Antimony (µg/L)	µg/L	4.96	8.36	13.25	28.72	5.36	34.82	27.33	26.47
Arsenic (µg/L)	µg/L	742.00	1422.07	16.38	156.21	498.07	18.32	55.31	14.92
Barium (µg/L)	µg/L	5.12	5.66	5.18	15.96	11.32	22.40	16.53	11.84
Beryllium (µg/L)	µg/L	19.52	59.10	102.17	163.65	241.80	184.58	156.37	122.29
Cadmium (µg/L)	µg/L	313.20	377.40	324.61	222.50	135.13	447.56	350.21	209.72
Calcium (µg/L)	µg/L	84.90	0.22	4.53	4.65	4.82	5.09	5.56	6.31
Chromium (µg/L)	µg/L	62.30	3.87	22.74	28.66	33.74	6.20	17.82	11.86
Cobalt (µg/L)	µg/L	58.50	0.21	3.97	0.53	20.29	30.51	26.59	22.90
Copper (µg/L)	µg/L	121.70	19.11	306.28	45.32	7.65	3.67	6.23	2.17
Iron (µg/L)	µg/L	58.50	1.99	2.86	5.40	2.59	3.01	2.04	2.48
Magnesium (µg/L)	µg/L	59.40	1.98	0.28	2.61	2.30	2.62	1.94	1.53
Mercury (µg/L)	µg/L	867.00	1779.53	92.11	69.64	61.89	29.78	54.31	62.81
Molybdenum (µg/L)	µg/L	86.80	5.86	0.89	21.88	0.20	2.20	3.55	3.51
Nickel (µg/L)	µg/L	244.30	0.34	4.98	1.23	2.37	2.33	3.02	3.45
Potassium (µg/L)	µg/L	165.10	2.44	3.45	3.88	0.95	1.26	1.39	1.97
Selenium (µg/L)	µg/L	210.00	167.39	60.44	656.56	116.61	204.59	162.08	180.60
Silver (µg/L)	µg/L	56.00	5.30	0.91	2.07	21.57	31.37	40.46	42.13
Sodium (µg/L)	µg/L	29.20	**4.33**	0.73	1.95	**4.33**	3.85	3.70	3.40
Vanadium (µg/L)	µg/L	79.20	**3.99**	5.13	26.57	**12.76**	**66.60**	44.38	23.61
Uranium (µg/L)	µg/L	47.20	4.90	2.79	2.38	1.39	1.09	1.25	1.01
Zinc (µg/L)	µg/L	90.00	**7.31**	9.38	24.20	12.22	5.97	**9.58**	17.37

Notes:
mg/kg = Milligrams/kilogram
Metals detected in at least one sample shown in bold.
ND = Not detected above method detection limit shown in parentheses.
na = Not analyzed.
B = The metal was detected in the laboratory method blank corresponding to that batch of samples.
E = The concentration indicated is an estimated value above the calibration range of the instrument. The value shown is considered an estimate.
J = The metal was positively identified above the method detection limit but below the reporting limit. The reported numerical value is the approximate concentration of the metal in the sample.
U = The metal was analyzed for, but was not detected above the reported sample quantitation limit.
I = Laboratory control sample recovery failure.
x = Field blank contamination.
y = Method blank contamination.

TABLE 2-1
Palisade Glacier
Surface VOC DATA
Seirra Nevada Mtns, CA

Sample ID:		S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	S17	S18	S19	S20	S21	S22	S23	S24
Type:		Hand Collected	Hand Collected	Hand Collected	Hand Collected	Hand Collected	Hand Collected	Hand Collected	Hand Collected	Hand Collected	Hand Collected	Hand Collected	Hand Collected	Hand Collected	Hand Collected	Hand Collected	Hand Collected	Hand Collected	Hand Collected	Hand Collected	Hand Collected	Hand Collected	Hand Collected	Hand Collected	Hand Collected
Depth Below Ground Surface (ft):		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sample Date:		9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005
Analytical Lab		OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD
Volatile Organic Compounds (EPA 8260B)																									
Acetone	µg/L	0.60	0.627	0.58	0.31	0.24	0.18	0.14	0.05	0.46	0.48	0.42	0.31	0.34	0.29	0.34	0.34	0.35	0.41	0.39	0.31	0.24	0.18	0.21	0.24
Benzene	µg/L	0.03	0.01	0.01	0.02	0.01	0.02	0.01	0.01	0.03	0.01	0.01	0.02	0.01	0.02	0.01	0.01	0.03	0.01	0.01	0.02	0.01	0.02	0.01	0.01
Bromobenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.3)
Bromochloromethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<3.4)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<3.4)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<3.4)
Bromodichloromethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.4)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.4)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.4)
Bromoform	µg/L	ND (<0.50) UJI	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<3.1)	ND (<0.50) UJI	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<3.1)	ND (<0.50) UJI	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<3.1)
Bromomethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<15)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<15)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<15)
2-Butanone (MEK)	µg/L	0.05	0.04	0.02	0.01	0.01	0.02	0.03	0.01	0.05	0.04	0.02	0.01	0.01	0.02	0.03	0.01	0.05	0.04	0.02	0.01	0.01	0.02	0.03	0.01
n-Butylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)
sec-Butylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)
tert-Butylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.87)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.87)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.87)
Carbon Disulfide	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<5.2)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<5.2)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<5.2)
Carbon Tetrachloride	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.1)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.1)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.1)
Chlorobenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.8)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.8)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.8)
Chloroethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.6)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.6)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.6)
Chloroform	µg/L	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<2.7) J/Ux	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<2.7) J/Ux	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<2.7) J/Ux
Chloromethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<8.9)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<8.9)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<8.9)
2-Chlorotoluene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.2)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.2)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.2)
4-Chlorotoluene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)
Dibromochloromethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.3)
1,2-Dibromo-3-Chloropropane	µg/L	ND (<1.0)	ND (<1.0)	ND (<2.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<12)	ND (<1.0)	ND (<1.0)	ND (<2.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<12)	ND (<1.0)	ND (<1.0)	ND (<2.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<12)
1,2-Dibromoethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<4.0)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<4.0)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<4.0)
Dibromomethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.1)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.1)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.1)
1,2-Dichlorobenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.2)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.2)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.2)
1,3-Dichlorobenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.9)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.9)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.9)
1,4-Dichlorobenzene	µg/L	0.01	0.03	0.07	0.02	0.05	0.04	0.01	0.02	0.01	0.03	0.07	0.02	0.05	0.04	0.01	0.02	0.01	0.03	0.07	0.02	0.05	0.04	0.01	0.02
Dichlorodifluoromethane (Freon-12)	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.3)
1,1-Dichloroethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.6)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.6)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.6)
1,2-Dichloroethane (EDC)	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)
1,1-Dichloroethene	µg/L	**0.31**	0.255	0.263	0.27	0.3	0.242	0.21	0.04	**0.31**	0.26	0.27	0.27	0.30	0.26	0.27	0.24	**0.31**	0.25	0.29	0.27	0.30	0.28	0.22	0.22
c-1,2-Dichloroethene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)
t-1,2-Dichloroethene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)
1,2-Dichloropropane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.4)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.4)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.4)
1,3-Dichloropropane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)
2,2-Dichloropropane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.0)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.0)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.0)
1,1-Dichloropropene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.1)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.1)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.1)
c-1,3-Dichloropropene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.3)
t-1,3-Dichloropropene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)
Ethylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.87)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.87)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.87)
2-Hexanone (MBK)	µg/L	ND (<10)	ND (<10)	ND (<20)	ND (<10)	ND (<10)	ND (<10)	ND (<10)	ND (<9.3)	ND (<10)	ND (<10)	ND (<20)	ND (<10)	ND (<10)	ND (<10)	ND (<10)	ND (<9.3)	ND (<10)	ND (<10)	ND (<20)	ND (<10)	ND (<10)	ND (<10)	ND (<10)	ND (<9.3)
Isopropylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.2)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.2)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.2)
4-Isopropyltoluene	µg/L	ND (<1.0)	ND (<1.0)	ND (<2.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<2.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<2.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)
4-Methyl-2-pentanone	µg/L	ND (<5.0)	ND (<5.0)	ND (<10.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<12)	ND (<5.0)	ND (<5.0)	ND (<10.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<12)	ND (<5.0)	ND (<5.0)	ND (<10.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<12)
Methylene Chloride	µg/L	ND (<5.0) UJI	ND (<5.0)	ND (<10.0) UJI	ND (<5.0) UJI	ND (<5.0)	ND (<5.0)	ND (<5.0) UJI	ND (<32) J/Uxy	ND (<5.0) UJI	ND (<5.0)	ND (<10.0) UJI	ND (<5.0) UJI	ND (<5.0)	ND (<5.0)	ND (<5.0) UJI	ND (<32) J/Uxy	ND (<5.0) UJI	ND (<5.0)	ND (<10.0) UJI	ND (<5.0) UJI	ND (<5.0)	ND (<5.0)	ND (<5.0) UJI	ND (<32) J/Uxy
Naphthalene	µg/L	0.21	0.17	0.24	0.20	0.19	0.17	0.18	0.20	0.21	0.24	0.24	0.20	0.19	0.19	0.15	0.18	0.21	0.25	0.28	0.20	0.19	0.17	0.11	0.12
n-Propylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)
Styrene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.4)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.4)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.4)
1,1,1,2-Tetrachloroethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.9)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.9)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.9)
1,1,2,2-Tetrachloroethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.8)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.8)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.8)
Tetrachloroethene (PCE)	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)
Toluene	µg/L	0.04	**0.02**	0.03	0.02	0.01	0.03	0.01	0.01	0.04	**0.02**	0.03	0.02	0.01	0.03	0.01	0.01	0.04	**0.02**	0.03	0.02	0.01	0.03	0.01	0.01
1,2,3-Trichlorobenzene	µg/L	0.07	0.04	0.05	0.038	0.06	0.04	0.05	0.02	0.07	0.04	0.05	0.06	0.06	0.04	0.05	0.02	0.07	0.04	0.05	0.06	0.06	0.04	0.05	0.02
1,2,4-Trichlorobenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.7)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.7)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.7)
1,1,1-Trichloroethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.6)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.6)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.6)
1,1,2-Trichloroethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND	ND (<0.50)	ND (<2.7)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND	ND (<0.50)	ND (<2.7)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND	ND (<0.50)	ND (<2.7)
Trichloroethene (TCE)	µg/L	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)
Trichlorofluoromethane (Freon-11)	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.8)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.8)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.8)
1,2,3-Trichloropropane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<11)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<11)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<11)
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon-113)	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.7)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.7)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.7)
1,2,4-Trimethylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.3)
1,3,5-Trimethylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.94)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.94)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.94)
Vinyl Chloride	µg/L	0.05	0.125	0.23	0.26	0.16	0.18	0.21	0.11	0.18	0.21	0.23	0.26	0.22	0.25	0.09	0.14	0.05	0.15	0.23	0.14	0.16	0.13	0.09	0.13
m,p-Xylene	µg/L	ND (<1.0)	ND (<1.0)	ND (<2.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<0.50)	ND (<1.9)	ND (<1.0)	ND (<1.0)	ND (<2.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<0.50)	ND (<1.9)	ND (<1.0)	ND (<1.0)	ND (<2.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<0.50)	ND (<1.9)
o-Xylene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)
Methyl-t-Butyl Ether (MTBE)	µg/L	0.02	0.596	0.09	0.05	0.08	0.106	0.06	0.02	0.02	0.08	0.09	0.05	0.08	0.07	0.09	0.02	0.02	0.37	0.09	0.05	0.08	0.08	0.09	0.07
1,4-Dioxane	µg/L	na	na	na	na	na	na	--	ND (<0.40)	na	na	na	na	na	na	--	ND (<0.40)	na	na	na	na	na	na	--	ND (<0.40)

Notes:
µg/L = Micrograms/liter.
Analytes detected in at least one sample shown in bold.
ND = Not detected above method detection limit shown in parentheses.
na = Not analyzed.
B = The analyte was detected in the laboratory method blank corresponding to that batch of samples.
E = The concentration indicated is an estimated value above the calibration range of the instrument. The value shown is considered an estimate.
J = The analyte was positively identified above the method detection limit but below the reporting limit. The reported numerical value is the approximate concentration of the analyte in the sample.
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
I = Laboratory control sample recovery failure.
x = Field blank contamination.
y = Method blank contamination.

TABLE 2-2
Palisade Glacier
Surface Metal Data
Sierra Nevada Mtns, CA

Sample ID:	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	S17	S18	S19	S20	S21	S22	S23	S24
Type:	Hydropunch	Hydropunch	SimulProbe	Hydropunch	Hydropunch	Hydropunch	Hydropunch	SimulProbe	Hydropunch		Low Flow	Regional	Low Flow	Regional	Low Flow	Low Flow	Regional	Regional	Low Flow	Regional	Low Flow	Low Flow	Regional	Low Flow
Depth Below Ground Surface (ft):	101	100	120	101	100	99	100	120.5	110		na		na		na	na			na		na	na		na
Sample Date:	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005
Analytical Lab	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD
Metals by EPA 7420																								
Total Lead (µg/L)	3.55	3.88	0.95	1.26	2.33	92.11	69.64	61.89	29.78	135.13	9.27	350.21	3.45	16.53	3.55	3.51	5.98	22.36	24.62	10.98	55.82	0.20	15.96	11.32
Antimony (µg/L)	3.02	0.89	1.97	0.21	3.97	0.53	20.29	3.55	2.20	69.64	61.89	2.62	5.86	0.89	21.88	0.20	2.20	3.55	2.61	80.68	5.86	4.65	163.65	241.80
Arsenic (µg/L)	1.39	4.98	55.82	92.11	69.64	61.89	29.78	13.25	15.96	11.32	22.40	29.78	3.51	3.55	3.51	10.32	1.99	2.86	69.64	2.64	0.34	28.66	7.31	54.31
Barium (µg/L)	3.02	3.45	0.89	3.45	0.50	0.22	4.53	16.38	163.65	11.36	84.37	2.20	3.45	3.02	3.45	10.98	1.98	0.28	21.88	8.88	2.44	28.72	0.28	3.55
Beryllium (µg/L)	1.98	0.28	2.61	1.97	10.40	3.87	22.74	5.18	7.31	54.31	5.98	309.47	1.97	1.39	1.97	80.68	55.82	92.11	1.23	0.71	2.20	156.21	92.11	3.02
Cadmium (µg/L)	5.36	19.11	33.06	24.20	1.23	1.53	61.89	0.59	0.28	3.55	2.48	5.86	26.47	27.33	26.47	2.64	5.86	0.89	3.88	0.20	1.97	15.96	0.89	1.39
Chromium (µg/L)	5.36	1.99	2.86	2.30	3.88	62.81	0.20	2.58	92.11	3.02	1.53	0.34	14.92	55.31	14.92	8.88	0.34	4.98	1.26	1.39	26.47	163.65	4.98	54.31
Cobalt (µg/L)	5.36	1.98	0.28	61.89	0.22	4.53	4.65	26.47	0.89	1.39	62.81	2.44	11.84	16.53	11.84	0.71	2.44	3.45	34.82	27.33	14.92	7.65	3.45	3.55
Copper (µg/L)	11.32	55.82	11.36	0.20	3.87	22.74	28.66	14.92	4.98	54.31	3.51	8.36	21.88	33.74	6.20	17.82	3.88	0.95	18.32	55.31	11.84	5.98	0.28	3.02
Mercury (µg/L)	241.80	2.20	3.55	0.89	8.36	13.25	28.72	0.89	3.45	3.55	32.97	44.38	4.33	20.29	30.51	26.59	28.72	5.36	22.40	16.53	122.29	2.20	61.89	163.65
Molybdenum (µg/L)	135.13	2.33	3.02	4.98	336.00	16.38	156.21	4.98	0.28	3.02	1.09	1.25	11.89	7.65	3.67	6.23	156.21	6.39	184.58	156.37	208.11	1.99	0.22	33.61
Nickel (µg/L)	0.95	1.26	1.39	3.45	5.66	5.18	15.96	3.45	92.11	1.39	5.97	9.58	1.39	2.59	3.01	2.04	15.96	11.32	347.00	362.10	3.55	1.98	3.87	62.81
Selenium (µg/L)	2.37	2.59	3.01	2.04	59.10	2.17	9.36	4.82	0.89	27.33	1.94	1.53	12.22	2.30	2.62	1.94	163.65	241.80	0.20	2.20	3.02	55.82	1.53	3.51
Silver (µg/L)	2.24	2.30	2.62	1.94	19.65	45.32	7.65	33.74	4.98	55.31	54.31	62.81	2.62	61.89	29.78	54.31	31.92	135.13	2.37	2.33	1.39	5.86	62.81	3.45
Thallium (µg/L)	1.94	324.61	222.50	135.13	260.00	5.99	3.65	2.24	1.36	1.98	0.20	0.62	69.64	61.89	29.78	54.31	62.81	0.89	21.88	0.20	16.53	0.34	4.53	3.40
Vanadium (µg/L)	54.31	0.89	21.88	0.20	2.20	2.80	2.75	0.64	5.55	5.36	3.79	2.66	21.88	0.20	2.20	3.55	3.51	4.98	1.23	2.37	15.67	1.2 J	0.97	2.9 J
Zinc (µg/L)	3.55	4.98	1.23	2.37	2.33	4.96	8.36	13.25	28.72	5.36	34.82	27.33	1.23	2.37	2.33	3.02	3.45	3.45	3.88	0.95	1.39	2.0 J	3.00	5.36

Notes:
mg/kg = Milligrams/kilogram
Metals detected in at least one sample shown in bold.
ND = Not detected above method detection limit shown in parentheses.
na = Not analyzed.
B = The metal was detected in the laboratory method blank corresponding to that batch of samples.
E = The concentration indicated is an estimated value above the calibration range of the instrument. The value shown is considered an estimate.
J = The metal was positively identified above the method detection limit but below the reporting limit. The reported numerical value is the approximate concentration of the metal in the sample.
U = The metal was analyzed for, but was not detected above the reported sample quantitation limit.
I = Laboratory control sample recovery failure.
x = Field blank contamination.
y = Method blank contamination.

µg/L

TABLE 3-1
Palisade Glacier
Crevasse VOC DATA
Sierra Nevada Mtns, CA
Page 1 of 1

Sample ID:		C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20	C21	C22	C23	C24
Type:		Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger
Depth Below Ground Surface (ft):		0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5
Sample Date:		9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005
Analytical Lab		OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD
Volatile Organic Compounds (EPA 8260B)																									
Acetone	µg/L	0.53	0.67	0.51	0.46	0.46	0.45	0.34	0.33	0.30	0.30	0.30	0.31	0.24	0.26	0.24	0.28	0.30	0.28	0.27	0.31	0.24	0.28	0.14	0.05
Benzene	µg/L	0.04	0.03	0.03	0.03	0.02	0.04	0.03	0.02	0.02	0.02	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.00	0.01	0.02
Bromobenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.3)
Bromochloromethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<3.4)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<3.4)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<3.4)
Bromodichloromethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.4)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.4)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.4)
Bromoform	µg/L	ND (<0.50) UJl	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<3.1)	ND (<0.50) UJl	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<3.1)	ND (<0.50) UJl	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<3.1)
Bromomethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<15)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<15)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<15)
2-Butanone (MEK)	µg/L	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
n-Butylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)
sec-Butylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)
tert-Butylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.87)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.87)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.87)
Carbon Disulfide	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<5.2)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<5.2)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<5.2)
Carbon Tetrachloride	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.1)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.1)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.1)
Chlorobenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.8)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.8)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.8)
Chloroethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.6)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.6)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.6)
Chloroform	µg/L	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<2.7) J/Ux	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<2.7) J/Ux	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<2.7) J/Ux
Chloromethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<8.9)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<8.9)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<8.9)
2-Chlorotoluene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.2)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.2)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.2)
4-Chlorotoluene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)
Dibromochloromethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.3)
1,2-Dibromo-3-Chloropropane	µg/L	ND (<1.0)	ND (<1.0)	ND (<2.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<12)	ND (<1.0)	ND (<1.0)	ND (<2.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<12)	ND (<1.0)	ND (<1.0)	ND (<2.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<12)
1,2-Dibromoethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<4.0)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<4.0)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<4.0)
Dibromomethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.1)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.1)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.1)
1,2-Dichlorobenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.2)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.2)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.2)
1,3-Dichlorobenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.9)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.9)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.9)
1,4-Dichlorobenzene	µg/L	0.07	0.06	0.04	0.04	0.04	0.04	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.01	0.02	0.01	0.02
Dichlorodifluoromethane (Freon-12)	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.3)
1,1-Dichloroethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.6)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.6)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.6)
1,2-Dichloroethane (EDC)	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)
1,1-Dichloroethene	µg/L	**0.31**	0.23	0.24	0.27	0.30	0.12	0.08	0.04	**0.31**	0.11	0.14	0.27	0.30	0.12	0.08	0.04	**0.15**	0.11	0.14	0.27	0.17	0.12	0.19	0.04
c-1,2-Dichloroethene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)
t-1,2-Dichloroethene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)
1,2-Dichloropropane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.4)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.4)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.4)
1,3-Dichloropropane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)
2,2-Dichloropropane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.0)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.0)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.0)
1,1-Dichloropropene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.1)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.1)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.1)
c-1,3-Dichloropropene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.3)
t-1,3-Dichloropropene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)
Ethylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.87)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.87)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.87)
2-Hexanone (MBK)	µg/L	ND (<10)	ND (<10)	ND (<20)	ND (<10)	ND (<10)	ND (<10)	ND (<10)	ND (<9.3)	ND (<10)	ND (<10)	ND (<20)	ND (<10)	ND (<10)	ND (<10)	ND (<10)	ND (<9.3)	ND (<10)	ND (<10)	ND (<20)	ND (<10)	ND (<10)	ND (<10)	ND (<10)	ND (<9.3)
Isopropylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.2)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.2)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.2)
4-Isopropyltoluene	µg/L	ND (<1.0)	ND (<1.0)	ND (<2.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<2.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<2.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)
4-Methyl-2-pentanone	µg/L	ND (<5.0)	ND (<5.0)	ND (<10.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<12)	ND (<5.0)	ND (<5.0)	ND (<10.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<12)	ND (<5.0)	ND (<5.0)	ND (<10.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<12)
Methylene Chloride	µg/L	ND (<5.0) UJl	ND (<5.0)	ND (<10.0) UJl	ND (<5.0) UJl	ND (<5.0)	ND (<5.0)	ND (<5.0) UJl	ND (<32) J/Uxy	ND (<5.0) UJl	ND (<5.0)	ND (<10.0) UJl	ND (<5.0) UJl	ND (<5.0)	ND (<5.0)	ND (<5.0) UJl	ND (<32) J/Uxy	ND (<5.0) UJl	ND (<5.0)	ND (<10.0) UJl	ND (<5.0) UJl	ND (<5.0)	ND (<5.0)	ND (<5.0) UJl	ND (<32) J/Uxy
Naphthalene	µg/L	0.17	**0.12**	0.11	0.10	0.07	0.06	0.06	0.04	0.04	**0.02**	0.03	0.02	0.01	0.03	0.01	0.02	0.06	0.05	0.07	0.04	0.06	0.05	0.07	0.08
n-Propylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)
Styrene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.4)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.4)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.4)
1,1,1,2-Tetrachloroethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.9)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.9)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.9)
1,1,2,2-Tetrachloroethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.8)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.8)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.8)
Tetrachloroethene (PCE)	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)
Toluene	µg/L	0.04	**0.02**	0.03	0.02	0.01	0.03	0.01	0.01	0.04	**0.02**	0.03	0.02	0.01	0.03	0.01	0.01	0.04	**0.02**	0.03	0.02	0.01	0.03	0.01	0.01
1,2,3-Trichlorobenzene	µg/L	0.16	0.04	0.16	0.13	0.13	0.04	0.05	0.02	0.07	0.04	0.05	0.09	0.06	0.04	0.05	0.02	0.07	0.04	0.05	0.09	0.06	0.04	0.05	0.02
1,2,4-Trichlorobenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.7)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.7)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.7)
1,1,1-Trichloroethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.6)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.6)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.6)
1,1,2-Trichloroethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND	ND (<0.50)	ND (<2.7)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND	ND (<0.50)	ND (<2.7)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND	ND (<0.50)	ND (<2.7)
Trichloroethene (TCE)	µg/L	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)
Trichlorofluoromethane (Freon-11)	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.8)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.8)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.8)
1,2,3-Trichloropropane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<11)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<11)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<11)
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon-113)	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.7)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.7)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.7)
1,2,4-Trimethylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.3)
1,3,5-Trimethylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.94)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.94)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.94)
Vinyl Chloride	µg/L	0.05	0.15	0.23	0.26	0.16	0.13	0.09	0.04	0.05	0.15	0.23	0.26	0.16	0.13	0.09	0.04	0.05	0.15	0.23	0.26	0.16	0.13	0.09	0.04
m,p-Xylene	µg/L	ND (<1.0)	ND (<1.0)	ND (<2.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<0.50)	ND (<1.9)	ND (<1.0)	ND (<1.0)	ND (<2.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<0.50)	ND (<1.9)	ND (<1.0)	ND (<1.0)	ND (<2.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<0.50)	ND (<1.9)
o-Xylene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)
Methyl-t-Butyl Ether (MTBE)	µg/L	0.42	0.56	0.45	0.40	0.41	0.35	0.32	0.33	0.35	0.35	0.34	0.29	0.26	0.31	0.09	0.02	0.02	0.17	0.09	0.05	0.08	0.15	0.09	0.02
1,4-Dioxane	µg/L	na	na	na	na	na	na	--	ND (<0.40)	na	na	na	na	na	na	--	ND (<0.40)	na	na	na	na	na	na	--	ND (<0.40)

Notes:

µg/L = Micrograms/liter.

Analytes detected in at least one sample shown in bold.

ND = Not detected above method detection limit shown in parentheses.

na = Not analyzed.

B = The analyte was detected in the laboratory method blank corresponding to that batch of samples.

E = The concentration indicated is an estimated value above the calibration range of the instrument. The value shown is considered an estimate.

J = The analyte was positively identified above the method detection limit but below the reporting limit. The reported numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

I = Laboratory control sample recovery failure.

x = Field blank contamination.

y = Method blank contamination.

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TABLE 3-2
Palisade Glacier
Crevasse VOC DATA
Sierra Nevada Mtns, CA
Page 1 of 1

Sample ID:		C25	C26	C27	C28	C29	C30	C31	C32	C33	C34	C35	C36	C37	C38	C39	C40	C41	C42	C43	C44	C45	C46	C47	C48
Type:		Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger
Depth Below Ground Surface (ft):		12.0	12.5	13.0	13.5	14.0	14.5	15.0	15.5	16.0	16.5	17.0	17.5	18.0	18.5	19.0	19.5	20.0	20.5	21.0	21.5	22.0	22.5	23.0	23.5
Sample Date:		9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005
Analytical Lab		OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD
Volatile Organic Compounds (EPA 8260B)																									
Acetone	µg/L	0.09	0.12	0.10	0.14	0.15	0.18	0.14	0.19	0.20	0.14	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.08	0.07	0.14	0.05
Benzene	µg/L	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Bromobenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.3)
Bromochloromethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<3.4)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<3.4)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<3.4)
Bromodichloromethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.4)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.4)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.4)
Bromoform	µg/L	ND (<0.50) UJI	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<3.1)	ND (<0.50) UJI	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<3.1)	ND (<0.50) UJI	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<3.1)
Bromomethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<15)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<15)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<15)
2-Butanone (MEK)	µg/L	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
n-Butylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)
sec-Butylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)
tert-Butylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.87)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.87)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.87)
Carbon Disulfide	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<5.2)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<5.2)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<5.2)
Carbon Tetrachloride	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.1)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.1)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.1)
Chlorobenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.8)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.8)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.8)
Chloroethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.6)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.6)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.6)
Chloroform	µg/L	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<2.7) J/Ux	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<2.7) J/Ux	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<2.7) J/Ux
Chloromethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<8.9)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<8.9)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<8.9)
2-Chlorotoluene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.2)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.2)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.2)
4-Chlorotoluene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)
Dibromochloromethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.3)
1,2-Dibromo-3-Chloropropane	µg/L	ND (<1.0)	ND (<1.0)	ND (<2.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<12)	ND (<1.0)	ND (<1.0)	ND (<2.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<12)	ND (<1.0)	ND (<1.0)	ND (<2.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<12)
1,2-Dibromoethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<4.0)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<4.0)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<4.0)
Dibromomethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.1)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.1)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.1)
1,2-Dichlorobenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.2)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.2)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.2)
1,3-Dichlorobenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.9)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.9)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.9)
1,4-Dichlorobenzene	µg/L	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.02	0.02	0.03	0.03	0.01	0.02	0.02	0.02	0.02	0.02
Dichlorodifluoromethane (Freon-12)	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.3)
1,1-Dichloroethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.6)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.6)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.6)
1,2-Dichloroethane (EDC)	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)
1,1-Dichloroethene	µg/L	**0.18**	0.11	0.14	0.27	0.18	0.12	0.08	0.04	**0.31**	0.11	0.14	0.27	0.30	0.12	0.08	0.04	**0.31**	0.11	0.14	0.27	0.30	0.12	0.08	0.04
c-1,2-Dichloroethene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)
t-1,2-Dichloroethene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)
1,2-Dichloropropane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.4)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.4)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.4)
1,3-Dichloropropane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)
2,2-Dichloropropane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.0)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.0)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.0)
1,1-Dichloropropene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.1)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.1)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.1)
c-1,3-Dichloropropene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.3)
t-1,3-Dichloropropene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)
Ethylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.87)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.87)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.87)
2-Hexanone (MBK)	µg/L	ND (<10)	ND (<10)	ND (<20)	ND (<10)	ND (<10)	ND (<10)	ND (<10)	ND (<9.3)	ND (<10)	ND (<10)	ND (<20)	ND (<10)	ND (<10)	ND (<10)	ND (<10)	ND (<9.3)	ND (<10)	ND (<10)	ND (<20)	ND (<10)	ND (<10)	ND (<10)	ND (<10)	ND (<9.3)
Isopropylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.2)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.2)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.2)
4-Isopropyltoluene	µg/L	ND (<1.0)	ND (<1.0)	ND (<2.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<2.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<2.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)
4-Methyl-2-pentanone	µg/L	ND (<5.0)	ND (<5.0)	ND (<10.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<12)	ND (<5.0)	ND (<5.0)	ND (<10.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<12)	ND (<5.0)	ND (<5.0)	ND (<10.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<12)
Methylene Chloride	µg/L	ND (<5.0) UJI	ND (<5.0)	ND (<10.0) UJI	ND (<5.0) UJI	ND (<5.0)	ND (<5.0)	ND (<5.0) UJI	ND (<32) J/Uxy	ND (<5.0) UJI	ND (<5.0)	ND (<10.0) UJI	ND (<5.0) UJI	ND (<5.0)	ND (<5.0)	ND (<5.0) UJI	ND (<32) J/Uxy	ND (<5.0) UJI	ND (<5.0)	ND (<10.0) UJI	ND (<5.0) UJI	ND (<5.0)	ND (<5.0)	ND (<5.0) UJI	ND (<32) J/Uxy
Naphthalene	µg/L	0.05	0.07	0.08	0.10	0.07	0.08	0.07	0.06	0.07	0.07	0.05	0.08	0.07	0.08	0.09	0.08	0.02	0.03	0.03	0.01	0.02	0.02	0.02	0.02
n-Propylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)
Styrene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.4)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.4)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.4)
1,1,1,2-Tetrachloroethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.9)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.9)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.9)
1,1,2,2-Tetrachloroethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.8)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.8)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.8)
Tetrachloroethene (PCE)	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)
Toluene	µg/L	0.04	**0.02**	0.03	0.02	0.01	0.03	0.01	0.01	0.04	**0.02**	0.03	0.02	0.01	0.03	0.01	0.01	0.04	**0.02**	0.03	0.02	0.01	0.03	0.01	0.01
1,2,3-Trichlorobenzene	µg/L	0.07	0.04	0.05	0.09	0.06	0.04	0.05	0.02	0.07	0.04	0.05	0.09	0.06	0.04	0.05	0.02	0.07	0.04	0.05	0.09	0.06	0.04	0.05	0.02
1,2,4-Trichlorobenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.7)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.7)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.7)
1,1,1-Trichloroethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.6)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.6)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.6)
1,1,2-Trichloroethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND	ND (<0.50)	ND (<2.7)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND	ND (<0.50)	ND (<2.7)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND	ND (<0.50)	ND (<2.7)
Trichloroethene (TCE)	µg/L	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)
Trichlorofluoromethane (Freon-11)	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.8)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.8)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.8)
1,2,3-Trichloropropane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<11)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<11)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<11)
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon-113)	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.7)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.7)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.7)
1,2,4-Trimethylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.3)
1,3,5-Trimethylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.94)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.94)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.94)
Vinyl Chloride	µg/L	0.05	0.15	0.23	0.26	0.16	0.13	0.09	0.04	0.05	0.15	0.23	0.26	0.16	0.13	0.09	0.04	0.05	0.15	0.23	0.26	0.16	0.13	0.09	0.04
m,p-Xylene	µg/L	ND (<1.0)	ND (<1.0)	ND (<2.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<0.50)	ND (<1.9)	ND (<1.0)	ND (<1.0)	ND (<2.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<0.50)	ND (<1.9)	ND (<1.0)	ND (<1.0)	ND (<2.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<0.50)	ND (<1.9)
o-Xylene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)
Methyl-t-Butyl Ether (MTBE)	µg/L	0.02	0.23	0.09	0.05	0.08	0.15	0.09	0.02	0.02	0.30	0.09	0.05	0.08	0.15	0.09	0.02	0.02	0.18	0.09	0.05	0.08	0.15	0.09	0.02
1,4-Dioxane	µg/L	na	na	na	na	na	na	--	ND (<0.40)	na	na	na	na	na	na	--	ND (<0.40)	na	na	na	na	na	na	--	ND (<0.40)

Notes:

µg/L = Micrograms/liter.

Analytes detected in at least one sample shown in bold.

ND = Not detected above method detection limit shown in parentheses.

na = Not analyzed.

B = The analyte was detected in the laboratory method blank corresponding to that batch of samples.

E = The concentration indicated is an estimated value above the calibration range of the instrument. The value shown is considered an estimate.

J = The analyte was positively identified above the method detection limit but below the reporting limit. The reported numerical value is the approximate concentration of the analyte in the sample.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

I = Laboratory control sample recovery failure.

x = Field blank contamination.

y = Method blank contamination.

TABLE 3-3
Palisade Glacier
Crevasse VOC DATA
Sierra Nevada Mtns, CA
Page 1 of 1

Sample ID:		C49	C50	C51	C52	C53	C54	C55	C56	C57	C58	C59	C60	C61	C62	C63	C64	C65	C66	C67	C68	C69	C70	C71	C72
Type:		Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger
Depth Below Ground Surface (ft):		24.0	24.5	25.0	25.5	26.0	26.5	27.0	27.5	28.0	28.5	29.0	29.5	30.0	30.5	31.0	31.5	32.0	32.5	33.0	33.5	34.0	34.5	35.0	35.5
Sample Date:		9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005
Analytical Lab		OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD
Volatile Organic Compounds (EPA 8260B)																									
Acetone	µg/L	0.09	0.07	0.04	0.12	0.24	0.18	0.14	0.11	0.13	0.11	0.15	0.09	0.24	0.18	0.14	0.12	0.11	0.17	0.13	0.17	0.24	0.18	0.14	0.05
Benzene	µg/L	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Bromobenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.3)
Bromochloromethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<3.4)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<3.4)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<3.4)
Bromodichloromethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.4)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.4)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.4)
Bromoform	µg/L	ND (<0.50) UJI	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<3.1)	ND (<0.50) UJI	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<3.1)	ND (<0.50) UJI	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<3.1)
Bromomethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<15)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<15)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<15)
2-Butanone (MEK)	µg/L	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.02	0.02	0.03	0.03	0.04	0.04	0.04	**0.04**	0.04	0.02	0.01	0.01	0.01	0.01	0.01	0.01
n-Butylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)
sec-Butylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)
tert-Butylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.87)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.87)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.87)
Carbon Disulfide	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<5.2)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<5.2)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<5.2)
Carbon Tetrachloride	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.1)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.1)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.1)
Chlorobenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.8)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.8)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.8)
Chloroethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.6)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.6)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.6)
Chloroform	µg/L	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<2.7) J/Ux	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<2.7) J/Ux	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<2.7) J/Ux
Chloromethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<8.9)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<8.9)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<8.9)
2-Chlorotoluene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.2)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.2)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.2)
4-Chlorotoluene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)
Dibromochloromethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.3)
1,2-Dibromo-3-Chloropropane	µg/L	ND (<1.0)	ND (<1.0)	ND (<2.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<12)	ND (<1.0)	ND (<1.0)	ND (<2.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<12)	ND (<1.0)	ND (<1.0)	ND (<2.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<12)
1,2-Dibromoethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<4.0)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<4.0)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<4.0)
Dibromomethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.1)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.1)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.1)
1,2-Dichlorobenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.2)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.2)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.2)
1,3-Dichlorobenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.9)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.9)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.9)
1,4-Dichlorobenzene	µg/L	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.02	0.01	0.01	0.01	0.02	0.02	0.02	0.01	0.02	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.01
Dichlorodifluoromethane (Freon-12)	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.3)
1,1-Dichloroethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.6)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.6)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.6)
1,2-Dichloroethane (EDC)	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)
1,1-Dichloroethene	µg/L	**0.31**	0.11	0.14	0.27	0.02	0.01	0.01	0.02	**0.31**	0.11	0.14	0.27	0.30	0.12	0.08	0.04	**0.31**	0.11	0.14	0.27	0.30	0.12	0.08	0.04
c-1,2-Dichloroethene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)
t-1,2-Dichloroethene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)
1,2-Dichloropropane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.4)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.4)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.4)
1,3-Dichloropropane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)
2,2-Dichloropropane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.0)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.0)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.0)
1,1-Dichloropropene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.1)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.1)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.1)
c-1,3-Dichloropropene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.3)
t-1,3-Dichloropropene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)
Ethylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.87)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.87)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.87)
2-Hexanone (MBK)	µg/L	ND (<10)	ND (<10)	ND (<20)	ND (<10)	ND (<10)	ND (<10)	ND (<10)	ND (<9.3)	ND (<10)	ND (<10)	ND (<20)	ND (<10)	ND (<10)	ND (<10)	ND (<10)	ND (<9.3)	ND (<10)	ND (<10)	ND (<20)	ND (<10)	ND (<10)	ND (<10)	ND (<10)	ND (<9.3)
Isopropylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.2)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.2)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.2)
4-Isopropyltoluene	µg/L	ND (<1.0)	ND (<1.0)	ND (<2.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<2.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<2.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)
4-Methyl-2-pentanone	µg/L	ND (<5.0)	ND (<5.0)	ND (<10.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<12)	ND (<5.0)	ND (<5.0)	ND (<10.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<12)	ND (<5.0)	ND (<5.0)	ND (<10.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<12)
Methylene Chloride	µg/L	ND (<5.0) UJI	ND (<5.0)	ND (<10.0) UJI	ND (<5.0) UJI	ND (<5.0)	ND (<5.0)	ND (<5.0) UJI	ND (<32) J/Uxy	ND (<5.0) UJI	ND (<5.0)	ND (<10.0) UJI	ND (<5.0) UJI	ND (<5.0)	ND (<5.0)	ND (<5.0) UJI	ND (<32) J/Uxy	ND (<5.0) UJI	ND (<5.0)	ND (<10.0) UJI	ND (<5.0) UJI	ND (<5.0)	ND (<5.0)	ND (<5.0) UJI	ND (<32) J/Uxy
Naphthalene	µg/L	0.02	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.02	0.01	0.01	0.07	0.08	0.07	0.04	0.03	0.04	0.04	0.02	0.04	0.03	0.01	0.01	0.01
n-Propylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.5)
Styrene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.4)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.4)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.4)
1,1,1,2-Tetrachloroethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.9)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.9)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.9)
1,1,2,2-Tetrachloroethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.8)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.8)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.8)
Tetrachloroethene (PCE)	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)
Toluene	µg/L	0.04	**0.02**	0.03	0.02	0.01	0.03	0.01	0.01	0.04	**0.02**	0.03	0.02	0.01	0.03	0.01	0.01	0.04	**0.02**	0.03	0.02	0.01	0.03	0.01	0.01
1,2,3-Trichlorobenzene	µg/L	0.07	0.04	0.05	0.09	0.06	0.04	0.05	0.02	0.07	0.04	0.05	0.09	0.06	0.04	0.05	0.02	0.07	0.04	0.05	0.09	0.06	0.04	0.05	0.02
1,2,4-Trichlorobenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.7)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.7)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.7)
1,1,1-Trichloroethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.6)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.6)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.6)
1,1,2-Trichloroethane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND	ND (<0.50)	ND (<2.7)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND	ND (<0.50)	ND (<2.7)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND	ND (<0.50)	ND (<0.50)	ND (<2.7)
Trichloroethene (TCE)	µg/L	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)
Trichlorofluoromethane (Freon-11)	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.8)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.8)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.8)
1,2,3-Trichloropropane	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<11)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<11)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<11)
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon-113)	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.7)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.7)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<2.7)
1,2,4-Trimethylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.3)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.3)
1,3,5-Trimethylbenzene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.94)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.94)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.94)
Vinyl Chloride	µg/L	0.05	0.15	0.23	0.26	0.16	0.13	0.09	0.04	0.05	0.15	0.23	0.26	0.16	0.13	0.09	0.04	0.05	0.15	0.23	0.26	0.16	0.13	0.09	0.04
m,p-Xylene	µg/L	ND (<1.0)	ND (<1.0)	ND (<2.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<0.50)	ND (<1.9)	ND (<1.0)	ND (<1.0)	ND (<2.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<0.50)	ND (<1.9)	ND (<1.0)	ND (<1.0)	ND (<2.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<0.50)	ND (<1.9)
o-Xylene	µg/L	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<1.0)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<1.0)
Methyl-t-Butyl Ether (MTBE)	µg/L	0.02	0.13	0.09	0.05	0.08	0.15	0.09	0.02	0.02	0.37	0.09	0.05	0.08	0.15	0.09	0.02	0.02	0.24	0.09	0.05	0.08	0.15	0.09	0.02
1,4-Dioxane	µg/L	na	na	na	na	na	na	--	ND (<0.40)	na	na	na	na	na	na	--	ND (<0.40)	na	na	na	na	na	na	--	ND (<0.40)

Notes:
µg/L = Micrograms/liter.
Analytes detected in at least one sample shown in bold.
ND = Not detected above method detection limit shown in parentheses.
na = Not analyzed.
B = The analyte was detected in the laboratory method blank corresponding to that batch of samples.
E = The concentration indicated is an estimated value above the calibration range of the instrument. The value shown is considered an estimate.
J = The analyte was positively identified above the method detection limit but below the reporting limit. The reported numerical value is the approximate concentration of the analyte in the sample.
U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
I = Laboratory control sample recovery failure.
x = Field blank contamination.
y = Method blank contamination.

TABLE 4-1
Palisade Glacier
Crevasse Metal Data
Sierra Nevada Mtns, CA

Sample ID:		C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20	C21	C22	C23	C24
Type:		Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger
Depth Below Ground Surface (ft):		0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5
Sample Date:		9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005
Analytical Lab		OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD
Metals by EPA 7420																									
Total Lead (µg/L)	µg/L	0.59	4.20	4.33	0.73	1.95	4.33	3.85	3.70	5.99	3.65	2.24	1.36	1.98	0.20	**0.62**	6.80	12.50	6.90	9.00	17.00	**17.70**	21.88	0.20	2.20
Antimony (µg/L)	µg/L	2.58	22.96	3.99	59.40	83.40	82.90	32.97	44.38	2.80	2.75	0.64	5.55	5.36	3.79	2.66	21.88	0.20	2.20	3.55	3.51	4.98	1.23	2.37	2.33
Arsenic (µg/L)	µg/L	204.00	215.30	206.80	197.40	190.00	160.11	155.33	101.37	88.61	94.28	50.39	44.91	22.37	34.82	27.33	1.23	2.37	2.33	3.02	3.45	3.45	3.88	0.95	1.26
Barium (µg/L)	µg/L	112.69	118.87	127.63	142.70	127.20	122.90	121.40	108.30	107.20	116.40	125.30	105.70	103.80	61.60	55.31	3.88	0.95	1.26	1.39	1.97	0.28	2.61	2.30	2.62
Beryllium (µg/L)	µg/L	11.84	8.70	0.28	14.20	8.50	2.62	1.94	1.53	5.12	5.66	5.18	15.96	11.32	22.40	16.53	2.61	2.30	2.62	1.94	1.53	75.10	69.64	61.89	29.78
Cadmium (µg/L)	µg/L	122.29	155.00	158.60	165.80	61.89	29.78	54.31	62.81	19.52	59.10	102.17	95.20	94.00	112.90	115.30	69.64	61.89	29.78	54.31	62.81	0.89	21.88	0.20	2.20
Chromium (µg/L)	µg/L	209.72	15.60	0.89	21.88	9.00	2.20	3.55	3.51	5.98	96.00	72.80	63.10	51.50	70.80	74.40	21.88	0.20	2.20	3.55	3.51	4.98	1.23	2.37	2.33
Cobalt (µg/L)	µg/L	6.31	10.10	23.80	15.10	11.30	2.33	3.02	3.45	0.50	0.22	4.53	4.65	4.82	**5.09**	5.56	1.23	2.37	2.33	3.02	**3.45**	3.45	3.88	0.95	1.26
Copper (µg/L)	µg/L	11.86	27.40	17.20	15.80	10.00	1.26	1.39	1.97	10.40	3.87	22.74	28.66	33.74	6.20	17.82	3.88	0.95	1.26	1.39	1.97	21.88	0.20	2.20	3.55
Mercury (µg/L)	µg/L	106.20	118.70	104.80	76.50	10.40	2.62	1.94	1.53	3.91	0.21	3.97	0.53	20.29	30.51	26.59	28.72	5.36	34.82	27.33	26.47	1.23	2.37	2.33	3.02
Molybdenum (µg/L)	µg/L	2.17	162.40	172.70	196.70	175.50	161.40	137.90	114.70	123.40	34.50	41.50	45.32	7.65	3.67	6.23	86.20	83.10	71.60	55.31	14.92	3.88	0.95	1.26	1.39
Nickel (µg/L)	µg/L	179.50	180.40	185.60	176.40	155.00	133.50	3.55	3.51	10.32	1.99	2.86	5.40	2.59	3.01	2.04	15.96	11.32	22.40	16.53	11.84	2.61	2.30	2.62	1.94
Selenium (µg/L)	µg/L	18.90	65.10	67.90	67.30	12.30	2.33	3.02	3.45	10.98	1.98	0.28	2.61	2.30	2.62	1.94	102.90	94.30	113.10	95.90	79.20	69.64	61.89	29.78	54.31
Silver (µg/L)	µg/L	116.70	110.60	70.90	101.50	95.60	20.80	18.00	15.70	74.90	78.80	92.11	85.60	83.60	87.20	104.10	112.90	117.30	122.10	99.70	97.20	21.88	0.20	2.20	3.55
Thallium (µg/L)	µg/L	32.50	**47.60**	48.20	52.10	52.60	34.82	**27.33**	26.47	**2.64**	**5.86**	**0.89**	**21.88**	**0.20**	**2.20**	**3.55**	**0.89**	21.88	0.20	2.20	**3.55**	**1.23**	**2.37**	**2.33**	**3.02**
Vanadium (µg/L)	µg/L	183.20	**23.94**	16.38	134.60	**114.80**	**117.50**	114.50	14.92	**8.88**	**0.34**	**4.98**	**1.23**	**2.37**	**2.33**	**3.02**	**4.98**	1.23	2.37	2.33	**3.02**	**3.88**	0.95	1.26	**1.39**
Zinc (µg/L)	µg/L	174.10	**124.50**	85.40	85.10	90.60	87.30	84.50	82.60	**70.90**	**45.10**	**51.00**	3.88	0.95	**1.26**	1.39	**3.45**	**3.88**	0.95	1.26	**1.39**	28.72	5.36	34.82	27.33

Notes:
mg/kg = Milligrams/kilogram
Metals detected in at least one sample shown in bold.
ND = Not detected above method detection limit shown in parentheses.
na = Not analyzed.
B = The metal was detected in the laboratory method blank corresponding to that batch of samples.
E = The concentration indicated is an estimated value above the calibration range of the instrument. The value shown is considered an estimate.
J = The metal was positively identified above the method detection limit but below the reporting limit. The reported numerical value is the approximate concentration of the metal in the sample.
U = The metal was analyzed for, but was not detected above the reported sample quantitation limit.
I = Laboratory control sample recovery failure.
x = Field blank contamination.
y = Method blank contamination.

TABLE 4-2
Palisade Glacier
Crevasse Metal Data
Sierra Nevada Mtns, CA

Sample ID:		C25	C26	C27	C28	C29	C30	C31	C32	C33	C34	C35	C36	C37	C38	C39	C40	C41	C42	C43	C44	C45	C46	C47	C48
Type:		Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger
Depth Below Ground Surface (ft):		12.0	12.5	13.0	13.5	14.0	14.5	15.0	15.5	16.0	16.5	17.0	17.5	18.0	18.5	19.0	19.5	20.0	20.5	21.0	21.5	22.0	22.5	23.0	23.5
Sample Date:		9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005
Analytical Lab		OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD
Metals by EPA 7420																									
Total Lead (µg/L)	µg/L	0.33	5.12	5.66	5.18	15.96	11.32	22.40	3.51	10.32	1.99	2.86	5.40	2.59	3.01	2.04	15.96	11.32	22.40	16.53	1.53	3.91	4.33	6.23	7.20
Antimony (µg/L)	µg/L	3.79	19.52	59.10	102.17	132.50	139.00	116.90	3.45	10.98	1.98	0.28	2.61	2.30	2.62	1.94	163.65	183.80	184.58	156.37	62.81	13.52	3.99	2.04	15.96
Arsenic (µg/L)	µg/L	34.82	5.98	309.47	324.61	247.10	247.30	255.80	96.20	80.68	55.82	92.11	69.64	61.89	29.78	54.31	222.50	261.60	305.30	250.70	77.20	65.40	100.00	81.70	85.70
Barium (µg/L)	µg/L	18.32	0.50	0.22	4.53	4.65	4.82	25.69	26.47	75.12	88.34	92.59	44.10	0.20	2.20	3.55	0.89	21.88	0.20	2.20	9.80	4.70	7.31	54.31	38.90
Beryllium (µg/L)	µg/L	22.40	10.40	3.87	22.74	134.70	153.00	6.20	14.92	8.88	0.34	4.98	1.23	2.37	2.33	3.02	26.10	1.23	2.37	2.33	27.50	80.68	0.28	3.55	0.89
Cadmium (µg/L)	µg/L	47.40	3.91	0.21	3.97	0.53	20.29	30.51	11.84	0.71	2.44	3.45	3.88	0.95	1.26	1.39	3.45	3.88	0.95	1.26	26.47	2.64	92.11	3.02	4.98
Chromium (µg/L)	µg/L	76.00	13.52	19.11	306.28	45.32	7.65	3.67	21.88	0.20	2.20	3.55	1.23	2.37	2.33	3.02	62.81	0.89	21.88	0.20	14.92	15.50	0.89	1.39	3.45
Cobalt (µg/L)	µg/L	5.09	3.02	3.45	0.50	0.22	4.53	1.95	4.33	3.85	3.70	5.99	3.65	2.24	1.36	1.98	3.51	4.98	1.23	2.37	36.60	0.71	4.98	54.31	62.81
Copper (µg/L)	µg/L	6.20	1.39	1.97	10.40	3.87	22.74	26.57	11.89	32.97	44.38	2.80	2.75	0.64	5.55	5.36	3.45	3.45	3.88	0.95	26.59	28.72	3.45	3.55	3.51
Mercury (µg/L)	µg/L	30.51	1.94	1.53	40.00	0.21	3.97	2.38	60.60	1.09	1.25	4.96	8.36	13.25	28.72	5.36	1.97	0.28	2.61	2.30	14.50	-0.50	0.28	3.02	3.45
Molybdenum (µg/L)	µg/L	3.67	54.31	62.81	151.50	272.30	306.28	203.20	141.10	109.70	80.00	81.20	226.00	263.90	267.40	300.40	265.70	128.90	115.90	96.50	37.90	32.00	92.11	1.39	1.97
Nickel (µg/L)	µg/L	3.01	3.55	3.51	10.32	1.99	2.86	2.30	6.80	1.94	1.53	5.12	5.66	5.18	15.96	11.32	62.81	0.89	11.50	0.20	16.20	30.80	0.89	27.33	26.47
Selenium (µg/L)	µg/L	2.62	3.02	3.45	10.98	1.98	0.28	61.89	29.78	54.31	62.81	19.52	59.10	102.17	163.65	241.80	72.50	4.98	1.23	2.37	54.31	40.40	4.98	55.31	14.92
Silver (µg/L)	µg/L	29.78	1.39	1.97	80.68	55.82	132.50	0.20	33.30	28.70	3.51	5.98	309.47	324.61	251.50	262.50	133.00	156.10	58.80	60.90	44.50	0.89	3.45	16.53	11.84
Thallium (µg/L)	µg/L	2.20	98.00	107.20	116.10	113.10	104.40	105.70	80.68	55.82	92.11	69.64	61.89	29.78	54.31	222.50	102.60	110.00	29.00	27.80	45.40	20.00	13.25	86.80	68.20
Vanadium (µg/L)	µg/L	2.33	78.70	90.90	132.70	0.34	4.98	26.47	45.40	71.50	0.89	21.88	0.20	2.20	3.55	0.89	73.80	136.80	42.10	42.40	42.80	36.90	16.38	69.64	61.89
Zinc (µg/L)	µg/L	36.40	46.10	47.30	76.10	84.00	79.20	90.40	21.88	0.20	2.20	3.55	3.51	10.32	1.99	2.86	40.70	61.30	86.60	89.60	70.40	55.10	5.18	21.88	0.20

Notes:
mg/kg = Milligrams/kilogram
Metals detected in at least one sample shown in bold.
ND = Not detected above method detection limit shown in parentheses.
na = Not analyzed.
B = The metal was detected in the laboratory method blank corresponding to that batch of samples.
E = The concentration indicated is an estimated value above the calibration range of the instrument. The value shown is considered an estimate.
J = The metal was positively identified above the method detection limit but below the reporting limit. The reported numerical value is the approximate concentration of the metal in the sample.
U = The metal was analyzed for, but was not detected above the reported sample quantitation limit.
I = Laboratory control sample recovery failure.
x = Field blank contamination.
y = Method blank contamination.

TABLE 4-3
Palisade Glacier
Crevasse Metal Data
Sierra Nevada Mtns, CA

Sample ID:		C49	C50	C51	C52	C53	C54	C55	C56	C57	C58	C59	C60	C61	C62	C63	C64	C65	C66	C67	C68	C69	C70	C71	C72
Type:		Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger	Hand Auger
Depth Below Ground Surface (ft):		24.0	24.5	25.0	25.5	26.0	26.5	27.0	27.5	28.0	28.5	29.0	29.5	30.0	30.5	31.0	31.5	32.0	32.5	33.0	33.5	34.0	34.5	35.0	35.5
Sample Date:		9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005	9/24/2005
Analytical Lab		OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD	OCWD
Metals by EPA 7420																									
Total Lead (µg/L)	µg/L	3.51	3.55	3.51	7.00	1.99	2.86	5.40	3.60	1.98	3.30	1.23	2.37	2.33	4.20	4.30	4.50	5.50	6.90	3.60	4.30	3.51	2.60	4.90	1.94
Antimony (µg/L)	µg/L	3.45	3.02	3.45	10.98	1.98	0.28	2.61	80.68	55.82	3.45	3.88	0.95	1.26	0.89	21.88	0.20	2.20	69.64	61.89	2.62	3.02	3.45	10.98	23.50
Arsenic (µg/L)	µg/L	75.80	71.80	63.50	80.68	55.82	71.30	69.64	2.64	5.86	3.55	1.23	2.37	2.33	72.30	62.81	5.18	15.96	11.32	22.40	29.78	1.39	1.97	80.68	3.98
Barium (µg/L)	µg/L	26.47	27.33	26.47	2.64	5.86	0.89	21.88	8.88	0.34	5.99	3.65	2.24	1.36	0.89	3.51	102.17	64.50	83.30	79.20	2.20	27.33	26.47	2.64	2.86
Beryllium (µg/L)	µg/L	14.92	55.31	14.92	8.88	0.34	4.98	1.23	0.71	2.44	21.88	0.20	1.94	83.30	4.98	3.45	3.51	7.31	8.86	5.98	9.43	10.33	12.82	13.62	14.57
Cadmium (µg/L)	µg/L	11.84	16.53	11.84	0.71	2.44	3.45	3.88	0.20	2.20	1.23	2.37	54.31	100.40	3.45	1.97	0.59	0.28	3.55	2.48	5.86	0.89	21.88	0.20	2.20
Chromium (µg/L)	µg/L	21.88	33.74	6.20	17.82	3.88	0.95	1.26	1.39	1.97	4.33	0.73	3.55	0.89	62.81	26.47	2.58	92.11	3.02	1.53	0.34	4.98	1.23	2.37	2.33
Cobalt (µg/L)	µg/L	4.33	20.29	30.51	26.59	28.72	5.36	34.82	27.33	26.47	3.99	5.13	3.02	4.98	3.51	14.92	26.47	0.89	1.39	62.81	2.44	3.45	3.88	0.95	1.26
Copper (µg/L)	µg/L	11.89	7.65	3.67	6.23	83.30	22.58	18.32	55.31	14.92	4.90	2.79	1.39	3.45	3.45	11.84	14.92	4.98	54.31	3.51	8.36	13.25	28.72	5.36	34.82
Mercury (µg/L)	µg/L	1.39	2.59	3.01	2.04	15.96	11.32	22.40	16.53	11.84	7.31	9.38	3.45	3.88	1.97	82.60	0.89	3.45	3.55	32.97	44.38	2.80	2.75	0.64	5.55
Molybdenum (µg/L)	µg/L	12.22	2.30	2.62	1.94	2.37	9.61	3.75	1.37	2.09	19.11	3.73	14.62	1.23	1.53	61.89	4.98	0.28	3.02	1.09	1.25	4.96	8.36	13.25	28.72
Nickel (µg/L)	µg/L	2.62	6.18	29.78	54.31	22.75	13.69	44.97	35.80	63.25	1.99	2.86	2.30	3.88	62.81	0.20	3.45	92.11	1.39	5.97	9.58	81.20	84.50	16.38	48.50
Selenium (µg/L)	µg/L	9.72	0.20	2.20	3.55	0.89	21.88	0.20	2.20	3.55	1.98	0.28	61.89	0.22	4.53	4.65	30.90	0.89	27.33	1.94	1.53	5.12	5.66	5.18	15.96
Silver (µg/L)	µg/L	2.20	2.37	2.33	3.02	4.98	1.23	2.37	2.33	3.02	55.82	46.00	0.20	3.87	22.74	28.66	33.74	4.98	55.31	54.31	62.81	19.52	59.10	10.27	12.88
Thallium (µg/L)	µg/L	8.95	0.95	1.26	1.39	3.45	3.88	0.95	1.26	1.39	5.86	0.89	1.97	0.21	3.97	0.53	20.29	3.45	16.53	3.55	3.51	5.98	34.65	32.04	27.41
Vanadium (µg/L)	µg/L	2.64	5.40	2.59	3.01	2.04	15.96	11.32	22.40	16.53	0.34	4.98	26.47	19.11	83.90	45.32	7.65	3.29	6.58	5.62	9.17	9.64	1.91	9.58	7.44
Zinc (µg/L)	µg/L	21.88	2.61	2.30	2.62	1.94	114.60	107.50	100.00	94.00	2.44	3.45	0.89	3.45	0.50	0.22	50.00	50.90	69.64	5.86	0.89	21.88	0.20	2.20	3.55

Notes:
mg/kg = Milligrams/kilogram
Metals detected in at least one sample shown in bold.
ND = Not detected above method detection limit shown in parentheses.
na = Not analyzed.
B = The metal was detected in the laboratory method blank corresponding to that batch of samples.
E = The concentration indicated is an estimated value above the calibration range of the instrument. The value shown is considered an estimate.
J = The metal was positively identified above the method detection limit but below the reporting limit. The reported numerical value is the approximate concentration of the metal in the sample.
U = The metal was analyzed for, but was not detected above the reported sample quantitation limit.
I = Laboratory control sample recovery failure.
x = Field blank contamination.
y = Method blank contamination.

Table 5-1

GPS Location
of
Glacier Surface Samples
Palisade Glacier, California

Sample	Glacier Surface Samples (collected 9/24/05)		
	GPS Location		Sample Elevation (feet above msl)
	Easting	Northing	
S1	37.101493	118.503792	12,560
S2	37.101164	118.503936	12,600
S3	37.100728	118.504203	12,640
S4	37.100346	118.504468	12,715
S5	37.100178	118.505314	12,720
S6	37.100175	118.506227	12,680
S7	37.100307	118.506912	12,645
S8	37.100408	118.507306	12,610
S9	37.100485	118.508028	12,605
S10	37.100834	118.508434	12,590
S11	37.101328	118.508425	12,550
S12	37.102009	118.507861	12,460
S13	37.102251	118.507375	12,405
S14	37.102696	118.506678	12,350
S15	37.10309	118.506344	12,320
S16	37.103323	118.506219	12,310
S17	37.103607	118.505835	12,290
S18	37.103993	118.505948	12,270
S19	37.104347	118.505718	12,250
S20	37.104786	118.505624	12,235
S21	37.104989	118.505344	12,220
S22	37.105224	118.505443	12,210
S23	37.105386	118.505234	12,205
S24	37.105676	118.505314	12,190

Notes:
NAD 27 Datum used
All elevation measurements were sourced from USGS Topographic Maps.
msl = mean sea level

Table 6-1

GPS Location of Fluvial Water Runoff
With Stabilized Field Parameters

Palisade Glacier, California

Sample	Date	Surface Water Runoff (Samples collected 9/24/05)			Field Parameter Measurements (Stabilized)			
		GPS Location		Sample Elevation (feet above msl)	Temperature (Deg. C)	pH	Conductivity (µmho/cm)	Turbidity (NTU)
		Easting	Northing					
R1	9/24/2007	37.107180	118.503760	12,125	3.81	7.26	1,000	2.4
R2	9/24/2007	37.118521	118.504352	11,540	4.61	8.76	653	5.3
R3	9/24/2007	37.122272	118.497400	10,625	3.55	7.52	752	3.4
R4	9/25/2007	37.121368	118.490880	10,255	4.20	8.42	801	6.2
R5	9/25/2007	37.123203	118.484193	9,880	3.28	7.27	953	1.3
R6	9/25/2007	37.127109	118.475059	9,110	3.49	7.35	820	3.4
R7	9/25/2007	37.134204	118.465176	8,735	2.23	7.06	971	4.2
R8	9/25/2007	37.129020	118.445205	8,215	2.41	7.21	1,236	2.0

Notes:
NAD 27 Datum used
All depth to groundwater measurements were made from the top of the well casings.
msl = mean sea level

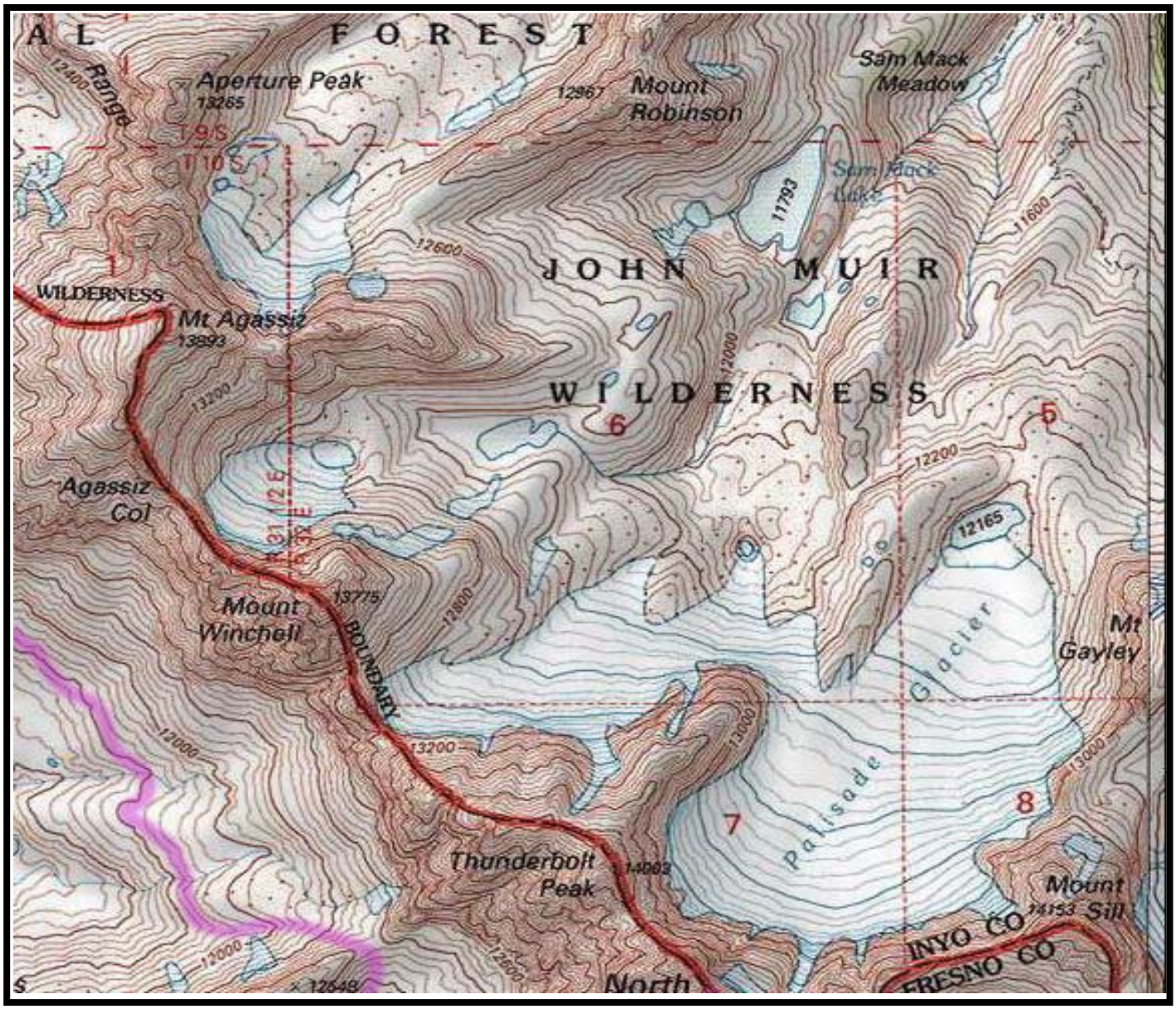
FIGURES

Figure #1

Vicinity Map
of North Palisade Glacier

Figure #2

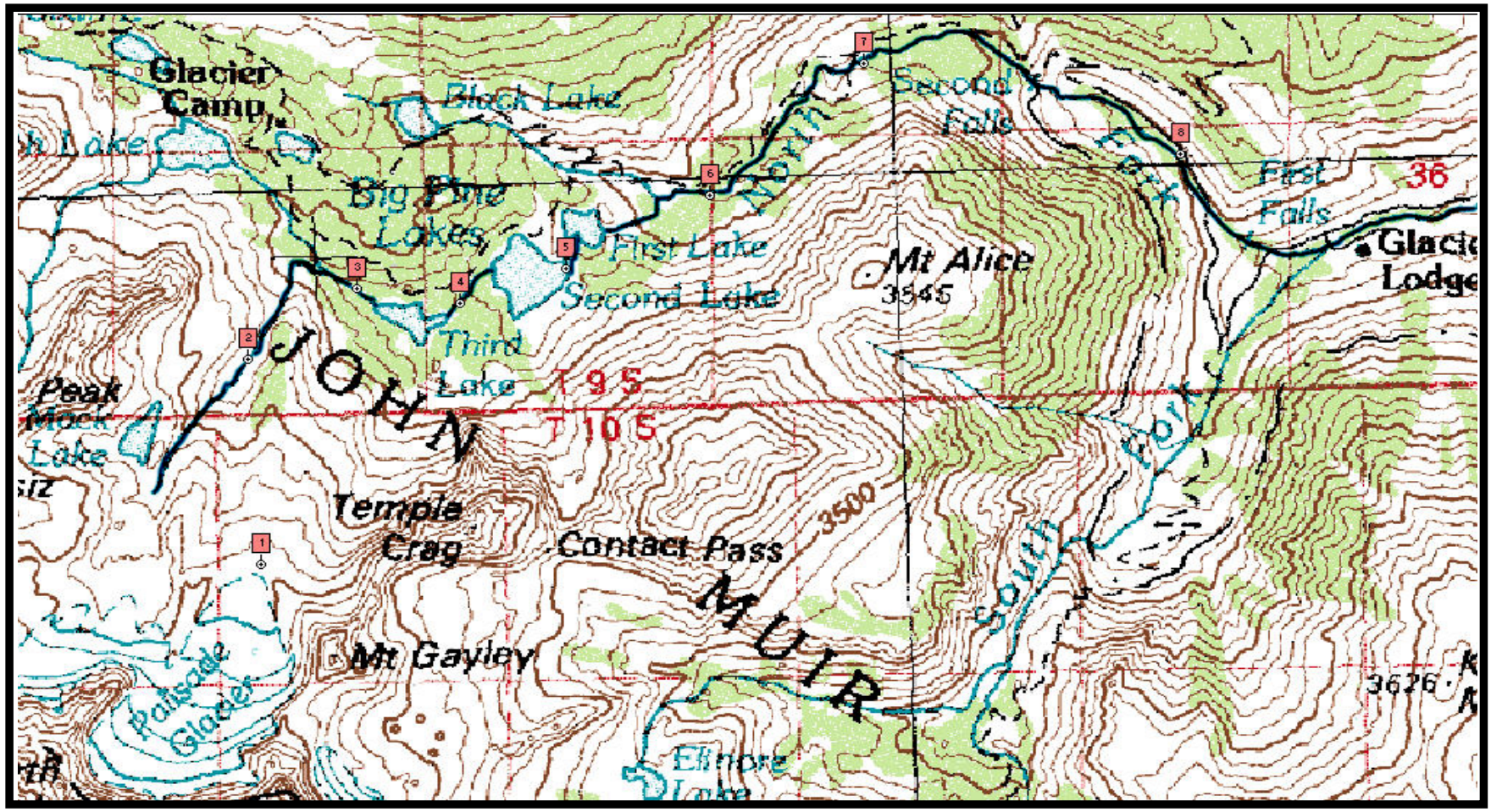
Local Topagraphy Map
of
North Palisade Glacier



0 .5 1 MILE
0 1000 FEET 0 500 1000 METERS

Figure #3

Sample Locations of Fluvial Runoff



One Mile

Figure #4

Sample Locations along the North Palisade Glacier Surface

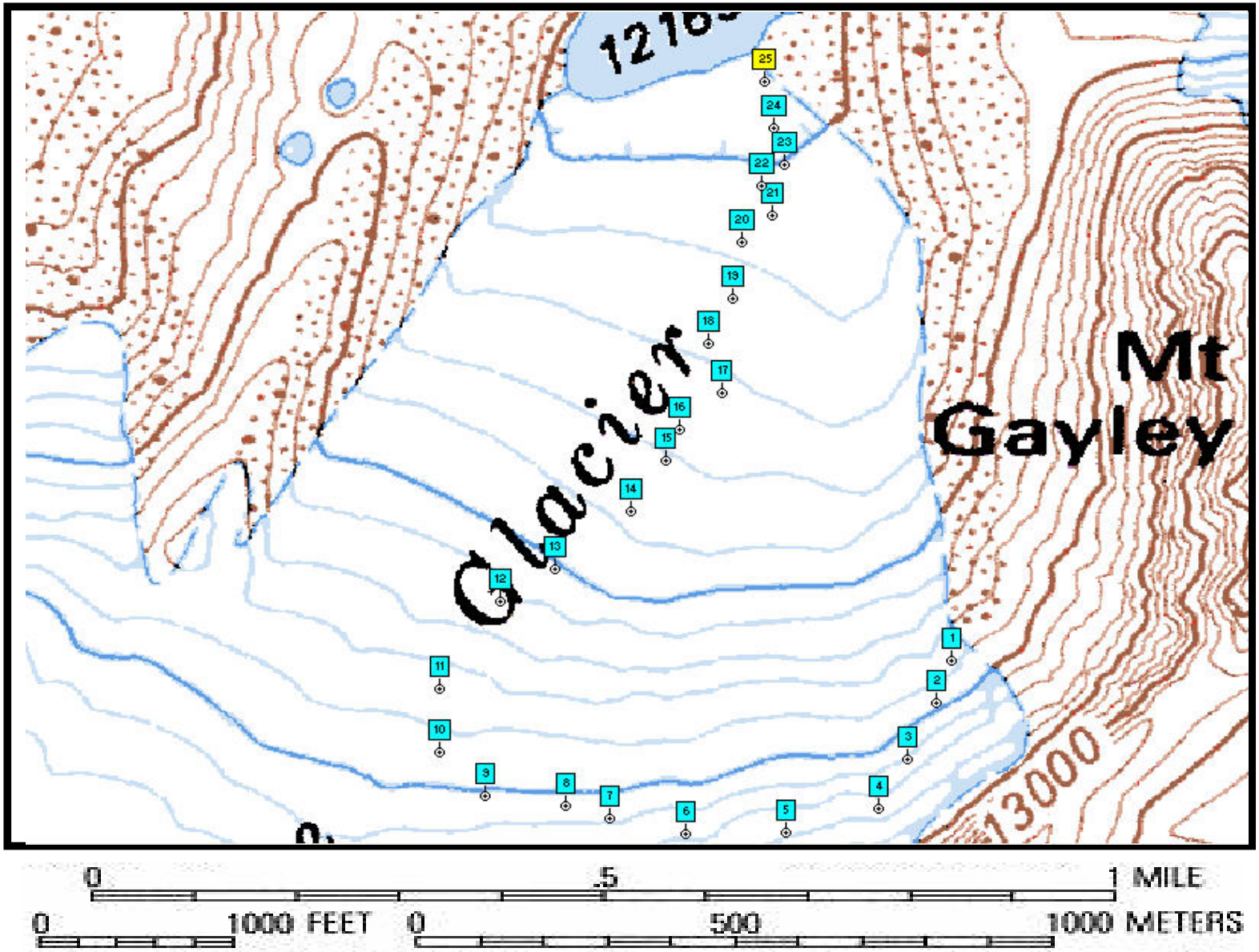
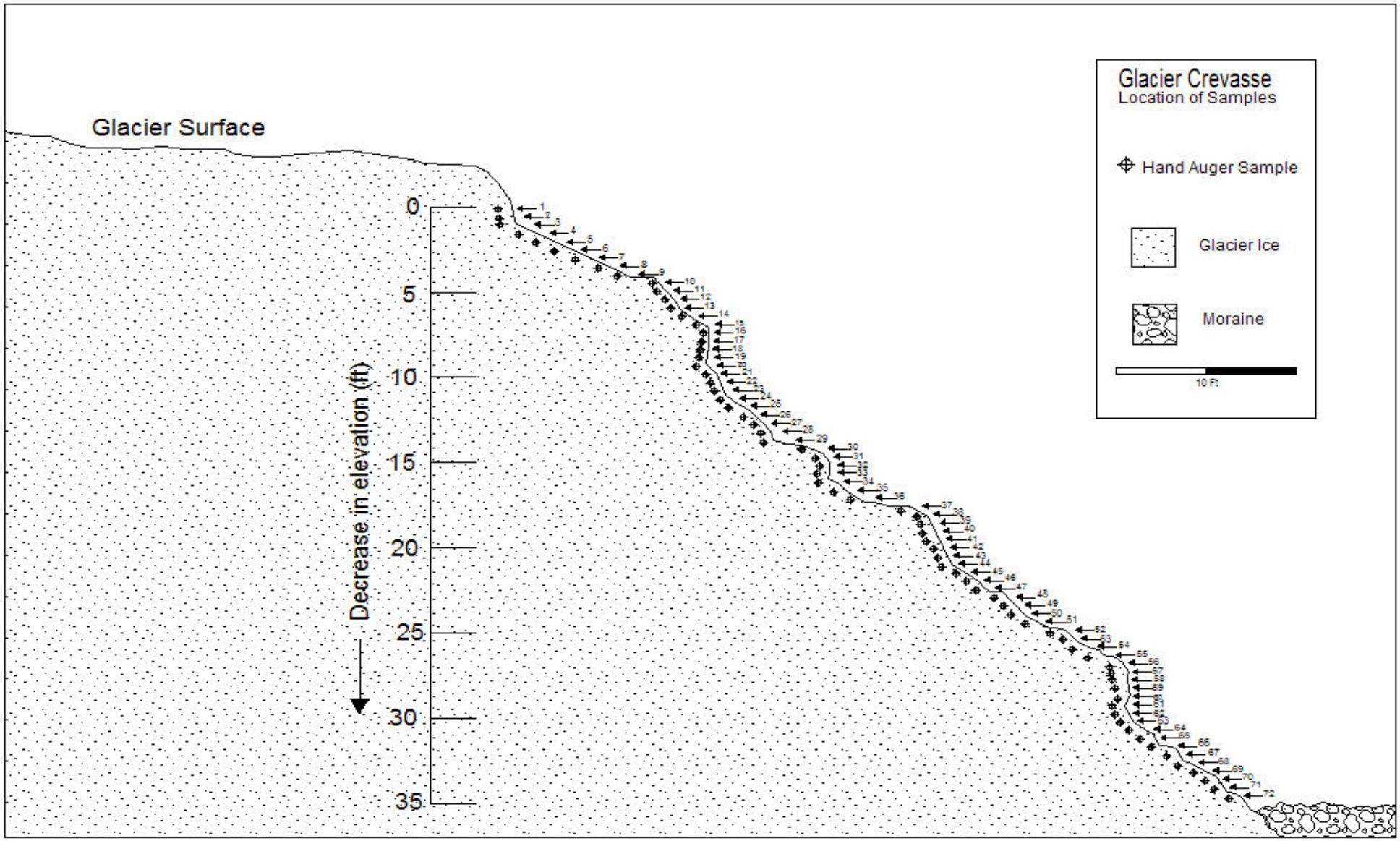


Figure #5

Cross Section View of
Sample Locations within Glacier Crevasse



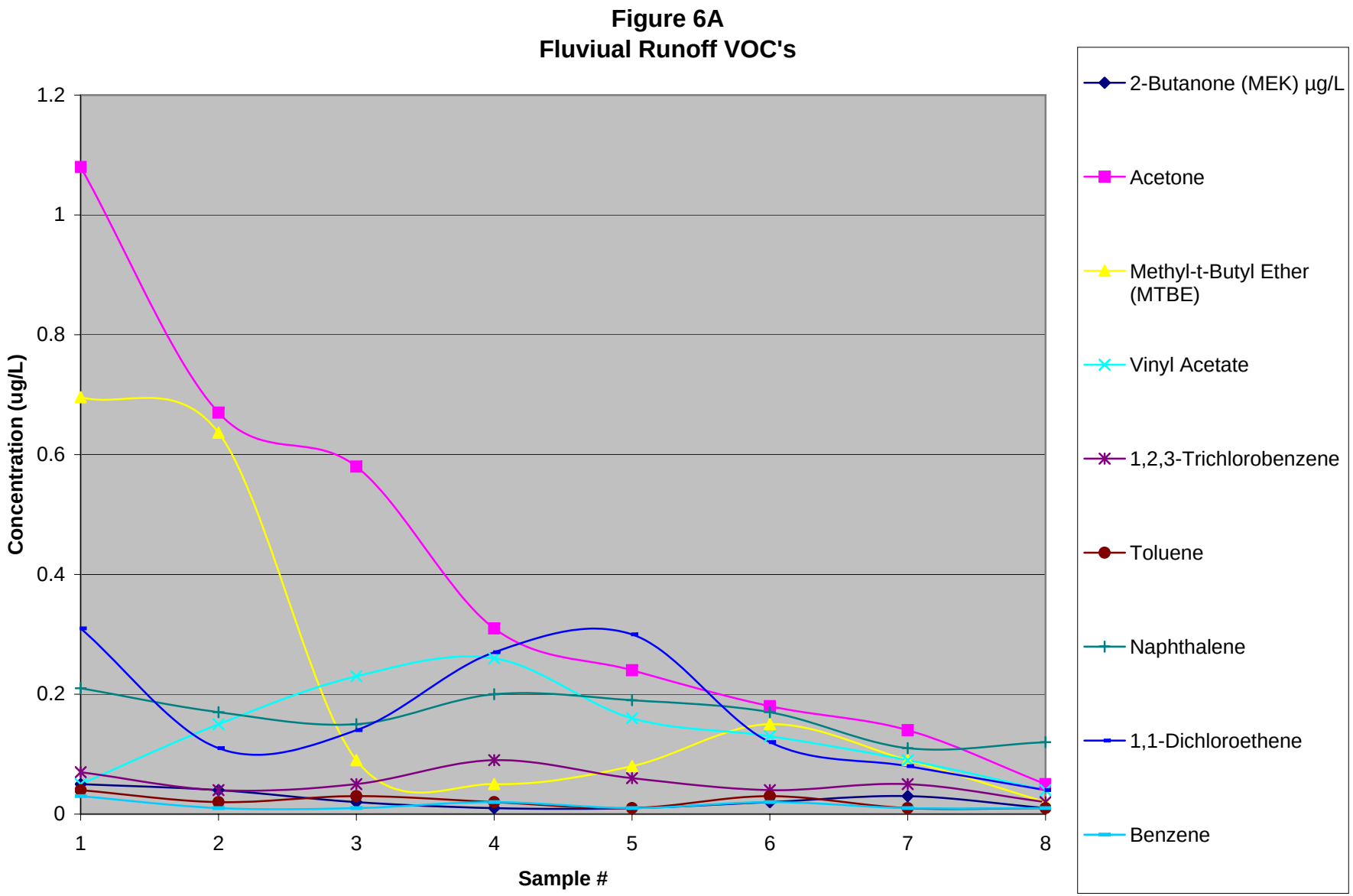


Figure 6A
Fluviual Runoff VOC's
Concentration (ug/L)
1.2
1
0.8
0.6
0.4
0.2
0
1
2
3
4
5
6
7
8
Sample #
2-Butanone (MEK) µg/L
Acetone
Methyl-t-Butyl Ether (MTBE)
Vinyl Acetate
1,2,3-Trichlorobenzene
Toluene
Naphthalene
1,1-Dichloroethene
Benzene

Figure No. 3

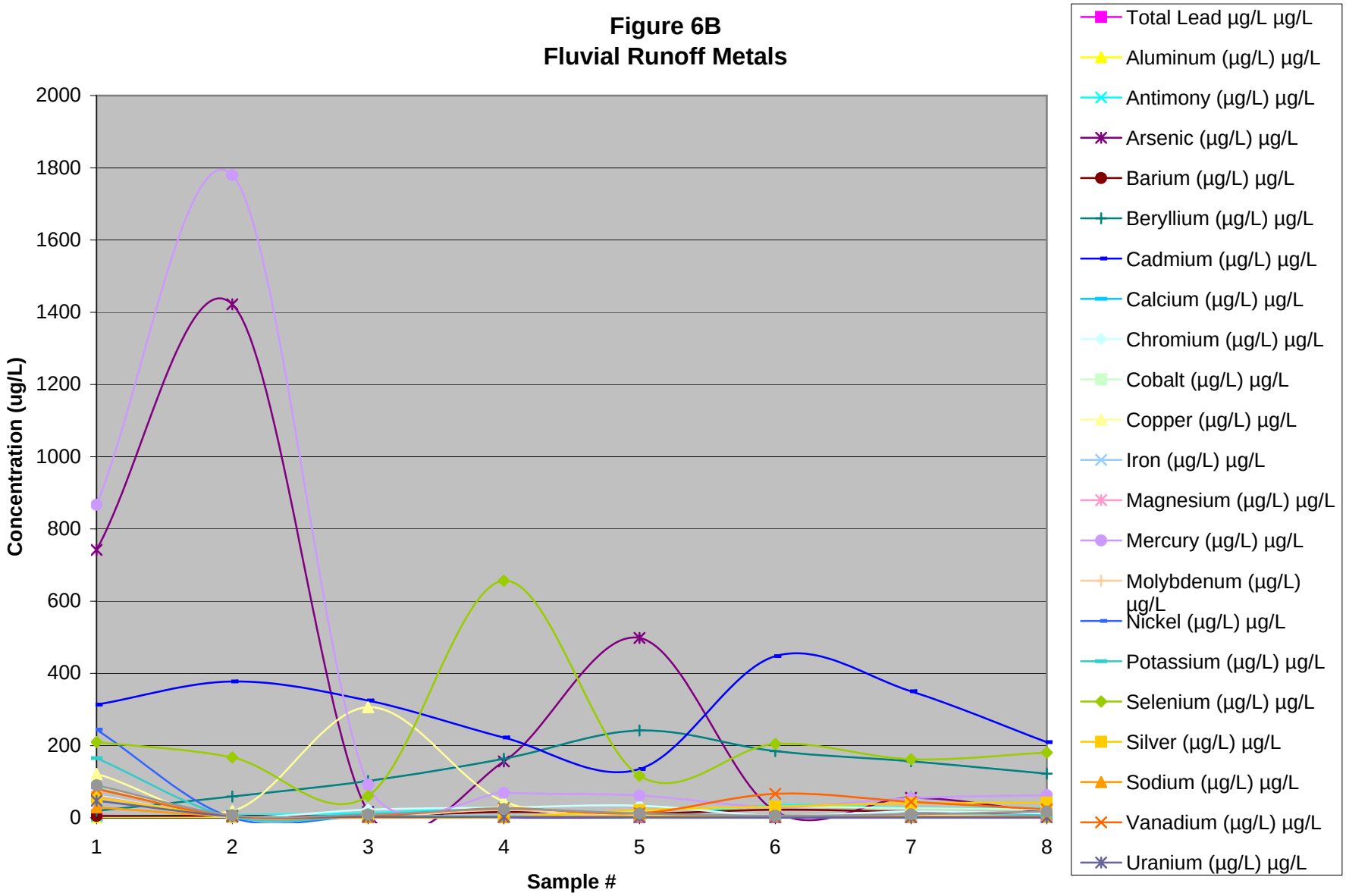


Figure 6B
Fluvial Runoff Metals
Concentration (ug/L)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
1
2
3
4
5
6
7
8
Sample #
Total Lead µg/L µg/L
Aluminum (µg/L) µg/L
Antimony (µg/L) µg/L
Arsenic (µg/L) µg/L
Barium (µg/L) µg/L
Beryllium (µg/L) µg/L
Cadmium (µg/L) µg/L
Calcium (µg/L) µg/L
Chromium (µg/L) µg/L
Cobalt (µg/L) µg/L
Copper (µg/L) µg/L
Iron (µg/L) µg/L
Magnesium (µg/L) µg/L
Mercury (µg/L) µg/L
Molybdenum (µg/L) µg/L
Nickel (µg/L) µg/L
Potassium (µg/L) µg/L
Selenium (µg/L) µg/L
Silver (µg/L) µg/L
Sodium (µg/L) µg/L
Vanadium (µg/L) µg/L
Uranium (µg/L) µg/L

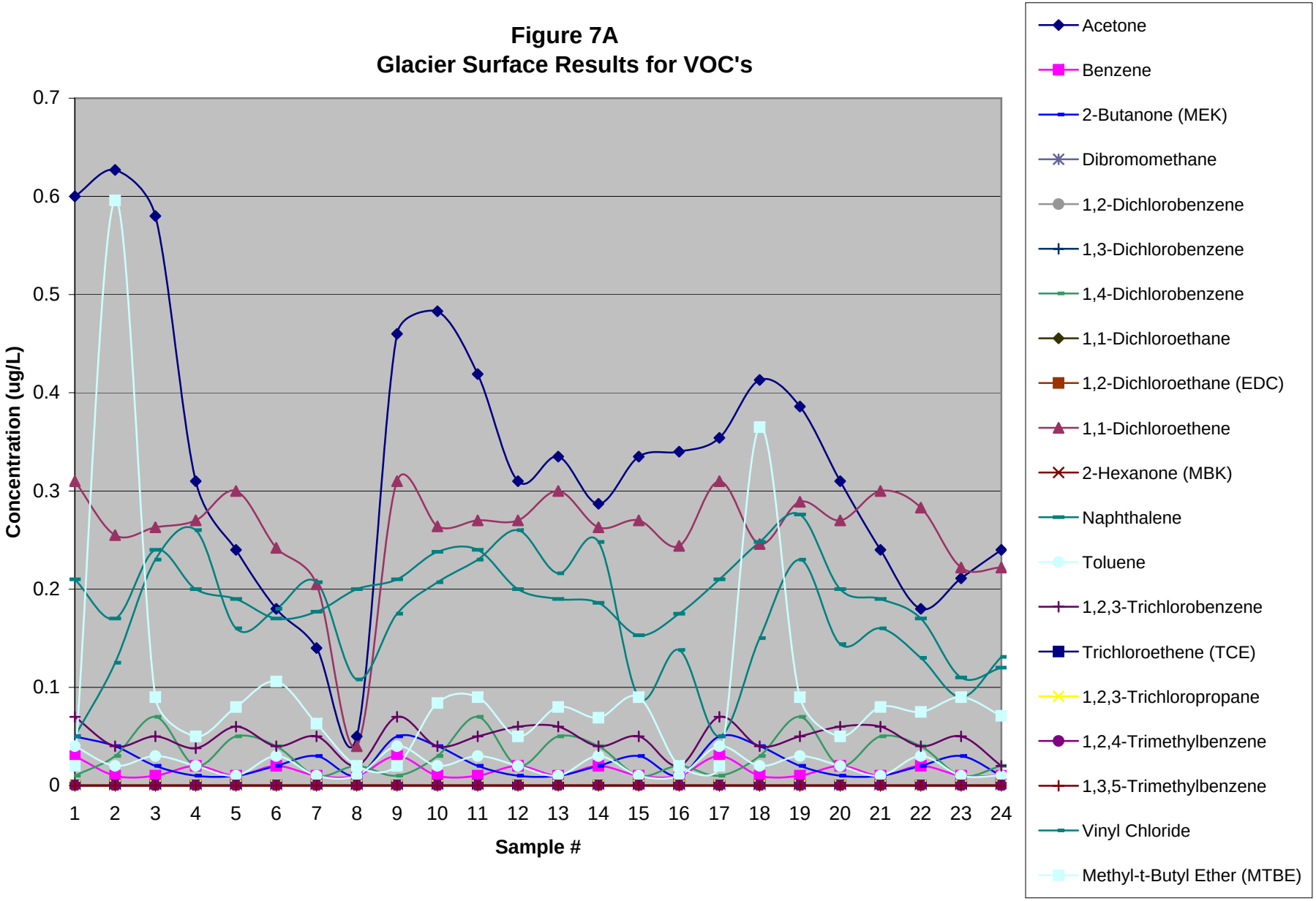
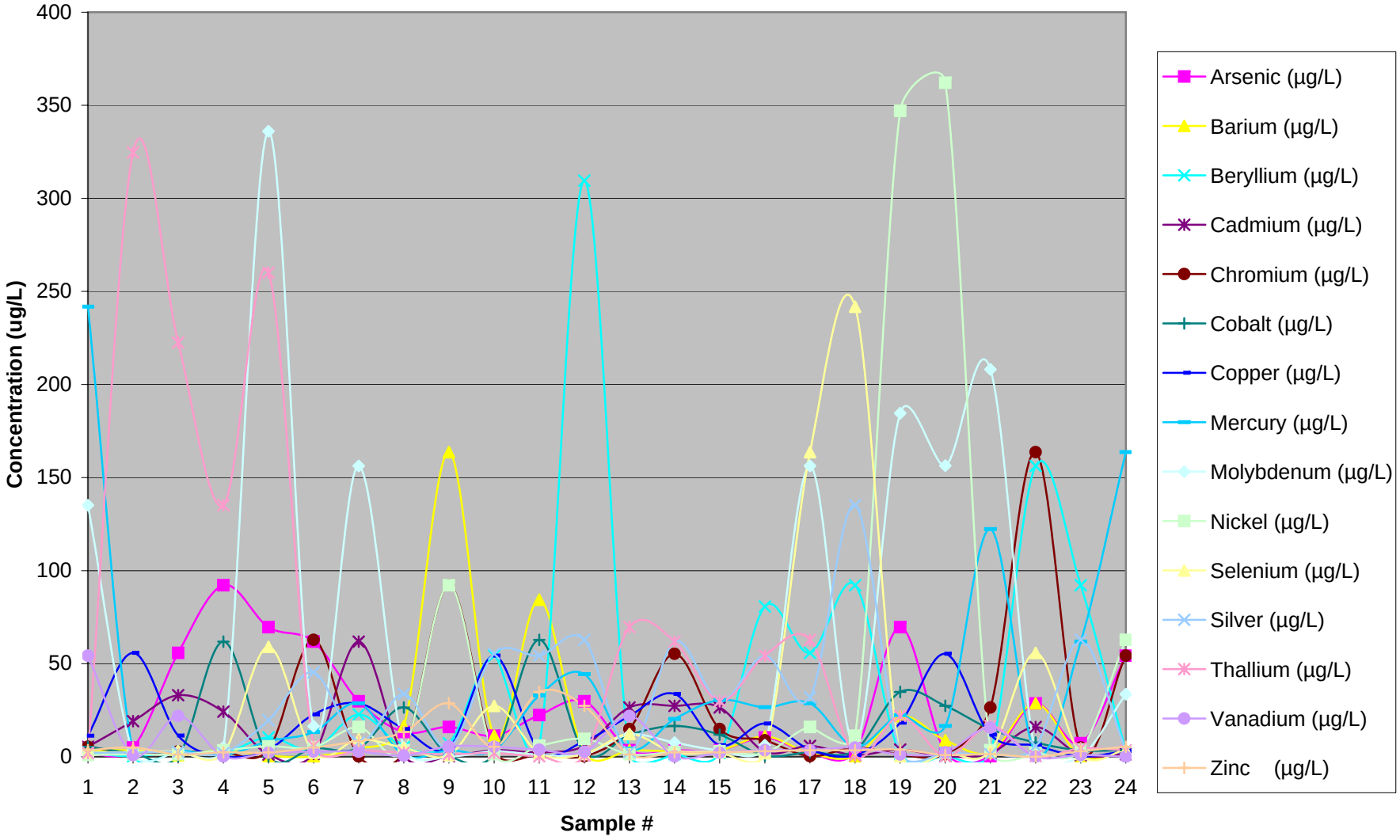


Figure 7A
Glacier Surface Results for VOC's
Concentration (ug/L)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Sample #
Acetone
Benzene
2-Butanone (MEK)
Dibromomethane
1,2-Dichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
1,1-Dichloroethane
1,2-Dichloroethane (EDC)
1,1-Dichloroethene
2-Hexanone (MBK)
Naphthalene
Toluene
1,2,3-Trichlorobenzene
Trichloroethene (TCE)
1,2,3-Trichloropropane
1,2,4-Trimethylbenzene
1,3,5-Trimethylbenzene
Vinyl Chloride
Methyl-t-Butyl Ether (MTBE)

Figure 7B
Glacier Surface Results for Metals



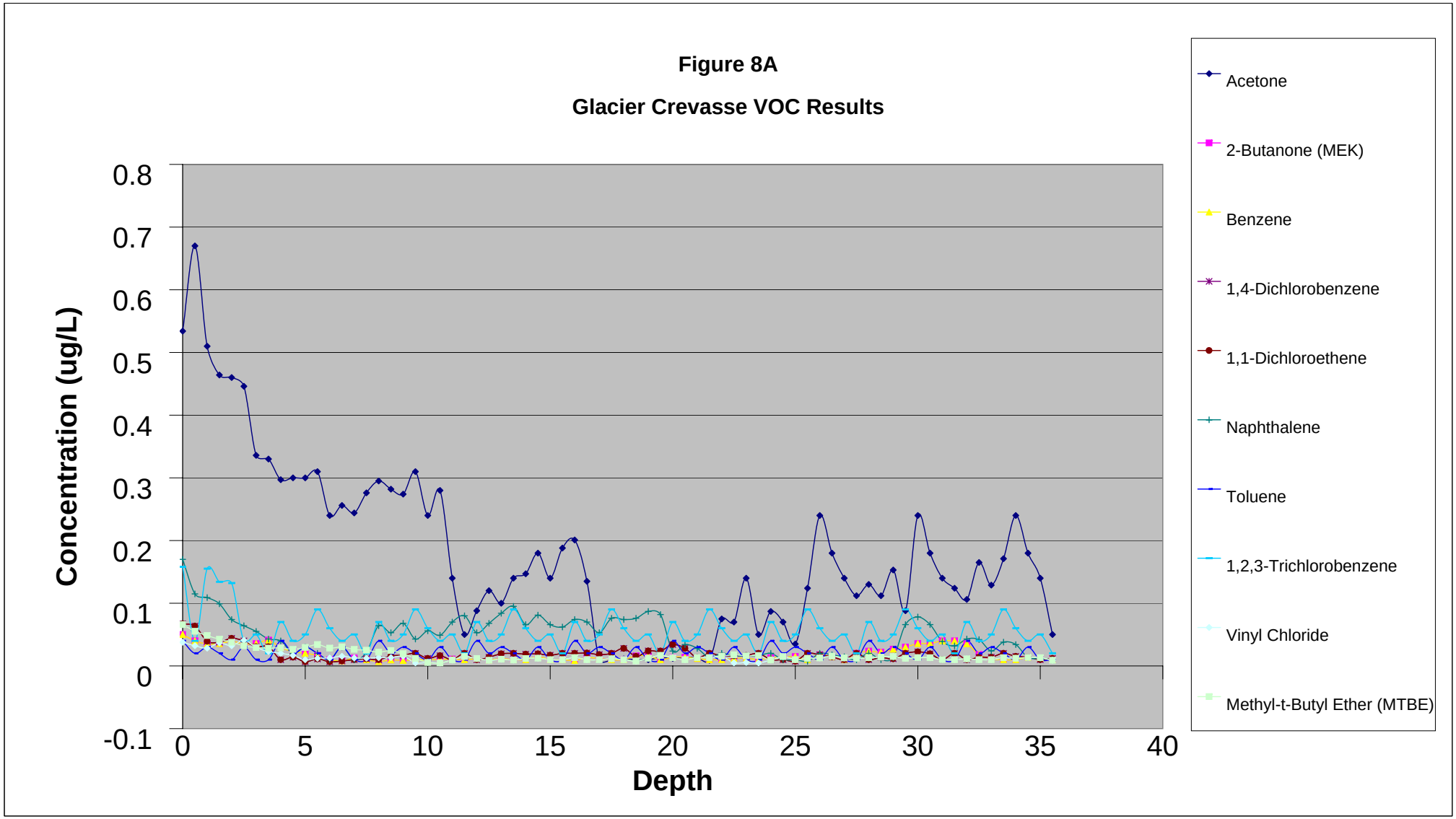


Figure 8A
Glacier Crevasse VOC Results
Concentration (ug/L)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
0
5
10
15
20
25
30
35
40
Depth
Acetone
2-Butanone (MEK)
Benzene
1,4-Dichlorobenzene
1,1-Dichloroethene
Naphthalene
Toluene
1,2,3-Trichlorobenzene
Vinyl Chloride
Methyl-t-Butyl Ether (MTBE)

Figure 8B
Glacier Crevasse Metal Content

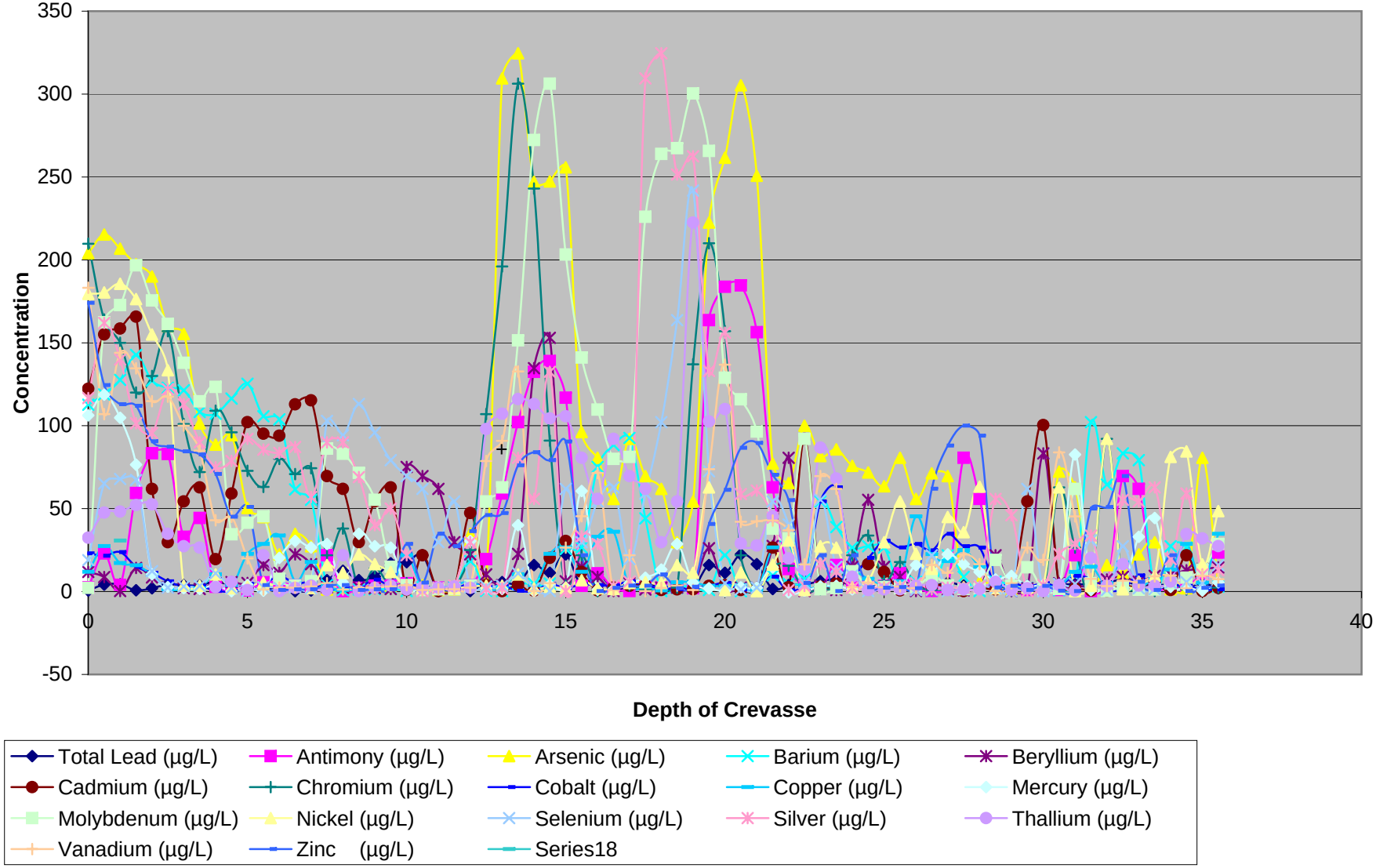
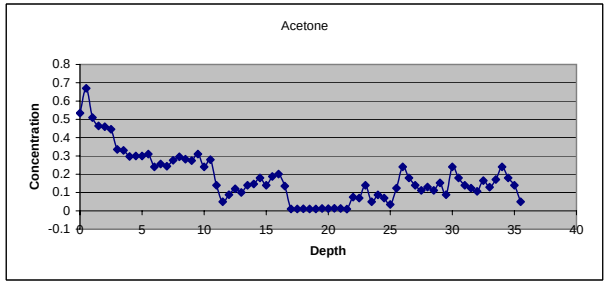
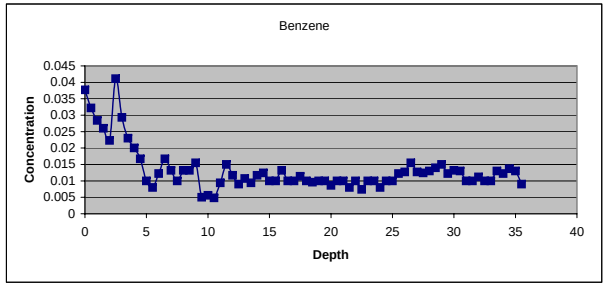
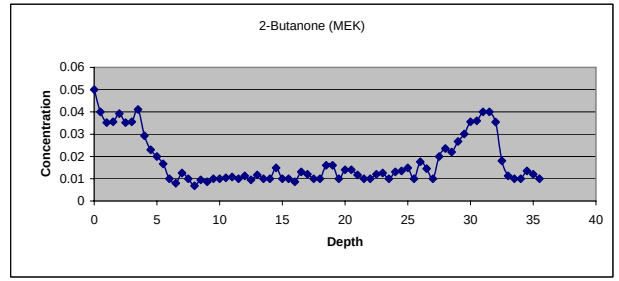
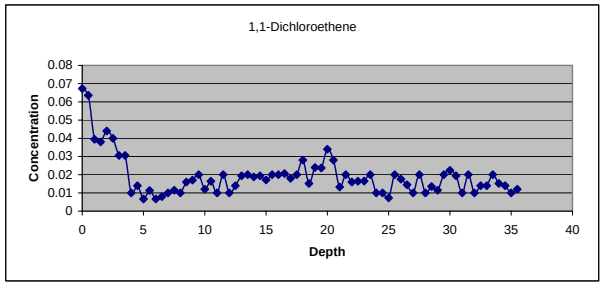


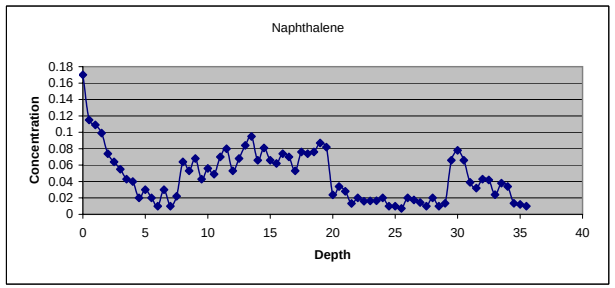
Figure 8C
Palisade Glacier Surface Results for Individual VOC's

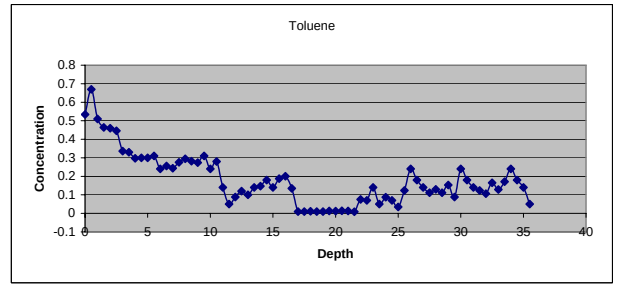


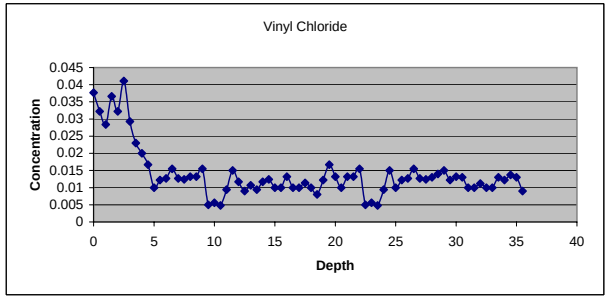


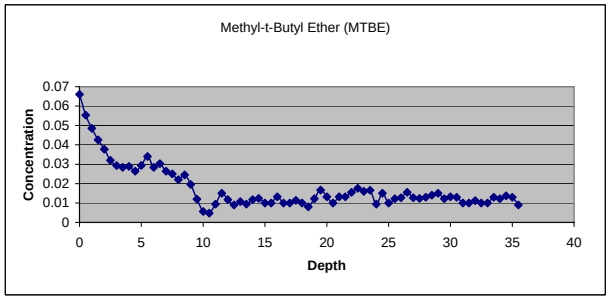


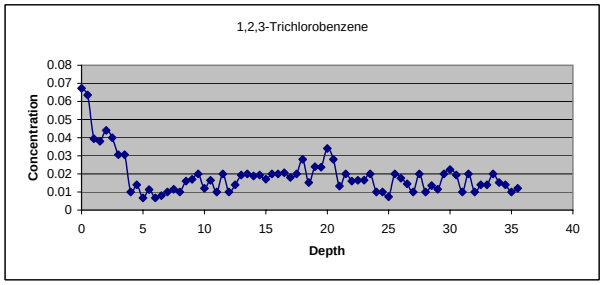












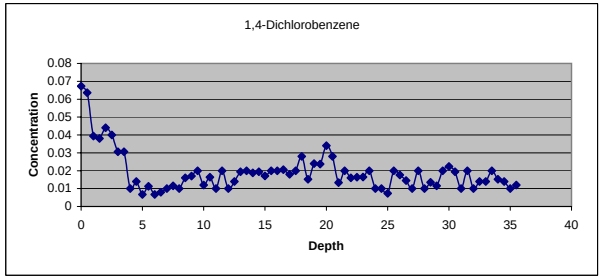
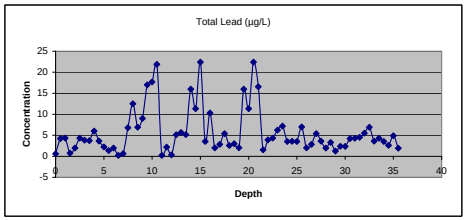
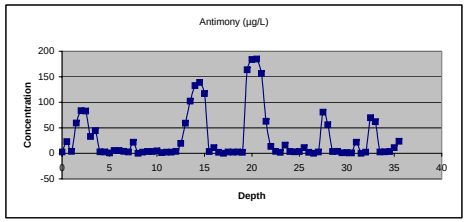
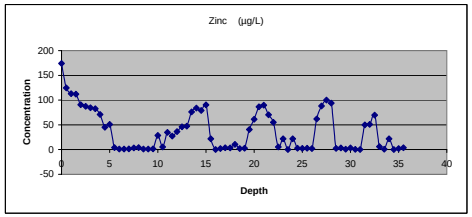
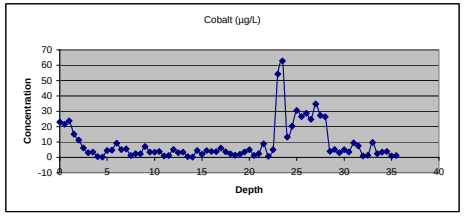


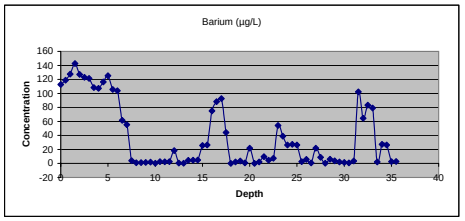
Table 8D
Palisade Glacier Crevasse
Results of Individual Metals

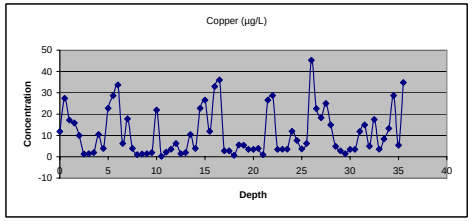


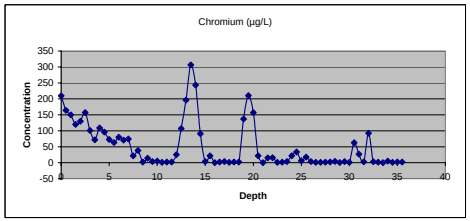


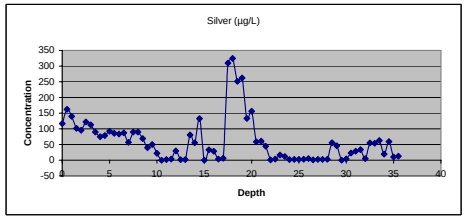


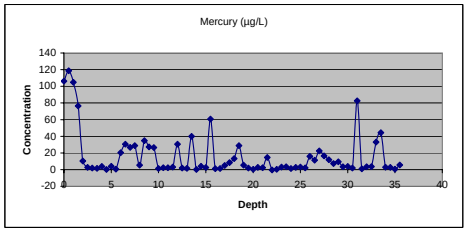


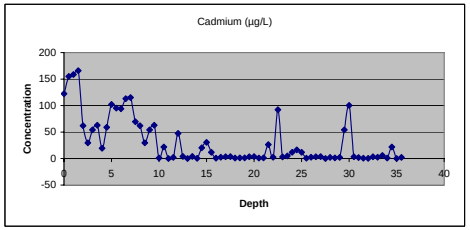


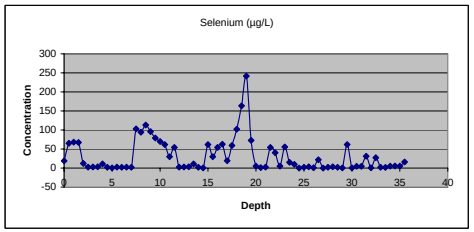


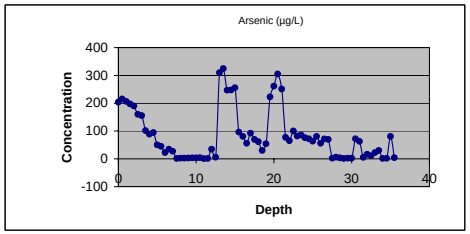


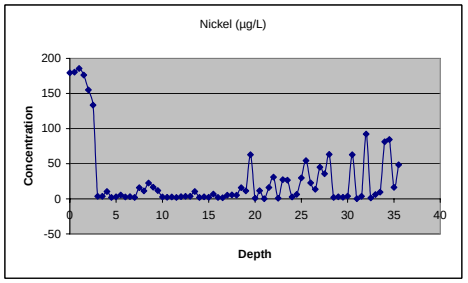


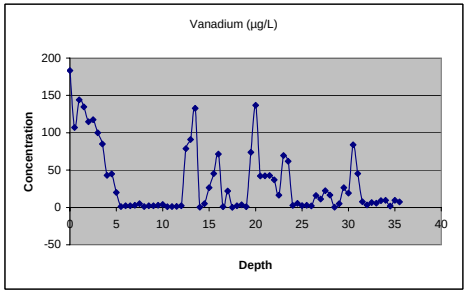


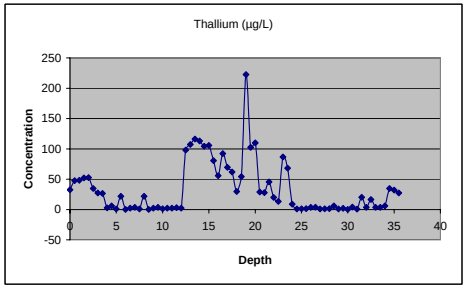


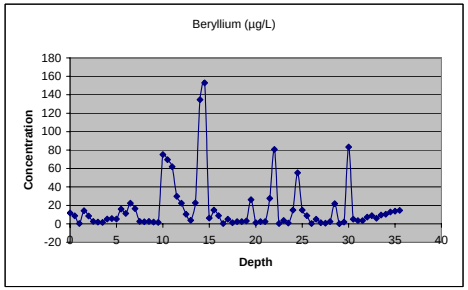


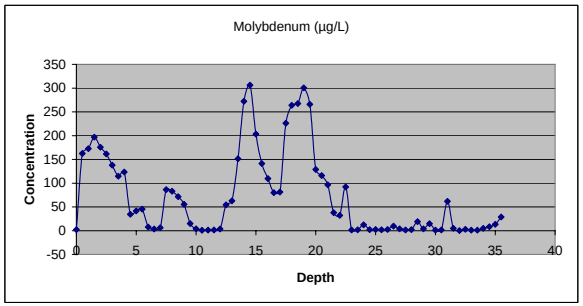












Note: Concentraion Units in ug/L