EVALUATION OF THE IMPACT OF LANDFILL LEACHATE ON GROUND-WATER QUALITY AT THE LEXINGTON COUNTY, SOUTH CAROLINA LANDFILL SITE

SUBMITTED TO

ENVIRONMENTAL PROTECTION AGENCY

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OFFICE OF ENVIRONMENTAL QUALITY CONTROL

HYDROLOGY DIVISION

DISCLAIMER

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ACKNOWLEDGEMENTS

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Acknowledgement is also made to Messers, Hartsill W. Truesdale, Donald A. Duncan, George Dixon, James Ferguson, and Gary Padgett for their assistance in conducting the investigation and editing this report.

This investigation of the environmental impact of leachate on ground and surface waters of the Lexington County Landfill (LCL) was begun in September 1977, and was completed in January 1979. The work in this study was performed by SCDHEC, Hydrology Division under a contract with the U.S. Environmental Protection Agency (EPA). Technical direction was provided by James Scarbrough, EPA Project Officer. The principal investigator was Joseph O. Lewis. The work was under the immediate supervision of D. A. Duncan, Director of the Hydrology Division.

The 1975 EPA contractor's study concluded that, in time, the landfill will force the abandonment of the shallow aquifer in the area and will probably restrict the usefulness of the deeper aquifers. The report recommended that a less permeable cover meaterial be used, and the fill be graded to minimize ponding and infiltration. A second major recommendation was to collect and treat the leachate at its discharge area and/or to collect the leachate and spray it back onto the landfill.

Although one monitoring point in the 1975 E.P.A. study was installed through the refuse, current E.P.A. policy discourages such placement.

PURPOSE AND SCOPE

The purpose of the geologic and hydrologic investigation of the Lexington Landfill (LCL) area was to continue the assessment of the environmental impact of leachate on ground and surface waters with emphasis on obtaining a more detailed description of site geology and on isolating the effect of the abandoned Cayce Dump. All published and unpublished reports and available data were reviewed and evaluated for reliability and accuracy.

Fourteen stratigraphic test holes were drilled, six monitoring wells were constructed and three existing wells were incorporated into the ground-water monitoring network. Four surface-water monitoring sites were designated, located and sampled to meet project objectives.

Ground-water samples were collected and analyzed to determine trends in the chemical quality of ground water in the study area. An analysis of the hydrogeologic setting was made in order to determine the direction and rate of movement of local ground water.

PREVIOUS INVESTIGATIONS

Two previous investigations have been made of the Lexington County Landfill (LCL). One was performed by J. Michel entitled Ground Water Pollution and Geochemical Variations in Leachate from Solid Waste Disposal and the other under a previous EPA contract, entitled Evalution of the Effect of the Lexington County, South Carolina Landfill on Ground and Surface Water.

J. Michel's study was conducted from April 1975 to December 1975 to obtain detailed information concerning the nature of surface and ground-water pollution from solid-waste disposal at the LCL and abandoned "Old Cayce Dump" (OCD). The main objectives were to determine if contamination of the Middendorf aquifer was occurring, find a geochemical "fingerprint" to identify the leachate, and to propose hydrologic and geochemical models to determine trends and variations.

Ms. Michel's conclusions were that there were long-term increases in certain ground-water parameters which were resulting from the introduction of leachate into the Middendorf. She also concluded that no large-scale ground-water pollution was occurring from the OCD because it is located in a local ground-water discharge area and a large part of the leachate is discharged into the surface streams. The surface-water quality has been impaired due to leachate from the LCL, but more so from the loading of strongly anaerobic water percolating through the ponded refuse in the Cayce dump. No recommendations were offered.

The previous EPA study was conducted from February 1975 to December 1975 to evaluate the effect of solid-waste disposal on ground and surface-water resources within and adjacent to the LCL. The main objectives were to determine the type and extent of contaminants, and their associated trends during the period of the study. Soils, climatology, and geology and their relationships to pollutant generation and attenuation were also studied.

LOCATION AND DESCRIPTION OF STUDY AREA

Lexington County is located in central South Carolina (see Figure 1). The northern part (approximately one-fourth) of the county is in the Piedmont physiographic province and the southern three-fourths of the county is in the "Sandhills" part of the Atlantic Coastal Plain Province.

The study area is located on the east of U.S. Highway 321 approximately five miles south of the City of Cayce. The LCL is an abandoned sand mine which was converted into a landfill in May 1972. The Cayce dump to the southeast was a swampy area part of which was called "Stanley Pond" which was completely filled in and covered over in the early 1970's. The cover material in the study area was obtained on site and is very sandy with little clay.

Topography and Drainage - The LCL is topographically higher than the surrounding region (see Figure 2). To the east and south, toward the Congaree River, the surface slopes steeply (2.0 - 2.5 percent); while to the west, toward U.S. 321 and beyond, the surface slopes more gently (about 1.0 percent).

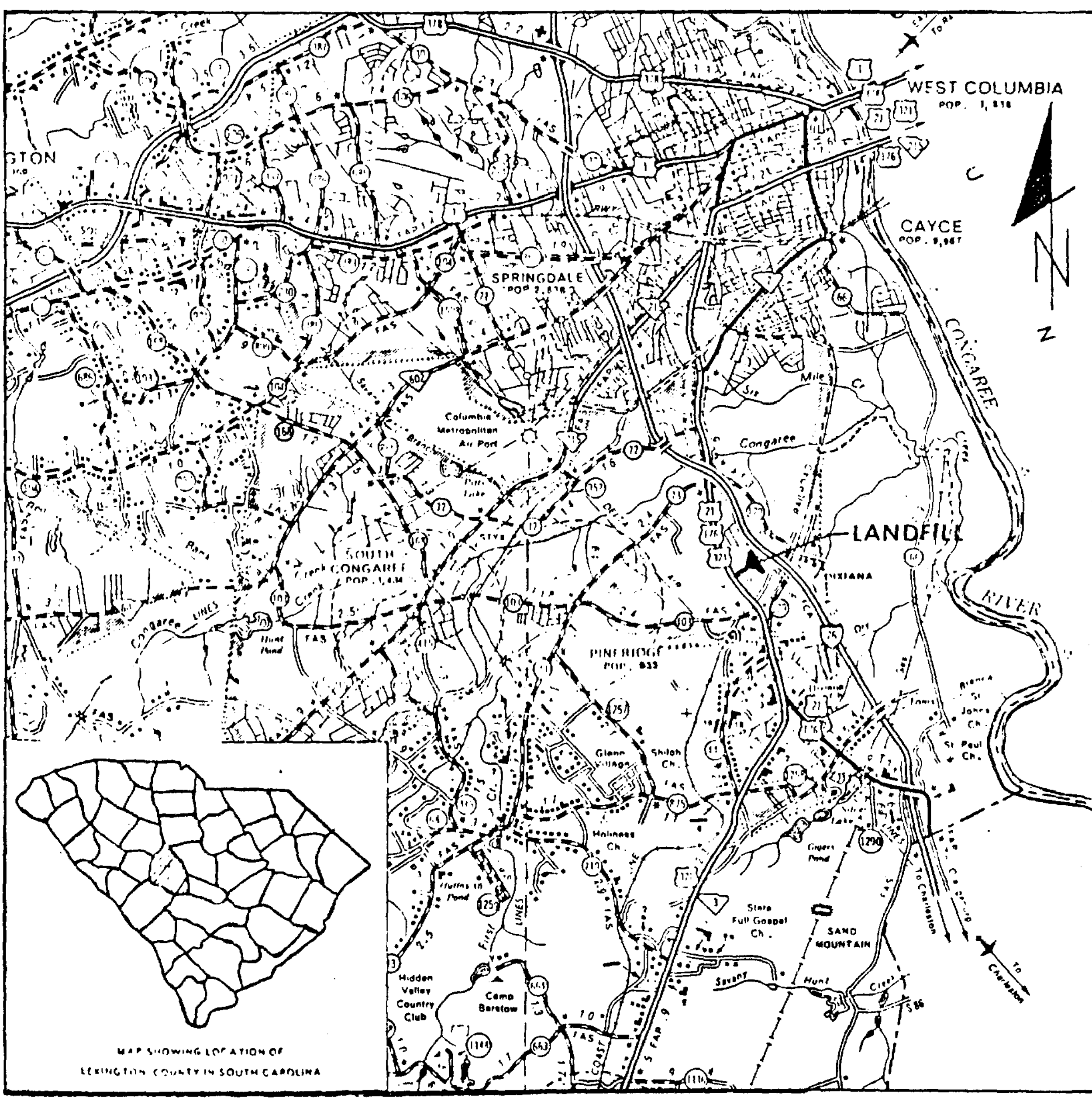

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Figure 1. Location of the Lexington County, South Carolina Landfill.

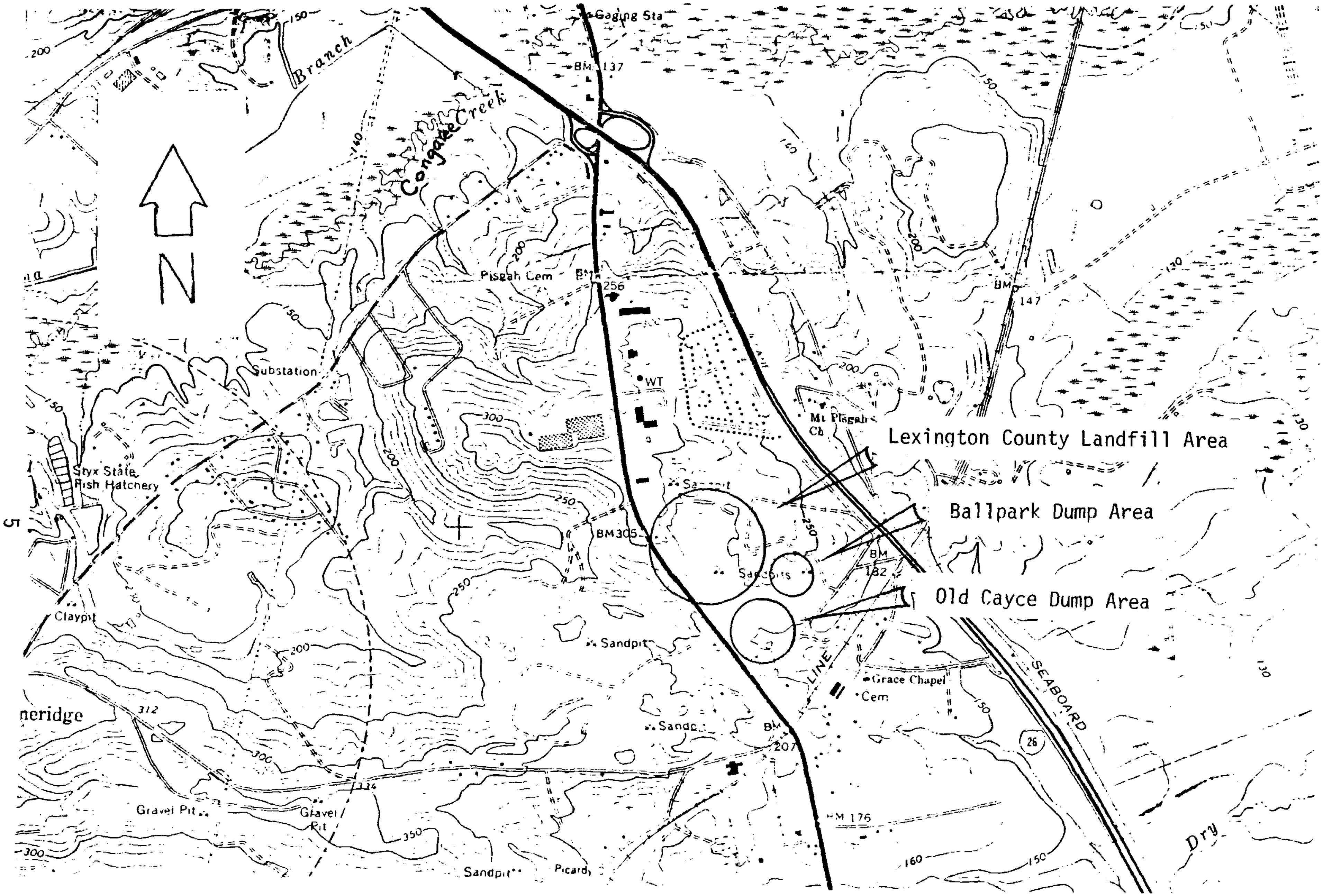


Figure 2. Site topography showing generalized refuse disposal areas. Reproduction of U.S.G.S. 7.5-minute Southwest Columbia quadrangle. Scale 1:24,000.

The main surface drainage for the LCL area is Congaree Creek which flows to the Congaree River. Both Congaree Creek and the Congaree River flow in an southeasterly direction.

The precipitation in the immediate area that does not percolate into the surrounding coarse sands flows directly into the landfill pit. The northern edge, which is the highest point, slopes toward the south and east where the lowest point is normally a small pond near the southeastern edge of the pit.

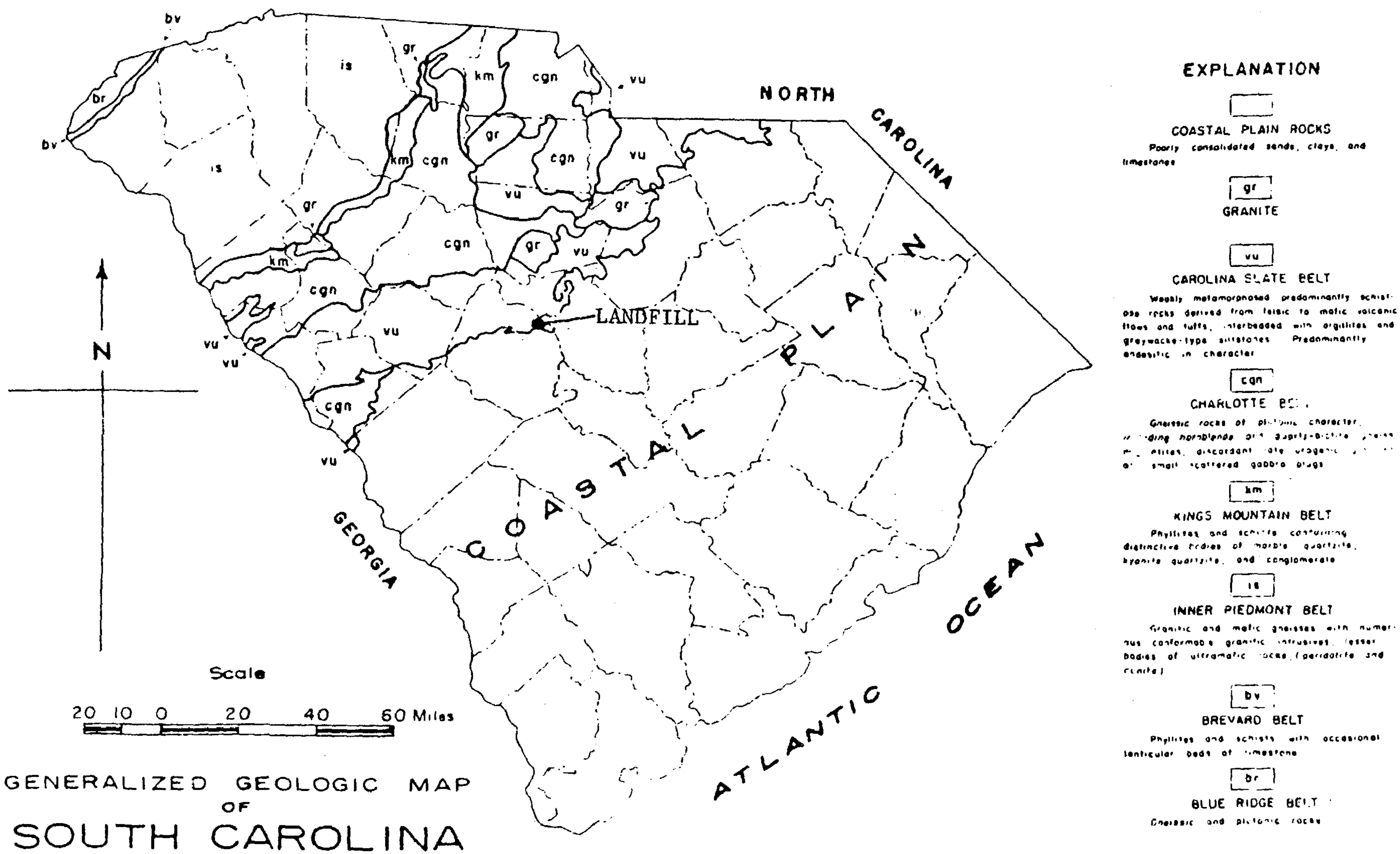
On the southern end, toward the OCD, a ridge of medium to coarse grained sand separates the landfill from the abandoned Cayce dump. Precipitation which infiltrates into the sand and refuse of the LCL migrates within the sand ridge and re-emerges in a spring within the OCD. Water from this spring flows initially in a southeasterly direction under an unsurfaced road (see Figure 2) and gradually meanders toward the Congaree River. This stream is the only observed semi-permanent surface drainage emanating from the immediate study area.

REGIONAL GEOLOGY

The study area is located near the "fall line", between two geological provinces, the Piedmont and the Coastal Plain (see Figure 3).

Piedmont Province - The Piedmont Province occurs between the Blue Ridge and the Coastal Plain Provinces and crosses South Carolina in a northeast-southwest direction in a band approximately 100 miles (161 kilometers) wide. The Piedmont is divided into five distinct geological belts: the Carolina slate belt, Charlotte belt, Kings Mountain belt, Inner Piedmont belt, and the Brevard Zone.

GEOLOGIC BELTS OF THE SOUTH CAROLINA BLUE RIDGE AND PIEDMONT



Source: Overstreet and Bell, 1965, plate 2.

Figure 3

The Piedmont Province is comprised of thick sequences of strata composed of meta-volcanics and meta-sediments that have undergone more than one instance of deformation, metamorphism, and igneous intrusion during the Paleozoic (Overstreet, William C., 1970). The oldest discernable rock unit is a volcanic assemblage known as the Persimmon Fork Formation, which is overlain by a meta-sedimentary group called the Richtex. The Richtex, Persimmon Fork, and an overlying meta-volcanic unit are intruded by granitic plutons in many areas of the Piedmont.

Several periods of metamorphism of varying intensities have occurred throughout the Piedmont. Areas bordering the Coastal Plain have undergone the least amount of deformation and are weakly (greenschist facies) metamorphosed, while toward the west, deformation is more pronounced and higher grades (amphibolite facies) result (Overstreet, William C., 1970).

The basement rock in the study area is composed of crystalline rock similar to that found in the Piedmont. Exact depth to basement could not be determined due to a lack of deep-well data available in the study area, but the basement is in excess of 163 feet (50 meters). This information was obtained from two wells. Willie Sox, of Sox Well Drilling, drilled a well for the recreation area at Bray Park to 150 feet (45.7 meters) with no rock formations encountered in 1975. Dixianna Sand and Glass Company's well #2, which is located across U.S. 321, west of the landfill, did penetrate saprolite at 163 feet (50 meters) with no unweathered rock encountered.

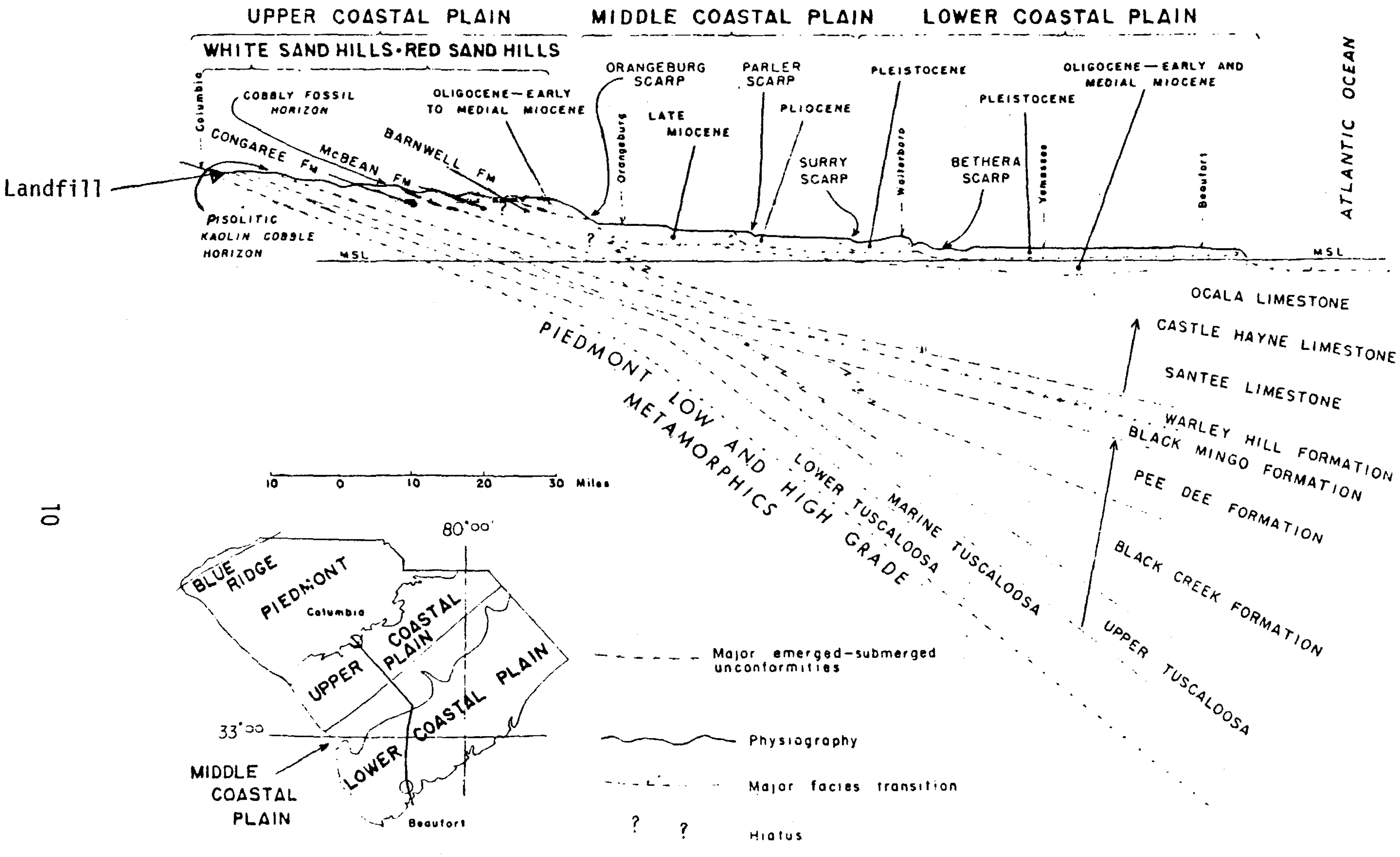
Coastal Plain - The Coastal Plain can be roughly divided into three subdivisions: The Upper Coastal Plain is composed of sediments that have formed mainly by stream deposition (fluvial) and in some instances by wind action (aeolian). The Middle Coastal Plain has undergone extensive erosion so that the original surface is difficult to define. The Middle and Lower Coastal Plains are mantled by alluvial deposits, coastline features, and marine sediments thought to be of Pleistocene origin (Colquhoun, D.J., 1965).

The sediments of the Coastal Plain were deposited on a base of crystalline rock that dips at a steeper angle than the sedimentary units overlying it. The sediments are like a wedge, thinner and dipping gently (approximately 0.25 per cent) along the fall line becoming thicker and dipping more steeply (about .50 per cent) eastward toward the coast (Colquhoun and Johnson, 1968).

The Coastal Plain sediments can be grouped into 12 units or formations (see Figure 4). Older Upper Cretaceous formations crop out on the edge of the Coastal Plain and successively younger (Tertiary and Quaternary) units crop out closer to the coast (Colquhoun and Johnson, 1968).

Middendorf (Tuscaloosa) Formation - The study area is in the outcrop area of the Middendorf Formation which consists of interbedded fluvial sand and kaolinitic clay. The formation lies upon bedrock that dips to the southeast, and is exposed throughout the study area.

The Middendorf in the vicinity of the landfill is composed of yellowish orange (10YR 6/6) to light brown (5YR 5/6) medium to coarse grain arkosic sand, with some gravel, intercalated with lenses of orange, purple, brown, and red clays. Individual beds of medium to coarse sands in no regular sequence were encountered in the drilling program. These small units tend to pinch out within comparitively short distances.



Modified after Colquhoun and Johnson, 1968, p. 109.

Figure 4 GENERALIZED CROSS-SECTION OF THE SOUTH CAROLINA COASTAL PLAIN

The composition of sediments within the Middendorf exhibits the disintegration of the parent crystalline rocks of the nearby Piedmont, indicating that it was formed within a depositional environment of sediment laden streams eroding and draining the Piedmont in the late Cretaceous (Colquhoun, D.J., 1965).

The water-bearing properties of the Middendorf vary greatly due to its heterogeneous nature, resulting in complicated ground-water flow patterns. It is the generally accepted thesis that permeable deposits of medium to coarse grained sands occur as irregular masses intercalated with impervious beds of clay. The sediments are not uniformly permeable, given the wide variability of well yield, but the Middendorf does represent the major source of ground water in the Upper Coastal Plain. In Geology and Ground Water of the Savannah River Plant and Vicinity, George Siple of the U.S. Geological Survey states that there are beds or lenses of clay in the Middendorf which in many areas may be sufficiently extensive as to separate these water-bearing sands into two or more aquifers, but the drill-hole data to make this determination in the study area are not available. Exact thickness of the Middendorf in the study area is not known, but the Bray Park well and Dixianna Glass and Sand Company well #2 indicate that the elevation of Piedmont bedrock is about ninety to one-hundred feet, (27.4 to 30.5 meters) above mean sea level, although its surface is probably highly irregular.

Overlying the Middendorf on topographic highs is a white (N9) to light brown (5YR 6/4) medium to coarse-grained sand with thickness as much as 60 feet (18.3 meters). These sands overlying the Middendorf are characterized by some crossbedding, long gentle slopes, and rounded summits which were probably formed by wind action. Few fossils have been found in these sands, which makes age determination difficult. The Pliocene is the estimated age of the Pinehurst Formation in North Carolina, which is thought to have the same paleo-environment as the sands in the study area.

Climate - The climatology for the site was adequately discussed in the 1975 EPA report and is based on data collected by the National Oceanic and Atmospheric Administration at the Columbia Metropolitan Airport, approximately 3 miles to the northwest.

For the period 1939 to 1978, precipitation in the form of rainfall (snow averaged 1.7 inches (4.3 centimeters) per year) has averaged from the minimum monthly rainfall of a trace (October 1963) to a maximum of 16.72 inches (42.5 centimeters, August 1949). Average precipitation is 45.26 inches (115.0 centimeters) per year (1939-1978).

The greatest rainfall occurs in July and August. This period averages 5.6 inches (14.2 centimeters) per month. The driest months are October and November averaging 2.7 inches (6.7 centimeters) per month.

During the study period (September 1977 to January 1979) precipitation was slightly below normal for the period 1939 to 1978 and was distributed as follows:

Month	Precipitation (inches/centimeters)
September 1977	1.51/ 3.8
October	4.81/12.2
November	2.10/ 5.3
December	3.69/ 9.4
January 1978	9.26/23.5
February	1.28 3.3
March	3.49/ 8.9
April	4.28/10.9
May	3.09/ 7.8
June	4.73/12.0
July	2.10/ 5.3
August	4.45/11.3
September	4.09/10.4
October	0.79/ 2.0
November	2.98/ 7.6
December	1.82/ 4.6
January 1979	4.19/13.2

SITE HYDROGEOLOGY

Site Geology - The stratigraphy to a depth of about seventy-five feet (22.9 meters) was determined by the drilling of fourteen chronologically numbered wells and stratigraphic tests using a Simco 2400 four-inch (10.2 centimeter) power auger.

Existing wells were given a lettered designation. (Lettering designated A', B', etc. indicates surface water sample station.)

The field work was carried out between October 1977 and January 1979, with the bulk of the drilling done in December 1977. Additional drilling, not specified within the contract requirements, was performed by the South Carolina Department of Health and Environmental Control (SCDHEC) for a better understanding of geological conditions and the effect those conditions have on contaminant migration.

The purpose of the drilling was two-fold; (1) to establish a shallow aquifer monitoring system, and (2) to determine the stratigraphy in and around the study area.

Three cross sections were constructed from drilling data (see Figure 5). Cross section X-X' located east of the LCL and OCD was based on borings #3, #4, #6, #8, and #11; cross sections W-W' traversing the LCL north to south was based on borings #2, #9, and #10, with added information from previously installed monitoring wells (B and C); the OCD cross section (Y'-Y) was constructed from data acquired from borings #1, #6, and #12.

Cross section (X-X') illustrates lithologies east of the landfill and OCD (see Figure 6). The oldest unit is a very pale (5YR 8/2) to grayish orange (10YR 7/14) clay intercalated with a medium to coarse

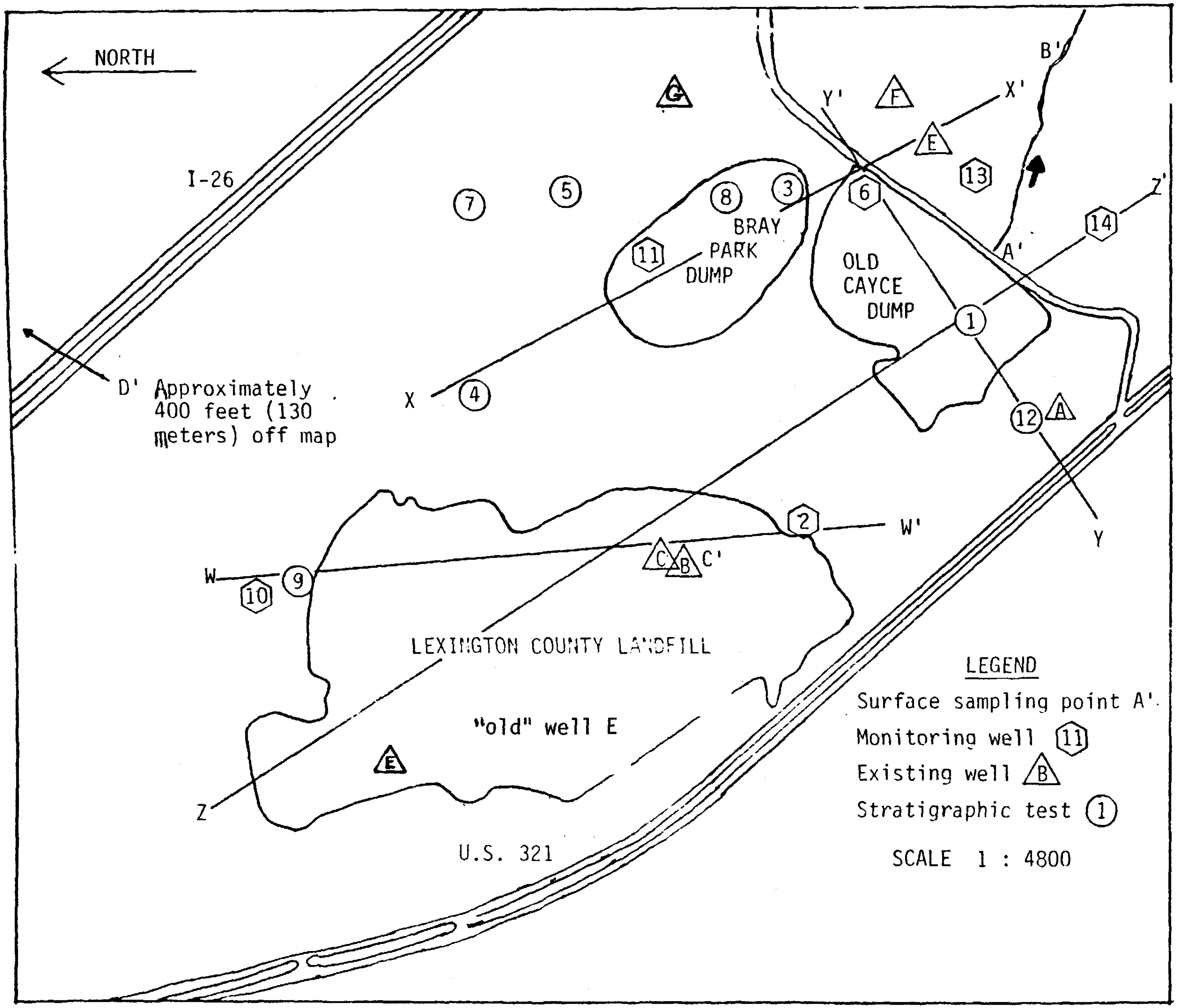


Figure 5. Plan view of the study area showing the locations of sampling points, stratigraphic tests, and cross-sections. Disposal area boundaries are approximate.

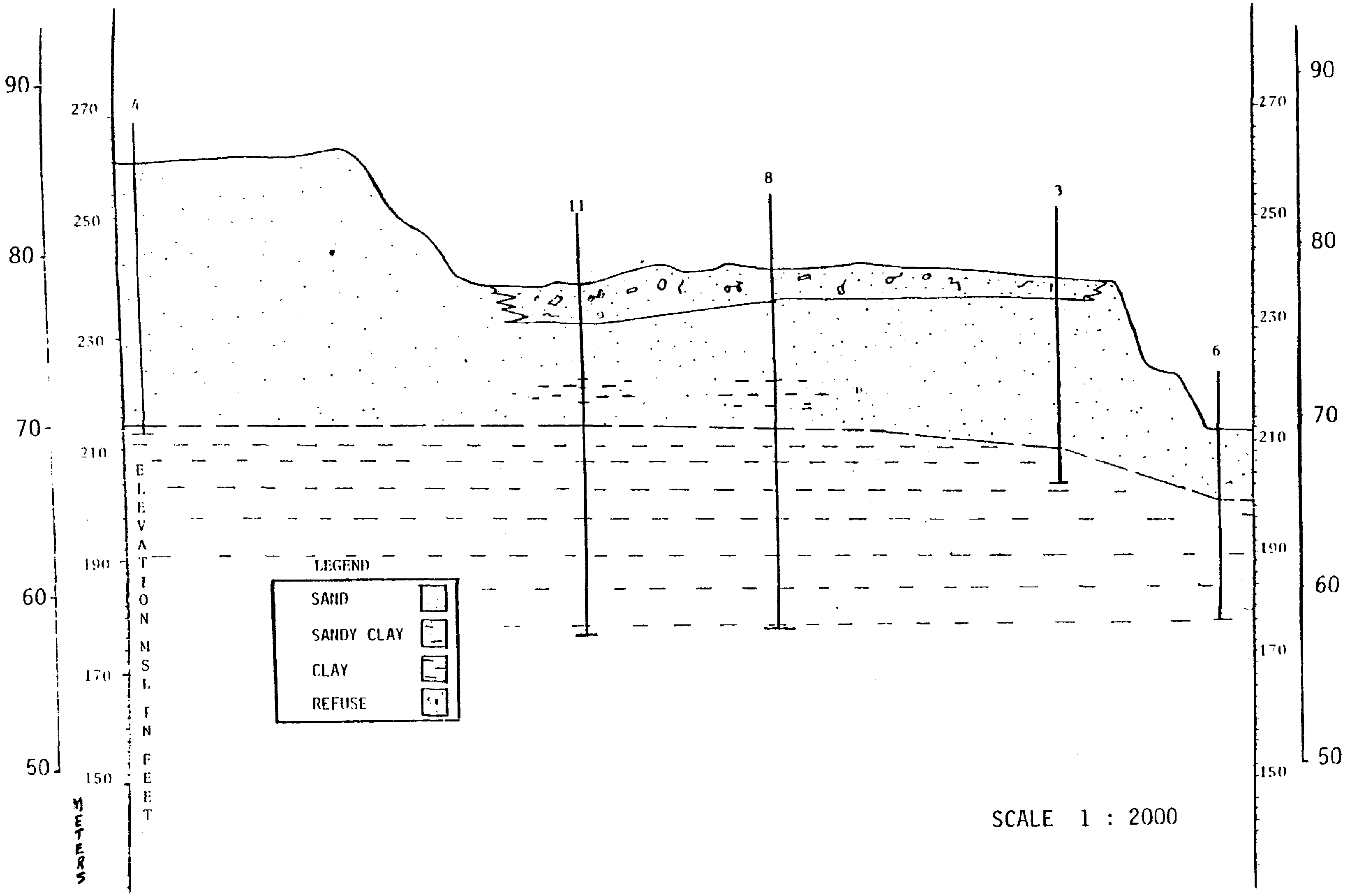


Figure 6. Cross-section X-X' from stratigraphic test 4 to monitoring well 6.

light brown (5YR 5/6) sand averaging 35 feet (10.7 meters) below the surface. This clay is considered to be part of the Middendorf Formation. Individual sand units within this formation could not be correlated indicating they are irregular or pinch out at relatively short distances.

Overlying the clay is a light brown (5YR 6/4) to orange (10YR 8/6), medium to coarse grained sand with a maximum thickness of 45 feet (13.7 meters) at stratigraphic boring #4. It is thought to be aeolian in origin and Pliocene in age. It was discovered in this study that in some places this sand had been excavated (west of Bray Park) and waste material deposited on top of the clay. Stratigraphic borings #3, #8, and #11 indicate 8 feet (2.4 meters) as the average thickness of the refuse. Overlying the Bray Park waste is an olive gray (5YR 3/1) to yellowish brown (10YR 6/2) coarse grained sand 2 to 5 feet (0.6 to 1.5 meters) in thickness.

Cross section W-W' illustrates litholgoies associated directly with the LCL (see Figure 7). A pink to grayish orange (10 YR 5/6) clay intercalated with a light brown (5YR 5/6) medium to coarse-grained sand underlies the landfill and is exposed on the eastern floor.

On the southern end overlying this clay is an off-white (N8) medium to coarse-grained sand. This light brown (5YR 5/6) sand with thickness up to 60 feet (18.3 meters can be observed along the walls of the landfill on the east and west sides. On the northern end the medium to coarse-grained sand reaches thicknesses averaging 32 feet (9.8 meters) as indicated by borings #9 and #10.

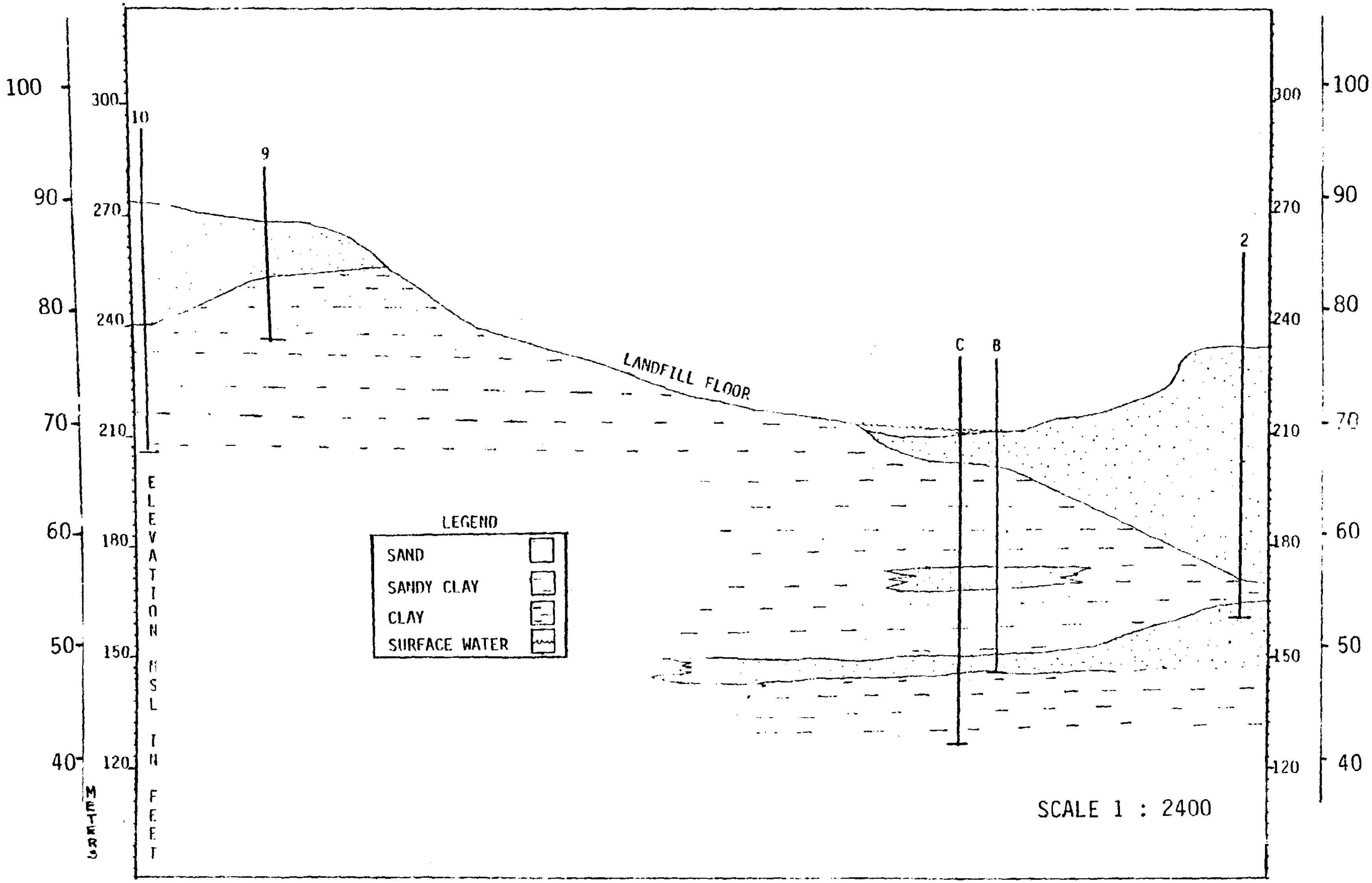


Figure 7. Cross-section W-W' from stratigraphic test 9 to monitoring well 2.

During the period of study, waste material was deposited on the clay floor on the west side of the landfill. Previous well E (since abandoned) indicated 12 feet (3.7 meters) of wastes on the southwest end. At this time the estimate is 25 feet (7.6 meters) at that point. No other data on waste thickness are available. The cover for the landfill is a light brown (5YR 5/6) medium to coarse-grained sand.

The cross-section through the OCD (Y'-Y) illustrates subsurface lithologies of the Stanley Pond area (see Figure 8 supra). The pond itself was turned into a trash dump in the mid 1960's. Drilling showed a pale-orange (10YR 8/2) slightly plastic clay of unknown thickness averaging 16 feet (4.9 meters) below the surface. Overlying this unit, in the vicinity of monitoring well #6 east of the OCD is a coarse-grained yellowish-orange (10YR 6/6) sand, 8 feet (2.4 meters) in thickness. To the west, stratigraphic boring #12 indicated 15 feet (4.6 meters) of sandy clay overlying the clay.

Lithologies were much different in the dump area where Stanley Pond once existed, as indicated by stratigraphic boring #1. Overlying the pale-orange (10YR 3/6) clay is a 4-foot (1.2 meter) thick dark organic-rich silt, which may have been deposited at the bottom of Stanley Pond. Overlying the dark silt was 10 feet (3 meters) of black highly decomposed waste material which was covered by a 7-foot (2.1 meters) layer of medium-grained light-brown (5YR 6/4) sand.

Shallow Ground Water Hydrology - Water-level data from monitoring wells and points of spring emergence give a varying and complex hydrologic picture of shallow ground-water flow in the study area. Water levels measured in wells #2, #6, #11, #13, and #14 indicate water-table flow is in a south-southeasterly direction through the LCL and the OCD

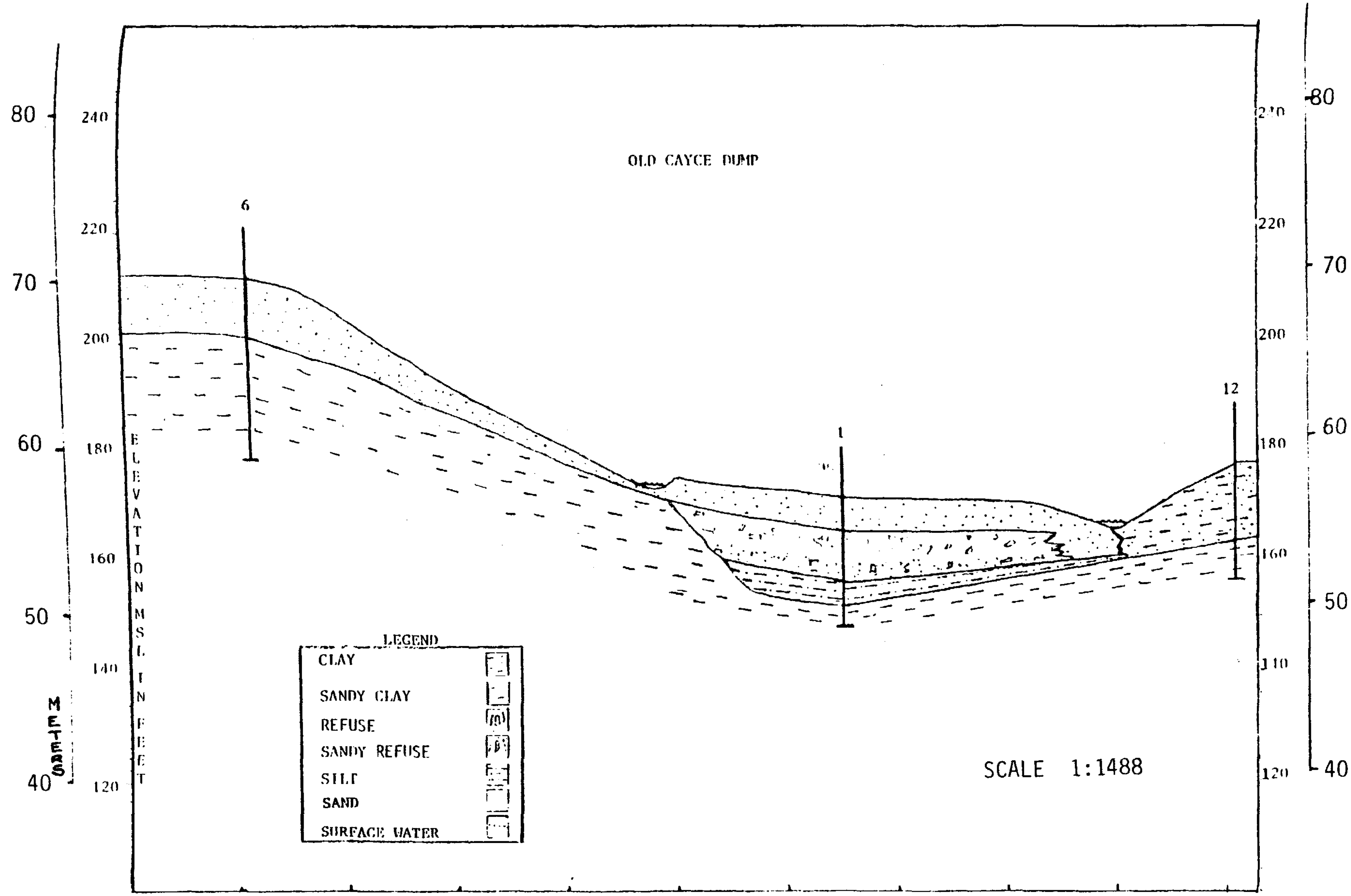


Figure 8. Cross-section Y-Y' from stratigraphic test 12 to monitoring well 6.

(see figures 9 and 10 supra). J. Michel stated that the flow of ground water from the LCL is radial, but this cannot be confirmed without a more extensive shallow well network.

The study area consists of a local recharge-discharge flow system superimposed on the deeper regional flow systems that probably have a hydraulic gradient to the southeast. The recharge that is not discharge to small streams becomes part of that regional flow (J. Michel, 1975).

In the vicinity of the landfill, there is a small unnamed stream which has its headwaters in the abandoned Cayce Dump at A'. A substantial quantity of shallow ground water and leachate apparently are discharged to this stream which is the only observed surface flow out of the study area. During drier weather, stream flow decreases away from A' until there is no surface flow within several hundred meters. This leachate enriched water may reenter the shallow ground-water system at some point between A' and I-26, but such a determination was beyond the scope of this study.

It is estimated that the surface discharge at A' constitutes a very small percentage of the total discharge from the drainage basin above A' and that ground-water discharge is by far the most significant. It is impossible to predict the amount of this ground-water discharge which becomes contaminated by passing through the refuse or the depth to which any leachate is able to flow. It can be said, however, that a large volume of water falling in the small drainage basin (about 0.21 square miles) has the potential to become leachate and contaminate

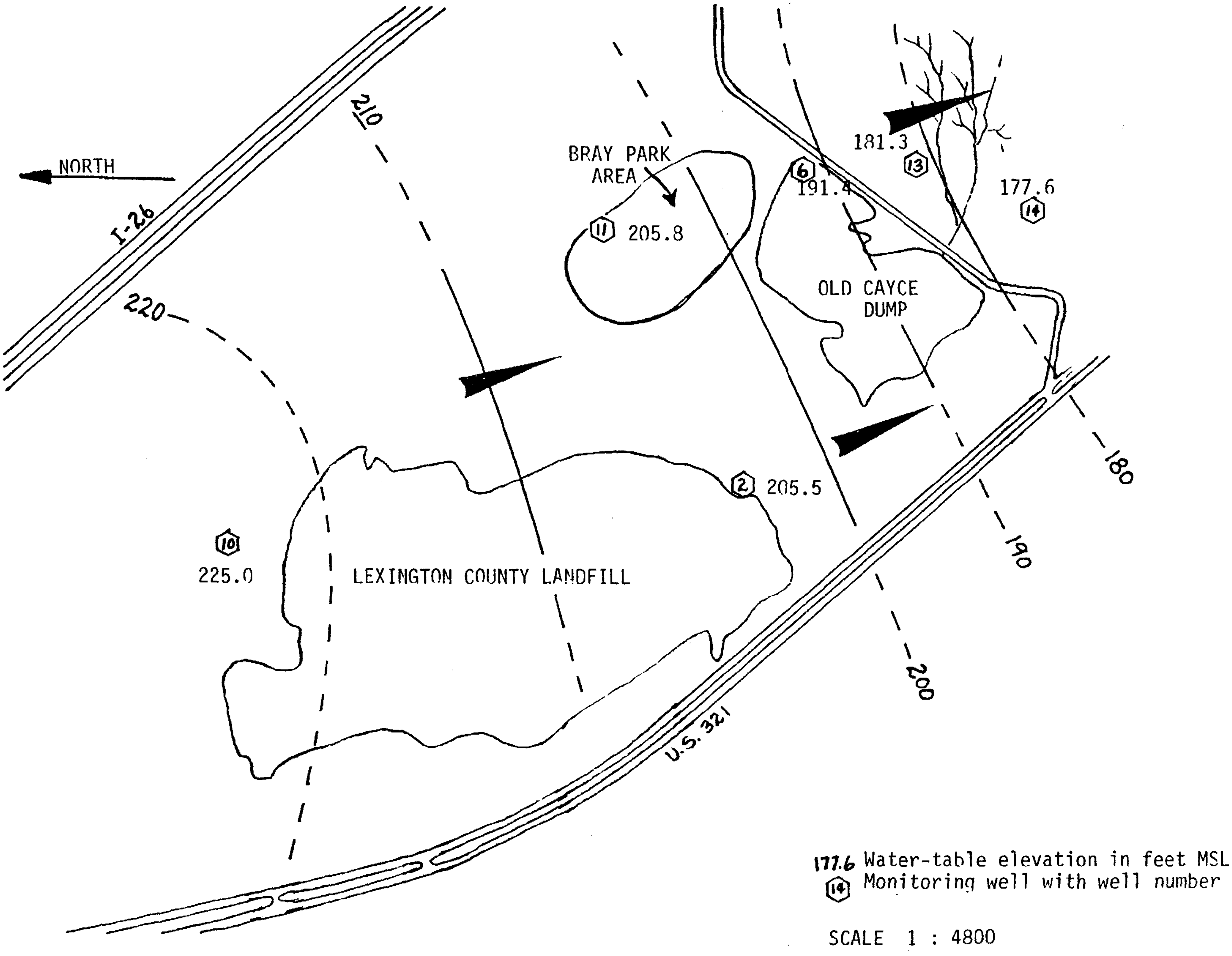


Figure 9. Water-table surface measured on July 7, 1978. Contour lines dashed where inferred. Arrows indicate probable flow direction.

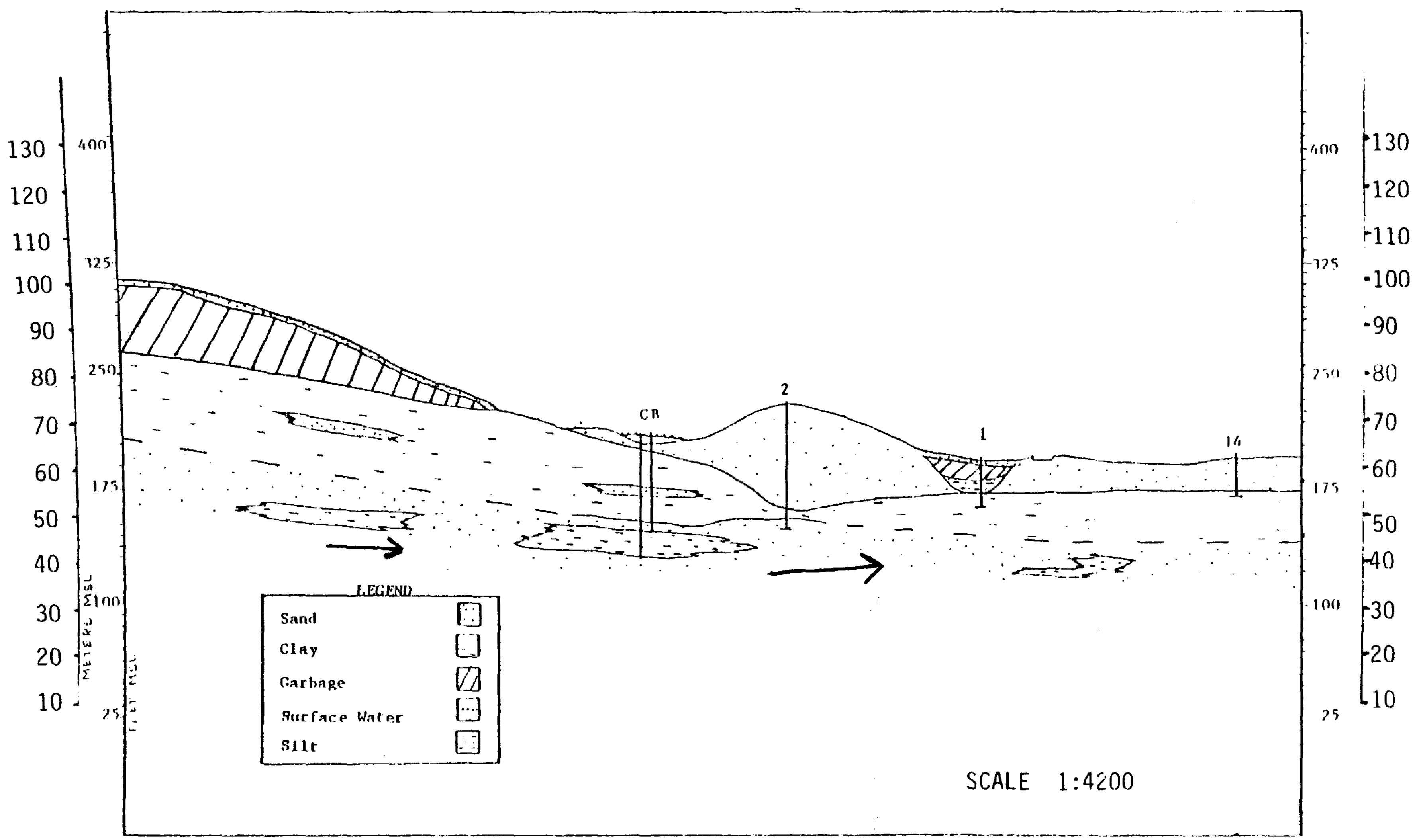


Figure 10. Cross-section Z-Z' from the northern edge of the Lexington County Landfill to monitoring well 14.

the deeper sands in the Middendorf aquifer system, although the data to confirm this possibility has not been collected because such work is beyond the scope of this study.

Monitoring well locations were selected on information from previous studies, field observations of seeps, and topography. Wells #6 and #11 were used to intercept possible contaminants generated in the Bray Park Dump. Monitoring well #2 was intended to isolate the effects of the LCL. Monitoring wells #13 and #14 were drilled to assess the impact of both the OCD and LCL on shallow ground water. Well #10 was drilled as a background well.

Drill logs indicate a basal clay of unknown thickness beneath the LCL and the OCD (see Figure 10 supra). Even taking into account the heterogeneous nature of the Middendorf Formation, the continuity of this clay in the OCD area appears very probable. Ground water emerging from the OCD probably is caused by rain percolating through sand and waste material in the LCL area and traveling laterally on top of this basal clay, which is within about twenty feet (6.1 meters) of the surface in the vicinity of the OCD.

Michel reported that contaminant levels for seeps emerging from the surface of the OCD are an order of magnitude lower at the headwaters near the center of the dump area than several tens of feet down stream, indicating most of the dissolved material results from contact with wastes within the OCD rather than the LCL, although there are other contaminant avenues, such as ground-water flow from LCL.

As previously stated, wells #6 and #11 were used to determine if the Bray Park Dump was contaminating shallow ground water. Well #11 was placed on the north-eastern edge of the Bray Park Dump and screened at a depth of 50-57 feet (15.2 - 17.4 meters). Well #6 was placed south-east of the Bray Park Dump and screened at a depth of 27-34 feet (8.2-10.4 meters). Geochemical data show little contamination in well #6, indicating either leachate is following deeper flow lines or migrating in a more southerly direction. Well #11 could be showing no contamination because it is upgradient, with respect to ground-water flow, from the Bray Park Dump area.

Monitoring wells #13 and #14 (screened at a depth of 15 to 20 feet) indicate little contamination which would infer shallow ground water is protected by an aquitard separating contaminated surface water flowing southeast from ground water migrating due south. Monitoring well #2 (screened at a depth of 50-57 feet) is intercepting leachate generated in the LCL migrating due south. A hydrologic relationship between well #2 and surface water in the OCD was difficult to establish due to fluctuations in precipitation and a lag in response to these fluctuations.

Shallow Ground Water Quality - The quality of ground water in the water-table aquifer was determined by sampling DHEC wells #2, #6, #10, #13, #14, private wells E and F. Surface water quality was determined by sampling stations A', B', C', and D'. Parameters for analyses were established by the EPA. The DHEC laboratories analyzed unfiltered samples for total metals plus selenium, chlorides, nitrates, phenols, cyanide, total hardness and COD. An independent laboratory, under an EPA contract, analyzed filtered samples for metals plus arsenic and selenium.

All metals were acidified with HCl in the field immediately after sampling. (Dissolved metals were acidified after filtration through a

0.45 micron membrane filter). COD samples were acidified with H_2SO_4. Phenols were fixed with $CuSO_4$ and chilled. The pH for cyanide was raised to excess of 12 with NaOH (no sample was taken if the pH was less than 6 due to safety considerations). Chlorides, nitrates, and total hardness were left unfixed and delivered to the DHEC labs within 45 minutes.

Water-quality data for filtered and unfiltered samples are shown in Tables 1 through 24 and graphically in Figures 12 through 78.

DHEC well #2 located between the LCL and the COD as recommended by J. Michel is assumed to represent leachate quality horizontallyleaving the LCL (see Figures 12 through 17). The most significant water-quality changes are elevated conductivity and chlorides which approached drinking water standards (see bottom) once during the period of study. The elevated iron and manganese may be attributed to leachate and/or the dissolving of these metals from the formation between the landfill and well #2. Lead exceeded drinking water standards three times. Hardness, COD, copper, cadmium, chromium and selenium are slightly elevated above background for normal Upper Coastal Plain shallow ground water. In general the concentration of dissolved material in well #2 appears to be a function of precipitation (increased precipitation produces greater volumes of more dilute leachate). Leachate leaving the LCL is probably localized and restricted to the water table aquifer and shallow ground water entering the OCD may be previously contaminated by the LCL.

As more solid wastes are added to the LCL, the average concentrations of leachable substances can be expected to increase in the ground

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National Intermin Primary Drinking Water Regulations or National Secondary Drinking Water Regulations, as applicable.

water with seasonal fluctuations caused by variation in precipitation and evapotranspiration.

DHEC well #6 was drilled to monitor water-quality changes to the southeast of the LCL, but, as a result of the discovery of the Bray Park abandoned dump, the purpose of well #6 was changed to indicate the effect of leachate generated in the Bray Park Dump on shallow ground water. However, there was no conclusive indication that shallow water quality at well #6 was significantly affected during the period of study, with the exception of one sample in February in which dissolved lead exceeded the drinking water standard.

DHEC well #10, which was intended to monitor background quality in the water-table aquifer, was vandalized several times during the period of study and its use for this purpose is subject to considerable doubt. Elevated lead, iron, manganese, chromium, cadmium and arsenic were detected in August; but it is not known if their occurrences are indicative of background conditions or were derived from foreign material dumped into the well.

DHEC well #11 was drilled to assess water quality changes to the southeast of the LCL. During drilling about 10 feet (3.0 meters) of solid waste was penetrated. It is believed that this waste is part of the Bray Park Dump. Conductivity was highest when water level and precipitation were lowest but only slight contamination (lead of 0.07 mg/l in May) was detected (also, selenium approached standard on some rounds). It is possible that well #11 is upgradient of most of the dump and is affected only by the refuse above.

DHEC wells #13 and #14 were drilled to determine the impact of the study area on the shallow ground water. These wells were also used to determine if there is a relationship between the surface water leaving the OCD and the shallow ground water. Water levels in wells #13 and #14 are about 9 feet (2.7 meters) and 12 feet (3.7 meters) lower, respectively, than the nearby surface flow.

It is possible that the small stream is losing water (and leachate) to the ground, causing contamination and/or the OCD is contaminating the ground water via subsurface flow. In any case, the contamination of the water-table aquifer at these points appears to be low-level consisting of iron, chromium, lead and arsenic in well #13 and iron and chromium in well #14.

Surface sampling station A' was used to indicate leachate quality emanating from the surface of the OCD. It is the most mineralized water analyzed in this study. The drinking water standard for mercury was exceeded once (February 1978) and the conductivity reached 1000 umho/cm during dry weather in November 1978. Chloride, hardness, barium, and chromium also exceeded background. It is believed that the poorer quality of water at A' is the result of leachate production in the LCL and the top 5 feet of the OCD.

Surface sampling station B' downstream of A' reflects rapid dilution in the 150 yards (137 meters) of surface flow. Volume of flow appears to increase, indicating that the stream is a gaining stream for that distance in contradiction to the conclusion that the stream may be a losing stream drawn from the relatively lower water levels in wells #13 and #14.

The dilution causes significant reduction in nearly all parameters. The flow path of this water was not fully studied, but it was observed that the stream disappeared on the west side of I-26 in the spring of the study year.

The Rucker Wells (E and F) were sampled as another indication of water quality in the water-table aquifer downgradient of the LCL and OCD and because wells E and F are being used as drinking water sources. The most significant water quality characteristics for well F were mercury (filtered) with a concentration of 0.28 mg/l in February (exceeding the drinking water standard) and conductivity of 330 umho/cm during dry weather in early November (exceeding background levels by an order of magnitude). Other parameters approached or exceeded drinking water standards on some rounds. These included: Fe, Mn, Pb, Hg for well E and Pb, Fe, Mn, Hg for well F. It is suspected that the source of these contaminants is the Bray Park Dump, based on water levels, but this conclusion is highly conjectural without knowledge of amount, lateral extent, and types of wastes buried in the abandoned Bray Park Dump.

Surface sampling stations C' and D' are small ponds; C; is located within the LCL pit and D' is located east of I-26. Sample station C' was selected to determine the quality of surface runoff which collects in the LCL pit. Sampling station D' was selected as a background surface water station. Several parameters for C' and D' exceeded drinking water standards or had elevated levels on some sampling rounds. These parameters included:

C'	D'
Fe	Fe
Cr	Mn
T.H.	Cr
Pb	Cu
Cl	
Mn	COD
Se	

Water quality at C' is greatly influenced by dilution as a result of surface runoff within the landfill pit as evidenced by the highest concentrations of most paramters occurring in the summer months when evapotranspiration is highest. The occurrence of elevated concentrations in the pond at D' cannot be explained within the scope of this investigation.

Deep Ground Water Hydrology - The clay units under the landfill appear to behave as local aquitards, but they appear to grade into coarse units and hydrologically connect the different sands of the Middendorf Formation (J. Michel, 1975). Individual beds of coarse and fine sediments are intermixed and grade laterally into one another or pinch out within comparatively short distances (G.E. Siple, 1967), therefore clays under the study area are probably not efficient barriers to the downward migration of contaminants.

Three wells (B, C, and "old" E) drilled in the LCL pit in 1975 indicate little degradation of aquifers deeper than 30 to 40 feet (9.1 to 12.2 meters) within the Middendorf directly beneath the landfill. Only "old" well E penetrated the refuse. This well showed some elevation of the following parameters: specific conductance, COD, iron, manganese. Wells B and C showed little or no contamination. It is possible that insufficient time has elapsed for ground-water flow to carry leachate to this depth.

SUMMARY

The drilling of fourteen relatively shallow borings, some of which were made into monitoring wells, were used to further define the hydrogeologic setting for the LCL. A light gray to pink kaolinitic clay was encountered in all fourteen borings, but it can not be concluded that the clay is one continuous unit which would be a permeability barrier to downward migration of leachate contaminated ground water. In fact, due to the typically heterogenous nature of Middendorf sediments, it is concluded that the clays are not continuous and that they are aquitards on a local basis only. Therefore, interpretation of water-quality and water-level data is difficult and subject to speculation. It is possible that some of the monitoring wells are drilled into perched water tables which may not be significantly affected by leachate from the numerous sources in the study area. A newly discovered leachate source (Bray Park Dump) further complicated the determination of cause and effect relationships with the limited number of wells available.

It is clear, however, that the study area has the potential to significantly impair ground-water quality on a regional basis in the deeper sands of the Middendorf aquifer system for the following reasons:

1. Elevated concentrations of several contaminants occurred during the study period even though sporadic;
2. The area has strong potential as a regional recharge area due to its location in the outcrop of the Middendorf aquifer system on a topographic high where the head differential between deeper zones in the Middendorf and the overlying aquifers is at a maxi-

mum (static water level in existing well B was consistently 12 to 14 feet (3.7 to 4.3 meters) higher than well C during 1975), and

3. The abandoned sand pit which contains the LCL is very large and if completely filled, as planned, will contain a volume of solid waste many times greater than that which existed at the time of this study.

RECOMMENDED ALTERNATIVES TO MINIMIZE PRESENT AND POTENTIAL CONTAMINATION

After considerable study the environmental impact of the LCL remains poorly understood because of the complex lithologic setting and the multiple leachate sources. The question concerning deep migration of leachate -contaminated ground water would require additional research.

It is recommended that the hydrologic relationship between the shallow aquifers and the deeper parts of the Middendorf be more accurately defined prior to considering leachate collection and treatment. In order to make this determination it is recommended that four test holes to basement rock should be drilled (with cores taken at 10-foot intervals) and geophysically logged in order to more accurately determine the site stratigraphy. The information gathered from the test holes could then be used as the basis for the installation of piezometers and permanent monitoring wells in the locations and to the depths which will provide the most meaningful data possible. A complete understanding of the geohydrologic conditions is absolutely necessary to determine:

1. the ultimate fate of the resulting leachate;
2. the design of a monitoring program, and
3. the design of a leachate collection system, should this become necessary.

Until a more comprehensive evaluation can be performed, the following steps are recommended to be performed promptly:

1. Existing wells B, C, and "old" E should be plugged with cement prior to covering with solid wastes. If they are not to be covered, they could be incorporated into the monitoring program.
2. The daily and intermediate cover material should be changed to a clayey sand instead of sand now being used. The final cover should be at least 24 inches of a low permeability (e.g. clay).
3. New waste cells could be completely encased in a low permeability material, especially at edges of the landfill to prevent lateral migration of leachate through the sandy walls.

A P P E N D I C E S

APPENDIX - A

FIGURES

MONITORING WELL # 2

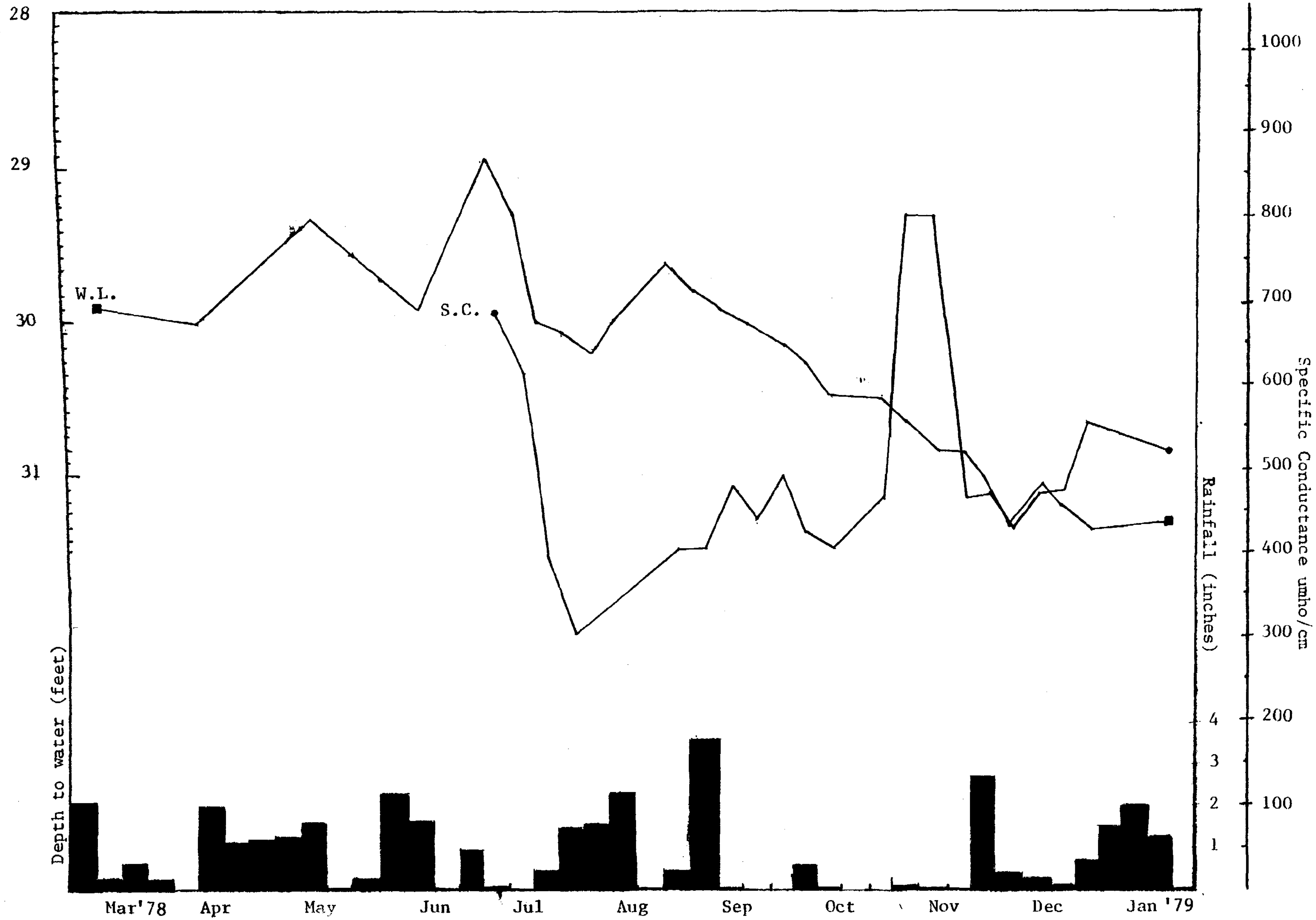

Figure 11 Precipitation record from the Columbia Metropolitan Airport, weekly hydrographs, and specific conductance.

Sampling Point 2

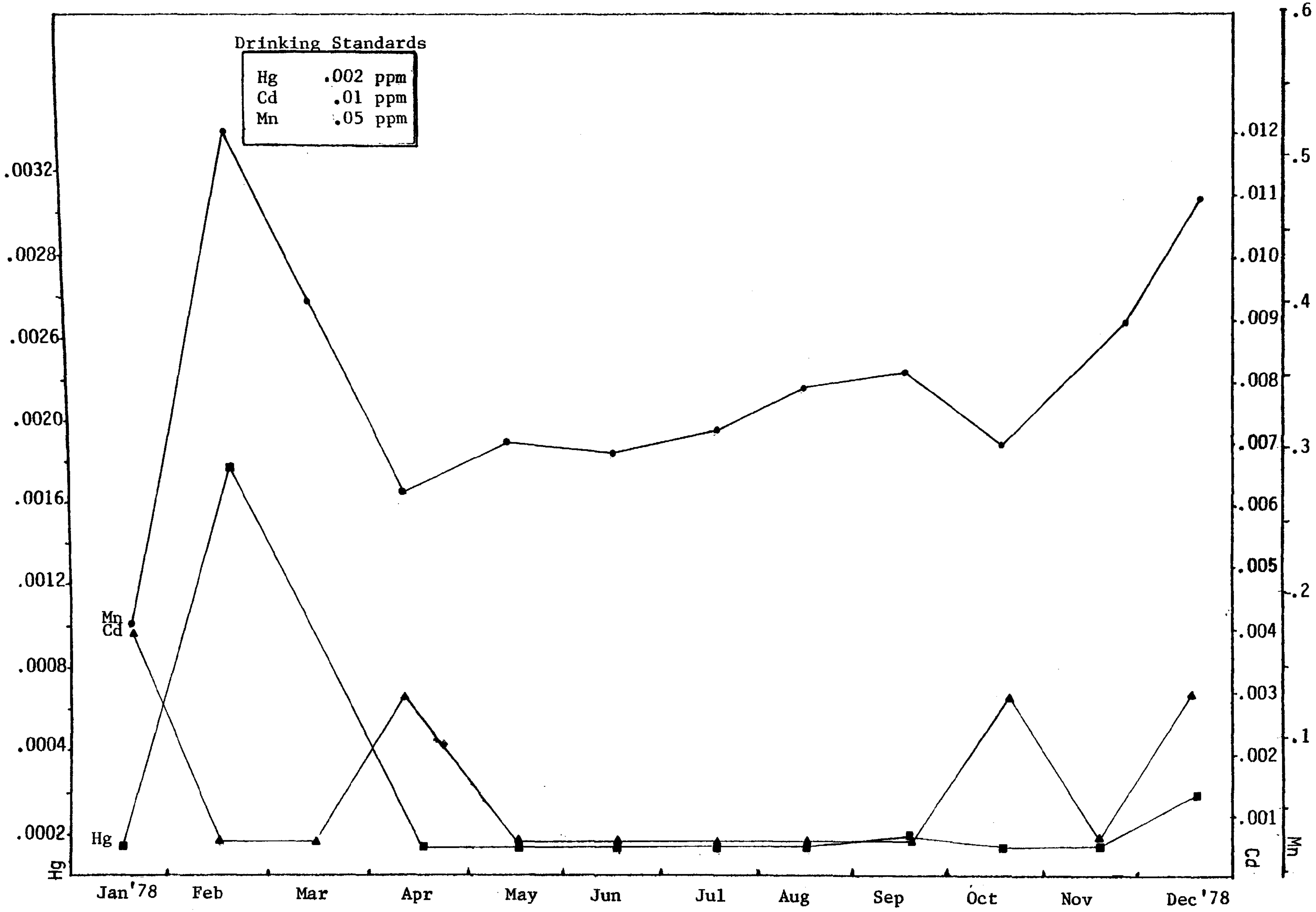

Figure 12 Water quality trends from filtered samples for Cadmium, Manganese, and Mercury in parts per million

Sampling Point 2

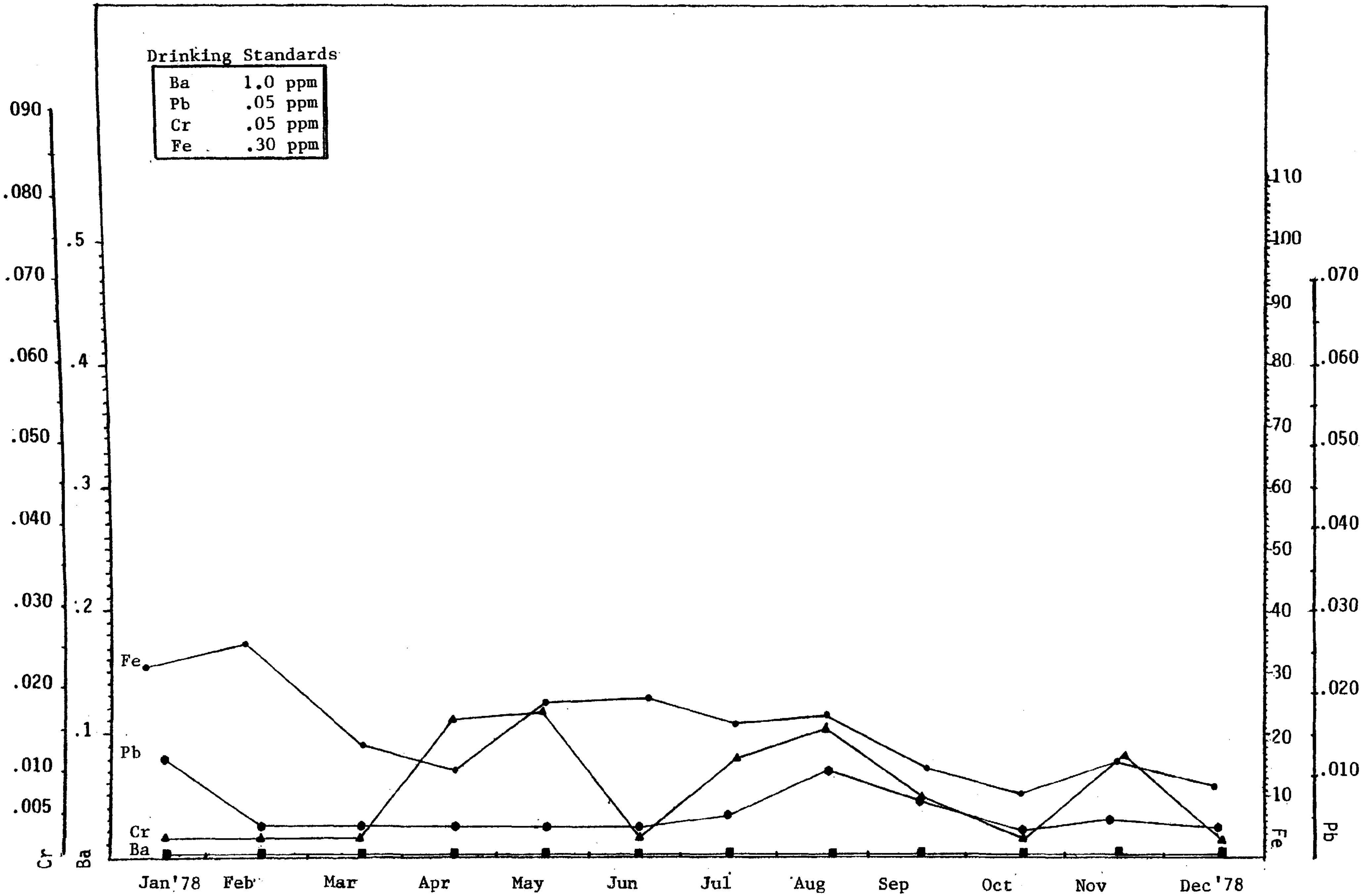

Figure 13 Water quality trends from filtered samples for Chromium, Barium, Iron, and Lead in parts per million

and Phenols (in parts per billion)

Sampling Point 2

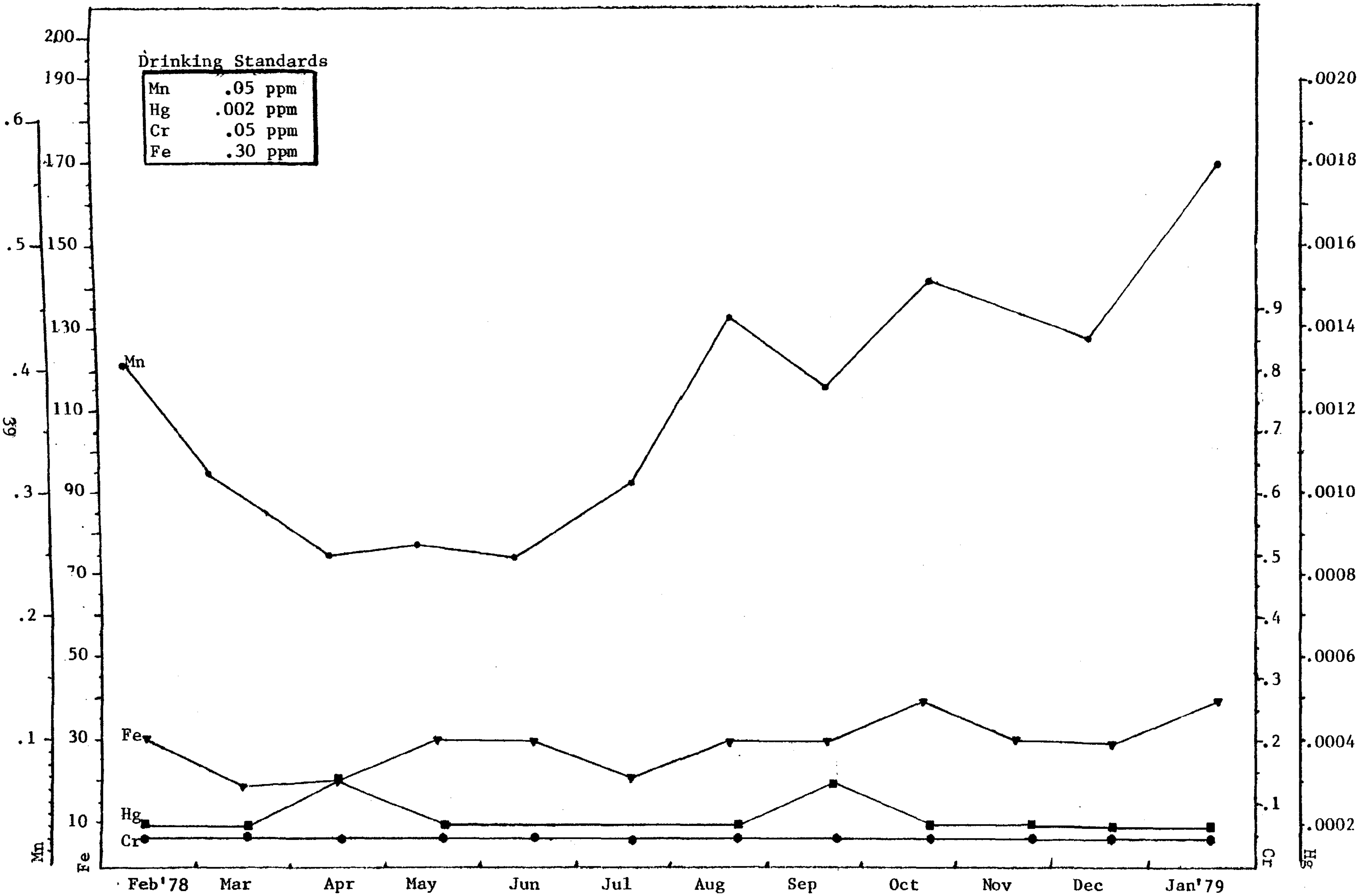

Figure 14 Water quality trends from unfiltered samples for Chromium, Iron, Mercury, and Manganese in parts per million

Sampling Point 2

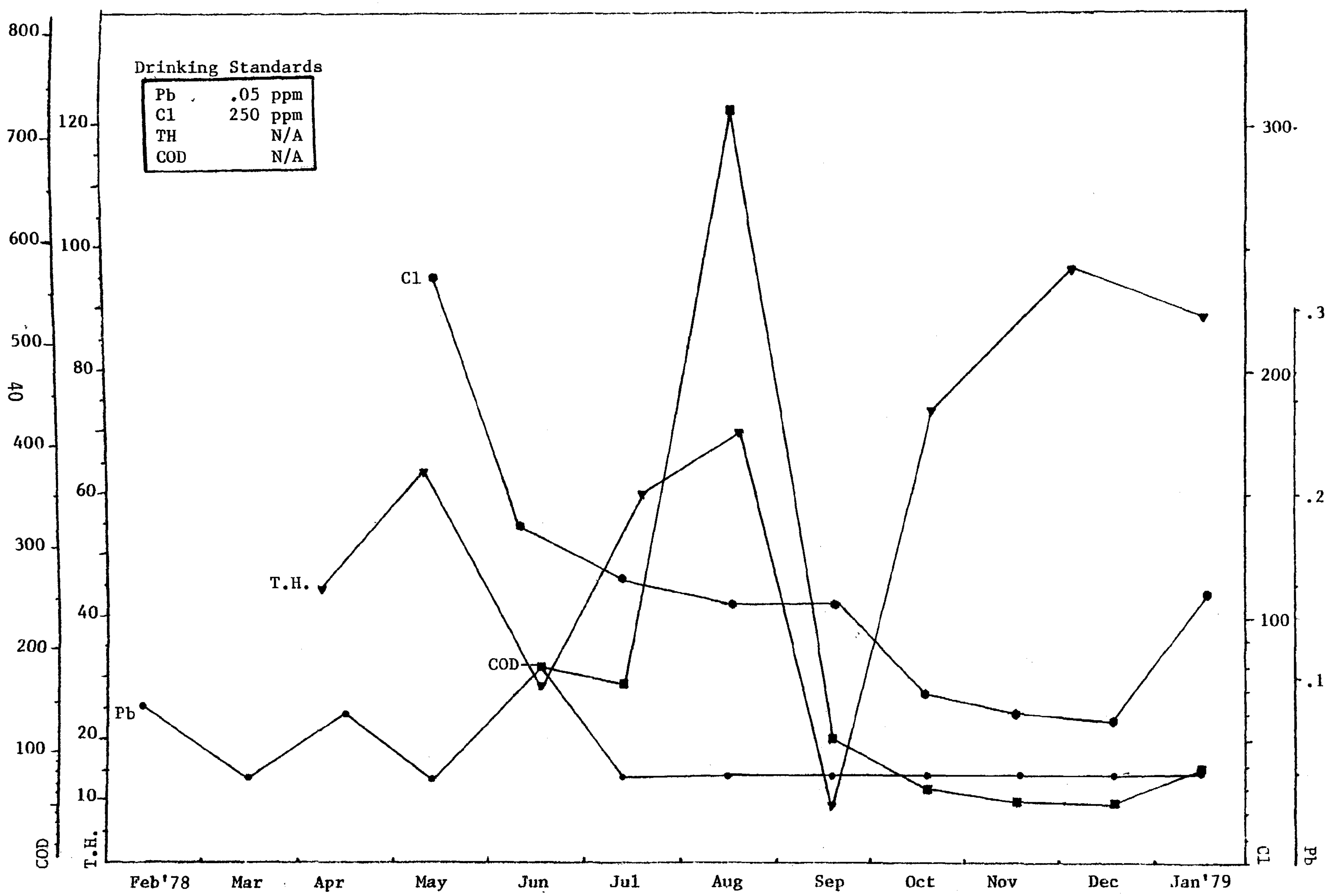

Figure 15 Water quality trends from unfiltered samples for COD, Hardness, Chlorides, and Lead in parts per million

Sampling Point 2

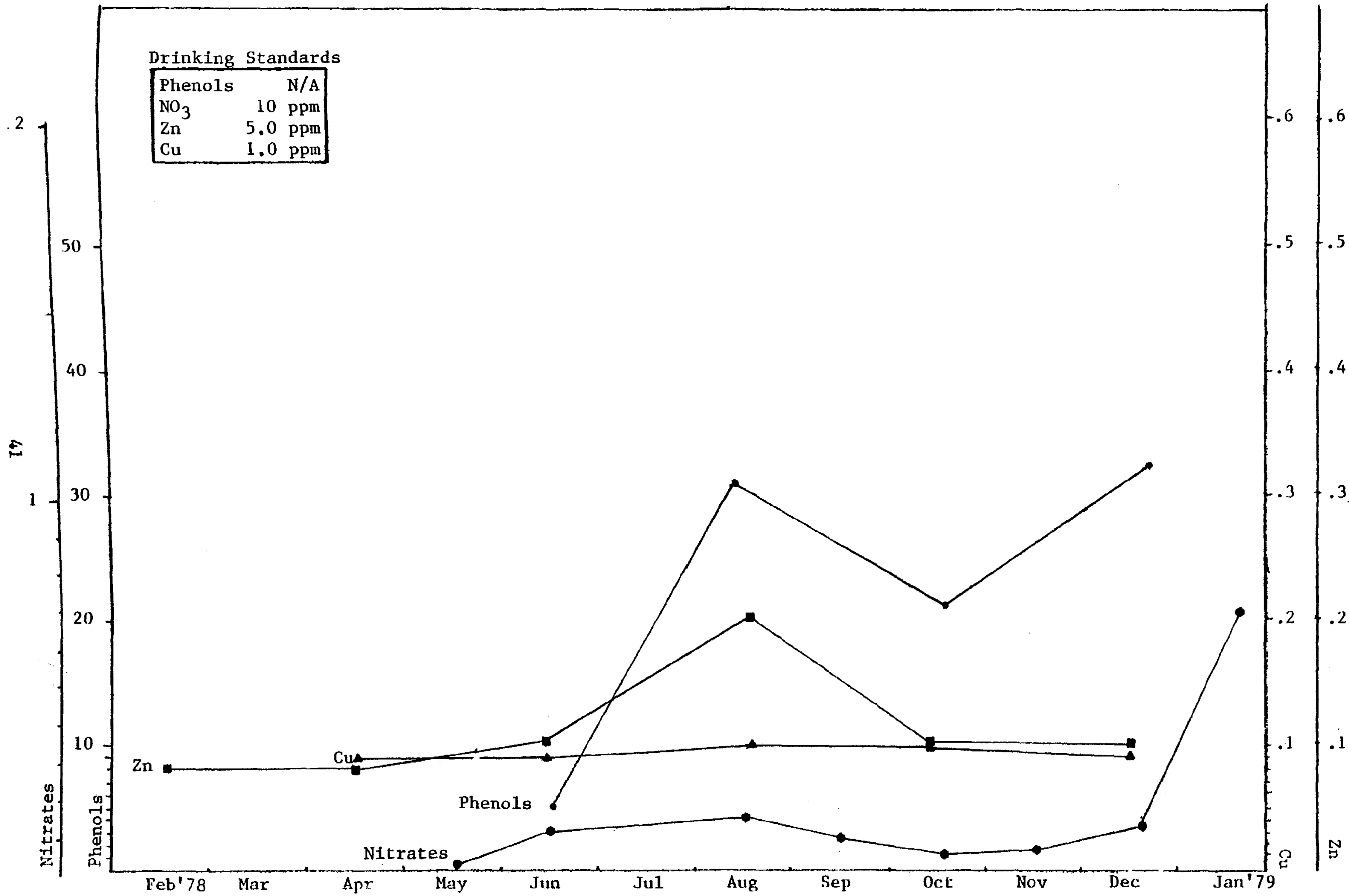

Figure 16 Water quality trends from unfiltered samples for Nitrates, Copper, Zinc (in parts per million) and Phenols (in parts per billion)

MONITORING WELL # 6

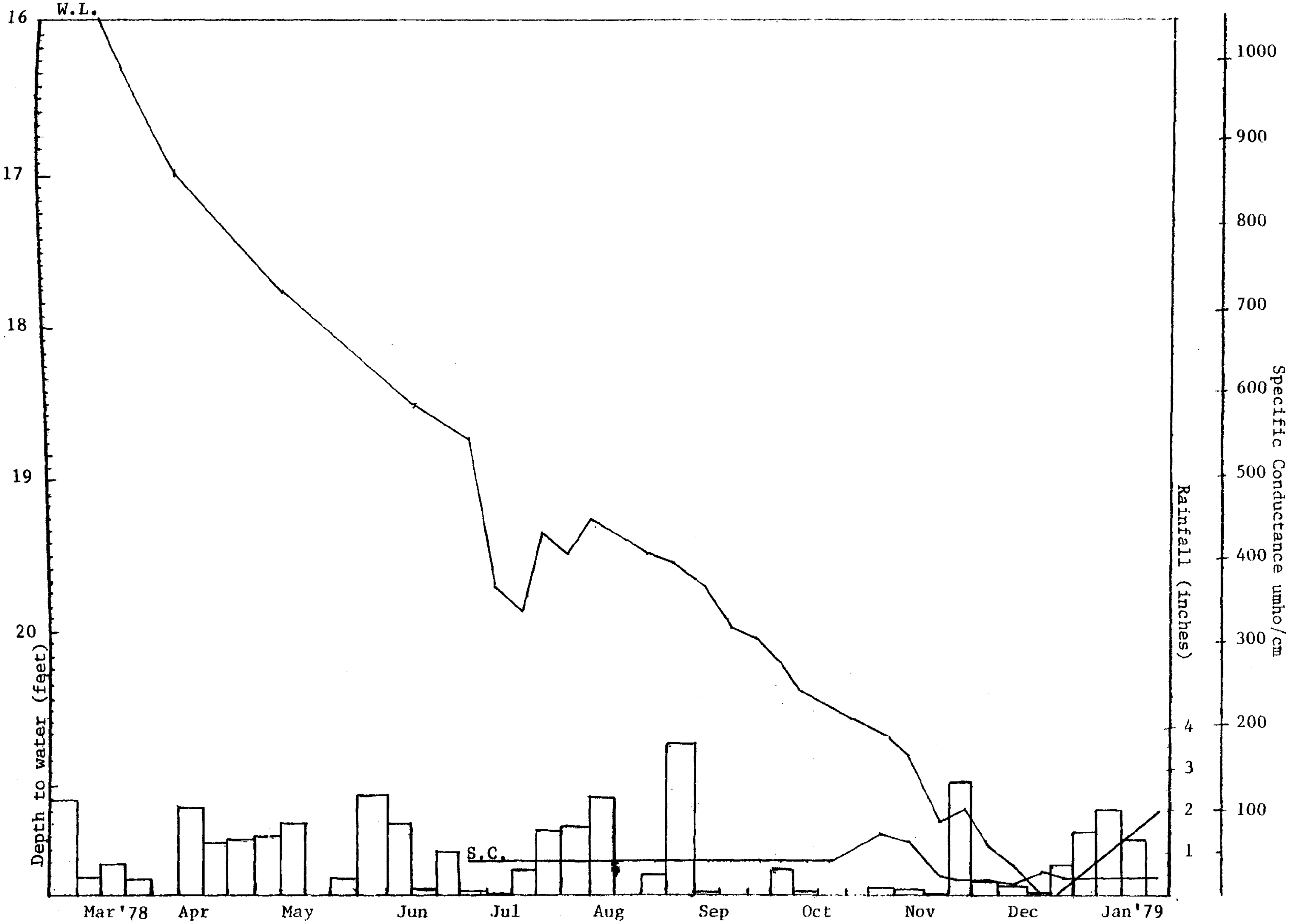

Figure 17 Precipitation record from the Columbia Metropolitan Airport, weekly hydrographs, and specific conductance.

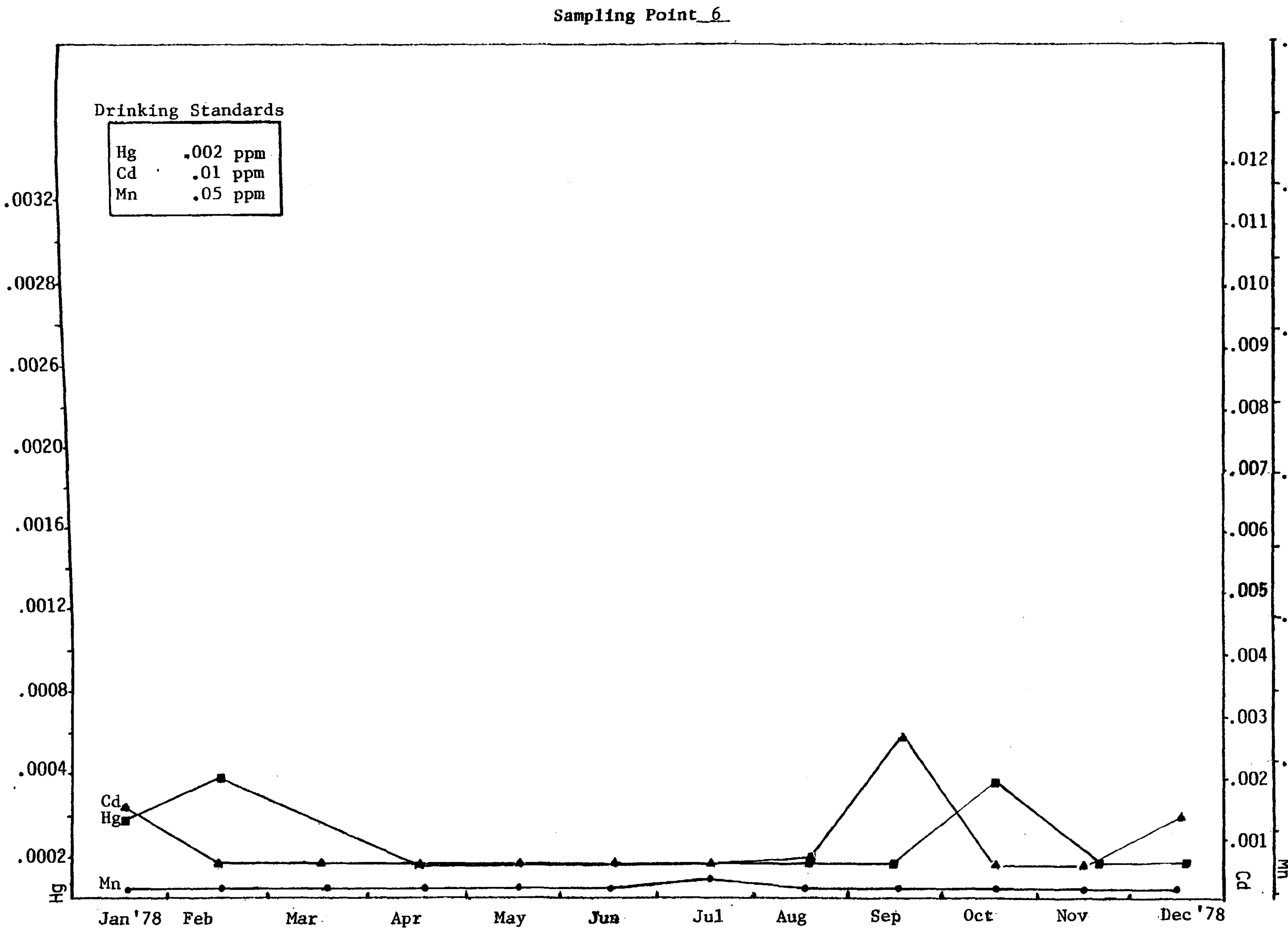

Figure 18 Water quality trends from filtered samples for Cadmium, Manganese, and Mercury in parts per million

Sampling Point 6

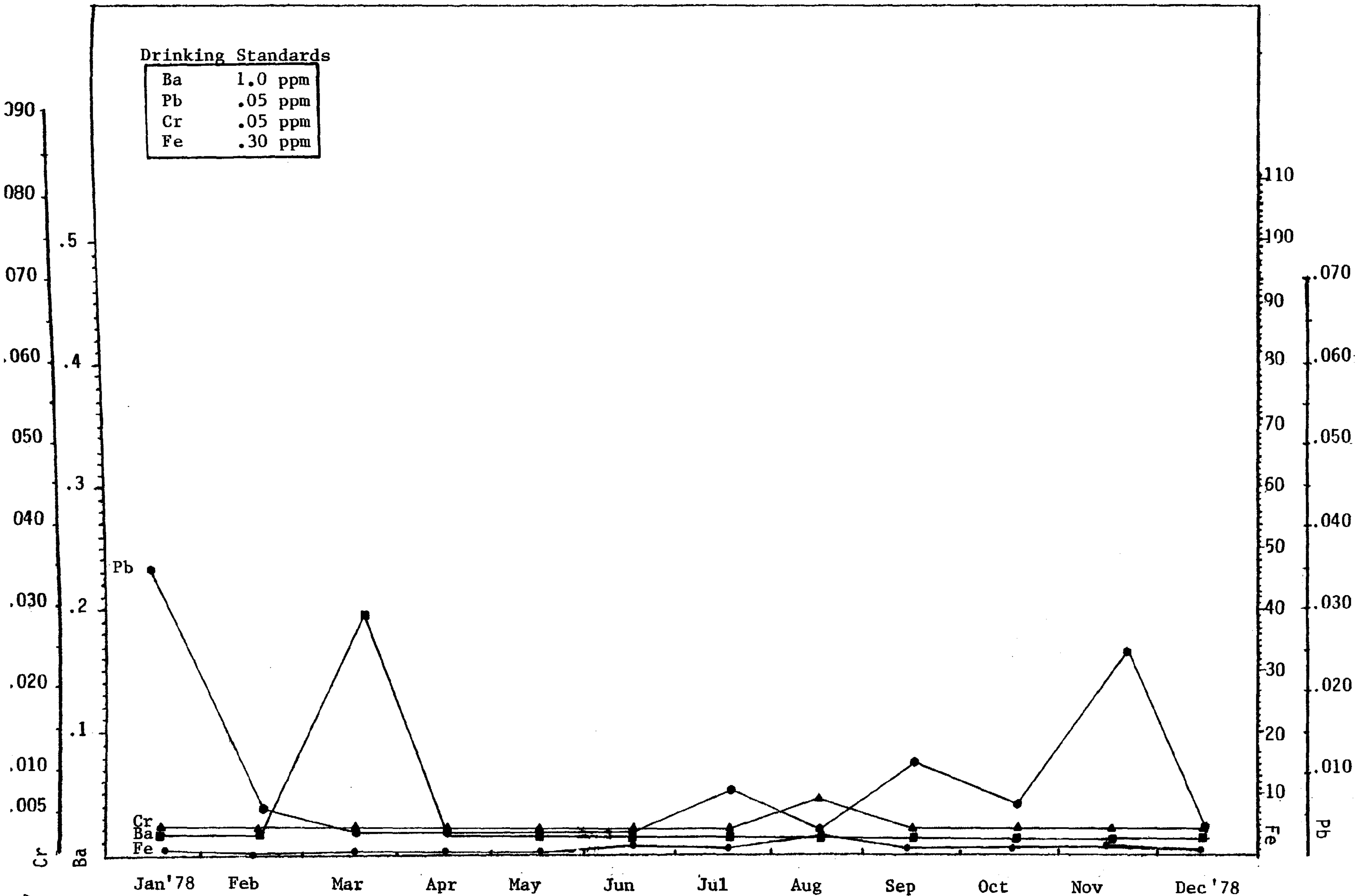

Figure 19 Water quality trends from filtered samples for Chromium, Barium, Iron, and Lead in parts per million

Sampling Point 6

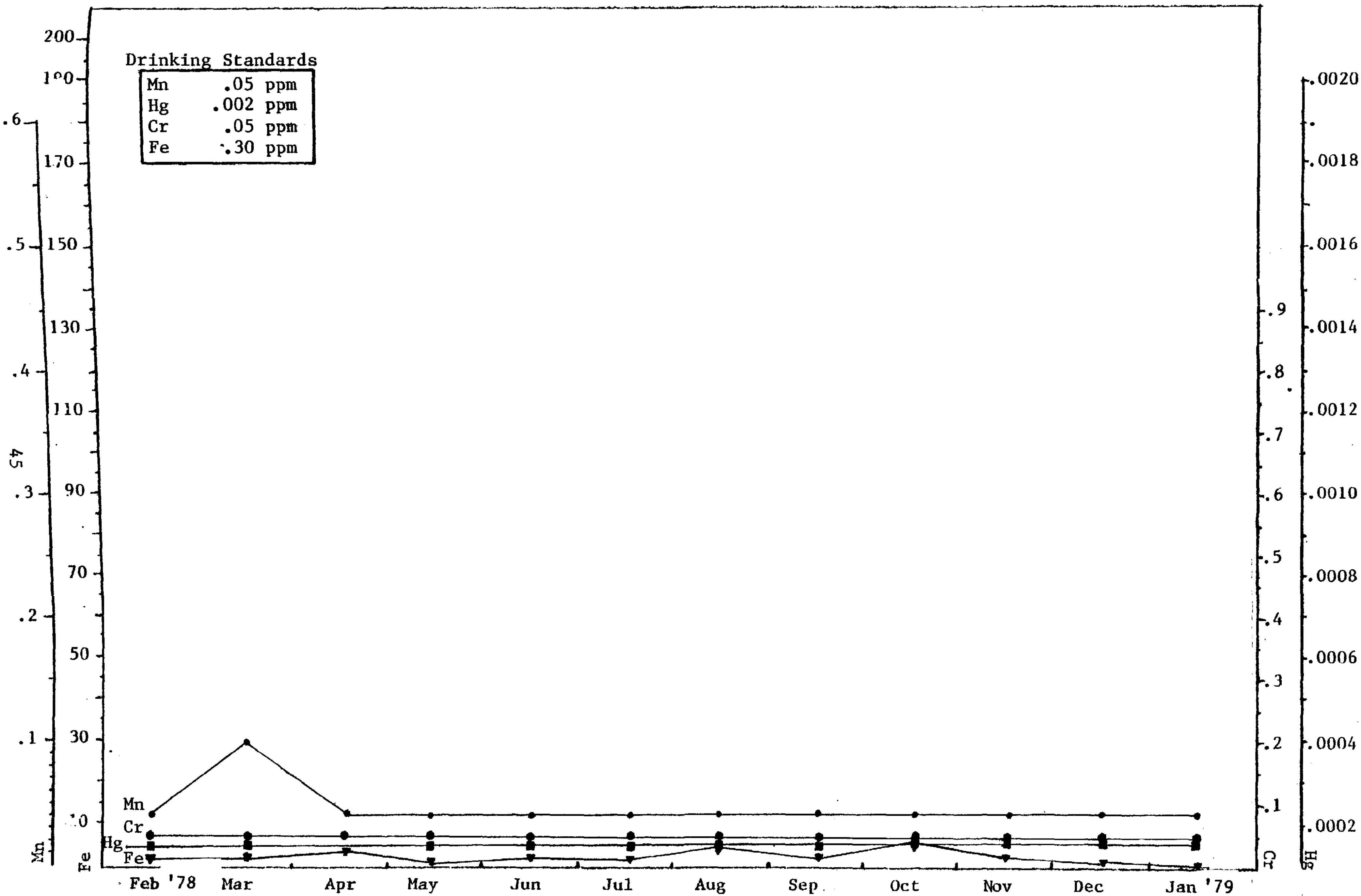

Figure 20 Water quality trends from unfiltered samples for Chromium, Iron, Mercury, and Manganese in parts per million

Sampling Point 6

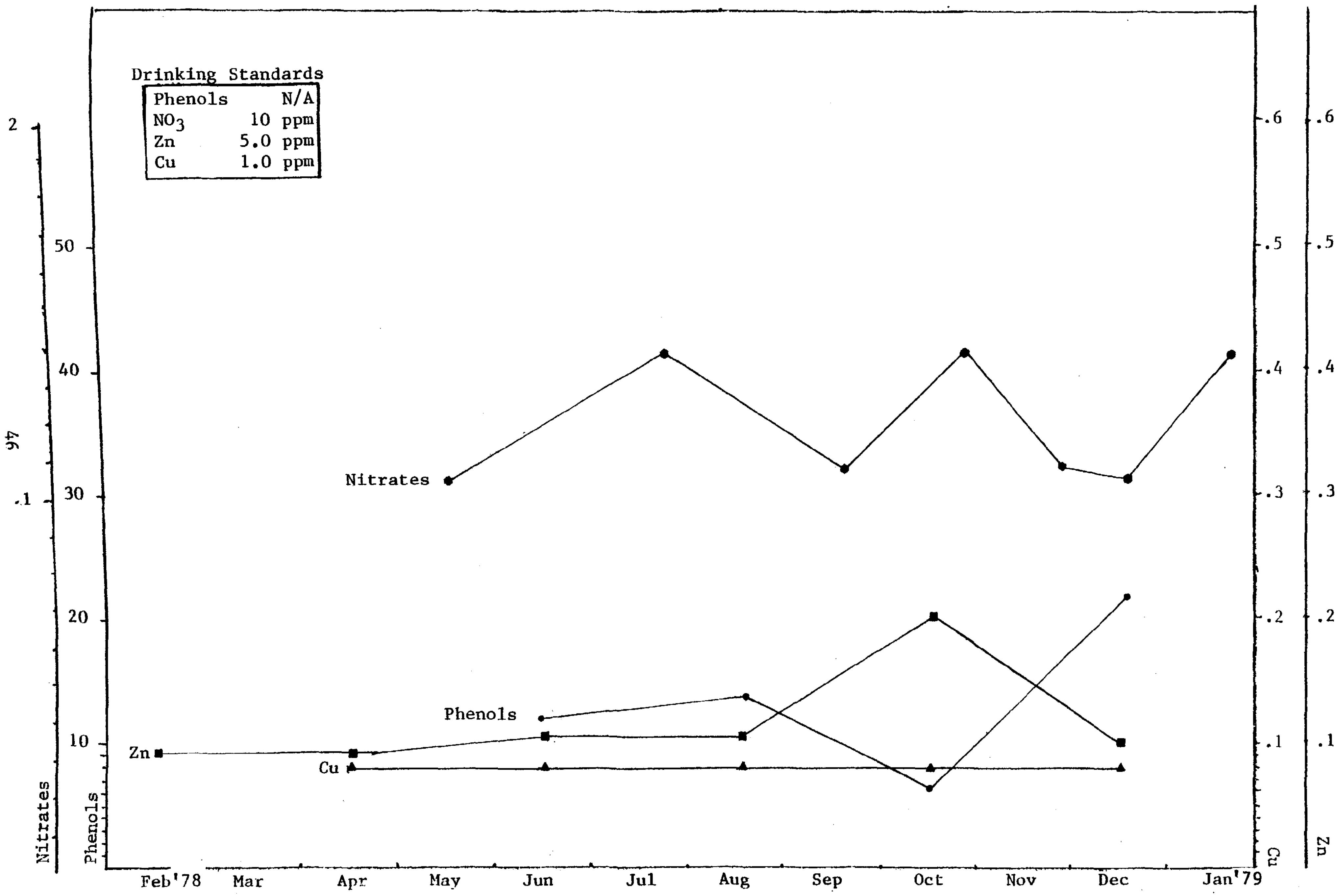

Figure 21 Water quality trends from unfiltered samples for Nitrates, Copper, Zinc (in parts per million) and Phenols (in parts per billion)

Sampling Point 6

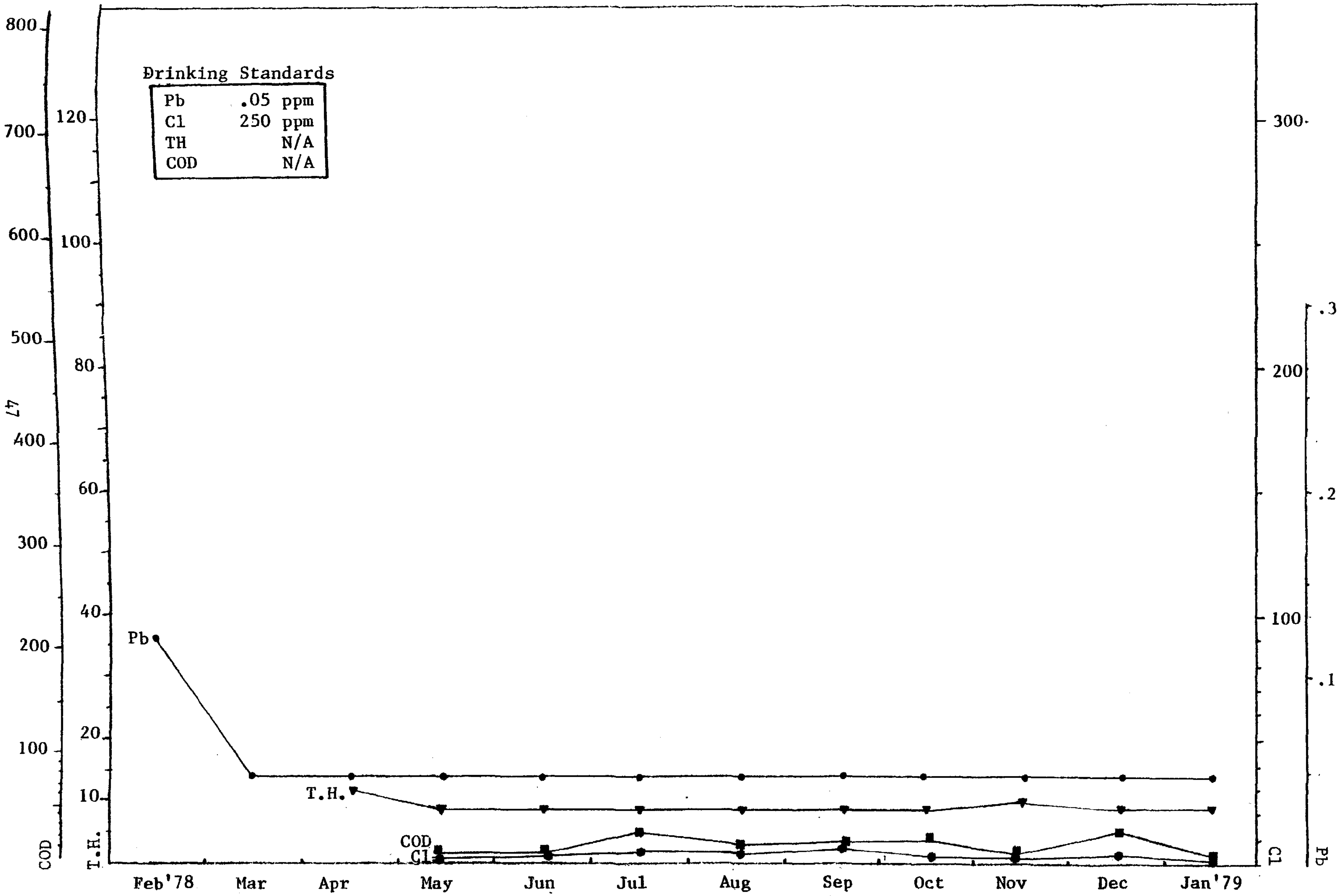

Figure 22 Water quality trends from unfiltered samples for COD, Hardness, Chlorides, and Lead in parts per million

MONITORING WELL # 14

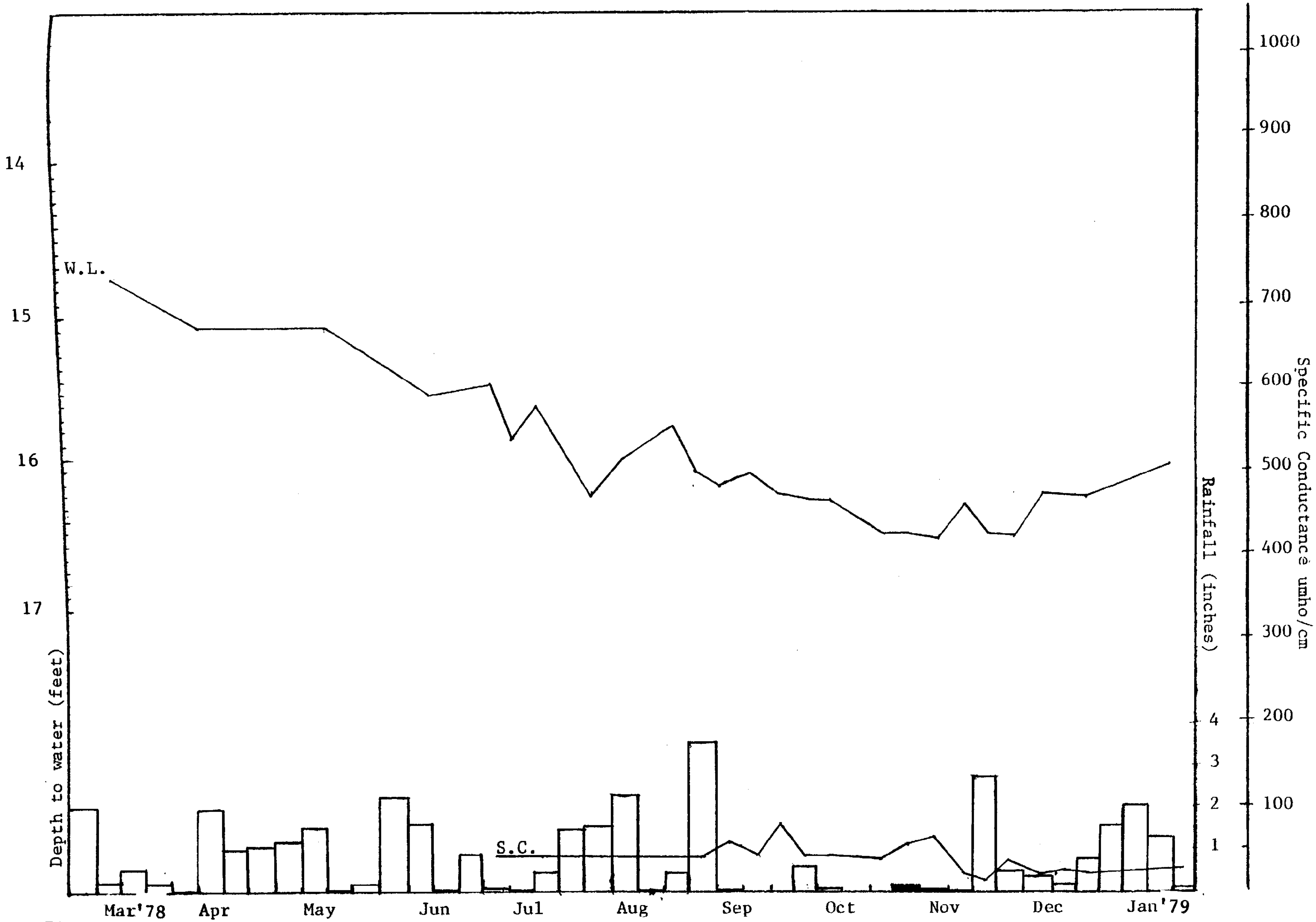

Figure 23 Precipitation record from the Columbia Metropolitan Airport, weekly hydrographs, and specific conductance.

Sampling Point 14

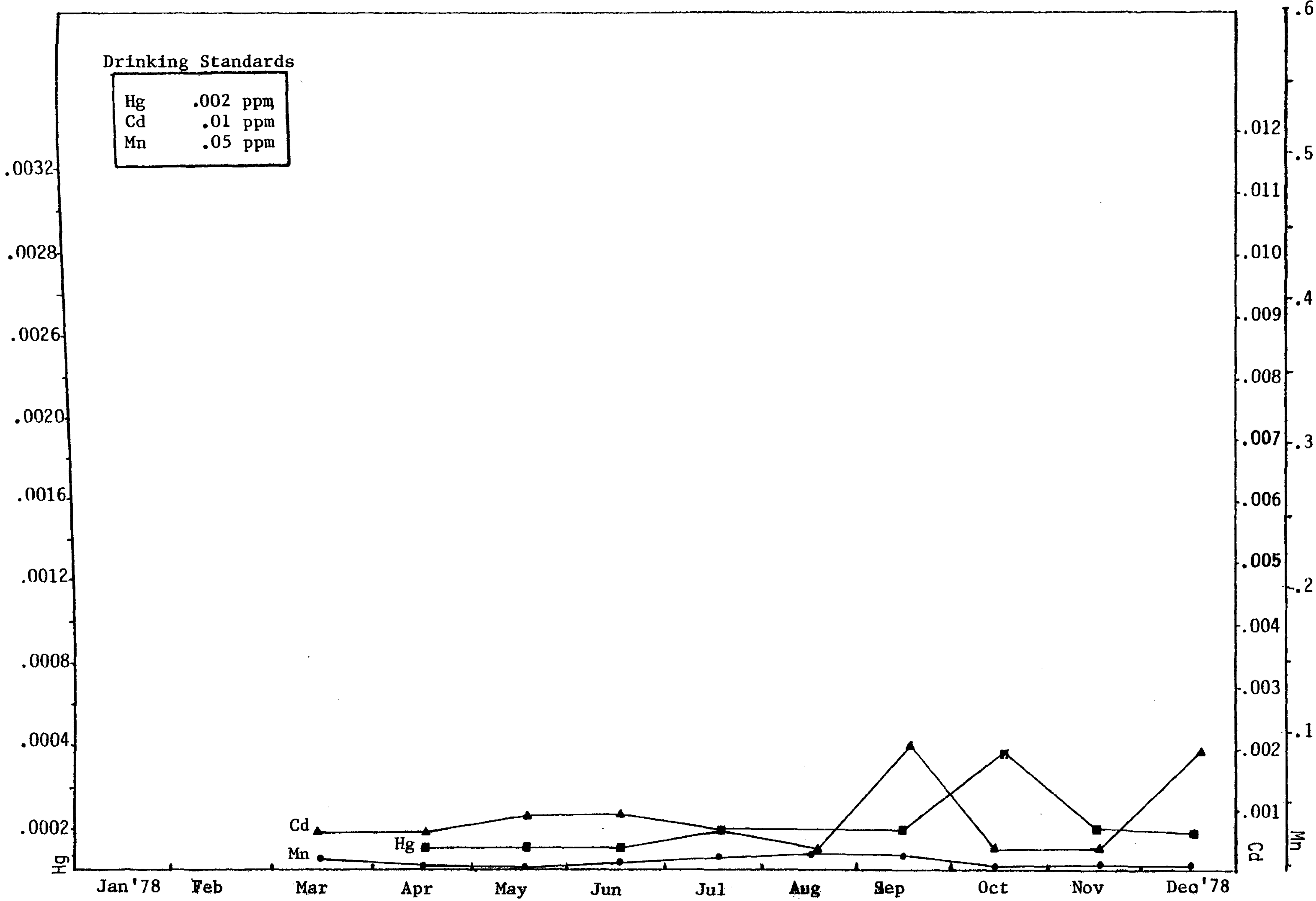

Figure 24 Water quality trends from filtered samples for Cadmium, Manganese, and Mercury in parts per million

Sampling Point 14

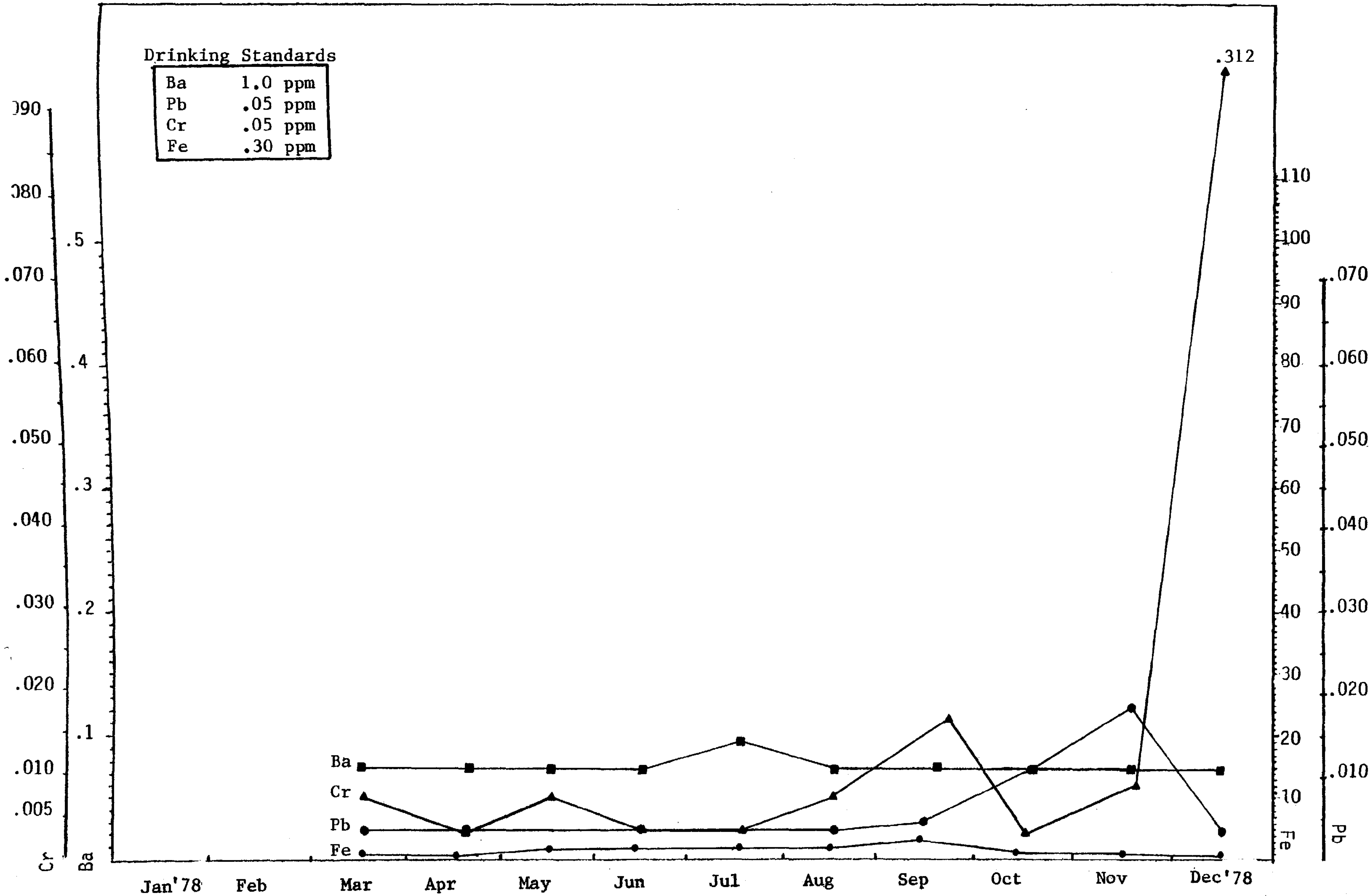

Figure 25 Water quality trends from filtered samples for Chromium, Barium, Iron, and Lead in parts per million

Sampling Point 14

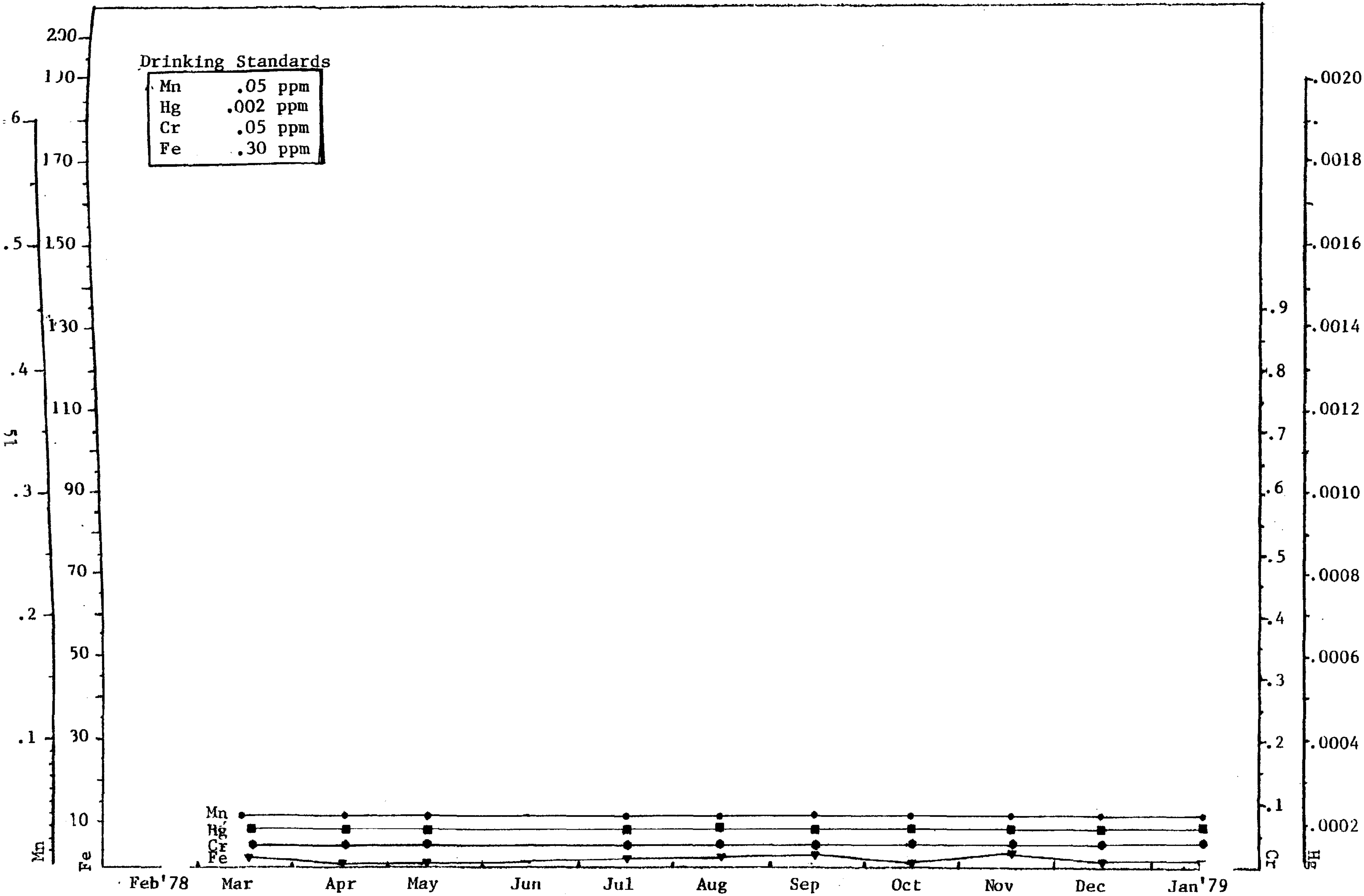

Figure 26 Water quality trends from unfiltered samples for Chromium, Iron, Mercury, and Manganese in parts per million

Sampling Point 14

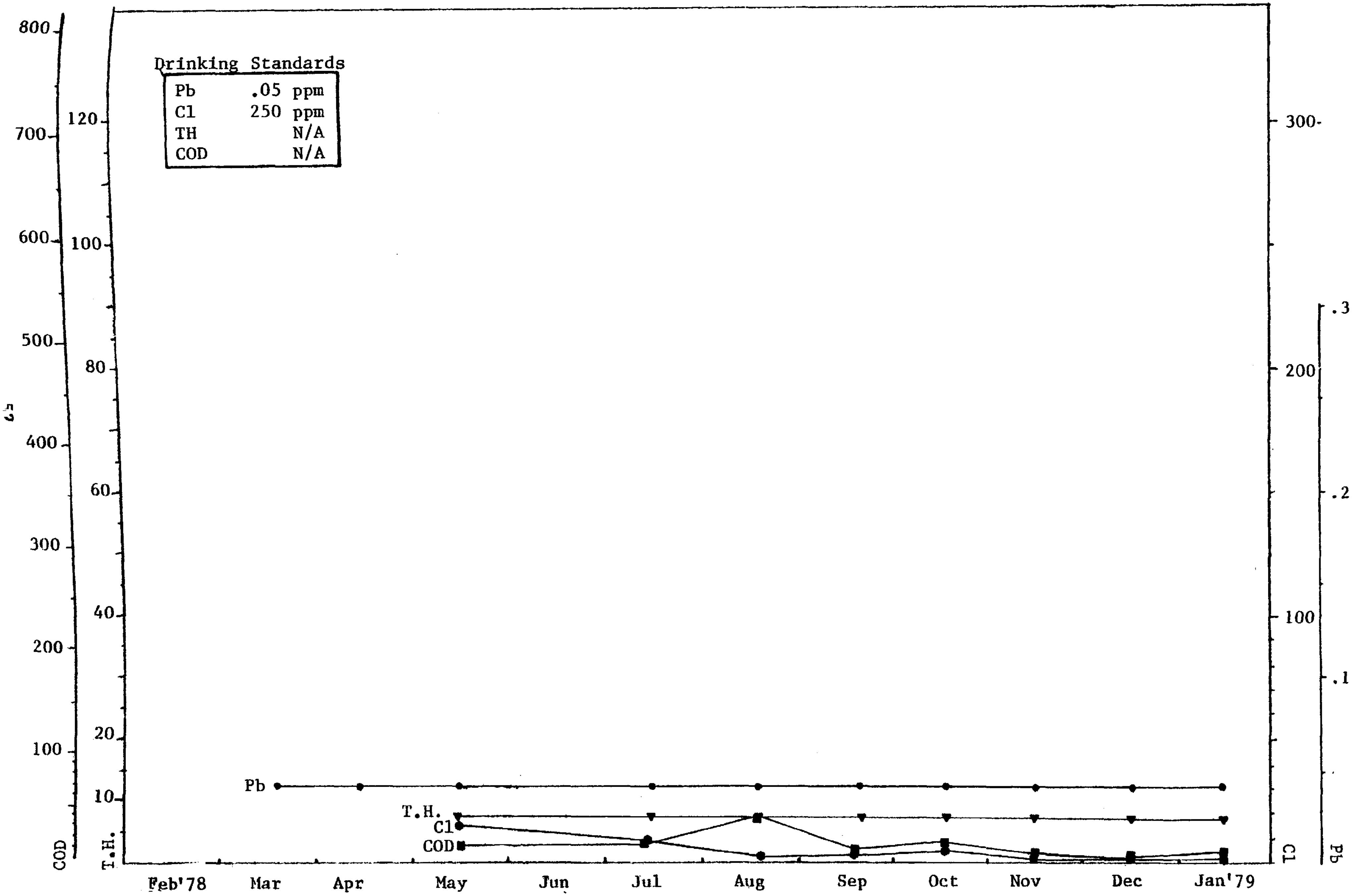

Figure 27 Water quality trends from unfiltered samples for COD, Hardness, Chlorides, and Lead in parts per million

Sampling Point 14

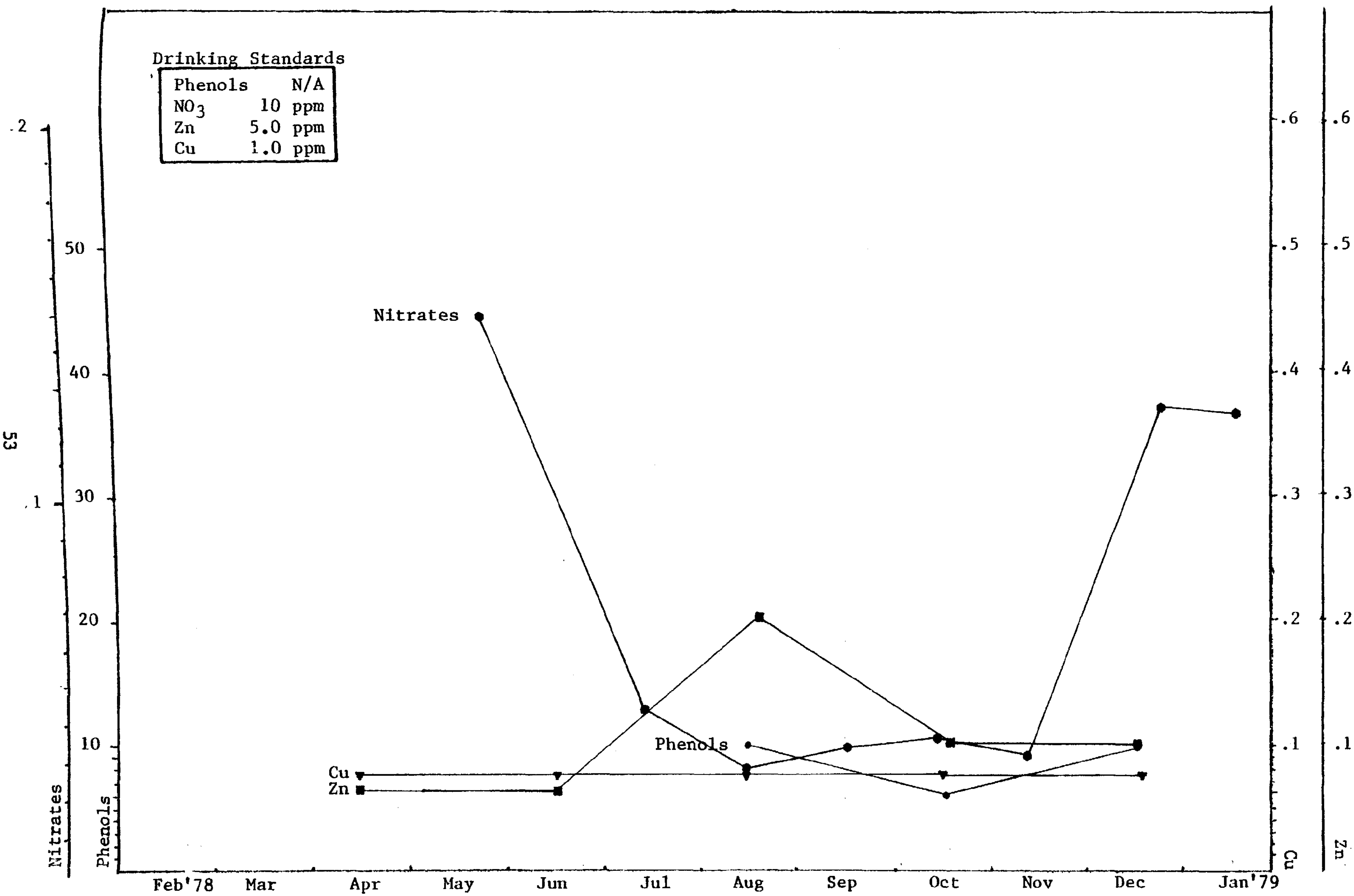

Figure 28 Water quality trends from unfiltered samples for Nitrates, Copper, Zinc (in parts per million) and Phenols (in parts per billion)

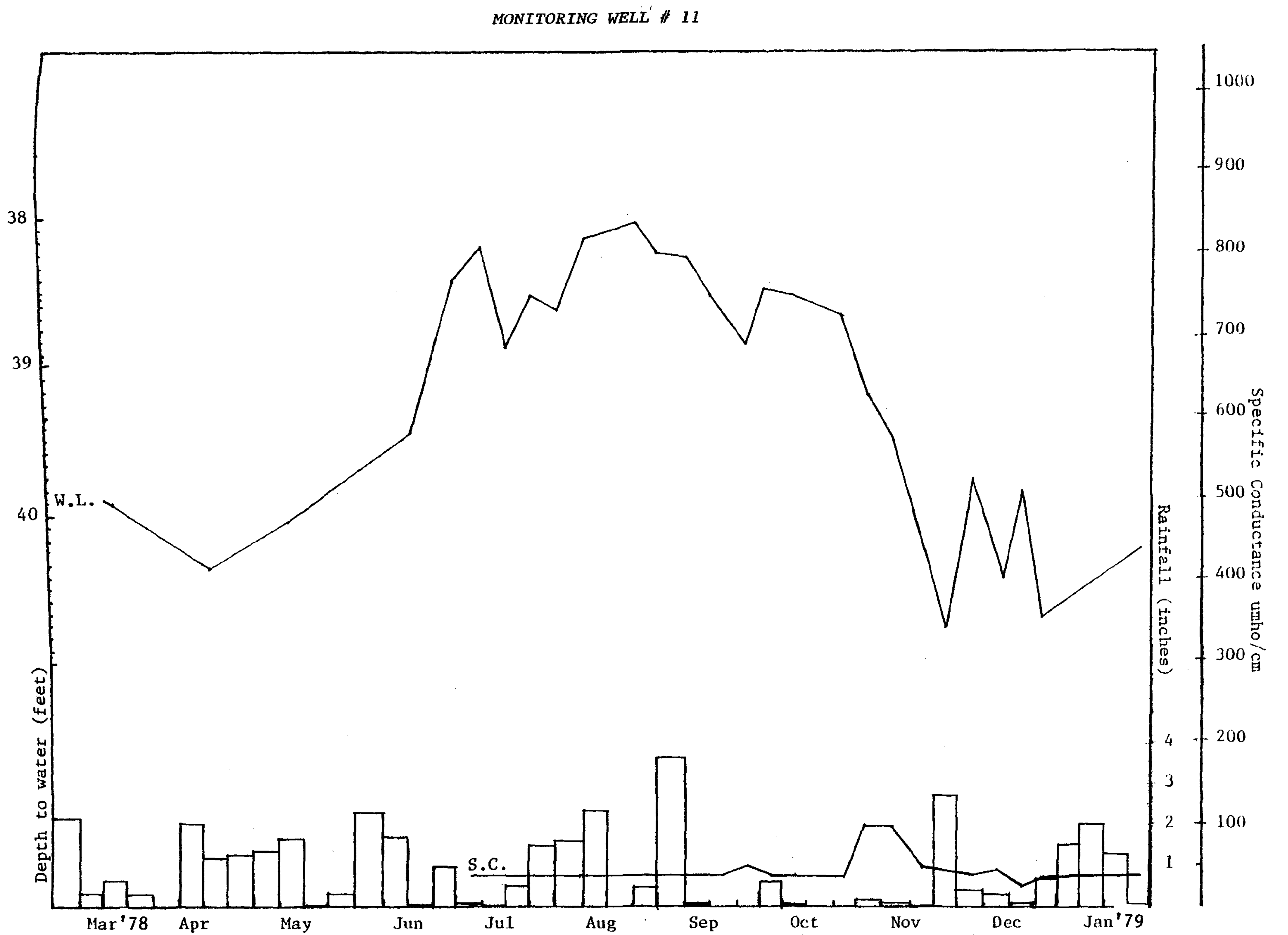

Figure 29 Precipitation record from the Columbia Metropolitan Airport, weekly hydrographs, and specific conductance.

Sampling Point 11

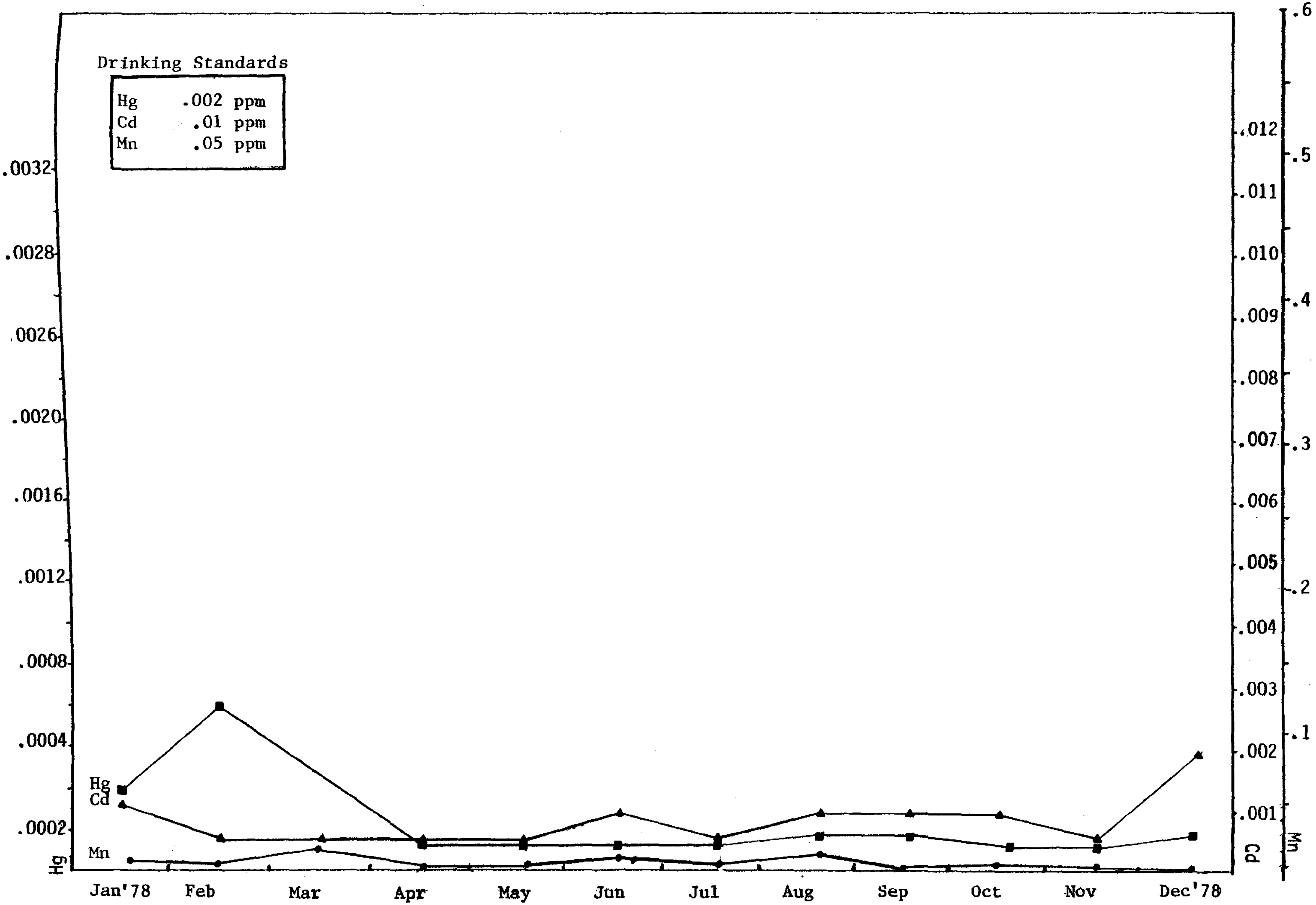

Figure 30 Water quality trends from filtered samples for Cadmium, Manganese, and Mercury in parts per million

Sampling Point 11

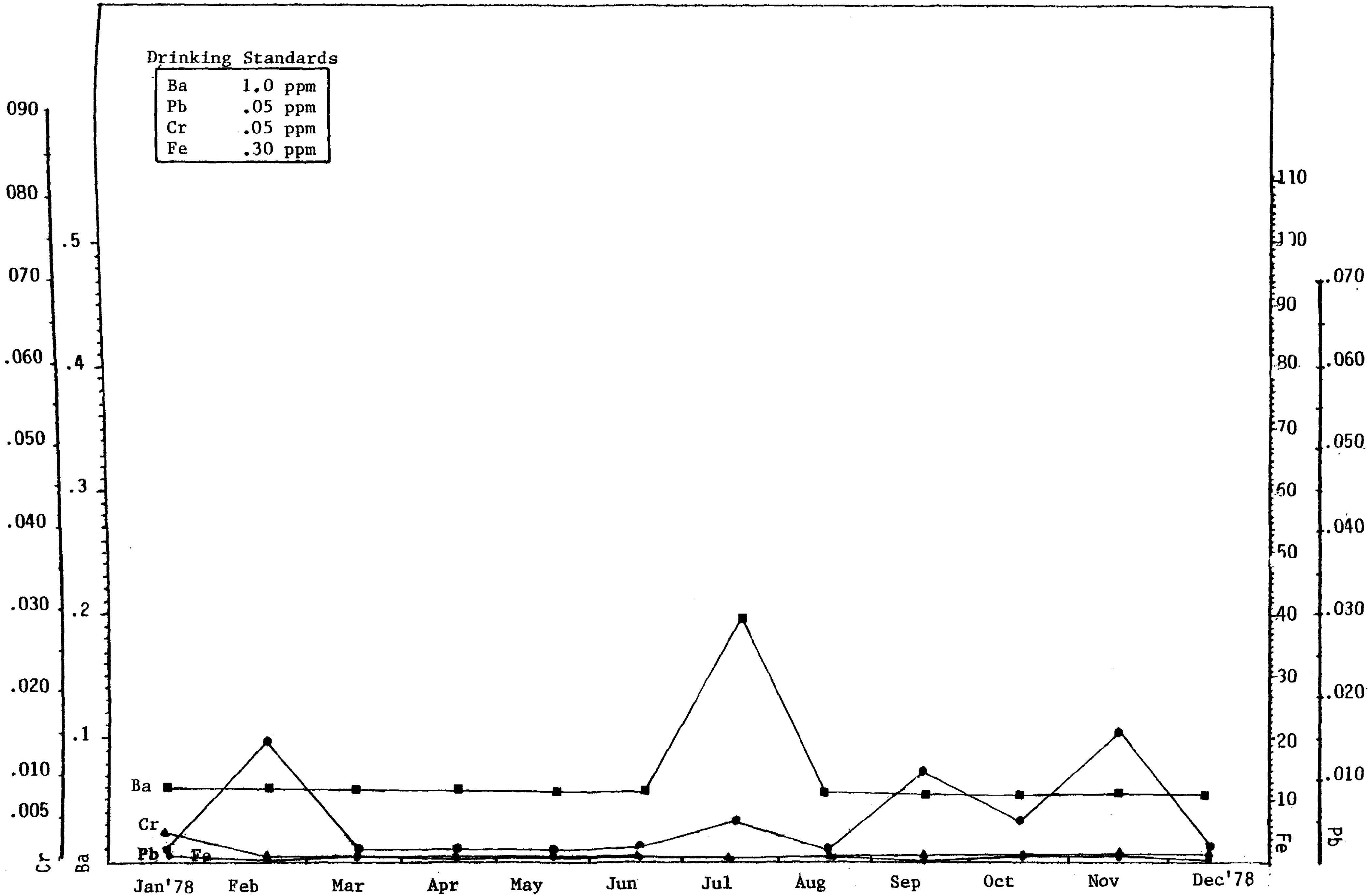

Figure 31 Water quality trends from filtered samples for Chromium, Barium, Iron, and Lead in parts per million

Sampling Point 11

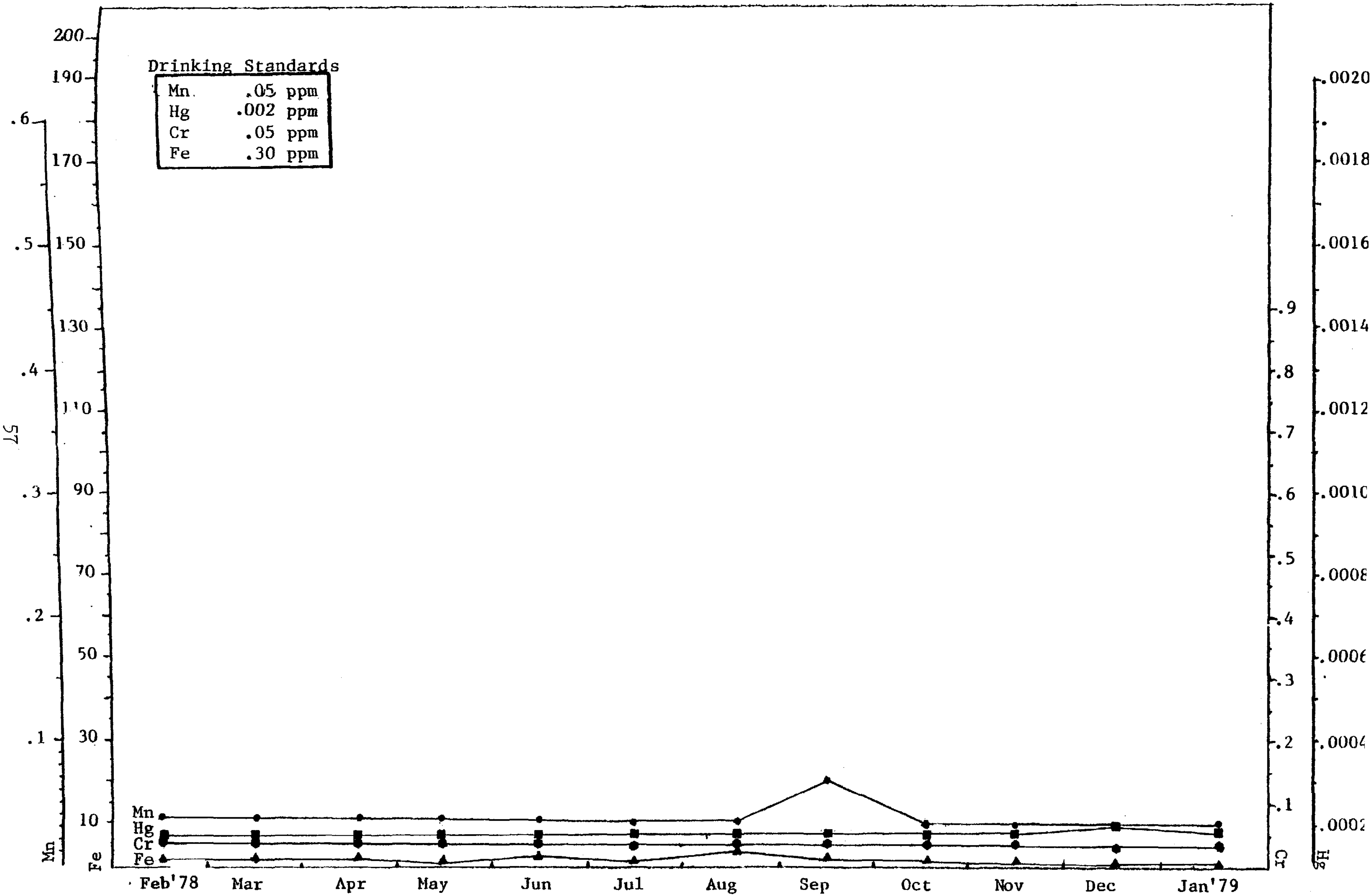

Figure 32 Water quality trends from unfiltered samples for Chromium, Iron, Mercury, and Manganese in parts per million

Sampling Point 11

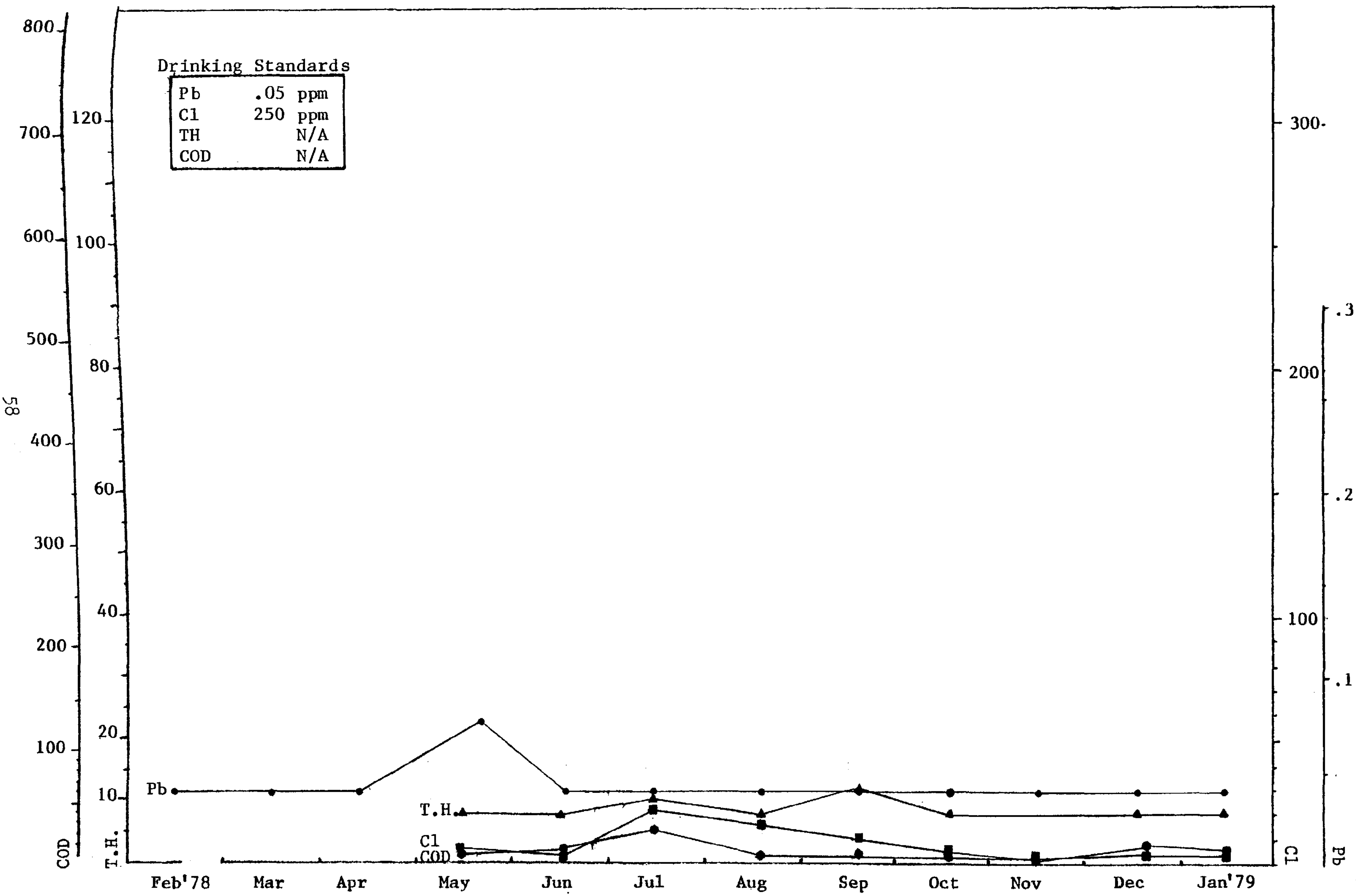

Figure 33 Water quality trends from unfiltered samples for COD, Hardness, Chlorides, and Lead in parts per million

Sampling Point 11

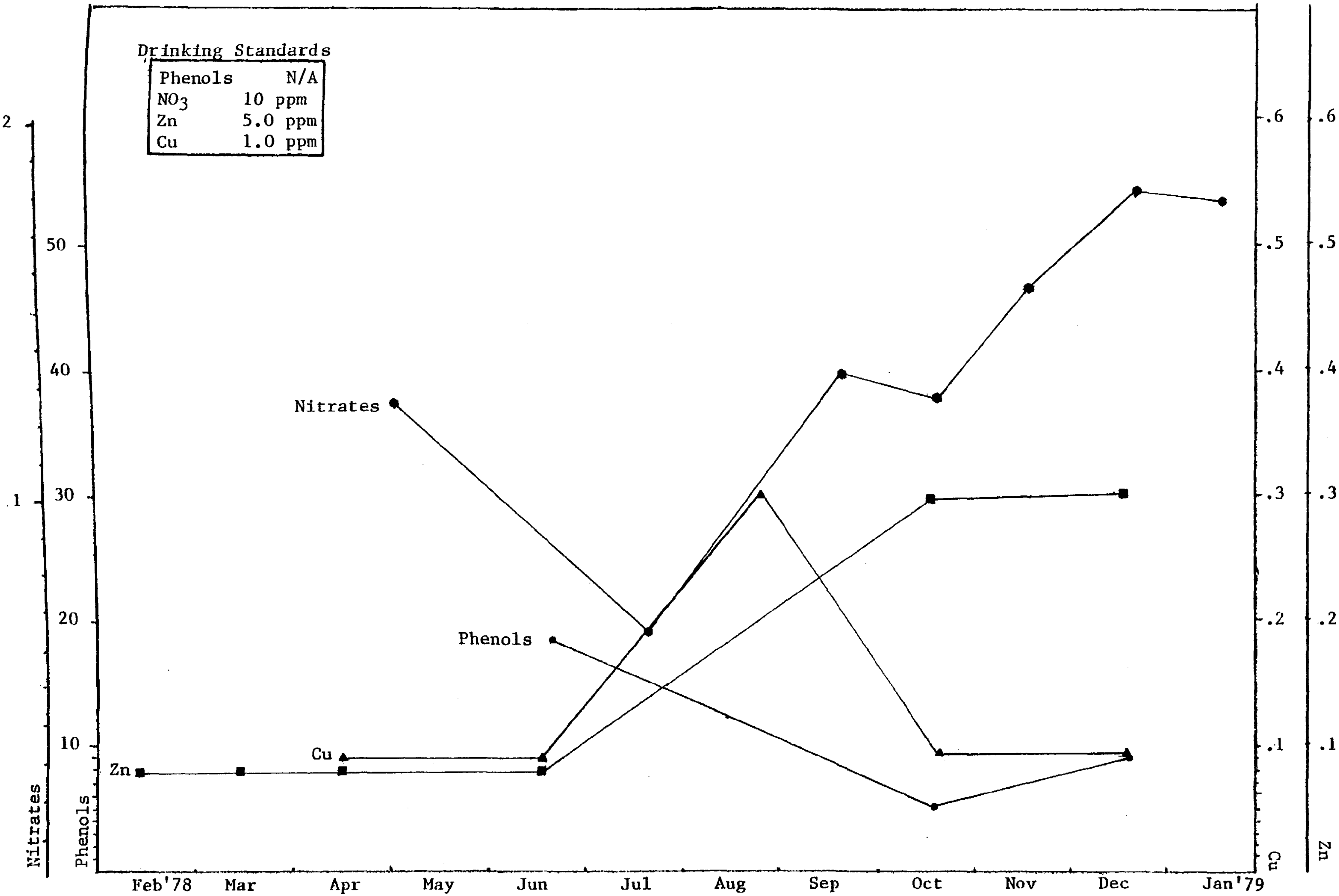

Figure 34 Water quality trends from unfiltered samples for Nitrates, Copper, Zinc (in parts per million) and Phenols (in parts per billion)

MONITORING WELL # 13

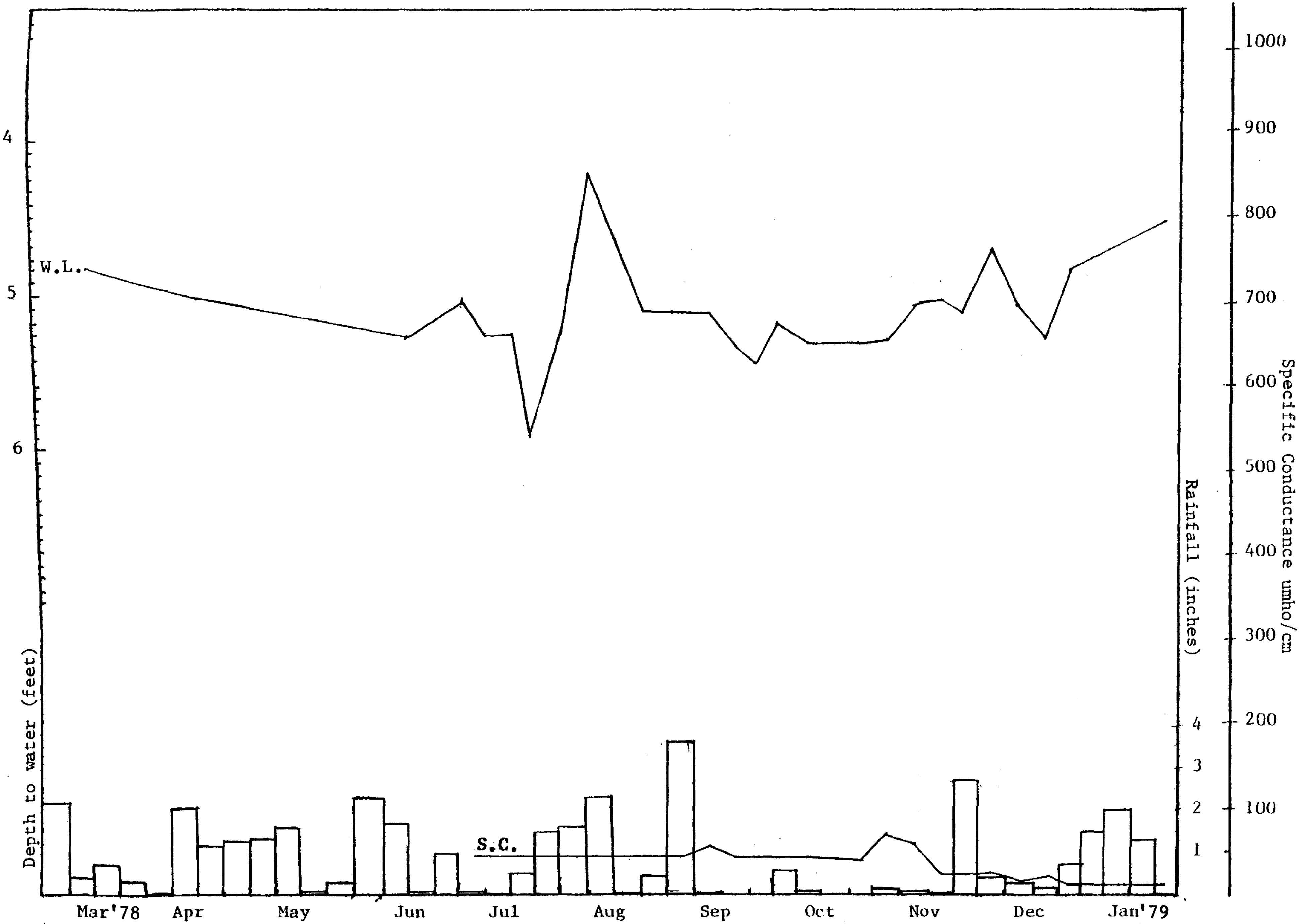

Figure 35 Precipitation record from the Columbia Metropolitan Airport, weekly hydrographs, and specific conductance.

Sampling Point 13

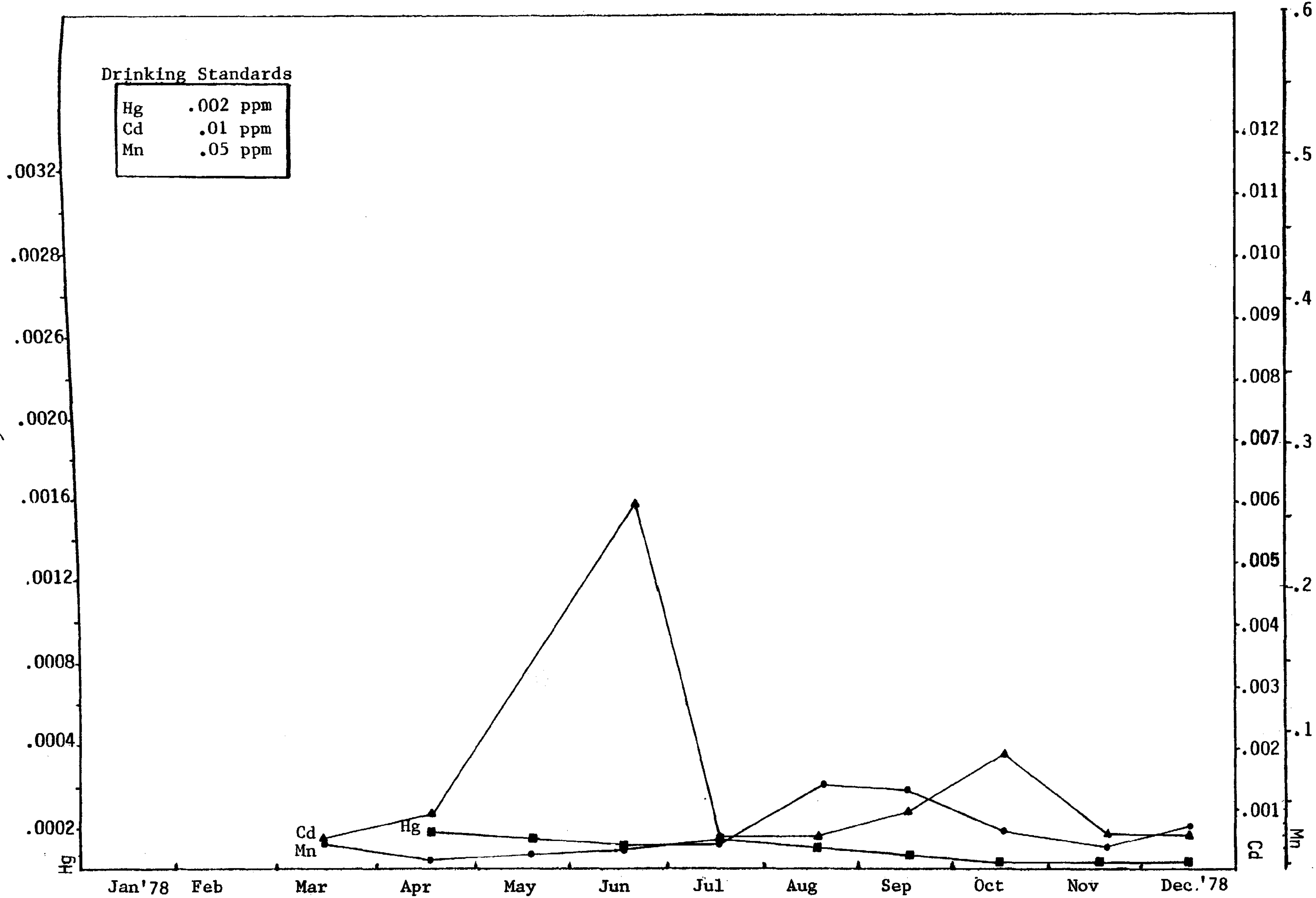

Figure 36 **Water quality trends from filtered samples for Cadmium, Manganese, and Mercury in parts per million**

Sampling Point 13

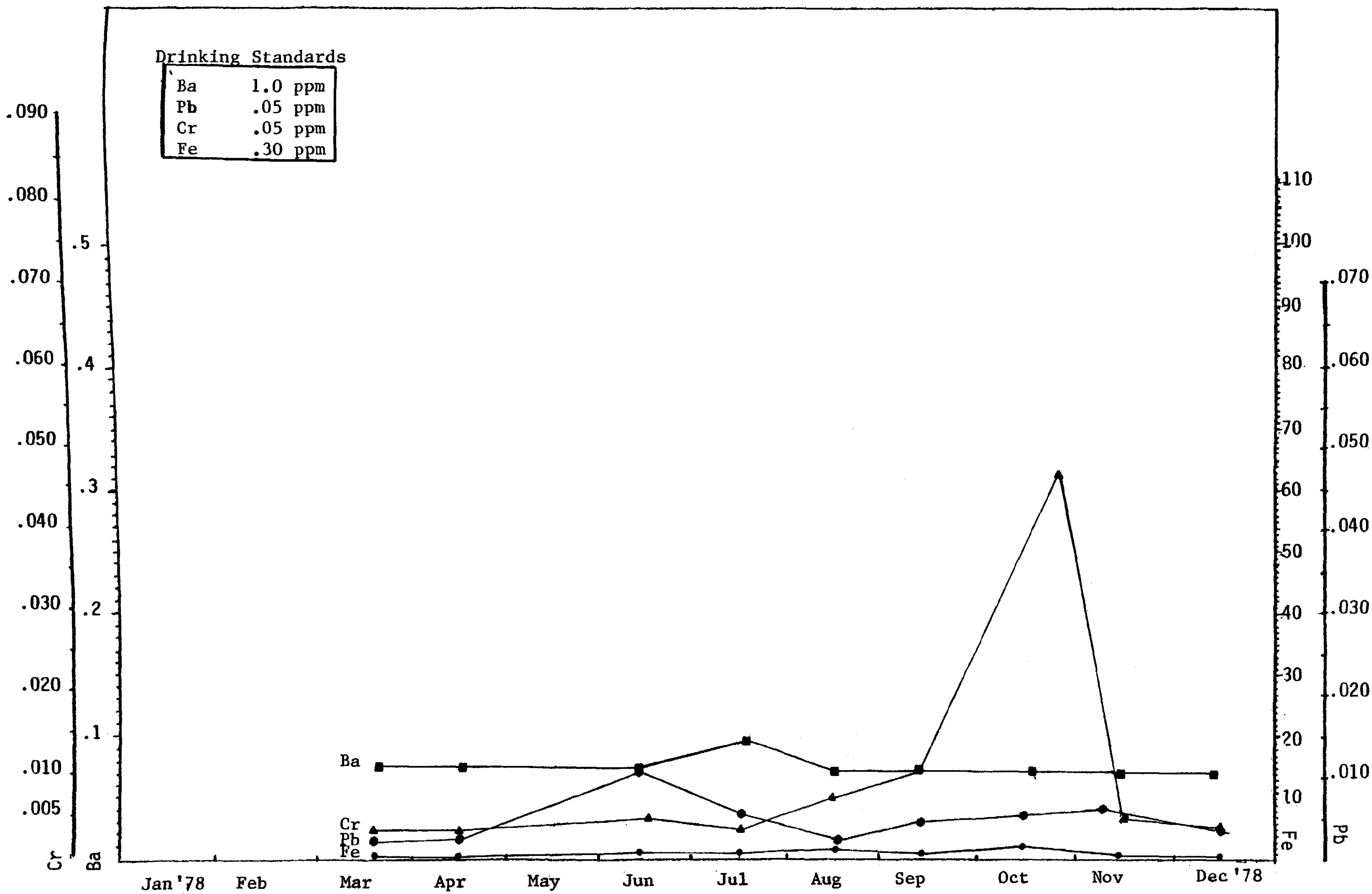

Figure 37 Water quality trends from filtered samples for Chromium, Barium, Iron, and Lead in parts per million

Sampling Point 13

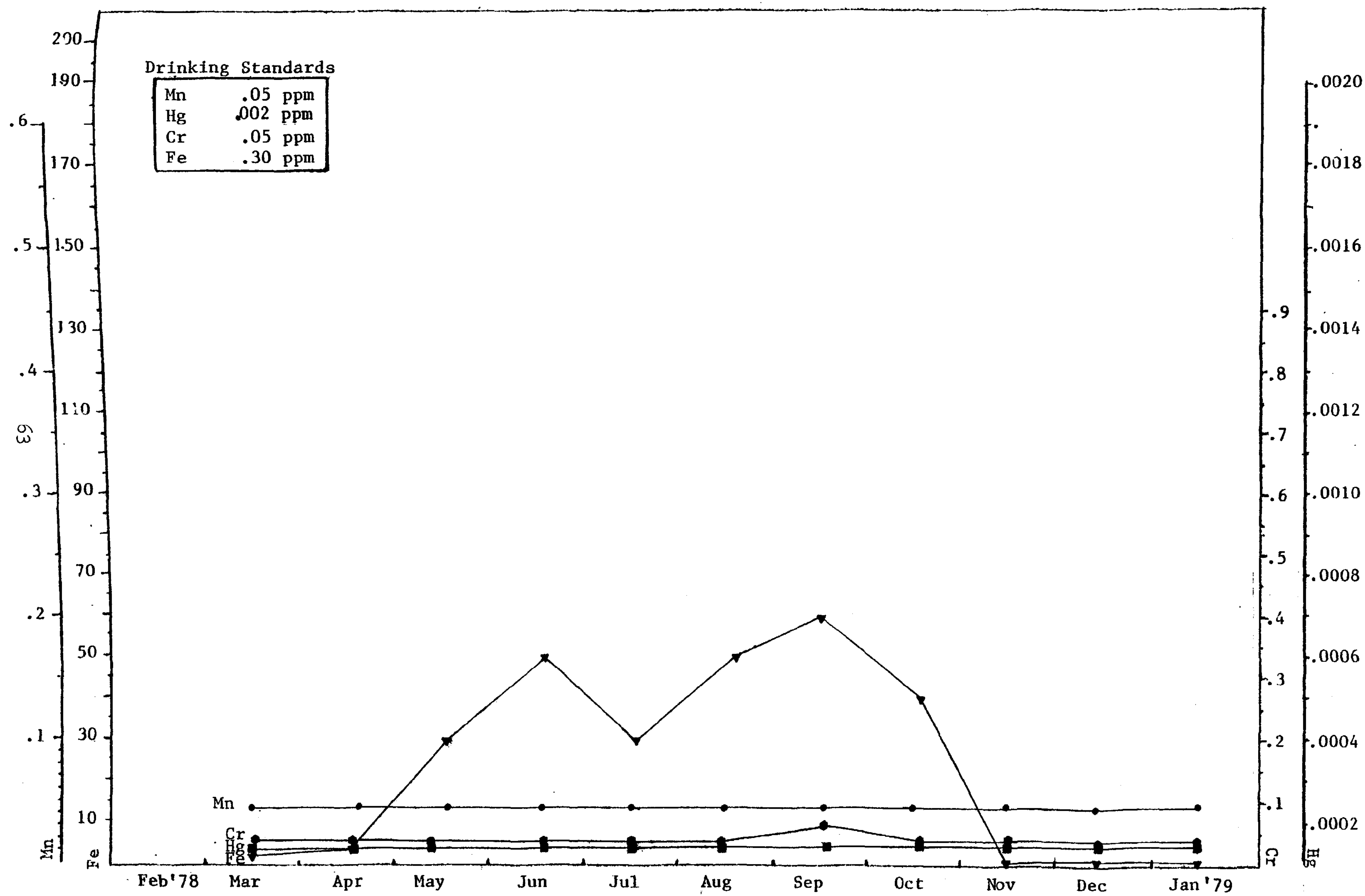

Figure 38 Water quality trends from unfiltered samples for Chromium, Iron, Mercury, and Manganese in parts per million

Sampling Point 13

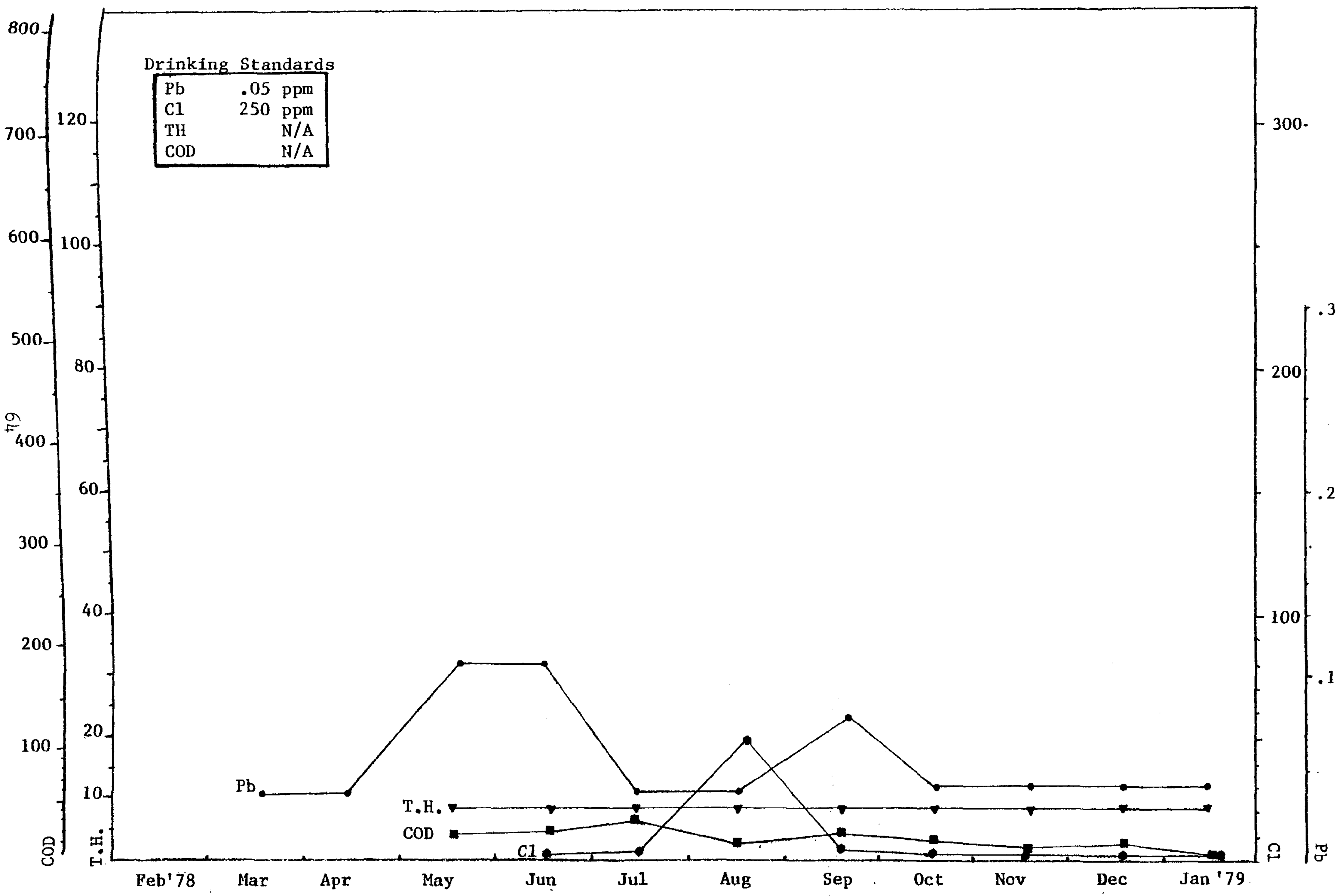

Figure 39 Water quality trends from unfiltered samples for COD, Hardness, Chlorides, and Lead in parts per million

Sampling Point 13

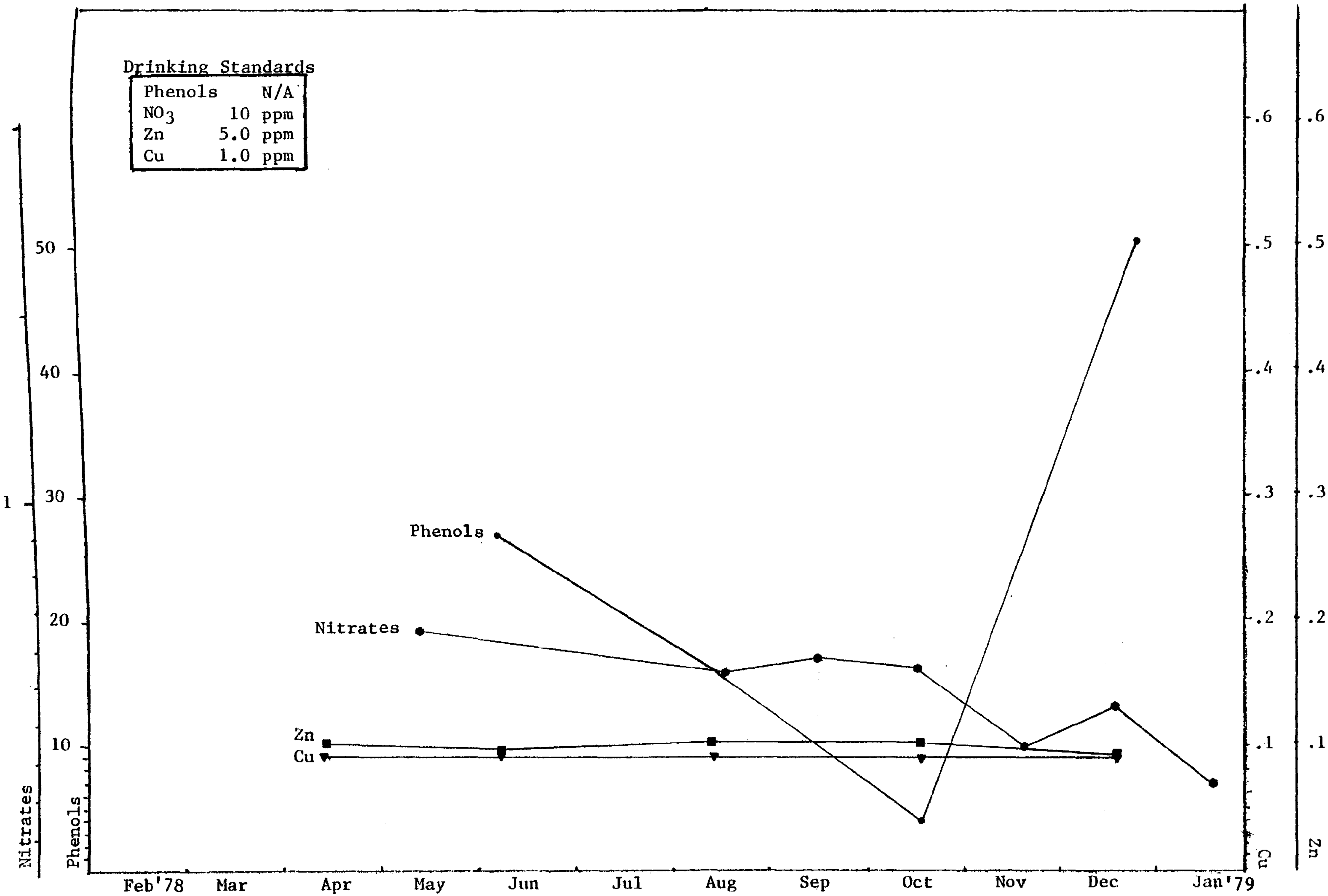

Figure 40 Water quality trends from unfiltered samples for Nitrates, Copper, Zinc (in parts per million) and Phenols (in parts per billion)

SAMPLING POINTS A', B', E and F

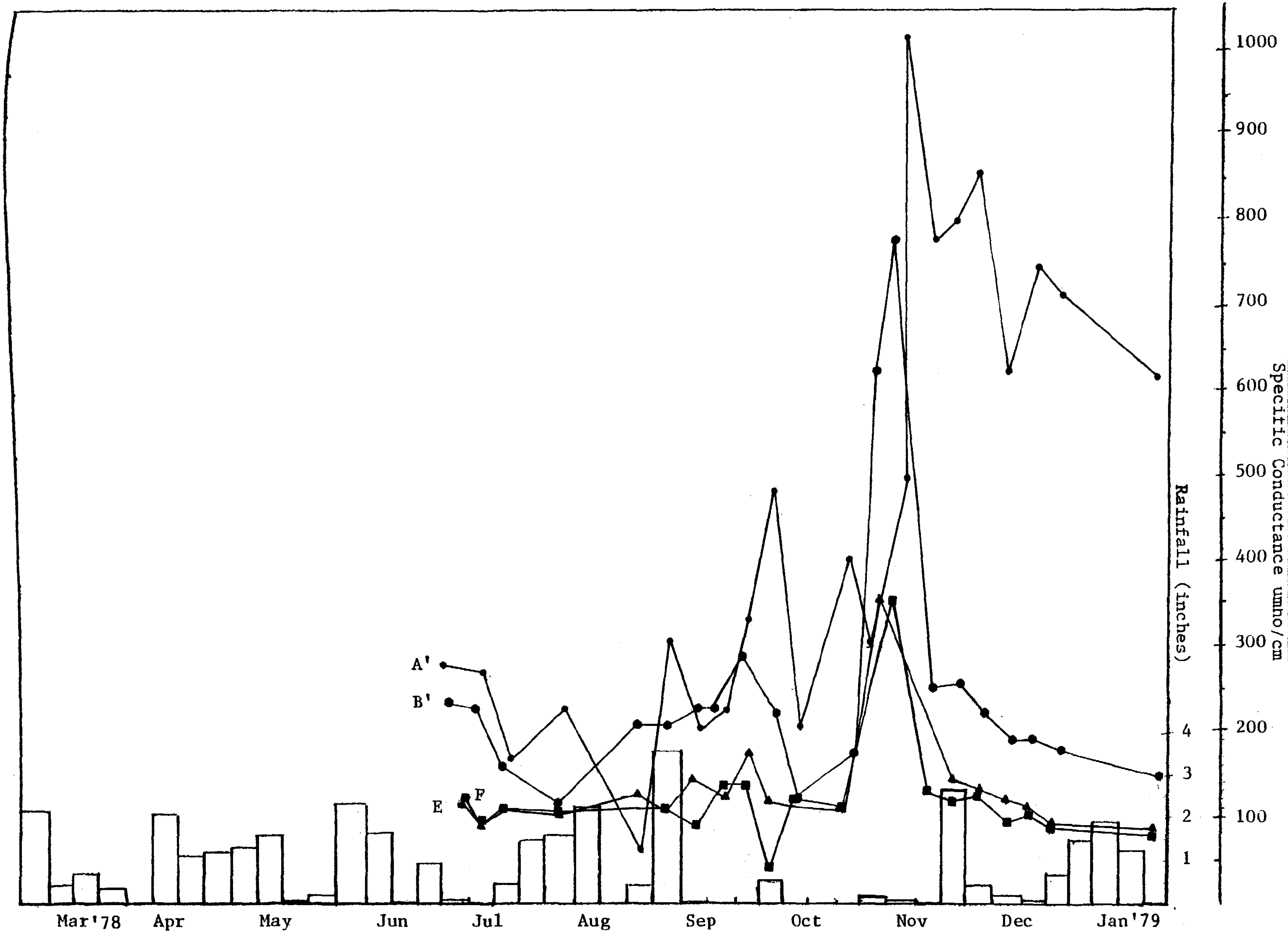

Figure 41 **Precipitation record from the Columbia Metropolitan Airport and Specific Conductance**

Sampling Point A'

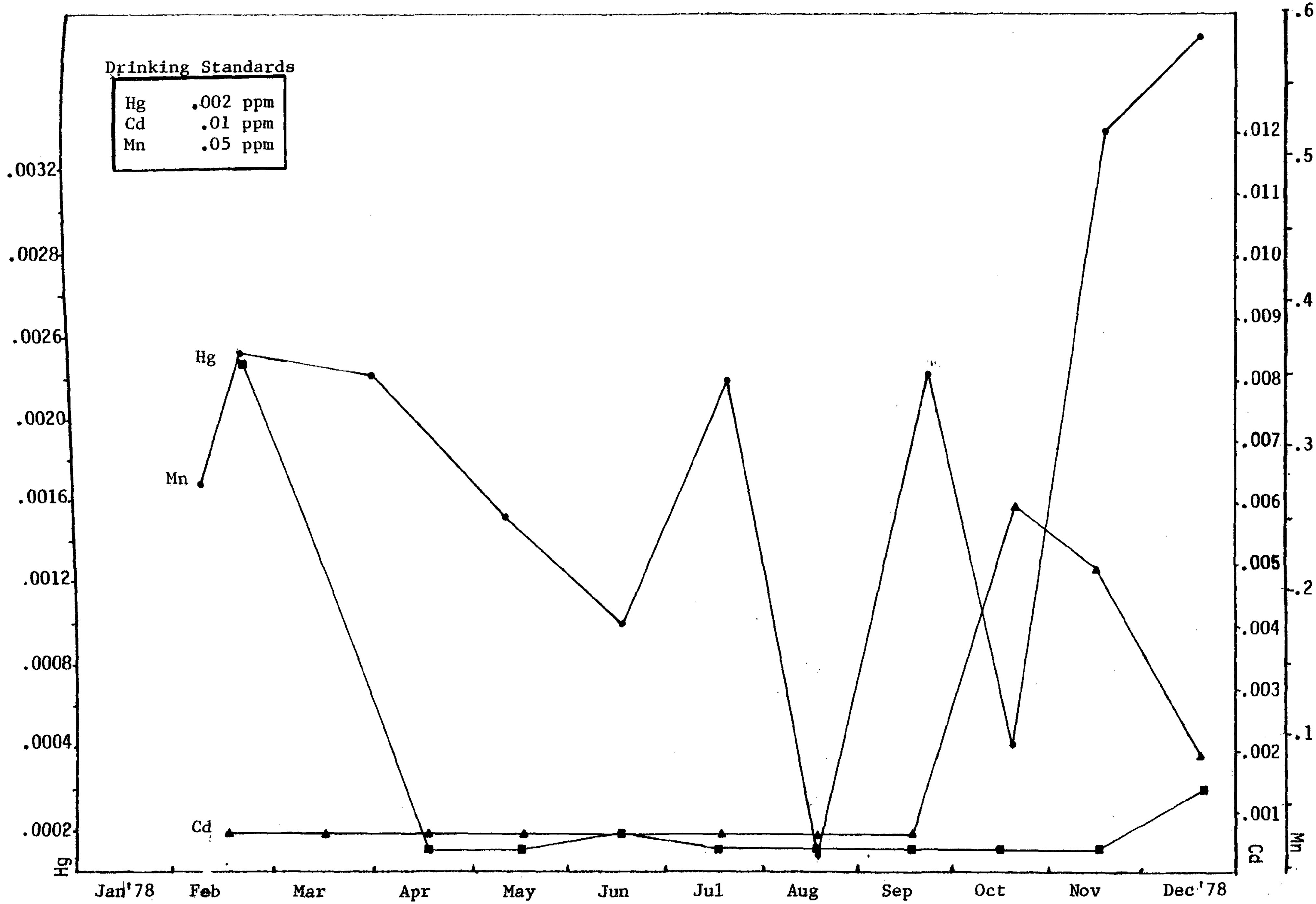

Figure 42 Water quality trends from filtered samples for Cadmium, Manganese, and Mercury in parts per million

Sampling Point A'

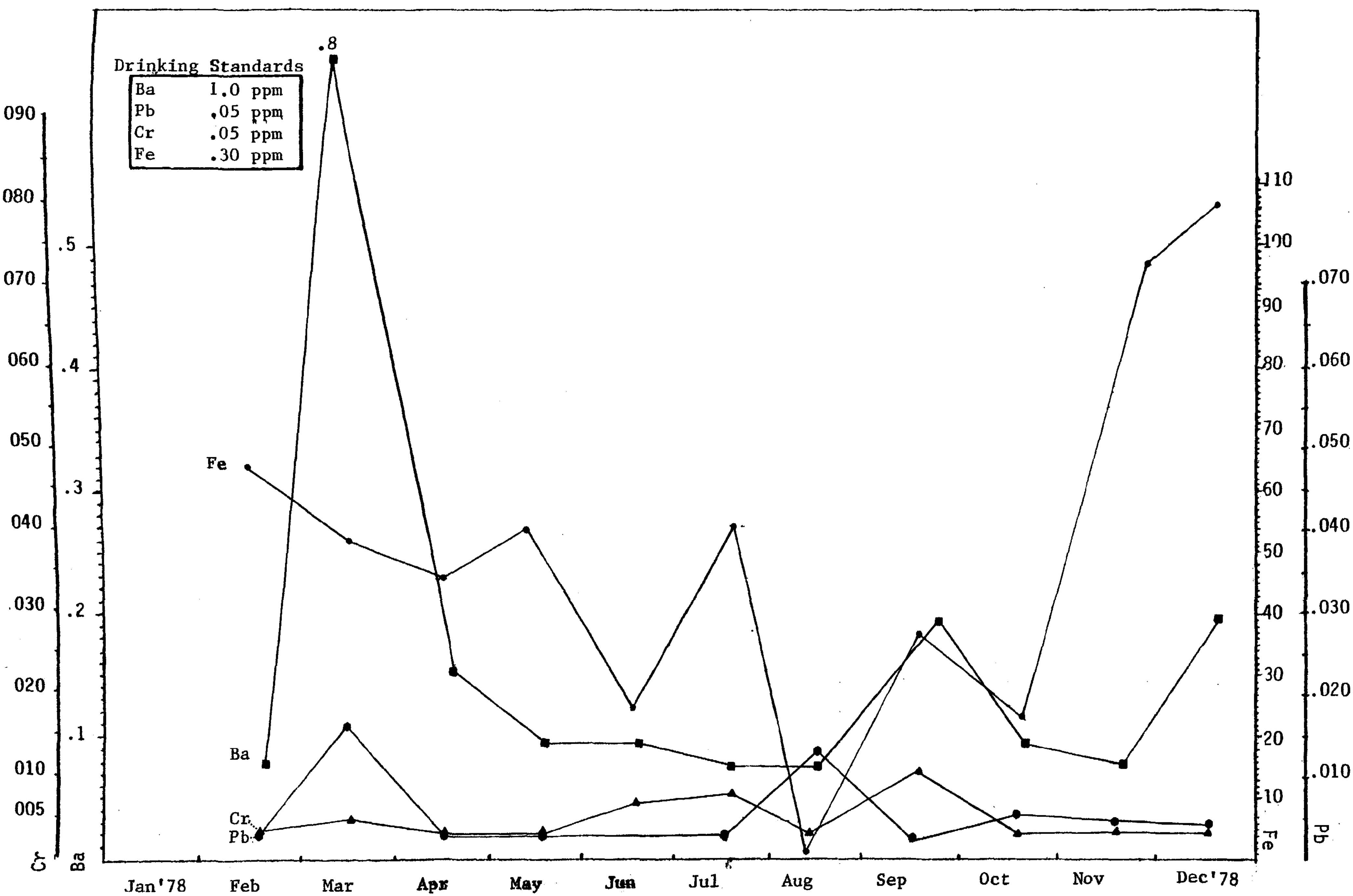

Figure 43 Water quality trends from filtered samples for Chromium, Barium, Iron, and Lead in parts per million

Sampling Point A'

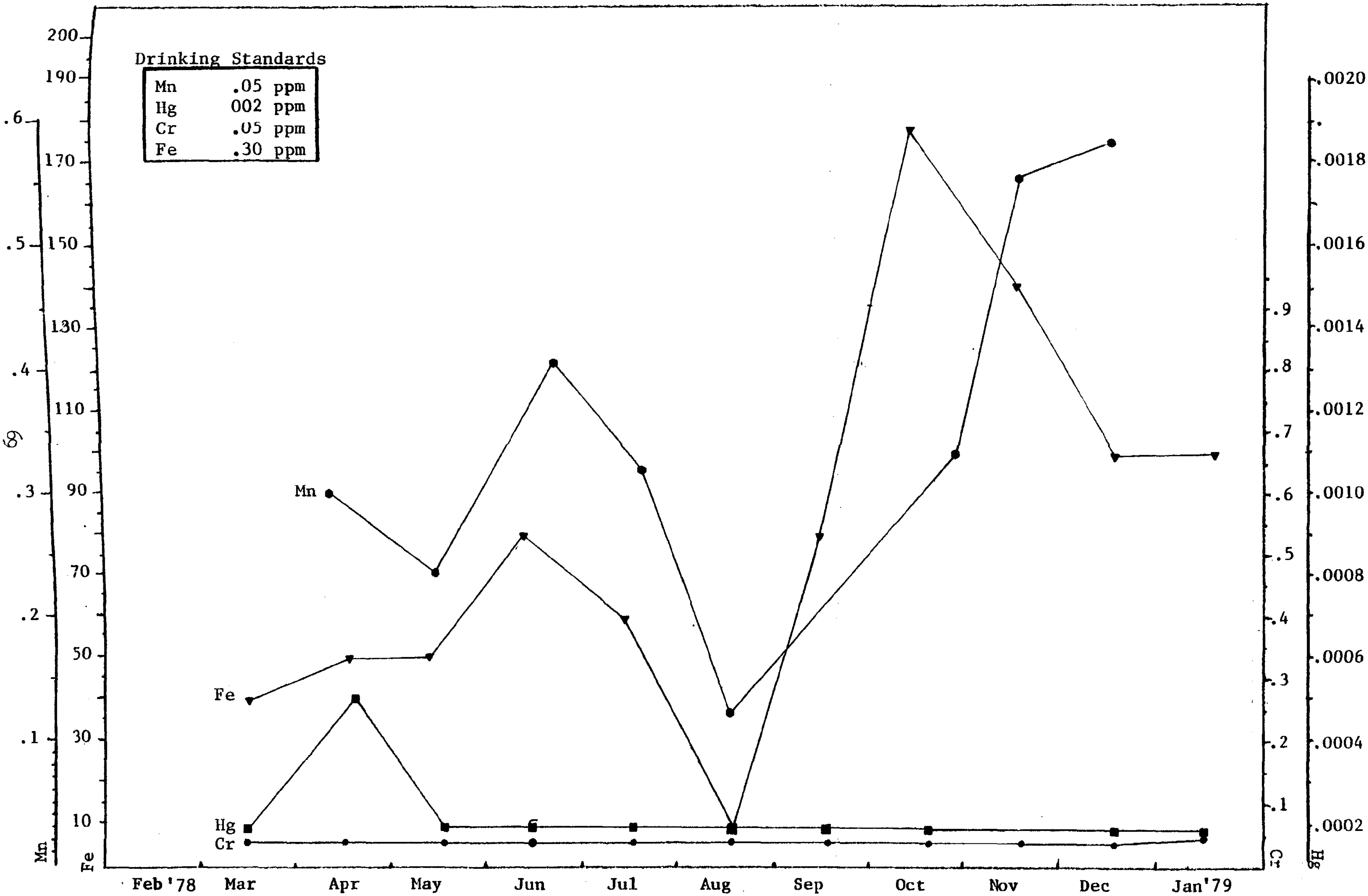

Figure 44 Water quality trends from unfiltered samples for Chromium, Iron, Mercury, and Manganese in parts per million

69

Sampling Point A'

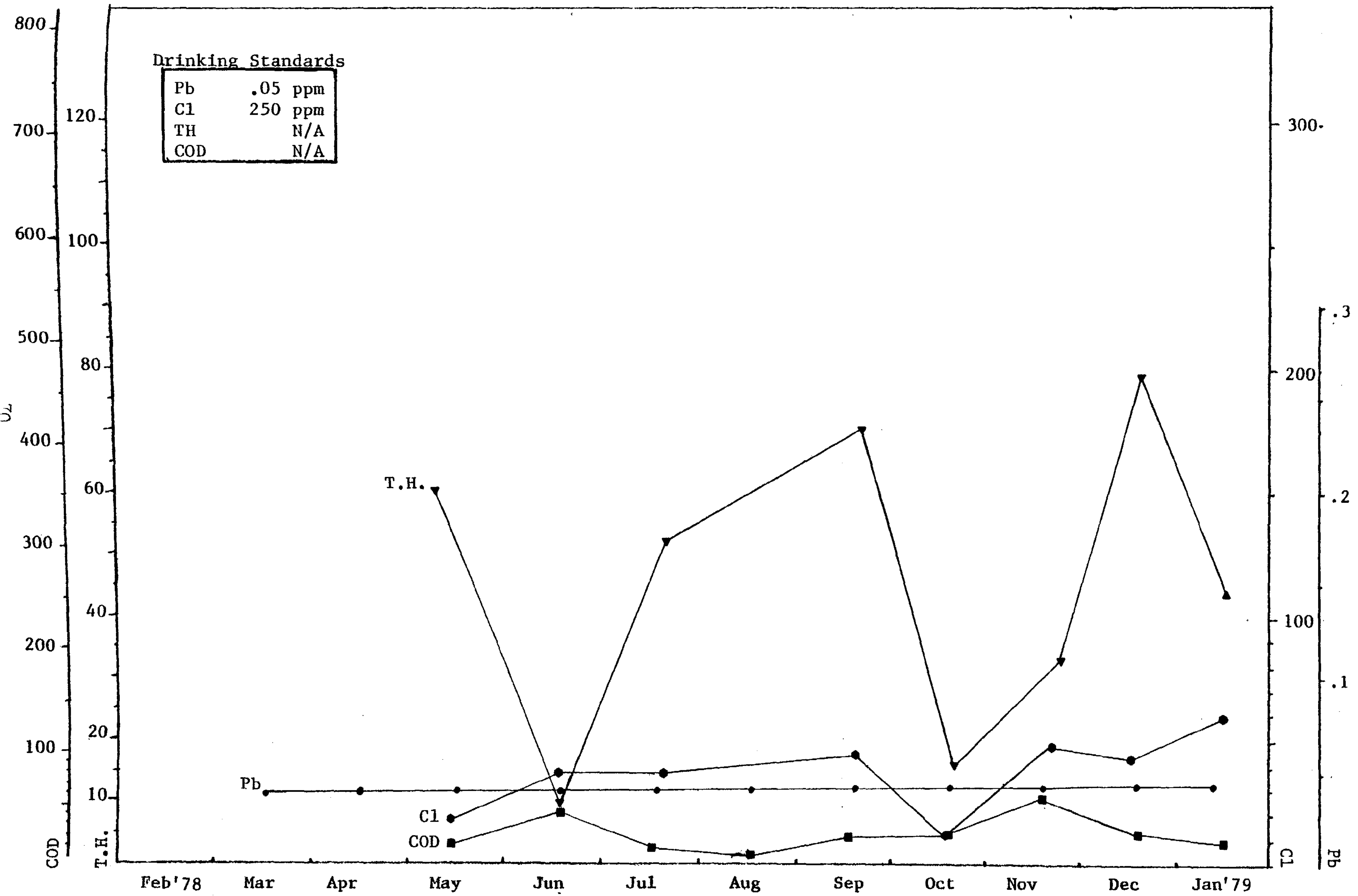

Figure 45 Water quality trends from unfiltered samples for COD, Hardness, Chlorides, and Lead in parts per million

Sampling Point A'

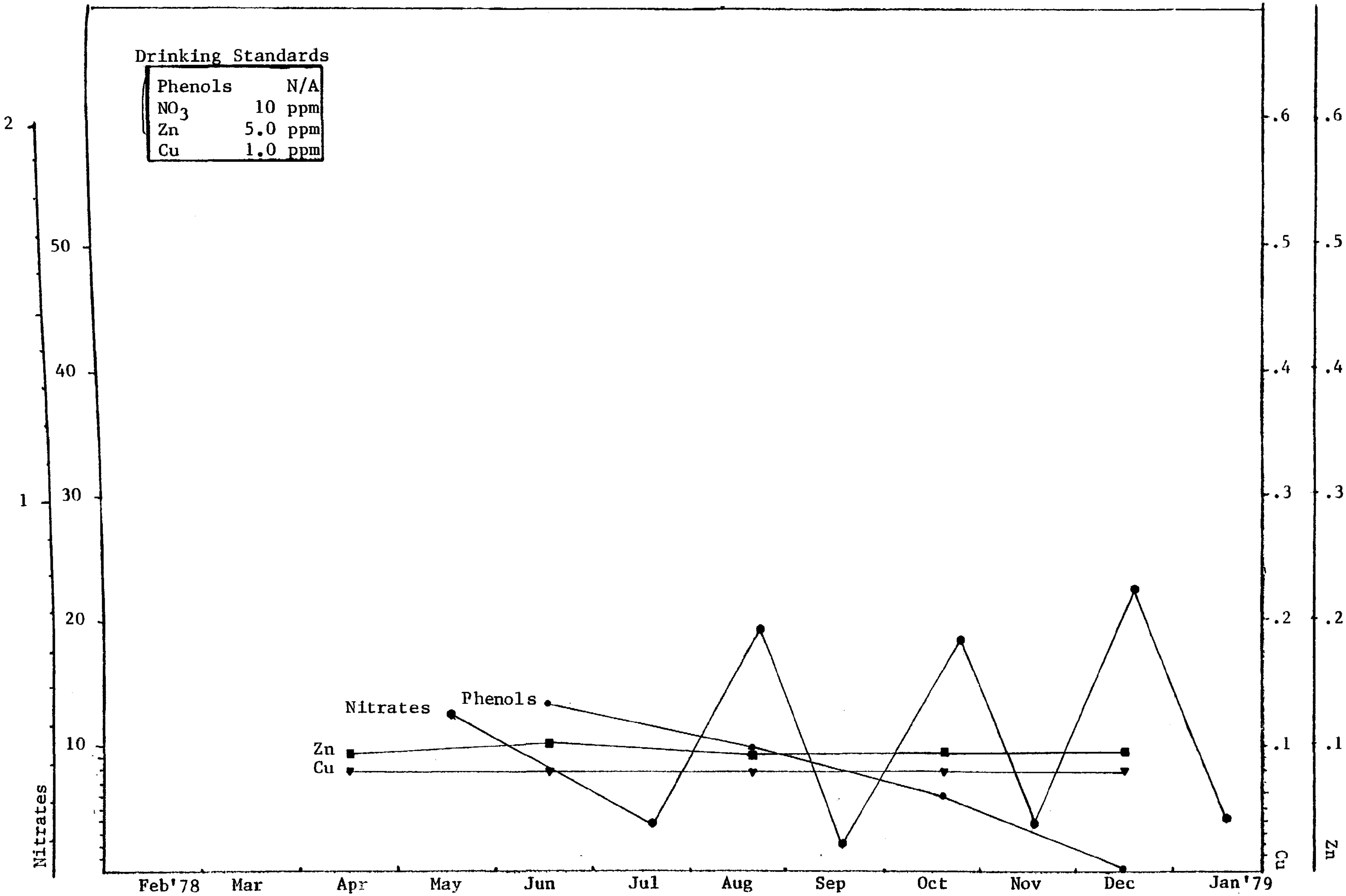

Figure 46 Water quality trends from unfiltered samples for Nitrates, Phenols, Copper, Zinc (in parts per million) and Phenols (in parts per billion)

Sampling Point B'

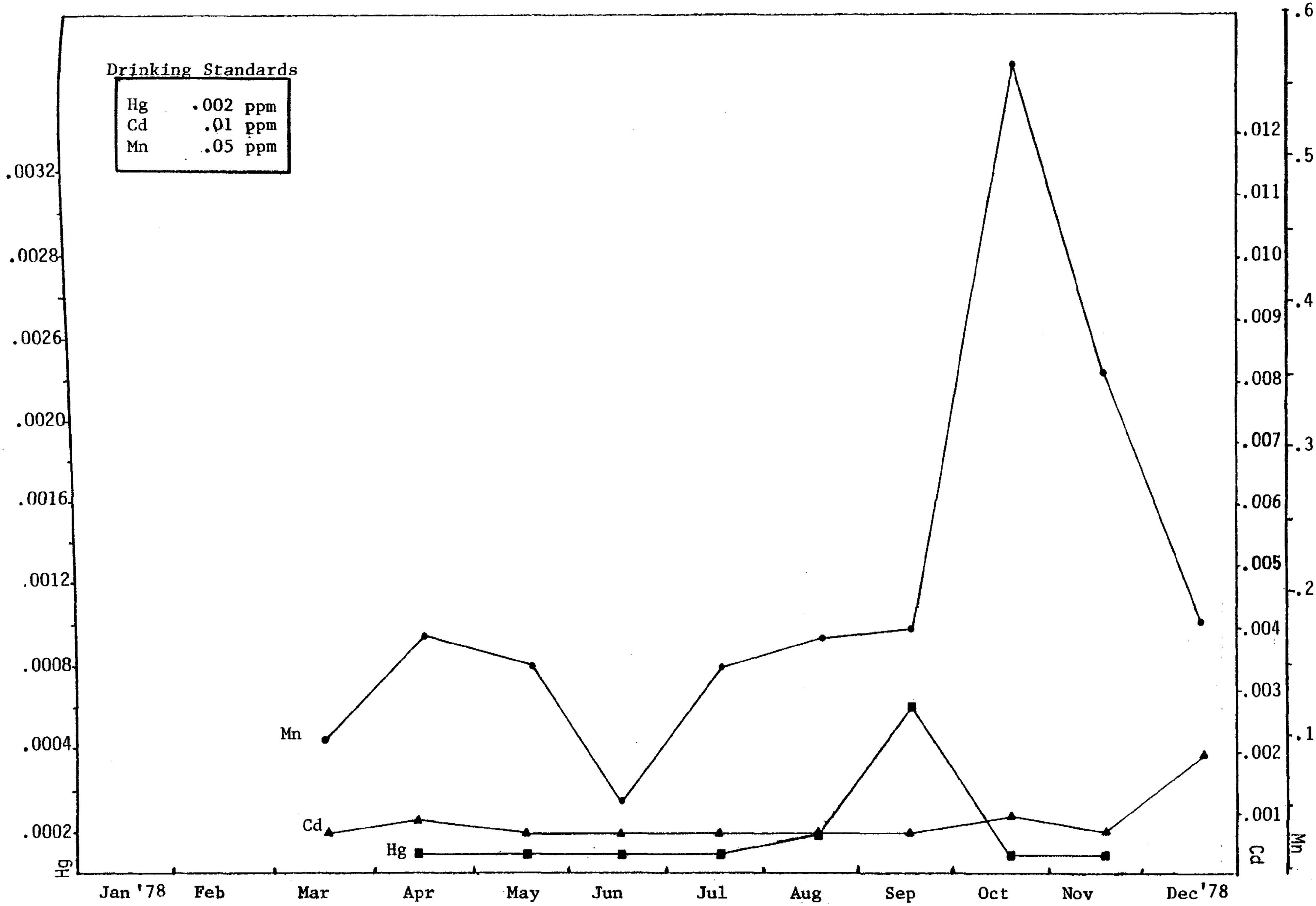

Figure 47 Water quality trends from filtered samples for Cadmium, Manganese, and Mercury in parts per million

Sampling Point B'

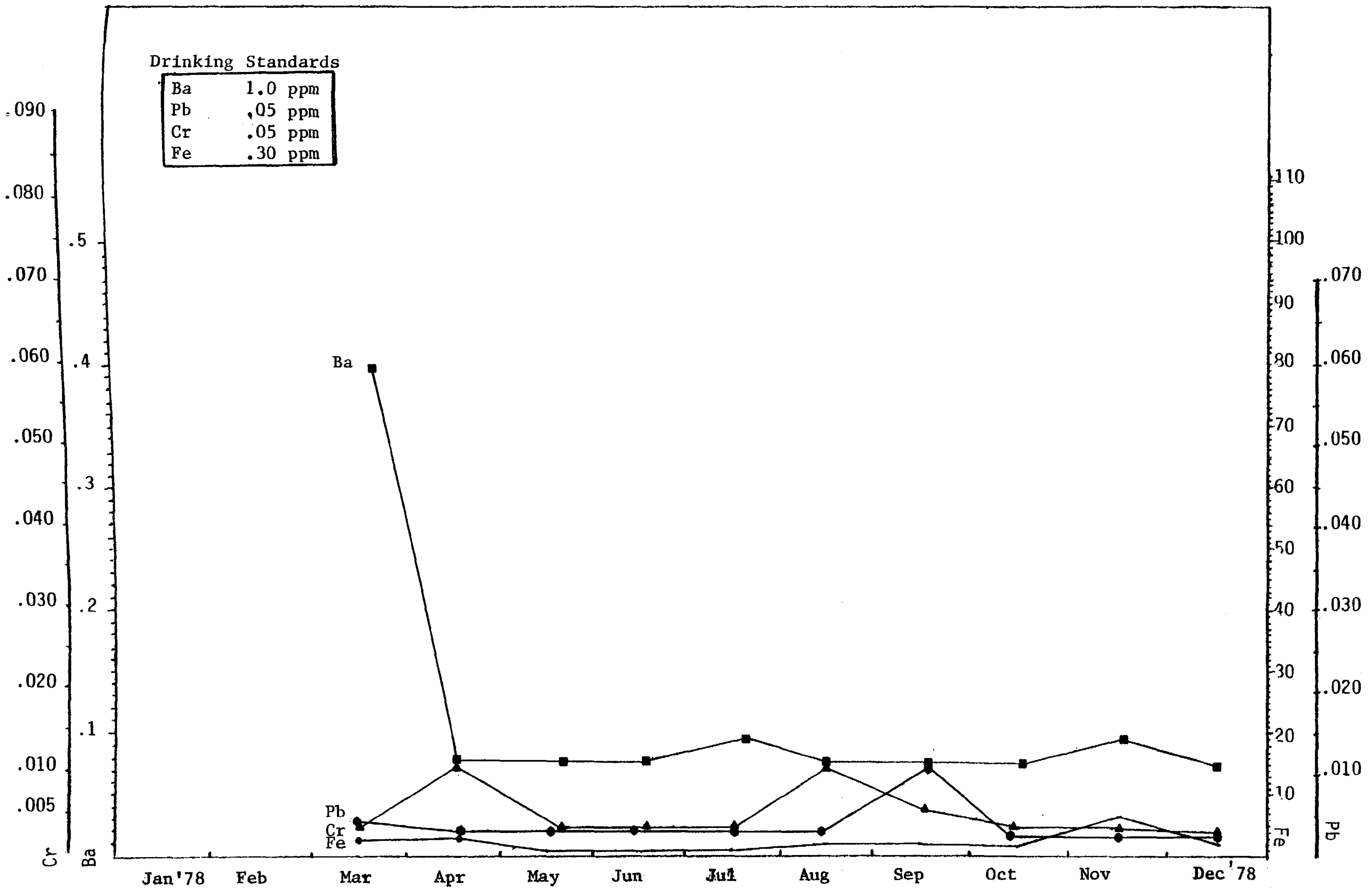

Figure 48 Water quality trends from filtered samples for Chromium, Barium, Iron, and Lead in parts per million

Sampling Point B'

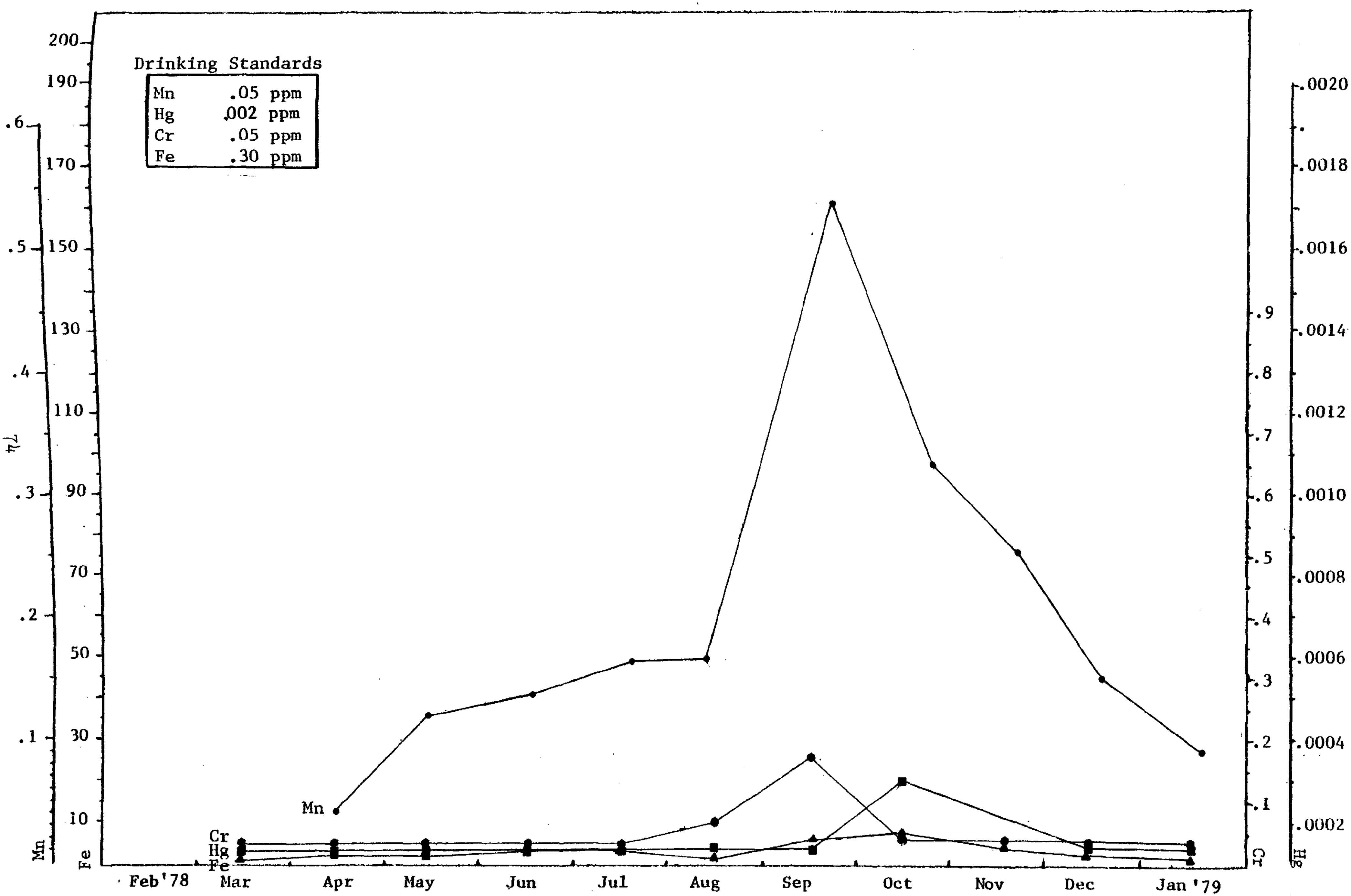

Figure 49 Water quality trends from unfiltered samples for Chromium, Iron, Mercury, and Manganese in parts per million

Sampling Point B'

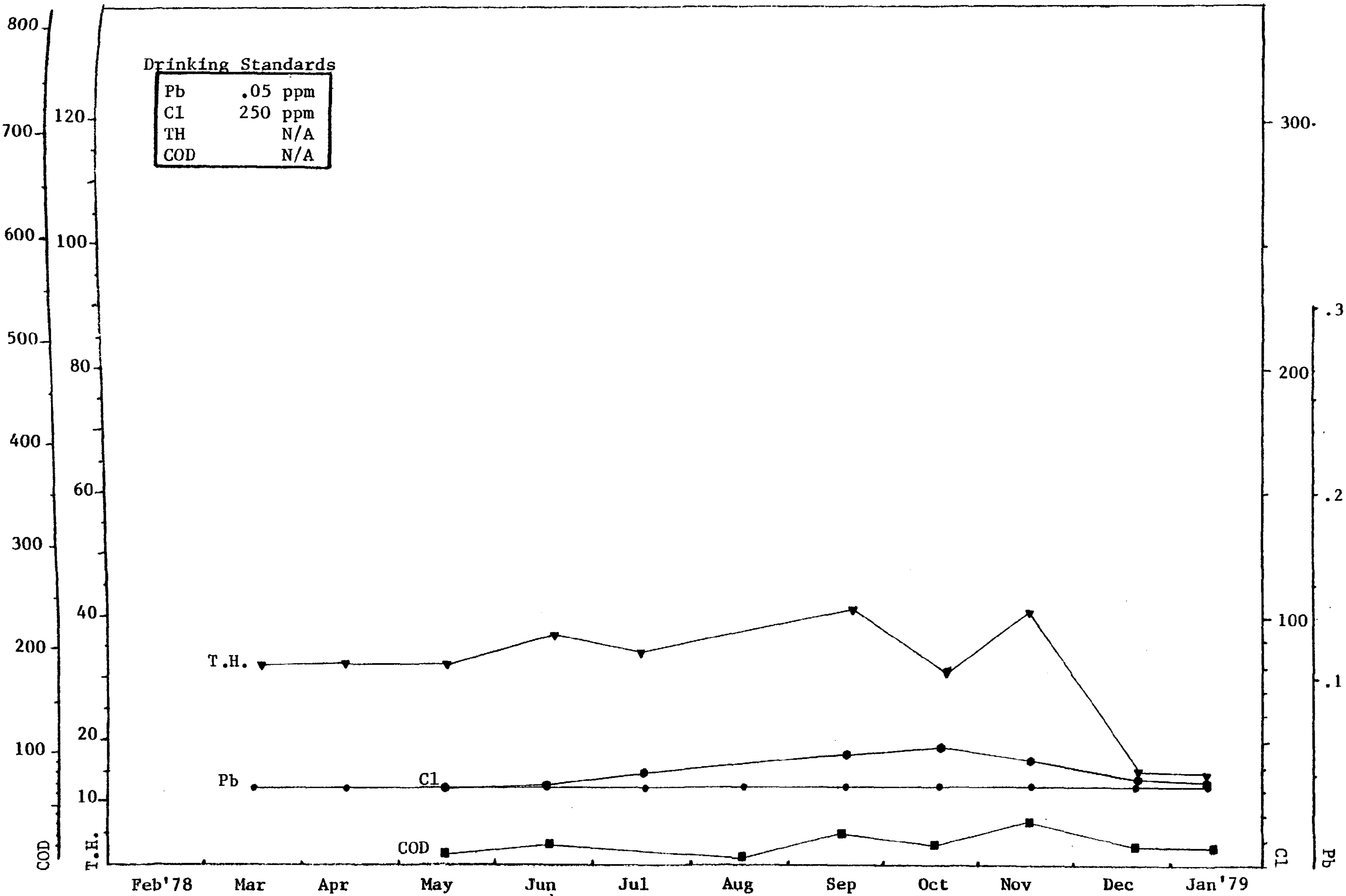

Figure 50 Water quality trends from unfiltered samples for COD, Hardness, Chlorides, and Lead in parts per million

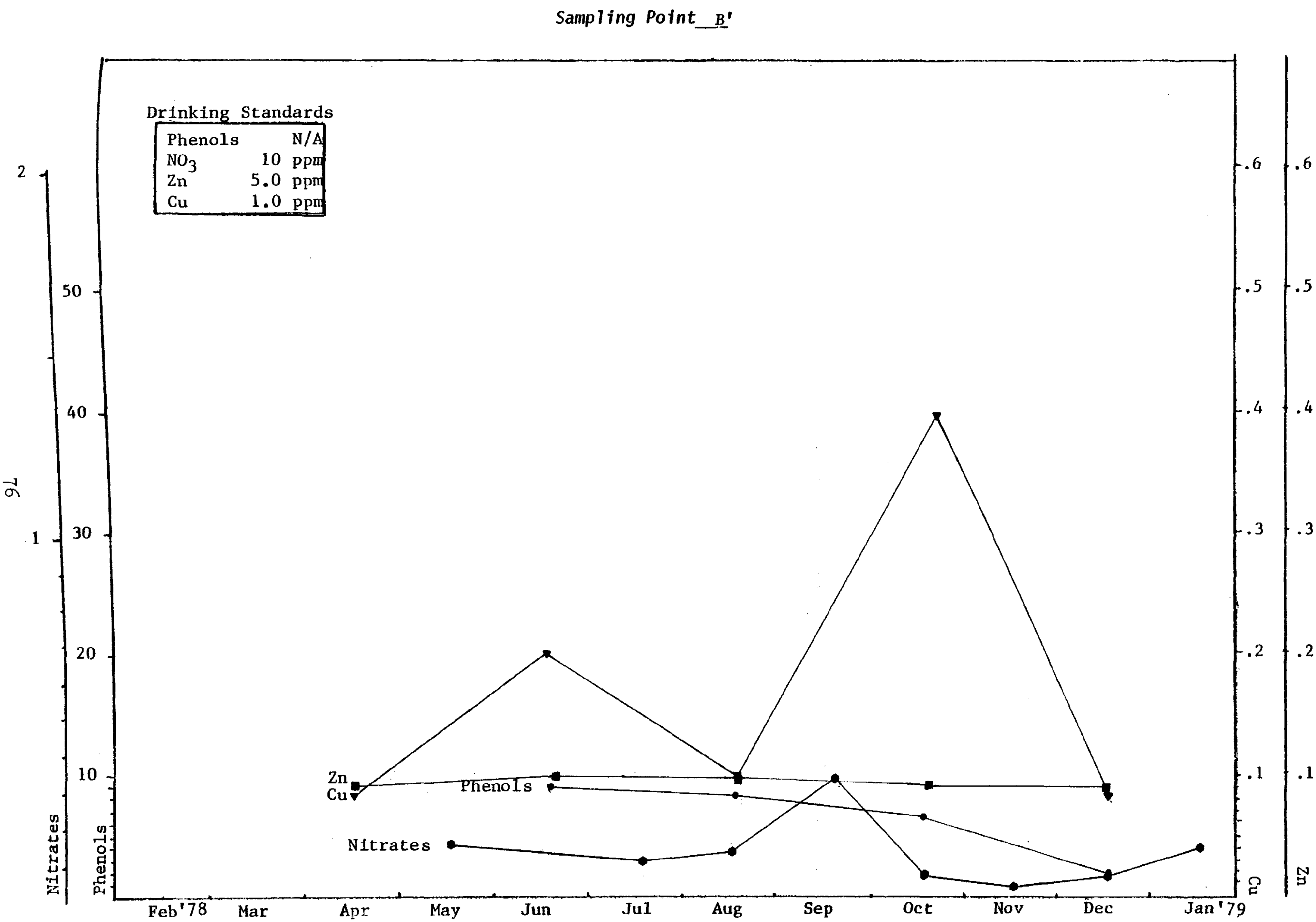

Figure 51 Water quality trends from unfiltered samples for Nitrates, Copper, Zinc (in parts per million) and Phenols (in parts per billion)

Sampling Point E

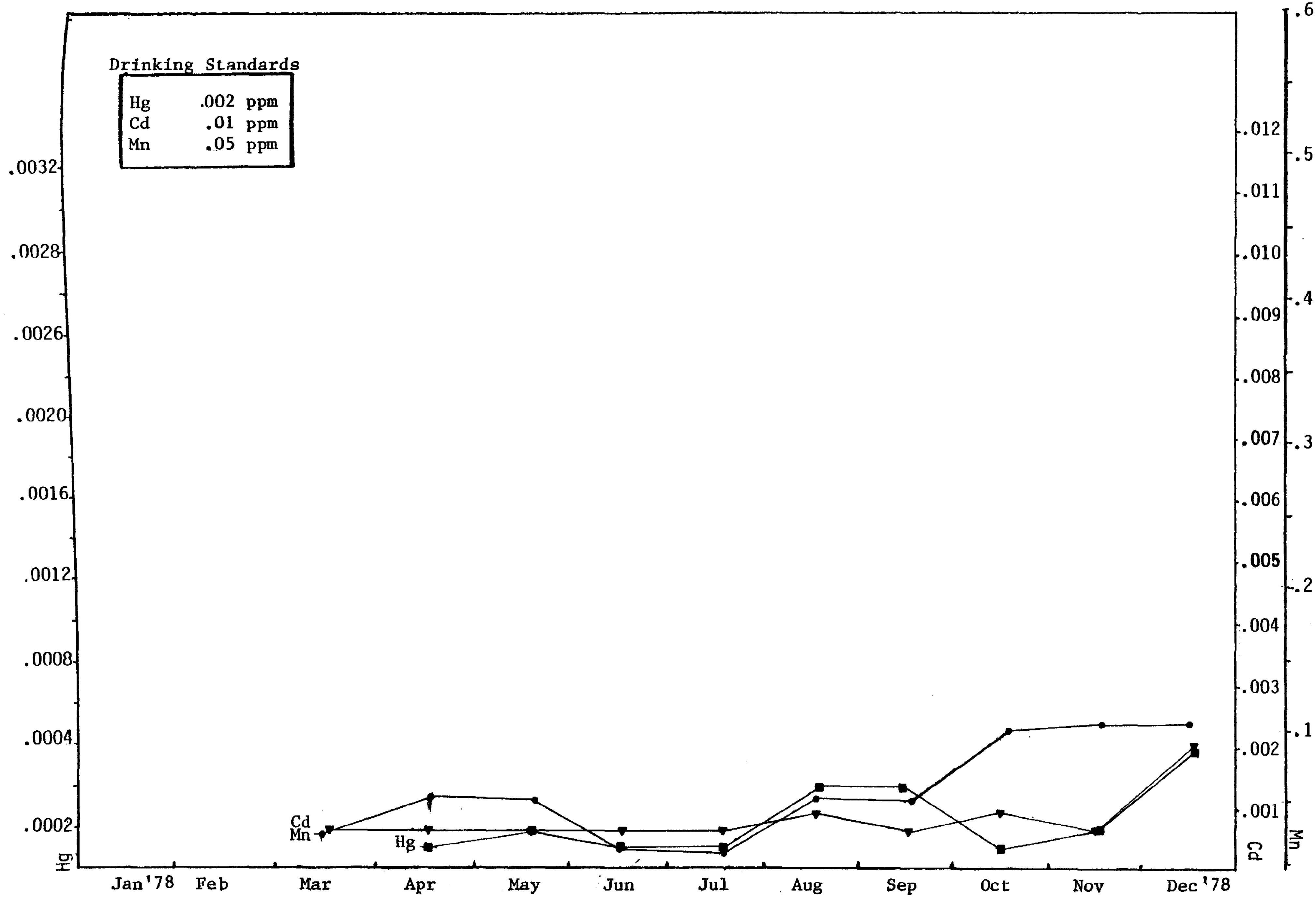

Figure 52 Water quality trends from filtered samples for Cadmium, Manganese, and Mercury in parts per million

Sampling Point E

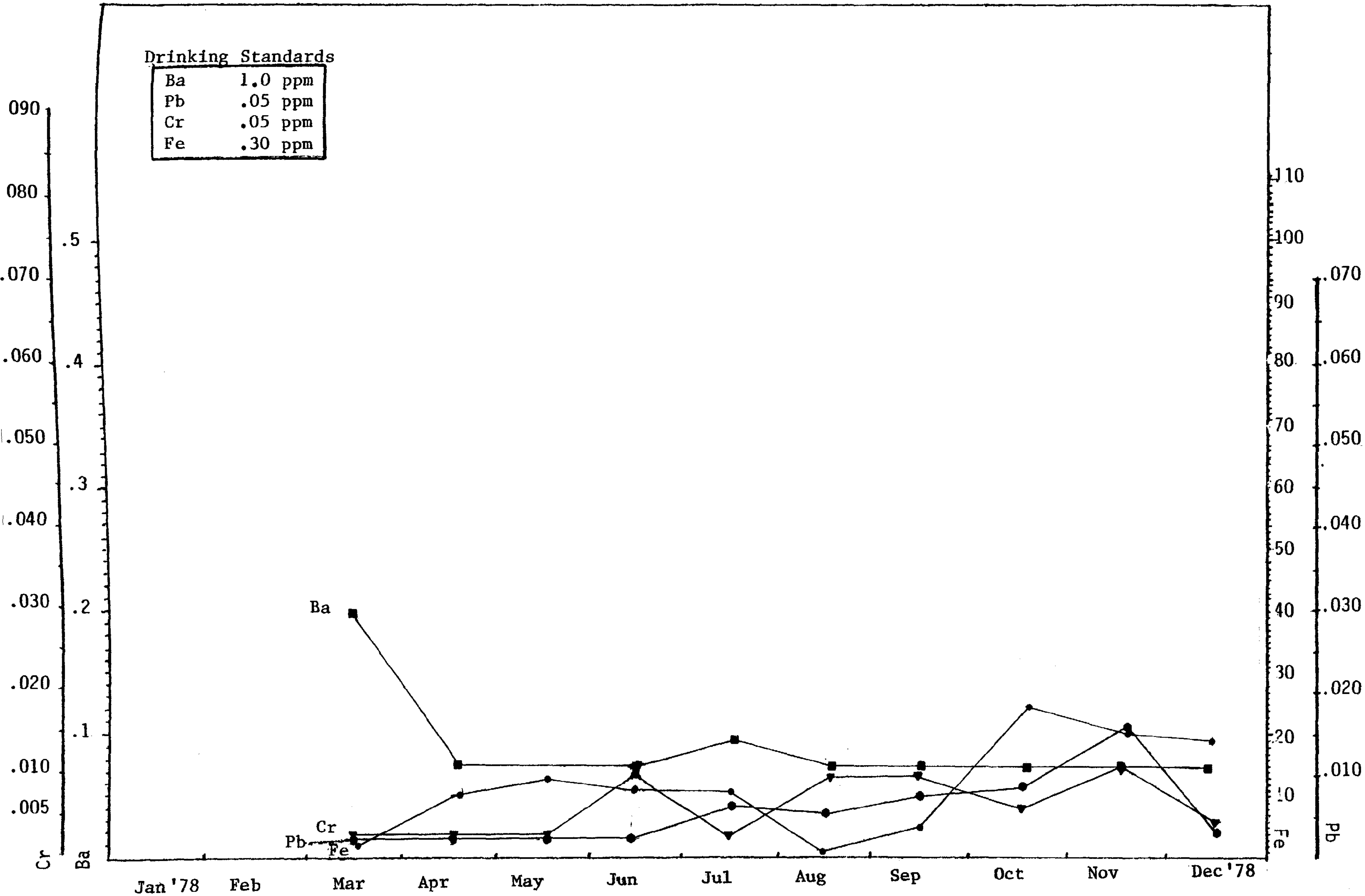

Figure 53 Water quality trends from filtered samples for Chromium, Barium, Iron, and Lead in parts per million

Sampling Point E

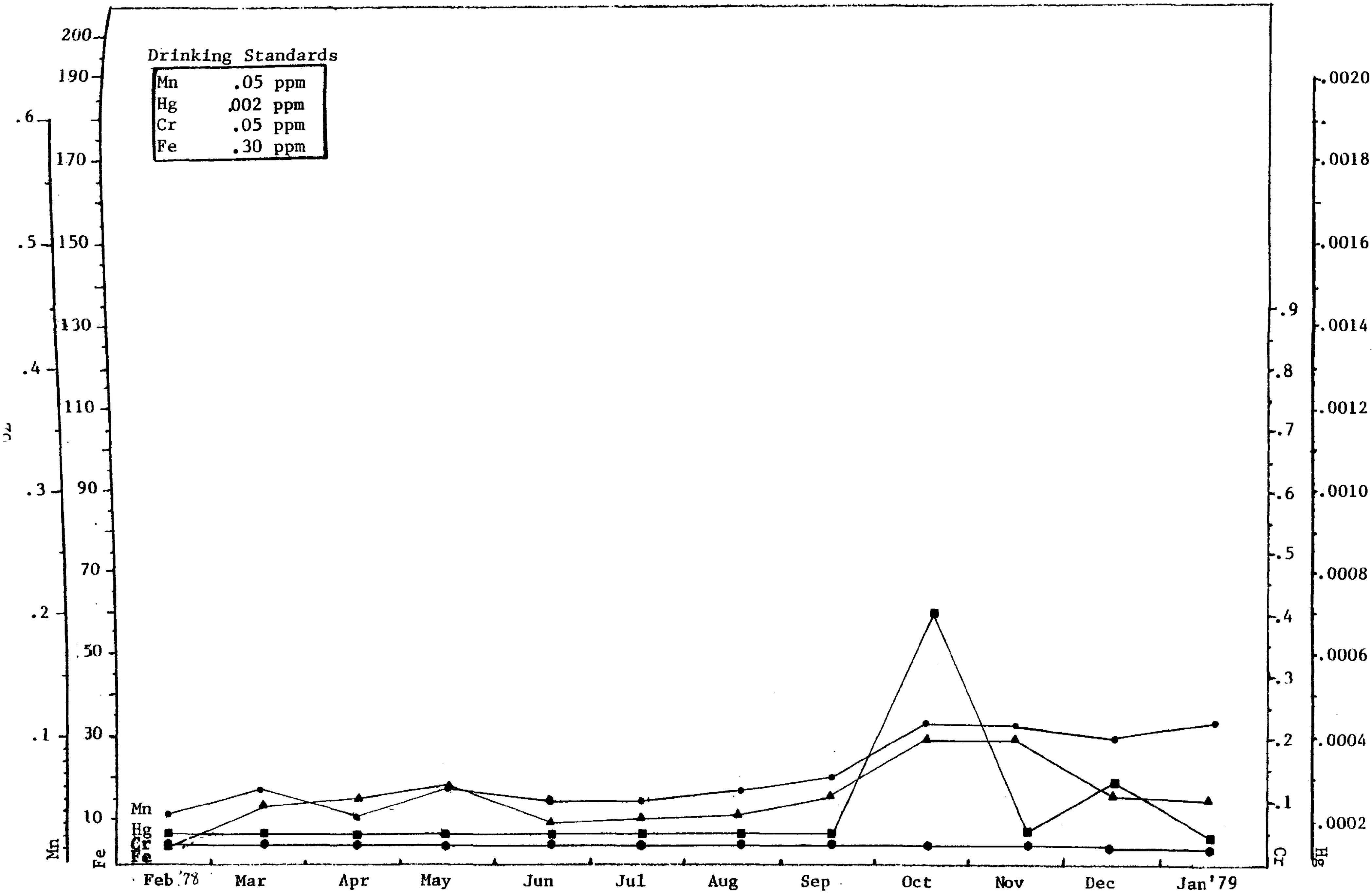

Figure 54 Water quality trends from unfiltered samples for Chromium, Iron, Mercury, and Manganese in parts per million

Sampling Point E

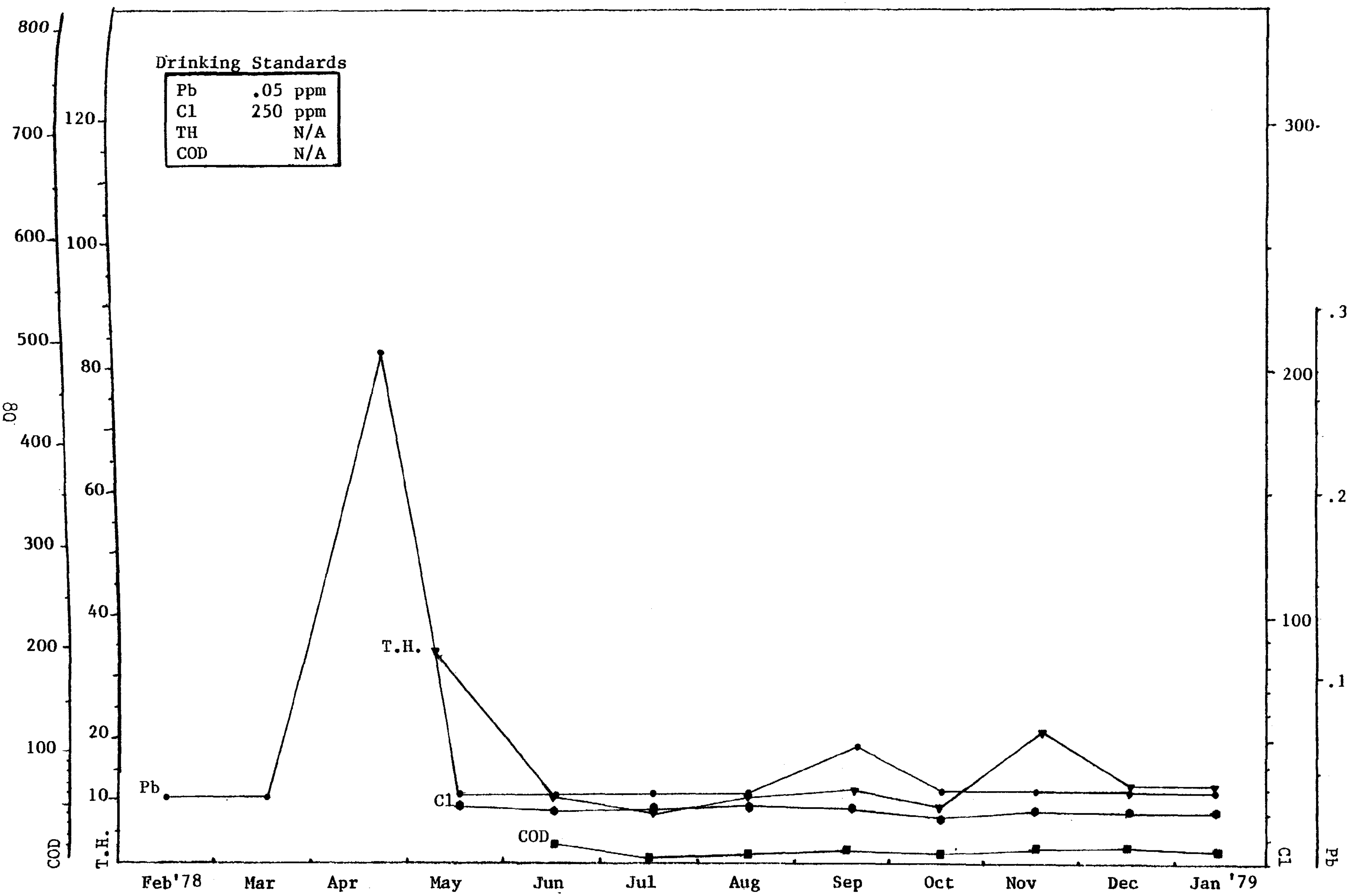

Figure 55 Water quality trends from unfiltered samples for COD, Hardness, Chlorides, and Lead in parts per million

Sampling Point E

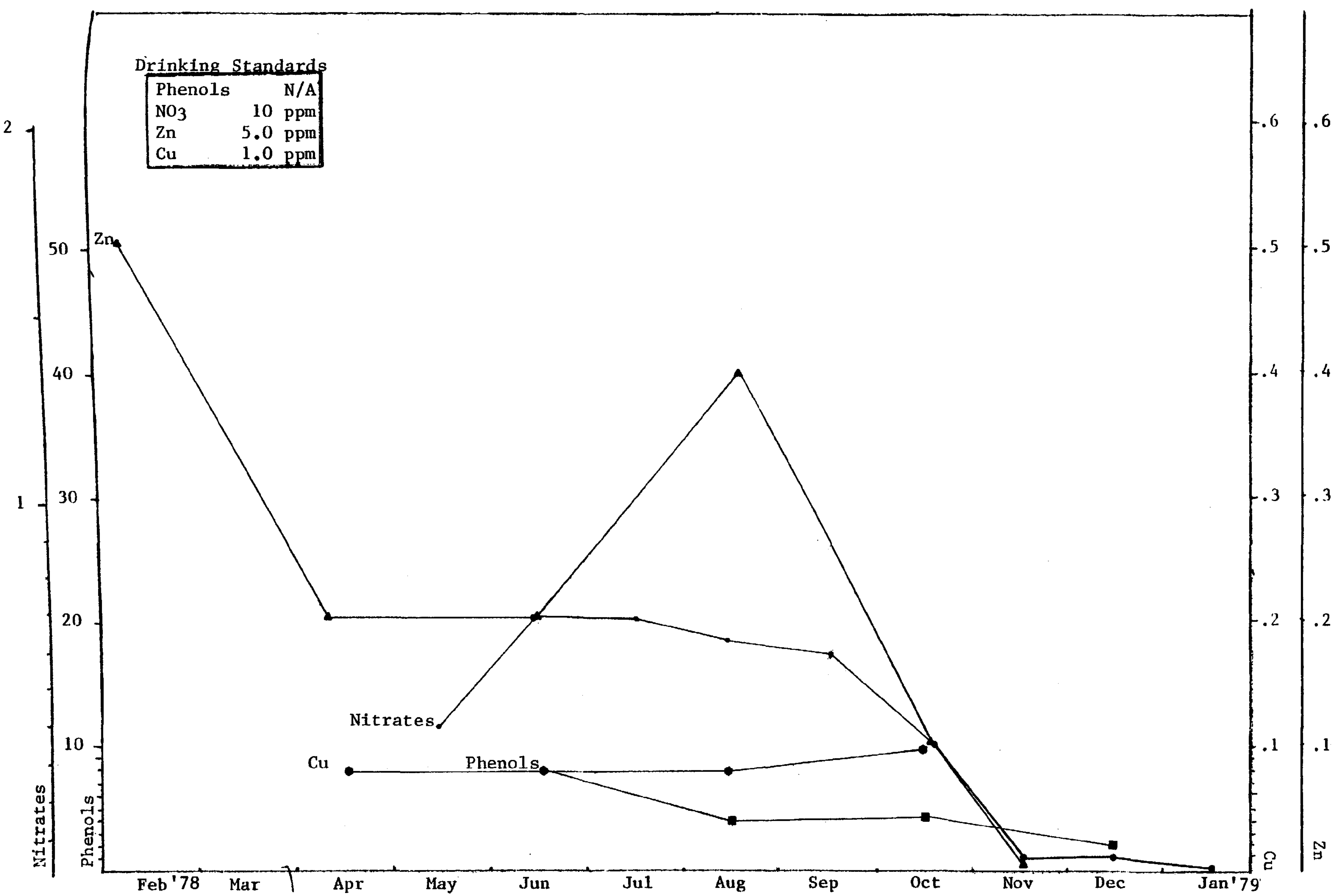

Figure 56 Water quality trends from unfiltered samples for Nitrates, Copper, Zinc (in parts per million) and Phenols (in parts per billion)

Sampling Point F

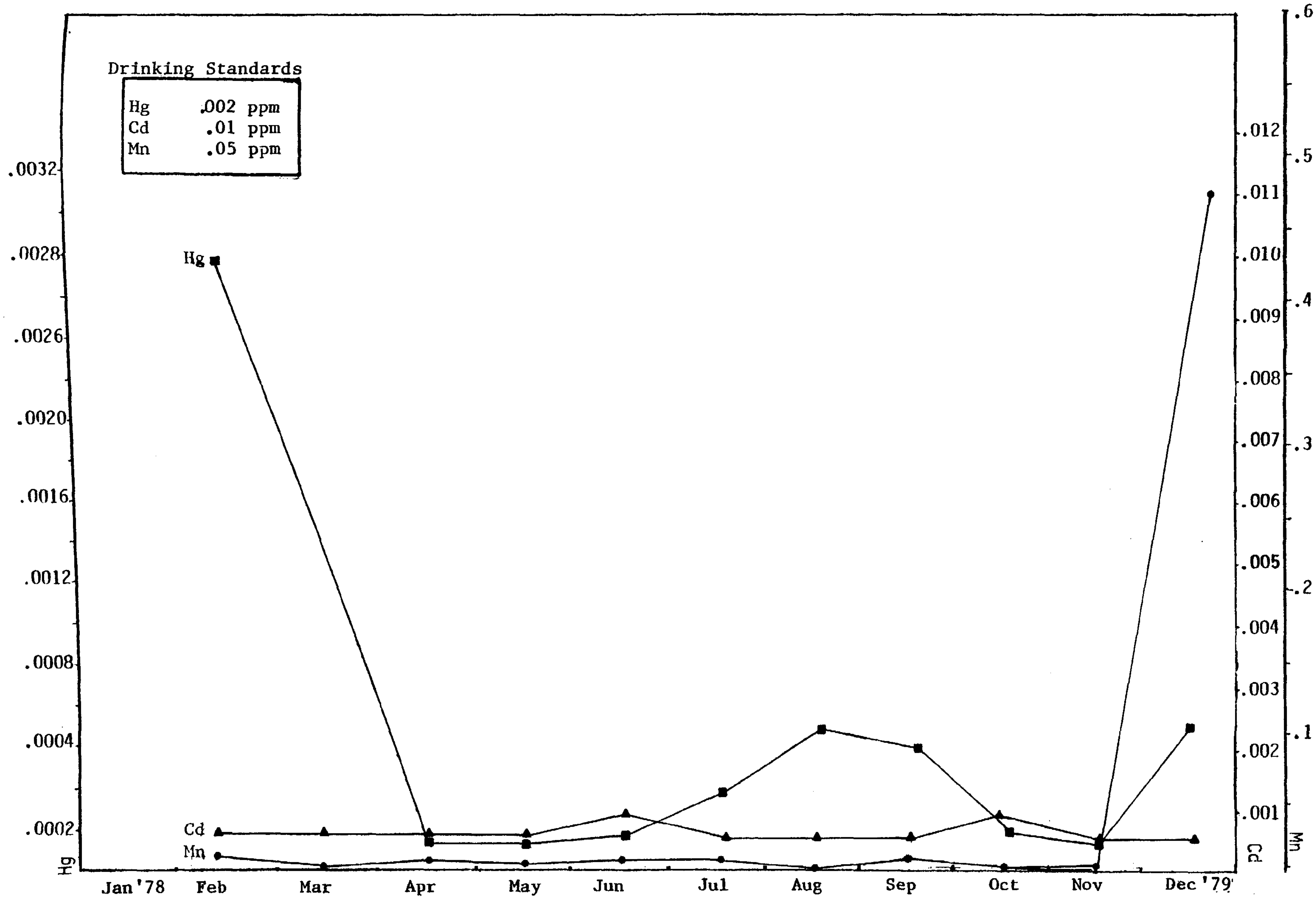

Figure 57 Water quality trends from filtered samples for Cadmium, Manganese, and Mercury in parts per million

Sampling Point F

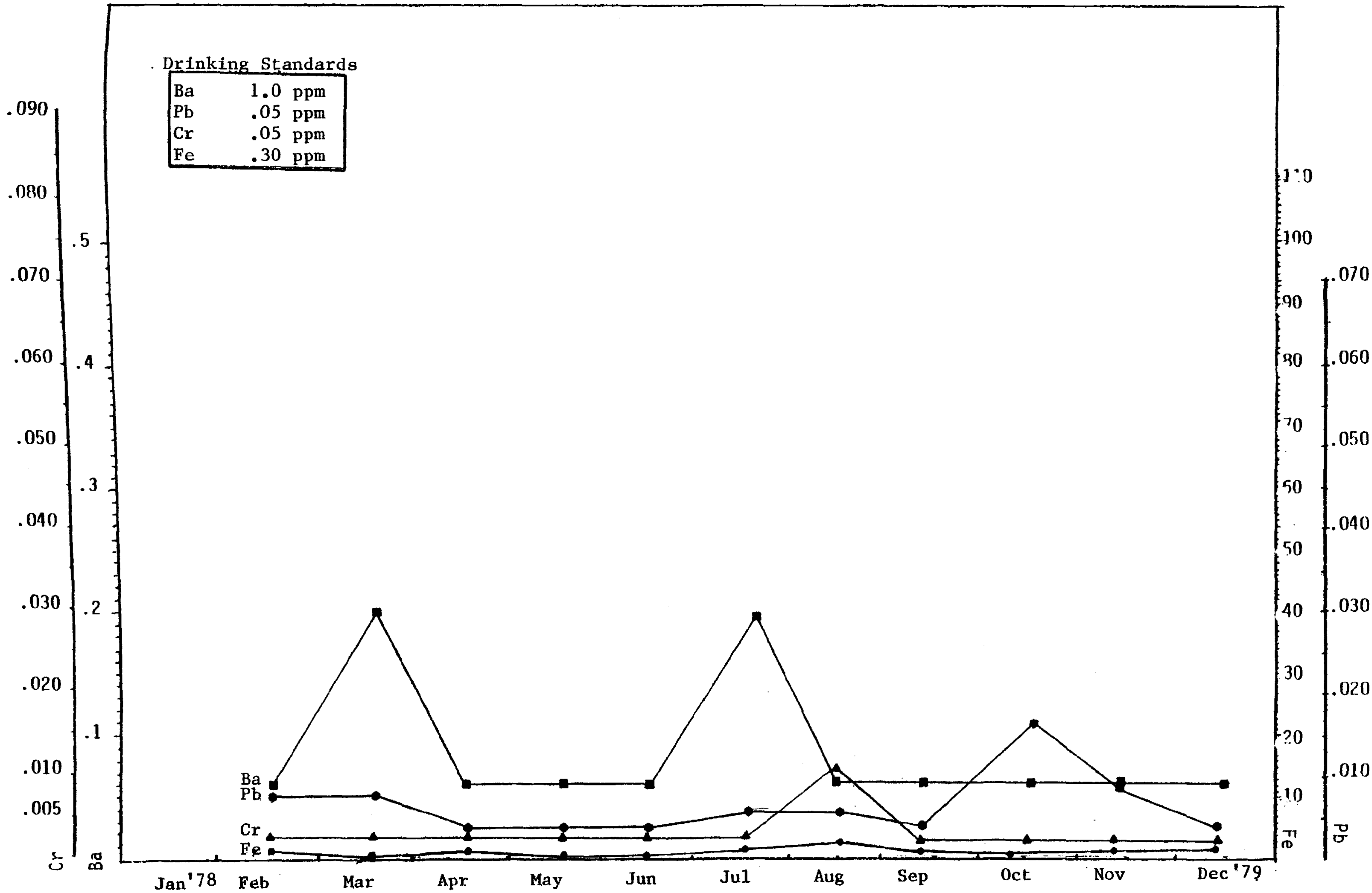

Figure 58 Water quality trends from filtered samples for Chromium, Barium, Iron, and Lead in parts per million

Sampling Point F

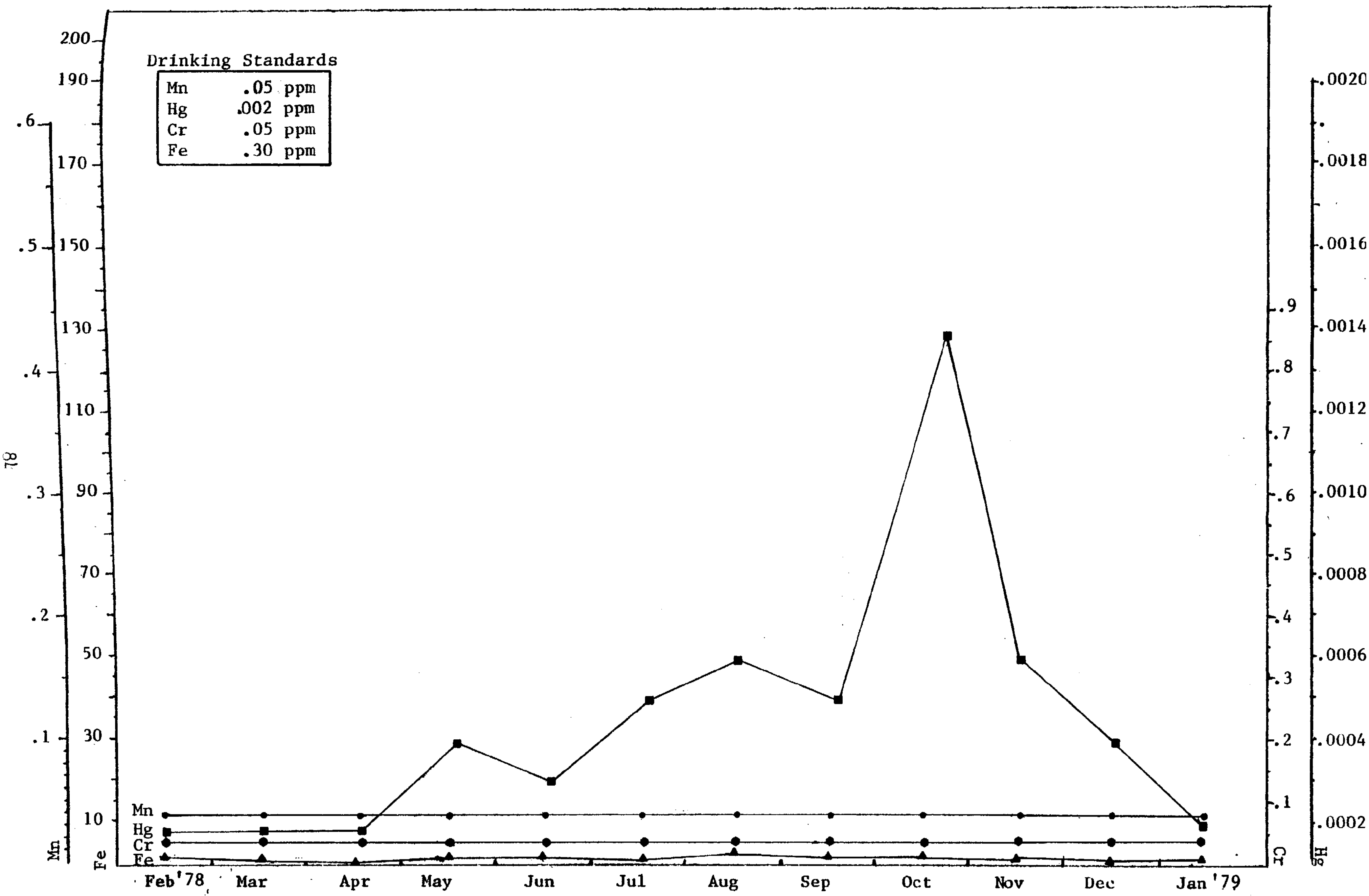

Figure 59 Water quality trends from unfiltered samples for Chromium, Iron, Mercury, and Manganese in parts per million

Sampling Point F

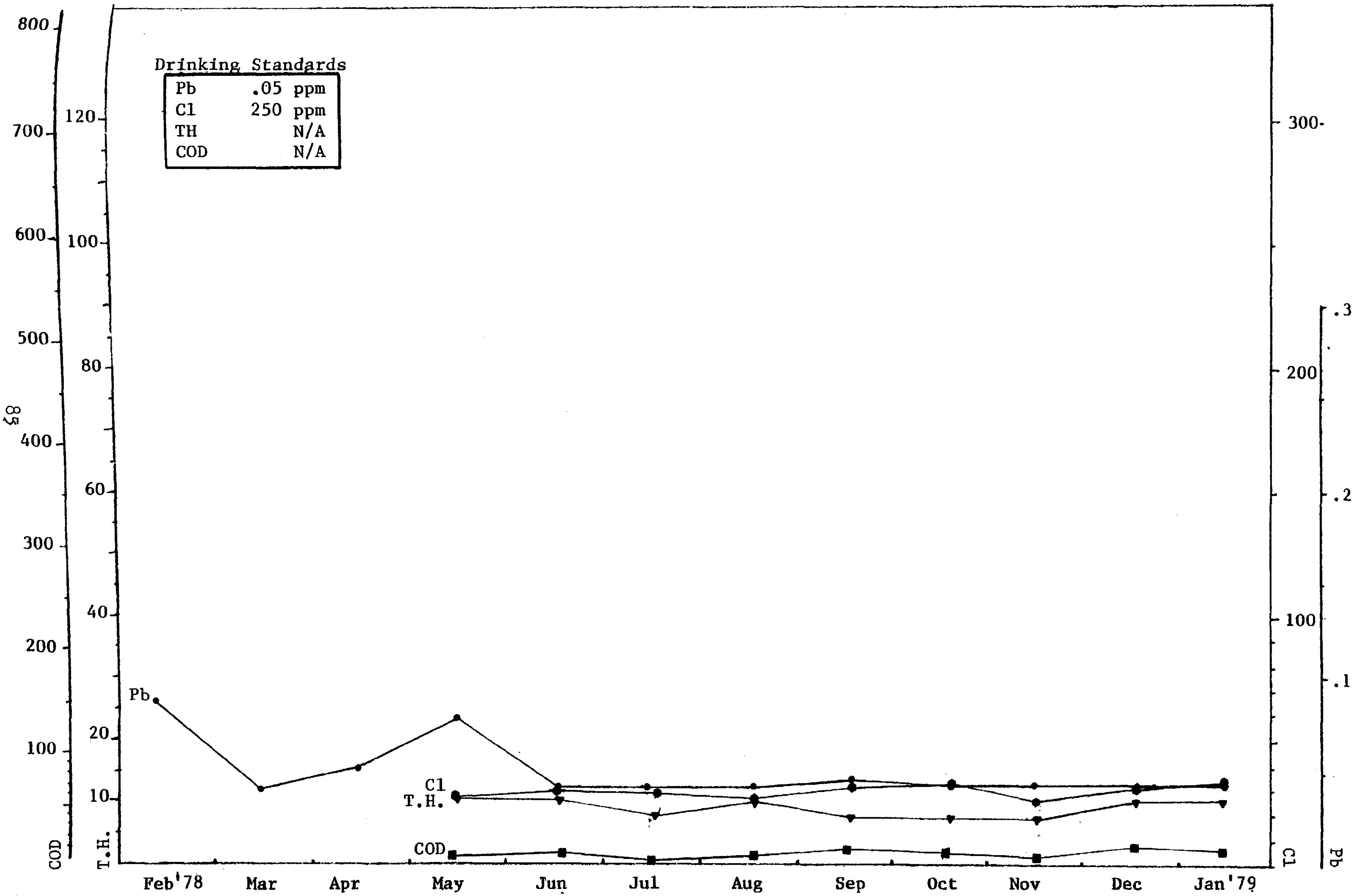

Figure 60 Water quality trends from unfiltered samples for COD, Hardness, Chlorides, and Lead in parts per million

Sampling Point F

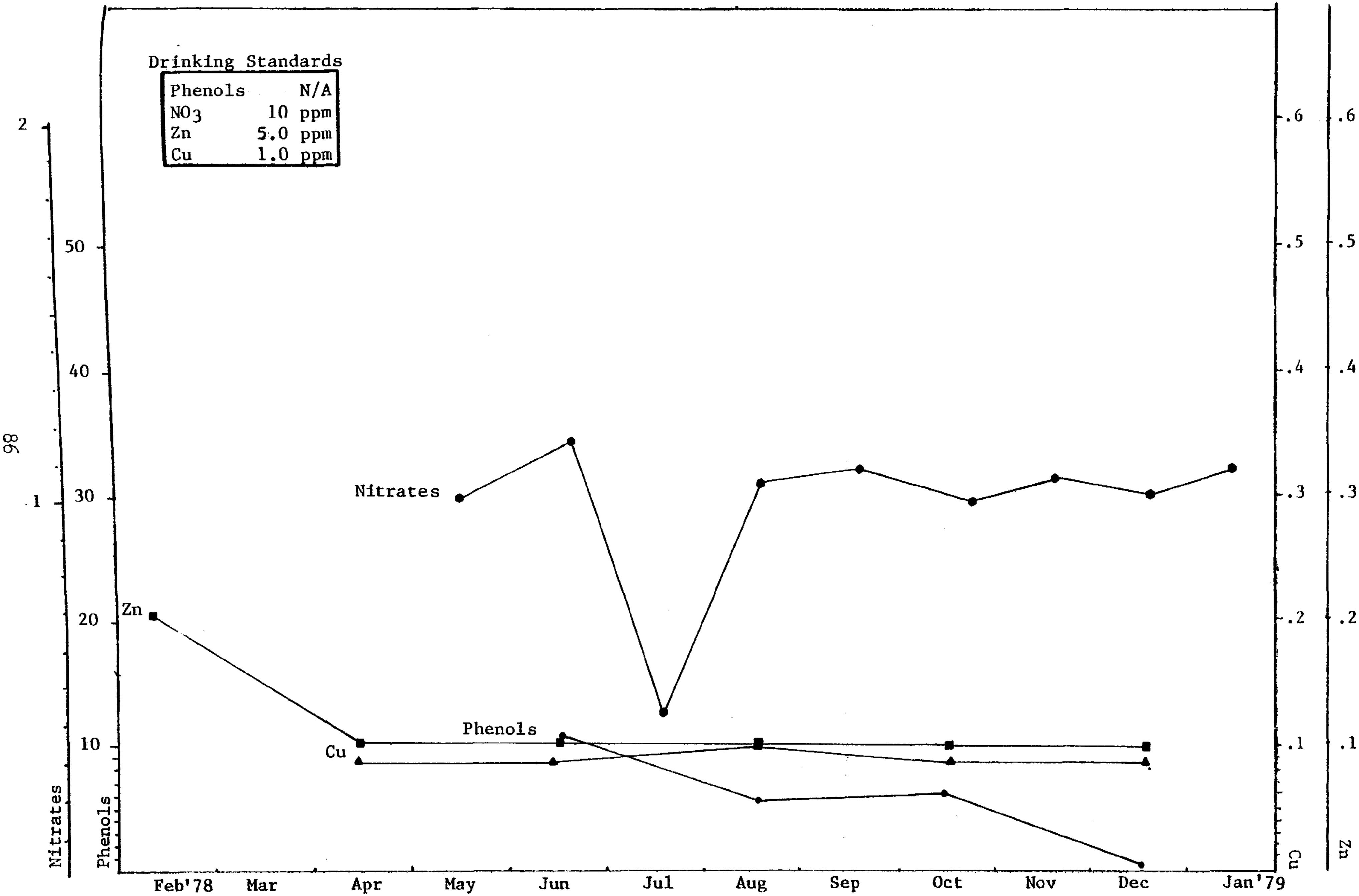

Figure 61 Water quality trends from unfiltered samples for Nitrates, Copper, Zinc (in parts per million) and Phenols (in parts per billion)

SAMPLING POINTS C', D' and G

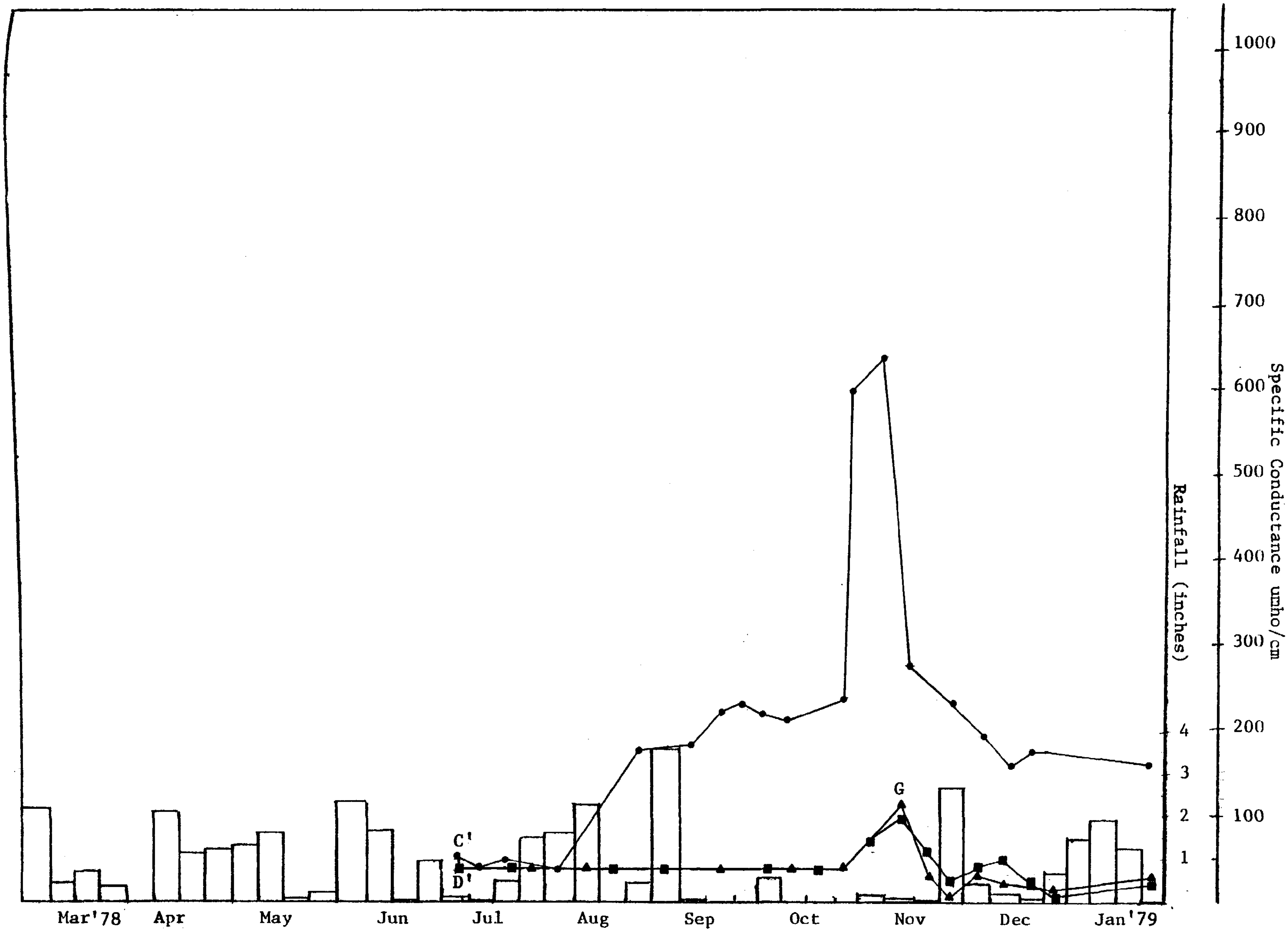

Figure 62 Precipitation record from the Columbia Metropolitan Airport and specific conductance.

and Phenols (in parts per million)

Sampling Point C'

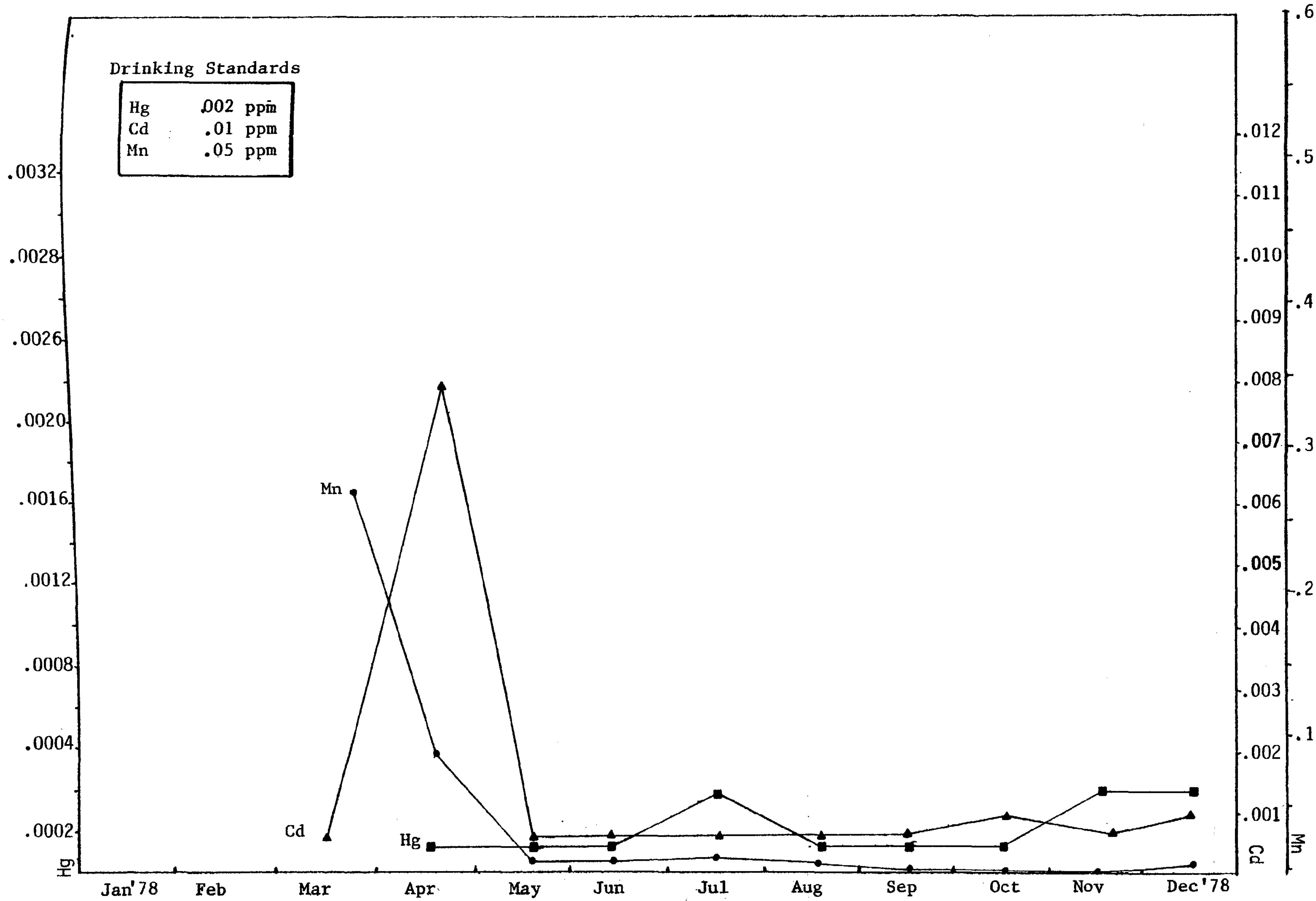

Figure 63 Water quality trends from filtered samples for Cadmium, Manganese, and Mercury in parts per million

Sampling Point C'

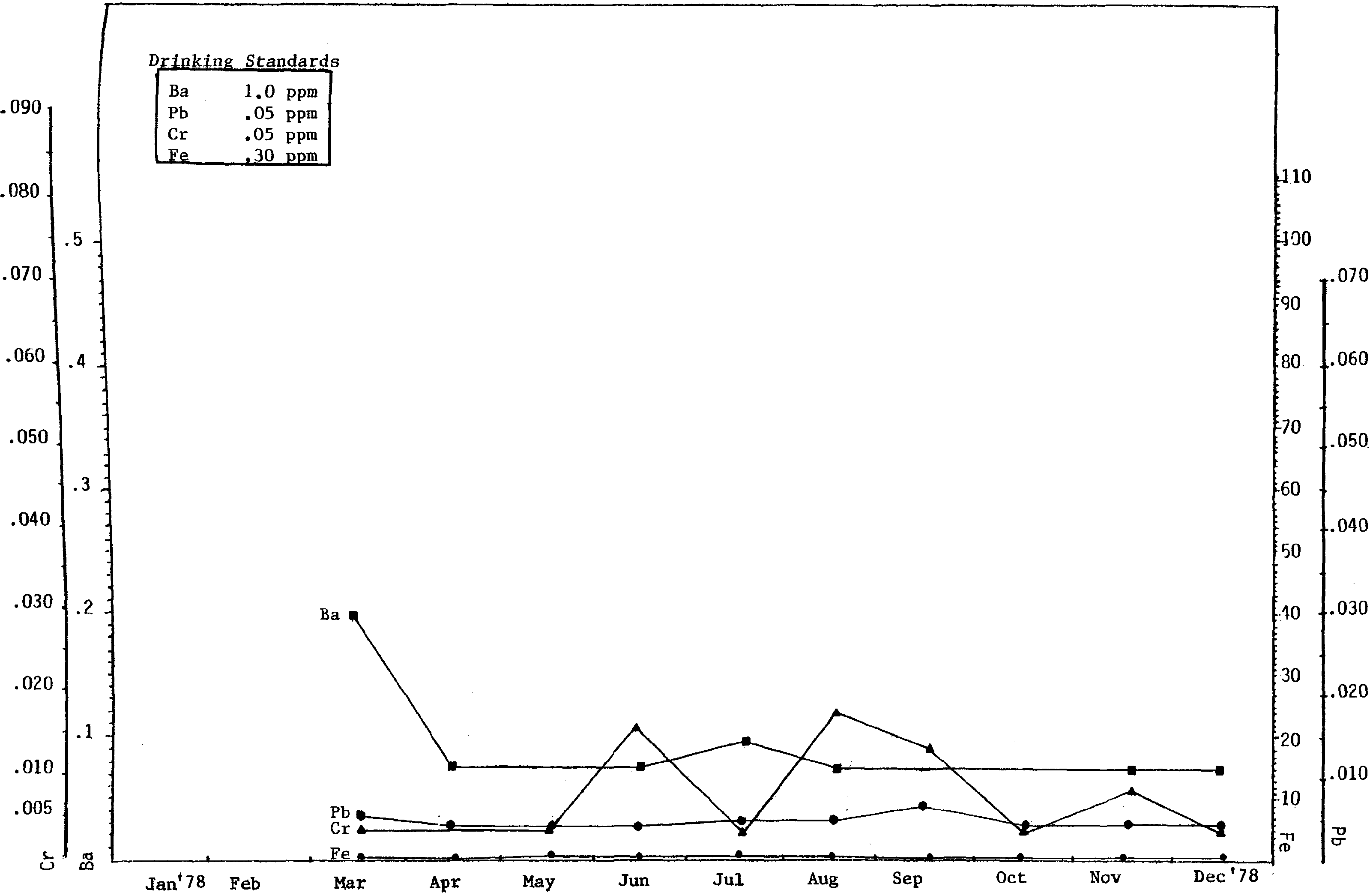

Figure 64 Water quality trends from filtered samples for Chromium, Barium, Iron, and Lead in parts per million

Sampling Point C'

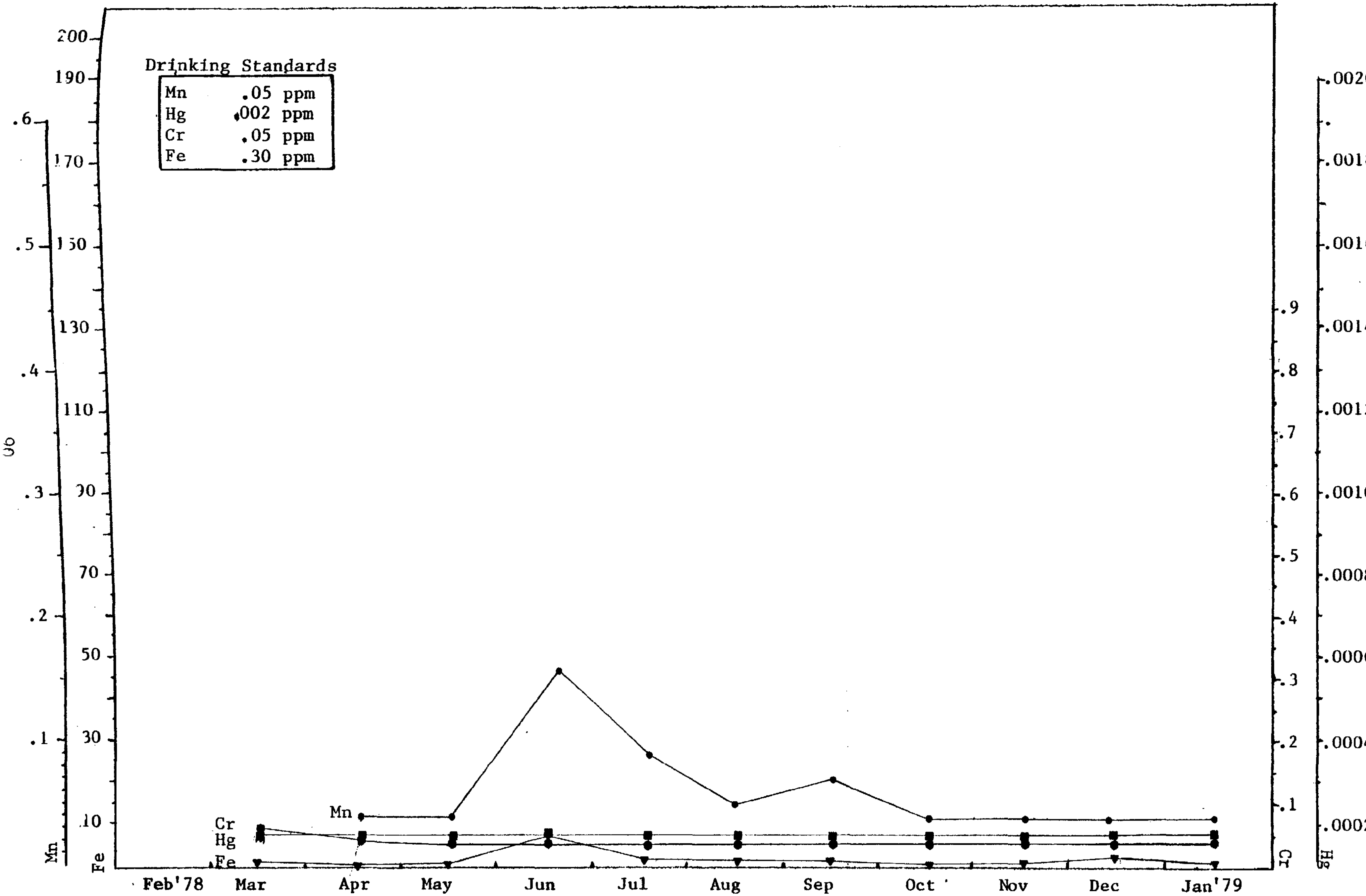

Figure 65 Water quality trends from unfiltered samples for Chromium, Iron, Mercury, and Manganese in parts per million

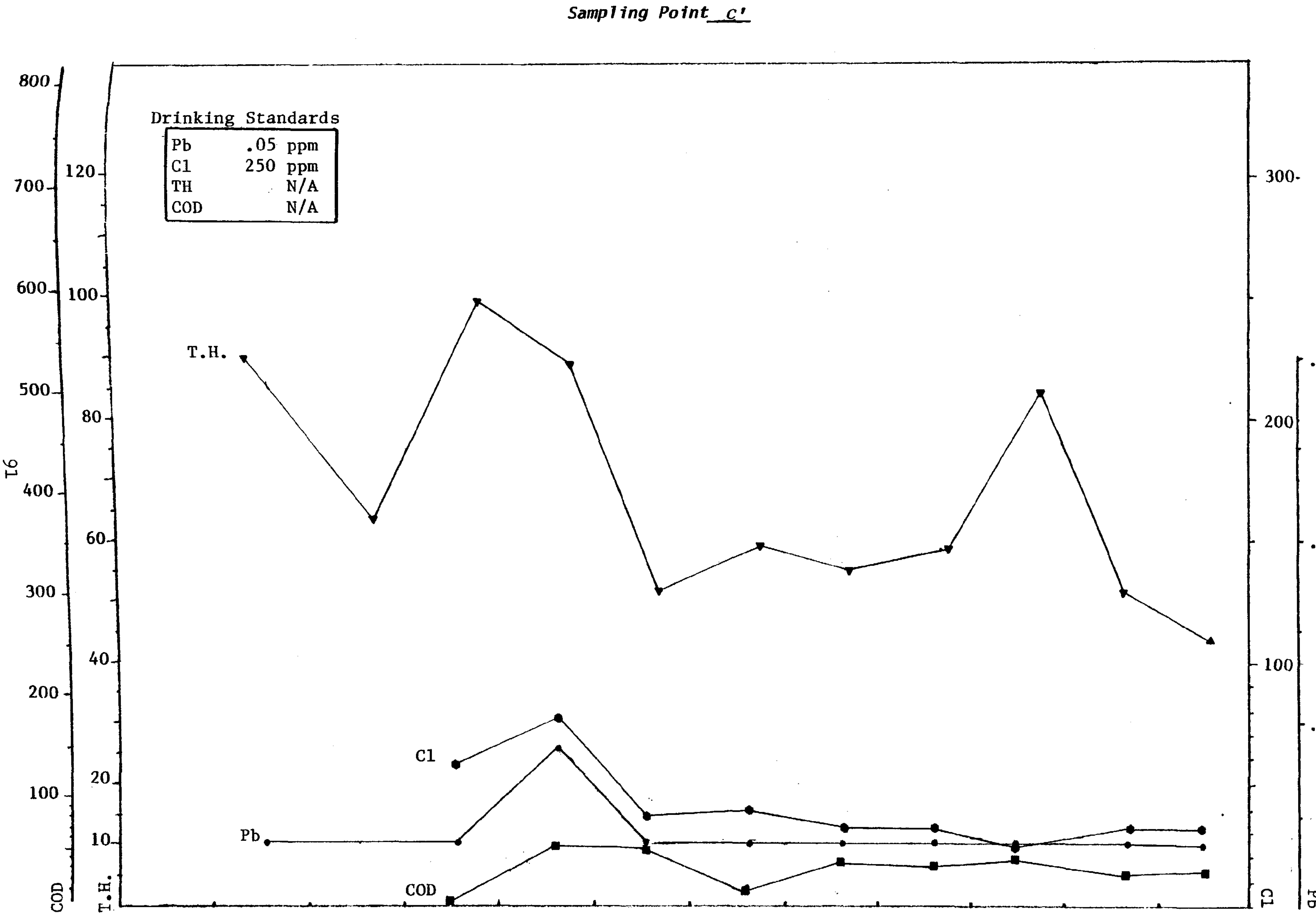

Figure 66 Water quality trends from unfiltered samples for COD, Hardness, Chlorides, and Lead in parts per million

Sampling Point C'

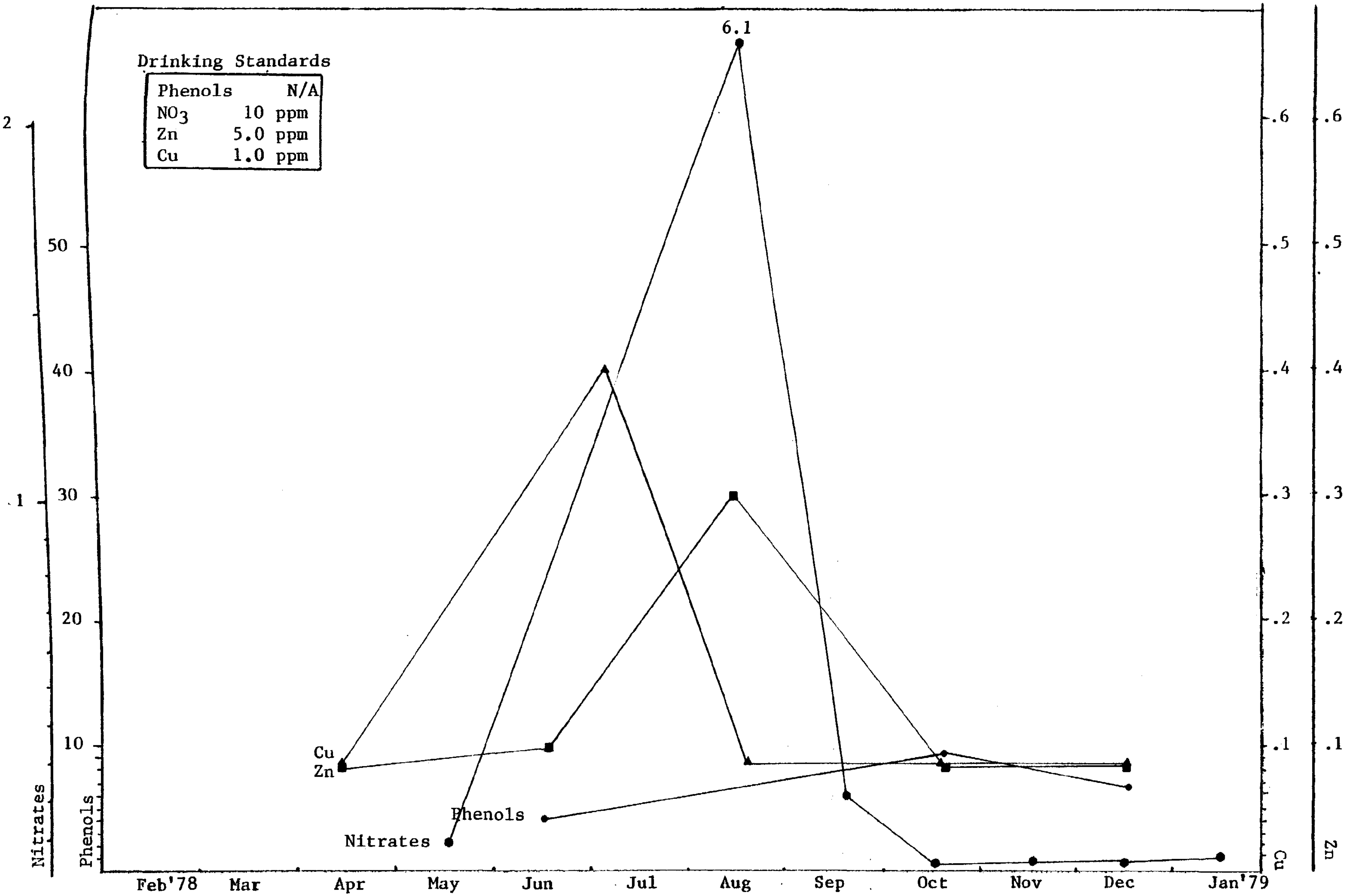

Figure 67 Water quality trends from unfiltered samples for Nitrates, Copper, Zinc (in parts per million) and Phenols (in parts per billion).

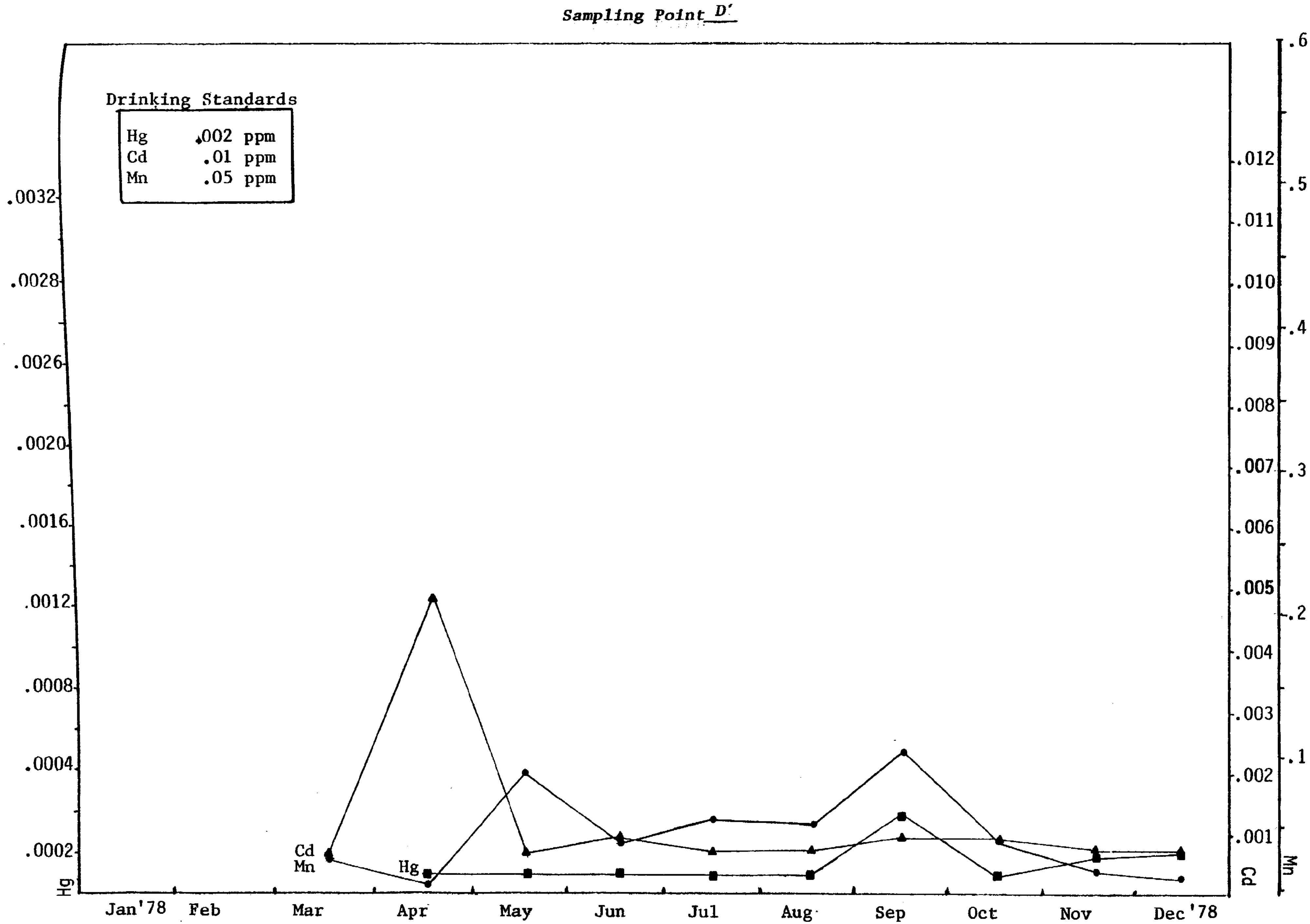

Figure 68 Water quality trends from filtered samples for Cadmium, Manganese, and Mercury in parts per million.

Sampling Point D'

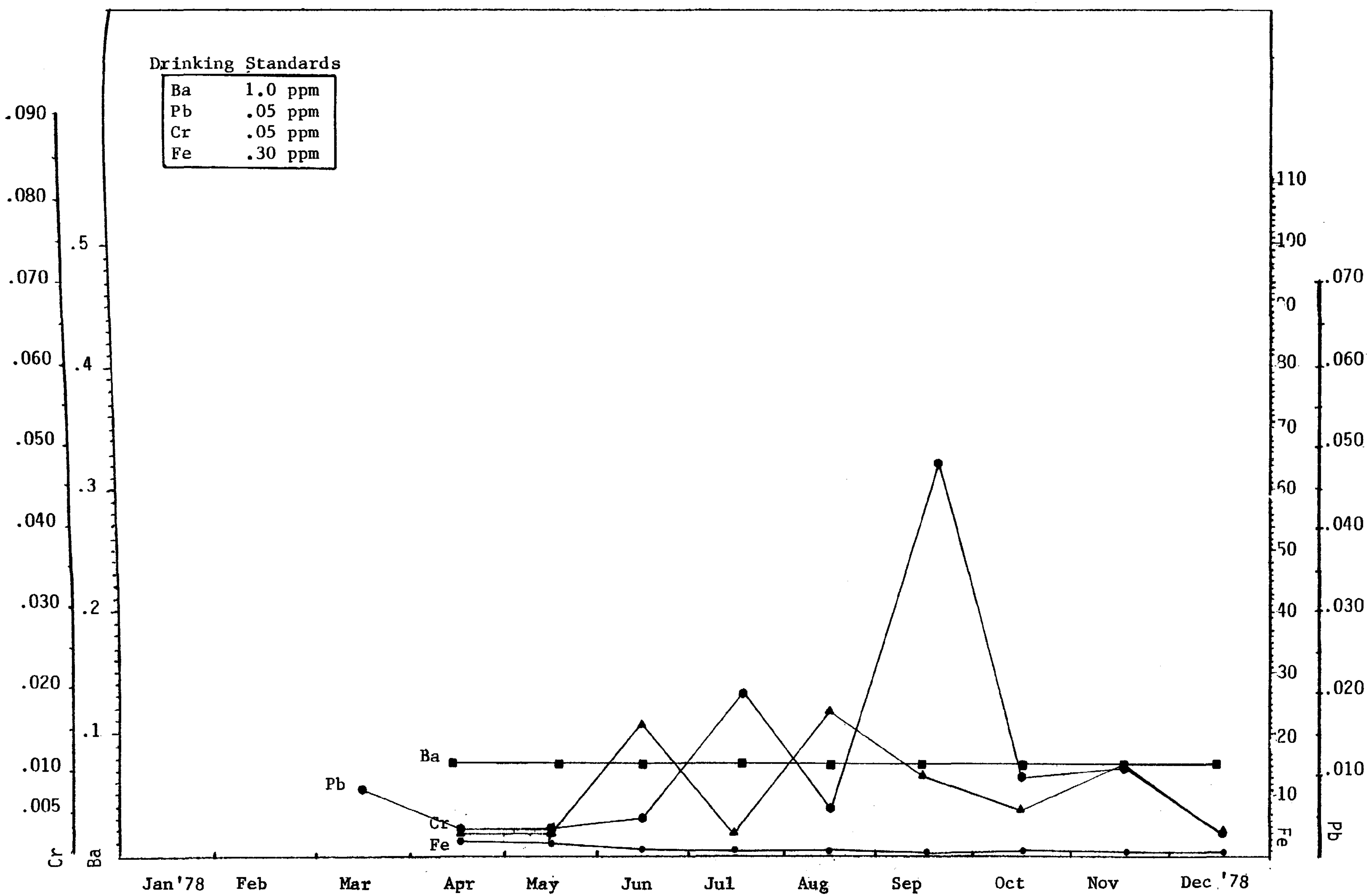

Figure 69 Water quality trends from filtered samples for Chromium, Barium, Iron, and Lead in parts per million.

Sampling Point D'

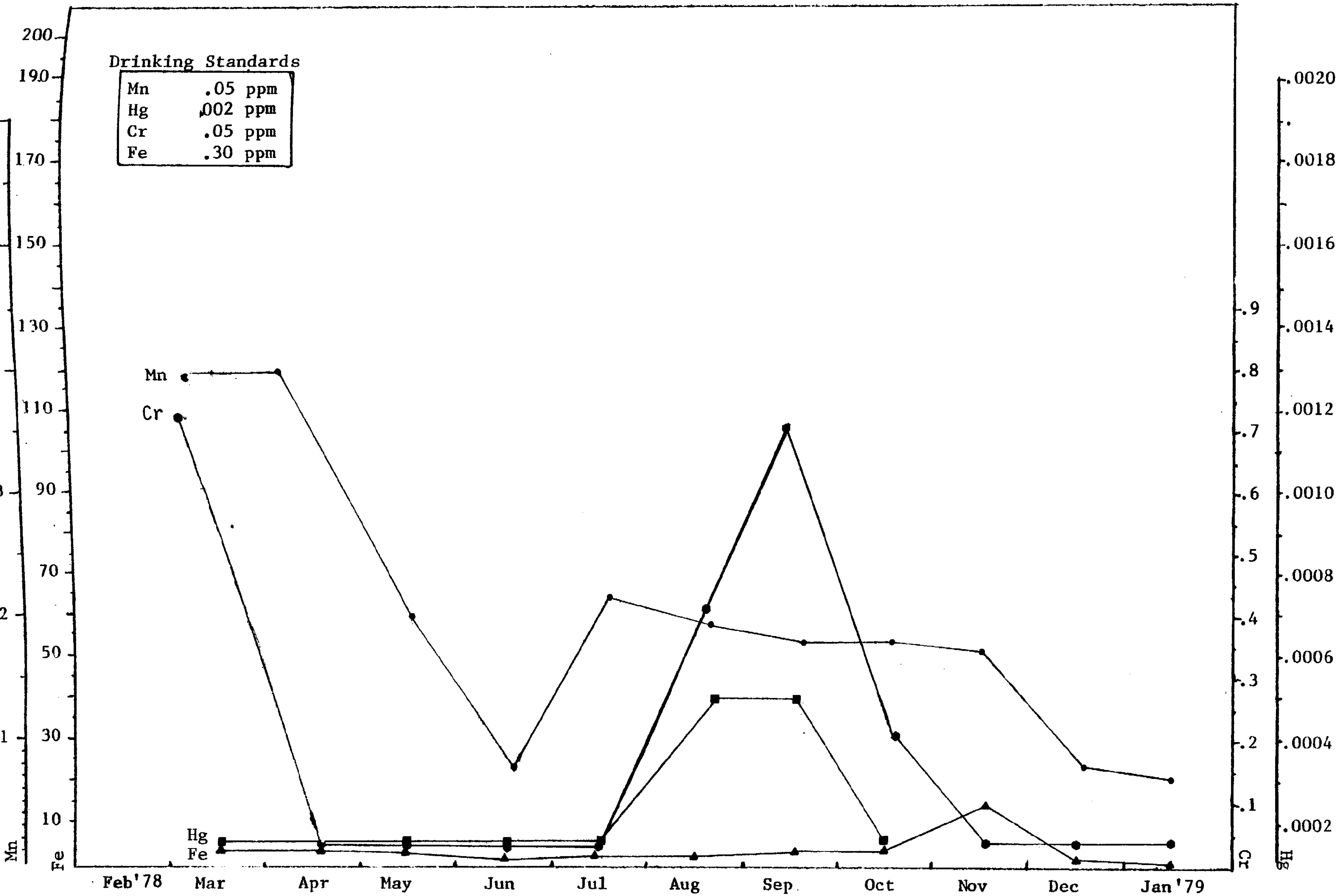

Figure 70 Water quality trends from unfiltered samples for Chromium, Iron, Mercury, and Manganese in parts per million

Sampling Point D'

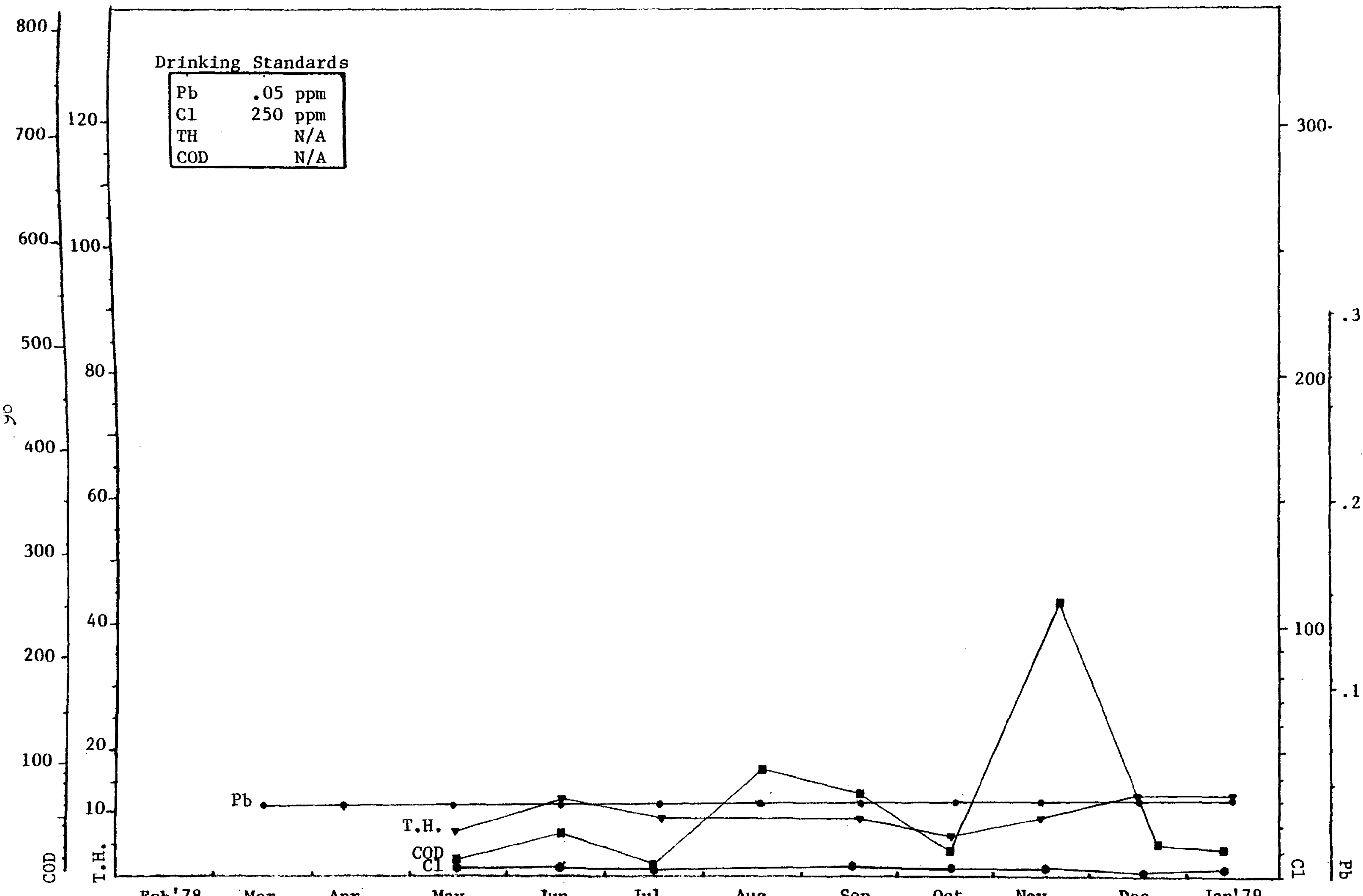

Figure 71 Water quality trends from unfiltered samples for COD, Hardness, Chlorides, and Lead in parts per million

Sampling Point D'

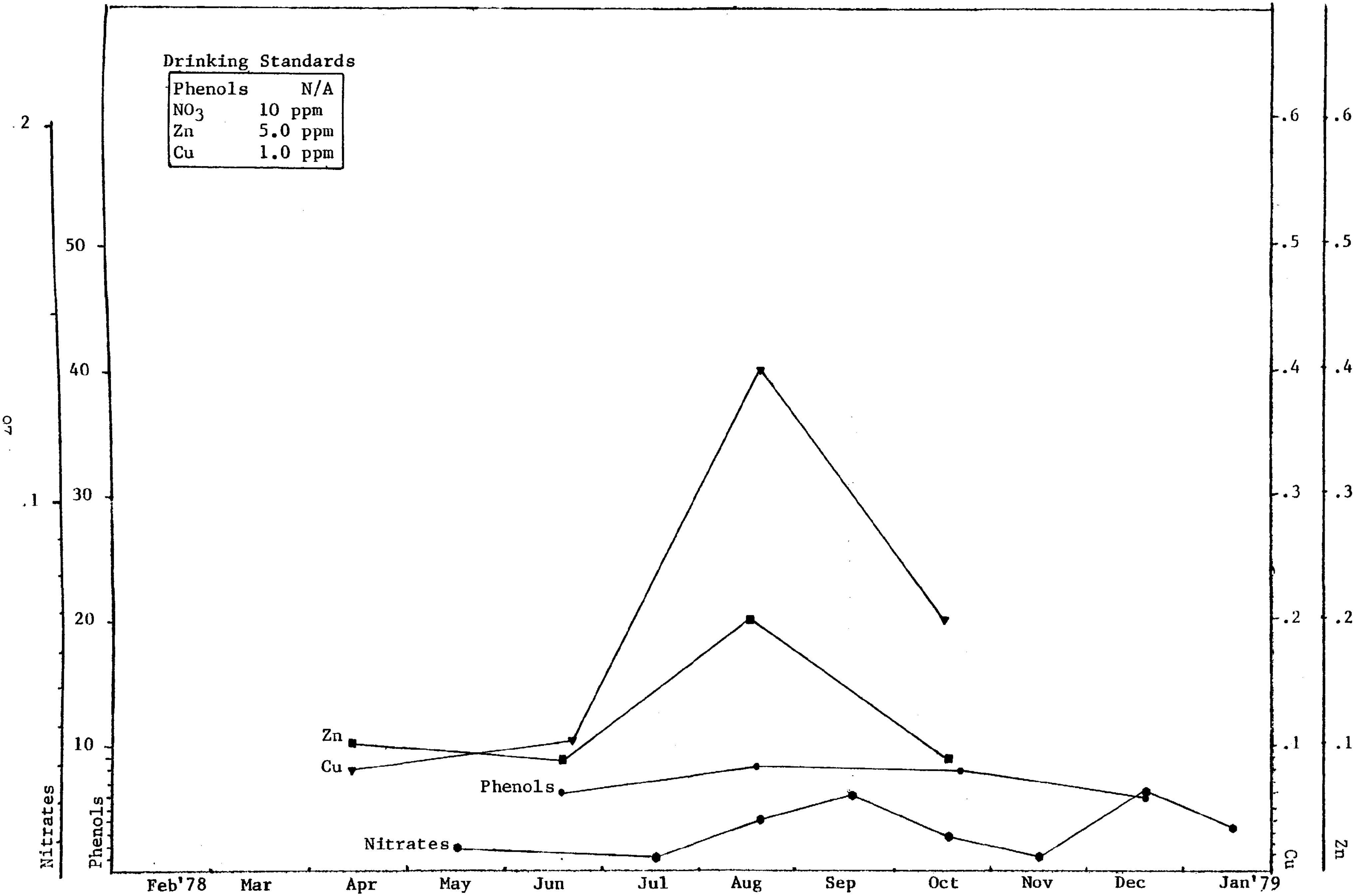

Figure 72 Water quality trends from unfiltered samples for Nitrates, Copper, Zinc (in parts per million) and Phenols (in parts per billion)

Sampling Point G

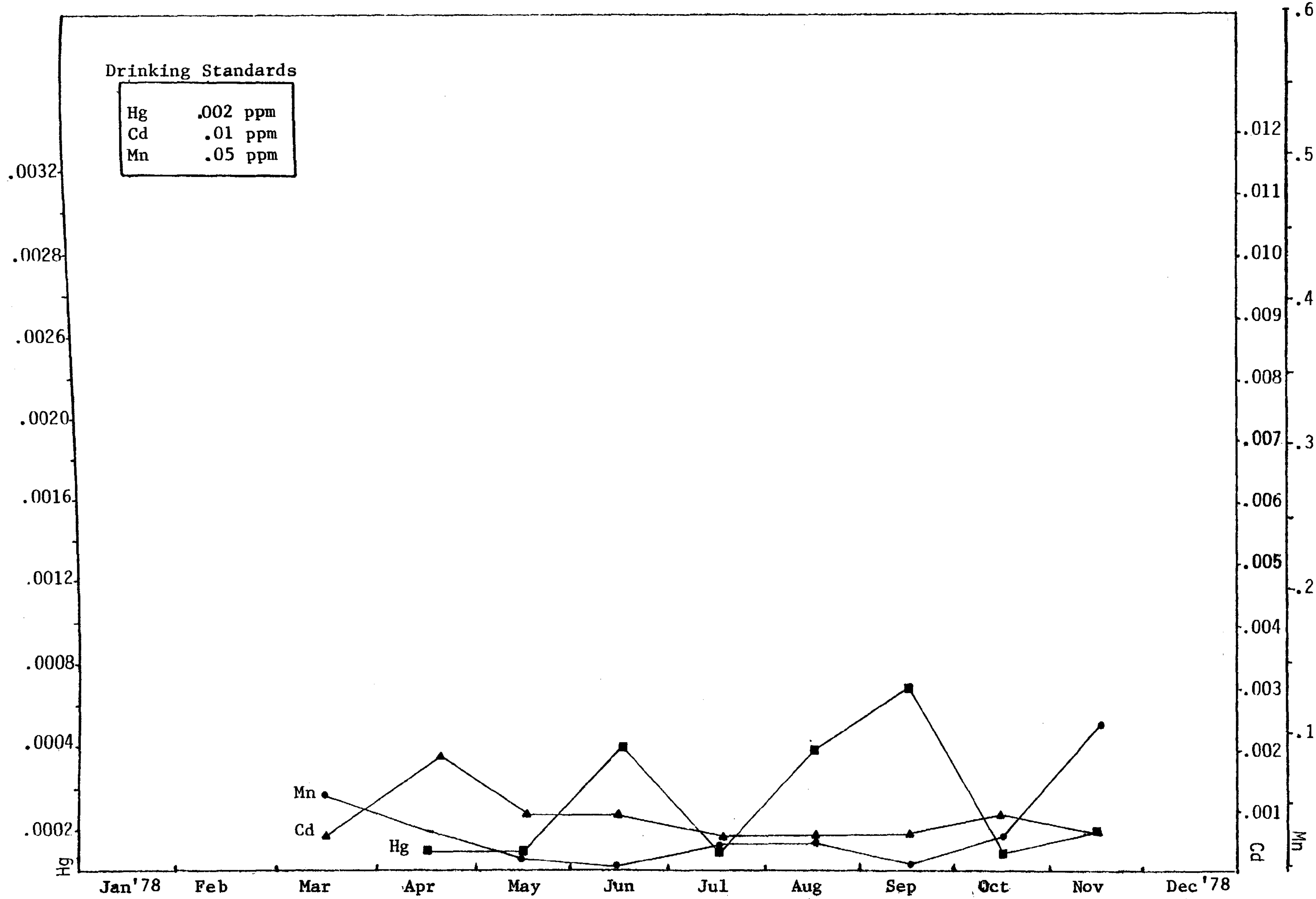

Figure 73 Water quality trends from filtered samples for Cadmium, Manganese, and Mercury in parts per million

Sampling Point G

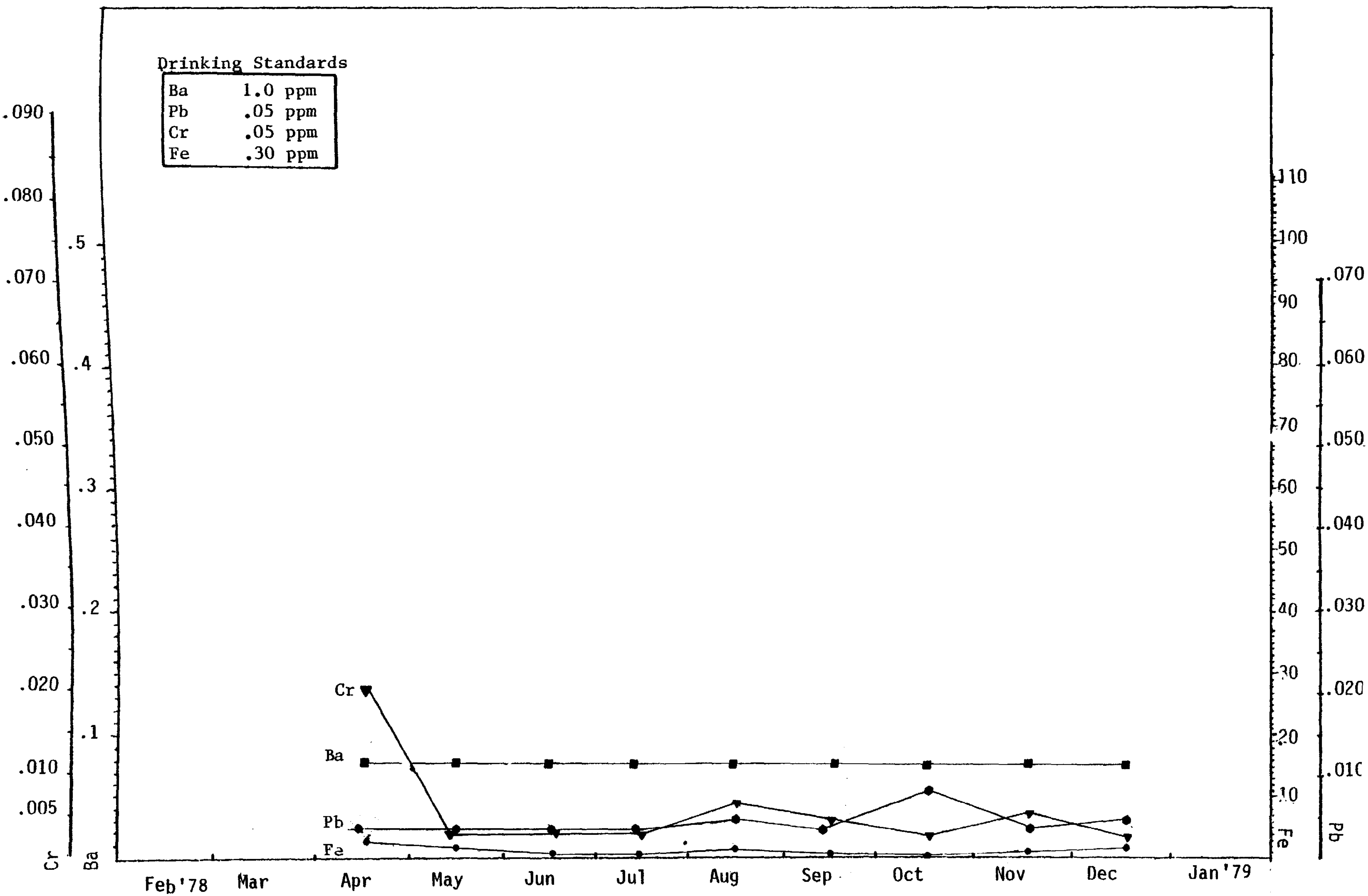

Figure 74 Water quality trends from filtered samples for Chromium, Barium, Iron, and Lead in parts per million

Sampling Point G

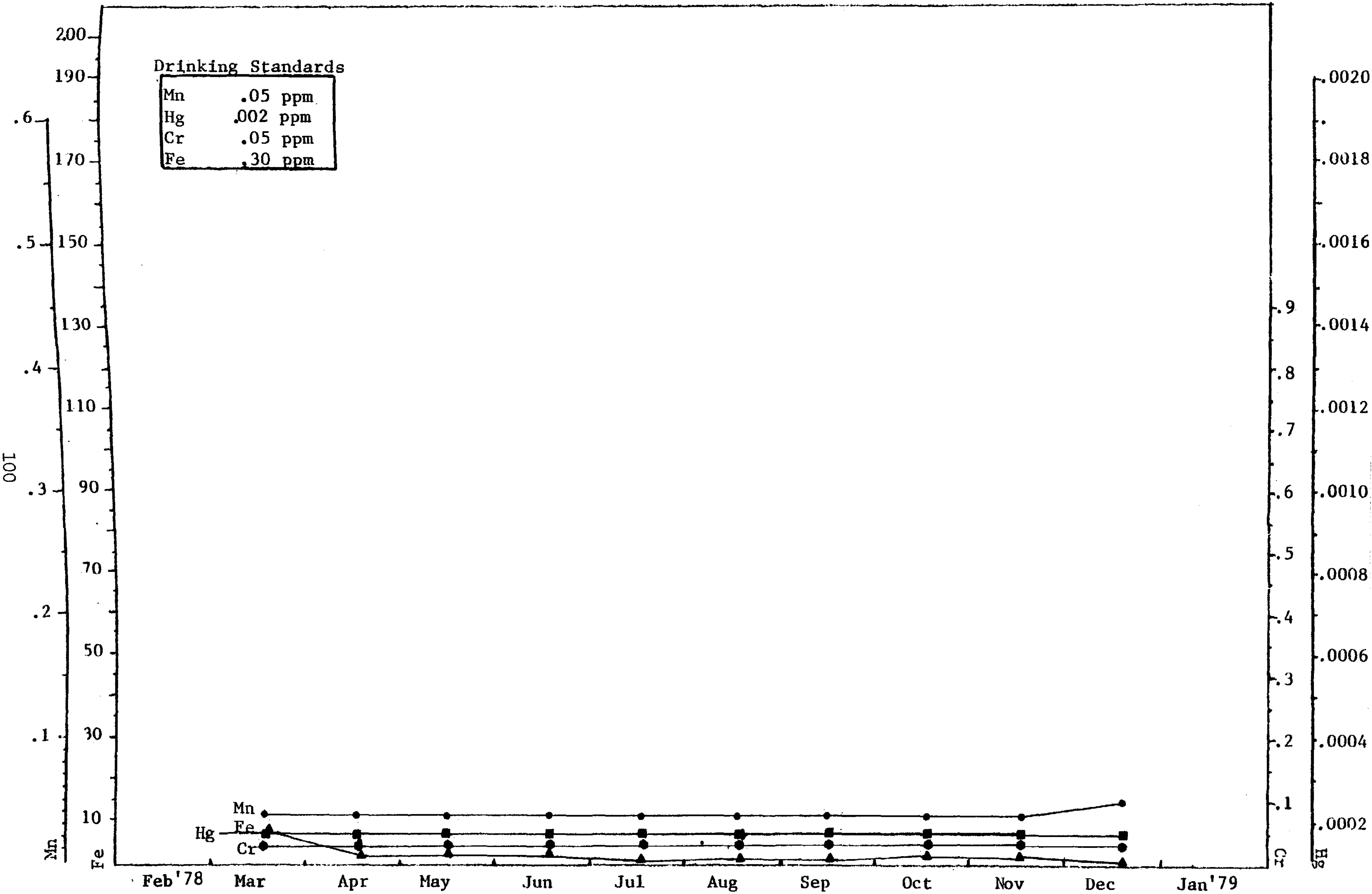

Figure 75 Water quality trends from unfiltered samples for Chromium, Iron, Mercury, and Manganese in parts per million

Sampling Point G

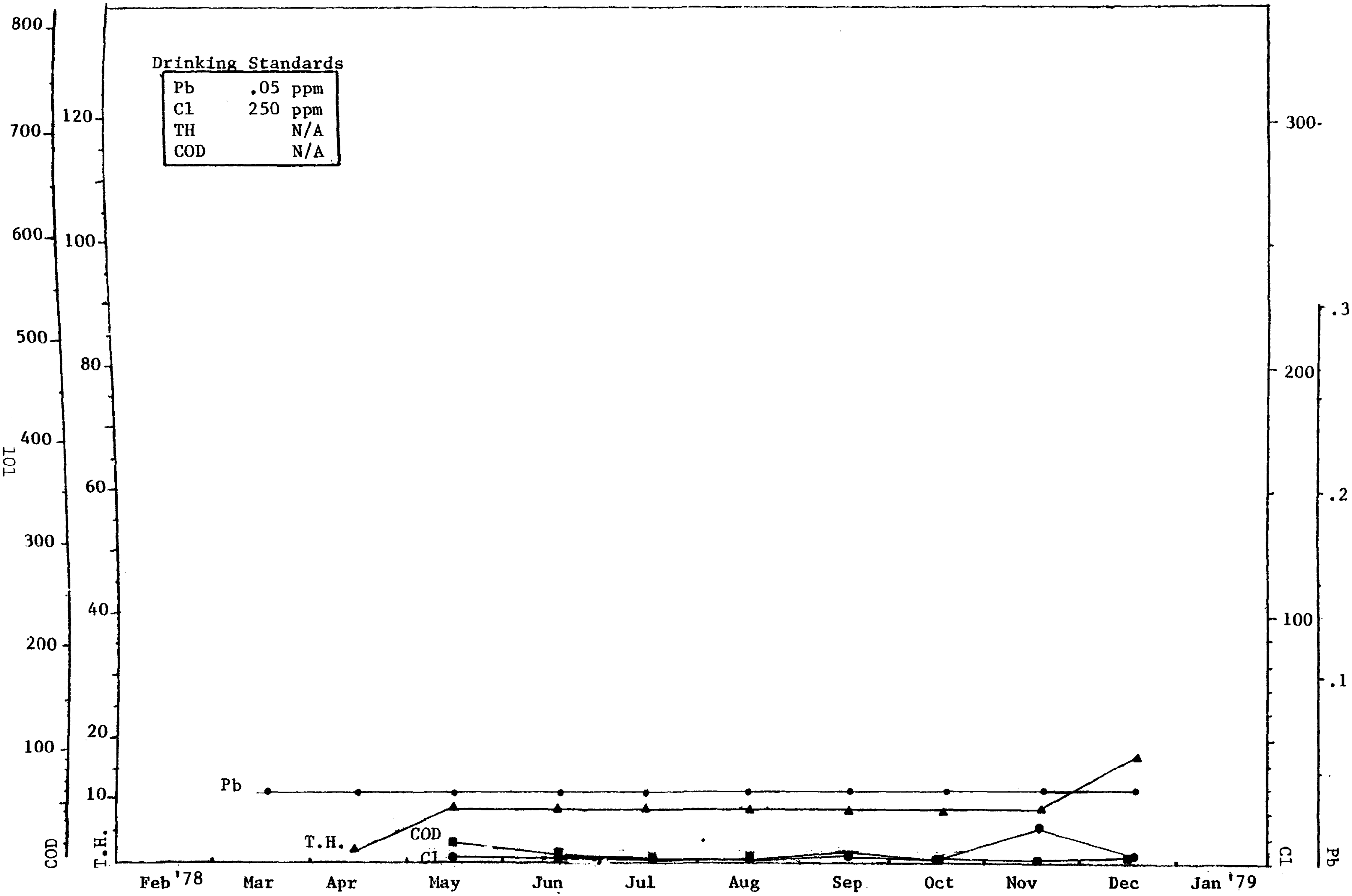

Figure 76 Water quality trends from unfiltered samples for COD, Hardness, Chlorides, and Lead in parts per million

Sampling Point G

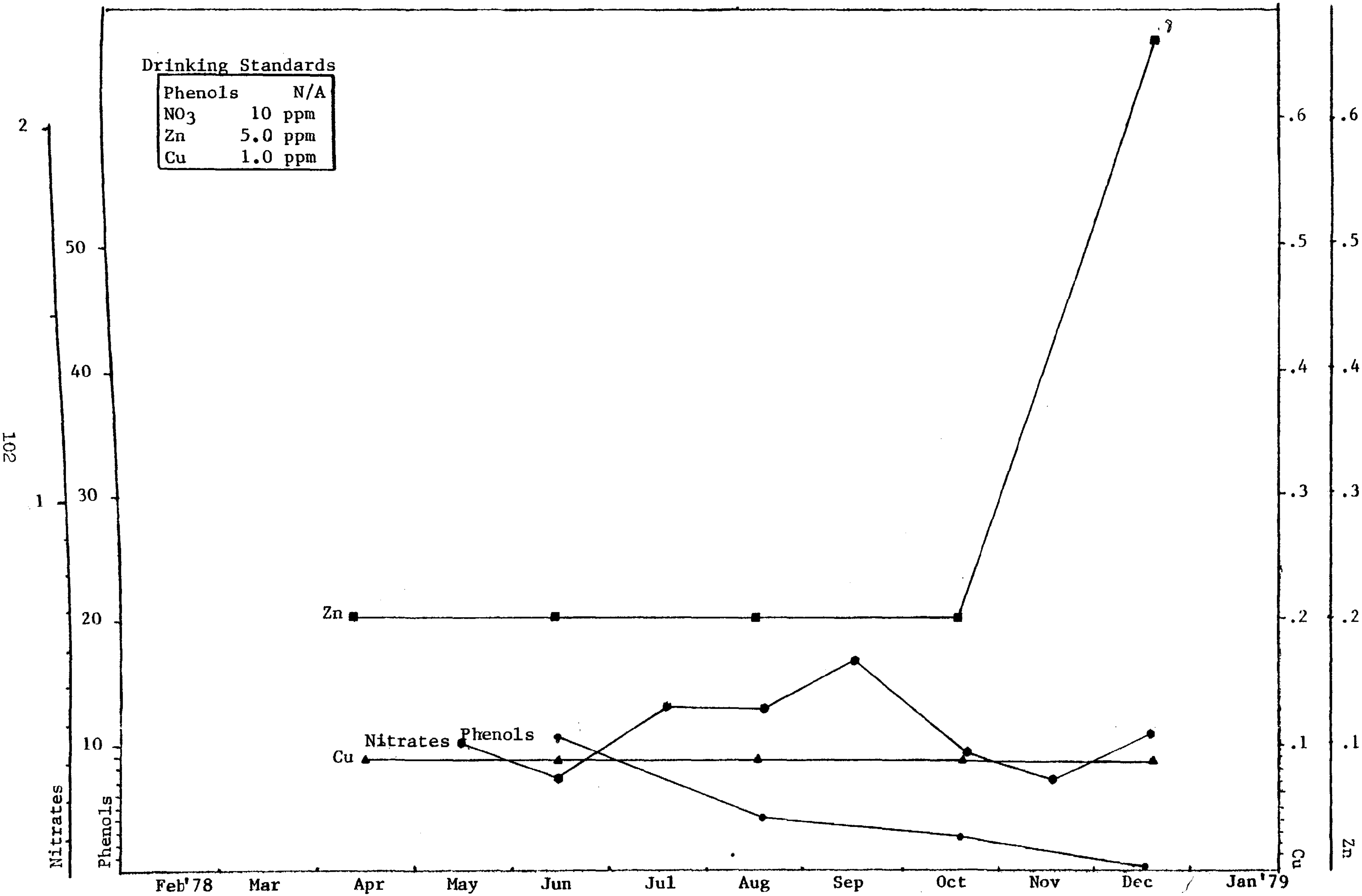

Figure 77 Water quality trends from unfiltered samples for Nitrates, Copper, Zinc (in parts per million) and Phenols (in parts per billion)

DRILL HOLE LOG

Date: 10-27-77

County: Lexington Grid Coord: ______ Lat-Long: ______

Location: Lexington County Landfill/Cayce Dump

Total Depth: 24'
Water Table: 5'
Screen Depth: ______

STRAT. WELL # 1

Elevation: ______
Drilled by: George Workman
Logged by: J. Lewis and Bill Goforth
Type Drill: Power Auger

*Sample taken corresponding to depth.

Strat.	Depth (m / ft)	Predom. Litho.	gravel	sand c	sand m	sand f	silt	clay	Angularity	Color	Foss	Comments (drilling characteristics, minerals, contacts, env. of dep., etc.)
	0	Sand		10	60	30				Lt. brown turning darker		fill, moist at 4'
		Trash								black		saturated, moderate shell hydrogen sulfide
		Sandy Trash								black to dark gray		trash mixed with a moderately coarse sand
		Silty Sand			30	60	10			dk. brown		appears to be pond bottom filled with organics micaceous
		Clay					10	90		white		very plastic with a thin layer of coarse sand on top
	25 ft	TD										

Figure 78

[illegible] Water Resources Commission, Dept. of Health and Env. Control

DRILL HOLE LOG

Date: Oct. 23, 1977

County: Lexington County   Grid Coord: Lat-Long:

Location: On Sand Ridge between Lexington Landfill & Cayce Dump #2

Total Depth: 75'
Water Table: 31'
Screen Depth: 50'-57'

Elevation: 236.91
Drilled by: George Workman
Logged by: Joel Lewis
Type Drill: Power Auger

*Sample taken corresponding to depth.

Strat. Age	Strat. Fm.	Depth m	Depth ft	Predom. Litho.	gravel	sand c	sand m	sand f	silt	clay	Angularity	Color	Foss	Comments (drilling characteristics, minerals, contacts, env. o dep., etc.)
		0–2	0–5	Sand		5	60	35				Light olive gray 5Y6/1 Dark Brown		Easy Drilling Dry
		2–4	10	Sand			70	30				Med. Drk. Brown Drk. yellowish brown 10YR4/2		Dry
		4–5	15	Sand			70	30				Very Pale Orange 10YR8/2 Golden Brown		Dry
		6–7	20	Sand			65	35				Grayish Orange 10YR7/4 Light Brwn.		Moist
		7–15	25–50	Sand			60	40				Off White Very pale orange 10YR8/2		Moist
							60	40						
							60	40				Very pale orange 10YR8/2 Off White		
							60	40				Mod. yellowish Brwn. 10YR4/2 Grayish orange 10YR7/4 Off White		Wet - not completely Saturated
							60	40				Very Pale Orange 10YR8/2		
							60	40				Same		

Figure 79

DRILL HOLE LOG

Date:

County:

Grid Coord:

Lat-Long:

Location: Page 2 #2

Total Depth:

Water Table:

Screen Depth:

Elevation:

Drilled by:

Logged by:

Type Drill:

*Sample taken corresponding to depth.

Depth m	Depth ft	Predom. Litho.	gravel	sand c	sand m	sand f	silt	clay	Angularity	Color	Foss	Comments (drilling characteristics, minerals, contacts, env. dep., etc.)
0	50	Sand			60	40				Off White		
										same		
1	55	Sand			55	40	5			Brownish White		Wet - not completely Saturated
2										same		
3	60				55	40	5			same		
										same		
4	65				60	40						
5					55	40	5					
6	70	Clay				5	15	80		Pink to White		Hard drilling Plastic
7						5	25	70		Grayish orange pink 5YR7/2		
	TD 75	Sand			5	40	15					Wet - Saturated

Depth scale: 0–15 m

Distribution: Development Board, Water Resources Commission, Dept. of Health and Env. Control

DRILL HOLE LOG

Date: 12-12-77

County: Lexington County Grid Coord: ________ Lat-Long: ________

Location: Lexington Co. Landfill Strat. Well #3

Total Depth: 37'
Water Table: ________
Screen Depth: ________

Elevation: ~230
Drilled by: George Workman
Logged by: Joel Lewis
Type Drill: Auger 2400

*Sample taken corresponding to depth.

Strat. (Age / Fm)	Depth (ft)	Predom. Litho.	Grain Size (%) (gravel / sand c m f / silt / clay)	Angularity	Color	Foss	Comments (drilling characteristics, minerals, contacts, env. of dep., etc.)
	0	Sand	medium to coarse		Olive Gray 5 Y 3/2		Garbage mixed
					Olive Black 5 Y 2/1		Garbage mixed
	10	Sand	coarse		Dark yellowish orange 10 YR 6/6		Sand only
		Sand	coarse to very coarse		Dark yellowish brown 10 YR 4/2		
		Sand	coarse		Mod. Reddish Brown 10 R 4/6		
	20	Sand			same		
	25	Sand	coarse to very coarse		lite brown 5 YR 5/6		
	30	Sand	coarse to very coarse		lite brown 5 YR 6/4		
	35	Clay	silt		very pale orange 10 YR 8/2		Very hard drilling DRY

Depth scale: m 0–15; ft 0–50.

Figure 80

DRILL HOLE LOG

Date: 12-14-77

County: Lexington County Grid Coord: Lat-Long:

Location: Lexington Co. Landfill Strat. Well #4

Total Depth: 48'
Water Table:
Screen Depth:

Elevation: ~250
Drilled by: George Workman
Logged by: Joel Lewis
Type Drill: Powered Auger

*Sample taken corresponding to depth.

Strat. Age	Strat. Fm	Depth (m)	Depth (ft)	Predom. Litho.	Grain Size (%) gravel	sand c	sand m	sand f	silt	clay	Angularity	Color	Foss	Comments drilling characteristics, minerals, contacts, env. of dep., etc.
		0	0	Sand		coarse sand						Lite Brown 5 YR 5/6		
			5			coarse to very coarse						Dark yellowish orange 10 YR 6/6		
		3	10									Lite brown 5 YR 5/6		
			15									pale yellow orange 10 YR 8/6		
						coarse								
		6	20									Dark yellowish orange 10 YR 6/6		
			25	Sand		coarse						Mod. Brown 5 YR 4/4		
						coarse to very coarse						Dark yellowish orange 10 YR 6/6		
		11		Sand										
		12	40			very coarse						Pale yellowish orange 10 YR 8/6		
			45	Clay			silt					5 YR 7/2 grayish orange		
		15	50											

Figure 81

Water Resources Commission, Dept. of Health and Env. Control

DRILL HOLE LOG

Date: 12-11-77

County: Lexington County Grid Coord: Lat-Long:

Location: Lexington County Landfill Strat well 5

Total Depth: 50'
Water Table: 49'
Screen Depth:

Elevation: ~ 240
Drilled by: George Workman
Logged by: J. Lewis
Type Drill: Power Auger

*Sample taken corresponding to depth.

Strat. age	Fm	Depth m	Depth ft	Predom. Litho.	Grain Size (%) gravel	sand c	sand m	sand f	silt	clay	Angularity	Color	Foss	Comments drilling characteristics, minerals, contacts, env. o dep., etc.
		0	0	Sand			medium to coarse					Dark yellowish brown 10 YR 4/2		Easy Drilling
		3	10				coarse					Dark yellowish orange 10 YR 6/6		
		4										Lite brown 5 YR 5/6		
		5		Clay			silt					Grayish-orange pink 5 YR 7/2		Mod. hard drilling
		7	25									Very pale orange 10 YR 8/2		
		9	30									Mod. orange pink 5 YR 8/4		
		10	35									Lite Brown 5 YR 6/4		
		12	40									Grayish orange pink 5 YR 7/2		
		15	50											Mod. wet not saturated

Figure 82

DRILL HOLE LOG

Date: 12-15-77

County: Lexington County Grid Coord: Lat-Long:

Location: Lexington County Landfill Strat well 6

Total Depth: 34'
Water Table: 16'
Screen Depth: 27'-34'

Elevation: 212.56
Drilled by: George Workman
Logged by: J. Lewis
Type Drill: Power Auger

*Sample taken corresponding to depth.

Strat. Age	Strat. Fm	Depth m	Depth ft	Predom. Litho.	Grain Size (%) gravel	sand c	sand m	sand f	silt	clay	Angularity	Color	Foss	Comments drilling characteristics, minerals, contacts, env. o dep., etc.
		0	0	Sand			coarse					Dark yellowish orange 10 YR 6/6		Easy Drilling
							coarse					Light Brown 5 YR 5/6		
		4		Clay			silt					very pale orange 10 YR 3/2		Mod. hard drilling.
												Grayish red purple 5 RP 4/2		
												Grayish orange 10 YR 7/4		
												Very pale orange 10 YR 8/2		
												Lite brown 5 YR 6/4		saturated

Depth scale: m 0–15; ft 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50

Figure 83

South Carolina Water Resources Commission, Dept. of Health and Env. Control

DRILL HOLE LOG

Date: 12-15-77

County: Lexington   Grid Coord: ____   Lat-Long: ____

Location: Lexington County Landfill   Strat 7

Total Depth: 44
Water Table: ____
Screen Depth: ____

Elevation: ~260
Drilled by: George Workman
Logged by: Joel Lewis
Type Drill: Power Auger

*Sample taken corresponding to depth.

Strat. Age	Strat. Fm	Depth m	Depth ft	Predom. Litho.	Grain Size (%) gravel	sand c	sand m	sand f	silt	clay	Angularity	Color	Foss	Comments drilling characteristics, minerals, contacts, env. of dep., etc.
		0–11	0–37	Sand			coarse					moderate brown 5 YR 3/4		Easy Drilling
							coarse					Lite brown 5 YR 5/6		
							coarse					Dark yellowish orange 10 YR 6/6		
							coarse					lite Brown 5 YR 5/6		
							medium to coarse					Grayish Orange 10 YR 7/4		
		11–13.5	37–44	Clay			silt					pale red purple 5 RP 6/2		Very hard drilling Auger would not penetrate

Figure 84

... Water Resources Commission, Dept. of Health and Env. Control

DRILL HOLE LOG

Date: 12-16-77

County: Lexington County Grid Coord: Lat-Long:

Location: Lexington County Landfill-Strat. boring #8

Total Depth: 64'
Water Table: 56'
Screen Depth:

Elevation:
Drilled by: George Workman
Logged by: Joel Lewis
Type Drill: Power Auger

*Sample taken corresponding to depth.

Depth (ft)	Predom. Litho.	Grain Size (%)	Color	Comments: drilling characteristics, minerals, contacts, env. of dep., etc.
0–19	Sand	Coarse	Dark yellowish brown 10 YR 4/2	Garbage mixed very foul odor
		coarse to very coarse	moderate yellowish brown 10 YR 5/4	Garbage mixed foul odor
		coarse to very coarse	Dark yellowish orange 10 YR 6/6	Mod. hard drilling
19–24	Sandy Clay	Silt - coarse to very coarse	Pale reddish brown 10 R 5/4	Kaolin lenses intermixed
24–29	Clay	Silt	Grayish orange pink 10 R 8/2	Hard drilling
29–38	Sand	coarse to very coarse	Lite brown 5 YR 5/6	
		coarse to very coarse	Moderate brown 5 YR 4/4	
38–50	Clay	silt	very pale orange 10 YR 8/2	Hard drilling
		silt	Grayish orange pink 5 YR 7/2	
			Same	

Figure 85

DRILL HOLE LOG

Date:

County: Grid Coord: Lat-Long:

Location: Strat. boring #8

Total Depth:
Water Table:
Screen Depth:

Elevation:
Drilled by:
Logged by:
Type Drill:

*Sample taken corresponding to depth.

Strat. Age	Strat. Fm	Depth m	Depth ft	Predom. Litho.	Grain Size (%) gravel	sand c	sand m	sand f	silt	clay	Angularity	Color	Foss	Comments drilling characteristics, minerals, contacts, env. of dep., etc.
		0	0	Clay										
		1–2	55				silt					Grayish orange pink 5 YR 7/2		Very hard drilling
		3	60				silt					same		Mod. saturated
		4–5	65									same		saturated water has foul odor
		6	70											
		7–8	75											
		9	80											
		10–11	85											
		12												
		13												
		14												
		15												

DRILL HOLE LOG

Date:

County: Lexington County Grid Coord: Lat-Long:

Location: Lexington County Landfill # 9

Total Depth: 29'
Water Table:
Screen Depth:

Elevation:
Drilled by: George Workman
Logged by: Joel Lewis
Type Drill: Power Auger

*Sample taken corresponding to depth.

Age Strat.	Fm	Depth (m)	Depth (ft)	Predom. Litho.	Grain Size (%) (gravel / sand c, m, f / silt / clay)	Angularity	Color	Foss	Comments (drilling characteristics, minerals, contacts, env. of dep., etc.)
				Sand	coarse		Mod. brown 5YR4/4		
					coarse		Lite Brown 5YR5/6		
					Med. to coarse		Lite Brown 5YR5/6		
				Clayey sand	coarse to very coarse		Mod. Brown 5YR4/4		
				Sandy clay	Silt - Medium		Lite brown 5YR5/6 w/mod.orange pink 5YR8/4		Clay lenses

Figure 86

... Water Resources Commission, Dept. of Health and Env. Control

DRILL HOLE LOG

Date: 12/22/77

County: Lexington Grid Coord: Lat-Long:

Location: Lexington County Landfill Mon. well 10

Total Depth: 64
Water Table: 42
Screen Depth: 50'-57'

Elevation: 273.47'
Drilled by: George Workman
Logged by: Joel Lewis
Type Drill: Power Auger 2404

*Sample taken corresponding to depth.

Depth (m)	Depth (ft)	Predom. Litho.	Grain Size (%) sand	Color	Comments: drilling characteristics, minerals, contacts, env. dep., etc.
0	0	Sand	Coarse	Moderate brown 5YR3/4	Easy drilling, coarse sand very dry. Clean no clay evedent
3	10		Coarse	Moderate brown 5YR3/4	
4	15		Coarse	Lite brown 5YR5/6	
6	20		Coarse	Lite brown 5YR5/6	
7	25		Coarse - to very coarse	Lite brown 5YR5/6	
9	30		Coarse - to very coarse	Lite brown 5YR5/6	Some clay evident
10	35	Sandy clay	coarse	Very pale orange 10YR8/2 and 5YR5/6	Clay lenses Evident
12	40			Mod. orange pink 5YR8/4 and 5YR5/6	hard drilling
14	45		coarse	Pale yellow brown 10YR6/2	Moist
15	50			Lite brown 5YR6/4	Saturated

Figure 87

South Carolina ... Water Resources Commission, Dept. of Health and Env. Control

DRILL HOLE LOG

Date: ______

County: ______ Grid Coord: ______ Lat-Long: ______

Location: Monitoring well #10

Total Depth: ______
Water Table: ______
Screen Depth: ______

Elevation: ______
Drilled by: ______
Logged by: ______
Type Drill: ______

*Sample taken corresponding to depth.

Depth (m)	Depth (ft)	Predom. Litho.	gravel	sand c	sand m	sand f	silt	clay	Angularity	Color	Foss	Comments drilling characteristics, minerals, contacts, env. dep., etc.
0–1		Clay		Silt						Pale red purple 5RP6/2		
1–2	55											
2–3				Silt						Pale pink 5RP8/2		
3–4	60											
4–5	65			Silt						Pale pink 5RP8/2		
5–15												

Distribution: Development Board, Water Resources Commission, Dept. of Health and Env. Control

DRILL HOLE LOG

Date: Jan. 8, 1978

County: Lexington County Grid Coord: Lat-Long:

Location: 321 Landfill #11

Total Depth: 64'
Water Table: 41'
Screen Depth: 50'-57'

Elevation: 245.55
Drilled by: George Workman
Logged by: J. Lewis
Type Drill: Power Auger

*Sample taken corresponding to depth.

Depth (m)	Depth (ft)	Predom. Litho.	Grain Size (%)	Color	Comments
0–3.4	0–11	Sand & Garbage	Coarse	Light olive gray 5Y5/2	Very foul odor Garbage
3.4–6.7	11–22	Sand	Med. to coarse	Dark yellowish-orange 10YR6/6	
			Coarse to very coarse	Med. orange pink 5YR8/4	
6.7–8.2	22–27	Clayey - Sand	Silt - med. - coarse	Dusky yellow 5Y6/4	
8.2–9.7	27–32	Sand	Med. - to coarse	Very pale orange 10YR8/2	Mod. Saturated
9.7–15	32–50	Clay	Silt	Pale Red 5R6/2 Pale red 10R6/2	Dry Pinkish Gray 5YR8/1

Figure 88

DRILL HOLE LOG

Date: ____________

County: ____________ Grid Coord: ____________ Lat-Long: ____________

Location: Monitoring well # 11

Total Depth: ____________
Water Table: ____________
Screen Depth: ____________

Elevation: ____________
Drilled by: ____________
Logged by: ____________
Type Drill: ____________

*Sample taken corresponding to depth.

Strat. Age	Strat. Fm	Depth m	Depth ft	Predom. Litho.	Grain Size (%) gravel	sand c	sand m	sand f	silt	clay	Angularity	Color	Foss	Comments drilling characteristics, minerals, contacts, env. o dep., etc.
		0	50	Clay		Silt						Pale Pink 5RP8/2		Mod. Plastic Moist
		3	60	Silt		Silt						Pinkish gray 5YR8/1		Saturated
			65	TD										

Depth scale: m 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15; ft 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100

DRILL HOLE LOG

Date: 2-6-78

County: Lexington County Grid Coord: Lat-Long:

Location: Lexington Landfill #12

Total Depth: 19'
Water Table: 5'
Screen Depth:

Elevation:
Drilled by: George Workman
Logged by: J. Lewis
Type Drill: Power Auger

*Sample taken corresponding to depth.

Strat. Age	Strat. Fm	Depth m	Depth ft	Predom. Litho.	Grain Size (%) gravel	sand c	sand m	sand f	silt	clay	Angularity	Color	Foss	Comments drilling characteristics, minerals, contacts, env. of dep., etc.
		0	0	Sandy Clay	Coarse - medium - fine							Lite brown 5 YR 5/6		moist
				Sandy Clay								Dark yellowish brown 10 YR 6/6		moist
			15	Clay	Silt							Grayish orange 10 YR 7/4		saturated

Figure 89

Distribution: Development Board, Water Resources Commission, Dept. of Health and Env. Control

DRILL HOLE LOG

Date: Mar. 13, 1978

County: Lexington
Grid Coord:
Lat-Long:

Location: Lexington Landfill Well #14

Total Depth: 25'
Water Table: 15'
Screen Depth: 15 - 20'

Elevation:
Drilled by: George Workman
Logged by: Joel Lewis
Type Drill: Powe Auger

*Sample taken corresponding to depth.

Strat. Age	Strat. Fm	Depth m	Depth ft	Predom. Litho.	Grain Size (%) gravel	sand c	sand m	sand f	silt	clay	Angularity	Color	Foss	Comments drilling characteristics, minerals, contacts, env. o dep., etc.
		0–1.5	0–5	Sand			medium - Some coarse					Drk. yellowish Orange 10YR6/6		
		1.5–4.5	5–15	Clayey Sand			Silt to fine sand some coarse					lt. brown 5YR5/6		
		4.5–6	15–20	Sand			very coarse sand					Dark Yellowish Orange 10YR6/6		Grains angular in shape
		6–7.5	20–25	Kaolin			Silt					Grayish Orange 10YR7/4		Hard and Plastic

Figure 90

Distribution: Development Board, Water Resources Commission, Dept. of Health and Env. Control

WELL LOGS

LEXINGTON COUNTY LANDFILL, SOUTH CAROLINA

03/12/75

Well B

0.0 - 3.05 m (0.0 - 10.0 ft)	Light brown, fine- to coarse-grained sand.
3.05 - 8.23 m (10.0 - 27.0 ft)	Light gray to white clay (kaolin?) with some gravel 1/2 to 6 mm.
8.23 - 9.45 m (27.0 - 31.0 ft)	Light gray to white clay with fine- to medium-grained sand.
9.45 - 12.19 m (31.0 - 40.0 ft)	Light gray to white clay with fine gravel.
12.19 - 14.32 m (40.0 - 47.0 ft)	Light brown medium- to coarse-grained sand.
14.32 - 18.29 m (47.0 - 60.0 ft)	Light gray to white clay.
18.29 - 19.81 m (60.0 - 65.0 ft)	Light brown, fine- to medium-grained sand.

03/13/75

Well C

0.0 - 3.05 m (0.0 - 10.0 ft)	Light brown, fine- to coarse-grained sand becoming slightly clayey near 3.05 m (10 ft).
3.05 - 8.23 m (10.0 - 27.0 ft)	Light gray to white clay with some gravel.

Figure 91

03/13/75

Well C - (Continued)

8.23 - 9.45 m (27.0 - 31.0 ft)	Light gray to white clay with fine- to medium-grained sand.
9.45 - 12.19 m (31.0 - 40.0 ft)	Light gray to white clay with fine gravel.
12.19 - 14.32 m (40.0 - 47.0 ft)	Light brown, medium- to coarse-grained sand.
14.32 - 18.29 m (47.0 - 60.0 ft)	Light gray to white clay.
18.29 - 20.73 m (60.0 - 68.0 ft)	Light brown, fine- to medium-grained sand.

Figure 92

APPENDIX - B

TABLES

LEXINGTON COUNTY LANDFILL STUDY

CHEMICAL ANALYSIS CHART

PARAMETER (ppm)

SAMPLE LOCATION NUMBER

Rnd I February 1978

	2	6	10	11	A	E	F
Fe	30	1.4	2.0	.2	60	4	1.7
Mn	.41	< .05	< .05	< .05	.36	< .05	< .05
Ba	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cd	< .01	< .01	< .01	< .01	< .01	< .01	< .01
Cr	< .05	< .05	< .05	< .05	< .05	< .05	< .05
Hg	< .2	< .2	< .2	< .2	< .2	< .2	< .2
Pb	.09	.13	.07	< .05	.11	< .05	.09
Se							
Zn	< .1	< .1	< .1	< .1	< .1	.5	.2

TABLE 1.. WATER QUALITY DATA (UNFILTERED)

LEXINGTON COUNTY LANDFILL STUDY

CHEMICAL ANALYSIS CHART

PARAMETER (ppm)

SAMPLE LOCATION NUMBER

Rnd II March 1978

	2	6	10	11	13	14	A'	B'	C'	D'	E	F	G
Fe	19	1.3	1.5	.2	2	2	40	1.6	1.4	4	14	1.1	9
Mn	.32	.10	< .05	< .05	< .05	< .05	.23			.40	.06	.05	< .05
Ba	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cd	.01	.01	< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01
Cr	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	.06	.72	< .05	< .05	< .05
Hg	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002
Pb	.05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05
Se	< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01
T.H.								33	91				

TABLE 2.. WATER QUALITY DATA (UNFILTERED)

LEXINGTON COUNTY LANDFILL STUDY

CHEMICAL ANALYSIS CHART

PARAMETER (ppm) — SAMPLE LOCATION NUMBER — Rnd III April 1978

PARAMETER (ppm)	2	6	10	11	13	14	A'	B'	C'	D'	E	F	G	
Fe	20	3	3	.2	4	.1	50	2	.6	4	16	.3	2	
Mn	.25	<.05	<.05	<.05	<.05	<.05	.30	<.05	<.05	.40	<.05	<.05	<.05	
Ba	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	
Cd														
Cr	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	
Hg	.0003			.0002	.0002	.0002	.0005	<.0002	<.0002	<.0002	<.0002	.0002	.0002	
Pb	.08	<.05	<.05	<.05	<.05	<.05	<.05	<.05	.05	<.05	.28	.06	<.05	
Se	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	
T.H.	45	12	12					34	64				3	
Cu	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	
Zn	<.1	<.1	<.1	<.1	.1	<.1	<.1	<.1	<.1	.1	.2	.1	.2	
As	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	

TABLE 3.. WATER QUALITY DATA (UNFILTERED)

LEXINGTON COUNTY LANDFILL STUDY

CHEMICAL ANALYSIS CHART

PARAMETER (ppm) — SAMPLE LOCATION NUMBER — Rnd IV May 1978

PARAMETER (ppm)	2	6	10	11	13	14	A'	B'	C'	D'	E	F	G
Fe	30	.2	9	.1	30	.1	50	2	.3	3	19	1.0	2
Mn	.26	< .05	< .05	< .05	< .05	< .05	.24	.12	< .05	.20	.06	< .05	< .05
Ba	< .5	< .5	< .5	< .5	< .5	< .5	< .5	< .5	< .5	< .5	< .5	< .5	< .5
Cd	< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01
Cr	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05
Hg	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	.0004	< .0002
Pb	< .05	< .05	< .05	.07	.11	< .05	< .05	< .05	< .05	< .05	< .05	.08	< .05
Se	< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01
T.H.	64	< 10	10	< 10	< 10	< 10	61	34	100	< 10	35	11	< 10
Cn		< .01		< .01	< .01	< .01	.10	.02	.02	.02		.03	.02
COD		8		10	20	14	12	7.8	.02	11		4	17
Nitrate	< .02	1.17	1.28	1.51	.64	1.50	.43	.16	.10	.08	.41	1.08	.38
Chloride	240	.1	5	4		18	20	32	60	2	26	30	4
As	< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01

TABLE 4..WATER QUALITY DATA (UNFILTERED)

LEXINGTON COUNTY LANDFILL STUDY

CHEMICAL ANALYSIS CHART

PARAMETER (ppm) — SAMPLE LOCATION NUMBER

Rnd V June 1978

	2	6	10	11	13	14	A'	B'	C'	D'	E	F	G
Fe	30	1.2		.8	50		80	3	7	1.9	10	.9	1.8
Mn	.24	<.05		<.05	<.05		.41	.14	.16	.08	.05	<.05	<.05
Ba	<.5	<.5		<.5	<.5		<.5	<.5	<.5	<.5	<.5	<.5	<.5
Cd	<.01	<.01		<.01	<.01		<.01	<.01	<.01	<.01	<.01	<.01	<.01
Cr	<.05	<.05		<.05	<.05		<.05	<.05	<.05	<.05	<.05	<.05	<.05
Hg	<.0002	<.0002		<.0002	<.0002		<.0002	<.0002	<.0002	<.0002	<.0002	.0003	<.0002
Pb	.11	<.05		<.05	.11		<.05	<.05	.09	<.05	<.05	<.05	<.05
Se	<.01	<.01		<.01	<.01		<.01	<.01	<.01	<.01	<.01	<.01	<.01
Cu	<.1	<.1		<.1	<.1		<.1	.2	.1	1.1	<.1	<.1	<.1
T.H.	28	<10		<10	<10		10	38	90	13	11	11	<10
Zn	.1	.1		<.1	<.1		.1	.1	.4	<.1	.2	.1	.2
COD	180	8		2	21		47	16	56	39	15	6	4
NITRATE	.13								.05		.70	1.18	.28
CHLORIDE	140	2		5	3		40	35	80	5	23	31	2
PHENOLS (ppb)	6.6	12		19	27		14	9.1	4.2	6.6	8.4	11	11

TABLE 5..WATER QUALITY DATA (UNFILTERED)

LEXINGTON COUNTY LANDFILL STUDY

CHEMICAL ANALYSIS CHART

PARAMETER (ppm)

SAMPLE LOCATION NUMBER

Rnd VI July 1978

	2	6	10	11	13	14	A'	B'	C'	D'	E	F	G		
Fe	20	.9		.2	30	.9	60	3	1.1	3	11	.4	.3		
Mn	.31	<.05		<.05	<.05	<.05	.32	.17	.09	.22	.05	<.05	<.05		
Ba	<.5	<.5		<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5		
Cd	.030	<.01		<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01		
Cr	<.05	<.05		<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05		
Hg	<.0002	<.0002		<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	.0005	.0002		
Pb	<.05	<.05		<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05		
Se	<.01			<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01		
T.H.	61	<10		11	<10	<10	53	35	53	10	<10	<10	<10		
COD	170	29		48	33	15			.32	28	3	2	2		
NITRATE		1.41		.65		.45	.15	.12		.05	.67	.44	.47		
CHLORIDE	120	4		14	4	12	24	40	40	3	23	31	2		

TABLE 6.. WATER QUALITY DATA (UNFILTERED)

LEXINGTON COUNTY LANDFILL STUDY

CHEMICAL ANALYSIS CHART

PARAMETER (ppm)

SAMPLE LOCATION NUMBER

Rnd VII August 1978

	2	6	10	11	13	14	A'	B'	C'	D'	E	F	G	
Fe	30	4	70	1.3	50	1.2	9	1.9	.9	3	12	2	.8	
Mn	.44	<.05	.12	<.05	<.05	<.05	.13	.17	.05	.19	.06	<.05	<.05	
Ba	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	
Cd	.043	<.01	.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	
Cr	<.05	<.05	.08	<.05	<.05	<.05	<.05	.07	<.05	.42	<.05	<.05	<.05	
Hg	.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	.0005	.0002	.0006	.0002	
Pb	.05	<.05	.17	<.05	.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	
Se	<.01	<.01	<.01	<.01	<.01	<.01		<.01	<.01	<.01	<.01	<.01	<.01	
T.H.	71	<10	<10	<10	<10	<10			60		11	11	<10	
Cu	.1	<.1	.1	.3	<.1	<.1	<.1	<.1	.3	.4	<.1	.1	<.1	
Zn	.2	.1	.4		.1	.2	<.1	.1	<.1	.2	.4	.1	.2	
COD	740	11	85	31	15	40	7.5	9.2	10	100	5.4	6.6	1.2	
NITRATE	.16		1.33		.55	.30	.57	.15	6.1	.16	.64	1.06	.46	
CHLORIDE	110	3	7	5	50	3			41		24	29	1	
PHENOLS (ppb)	32	14	8.8	13.6	16	10	8.8	8.8		8.4	4.2	6.0	4.8	
SULFATE	23	<10	<10	<10		<10	<10	<10	18	<10	<10	<10	<10	
Cn	<.01	<.01	<.01	<.01	<.01	<.01	.26	.18		.18	.011	<.01	<.01	
As	.01	<.01	.06	<.01	.06	<.01		<.01	<.01	<.01	<.01	<.01	<.01	

TABLE 7...WATER QUALITY DATA (UNFILTERED)

LEXINGTON COUNTY LANDFILL STUDY

CHEMICAL ANALYSIS CHART

PARAMETER (ppm)

SAMPLE LOCATION NUMBER

RND VIII September 1978

	2	6	10	11	13	14	A'	B'	C'	D'	E	F	G
Fe	30	1.2	8	.4	60	1.3	80	5	.7	4	16	1.0	.5
Mn	.38	<.05	<.05	.07	<.05	<.05	.45	.54	.07	.18	.07	<.05	<.05
Ba	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5
Cd	.016	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
Cr	<.05	<.05	<.05	<.05	.06	<.05	<.05	.18	<.05	.70	<.05	<.05	<.05
Hg	.0003	<.0002		<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	.0005	.0002	.0005	<.0002
Pb	<.05	<.05	<.05	<.05	.08	<.05	<.05	<.05	<.05	<.05	.07	.05	.05
Se	<.01		<.01								<.01	<.01	<.01
T.H.	< 10	<10	65	13	<10		71	42	56	10	13	<10	<10
COD	120	14	160	19	19	9	19	28	39	77	8	10	6
NITRATE	.11	1.22	.33	1.33	.58	.36	.10	.35	.72	.22	.60	1.10	.58
CHLORIDE	110	3	5	5	5	5	46	47	35	5	23	31	5

TABLE 8..WATER QUALITY DATA (UNFILTERED)

LEXINGTON COUNTY LANDFILL STUDY

CHEMICAL ANALYSIS CHART

PARAMETER (ppm)

SAMPLE LOCATION NUMBER

RND IX October 1978

	2	6	10	11	13	14	A'	B'	C'	D'	E	F	G
Fe	40	5		.2	40	.3	180	7	.2	4	30	1.5	3
Mn	.47	<.05		<.05	<.05	<.05	.34	.33	<.05	.18	.12	<.05	<.05
Ba	<.5	<.5		<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5
Cd	<.01	<.01		<.01	.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
Cr	<.05	<.05		<.05	<.05	<.05	<.05	<.05	<.05	.21	<.05	<.05	<.05
Hg	<.0002	<.0002		<.0002	<.0002	<.0002	<.0002	.0003	<.0002	<.0002	.0007	.0014	.0002
Pb	<.05	<.05		<.05	<.05	<.05	.05	<.05	<.05	<.05	<.05	<.05	<.05
Se													
T.H.	76	<10		<10	<10	<10	18	32	58	<10	10	<10	<10
Cu	.1	<.1		<.1	<.1	<.1	<.1	.4	<.1	.2	<.1	<.1	<.1
Zn	.1	.2		.3	.1	.1	<.1	<.1	<.1	<.1	.1	.1	.2
COD	68	17		9	18	16	20	16	36	20	6	7	<1
NITRATE	.06	1.42		1.28	.56	.38	.63	.09	.03	.11	.35	1.0	.32
CHLORIDE	70	3		5	3	5	13	49	34	4	20	33	3
PHENOLS (ppb)	2.2	6.6		5.4	4.2	6.6	7.0	7.0	9.8	8.1	4.8	6.6	2.8
SULFATE	<10	<10			<10	<10	<10	<10	12	<10	<10	<10	<10

TABLE 9...WATER QUALITY DATA (UNFILTERED)

CHEMICAL ANALYSIS CHART

PARAMETER (ppm) — SAMPLE LOCATION NUMBER — RND X — November 1978

	2	6	10	11	13	14	A'	B'	C'	D'	E	F	G
Fe	30	1.3	3	.1	.1	3	140	4	.3	15	30	.8	1.9
Mn	.43	<.05	.08	<.05	<.05	<.05	.58	.26	<.05	1.7	.12	<.05	.05
Ba	<.5	<.5	<.5	<.5	<.5	<.5	.7	<.5	<.5	<.5	<.5	<.5	<.5
Cd	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01
Cr	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05
Hg	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002			<.0002		.0002	.0006	<.0002
Pb	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05
Se													
T.H.	95	10	15		<10	<10	34	42	85	10	22	<10	<10
COD	55	7		5	10	8	60	38	41	260	10	5	30
NITRATE	.08	1.28	.47	1.57	.34	.34	.15	.04	.08	.04	.03	1.08	.26
CHLORIDE	60	2	8	5	3	2	50	44	26	4	22	27	2
Cn	.02	<.01		<.01	<.01	<.01	.02	<.01	<.01	<.01		.02	<.01
As													

TABLE 10..WATER QUALITY DATA (UNFILTERED)

LEXINGTON COUNTY LANDFILL STUDY

CHEMICAL ANALYSIS CHART

PARAMETER (ppm) — SAMPLE LOCATION NUMBER — RND XI December 1978

PARAMETER (ppm)	2	6	10	11	13	14	A'	B'	C'	D'	E	F	G	
Fe	30	.2		.2	.3	.7	100	3	1.7	1.3	16	.5	1.7	
Mn	.44	< .05		< .05	< .05	< .05	.57	.15	< .05	.08	.10	< .05	< .05	
Ba	< .5	< .5		< .5	< .5	< .5	< .5	< .5	< .5	< .5	< .5	< .5	< .5	
Cd	< .01	< .01		< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01	< .01	
Cr	< .05	< .05		< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	
Hg	< .0002	< .0002		.0002	< .0002	< .0002	< .0002	< .0002	< .0002	< .0002	.0003	.0004	< .0002	
Pb	< .05	< .05		< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	< .05	
Se														
T.H.	84	< 10		< 10	< 10	< 10	80	24	52	.04	< 20	< 20	< 20	
Cu	< .1	< .1		< .1	< .1	< .1	< .1	< .1	< .1	< .1	< .1	< .1	< .1	
Zn	.1	< .1		.3	< .1	.1	< .1	< .1	.2	< .1	.1	.1	.8	
COD	52	28		13	12	4	25	16	24	30	14	14	6	
NITRATE	.14	1..20		1.8	.45	1.25	.78	.08	.05	.04	.22	1.03	.39	
CHLORIDE	58	2		3	4	2	47.5	37.5	33	2.5	21	32	2	
PHENOLS (ppb)	33	22		9.2	50	10	< 1	2.2	7	6.6	2.4	< 1	< 1	
SULFATE	< 10	< 10		< 10	< 10	< 10	< 10	< 10	11	< 10	< 10	< 10	< 10	

TABLE 11..WATER QUALITY DATA (UNFILTERED)

LEXINGTON COUNTY LANDFILL STUDY

CHEMICAL ANALYSIS CHART

PARAMETER (ppm)

SAMPLE LOCATION NUMBER

RND XII January 1979

	2	6	10	11	13	14	A'	B'	C'	D'	E	F	G	
Fe	40	.2		.2	.1	.6	100	1.7	.4	.6	15	.9		
Mn	.56	<.05		<.05	<.05	<.05	.55	.09	<.05	.07	.12	<.05		
Ba	<.5	<.5		<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5	<.5		
Cd	<.01	<.01		<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01		
Cr	<.05	<.05		<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05		
Hg	<.0002	.0007		<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	<.0002	.0002		
Pb	.05	<.05		<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05	<.05		
Se														
T.H.	90	<20		<20	<20	<20	100	26	45	<20	<20	<20		
COD	85	6		7	2	8	48	17	28	23	7	10		
NITRATE	.70	1.38		1.78	.26	1.25	.04	.16	.07	<.02	.16	1.09		
CHLORIDE	115	1		4.5	2.5	1	60	33	.32	4	21	33		

TABLE 12. WATER QUALITY DATA (UNFILTERED)

ROUND 1
JANUARY
1978

Sample # ppm	As	Ba	Cd	Cr	Cu	Fe	Pb	Mn	Hg	Se
2		<.03	0.004	<.02		31.	0.012	0.19	<.0002	0.015
6		<.03	<.002	<.02		0.06	0.035	<.02	0.0003	<.006
10		<.03	<.002	<.02		<.02	0.010	<.02	0.0008	<.006
11		<.03	<.002	<.02		0.15	<.001	<.02	0.0003	0.007
Det. Lim		0.03	0.002	0.02		0.02	0.001	0.02	0.0002	0.006

TABLE 13 WATER QUALITY DATA FOR TOTAL METALS (FILTERED)

ROUND 2
FEBRUARY
1978

Sample # ppm	Zn	Ba	Cd	Cr	Cu	Fe	Pb	Mn	Hg	Se
#2	<.5	<.1	<.001	<.005	0.1	35.	<.005	0.52	0.0017	<.001
#6	<.5	<.1	<.001	<.005	0.1	<.3	0.007	<.005	0.0004	<.001
#10	<.5	<.1	<.001	<.005	0.2	<.3	0.011	0.016	0.0004	<.001
#11	<.5	<.1	≤.001	<.005	0.3	<.3	0.015	0.010	0.0005	<.001
AA	<.5	<.1	<.001	<.005	0.1	63.	<.005	0.39	0.0024	<.001
E	1.3	<.1	0.001	<.005	0.2	3.1	0.012	0.028	0.0020	0.001
F	<.5	<.1	<.001	<.005	0.2	1.7	0.008	0.026	0.0028	<.001
Req. Det. Limit	.5	0.1	0.001	0.005	0.1	0.3	0.005	0.005	.002	0.001

TABLE 14 WATER QUALITY DATA FOR TOTAL METALS (FILTERED)

ROUND 3
MARCH
1978

Sample # ppm	As	Ba	Cd	Cr	Cu	Fe	Pb	Mn	Hg	Se
3105 (E)	<.005	0.2	<.001	<.005		2.3	<.005	0.036		<.01
3106 (G)	<.005	<.1	<.001	<.005		3.12	<.005	0.068		<.01
3107 (13)	<.005	<.1	<.001	<.005		0.3	<.005	0.014		<.01
3108 (10)	<.005	0.2	<.001	0.006		.77	0.008	0.014		<.01
3109 (2)	0.006	<.1	<.001	<.005		18.3	<.005	0.41		<.01
3110 (11)	<.005	<.1	<.001	<.005		1.14	<.005	0.022		<.01
3111 D' (Lake)	<.005	<.1	<.001	<.005		1.6	0.009	0.030		<.01
3112 (A')	<.005	0.8	<.001	0.016		52.	0.005	0.366		<.01
3113 (F)	<.005	0.2	<.001	<.005		0.6	0.008	0.006		<.01
3114 (14)	<.005	<.1	<.001	0.008		<.3	<.005	0.010		<.01
3115 C' (L.F. Pond)	<.005	0.2	<.001	<.005		0.4	0.006	0.28		<.01
3116 (6)	<.005	0.2	<.001	<.005		<.3	<.005	<.005		<.01
3117 (B)	<.005	0.4	<.001	<.005		2.4	0.005	0.10		<.01
Det. Limit	0.005	0.1	0.001	0.005		0.3	0.005	0.005		

TABLE 15 WATER QUALITY DATA FOR TOTAL METALS (FILTERED)

ROUND 4
APRIL
1978

Sample # ppm	As	Ba	Cd	Cr	Cu	Fe	Pb	Mn	Hg	Se
LF Pond C'		<.1	0.008	<.005		<.3	<.005	0.089	<.0002	<.01
Lake D'		<.1	0.005	<.005		2.79	<.005	0.015	<.0002	<.01
A'		0.152	<.001	<.005		46.3	<.005	0.353	<.0002	<.01
B'		<.1	0.001	0.011		2.31	<.005	0.179	<.0002	<.01
E		<.1	<.001	<.005		11.4	<.005	0.059	<.0002	<.01
F		<.1	<.001	<.005		0.783	<.005	0.021	<.0002	<.01
G		<.1	0.002	0.021		2.13	<.005	0.039	<.0002	<.01
2		<.1	0.003	0.017		14.5	<.005	0.273	<.0002	<.01
6		<.1	<.001	<.005		<.3	<.005	<.005	<.0002	<.01
10		<.1	0.0116	<.005		<.3	<.005	0.009	<.0002	<.01
11		<.1	0.002	<.005		<.3	<.005	0.011	<.0002	<.01
13		<.1	0.001	<.005		<.3	<.005	0.005	0.0002	<.01
14		<.1	<.001	<.005		<.3	<.005	0.007	<.0002	<.01
Det. Limit		0.1	0.001	0.005		0.3	0.005	0.005	0.0002	0.01

TABLE 16 WATER QUALITY DATA FOR TOTAL METALS (FILTERED)

ROUND 5
MAY
1978

Sample # ppm	Zn	Ba	Cd	Cr	Cu	Fe	Pb	Mn	Hg	Se
D Lake	<0.5	<0.1	<0.001	<.005	<.1	2.1	<0.005	.091	<.0002	<.002
C LF Pond	<0.5	<0.1	<0.001	<.005	<.1	0.6	<0.005	.017	<.0002	.011
A	<0.5	0.1	<0.001	<.005	<.1	55.3	<0.005	.251	<.0002	.004
B	<0.5	<0.1	<0.001	<.005	<.1	0.8	<0.005	.150	<.0002	.004
E	1.0	<0.1	<0.001	<.005	<.1	13.5	<0.005	.056	.002	.002
F	<0.5	<0.1	<0.001	<.005	0.2	0.4	<0.005	.010	<.0002	<.002
G	2.2	<0.1	0.001	<.005	<.1	1.5	<0.005	.014	<.0002	<.002
2	<0.5	<0.1	<0.001	.018	<.1	25.3	<0.005	.312	<.0002	.035
6	<0.5	<0.1	<0.001	<.005	<.1	<0.3	<0.005	<.005	<.0002	<.002
10	<0.5	<0.1	<0.001	<.005	<.1	<0.3	<0.005	.013	<.0002	<.002
11	<0.5	<0.1	<0.001	<.005	<.1	<0.3	<0.005	.006	<.0002	.009
14	<0.5	<0.1	0.001	.088	<.1	<0.3	<0.005	.006	<.0002	<.002
Det. Limit	0.5	0.1	0.001	.005	0.1	0.3	0.005	.005	.0002	.002

TABLE 17 WATER QUALITY DATA FOR TOTAL METALS (FILTERED)

ROUND 6
JUNE
1978

Sample # ppm	As	Ba	Cd	Cr	Zn	Fe	Pb	Mn	Hg	Se
A	<0.005	0.1	<.001	<0.005	<0.5	24.6	.007	.185	0.0002	<.001
B	<0.005	<0.1	<.001	0.007	<0.5	0.52	<.005	.053	<0.0002	<.001
C	<0.005	<0.1	<.001	0.016	<0.5	0.04	<.005	.016	<0.0002	<.001
D	<0.005	<0.1	.001	0.011	<0.5	1.42	.005	.044	<0.0002	<.001
E	<0.005	<0.1	<.001	<0.005	<0.5	11.5	<.005	.061	<0.0002	<.001
F	<0.005	<0.1	.001	<0.005	<0.5	0.19	<.005	.021	0.0002	<.001
G	<0.005	<0.1	.001	<0.005	3.0	0.12	<.005	.006	0.0004	<.001
2	0.012	<0.1	<.001	<0.005	<0.5	26.8	<.005	.300	<0.0002	<.001
6	<0.005	<0.1	<.001	<0.005	<0.5	0.05	<.005	<.005	<0.0002	<.001
10	<0.005	<0.1	.004	<0.005	<0.5	0.13	.005	.025	0.0002	<.001
11	<0.005	<0.1	.001	0.008	<0.5	0.10	<.005	.014	<0.0002	<.001
13	<0.005	<0.1	.006	0.005	<0.5	0.15	.012	.011	<0.0002	<.001
14	<0.005	<0.1	.001	<0.005	<0.5	0.13	<.005	.005	<0.0002	<.001
Det. Limit	0.005	0.1	.001	0.005	0.5	0.03	.005	<.005	0.0002	.001

TABLE 18 WATER QUALITY DATA FOR TOTAL METALS (FILTERED)

ROUND 7
JULY
1978

Sample # ppm	As	Ba	Cd	Cr	Cu	Fe	Pb	Mn	Hg	Se
A		<0.1	<.001	<0.005		55.0	.008	.35	<0.0002	<.001
B		0.1	<.001	<0.005		0.82	<.005	.15	<0.0002	<.001
C		<0.1	<.001	<0.005		0.09	.005	.02	0.0003	<.001
D		0.1	<.001	<0.005		0.79	.020	.06	<0.0002	<.001
E		0.1	<.001	<0.005		11.0	.007	.05	<0.0002	<.001
F		0.2	<.001	<0.005		1.01	.006	.02	0.0003	<.001
G		<0.1	<.001	0.008		1.87	.005	.02	<0.0002	<.001
2		<0.1	<.001	0.012		22.2	.005	.32	<0.0002	.011
6		<0.1	<.001	<0.005		0.04	.008	.01	<0.0002	<.001
11		0.2	<.001	<0.005		0.07	.006	.01	<0.0002	<.001
13		0.1	<.001	<0.005		0.12	.006	.02	<0.0002	<.001
14		0.1	<.001	<0.005		0.13	<.005	.01	0.0002	<.001
Det. Limit		0.1	.001	0.005		0.03	.005	.005	0.0002	.001

TABLE 19 WATER QUALITY DATA FOR TOTAL METALS (FILTERED)

ROUND 8
AUGUST
1978

Sample # ppm	Zn	Ba	Cd	Cr	Cu	Fe	Pb	Mn	Hg	Se
A	<.5	<.1	<.001	.014	<0.1	1.08	<.005	.017	<.0002	<.001
B	<.5	<.1	<.001	.011	<0.1	1.31	<.005	.174	.0002	<.001
C	<.5	<.1	<.001	.018	<0.1	0.39	.005	.170	<.0002	<.001
D	<.5	<.1	<.001	.010	<0.1	1.11	.006	.079	<.0002	<.001
E	<.5	<.1	.001	.013	<0.1	0.84	.006	.054	.0003	<.001
F	<.5	<.1	<.001	.011	0.2	2.30	.013	.009	.0005	<.001
G	2.4	<.1	<.001	.005	<0.1	0.83	<.005	.020	.0004	<.001
2	<.5	<.1	<.001	.016	0.1	23.3	.011	.346	<.0002	<.001
6	<.5	<.1	<.001	.007	<0.1	0.35	<.005	.009	.0002	<.001
11	1.6	<.1	.001	.005	<0.1	0.15	<.005	.017	.0002	<.001
13	<.5	<.1	<.001	.008	<0.1	0.19	<.005	.012	.0003	<.001
14	.5	<.1	<.001	.008	<0.1	0.11	<.005	.011	<.0002	<.001
Det.Limit	.5	0.1	.001	.005	0.1	0.03	.005	.005	.0002	.001

TABLE 20 WATER QUALITY DATA FOR TOTAL METALS (FILTERED)

ROUND 9
SEPTEMBER
1978

Sample # ppm	As	Ba	Cd	Cr	Cu	Fe	Pb	Mn	Hg	Se
2	.009	<0.1	<.001	.008		15.0	.008	.405	.0002	.002
[illegible] E	<.005	<0.1	<.001	.005		5.99	.008	.051	.0003	<.001
6	<.005	<0.1	<.001	<.005		.09	.011	<.005	.0005	<.001
11	<.005	<0.1	.001	.009		< .03	.011	<.005	.0002	<.001
13	<.005	<0.1	.001	.011		.08	.028	.008	.0003	<.001
14	<.005	<0.1	<.001	.017		.23	.005	.011	.0004	<.001
A	<.005	0.2	<.001	<.005		37.0	.011	.351	<.0002	<.001
B	<.005	<0.1	<.001	.006		.92	<.005	.182	.0005	<.001
C	<.005	<0.1	<.001	.014		.15	.007	.008	<.0002	<.001
D	<.005	<0.1	.001	.010		.28	.049	.103	.0003	<.001
G	<.005	<0.1	<.001	<.005		.24	.009	.008	.0006	<.001
F	<.005	<0.1	<.001	<.005		1.32	<.005	.018	.0004	<.001
Det. Limit	.005	0.1	.001	.005		.03	.005	.005	.0002	.001

TABLE 21 WATER QUALITY DATA FOR TOTAL METALS (FILTERED)

ROUND 10
OCTOBER.
1978

Sample # ppm	Zn	Ba	Cd	Cr	Cu	Fe	Pb	Mn	Hg	Se
A	<0.5	0.1	<.001	.006	<0.1	23.7	<.005	.097	<.0002	<.001
B	<0.5	<0.1	<.001	<.005	<0.1	.73	<.005	.574	<.0002	<.001
C	<0.5	<0.1	.001	<.005	<0.1	.16	<.005	<.005	<.0002	<.001
D	<0.5	<0.1	<.001	.006	<0.1	.51	.010	.042	<.0002	<.001
E	<0.5	<0.1	.001	.007	<0.1	25.3	.009	.107	<.0002	<.001
F	<0.5	<0.1	.001	<.005	<0.1	1.18	.017	.013	.0002	<.001
G	3.6	<0.1	.001	.006	<0.1	1.07	<.005	.026	<.0002	<.001
2	<0.5	<0.1	.003	<.005	<0.1	10.9	<.005	.301	<.0002	.001
6	<0.5	<0.1	.002	<.005	<0.1	.06	.007	<.005	<.0002	<.001
11	<0.5	<0.1	.001	<.005	<0.1	.10	.006	.008	<.0002	<.001
14	<0.5	<0.1	.002	<.005	<0.1	.08	.011	.008	<.0002	<.001
Det. Limit	0.5	0.1	.001	.005	0.1	.03	.005	.005	.0002	.001

TABLE 22 WATER QUALITY DATA FOR TOTAL METALS (FILTERED)

ROUND 11
NOVEMBER
1978

Sample # ppm	As	Ba	Cd	Cr	Cu	Fe	Pb	Mn	Hg	Se
Round 13 X		<0.1	.002	.049		.23	.006	<.005	.0002	<.001
A		0.2	<.001	.005		97.2	<.005	.533	<.0002	<.001
B		0.1	<.001	<.005		6.19	<.005	.352	<.0002	.001
C		<0.1	<.001	.009		.14	<.005	<.005	.0003	<.001
D		<0.1	<.001	.012		.52	.011	.026	.0002	<.001
E		<0.1	<.001	<.005		20.1	.016	.109	.0002	<.001
F		<0.1	<.001	<.005		1.93	.009	.012	<.0002	<.001
G		<0.1	<.001	<.005		1.73	.005	.043	.0002	<.001
2		<0.1	<.001	.013		16.3	<.005	.384	<.0002	<.001
6		<0.1	<.001	<.005		.26	.025	<.005	<.0002	<.001
10		<0.1	<.001	<.005		2.21	.011	.038	.0002	<.001
11		<0.1	<.001	<.005		.11	.016	<.005	<.0002	<.001
13		<0.1	<.001	.005		.54	.007	<.005	<.0002	<.001
14		<0.1	<.001	.009		.06	.018	.006	<.0002	<.001
Det. Limit		0.1	.001	.005		.03	.005	.005	.0002	.001

TABLE 23 WATER QUALITY DATA FOR TOTAL METALS (FILTERED)

ROUND 12
DECEMBER
1978

Sample # ppm	As	Ba	Cd	Cr	Cu	Fe	Pb	Mn	Hg	Se	Zn
A	<.001	0.2	.002	.005	<0.1	107.	<.005	.586	.0003	<.001	.041
B	<.001	<0.1	.002	<.005	<0.1	2.00	<.005	.175	*	<.001	.047
C	<.001	<0.1	.001	<.005	<0.1	0.23	<.005	.012	.0003	<.001	.024
D	<.001	<0.1	<.001	<.005	<0.1	0.51	<.005	.020	.0002	<.001	.035
E	<.001	<0.1	.002	.005	<0.1	19.0	<.005	.107	.0004	<.001	.098
F	<.001	<0.1	<.001	<.005	<0.1	2.57	<.005	.025	.0005	<.001	.070
2	.003	<0.1	.003	<.005	<0.1	12.0	<.005	.470	.0003	.001	.030
6	<.001	<0.1	.002	<.005	<0.1	0.13	<.005	<.005	.0003	<.001	.026
11	<.001	<0.1	.002	<.005	<0.1	0.13	<.005	.008	.0002	<.001	.042
13	<.001	<0.1	<.001	<.005	<0.1	0.54	<.005	<.005	.0002	<.001	.019
14	<.001	<0.1	.002	.312	<0.1	0.57	<.005	.008	.0002	<.001	.158
Det. Limit	.001	0.1	.001	.005	0.1	0.03	.005	.005	.0002	.001	.005
*Insufficient sample											

TABLE 24 WATER QUALITY DATA FOR TOTAL METALS (FILTERED)

REFERENCES CITED

Butler, Robert J., 1972, Age of Paleozoic Regional Metamorphism in the Carolinas, Georgia, and Tennessee South Appalachians: American Journal of Science. V. 272, p. 72-80.

Colquhoun, D.J., 1962, On Surficial Sediments in Central South Carolina - A Progress Report, S.C. State Development Board, Division of Geology, Geologic Notes, v. 6, p. 62.

Colquhoun, D.J., and Johnson, H.S., Jr., 1968, Tertiary Sealevel Fluctuation in South Carolina: Paleogeography, Paleoclimatology, Palaeocology, v. 5, p. 105-106.

Colquhoun, D.J., 1965, Terrace Sediment Complexes in Central South Carolina, University of South Carolina, Atlantic Coastal Plain Geological Association Field Conference, p. 62.

Hem, John D., 1970, Study and Interpretation of the Chemical Characteristics of Natural Water, U.S. Geological Survey Water-Supply Paper, 1473, SW-12d pp. 126, 171.

Illinois State Geological Survey, 1971, Hydrology of Solid Waste Disposal Sites in Northeastern Illinois, p. 61.

Michel, J.M., Ground Water Pollution and Geochemical Variations in Leachage from Solid waste Disposal, University of South Carolina, p. 1-67.

Overstreet, William C., 1970, The Piedmont in South Carolina in Fisher, et. al., eds Studies in Appalachian Geology: Central and Southern New York, Interscience Publishers, p. 369-382.

Siple, G.E., 1967, Geology and Ground Water of the Savannah River Plant and Vicinity, South Carolina p. 24.

U.S. Environmental Protection Agency (Contract No. 68-01-2993), 1975, Evaluation of the Effect of the Lexington County South Carolina Landfill on Ground and Surface Water Resources, p. 1-53.

U.S. Environmental Protection Agency, December 24, 1975, National Interim Primary Drinking Water Standards: Federal Register, v. 4, no. 248.

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16. Abstract (Limit: 200 words)

This report describes efforts made to monitor the leachate impact on the groundwater at the Lexington County, South Carolina Landfill. The geology and hydrogeology of the region, as well as the landfill in particular, are discussed in detail to help determine the movement of groundwater near the landfill. The purpose of the report was to isolate the groundwater effects of a nearby abandoned site, Cayce Dump. Fourteen stratigraphic test holes, six monitoring wells, and three existing wells were used for groundwater monitoring. Four surfacewater monitoring sites were also set up. The full impact of the leachate on the groundwater proved to be beyond the scope of this report. However, several steps were recommended to minimize potential contamination until a further study could be performed. The report was submitted in fulfillment of contract number 68-01-3959 by the South Carolina Department of Health and Environmental Control on May 2, 1980.

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