

Earthgreen Products Inc.



Environmental Research Summaries

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What is Humate?

Humate is the highly compressed and biodegraded remains of ancient plants and animals. Composted, fermented and changed far below the earth's surface, the buried plants and animals were distilled down to complex organic molecules and minerals. When this material is mined and applied to soils, it augments the capacity of soils to promote plant growth and productivity. Being completely natural, humates have good compatibility with plants and soils without adverse environmental effects.

The ability to do so many diverse things is explained by the molecular structure of humate. Humates and humic acids are very "surface active" complexes that hold elements (and fertilizer nutrients) strongly. They are excellent chelating agents which provide "timed release" availability of the materials with which they are applied.

In soil, they enhance the capacity to hold and exchange mineral nutrients with plant roots. They also promote greater absorption and utilization of nutrients applied to foliage. As they are organic and high in carbon, humates and humic acids buffer and safen chemicals with which they are applied, preventing phytotoxicity and "burn".

Unique Characteristics of Menefee Humate®:

Humates from different sources have different chemical and physical properties depending on where they come from. Plants respond differently to humic fertilizers according to their method of preparation. Therefore, consistency of source and the quality and consistency of the method of extraction and preparation are especially important in soil fertility potential and the choice of a humic acid source.

All humates are not alike. Some are more active and higher in quality than others. Humates mined from New Mexico's Menefee Formation are known to be among the world's highest quality natural humate deposits.

Geologically, Menefee Humate® began in the late Mesozoic Era in a period known as the Cretaceous. At that time the land that is now mined for Menefee Humate® was a tropical swampland on the margin of a receding sea. It was inhabited by dinosaurs and other prehistoric reptiles and mammals known to us solely through the study of their fossilized remains.

This environment was very rich and biologically productive. Giant tree ferns and lush marsh vegetation grew to heights and densities that we can only imagine today. These diverse plants were charged with the chemistry of life, possessing a natural richness of proteins, macro and micronutrients, organic carbon compounds and surging hormonal and enzymatic systems necessary for survival and growth in the dynamic tropical world of 70-100 million years ago.

Floods and natural disasters toppled, roiled and covered parts of these forest with sediments. In addition, cataclysms unlike any in modern times instantly buried many square miles of forests under millions of tons of fresh water sands and clays. Over the next 50 million years, this plant material was composted, biodegraded, compressed and concentrated to a fraction of its original bulk far below the surface of the earth.

The metamorphosed, sub-bituminous, coal-like humic substance was then heaved, broken and uplifted by the same processes that formed the great mountain ranges to the north. Volcanic activity and the tectonic movements that accompany it further disrupted the remains of the ancient tropical swampland, especially in northwestern New Mexico. The deposits were gradually pushed upward, bringing them closer to the surface. At this time, elephants, giant sloths, camels and prehistoric horses roamed the land surface above it.

During the next several million years, weathering, floods erosion and further uplifts exposed the ancient tropical vegetation which had become compressed shale and coal. Geologist called it the Menefee Formation. Where thick tenses of carbonaceous material in the formation were exposed, mining began.

The mined material, being sub-bituminous rather than lignitic or leonarditic, was rich in organic matter. However, the geologic and atmospheric processes which had increased the humic acid content to over 70% in some locations had decreased caloric content so that Menefee Humate® could not be used as soft coal. Subsequent analyses and studies confirmed the material was of fresh water origin and very low in sodium and clays. It was superior to leonardite in several ways including providing superior plastic viscosity in drilling fluids and greater bolstering of the physical and chemical properties of soils.

Mining and Processing Techniques:

In order to preserve the high quality of Menefee Humate® the natural material is mined in a standard strip mining technique. The natural reserves are located either on the surface or very near the surface. Therefore there is very little disturbance to the area where these natural reserves are located. Also this prevents the inclusion of a large amount of "overburden" material that can potentially contaminate the final product. The granular Menefee Humate® is processed only to achieve particular sizing requirements by customers. This is accomplished by use of multi-deck "shaker screening" equipment that is customarily used in sand and gravel operations. In this way the oversized overburden material is removed and the finished product is pure humate material from the natural formation. Packaging is done via standard conveyor and weight systems and the finished granular product is either packaged in 50 lb. (22.68 Kg) bags or one ton super sacks.

The water-soluble powder products are produced from the natural Menefee Humate® granular material. It is first solubilized in a liquid solution. This patented process releases these natural materials and makes them much more available to soil and plant systems. Then this solution is processed through an industrial spray drying system to convert the wet solution to a dry soluble powder in a uniform size. These products are then packaged for shipment. The standard packaging includes containers that contain either 10 lb. (4.54 Kg), 25 lb. (11.35 Kg), or 300 lb. (136 Kg) drums.

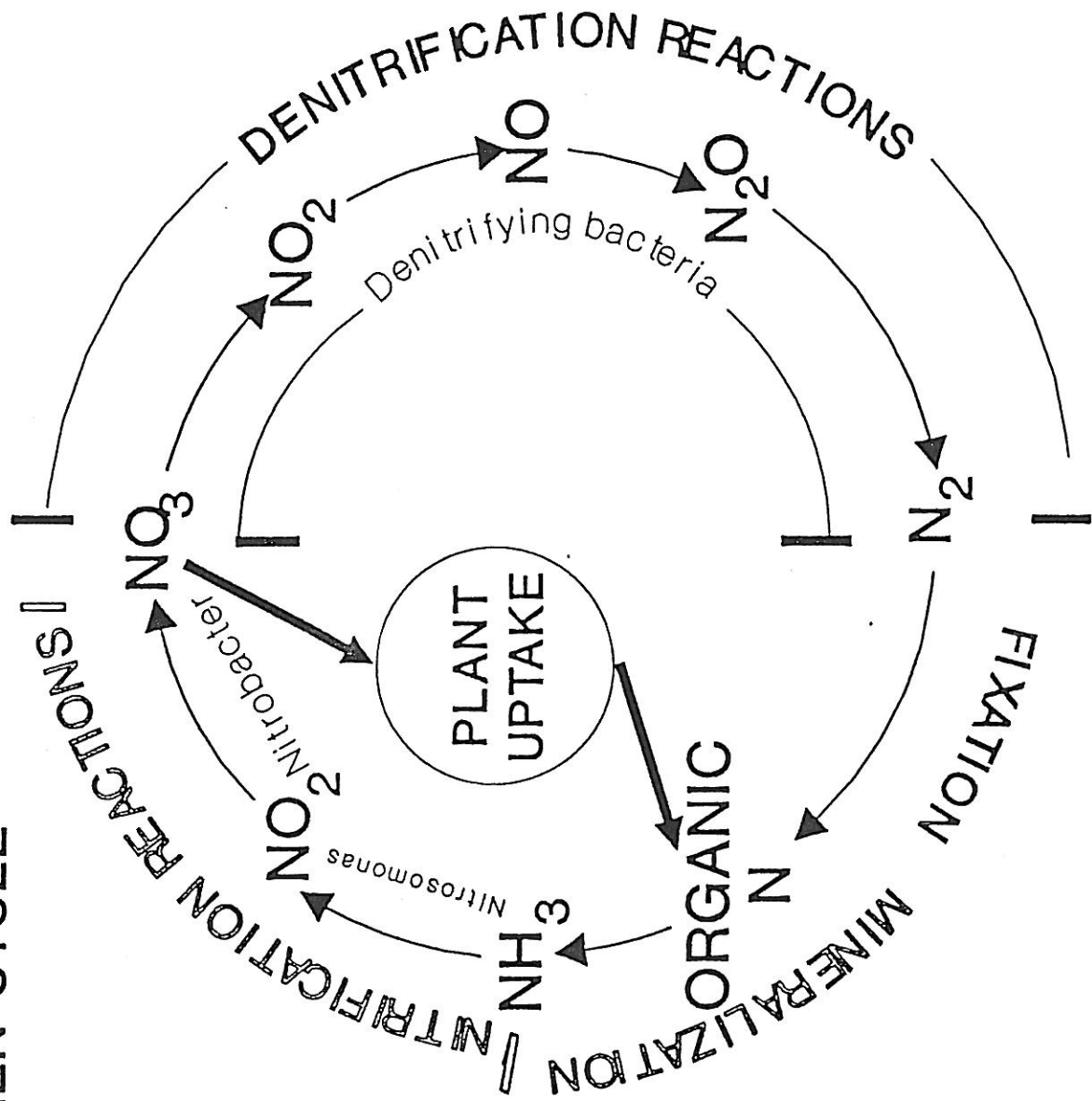
Due to the extremely high quality of the natural humate from the Menefee Formation there is no need to add any additional materials or processes to produce a premium humate product. Menefee Mining Corporation is the only company in the United States that is currently producing from these formations due to its unique contracts and agreements with the Federal Government of the United States, who owns these reserves in the State of New Mexico.

THE EFFECT OF
MENELEE HUMATETM IN
DENITRIFICATION PROCESS
DEVELOPMENT

THE ATTACHED MATERIAL WAS COMPILED FROM A
JOINT STUDY INVOLVING EARTHGREEN'S
MENELEE HUMATE,TM SUMITOMO CORPORATION'S
ISOLITE MATERIAL & TECHNOLOGY DEVELOPED BY
PINTAIL SYSTEMS, INC.

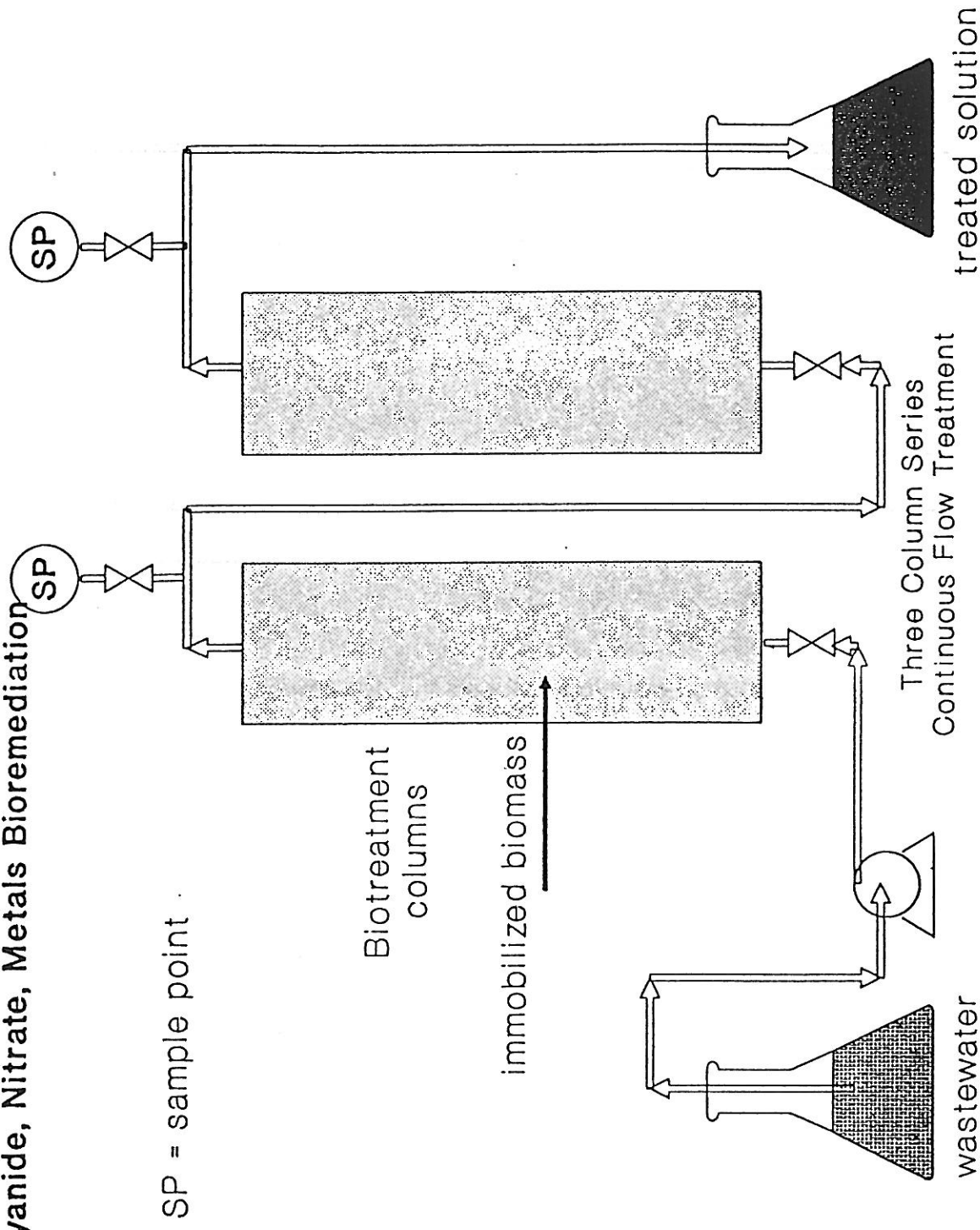
JUNE 1992

NITROGEN CYCLE

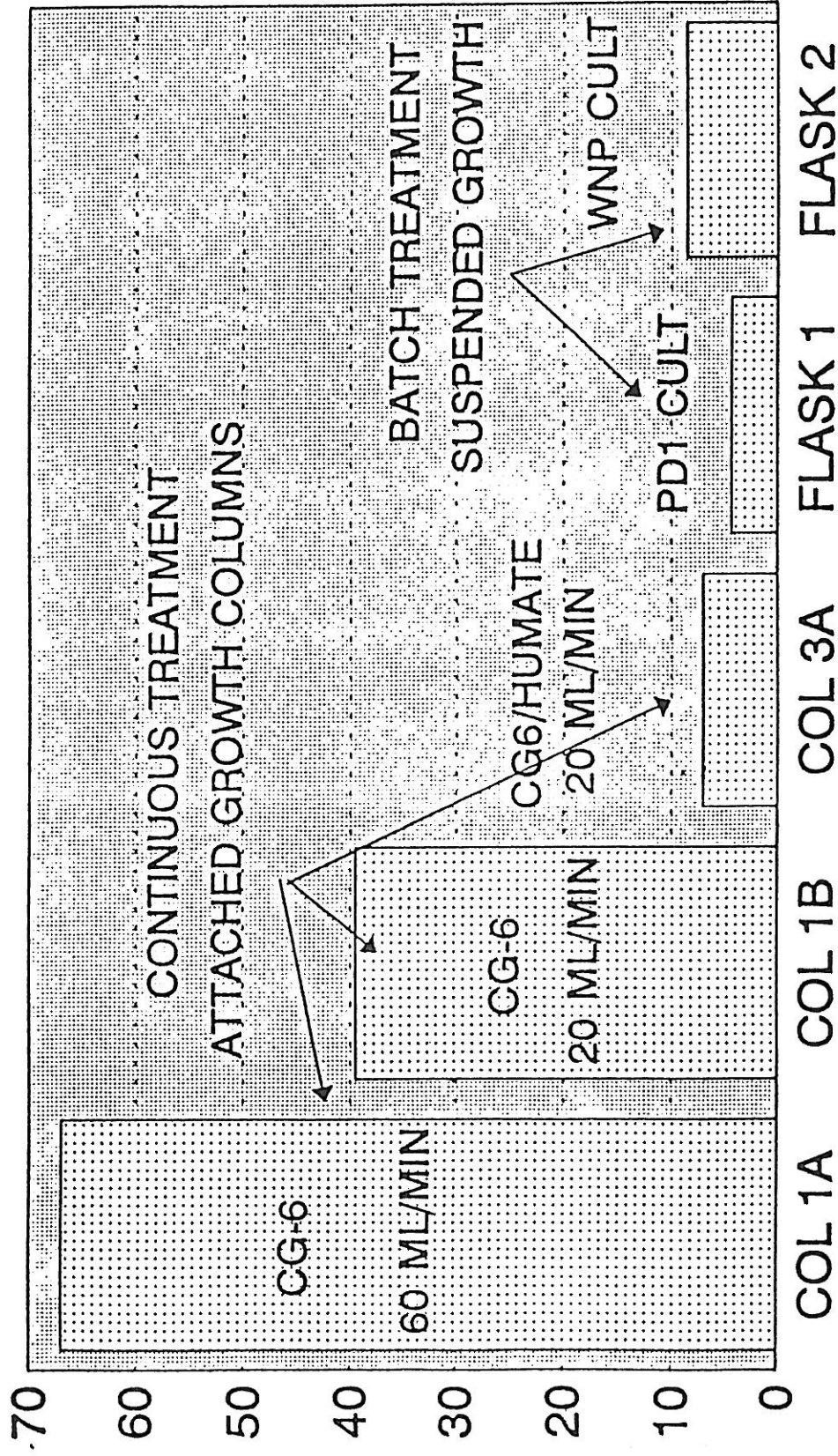


Wastewater Biotreatment

Cyanide, Nitrate, Metals Bioremediation



DENITRIFICATION TESTS TREATMENT COMPARISON @ 75 MINUTES CG-6 ISOLITE, MIXED BED, VARIED PUMPRATE



WASTEWATER USED IN THESE TESTS IS A MINE PROCESS SOLUTION CONTAINING 102 MG/L NO3 BEFORE TREATMENT. WASTEWATER CONTAINS METALS (Cu, Hg, As, U, Au, ETC.)

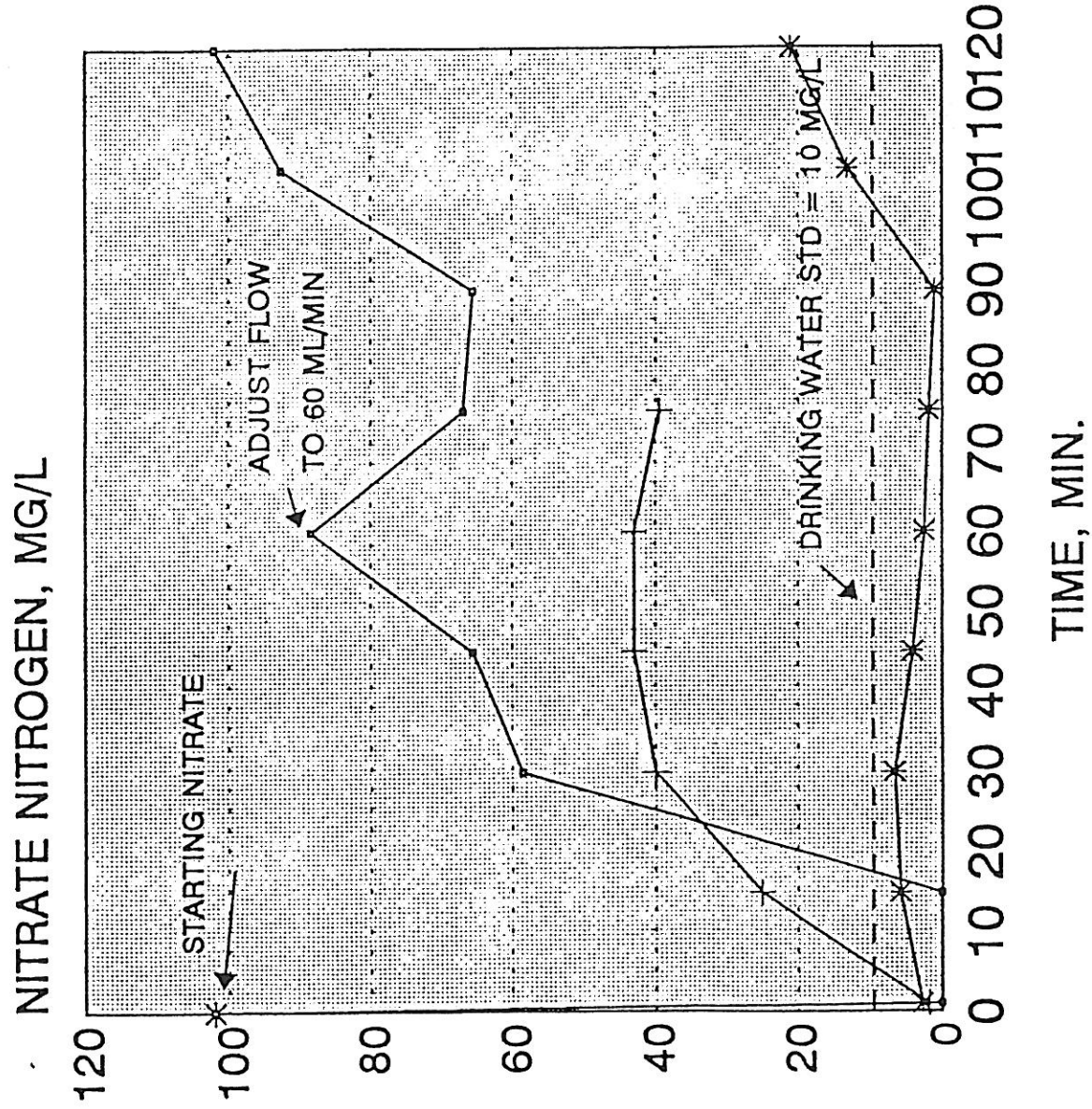
TEST RESULT INTERPRETATION

DENITRIFICATION COLUMN TESTS

- ISOLITE/BACTERIA DENITRIFICATION CAPACITY
CG-6 BETTER THAN CG-2
GREATER BACTERIA GROWTH IN CG-6
- ISOLITE/HUMATE/BACTERIA DENITRIFICATION CAPACITY
MIXED ISOLITE/HUMATE BETTER THAN ISOLITE ALONE
- APPLICATION RATE
RATES NEED TO BE OPTIMIZED
SLOWER PUMP RATES MORE EFFICIENT DENITRIFICATION

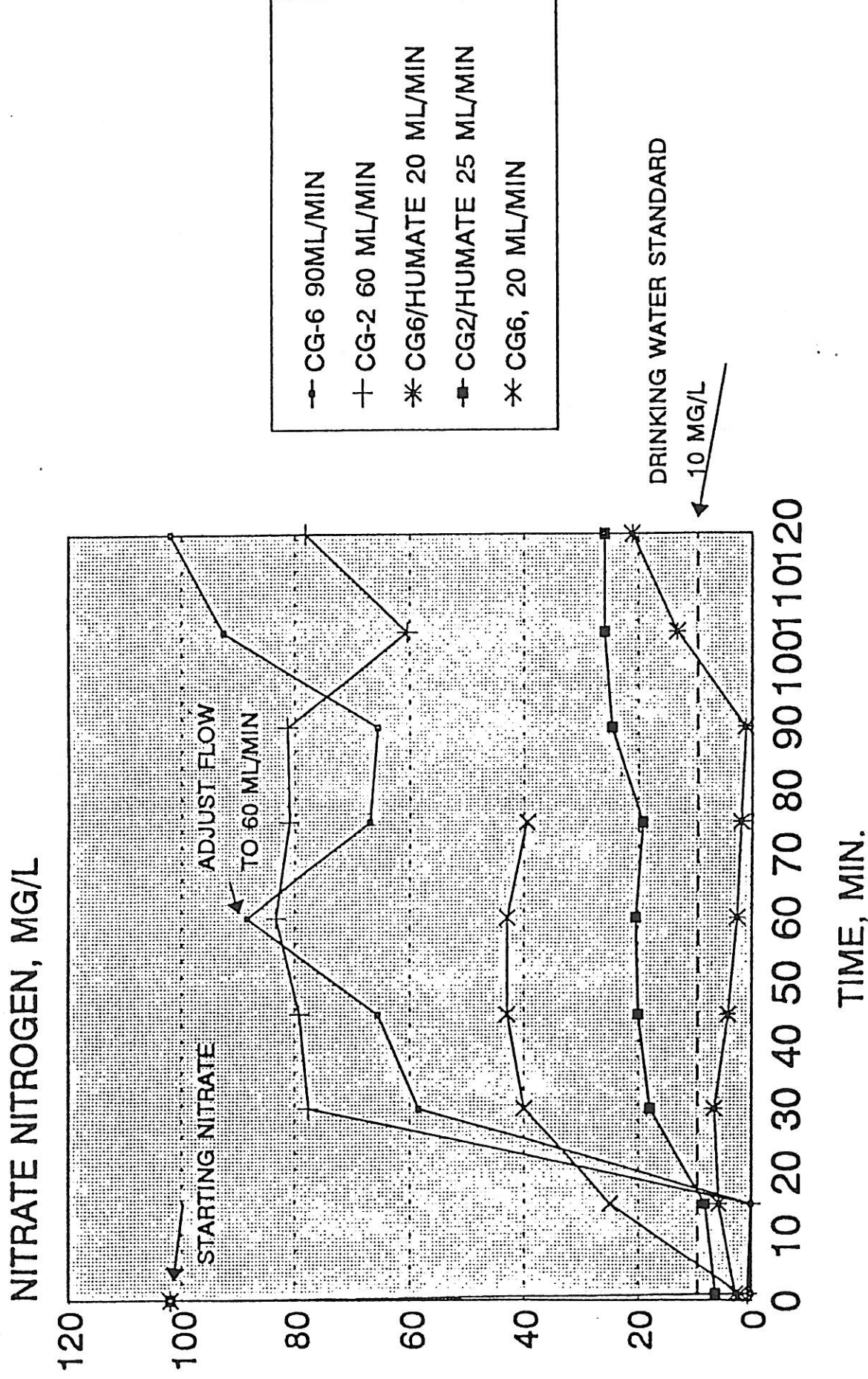
DENITRIFICATION PROCESS DEVELOPMENT

ISOLITE/HUMATE ANAEROBIC CELLS



DENITRIFICATION PROCESS DEVELOPMENT

ISOLITE/HUMATE ANAEROBIC CELLS



THE EFFECT OF
MENEFEH HUMATETM IN
DENITRIFICATION PROCESS
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THE ATTACHED MATERIAL WAS COMPILED FROM A
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MENEFEH HUMATE,TM SUMITOMO CORPORATION'S
ISOLITE MATERIAL & TECHNOLOGY DEVELOPED BY
PINTAIL SYSTEMS, INC.

MAY 1994

Charts and Graphs

<u>Page</u>	<u>Test ID #</u>	<u>Description</u>
3	DENITE 15.DO2	Sample: 10 PPM STD Standard Solution, Dilution of 1
4	DENITE 15.D36	Control: Non Treated Filter Media Dilution of 10
5	DENITE 15.D12 COL "L"	Treated Filter Media 5% Menefee Humate™, 95% Isolite CG6 Dilution of 10
6	DENITE 15.D14 COL "C"	Treated Filter Media 10% Menefee Humate™, 90% Isolite CG6 Dilution of 10
7	DENITE 15.D16 COL "R"	Treated Filter Media 20% Menefee Humate™, 80% Isolite CG6 Dilution of 10

* All tests were done at a Flow Rate of 2 Gallons per Minute (2GPM)

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|Sample Name: 10 PPM STD                     Collected  : 05/19/1994 17:26:16 |
|Inject #    : 2                             Vial #      :          |
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|Column Type:                               Operator     : MARE       |
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Calibration Volume Dilution Points Rate Start Stop Area Reject
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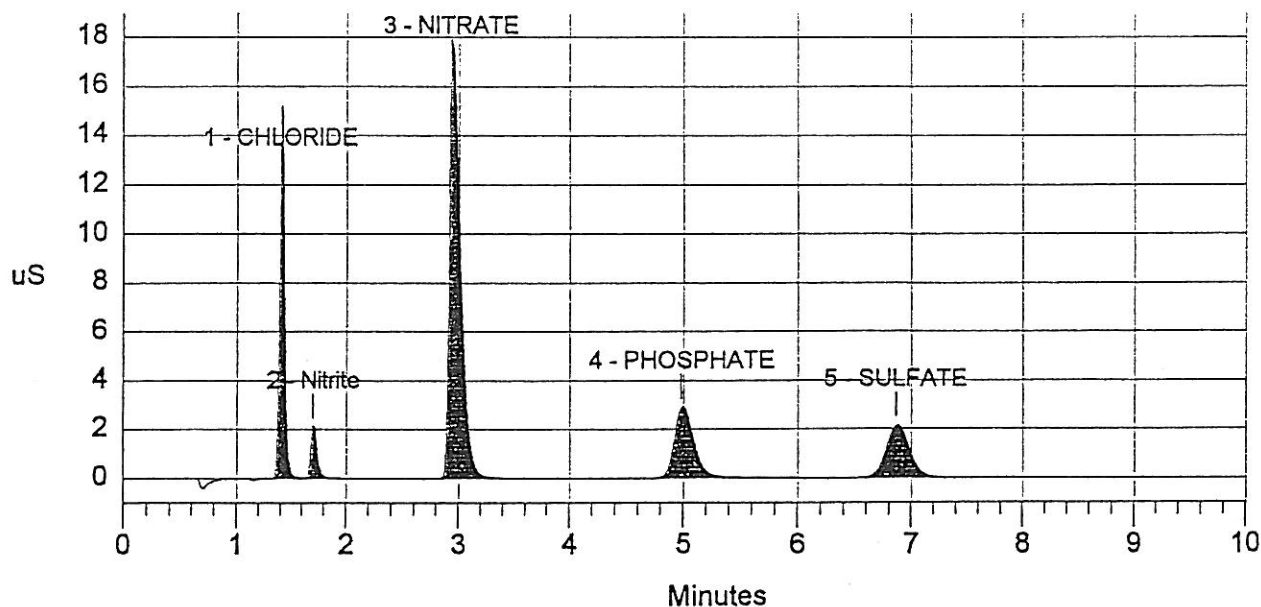
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***** Component Report: All Components *****

Pk. Num	Ret Time	Component Name	Concentration PPM	Height	Area	Bl. Code	%Delta
1	1.40	CHLORIDE	9.726	119801	458045	2	-3.45
2	1.70	Nitrite	0.694	20527	79732	2	0.00
3	2.93	NITRATE	10.048	165388	1168298	1	7.32
4	4.98	PHOSPHATE	10.244	28492	323355	1	3.82
5	6.87	SULFATE	10.483	21195	299649	1	1.73
Totals			41.195	355403	2329079		

#	Group Name	Amount	Area	Area%
1	TOTAL NITROGEN	10.0481	1168298	50.16%

File: DENITE15.D02 Sample: 10 PPM STD



The Effect of Menefee Humate™ In Denitrification Process Development,
May 1994

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|Data File   : C:\PEAKNET\DATA\DENITE15.D36   Report Date: 05/20/1994 00:48:38 |
|Sample Name:                               Collected : 05/20/1994 00:36:22 |
|Inject #    : 36                           Vial #      :                |
|Method File: c:\peaknet\method\antest.met    Calibrated  : 05/19/1994 18:29:44 |
|System Name: PINTAIL SYSTEMS INC.           Detector   : ED40:COND          |
|Column Type:                               Operator    : MARE              |
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Calibration Volume Dilution Points Rate Start Stop Area Reject
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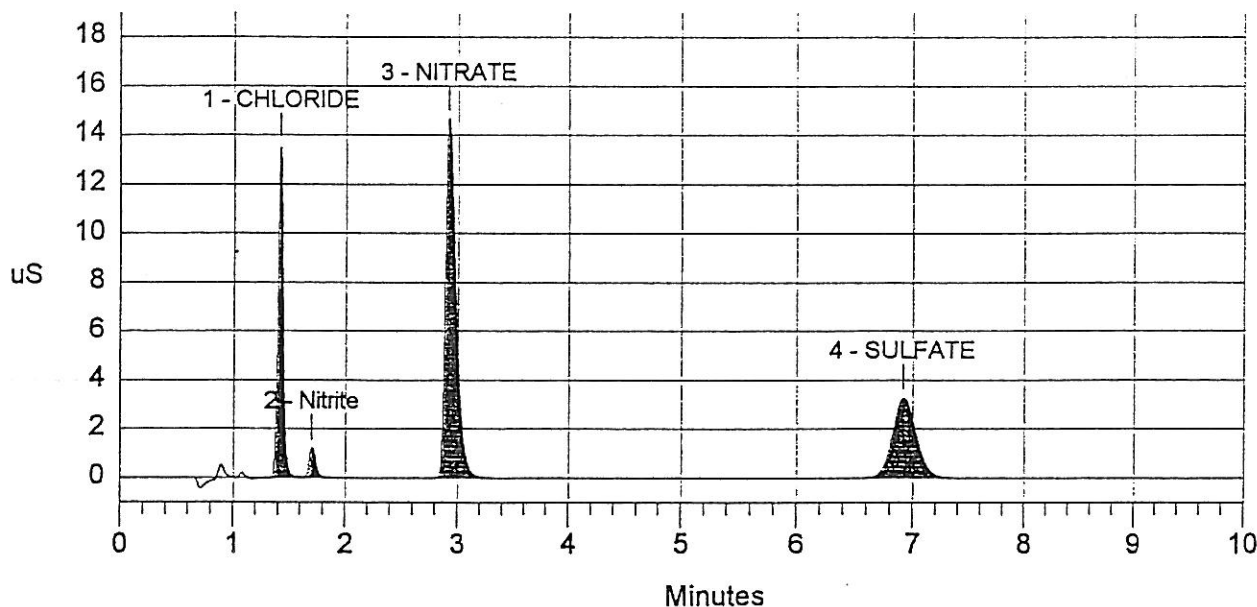
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***** Component Report: All Components *****

Pk. Num	Ret Time	Component Name	Concentration PPM	Height	Area	Bl. Code	%Delta
1	1.42	CHLORIDE	81.186	134888	401733	1	-3.41
2	1.70	Nitrite	2.534	11720	44023	1	-0.97
3	2.92	NITRATE	77.257	146243	918940	1	6.06
0	0.00	PHOSPHATE	0.000	0	0	0	0.00
4	6.92	SULFATE	139.857	32577	454284	1	2.72
Totals			300.834	325428	1818981		

#	Group Name	Amount	Area	Area%
1	TOTAL NITROGEN	77.2571	918940	50.52%

File: DENITE15.D36 Sample:



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|Data File   : C:\PEAKNET\DATA\DENITE15.D12   Report Date: 05/19/1994 19:45:37 |
|Sample Name: COL "L" DENO3 17E94             Collected  : 05/19/1994 19:33:20 |
|Inject #    : 12                             Vial #       :                |
|Method File: c:\peaknet\method\antest.met     Calibrated   : 05/19/1994 18:29:44 |
|System Name: PINTAIL SYSTEMS INC.            Detector    : ED40:COND          |
|Column Type:                                Operator     : MARE              |
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Calibration Volume Dilution Points Rate Start Stop Area Reject
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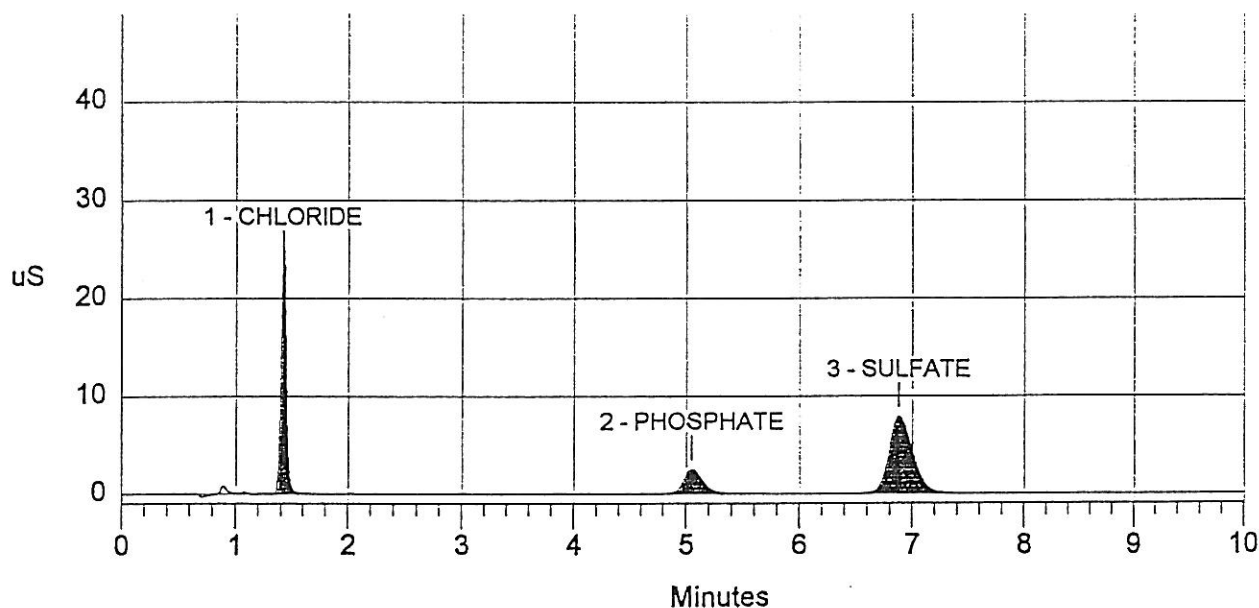
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***** Component Report: All Components *****

Pk. Num	Ret Time	Component Name	Concentration PPM	Height	Area	Bl. Code	%Delta
1	1.42	CHLORIDE	136.131	234520	732191	1	-3.41
0	0.00	Nitrite	0.000	0	0	0	0.00
0	0.00	NITRATE	0.000	0	0	0	0.00
2	5.05	PHOSPHATE	84.086	24441	272215	1	5.94
3	6.88	SULFATE	313.987	78093	1089948	1	2.23
Totals			534.204	337054	2094354		

#	Group Name	Amount	Area	Area%
1	TOTAL NITROGEN	0.0000	0	0.00%

File: DENITE15.D12 Sample: COL "L" DENO3 17E94



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|Data File   : C:\PEAKNET\DATA\DENITE15.D14   Report Date: 05/19/1994 20:10:52 |
|Sample Name: COL "C" DENO3 17E94             Collected  : 05/19/1994 19:58:33 |
|Inject #    : 14                             Vial #       :                |
|Method File: c:\peaknet\method\antest.met     Calibrated   : 05/19/1994 18:29:44 |
|System Name: PINTAIL SYSTEMS INC.             Detector    : ED40:COND          |
|Column Type:                                Operator     : MARE              |
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Calibration Volume Dilution Points Rate Start Stop Area Reject
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External          1          10 3000 5.00 Hz 0.00 10.00      1000
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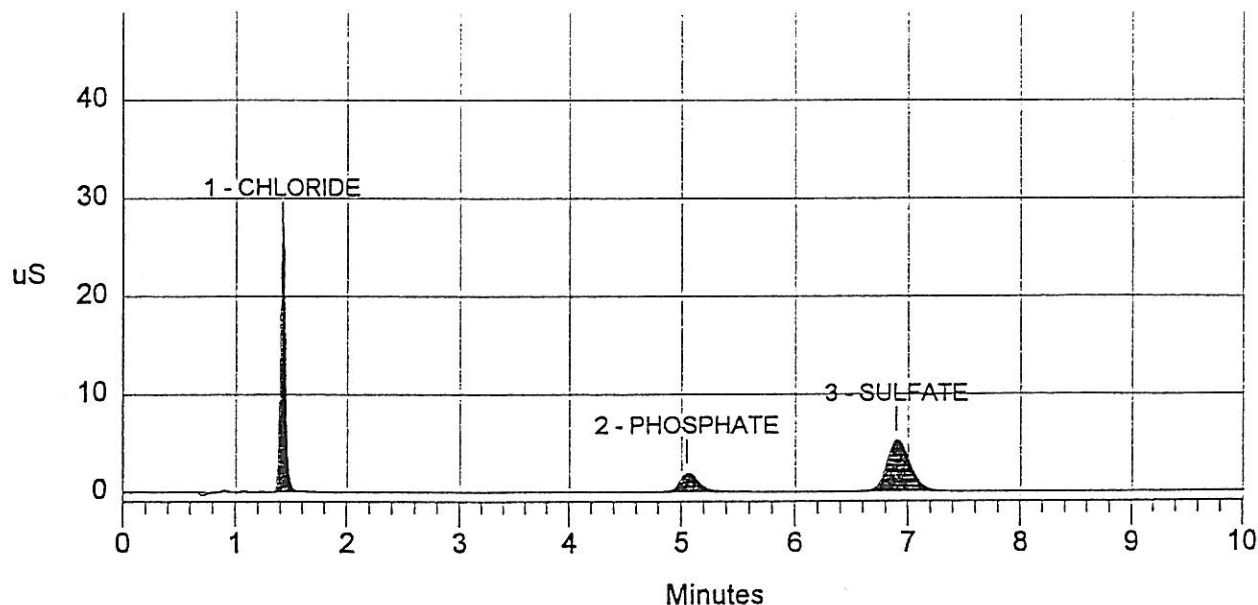
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***** Component Report: All Components *****

Pk. Num	Ret Time	Component Name	Concentration PPM	Height	Area	Bl. Code	%Delta
1	1.42	CHLORIDE	146.201	261883	792757	1	-3.41
0	0.00	Nitrite	0.000	0	0	0	0.00
0	0.00	NITRATE	0.000	0	0	0	0.00
2	5.05	PHOSPHATE	70.363	18645	208088	1	5.94
3	6.90	SULFATE	213.366	51785	722631	1	2.48
Totals			429.930	332312	1723475		

#	Group Name	Amount	Area	Area%
1	TOTAL NITROGEN	0.0000	0	0.00%

File: DENITE15.D14 Sample: COL "C" DENO3 17E94



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|Data File   : C:\PEAKNET\DATA\DENITE15.D16   Report Date: 05/19/1994 20:36:02 |
|Sample Name: COL "R" DENO3 17E94             Collected  : 05/19/1994 20:23:46 |
|Inject #    : 16                             Vial #       :                |
|Method File: c:\peaknet\method\antest.met     Calibrated   : 05/19/1994 18:29:44 |
|System Name: PINTAIL SYSTEMS INC.             Detector    : ED40:COND          |
|Column Type:                                Operator     : MARE              |
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Calibration Volume Dilution Points Rate Start Stop Area Reject
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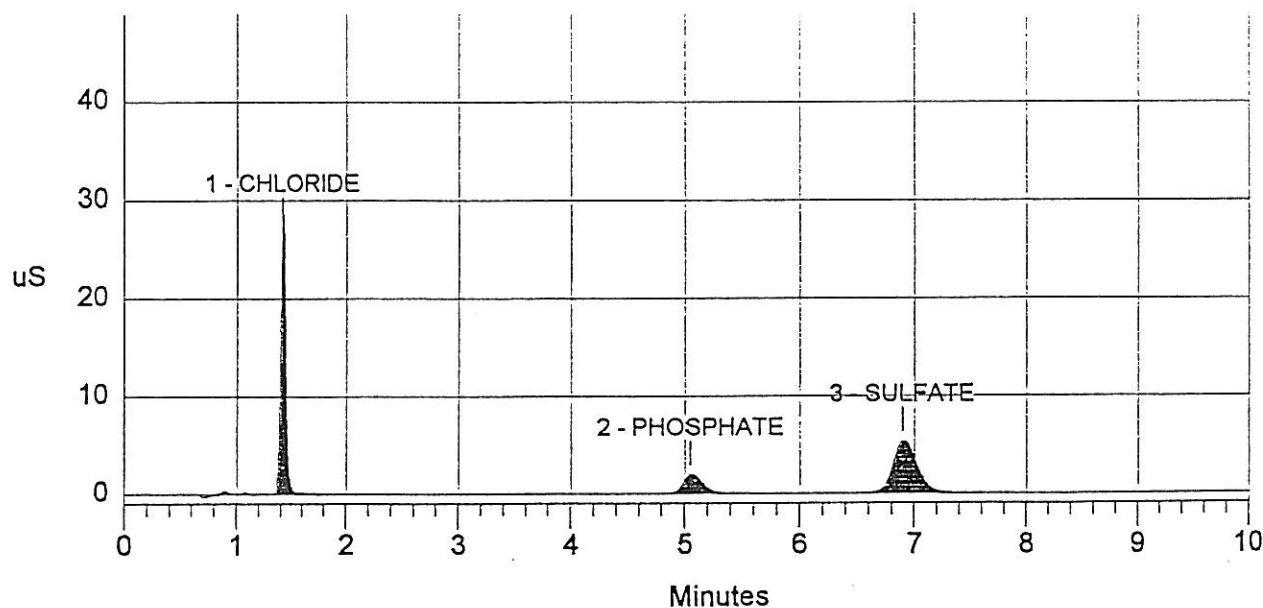
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***** Component Report: All Components *****

Pk. Num	Ret Time	Component Name	Concentration PPM	Height	Area	Bl. Code	%Delta
1	1.42	CHLORIDE	154.135	268658	840470	1	-3.41
0	0.00	Nitrite	0.000	0	0	0	0.00
0	0.00	NITRATE	0.000	0	0	0	0.00
2	5.05	PHOSPHATE	71.711	19123	214387	1	5.94
3	6.90	SULFATE	218.297	52962	740630	1	2.48
Totals			444.142	340742	1795487		

#	Group Name	Amount	Area	Area%
1	TOTAL NITROGEN	0.0000	0	0.00%

File: DENITE15.D16 Sample: COL "R" DENO3 17E94



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