CATALOG DOCUMENTATION
EMAP SURFACE WATERS PROGRAM LEVEL DATABASE
1991-1994 NORTHEAST LAKES DATA
LAKE WATER CHEMISTRY DATA

TABLE OF CONTENTS

1.   DATA SET IDENTIFICATION

1.1 Title of Catalog Document
EMAP Surface Waters Lake Database
1991-1994 Northeast Lakes
Water Chemistry Data Summarized by Lake

1.2 Authors of the Catalog Entry
U.S. EPA NHEERL Western Ecology Division
Corvallis, OR

1.3 Catalog Revision Date
November 1996

1.4 Data Set Name
CHMVAL

1.5 Task Group
Surface Waters

1.6 Data Set Identification Code
0104

1.7 Version
001

1.8 Requested Acknowledgment
These data were produced as part of the U.S. EPA's Environmental Monitoring
and Assessment Program (EMAP). If you publish these data or use them for
analyses in publications, EPA requires a standard statement for work it has
supported:

2.   INVESTIGATOR INFORMATION

2.1 Principal Investigator
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2.2 Investigation Participant - Sample Collection
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Harvard University
New York State Museum of Natural History
Oregon State University
SUNY Syracuse College of Environmental Sciences and Forestry
Queens University
University of Maine
U.S. Fish and Wildlife Service
U.S. Environmental Protection Agency
     Office of Research and Development
     Regions 1 and 2

3.   DATA SET ABSTRACT

3.1 Abstract of the Data Set
The primary function of the lake water chemistry samples, collected with a van Dorn sampler, is to determine acid-base status, trophic state, and classification of water chemistry type. Lake water stored in Cubitainers was used to measure major cations and anions, nutrients, turbidity, and color. Sealed syringe samples are analyzed for pH, dissolved inorganic carbon, and monomeric aluminum species (believed to be toxic to fish under acidic conditions. Waters samples are collected in sealed syringe to minimize contact with the atmosphere; the pH, dissolved inorganic carbon, and aluminum present in the water sample will all change if the lake water equilibrates with atmospheric carbon dioxide. The filter paper from the lake water filtration is used to determine the chlorophyll concentration, an indicator of algal biomass in the lake.

3.2 Keywords for the Data Set
Aluminum, alkalinity, acid neutralizing capacity, calcium, carbonate, color, specific conductance, dissolved inorganic carbon, dissolved organic carbon, bicarbonate, potassium, magnesium, ammonium, sodium, nitrate, total nitrogen, pH, total phosphorus, silica, total suspended solids, turbidity, absorbance, chlorophyll a, water chemistry, eutrophication

4. OBJECTIVES AND INTRODUCTION

4.1 Program Objective
The Environmental Monitoring and Assessment Program (EMAP) was designed to periodically estimate the status and trends of the Nation's ecological resources on a regional basis. EMAP provides a strategy to identify and bound the extent, magnitude and location of environmental degradation and improvement on a regional scale based on a probability-based statistical survey design.

4.2 Data Set Objective
This data set is part of a demonstration project to evaluate approaches to monitoring lakes in EMAP. The data set contains the results of analysis of chemistry from a water column sample taken during mid-summer.

4.3 Data Set Background Discussion
Water chemistry in lakes is analyzed for two purposes. First, to understand the chemical habitat within which biota must exist so that we can understand the biological potential of the system and second, to evaluate the chemical quality of the water for the purposes of determine the potential stresses to which the biota are exposed.

4.4 Summary of Data Set Parameters
Water chemistry parameters are reported for one sample taken at the location of the deepest part of the lake. These include: aluminum, alkalinity, acid neutralizing capacity, calcium, carbonate, color, specific conductance, dissolved inorganic carbon, dissolved organic carbon, bicarbonate, potassium, magnesium, ammonium, sodium, nitrate, total nitrogen, pH, total phosphorus, silica, total suspended solids, turbidity, and chlorophyll-a.

5. DATA ACQUISITION AND PROCESSING METHODS

5.1 Data Acquisition
5.1.1 Sampling Objective
To obtain a single grab sample of lake water for the purposes of chemical analysis during a two month sampling window from July through mid-September.

5.1.2 Sample Collection Methods Summary
A single grab sample was taken at 1.5m below the surface using a van Dorn sampler according to the protocols identified in Baker et al. (1997).

5.1.3 Sampling Start Date
July 1991

5.1.4 Sampling End Date
September 1994

5.1.5 Platform
Sampling was conducted from small boats.

5.1.6 Sampling Gear
A van Dorn sampler was used to collect lake water from a depth of 1.5m.

5.1.7   Manufacturer of Instruments
NA

5.1.8   Key Variables
At the time of collection, the depth at which the sample was collected was recorded. For the chlorophyll sample, the volume of lake water filtered was also recorded.

5.1.9   Sampling Method Calibration
NA

5.1.10 Sample Collection Quality Control
See Baker et al. 1997.

5.1.11 Sample Collection Method Reference

Baker, J.R., G.D. Merritt, and D.W. Sutton (eds.). 1997. Environmental Monitoring and Assessment Program - Surface Waters: Field Operations Manual for Lakes.

Chaloud, D.J. and D.V. Peck. 1994. Environmental Monitoring and Assessment Program - Surface Waters: Integrated Quality Assurance Project Plan for the Surface Waters Resource Group.

5.1.12 Sample Collection Method Deviations
NA

5.2 Data Preparation and Sample Processing
5.2.1   Sample Processing Objective
See Baker et al. (1997) and Chaloud and Peck (1994).

5.2.2   Sample Processing Methods Summary
See Baker et al. (1997) and Chaloud and Peck (1994).

5.2.3   Sample Processing Method Calibration
See Baker et al. (1997) and Chaloud and Peck (1994).

5.2.4   Sample Processing Quality Control
See Baker et al. (1997) and Chaloud and Peck (1994).

5.2.5   Sample Processing Method Reference
See Baker et al. (1997) and Chaloud and Peck (1994).

6.   DATA MANIPULATIONS

6.1 Name of New or Modified Values
None.

6.2 Data Manipulation Description
See Chaloud and Peck (1994).

7.   DATA DESCRIPTION

7.1 Description of Parameters

Parameter Name	Data Type	Len	Format	Parameter Label
ALDI	Num	8		Inorganic Monomeric Aluminum (ug/L)
ALDS	Num	8		PCV reactive (monomeric) aluminum (ug/L)
ALDSF	Char	6		Flag For ALDS
ALKCALC	Num	8		Calculated Alkalinity (ueq/L)
ALOR	Num	8		Nonexch. PCV (organic) aluminum (ug/L)
ALORF	Char	6		Flag For ALOR
ALTD	Num	8		Total Dissolved aluminum (ug/L)
ALTDF	Char	6		Flag for ALTD
ANC	Num	8		Gran Acid Neutralizing Capacity (ueq/L)
ANCF	Char	3		Flag For ANC
ANDEF	Num	8		Anion Deficit using ANC (ueq/L)
ANSUM	Num	8		Sum of Anions using ANC (ueq/L)
CA	Num	8		Calcium (ueq/L)
CAF	Char	5		Flag for CA
CATSUM	Num	8		Sum of Cations (ueq/L)
CHLA	Num	8		Trichromatic Chlorophyll A (ug/L)
CL	Num	8		Chloride (ueq/L)
CLF	Char	3		Flag For CL
CO3	Num	8		Calculated Carbonate (ueq/L)
COLOR	Num	8		Color (PCU)
COLORF	Char	3		Flag For COLOR
COM_FLD	Char	50		Field Sampling/Shipping Comments
COM_LAB	Char	50		Lab Analysis Comments
COND	Num	8		Specific Conductance (uS/cm)
CONDF	Char	3		Flag For COND
DATE_COL	Num	8	MMDDYY	Date Sample Collected
DATE_REC	Num	8	MMDDYY	Date sample received at laboratory
DAY_SHIP	Num	8		Number of Days for Sample to get to Lab
DEP_SAMP	Num	8		Depth (m) where Water Sample Taken
DIC	Num	8		Dissolved Inorganic Carbon (mg/L)
DICF	Char	3		Flag For DIC
DOC	Num	8		Dissolved Organic Carbon (mg/L)
DOCF	Char	3		Flag For DOC
H	Num	8		H+ from PHSTVL (ueq/L)
HCO3	Num	8		Calculated Bicarbonate (ueq/L)
IONSTR	Num	8		Ionic Strength (M)
K	Num	8		Potassium (ueq/L)
KF	Char	5		Flag for K
LAKENAME	Char	30		Lake Name
LAKE_ID	Char	6		Lake Identification Code
LAT_DD	Num	8		Lake Latitude (decimal degrees)
LON_DD	Num	8		Lake Longitude (-decimal degrees)
MG	Num	8		Magnesium (ueq/L)
MGF	Char	5		Flag for MG
NA	Num	8		Sodium (ueq/L)
NAF	Char	5		Flag for NA
NH4	Num	8		Ammonium (ueq/L)

```
NH4F       Char    3       Flag For NH4
NO3        Num     8       Nitrate (ueq/L)
NO3F       Char    3       Flag For NO3
NTL        Num     8       Total Nitrogen (ug/L)
NTLF       Char    3       Flag For NTL
OH         Num     8       Hydroxide from PHSTVL (ueq/L)
ORGION     Num     8       Est. Organic Anion (ueq/L)
PHEQ       Num     8       Air-equilibrated pH
PHEQF      Char    3       Flag For PHEQ
PHSTVL     Num     8       Closed System pH
PHSTVLF    Char    3       Flag For PHSTVL
PTL        Num     8       Total Phosphorous (ug/L)
PTLF       Char    6       Flag For PTL
SECMEAN    Num     8       Secchi Depth (m)
SIO2       Num     8       Silica (mg/L)
SIO2F      Char    3       Flag For SIO2
SITE_ID    Char    2       Lake Location Sampled (X=Index)
SO4        Num     8       Sulfate (ueq/L)
SO4F       Char    3       Flag For SO4
SOBC       Num     8       Sum of Base Cations (ueq/L)
TEAM_ID    Char    2       Sampling Team Identifier
TSS        Num     8       Total Suspended Solids (mg/L)
TSSF       Char    3       Flag For TSS
TURB       Num     8       Turbidity (NTU)
TURBF      Char    6       Flag For TURB
VISIT_NO   Num     8       Lake Sample Visit Number
YEAR       Num     8       Sample Year
```

7.1.1   Precision to Which Values are Reported

7.1.2   Minimum Value in Data Set by Parameter

```
Name     Min
------------
ALDI     -1
ALDS     0
ALKCALC  -61.27
ALOR     0
ALTD     0
ANC      -71.4
ANDEF    -261.92
ANSUM    49.49
CA       20
CATSUM   82.45
CHLA     0.3
CL       1
CO3      0
COLOR    0
COND     10.4
DAY_SHIP 1
DEP_SAMP 0.5
DIC      0.14
DOC      0.88
```

```
7.1.2              Minimum Value in Data Set by Parameter


H           0
HCO3        0.14
IONSTR      0
K           0.55
LAT_DD      39.2262
LON_DD      -67.30111
MG          9
NA          3.9
NH4         0
NO3         0
NTL         100
OH          0
ORGION      6.56
PHEQ        4.2
PHSTVL      4.21
PTL         0
SECMEAN     0.15
SIO2        0
SO4         11
SOBC        43.9
TSS         0
TURB        0.1
VISIT_NO 1
YEAR        1991


7.1.3                    Maximum Value in Data Set by Parameter

Name       Max
------------
ALDI        269
ALDS        284
ALKCALC     3299.84
ALOR        166
ALTD        396
ANC         3371
ANDEF       12441.89
ANSUM       347516.95
CA          16467
CATSUM      359958.84
CHLA        191.9
CL          315500
CO3         135.82
COLOR       315
COND        32130
DAY_SHIP 5
DEP_SAMP 1.5
DIC         40.81
DOC         25.14
H           61.66
HCO3        3278.62
IONSTR      0.52
```

```
K        7338.55
LAT_DD   47.2125
LON_DD   -78.97917
MG       61448.25
NA       274702.5
NH4      43.2
NO3      132
NTL      4013
OH       38.9
ORGION   250.32
PHEQ     8.69
PHSTVL   9.59
PTL      8740
SECMEAN  13.3
SIO2     15.24
SO4      30237.5
SOBC     359956.3
TSS      116
TURB     31.5
VISIT_NO 3
YEAR     1994
```

7.2 Data Record Example

7.2.1   Column Names for Example Records

ALDI,ALDS,ALDSF,ALKCALC,ALOR,ALORF,ALTD,ALTDF,ANC,ANCF,ANDEF,ANSUM,
CA,CAF,CATSUM,CHLA,CL,CLF,CO3,COLOR,COLORF,COM_FLD,COM_LAB,COND,CONDF,
DATE_COL,DATE_REC,DAY_SHIP,DEP_SAMP,DIC,DICF,DOC,DOCF,H,HCO3,IONSTR,K,KF,
LAKENAME,LAKE_ID,LAT_DD,LON_DD,MG,MGF,NA,NAF,NH4,NH4F,NO3,NO3F,NTL,NTLF,OH,
ORGION,PHEQ,PHEQF,PHSTVL,PHSTVLF,PTL,PTLF,SECMEAN,SIO2,SIO2F,SITE_ID,SO4,
SO4F,SOBC,TEAM_ID,TSS,TSSF,TURB,TURBF,VISIT_NO,YEAR

7.2.2   Example Data Records

```
.,.,," ",454.09,.,," ",27," ",496," ",62.08,815.88,432.6," ",877.95,2,239,
"",0.81,20," "," "," ",98.4," ",08/22/94,.,2,1.5,6.09," ",4.1,"",0.05,
453.18,0,25.3," ","NORTH SPRINGFIELD RESERVOIR","VT750L",43.3468,
72.5065,168.6," ",251.4," ",0," ",6.7," ",374,"",0.19,40.41,8.02," ",
7.28," ",17," ",1.66,4.5," ","X",116," ",877.9,"6",2.6,"",2.1," ",2,1994

.,.,," ",964.93,.,," ",13," ",963," ",16.61,1339.3,868.3," ",1355.92,1.3,239,
"",5.42,10," "," "," ",143.4," ",06/29/94,.,2,1.5,11.98," ",2.21,
"",0.02,958.98,0,30.9," ","STOUGHTON POND","VT751L",43.381,72.501,219.6,
"",237.1," ",0," ",10.3," ",322," ",0.6,21.95,8.34," ",7.78," ",12,
"",2.54,4.97," ","X",125," ",1355.9,"3",1.1," ",1.7," ",1,1994

.,.,," ",1659.8,.,," ",1," ",1692," ",118.71,2329.2,1741.5," ",2447.91,3,415,
"",23.21,8," "," "," ",248.2," ",06/29/94,.,2,1.5,20.07,
" ",3.53,"",0.01,1635.18,0.01,41.9," ","TILDYS POND","VT752L",
44.644,72.2043,244.3,"",420.2," ",0," ",0.3," ",241," ",1.51,35.18,8.55,
" ",8.18," ",7.8," ",3.4,6.15," ","X",254," ",2447.9,"4",0.3," ",0.9," ",1,1994
```

8. GEOGRAPHIC AND SPATIAL INFORMATION

8.1 Minimum Longitude
-78 Degrees 58 Minutes 45.01 Seconds West (-78.97917 Decimal Degrees)

8.2 Maximum Longitude
-67 Degrees 18 Minutes 4.00 Seconds West (-67.30111 Decimal Degrees)

8.3 Minimum Latitude
39 Degrees 13 Minutes 34.32 Seconds North (39.2262 Decimal Degrees)

8.4 Maximum Latitude
47 Degrees 12 Minutes 45.00 Seconds North (47.2125 Decimal Degrees)

8.5 Name of Area or Region
Northeast: EPA Regions I and II which includes Connecticut, Massachusetts,
Maine, New Hampshire, New Jersey, New York, Vermont, Rhode Island

9. QUALITY CONTROL / QUALITY ASSURANCE

9.1 Data Quality Objectives
See Chaloud and Peck (1994)

9.2 Quality Assurance Procedures
See Chaloud and Peck (1994)

9.3 Unassessed Errors
NA

10. DATA ACCESS

10.1 Data Access Procedures

10.2 Data Access Restrictions

10.3 Data Access Contact Persons

10.4 Data Set Format

10.5 Information Concerning Anonymous FTP

10.6 Information Concerning Gopher and WWW

10.7 EMAP CD-ROM Containing the Data

11. REFERENCES

Baker, J.R., G.D. Merritt, and D.W. Sutton (eds.). 1997. Environmental
Monitoring and Assessment Program - Surface Waters: Field Operations Manual
for Lakes. EPA/620/R-97/001. U.S. Environmental Protection Agency.
Office of Research and Development. Washington, D.C.

Chaloud, D.J. and D.V. Peck. 1994. Environmental Monitoring and Assessment Program - Surface Waters: Integrated Quality Assurance Project Plan for the Surface Waters Resource Group. U.S. Environmental Protection Agency. Office of Research and Development.

12. TABLE OF ACRONYMS

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