

The Central Analytical Laboratory of the National Atmospheric Deposition Program



Thirty-Nine Years of Analytical Evolution

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1978 Atomic Absorption Spectrophotometer IL 353
 1980 Atomic Absorption Spectrophotometer IL 951
 1994 Atomic Absorption Spectrophotometer Varian Spectra 800 Ca, Mg, Na, & K

ATOMIC ABSORPTION & INDUCTIVELY COUPLED PLASMA



Ion chromatography 1977-1984 Dionex Model 12 Cl, NO₃, & SO₄
 Ion Chromatography 1985-1987 Dionex QIC Models 2 systems Cl, NO₃, & SO₄
 Ion Chromatography 1987-1993 Dionex Model 2020i (2-channel) Cl, NO₃, PO₄, & SO₄
 Ion Chromatography 1995-2004 Dionex Model DX 500 2 systems Cl, NO₃, & SO₄



Automated Colorimetry Segmented Flow 1978-1985 Technicon Instruments Cl, NO₃, SO₄, PO₄, & NH₄
 Automated Colorimetry Segmented Flow 1978-1988 Technicon Instruments 2 systems added in 1982 Cl, NO₃, SO₄, PO₄, & NH₄
 Flow Injection Analysis 1989-1996 Lachat Quick Chem IV NH₄ & PO₄
 Flow Injection Analysis 1996-2015 Lachat Quik Chem 8000 NH₄ & PO₄

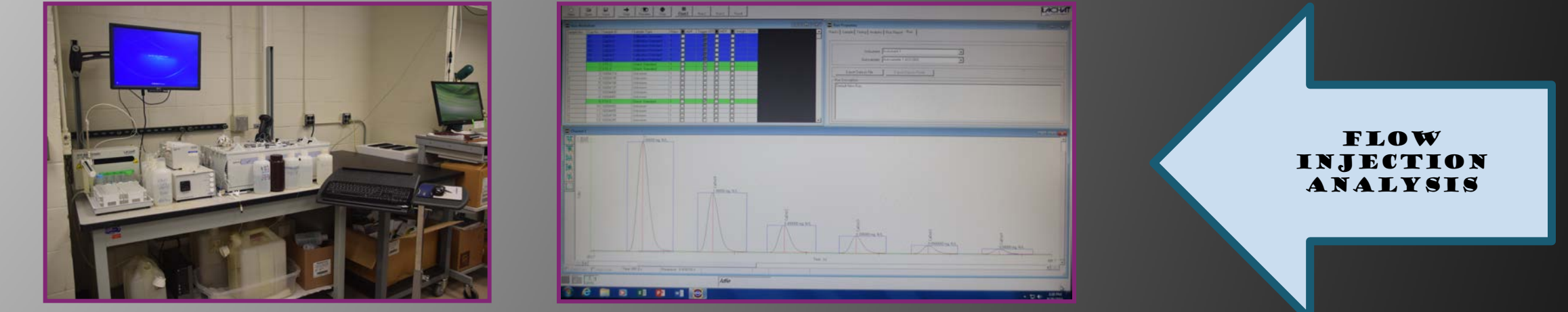


2003-2016 ICP-OES Varian Vista PRO Ca, Mg, Na, & K
 2015-2016 ICP-OES Agilent 5100 Ca, Mg, Na, & K

ION CHROMATOGRAPHY

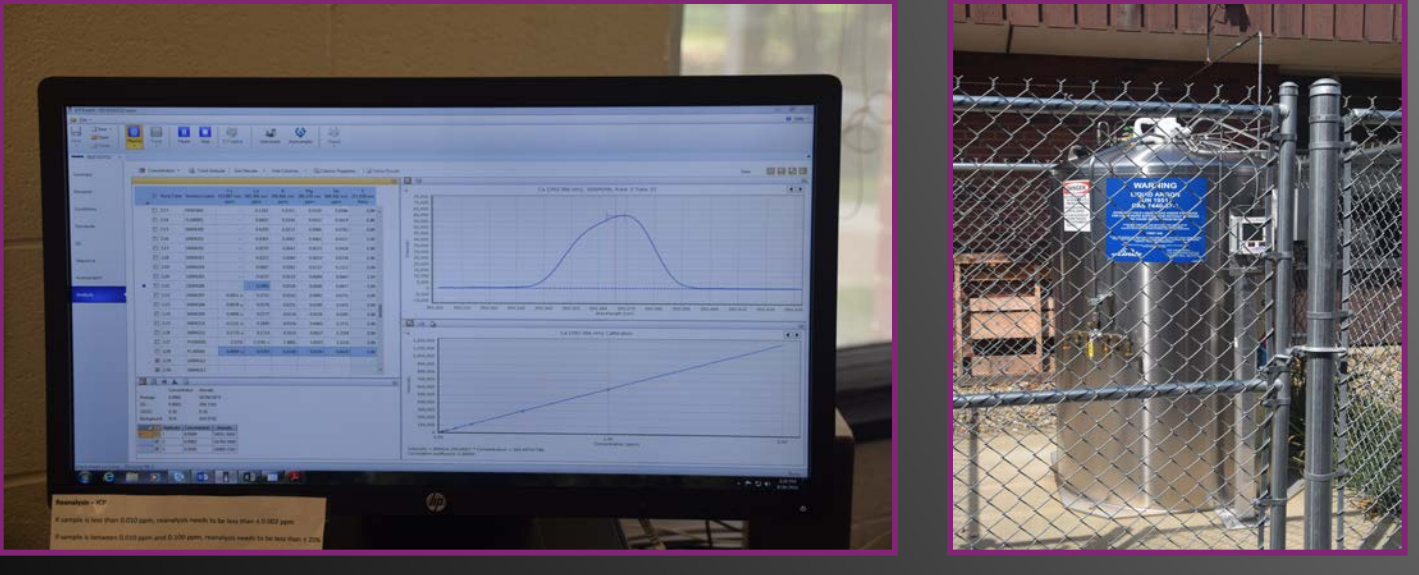


Ion Chromatography 2005-2016 Dionex Model ICS-2000 2 systems Cl, NO₃, SO₄, & Br
 Ion Chromatography 2011-2016 Dionex Model ICS 5000 2 systems Cl, NO₃, SO₄, & Br
 Dionex Chromeleon 7.0 Data Management Software 2011-2016



Flow Injection Analysis 2011-2016 Lachat Quik Chem 8500, Series 2 NH₄ & PO₄
 Lachat Omnicion Data Management Software 1996-2016

FLOW INJECTION ANALYSIS



Agilent ICP Expert Data Management Software 2015-2016
 Argon Dewar System Added in 2015

CAL Method Detection Limits (mg/L)						
Then and Now						
	1978	(Method)	2002	(Method)	2016	(Method)
Calcium (Ca)	0.010	Atomic Absorption	0.009	Atomic Absorption	0.001	ICP-OES
Magnesium (Mg)	0.002	Atomic Absorption	0.003	Atomic Absorption	0.001	ICP-OES
Sodium (Na)	0.004	Atomic Absorption	0.003	Atomic Absorption	0.001	ICP-OES
Potassium (K)	0.002	Atomic Absorption	0.004	Atomic Absorption	0.001	ICP-OES
Ammonium (NH ₄)	0.030	Colorimetry - Seg. Flow	0.020	Colorimetry - FIA	0.008	Colorimetry - FIA
Sulfate (SO ₄)	0.100	Colorimetry - Seg. Flow	0.010	Ion Chromatography	0.003	Ion Chromatography
Nitrate (NO ₃)	0.030	Colorimetry - Seg. Flow	0.010	Ion Chromatography	0.003	Ion Chromatography
Chloride (Cl)	0.050	Colorimetry - Seg. Flow	0.005	Ion Chromatography	0.003	Ion Chromatography
Bromide (Br)			0.003	Ion Chromatography	0.003	Ion Chromatography
Orthophosphate (PO ₄)	0.005	Colorimetry - Seg. Flow	0.010	Colorimetry - FIA	0.003	Colorimetry - FIA
	0.020	Ion Chromatography				

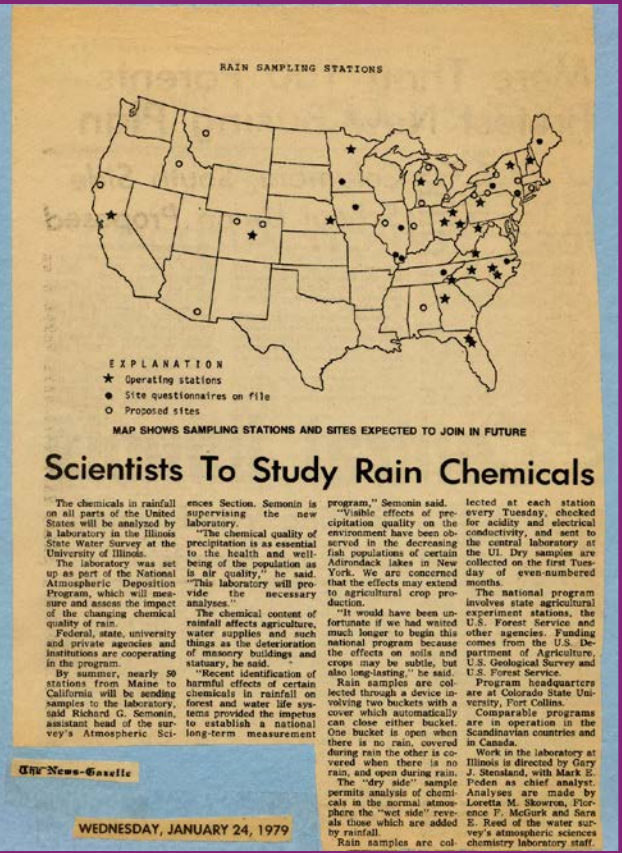


Orion pH meter Beckman electrode
 Coming pH meters 445 added 1998 & 2000
 SCP Science TitrEC 2017 Automated pH

PH

1977 1977 ASES organizes NADP
 1979 22 sites in NTN network
 Jan 1981 88 sites in NTN network
 1984 177 sites in NTN network
 1985 190 sites in NTN network
 1987 203 sites in NTN network
 1990 201 sites in NTN network
 1992 10 sites in AIRMoN network
 1993 200 sites in NTN network
 1995 230 sites in NTN network
 1996 48 sites in MDN network
 2000 224 sites in NTN network
 2002 245 sites in NTN network
 2010 50 sites in AMoN network
 2016 268 sites in NTN network
 2016 6 sites in AIRMoN network
 2016 111 sites in MDN network
 2016 103 sites in AMoN network

1977 State Agricultural Experiment Stations (SAES) organize NADP
 October 1, 1978 CAL began analyzing samples from 14 sites
 February 27, 1979 IL11 startup
 1982 NAPAP establishes NADP/NTN
 June 1984, NADP discontinued Dry-side collection
 October 1985 CAL moves to current ISWS location
 1986 Publication of *Methods for Collection and Analysis of Precipitation*
 1990 Clean Air Act enacted
 1991-1992 NADP pilot network for trace metals
 January 11, 1994 NTN bottle protocol initiated
 2007 NADP changes logo
 2009 AMNet is officially accepted as an NADP network
 March 20, 2012 NTN Samples stored in coolers
 2012 Litterfall Mercury Monitoring initiative began in Autumn
 NADP hosts Acid Rain 2015, in Rochester, NY



12/14/82 15,000 sample received



8/14/91 100,000 sample received

5/23/00 200,000 sample received



10/23/07 300,000 sample received



3/27/15 400,000 sample received

