

# Cambridge Water Department

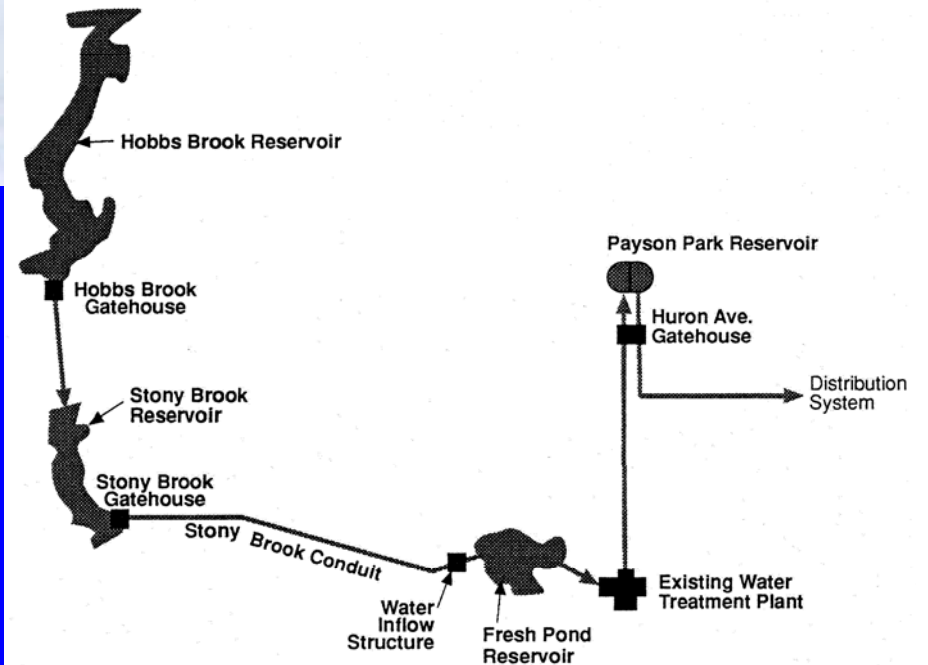
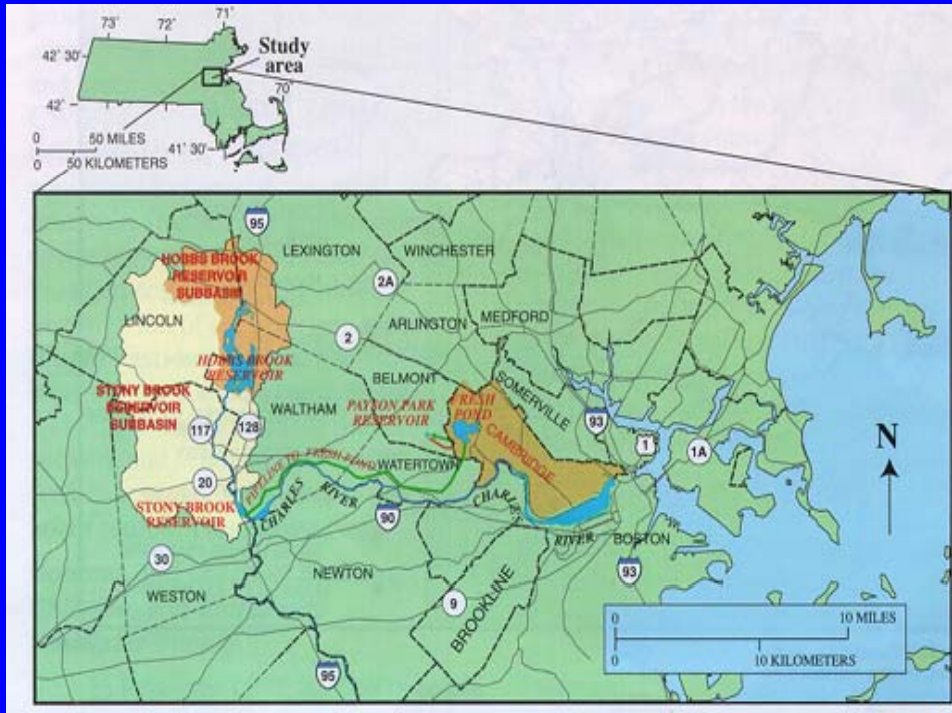


**Use of Ion chromatography in  
drinking water laboratory.**

**Krystyna McInally**

**Water Quality Supervisor**

# Cambridge Water Department



# Cambridge Water Department Info

- Watershed
  - 25 square mile watershed in Lexington, Lincoln, Waltham, Weston and Cambridge
  - 7 mile underground conduit
- Water Operations
  - 24 MGD Facility
- Distribution
  - 1750 hydrants, 4,500 valves, 14,000 services
  - 190 miles of water mains

# CWD Mission

To provide highest quality , safe drinking water for citizens of Cambridge.



# **To do the Job Right**

**We have a State Certified Lab meaning, we have:**

**Education/Training**

**Experience**

**Proper equipment**

**Quality Assurance Program Plan/Standard**

**Operating Procedures**

# **The Laboratories “Clients”**

**Watershed**

**Treatment**

**Distribution/Consumers**

# Watershed Protection

**Assess quality of water coming to the Plant and Help identify possible sources of contamination using a number of certified tests**

**Fecal Coli form  
Total Organic Carbon  
Compounds  
pH  
Nutrients  
Chlorides Bromide**

**E. coli  
Volatile Org.**

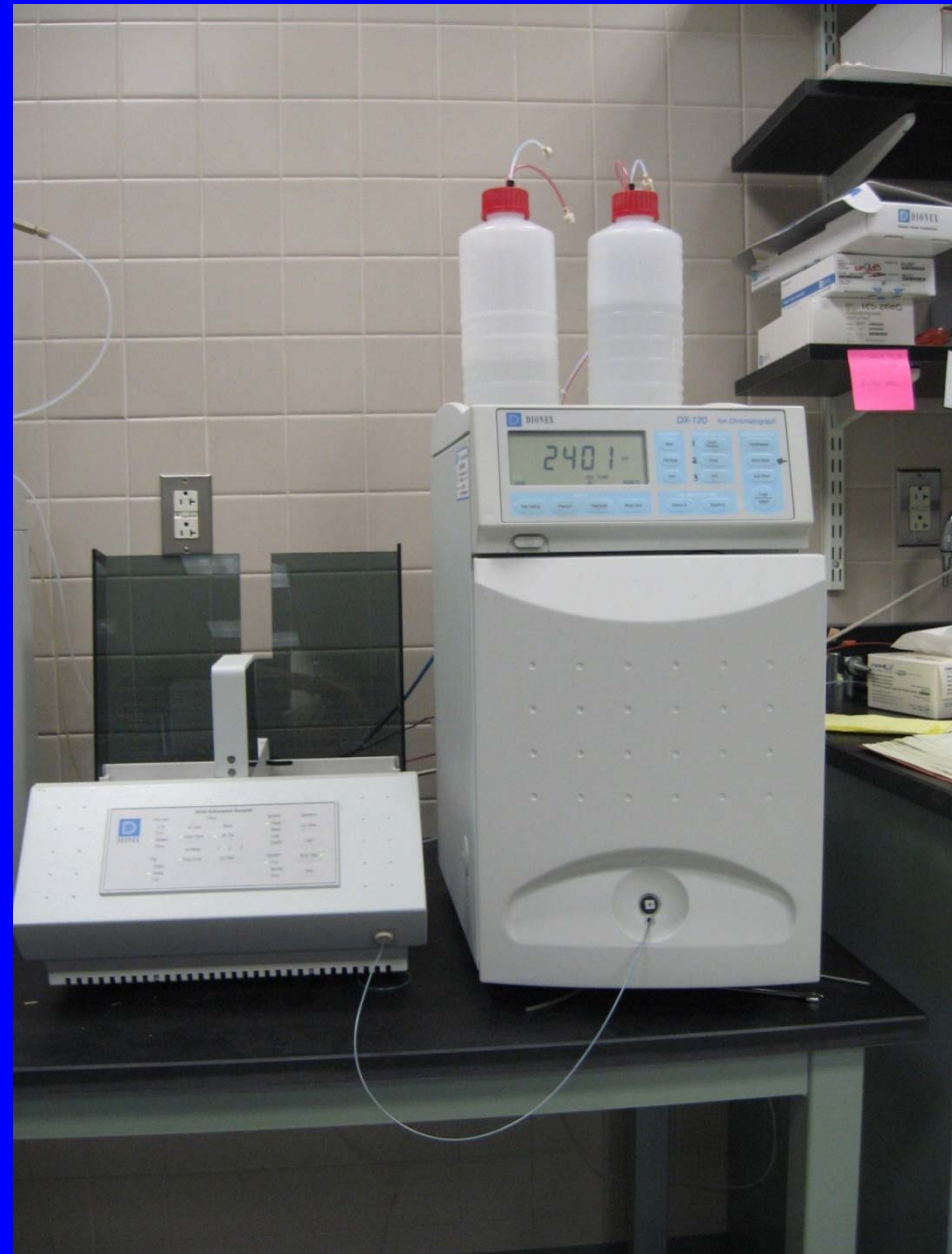
**UV254  
Metals**

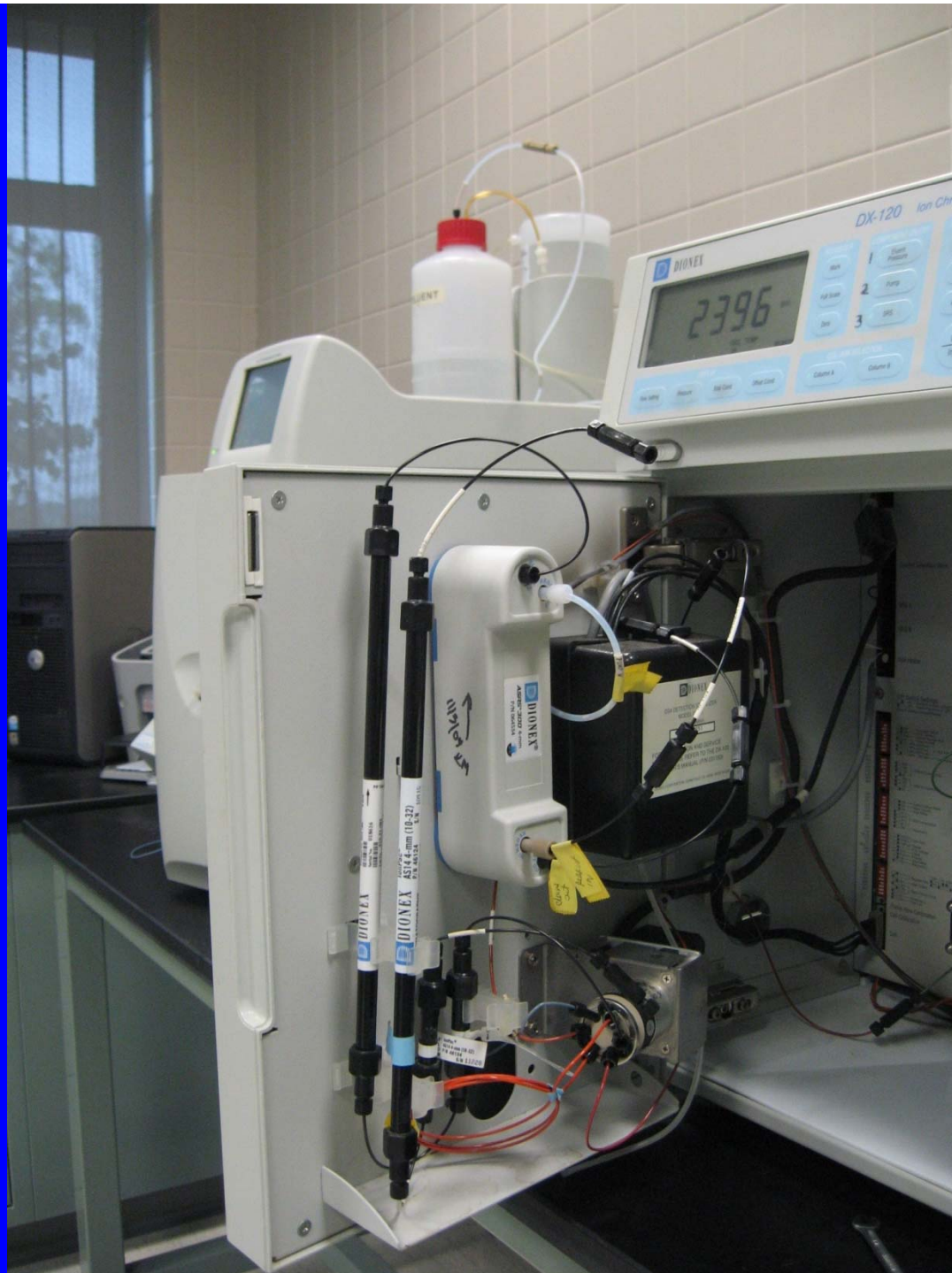
**Provide support in emergency situations**  
**Sampling Materials and Instructions**  
**Fast Sample processing**

# Lab



DX-120 (2001)





# Dionex DX-120 #1

- Standard Method 4110 B
- Chloride            25-150 mg/l
- Sulfate             5-50 mg/l
- Guard column    AG14 4 mm
- Analytical column AS14 4 mm
- Sample loop 25  $\mu$ l
- AS14 Eluent

# Typical run

Chromeleon - [DBTTMOC1\_local\ICS2000\Sequences\2011\August\80411 - Browser]

File Edit View Workspace Qualification Batch Tools Window Help

80911A  
81511  
Feb  
Jan  
July  
June  
March  
May  
Data  
shutdown  
Panels  
Diagnostics\_0000  
Diagnostics\_0001  
manual  
ICS2000  
AUDIT  
Data  
dionex test  
Panels  
Reports  
Sequences  
2007  
2008  
2009  
2010  
2011  
April  
August  
80411  
Feb  
Jan  
July  
June  
March  
May  
New Folder  
shutdown  
Diagnostics\_0000  
Diagnostics\_0001  
manual

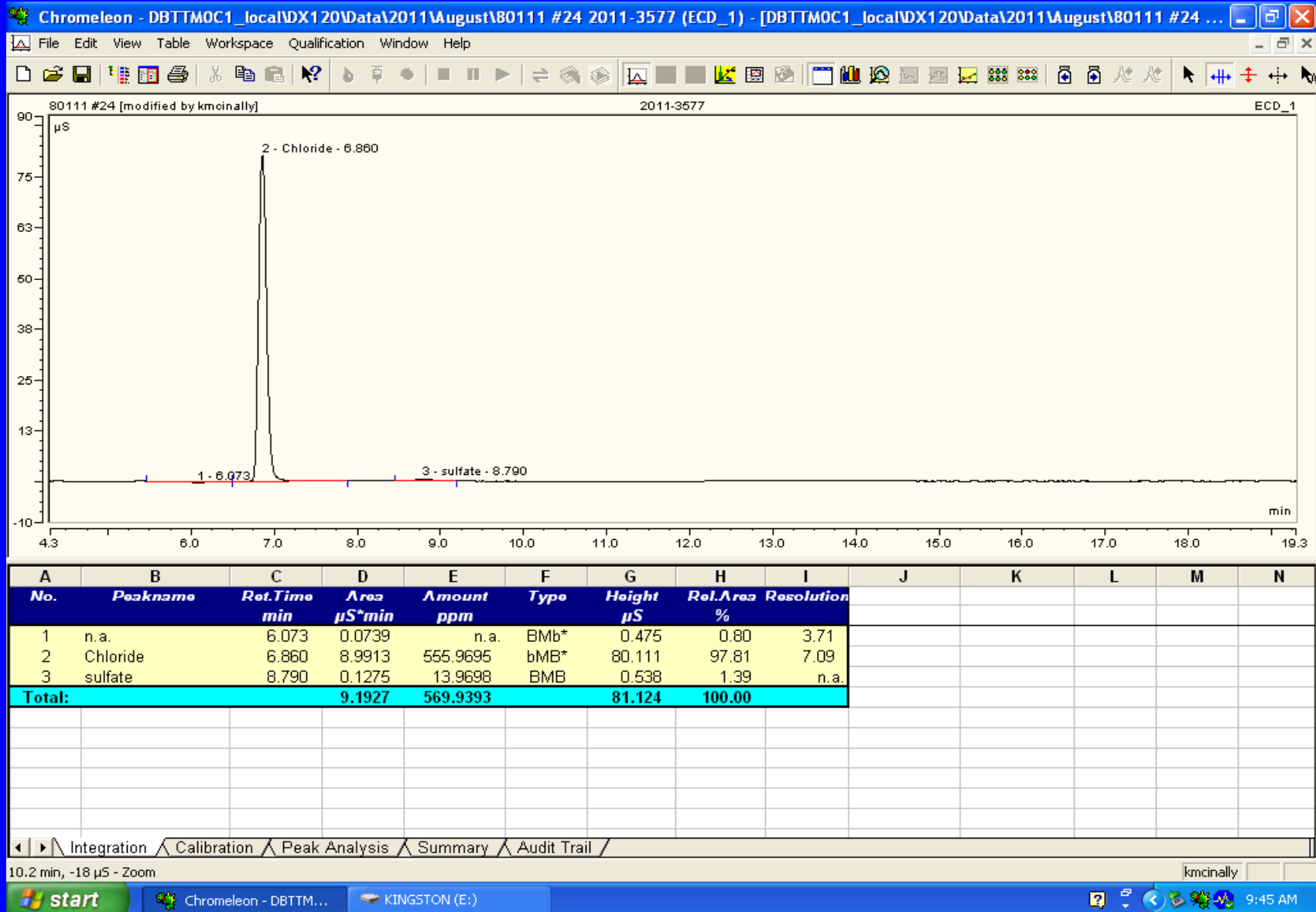
Name	Title	Timebase	Last Update	Operator	Siz
AS19 Quality Assu	AS19 4mm Quality Assurance Report	ICS2000	1/31/2005 4:25:07 P	JMadden	2 KB
AS19 Quality Assu	Quality Assurance Report for AG19 / AS	ICS2000	10/1/2009 1:15:08 P	kmcinally	50 KB
CWD300_1_Stop.p	CWD300.1	ICS2000	3/28/2007 1:21:30 P	kmcinally	1 KB
CWD300_1_pgm	CWD300.1	ICS2000	3/18/2009 1:46:06 P	kmcinally	2 KB
ICS-2000_System_			2/12/2007 3:45:49 P		125 KB

No.	Name	Type	Pos	Inj. Vol.	Program	Method	Status
1	Blank	Blank	99	250.0	CWD300_1	AS19 Quality Assurance Report	Finished
2	Part B #1	Standard	100	250.0	CWD300_1	AS19 Quality Assurance Report	Finished
3	Part B #2	Standard	101	250.0	CWD300_1	AS19 Quality Assurance Report	Finished
4	Part B #3	Standard	102	250.0	CWD300_1	AS19 Quality Assurance Report	Finished
5	Part B #4	Standard	103	250.0	CWD300_1	AS19 Quality Assurance Report	Finished
6	Part B #5	Standard	104	250.0	CWD300_1	AS19 Quality Assurance Report	Finished
7	QCS	Validate	105	250.0	CWD300_1	AS19 Quality Assurance Report	Finished
8	BLK	Blank	106	250.0	CWD300_1	AS19 Quality Assurance Report	Finished
9	LFB	Unknown	107	250.0	CWD300_1	AS19 Quality Assurance Report	Finished
10	MDL	Unknown	108	250.0	CWD300_1	AS19 Quality Assurance Report	Finished
11	MDL	Unknown	107	250.0	CWD300_1	AS19 Quality Assurance Report	Finished
12	Raw	Unknown	114	250.0	CWD300_1	AS19 Quality Assurance Report	Finished
13	Fin	Unknown	115	250.0	CWD300_1	AS19 Quality Assurance Report	Finished
14	C.commons	Unknown	115	250.0	CWD300_1	AS19 Quality Assurance Report	Finished
15	C.Commons F.dup	Unknown	116	250.0	CWD300_1	AS19 Quality Assurance Report	Finished
16	HB @ GH	Unknown	117	250.0	CWD300_1	AS19 Quality Assurance Report	Finished
17	SB @ GH	Unknown	117	250.0	CWD300_1	AS19 Quality Assurance Report	Finished
18	SB @ GH Dup	Unknown	117	250.0	CWD300_1	AS19 Quality Assurance Report	Finished
19	SB @ GH Spike	Unknown	115	250.0	CWD300_1	AS19 Quality Assurance Report	Finished
20	SB @ GH Spike Dup	Unknown	118	250.0	CWD300_1	AS19 Quality Assurance Report	Finished
21	QCS	Validate	117	250.0	CWD300_1	AS19 Quality Assurance Report	Finished
22	Blank	Blank	118	250.0	CWD300_1	AS19 Quality Assurance Report	Finished
23	Stop	Blank	119	250.0	CWD300_1_Stop	AS19 Quality Assurance Report	Finished

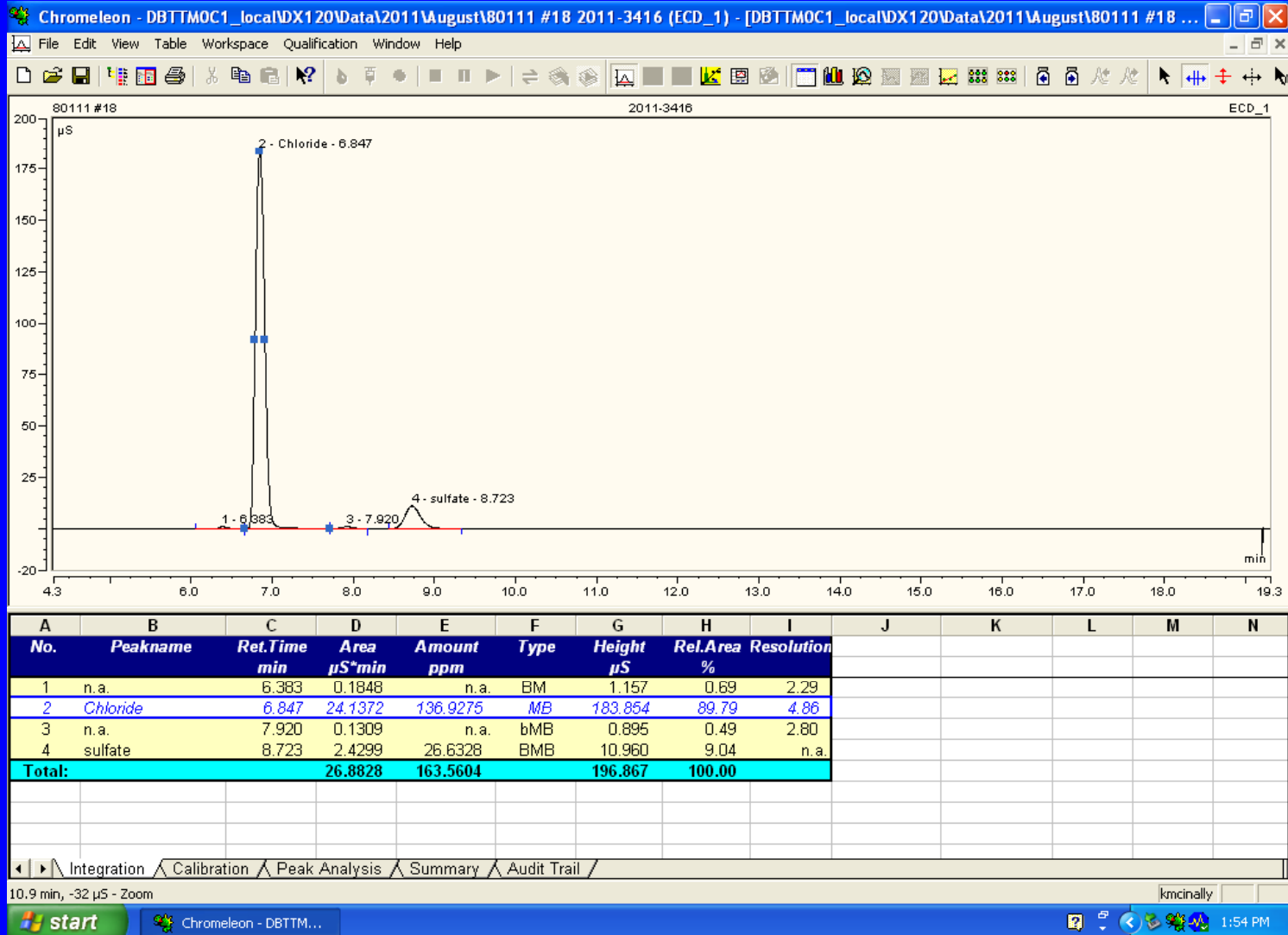
kmcinally

start Chromeleon - [DBTT... KINGSTON (E:) 9:59 AM

# Watershed Sample



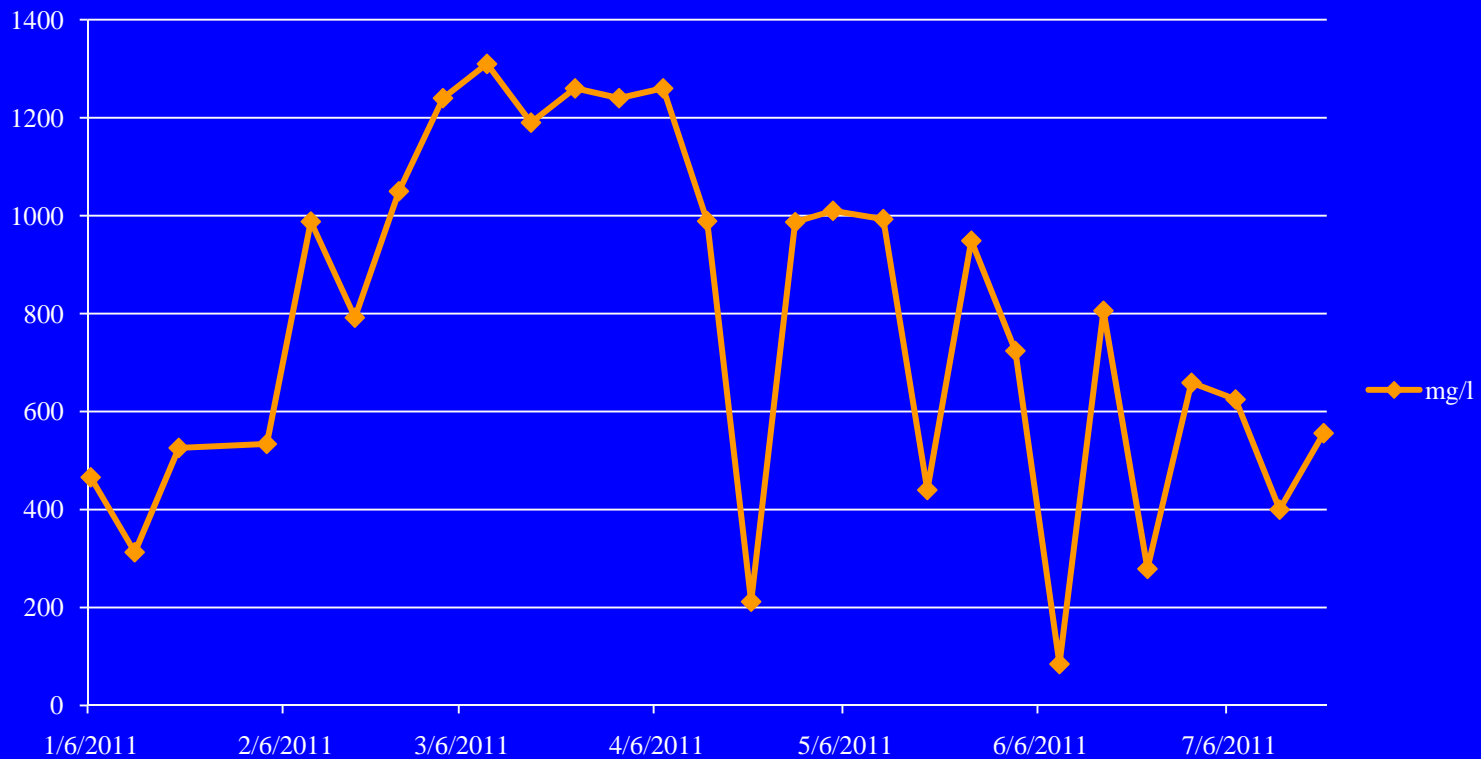
# Raw water sample



# Watershed data

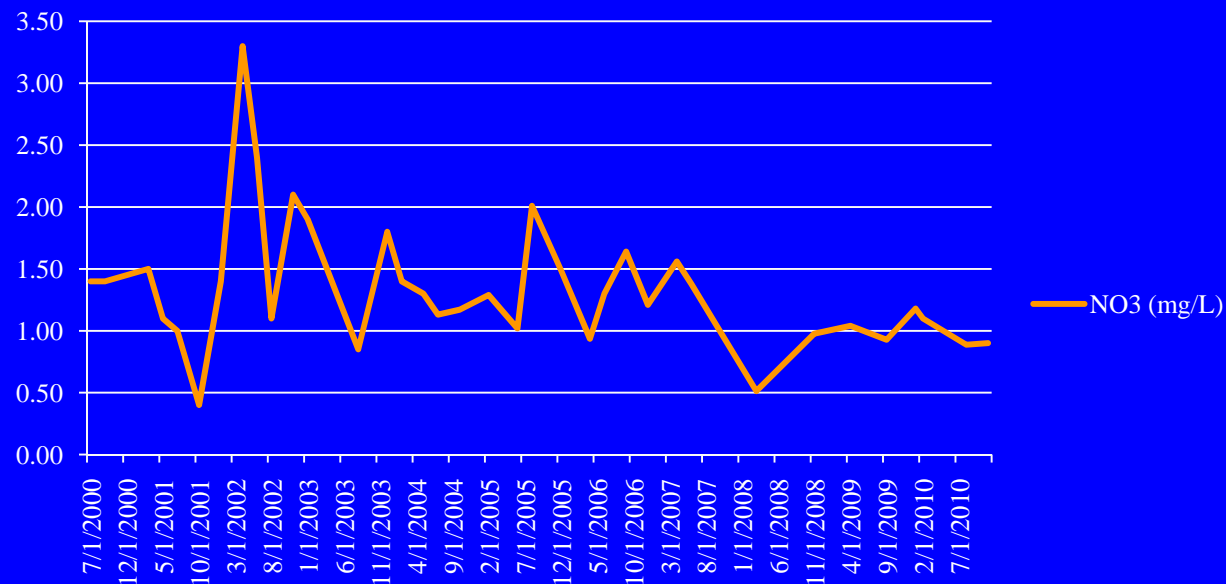
- Chloride range 120-1300 mg/l

Costco chlorides



# Watershed data

- Nitrate as Nitrogen



# Distribution System

**Assure quality of water coming to the Consumer tap using a number of certified tests**

**Total Coli form**

**Total Organic Carbon  
Compounds**

**pH**

**Nutrients**

**Chlorides Bromates**

**E. coli**

**Volatile Org.**

**UV254**

**Metals**

**Provide support in emergency situations**

**Sampling Materials and Instructions**

**Fast Sample processing**

# Dionex DX-120 #2

- Standard Method 4110 B
- Nitrite-N            10-400  $\mu\text{g/l}$
- Nitrate-N            15-600  $\mu\text{g/l}$
- Guard column    AG9-HC    4 mm
- Analytical column AS9-HC    4 mm
- Sample loop    200  $\mu\text{l}$
- 0.5 M Sodium Carbonate    Eluent

# Cambridge Water Department – MDL Study

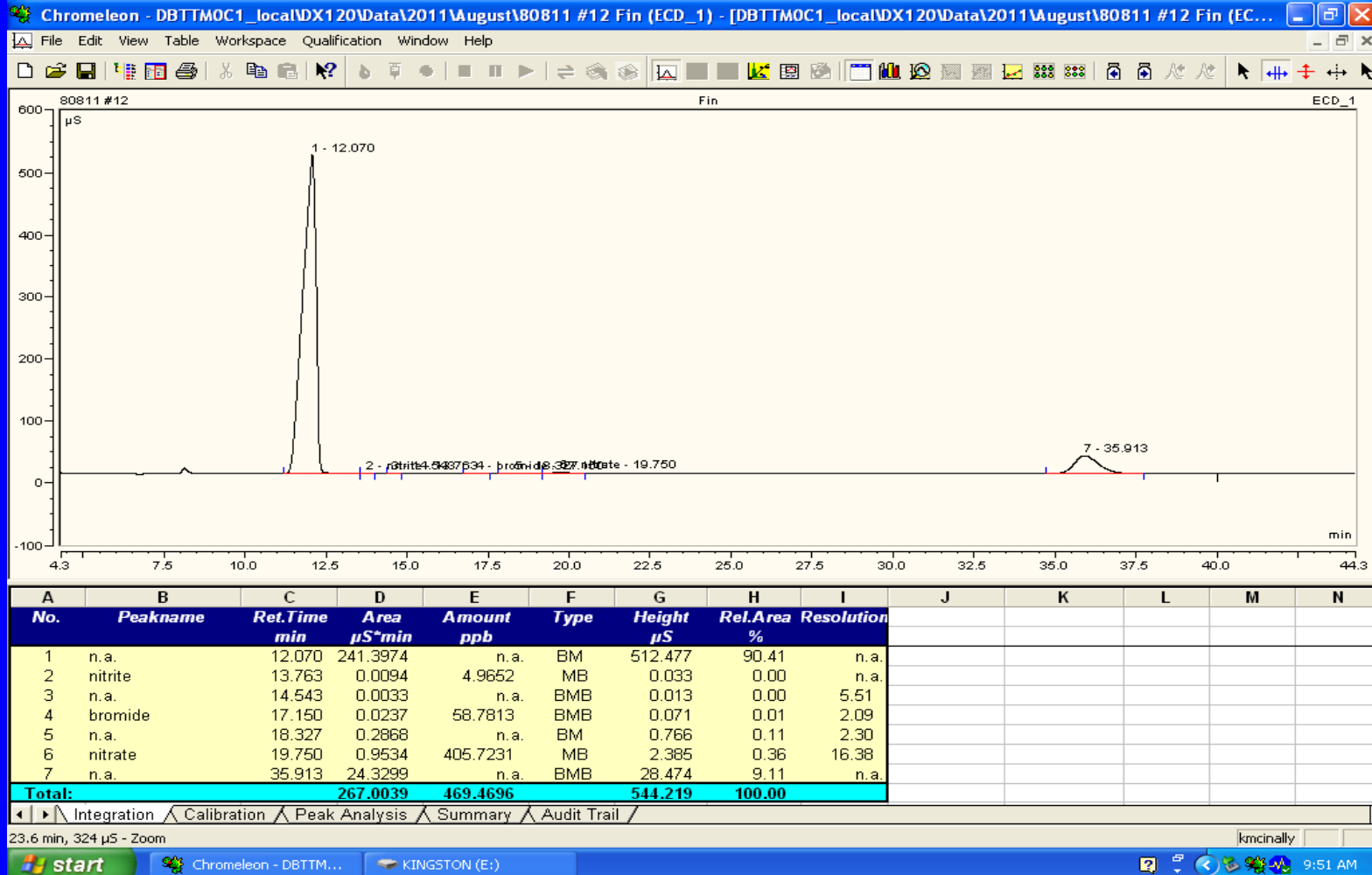
## Cambridge Water Department

2011

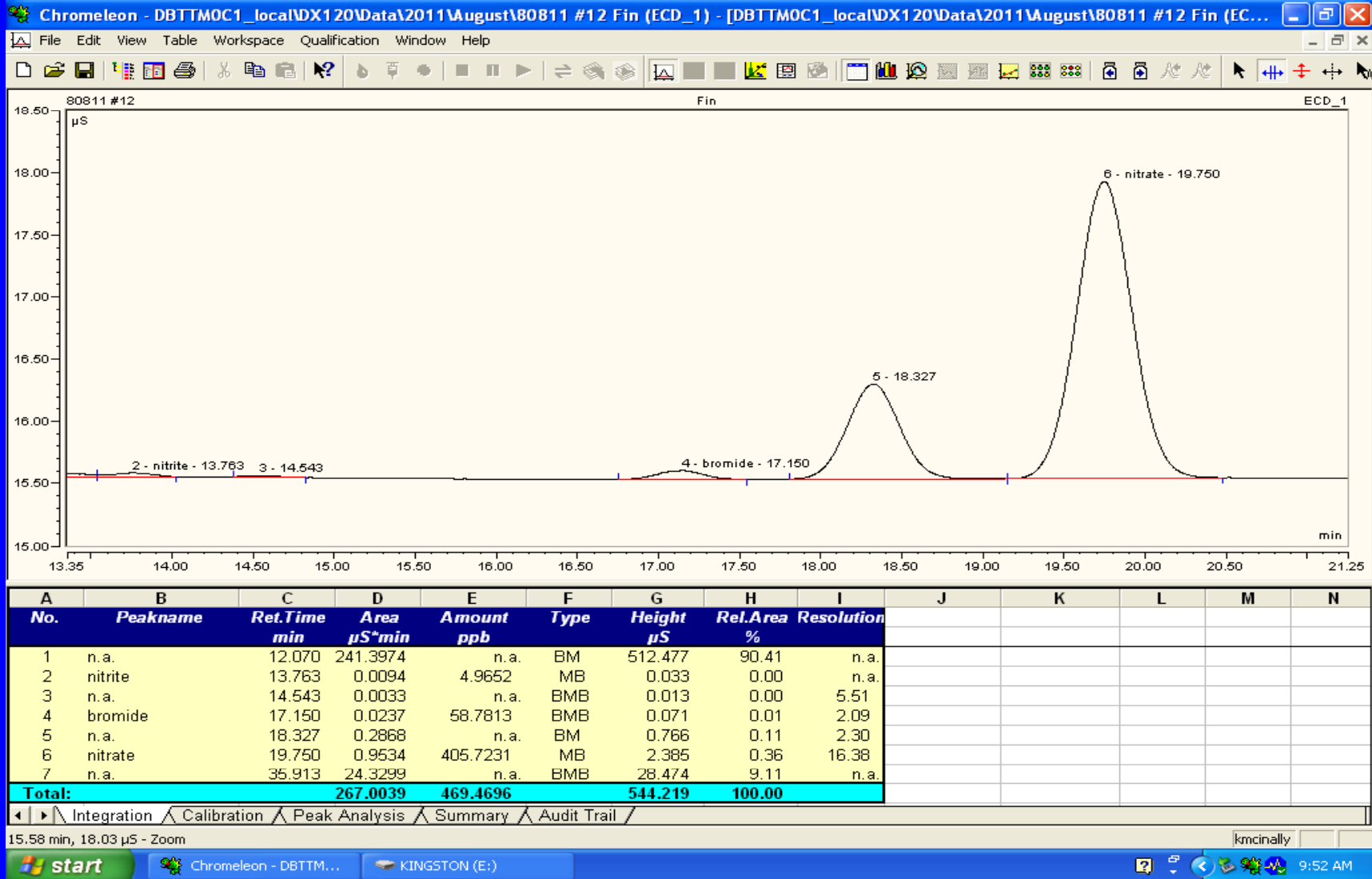
### MDL Study Column AG9HC

<u>TV=15ppb</u>	Nitrite		Nitrate	
	4/26/2011	13.49 ppb	Nitrate	47.8 ppb
		13.79 ppb		47.7 ppb
		14.05 ppb	<u>TV=50ppb</u>	52.89 ppb
	4/27/2011	14.63 ppb		50 ppb
		14.77 ppb		48.9 ppb
	5/26/2011	14.40 ppb		50.71 ppb
		13.15 ppb		48.05 ppb
		14.04	Mean	49.44
		0.56	STD	1.76
		<b>1.75 ppb</b>	MDL	<b>5.54 ppb</b>

# Raw water



# Finish water



# ICS 2000 (2007)



# ICS 2000

- EPA Method 300.1
- Bromate 5-100  $\mu\text{g/l}$
- Bromide 10-200  $\mu\text{g/l}$
- Guard column AG-19 (4x50mm)
- Analytical column AS-19 (4x50mm)
- Sample loop 250 $\mu\text{l}$
- EluGen II KOH cartridge

# ICS 2000 MDL Study

Tv=5ppb

**Bromate**

TV=10 ppb

**Bromide**

7/25/2011

4.43 ppb

7/25/2011

8.18 ppb

2.67 ppb

8.89 ppb

7/27/2011

4.99 ppb

8.68 ppb

5.03 ppb

8.77 ppb

3.97 ppb

8.51 ppb

8/4/2011

4.64 ppb

9 ppb

4.15 ppb

8.9 ppb

Mean

4.268571

Mean

8.704286

STD

0.748607

STD

0.261253

MDL

2.35 ppb

-

MDL

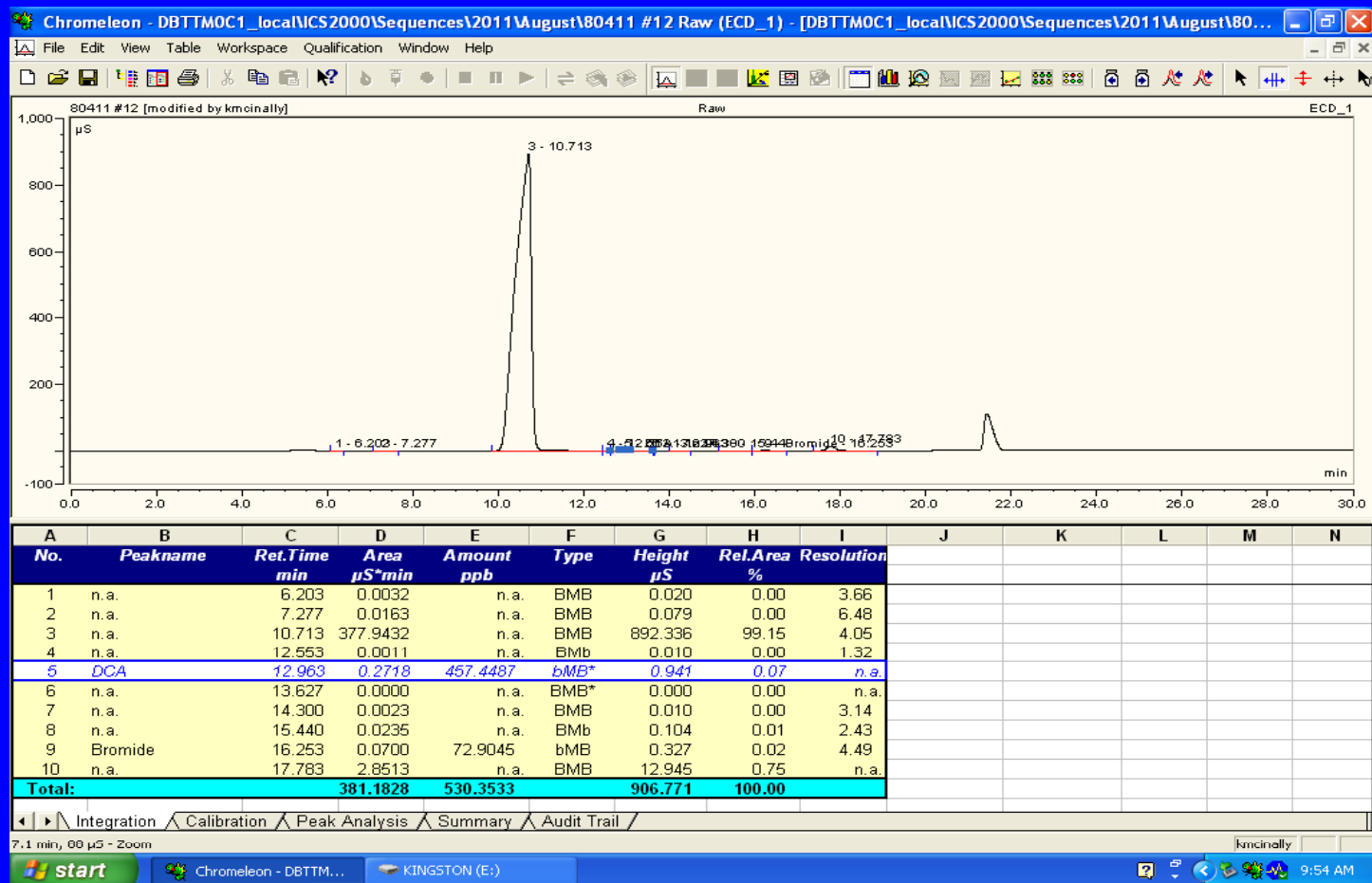
0.82 ppb

Reporting MDL

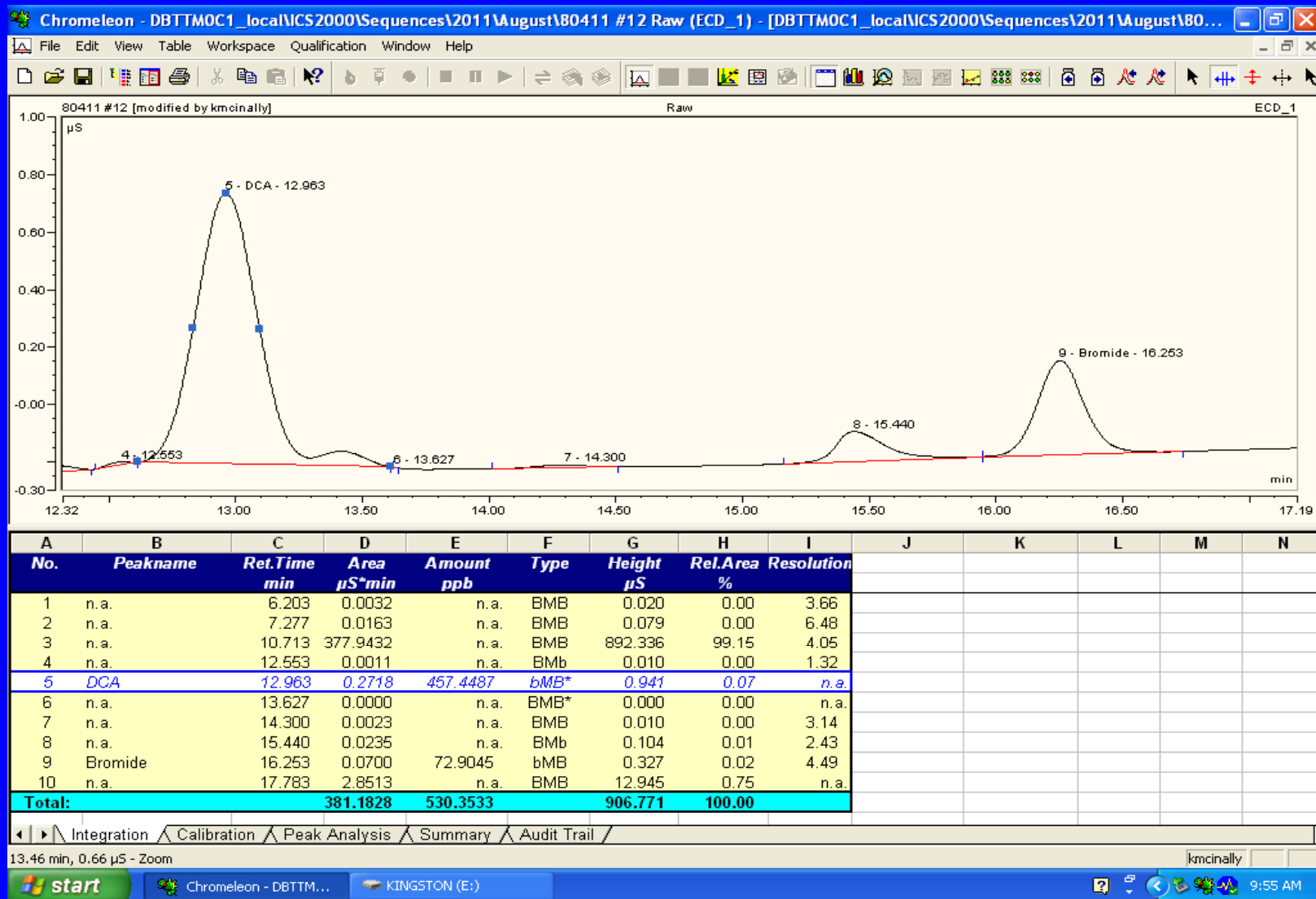
5 ppb

5 ppb

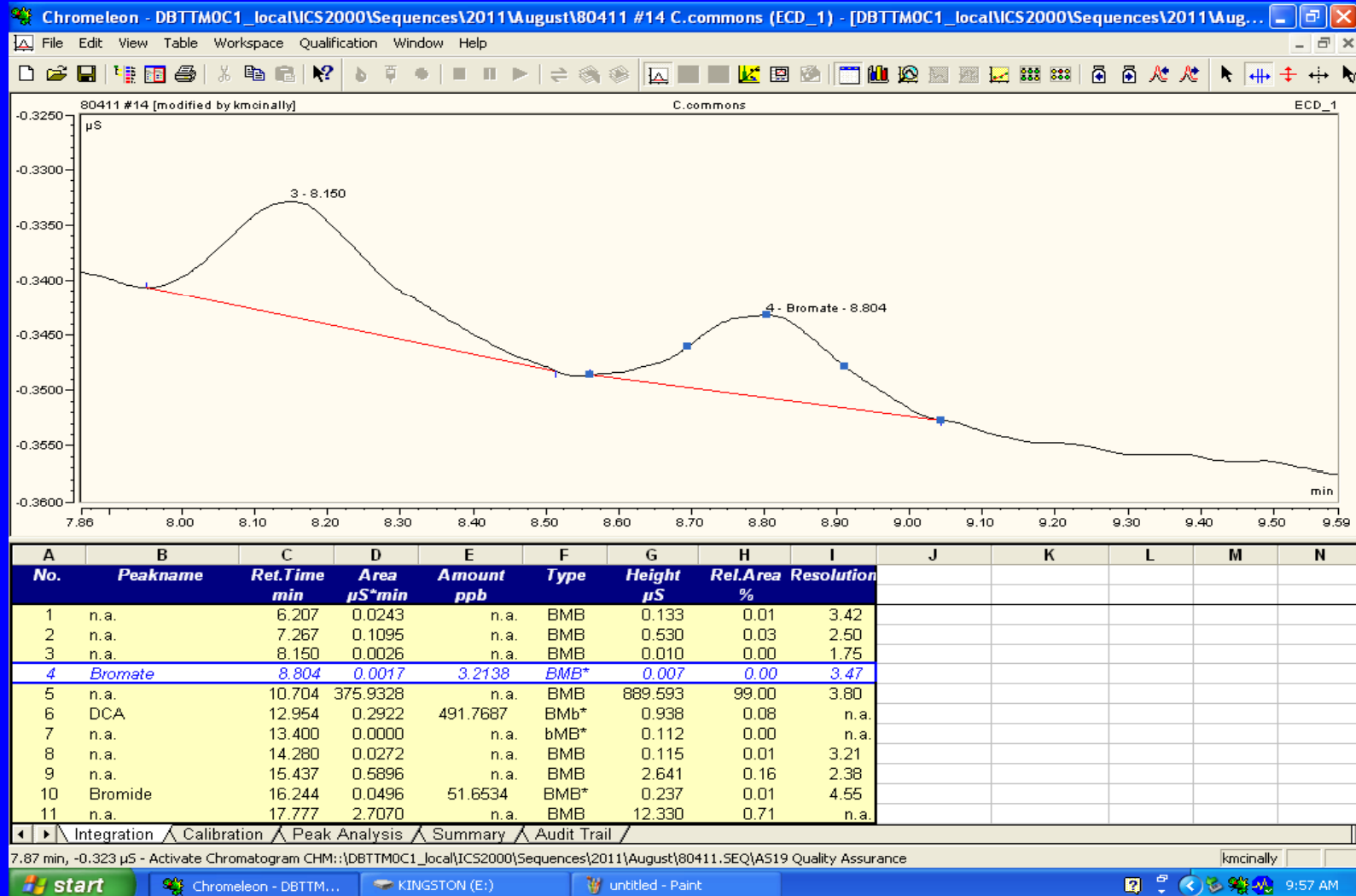
# Raw Water



# Raw water



# Finish water



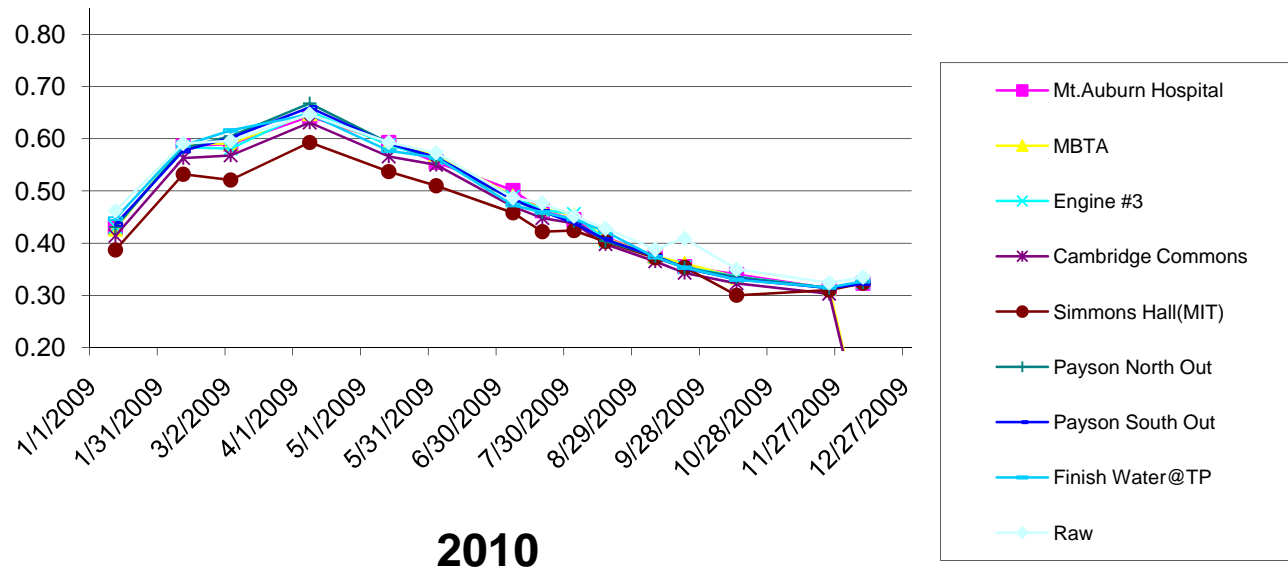




# Historical Data 2010

## Cambridge Water Department Lab.

Nitrate -Nitrogen mg/l





# Currently In-Process

- Replacement for DX 120
- Dual channel IC 5000
- Capability of running chlorides/sulfate
- and nitrites-N / nitrates-N during
- one run.

Questions ?

Thank you

# Treatment Process Schematic

