7.3 Ion Chromatography

7.3.1 Ion Chromatography (IC) Minimum Standards and Controls

The system is configured with the necessary eluent, regenerant, columns, suppressors, and detector as established by manufacturer.

7.3.1.1

Prior to each day's use, the IC system is initially flushed for 30 minutes or until an acceptable and stable baseline is established. An acceptable and stable baseline is demonstrated by showing very little fluctuation and by comparing the psi and total conductivity to previously recorded values.

7.3.1.2

An Anion standard mixture sample and/or Cation reference standard mixture sample shall be run each day of each system's use.

The appropriate reference standard is injected and the chromatogram is evaluated on the basis of relative retention times, peak resolution, baseline stability, and peak heights.

The reference standard for the anion system consists of fluoride, chloride, nitrate, sulfate, phosphate, nitrite, chlorate, iodide and perchlorate in 18.2 MΩ.cm H2O. Chlorite will be made up from bleach when necessary. The reference standard for the cation system consists of lithium, sodium, ammonium, potassium, magnesium and calcium in 18.2 MΩ.cm H2O.

The approximate calculated concentrations of each are as follows: - Note: ppm = mg/L

Anions (numbers in parenthesis are the desired range of ppm)

Fluoride - 2.5 ppm (2-6)

Chloride - 3.5 ppm (2-6)

Nitrate - 12.2 ppm (10-15)

Phosphate - 19.1 ppm (15-25)

Sulfate - 12.6 ppm (10-15)

Nitrite - 13.2 ppm (10-15)
salt used was not completely soluble)

Chlorate 13.4 ppm (10-15)

Cations

Lithium - 1.42 ppm (1-4)

Sodium - 3.32 ppm (2-5)

Ammonium - 3.83 ppm (3-6)

Potassium - 8.31 ppm (6-12)

Magnesium - 4.31 ppm (3-8)

Calcium - ~24.6 (20-30)(no exact value as

Iodide - 24.7 ppm (20-30)

Perchlorate – 37 ppm (30-50)

[Chlorite] not calculated, known bleach 1:100 and 1:1000 used

(Chlorite anions are difficult to calculate as hypochlorite exists in solution (or is converted to) mostly as chloride and chlorate.)

7.3.1.3

The following parameters are checked and recorded in a logbook: date, column used, system pressure and background conductivity. The retention times of all standard components are also recorded in the logbook.

7.3.1.4

A successful standard mixture run includes separation of peaks on System 1 and perchlorate detected in System 2. Each peak should be of approximately similar intensity and retention time to the previous day(s) of use.

7.3.1.5

Co-elution of peaks within standard mix runs on System 1 or unstable baselines on either system indicates that maintenance and/or service is needed. Remove the instrument from service and contact the Forensic Science Division equipment technician for maintenance and/or repair. Function verification shall be performed before the instrument is returned to service.

7.3.1.6

Reagent grade water (18.2 MΩ.cm) blanks shall be run between samples.

7.3.1.7

Detecting issues and trends:

As described above, the pressure in each column and the conductivity measured for each suppressor are recorded on each day of use. Trends in changes of pressure or conductivity would be noticed, indicating that the system needs to be cleaned or that the suppressor or conductivity cell may need to be replaced. The mix of anion standards is also run on each day of use and the retention times are recorded. Significant changes in retention times of peaks would be easily noticed, indicating that a column likely needs to be replaced.