National Human Exposure Assessment Survey (NHEXAS)

Maryland Study

Quality Systems and Implementation Plan for Human Exposure Assessment

Emory University
Atlanta, GA 30322

Cooperative Agreement CR 822038

Standard Operating Procedure **NHX/SOP-L03**

Title: Operation of an Ultra-High Purity Water System

Source: Harvard University/Johns Hopkins University

U.S. Environmental Protection Agency
Office of Research and Development
Human Exposure & Atmospheric Sciences Division
Human Exposure Research Branch

1. Title of Standard Operating Procedure

Harvard University/Johns Hopkins University Standard Operating Procedures:
L03 Operation of an Ultra-High Purity Water System, Rev. 1.0

2. Overview and Purpose

The purpose of this standard operating procedure is to ensure that all procedures, field and lab, utilize the highest quality water needed or available when sampling or analyzing NHEXAS samples. Using ultra-high-purity water (Milli-Q, Nanopure, or its equivalent with a resistivity more than 18 megohm) meets all applicable standards and provides further assurance that comparisons with other similarly obtained data, will be valid.

3. Discussion

In many cases, the toxic substances of interest in NHEXAS will exist at extremely low concentration levels. Although relatively large amounts of sample can be taken to help get the absolute levels above the LOD (Limit of Detection), any impurities in reagents or deionized water can reduce the precision or accuracy of the data. To minimize this potential source of contamination, a multi-cartridge polishing system is used to selectively remove all unwanted substances from the supply water and produce water of a known and reproducible quality. The supply water to the Milli-Q system is institutional capacity RO (Reverse Osmosis) water that is already very pure.

The following table compares the types of water used in the NHEXAS survey.

Type of Water	Characteristics
Milli-Q	resistivity > 18 megohms (18×10^6 ohms)
Reverse Osmosis	resistivity > 6.67×10^4 ohms (conductivity > 15 microsiemens)
DI (deionized)	
distilled	

4. Personnel Responsibilities

All personnel who use ultra-high purity water are required to ensure that the system is functioning properly; this is described in 6.1 below. The resident lab technician is responsible for changing cartridges when needed.

5. Required Equipment and Reagents

Milli-Q system or its equivalent

These permananently installed systems contain a series of selective removal cartridges for cations, anions, organics, and particles. The finished water product is usually monitored by an integral ohmmeter. In some systems only distilled or deionized water may be used as a feed and these systems have a warning light to indicate when the feed water quality is inadequate. Maintenance is minimal since the combination of meters and lights indicates when the cartridges have to be changed.

Conductivity meter, handheld

Logbook

6. Procedure

6.1 Feedwater check

Check the conductivity of the feed water supply with the handheld conductivity meter. Record the conductivity in the logbook.

If the conductivity is not below 15 microsiemens within 5 minutes of flushing, call Facilities Maintenance to rectify the situation.

6.2 Initial turn-on

Turn the Milli-Q system ON. Activate the recycling mode (if available). Wait for the high purity water meter to reach 18 megohm while making sure the warning light for the feed water does not turn on.

6.3 Usage

Occasionally observe the meter to ensure that the reading is 18 megohm or greater.

Use the Milli-Q water as needed and minimize waste. Do not leave the system power (pump) running for extended lengths of time if the water is not being used. Turn the system power off when finished.

7. Quality Assurance Procedures

These procedures are inherently part of the system operation.

8. References

Manufacturer's Operating Handbook. Millipore Corporation.