# National Human Exposure Assessment Survey (NHEXAS)

## *Arizona Study*

# Quality Systems and Implementation Plan for Human Exposure Assessment

The University of Arizona
Tucson, Arizona 85721

Cooperative Agreement CR 821560

**Standard Operating Procedure** **SOP-UA-L-3.1**

**Title:** Still Operation and Maintenance

**Source:** The University of Arizona

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

# Still Operation and Maintenance

## 1.0 Purpose and Applicability

The purpose of this SOP is to detail the operation and maintainence the deionized water still for the EPA NHEXAS and Border projects of the University of Arizona/Battelle/Illinois Institute of Technology consortia, as well as future "Health in the Environment" investigations.

## 2.0 Definitions

2.1 SOP = Standard Operating Procedure

2.2 DDW = Distilled deionized water

2.3 Distilled deionized water still = The still produces deionized, distilled water (DDW) for use in the Laboratory.

## 3.0 References

Not applicable

## 4.0 Discussion

Not applicable

## 5.0 Responsibilities

5.1 The Project Director will be responsible for:

5.1.1 Final review and approval of this procedure.

5.2 The Project Lab Supervisor will be responsible for:

5.2.1 Insuring SOP procedures are followed by the Project Lab Staff.

5.2.2 Notifying the appropriate technicians with needed repairs. In cases when the item can not be fixed in house, Project Field Coordinator will generate the appropriate paperwork, notify the appropriate vendor or company, and ship the disfunctional item.

5.3 The Project Lab Staff will be responsible for:

5.3.1 Knowing and following the procedures described in this SOP.

5.3.2 Recording the information as directed in this SOP.

5.3.3 Notifying the Project Lab Supervisor with down equipment and repair supplies needed (where applicable).

5.3.4 Providing the Project Lab Supervisor with down equipment label and isolating the down equipment into the down equipment area.

5.3.5 Insuring proper labeling techniques of down equipment.

5.3.6 Repairing the item (where applicable) in a timely matter.

## 6.0 Materials and Equipment

6.1 Equipment

6.1.1 Demineralizer cartridge
6.1.2 DDW production log Sheet (Figure 2)
6.1.3 DDW Still
6.1.4 DDW Water Usage Log (Figure 1)
6.1.5 Water supply

## 7.0 Procedure

7.1 Still Use

7.1.1 General Use Conditions

A. Log all DDW usage on the "DDW Usage Log"(figure 1).
B. Operate the still when the DDW reservoir is low.
C. Record DDW production on the "DDW Production Log"(figure 2). Note; the distilled deionized still requires close supervision during operation.

7.1.2 DDW Still Start-up

A. Ensure the water level in the boiler section is above the black block on the outside of the still (automatic shutoff sensor).
B. Open the water supply valve near the sink counter until water flows at a high enough velocity for the stream arc to land on the opposite lower corner of the sink while holding the tube horizontal.
C. Open the needle valve near the demineralizer cartridge to obtain a flow rate of just over 200 cc/min.
D. Ensure the water leaving the demineralizer enters the boiler section of the still.
E. Close the breaker on the still by lifting the large black on/off switch located on the still's far end near the wall.
F. Turn on the heaters by lifting up on the reset switch. A 'click' should be heard and the heaters should energize.
G. Check the conductivity of the demineralizer effluent and record the results of the sample in the "DDW Production Log" (figure 2). Rinse container used to sample DDW to remove any residues present. If the value is over 0.5 µmhos see 7.4.1.A and follow 7.2.1.A-K.
H. Monitor the still during operation. Failure to notice a reduction in water flow into the still may result in serious damage to the unit.

7.1.3 DDW Still Shut-down

A. De-energize heaters by pushing down on black on/off switch.
B. After boiling has ended shut water supply valve and needle valve.

C. Record the amount of water produced in the DDW production log (figure 2).

7.2 Replacing the Demineralizer Cartridge

7.2.1 Replacement procedure

A. Obtain a new, unused replacement cartridge.
B. Ensure the still is off, and water supply valve is shut.
C. Drain the demineralizer cartridge by removing demineralizer effluent tubing from boiler section, placing a container under the cartridge and opening the drain stop at the base of the unit.
D. When the demineralizer is drained, unscrew top hold-down knob and remove cartridge.
E. Ensure top and bottom rubber seals are clean and free of debris. Wet the rubber seals with clean water and install new demineralizer cartridge. Tighten hold-down knob to hold cartridge firmly in place.
F. Shut drain valve and fill demineralizer cartridge by opening water supply valve and needle valve.
G. Direct demineralizer effluent water into a container, allowing <u>one liter</u> of water to flow through the cartridge.
H. Sample demineralizer effluent water until conductivity is $\leq 0.5$ µmhos.
I. Log demineralizer cartridge change out and conductivity results in the DDW production log (figure 2).
J. Direct demineralizer effluent tube into boiler section.
K. Startup still if required, otherwise shut water supply valve and needle valve.

7.3 Calculations

Not applicable

7.4 Quality Control

7.4.1 Tolerance limits

A. DDW water is considered to be contaminated if it has a conductivity reading of > 0.5 µmhos.

7.4.2 Detection limits

Not applicable

7.4.3 Corrective Actions

A. If the water is contaminated
1. Test the batteries in the conductivity meter and replace if they are low on energy. The conductivity meter displays a low battery indicator.
2. Replace the demineralizer cartridge (7.2.1.A-K).
3. Drain the reservoir and replace with water which has flowed through the new

cartridge at the correct electroconductivity.

8.0 **Records**

8.1 Data Collected by this Procedure

8.1.1 DDW Usage and Production Log

A. All DDW usage is logged in the "DDW Usage Log" (figure 1).

B. When the still is operated, the correct log entries should be made in the "DDW Production Log" (figure 2).

8.2 Location/Placement of Forms

8.2.1 DDW Usage and Production Logs

A. The "DDW Usage Log" (Form L-3.0-1.0) and "DDW Production Log" (Form L-3.0-2.0) are kept in the vicinity of the distilled deionized water still (room 130).

Figure 1: DDW Usage log sheet

| DISTILLED DEIONIZED WATER USAGE LOG | | | | |
|---|---|---|---|---|
| Date | Tech | Amount (L) | Department | Comments |
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Figure 2: DDW production log sheet

| DISTILLED DEIONIZED WATER PRODUCTION LOG | | | |
|---|---|---|---|
| Date<br>/ / | Technician | Amount Produced (Liters) | Conductivity (Filtered Water) (micro mho) |
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Cartridge Install Date ____/____/19___
Tech Signature _____
Cartridge Lot# _____
L-3.0-2.0