

National Human Exposure Assessment Survey (NHEXAS)

Region 5 Study

Quality Systems and Implementation Plan for Human Exposure Assessment

Research Triangle Institute
Research Triangle Park, NC 27079
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Standard Operating Procedure

NHX/SOP-163-003

Title: Drying Ovens

Source: Research Triangle Institute

U.S. Environmental Protection Agency
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‡ Effective date of this version is the date of the last approval signature; revision 0 is the original version.

Standard Operating Procedure for Drying Ovens

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1.0 INTRODUCTION

Drying ovens are utilized for removing residual water and/or solvents from labware and reagents. Removal of such substances from either labware or chemicals is often necessary for successful analysis or reaction. To insure that the quality of data generated from these processes is not compromised by disfunctioning ovens, oven temperatures must be sufficiently accurate, and the ovens must be maintained in an appropriate state of cleanliness. The responsibilities for oven inspection and maintenance, and thermometer calibration, are handled by a custodian; the name of the oven custodian is on record with the unit QA Officer.

2.0 INSTRUMENTATION

Drying ovens are general-use items that are characterized by working temperature ranges of approximately 50-250°C. Units covered by this SOP include one Blue M (Model "Stabil Therm"), one Fisher (Model 349), and one Precision (Model STM 40). All units are convection ovens with heating provided by resistance elements; none is explosion-proof. Oven temperature is indicated by glass bulb thermometers for two units (Blue M and Fisher), and by gauge for one unit (Precision). Temperatures for all three units are maintained at approximately 100-150°C.

3.0 THERMOMETER/GAUGE CALIBRATION

Given the purpose of drying ovens, it is only necessary to establish the accuracy of thermometers/gauges in the 100-150°C range. For the low precision needs of these ovens,

calibration of thermometers/gauges can be conducted by measuring, with the oven thermometer/gauge, the uncorrected (for ambient pressure) temperature of boiling water. The thermometers from the Blue M and Fisher units are immersion thermometers, and should be calibrated by immersing each to the immersion mark in a beaker of at least 300 mL of rapidly boiling water. The gauge from the Precision unit is removable, and has a probe that should be immersed to a depth of approximately 5 cm in at least 300 mL of rapidly boiling water. After standing in the boiling water until a constant reading is obtained, the temperature from the thermometer/gauge is noted and recorded. The thermometer/gauge is considered sufficiently accurate for oven use if it reads $100^{\circ} \pm 5^{\circ}\text{C}$. Each oven thermometer is to be calibrated in this manner at least once per year, or each time a new thermometer/gauge is designated for use with an oven.

NOTE: Each oven thermometer/gauge is to be affixed with an identifying tag for reference purposes.

4.0 ROUTINE TEMPERATURE CHECKS

In order to insure that the oven is maintaining a constant temperature, periodic checks are to be made of thermometer/gauge readings. Such checks are to be made no less than every week. In the event that a temperature is noted that exceeds the acceptable range, the temperature will be verified with a different thermometer (also calibrated). If the second value confirms the first reading, all oven sample custodians will be notified of the problem. The staff member previously designated as responsible for the oven will restore the unit to working specifications.

5.0 ROUTINE MAINTENANCE

To maintain the ovens in a safe condition, and to prevent potential contamination of items/chemicals in the ovens, each oven will be inspected and cleaned at least once per month. The oven custodian is responsible for these activities. Cleaning involves removal of

any foreign material, such as chemical spills or dust, and any items not related to ongoing programs.

6.0 NONROUTINE MAINTENANCE

In the event of oven failure or malfunction, the oven custodian is responsible for effecting appropriate repairs in order to return the oven to working specifications. The custodian will also ensure that the unit is not used until it is returned to an acceptable working state. Following any repairs, it must be demonstrated (and documented) that the oven operates at its normal temperature range. This is accomplished by monitoring oven temperature (hourly), with a recently calibrated thermometer/gauge, over a period of at least 6 hours, followed by daily temperature checks for a period of at least three days.

7.0 DOCUMENTATION

A hard-bound book must be maintained for oven records. All calibration activities (date of calibration, name of person performing the calibration, results of the calibration) must be recorded. For routine temperature checks, the temperature, date, and name of recorder must be entered in the logbook. Inspection and cleaning activities (date, name of cleaner, description of cleaning operations) also are to be noted in the instrument logbook. The book shall be kept in close proximity to the oven.