Title: General Operations, Safety and Housekeeping Practices in the ICP-MS Laboratories		Copy No: ##
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General Operations, Safety and Housekeeping Practices in the ICP-MS Laboratories

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1 INTRODUCTION and SCOPE

1.1 The ICP-MS laboratory consists of sample preparation lab and instrument lab, the latter is equipped with an Agilent 7500ce Inductively Coupled Plasma Mass Spectrometer (ICP-MS) and other instruments, such as Capillary Electrophoresis Mass Spectrometer (CE-MS), Liquid Chromatography Mass Spectrometer (LC-MS) and a Gas Chromatograph (GC). The entrance/exit to the hallway is located in the sample preparation lab.

1.2 The ICP-MS laboratories are class 100,000 laboratories, which conduct sample preparation and analysis of metal ions and other compounds at parts per billion level (μg/L) and under. It is therefore very important to apply extra precautions in daily operations and housekeeping practices in order to prevent potential contamination and/or cross-contamination. One source of contamination is from the materials used in the lab. A rule of thumb is to avoid using unnecessary metallic and fabric items in the lab. Another source of contamination comes from the analysts and how they operate in the lab. Adherence to the following procedures will minimize the risk of contamination and/or cross contamination.

2 GENERAL OPERATIONS AND SAFETY

2.1 When entering the laboratories, visitors and analysts must change to a clean lab coat designated for use inside the ICP-MS laboratories (clean, disposable lab coats will be provided from the ICP-MS laboratory) and walk through an entryway mat (sticky mat), which is set at the entering path in the sample preparation lab.

2.2 Lab coat should be worn all the time in the laboratories, and cannot be taken outside the laboratories and brought back in.

2.3 Gloves should be worn all the time in sample preparation lab when handling chemicals and samples. Only powder-free gloves should be used.

2.4 Change gloves after handling "dirty" samples in order to avoid the gloves' becoming a contamination source.

2.5 Safety goggles should be worn all the time in the sample preparation lab. Safety goggles should also be worn in the instrument lab when performing sample introduction to the ICP-MS and other instruments.

2.6 All standard solutions and samples should be prepared in the Trace Metal Work Station (provides Class 100 air), and all bottles containing standards or certified reference materials should be opened in the Trace Metal Work Station.

2.7 Labware used for solution and sample preparation should be air dried in the Trace Metal Work Station.

2.8 Shorts and open-toed shoes are prohibited in the laboratories.

2.9 Eating, drinking, chewing gum, applying cosmetics, taking medicine or storing food are not allowed in the laboratories.

2.10 Wearing of make-up or jewelry should be limited to minimum in the laboratories.

2.11 Use of dandruff shampoo (contains zinc compounds) is discouraged. If one has to use this type of shampoo, then a polypropylene cap must be worn all the time in the laboratories.

2.12 Never use gloved hands to open the doors, to use the computers, phones, or to take laboratory notes.

2.13 Unnecessary entering and leaving the labs should be avoided.

3 HOUSEKEEPING

3.1 On a regular basis, the analysts should clean the laboratories.

3.2 The laboratories' benchtop surfaces should be wiped once a week with a wet lint-free towel, and the floors should be damp mopped once every month or as required, with a lint-free mop dedicated to the laboratories.

3.3 The squeeze bottle that contains deionized water, the clean graduated cylinders and all other opened clean vials should be kept in the Trace Metal Work Station.

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The capped clean vials, bottles and volumetric flasks should be kept in the designated boxes and shelves.

3.4 The pipettes should not be taken out of the ICP-MS laboratories.

4 APPLICABLE SOPs

SWP-001/*.*, "Safe Working Procedures and Policies", Analysis and Air Quality Division.

5 REVISIONS

September 2003: Author Heidi Chen. New document 6.11/1.0/S

December 2004: Reviewer Heidi Chen

Section 1: lab description was added to as 1.1; 1.2 includes addition of avoid using "fabric items" in the lab, and addition of "Another source of contamination comes from the analysts and how they operate in the lab"; Section 2: sequence was modified, e.g., part of 2.11 about visitors entering the lab was moved ahead as 2.1, all the rest sequence was changed as a result; 2.1 also includes addition of the rules for analysts entering the lab, as well as that of walking through an entryway mat (sticky mat) into the lab; 2.2 includes addition that the lab coat "cannot be taken outside the laboratories and brought back in"; 2.3 includes addition that "Only powder-free gloves should be used; 2.4 includes addition of the reason why gloves need to be changed after handling "dirty" samples; 2.5 includes addition of when to wear safety goggles in the instrument lab; 2.6 includes addition that "all bottles containing standards or certified reference materials should be opened in the Trace Metal Work Station", and also the description about Trace Metal Work Station as "provides Class 100 air"; addition of 2.10, 2.11; modification of rules on stationary in the lab (2.13). Section 3: 3.2 includes addition of using "lint-free" towel and mop for cleaning, also the frequency of mopping the lab was changed to "once every month"; 3.3 includes addition of "clean graduated cylinders, the pipette tips" that should be kept in the Trace Metal Work Station; 3.4 was removed and replaced by "The pipettes should not be taken out of the ICP-MS laboratories".

April 2007: Reviewer: Valbona Celo

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Section 2.12 includes addition of "computers and phones"

July 2010: Reviewer: Valbona Celo, Irina Okonskaia

Section 1.1: Instrument changed to 7500ce system; Section 2.4: statement: It is recommended to change gloves before entering the ICP-MS lab is deleted; Section 2.13 is deleted; Section 3.3: deleted "pipette tips" and added "all other opened clean vials". Added: "The capped clean vials, bottles and volumetric flasks should be kept in the designated boxes and shelves."

October 2012: Reviewer: Valbona Celo

No changes were made

6 REFERENCES

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Milestone duoPUR Subboiling Distillation System for Ultrapure Reagents: User Manual, Rev. 1, 2001, Milestone Inc., CT, USA

John R. Moody (1982), "NBS Clean Laboratories for Trace Element Analysis", *Anal. Chem*, **54**(13): 1358A-1376A.

Robert Richter (2003), Clean Chemistry – Techniques for the Modern Laboratory Milestone Press, Monroe, CT, USA, 96pp.

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