

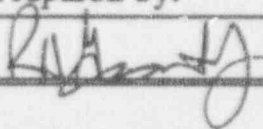

Applied Radiological Control, Inc.

CHEMISTRY PROCEDURE

TITLE Mobile Chemistry Lab and Counting Lab Check Off List

NUMBER 1.0

REVISION NUMBER 0

Prepared by:	Approved:
	

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APPLIED RADIOLOGICAL CONTROL, INC.

CHEMISTRY PROCEDURE 1.0

1.0 MOBILE CHEMISTRY LAB AND COUNTING LAB CHECK OFF LIST

1.1 Discussion:

The mobile chemistry lab and counting lab check off list will be used to ensure a safe, efficient and reliable working environment. The tasks shall be performed as the frequency is indicated for each. The weekly lab balance calibration checks and the monthly pipette calibration checks will be performed as per their procedures.

1.2 Prerequisites:

- a. Portable air compressor
- b. Portable Eye Wash Station
- c. Denver Instrument Co. XL 1800 Balance
- d. Denver Instrument Co. A-200DS Balance
- e. Eppendorf Model 4700 Pipettes
- f. Oxford P-7000 Pipette
- g. First Alert Smoke Detectors
- h. Distilled Water
- i. Vaneometer
- j. Canberra Gamma and Alpha Spectroscopy System

1.3 Procedure:

- a. Perform task as listed on the Mobile Chemistry Lab and Counting Lab Check Off List.
- b. Initial Check off list when the task is completed.
- c. Sign, date and submit the Mobile Chemistry Lab and Counting Lab Check Off List for review.

MOBILE CHEMISTRY LAB CHECK OFF LIST

WEEK ENDING _____

JOB DESCRIPTION								
	MON	TUE	WED	THU	FRI	SAT	SUN	FREQUENCY
Maintain an adequate supply of distilled water	*	*	*	*	*	*	*	Daily
Perform fume hood velocity check with Vancometer	*	*	*	*	*	*	*	Daily
Clean fume hood and general housekeeping					*			Weekly
Blowdown portable air compressor	*							Weekly
Test portable eye wash station and initial inspection tag		*						Weekly
Inspect fume hood blower assembly			*					Weekly
Test smoke detectors				*				Weekly
Perform calibration checks on lab balances				*				Weekly
Perform inventory and order supplies as needed	*							Weekly
Perform calibration checks on pipettes								Monthly
Technician		Date		Reviewed by				Date

Figure 1.1

MOBILE CHEMISTRY LAB CHECK OFF LIST

WEEK ENDING _____

JOB DESCRIPTION								
	MON	TUE	WED	THU	FRI	SAT	SUN	FREQUENCY
Pulser check on Alpha Spectroscopy System	*	*	*	*	*	*	*	Daily
Calibration Check on Gamma Spectroscopy System	*	*	*	*	*	*	*	Daily
Calibration Check on Alpha Spectroscopy System	*							Weekly
Background Check on Gamma Spectroscopy System					*			Weekly
Background Check on Alpha Spectroscopy System					*			Weekly
Fill Cryostat with Liquid Nitrogen	*							Weekly
Perform Radiological Survey on the Chemistry Lab					*			Weekly
Technician		Date		Reviewed by				Date

Figure 1.1

1.4 Pipette Maintenance and Calibration Check

1.4.1 Purpose:

To provide a maintenance plan and a method to access sampling error for Oxford and Eppendorf automatic pipettors used in the mobile chemistry laboratory.

1.4.2 Discussion:

The mobile chemistry laboratory uses automatic adjustable-volume Eppendorf pipettors. The Eppendorf 4700 pipettors have smooth grips, thumb buttons with three stops which eject tips on the third stop. Eppendorf 4700 incorporates an adjustable-volume feature. The blue cap Eppendorf 4700 pipettor can transfer volumes of 100, 200 and 250 microliter. By depressing the thumb button to the first stop, adjust the blue cap to the desired range. The yellow cap Eppendorf 4700 can transfer volumes of 10, 20 and 25 microliter. Adjustment is the same as the blue cap Eppendorf 4700. The Oxford P-7000 pipettor has a grip with ridges, a thumb button with two stops and a smaller thumb button used to eject tips. This pipettor can transfer volumes of one milliliter. The calibration of these instruments should be checked monthly in accordance with the Mobile Chemistry Lab Check off List.

1.4.3 Reference:

- a. Eppendorf 4700 Instruction Manual
- b. Oxford P-7000 Instruction Manual

1.4.4 Precautions:

- a. Eppendorf plunger should activate smoothly. If motion is jerky, consult the manual on cleaning and lubrication. The most common problem is that the O-ring and piston need cleaning.
- b. Oxford plunger should activate smoothly. To ensure this, before each days use, vigorously operate the plunger handle approximately ten times. This will redistribute the lubricant and ensure a smooth positive action.
- c. Tip should be new, clean and securely attached to the pipettor.

NOTE: Reused tips sometimes lose their surfactant coating and give false volumes.

1.4.5 Equipment and Materials:

- a. Appropriate pipettors and tips.
- b. 20 ml disposable micro beakers.
- c. Beaker of distilled water.
- d. Calibrated Denver Instrument Co. A-200DS Balance.

1.4.6 Procedure:

- a. Seat tip to pipetter.
- b. Put micro beaker on balance.
- c. Tare balance.
- d. Pipette volume into micro beaker.
- e. Record weighed volume on the Pipette Calibration Check Form.
- f. Repeat steps three, four, and five a total of fifteen times.
- g. Obtain a total weight by sum of the fifteen weighed volumes.
- h. Record the total weight on the Pipette Calibration Check Form. (Fig. 1.2)
- i. Obtain an average weighed volume by dividing the total weight by fifteen.
- j. Record the average weighed volume on the Pipette Calibration Check Form.
- k. Calculate the percent error by:

$$\frac{\text{Average weighed volume} - \text{Stated volume of pipette}}{\text{Stated volume of pipette}} \times 100$$

- l. Record percent error on the Pipette Calibration Check Form.
- m. Sign, date, and submit the Pipette Calibration Check Form for review.

1.4.7 Acceptance Criteria:

For all volumes 10 to 1000 microliter, the allowed percent is ± 6.0 .

PIPETTE CALIBRATION CHECK FORM					
PIPETTE: _____ microliter					
Weighed Volumes:					
1		6		11	
2		7		12	
3		8		13	
4		9		14	
5		10		15	
Total Weight _____ g					
Average Weighed Volume _____ g					
Percent Error _____ %					
Analyst _____				Date _____	
Reviewed by _____				Date _____	

PIPETTE CALIBRATION CHECK FORM					
PIPETTE: _____ microliter					
Weighed Volumes:					
1		6		11	
2		7		12	
3		8		13	
4		9		14	
5		10		15	
Total Weight _____ g					
Average Weighed Volume _____ g					
Percent Error _____ %					
Analyst _____				Date _____	
Reviewed by _____				Date _____	

Figure 1.2

1.5 The Denver Instrument Co. XL-1800 Balance

1.5.1 Discussion:

The Denver Instrument Co. XL-1800 Balance is used for general weighing analysis in the mobile chemistry laboratory. Electronic operation and digital readout make it well suited to routine reagent preparation and other related procedures. The range of 0.01 grams to 1800 grams will meet most requirements in the chemistry lab.

1.5.2 Reference:

The Denver Instrument Co. XL-1800 Operating Instructions.

1.5.3 Precautions:

- a. Avoid spilling chemicals on the balance.
- b. Do not overload balance - 1800 grams.
- c. Handle standard weights with forceps only.

1.5.4 Prerequisites:

- a. Apparatus Required:
 1. Denver Instrument Co. XL-1800 Balance
 2. 20 gram standard weight
 3. 100 gram standard weight
- b. Material to be weighed.

1.5.5 Procedure:

- a. Regular weighing
 1. Assure balance is on the 0.01 g to 1800 g range.
 2. Set weight indication to zero by depressing the tare sensor.
 3. Place object to be weighed on balance pan and read weight off digital meter.
- b. Weighing with tare
 1. Assure balance is on the 0.01 g to 1800 g range.
 2. Place tare container on balance pan. Depress tare sensor to set digital meter to zero.
 3. Place sample material in tare container and record weight off digital meter.
- c. Weekly Calibration Check of Denver Instrument Co. XL-1800 Balance.
 1. Weekly the calibration of the Denver Instrument Co. XL-1800 should be checked using a 20 gram and a 100 g weight.
 - i. Assure balance is on the 0.01 g to 1800 g range.

- ii. Depress tare sensor to set digital meter to zero.
- iii. In turn, weigh the 20 gram standard weight.
- iv. Record the result on the Weekly Lab Balance Check Form. (Fig. 1.3)
- v. Repeat steps ii, iii and iv using the 100 gram standard weight.
- vi. Calculate the percent error:
$$\frac{\text{Measured Weight} - \text{Standard Weight}}{\text{Standard Weight}} \times 100$$
- vii. Record percent error on the Weekly Lab Balance Check Form.
- viii. Sign, date and submit the Weekly Lab Balance Check form for review.

1.5.6 Acceptance Criteria:

- a. For the standard weights, the allowed percent error is ± 5.0 .

WEEKLY LAB BALANCE CHECK FORM

BALANCE: A-200DS		MEASUREMENT	% ERROR
STD WEIGHT:	20 mg	mg	
	20 g	g	
	100 g	g	
Analyst:			Date:
Reviewed by:			Date:

BALANCE: XL-1800		MEASUREMENT	% ERROR
STD WEIGHT:	20 g	g	
	100 g	g	
Analyst:			Date:
Reviewed by:			Date:

WEEKLY LAB BALANCE CHECK FORM

BALANCE: A-200DS		MEASUREMENT	% ERROR
STD WEIGHT:	20 mg	mg	
	20 g	g	
	100 g	g	
Analyst:			Date:
Reviewed by:			Date:

BALANCE: XL-1800		MEASUREMENT	% ERROR
STD WEIGHT:	20 g	g	
	100 g	g	
Analyst:			Date:
Reviewed by:			Date:

Figure 1.3

1.6 THE DENVER INSTRUMENT CO. A-200DS BALANCE

1.6.1 Discussion:

The Denver Instrument Co. A-200DS balance is a precision laboratory instrument featuring a digital display, message display, two operating ranges, automatic internal calibration and auto zero and tare. The dual range feature allows the operator to select either 31 gram capacity with a readability of 0.01 milligrams or 200 gram capacity with a readability of 0.1 milligrams. The balance incorporates an autorange feature which allows the balance to change range when fine range capacity is exceeded. The maximum tare capacity and maximum weighing capacity is 200 grams. The balance should be calibration checked weekly using the 1.0 milligram, 20 milligram, 20 gram and 100 gram standard weights.

1.6.2 Reference:

The Denver Instrument Co. A-200DS Operating Instructions.

1.6.3 Precautions:

- a. Do not place any items or lean on the balance during weighing operations as this will affect measurements.
- b. Avoid spilling chemicals on the balance.
- c. Do not overload the balance - 200 grams
- d. Handle standard weights with forceps only.

1.6.4 Prerequisites:

- a. Apparatus Required:
 1. Denver Instrument Co. A-200DS Balance
 2. 1.0 milligram std weight
 3. 20 milligram standard weight
 4. 20 gram standard weight
 5. 100 gram standard weight
- b. Material to be weighed.
- c. Balance leveled.

1.6.5 Procedure:

- a. Weight Determination
 1. Press the on/off switch
 2. The balance should always be in the auto range. If not, consult operating instructions page 33.
 3. Press the tare switch to zero the balance.
 4. Place an unknown mass on the center of the weighing pan. When the message display changes from "GRAM U" to "GRAM" it is now stable and the weight will be displayed.
- b. Tare Function

1. Press the on/off switch
2. Tare the balance by placing an empty container on the center of the weighing pan and pressing the tare switch. When the message display changes from "TARING" to "GRAM" the balance is properly tared.

c. Weekly Calibration Check

1. Perform steps 1.a. - 1.c. above
2. Placing the standard weights at the center of the weighing pan, weigh the standard weights.
3. Record the results on the Weekly Lab Balance Check Form.
4. Calculate the percent error:

$$\frac{\text{Measured weight} - \text{Standard weight}}{\text{Standard Weight}} \times 100$$

5. Record percent error on the Weekly Lab Balance Calibration Form for review.

NOTE: For the Internal Automatic Calibration consult the operation instructions beginning on Page 18.

1.6.6 Acceptance Criteria:

- a. For the standard weights the allowed percent error is ± 5.0