

BROOKHAVEN NATIONAL LABORATORY Safety & Health Services Division - Industrial Hygiene Group Standard Operating Procedure		Number	IH75190
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IH75190

Surface Wipe Sampling for Metals

1.0 Purpose & Scope This document describes a field procedure for taking wipe samples for metals on surfaces. It is based on methodology described in NIOSH 9100 “Lead in Surface Wipe Samples” of the NIOSH Manual of Analytical Methods.

The goal of the procedure is to provide a uniform methodology to collect representative samples. Using this method will ensure repeatability between various sampling personnel and between surface configurations. It is used for characterizing surface levels for the following reasons:

- Decommissioning operational areas
- Evaluating the effectiveness of clean-up of a spill
- Evaluating compliance with housekeeping levels in operational areas
- Characterizing a piece of equipment for release.



2.0 Responsibilities

- 2.1 **Demonstrated Competency:** This procedure is administered through persons who have demonstrated competency in performing this procedure in accordance with Section 7 are qualified to use this procedure.
- 2.2 **Chain of Custody procedures:** The qualified sampler is responsible for samples until they have been properly transferred to the IH Group laboratory using the *IH51200 IH Laboratory Equipment & Sample Processing* procedure.
- 2.3 **Hazard Analysis of the Sampling Task:** It is the responsibility of persons using this method and their supervisors to:
 - Use appropriate personal protective equipment; see section 5.3.
 - Obtain required training and qualification for hazards in areas.
 - Comply with all work planning and work permit system requirements.

3.0 Definitions

Surface Wipe- a technique for the determination of metal on surfaces conducted by wiping the loose dust from the surface with a cloth/paper media and analysis of the metal on the media by laboratory or XRF measurement.

Definitions associated with surface wipe criteria are cited in Attachment 9.3

4.0 Prerequisites

Area Access:

- 4.1 Training for hazards may be needed for entry into areas with hazards, such as radiological areas..

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- 4.2 Contact the appropriate Facility Support Representative or Technician to obtain approval to enter radiological areas.
- 4.3 Review and sign the Work Permit or Radiological Work Permit if needed.
- 4.4 Use appropriate PPE for area.

5.0 Precautions

- 5.1 **Hazard assessment:** Taking surface wipe samples may cause some exposure to health risks. Sampling may be performed in areas with metal, chemical or radiological contamination. These hazards must be assessed on a case-by-case basis by a competent individual knowledgeable of the hazards of the area.
- 5.2 **Job Risk Assessment:** Consult the *Job Risk Assessment* [SHSD-JRA-05](#) for the risk analysis of this operation based on the hazards and controls of this SOP.
- 5.3 **Personal Protective Equipment:** Use appropriate personal protective equipment when implementing this procedure.
 - **Hand:** Use gloves in areas of known or suspected metal, chemical or radiological contamination. Exam-style, splash gloves are acceptable. Acceptable polymers are: Nitrile, PVC, and Natural Rubber. The gloves must have sufficient impermeability to the surface contaminant and solvent used on the collection media to allow safe handling. See Table 1.
 - **Body:** Use a disposable suit if contact of the body with contaminated surfaces is anticipated. Acceptable chemical protective equipment materials include: Tyvek®, KleenGuard®, and cotton. Contact the ECR for disposable of garments. If personal clothing items become contaminated, they must be surrender for BNL cleaning or disposal.
 - **Foot:** Use disposable shoe coverings, boots or booties if contact of the feet with contaminated surfaces is anticipated. Acceptable material include: Tyvek®, KleenGuard®, and rubber. If personal shoes become contaminated, they must be surrendered for BNL cleaning or disposal.
 - **Respiratory:** Under normal use, respiratory protection is not required. Use a respirator in an area with the potential to exceed the OSHA, ACGIH, or DOE standards. The person collecting using respiratory protection must comply with the BNL Respiratory Protection Program.
 - **Eye:** Use safety glasses with side shields in laboratories, construction, and general industry areas.
- 5.4 **Radioactive Concerns:** It is possible that some surfaces to be tested may have radioactive contamination. In these cases, personal protective equipment and administrative controls must be implemented for the radiological contaminant hazard.

In addition, the collected sample must be analyzed for the radiological hazard before it can be submitted to the IH Group for analysis. The radiological contamination must be below the permissible release limits to the general public.
- 5.5 **Work Planning:** All requirements of work permits and work planning system reviews must be met in performing this procedure.
- 5.6 **Personal Hygiene:** Remove PPE and wash hands after sampling and before eating or drinking.

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5.7 **Environmental Impact and Waste Disposal:** This technique does not have adverse impact on the environment. Based on WMD testing of similar PPE material, the templates and gloves can be disposed as normal trash. See Attachment 9.4.

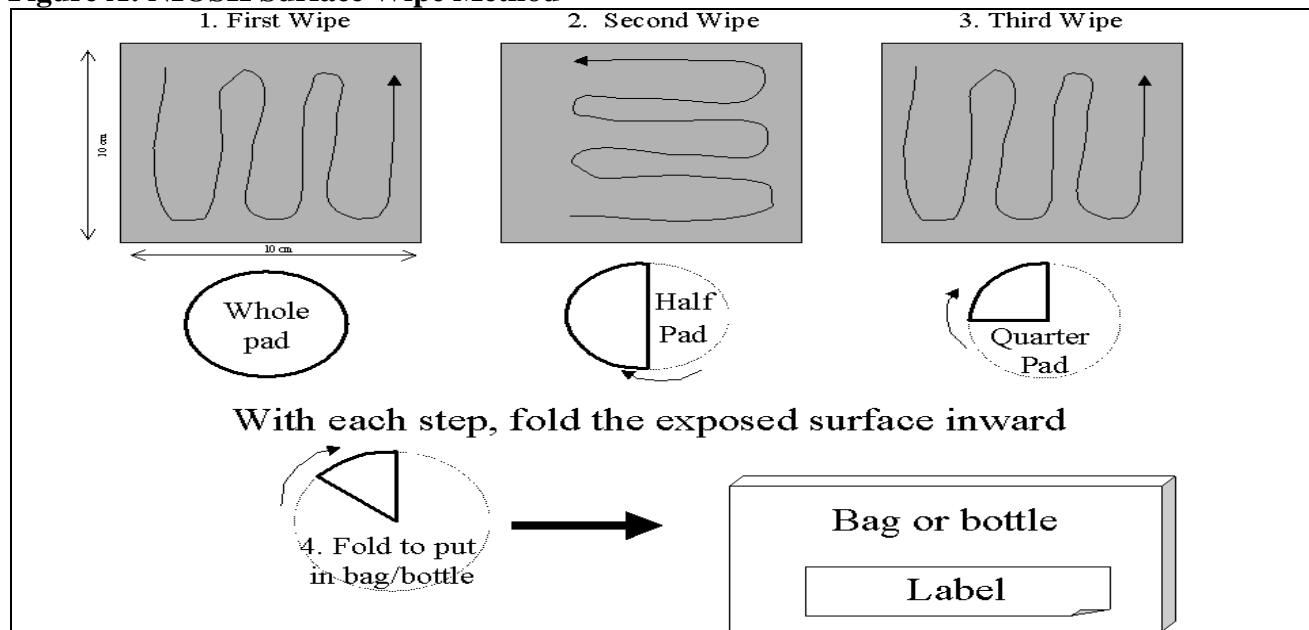
6.0 Procedure

6.1 Equipment

Sample container (either):	Bag, plastic, sealable with “zip” type seal.
	Vial, glass or plastic. (Glass is needed for hexane solvents based samples).
Sample media (any of these):	Gauze: 2” x 2” or 4” x 4” cotton gauze
	Paper: Ashless quantitative filter paper (typical diameter is 1.5 to 4 inches)
	Pre-moistened wipe: manufacturer foil wrapped, solvent soaked disposable cloths (such as GhostWipes™ or LeadWipe™) <ul style="list-style-type: none"> The type of wipe is dependent on the lab to be used. Check with the lab for appropriate media for the metals to be analyzed. For multiple metals, check with the lab to ensure they can all be done on a single wipe
Gloves	Appropriate for contaminant and solvent (see Table 1) and site hazards.
Solvent	Distilled water, Isopropanol, ethanol, methanol, n-hexane, or pre-moistened. See Table 1 for recommended solvent for each contaminant.
Template	Plastic sheet or cardboard: See Table 1 for size needed <ul style="list-style-type: none"> 100cm²: 10 cm x 10 cm square –or- circle of 11.24 cm diameter. 1ft²: 1foot x 1 foot, or other shape totaling 144 in².

6.2. **Wipe Technique:** BNL SHSD IH Group has selected the NIOSH method of collecting wipe samples. For uniformity, this method should be used for all sampling surface to be sampled (Visually depicted in Figure A)

Figure A: NIOSH Surface Wipe Method



6.2.1 Use a moistened sample media or pre-moistened wipe (e.g. GhostWipe™). Apply only enough solvent to moisten approximately 80% of the area of the media. Avoid excess

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solvent on the filter or pad as it may cause drips and running on the surface thus diluting the sample.

Contaminant	Media ⁽¹⁾	Solvent ⁽²⁾	PPE Glove ⁽²⁾ Disposable Style	Sample Size
Lead	Gauze or Filter	1 -2 ml Distilled Water	Natural Latex Rubber, Nitrile, PVC, or Polyethylene	1 square foot, 100 cm ² requires advanced approval by IH professional verifying that sensitivity is adequate
	Pre-moistened Wipe (should be cut in half) ⁽³⁾	n/a		
Beryllium	Gauze or Filter	1 - 2 ml Distilled Water Isopropanol, Methanol, Ethanol	Natural Latex Rubber, Nitrile, PVC, or Polyethylene	1 square foot minimum needed always
	Pre-moistened Wipe (should be cut in half) ⁽⁴⁾	n/a		
Arsenic, Cadmium	Gauze or Filter	1-2 ml of Distilled Water	Natural Latex Rubber, Nitrile, PVC, or Polyethylene	100 cm ² typically acceptable
	Pre-moistened Wipe (should be cut in half) ⁽⁴⁾	n/a		
Hexavalent Chromium	Preferred Medias: See Attachment 9.2	None: For chrome plating operations, see stabilizing solution in Attachment 9.2.	Powderless: Natural Latex Rubber, Nitrile, PVC, or Polyethylene	100 cm ² typically acceptable

Notes for Table 1:

- (1) Some pre-moistened media may not be compatible is certain laboratory analytical equipment. Check with the laboratory analyzing the samples prior to sampling to ensure the brand of media is compatible.
- (2) Solvent: The solvent is not critical for lead, beryllium, and most heavy metals such as cadmium, nickel, and chromium. In doing wipes for these compounds, it is allowable to choose the solvent that will have the least impact (residues) on the owner of the equipment being sampled (i.e. some equipment is sensitive to water residues and an alcohol or other solvent may be preferred by the equipment owner.)
- (3) Selection criteria: Breakthrough time greater than 1 hour of continuous contact. Source of data is *DOE Guidelines for the Selection of Chemical Protective Clothing, 1991*.
- (4) The use of full size pre-moistened may cause the sample not to meet the minimum level of detection. To increase sensitivity, cut wipe in half to reduce the size of the wipe.

6.2.2 Place the template over the area to be sampled or measure out 1 ft² or 100-cm² surface area, as per Table 1. If the object has a total surface area of less than 1 ft² or 100 cm², sample the whole surface area, if possible, and record the surface area. If the surface does not allow the use of a template, carefully determine the dimensions that will equal 1 ft² or 100 cm².

6.2.3 Wipe the surface with firm pressure, using “S” strokes, covering the entire surface (edge to edge). If the surface is very rough (such as concrete), a dabbing action may be substituted for the full contact pressure rubbing of the media across the surface. When dabbing, make sure to completely cover the same area as in the S-stroke wipe. Indicate dabbing done on sample form.

Fold the exposed side of the pad or filter inward (i.e. fold in half).

6.2.4 Using the once-folded media, wipe the same area S-strokes (see Figure A), starting at right angles to the first wipe. Fold the exposed side of the pad or filter inward.

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- 6.2.5 Using the twice-folded media, wipe with S-strokes (see Figure A) starting at the original point and wipe in the same direction. Fold the exposed side of the pad or filter in.
- 6.2.6 Place the media in a plastic bag or vial. Seal the zip lock or vial. Record the sample identification on the bag or vial.
- 6.2.7 Thoroughly clean reusable templates or discard paper templates in preparation of the next sample. Based on WMD testing of similar material, templates can be disposed as normal trash.
- 6.2.8 Remove gloves by pulling them off inside-out and discard appropriately before handling the next filter or pad.
- 6.2.9 Record the sample identification, surface area sampled, and description of the sample and surface on the sample form (Attachment 9.5) in the electronic [SHSD forms](#) page **Surface Wipe (Metals)- Field Sampling Records & Chain of Custody.**
- 6.2.10 Include 1 blank filter or pad (moisten and placed in bags or vials) with each set of samples (provide 1 blank per 6 samples).

6.3 Surface Wipe Technique for Hexavalent Chromium: see Attachment 9.2.

6.4 Determine HOW MANY samples to take. It is not possible to provide definitive guidance on the number of samples to be taken in every case. Table 2 provides general guidance on which to base professional judgment determining the number of samples. Factors that should be considered in selecting the number of samples include: the size of the area to be tested, the predicted uniformity of contamination over the surface area, and the eventual fate of the surface area (disposal, remediation, background measurement, etc.)

If more than six (6) samples are to be taken, it is suggested that at least one (1) duplicate sample be taken in close proximity to one other to verify the precision (repeatability) of the sampling.

Surface Configuration	Minimum Number of Samples	Qualifier
Entire Surface is less than 100 cm ² (example: a small article)	1	If possible, sample the whole item, one sample is usually sufficient.
Surface Area of object or area is greater than 100 cm ² but only a few square feet (example: table top on which a process is done)	1	If only one sample is taken, select the area with highest potential contamination
Surface Area of object or area is greater than a few square feet (example: floor or wall of a room)	1 - 3	Ideally three samples are taken, but fewer samples may be taken depending on the purpose for sampling

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Table 2: Statistical sampling plan		
Surface Configuration	Minimum Number of Samples	Qualifier
Multiple surfaces in a large area with the same exposure potential to source (example, many rooms in a building with a common source such as the HVAC system)	1 – 3 for each surface, 6 or more for the whole area	Assumes all the surfaces have similar exposure potential, else treat each area separately.

- 6.5 Determine WHAT KIND of samples (LOCATION). Consider these locations when characterizing levels of surface metals:
- surfaces that are frequently accessed,
 - surfaces that hazardous metal object rest on,
 - surfaces that are infrequently cleaned or disturbed (such as top of cabinets or high shelves)
 - sources of the contamination (such as process equipment, lab apparatus, site of known spills),
 - areas where contamination is not expected (these serve as a control), and
 - areas where contamination would not be permissible (such as lunch rooms).

- 6.6 **Results interpretation:** Normalize the units of sampling results from the laboratory to the base units of the Surface Level Criteria Requirements & Recommendations listed in Attachment 9.3.

Conversion of data between various laboratory reporting units of measures: Data can be converted from the various regulatory reporting and laboratory reporting units of measure based on the following values: 1 sq.ft. = 929 cm² 1 mg = 1000 ug

Convert from:	Multiply by
ug/100 cm² to ug/sq. ft	9.29
ug/sq. ft to ug/100 cm²	0.1076

- 6.7 **Posting equipment or areas:** Consult with Attachment 9.1 for recommended wording to be used for labelling equipment or areas when a warning is needed for toxic metal hazards.
- 6.8 **Reporting results:** Convey the assessment of results to the requestor of the sampling, in a written analysis documenting: sampling and analysis methods, contamination levels measured, compliance with regulatory and recommended levels, and recommended corrective actions (if necessary).

7.0 Implementation and Training

Qualification Criteria: Use of this SOP is limited to persons who have demonstrated the competency to satisfactorily use the procedure, as evidenced by experience and training. All persons must have demonstrated competency in the qualification criteria set in the Job Performance Measure (Attachment 9.6.) or [e-Exam IH75190](#). Qualification on this JPM is required on a 3 year basis.

8.0 References

- 8.1 ACGIH: Threshold Limit Values 2005
- 8.2 DOE: 10CFR 850 Chronic Beryllium Disease Prevention Program
- 8.3 EPA: Toxic Substance Control Act (TSCA) 40CFR745.227

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- 8.4 Ness, S.A.; *Surface and Dermal Monitoring for Toxic Exposures*, Van Nostrand Reinhold, 1994.
- 8.5 NIOSH: Manual of Analytical Method, Method 9100: *Lead in Surface Wipe Samples*.
- 8.6 OSHA: 29CFR1910.1000 Table Z1, Z2; and 1910.1027.
- 8.7 OSHA: Technical Manual Section II, Chapter 2.

9.0 Attachments

- 9.1 Sample of Signs for Areas and Equipment
- 9.2 Wipe Sampling Technique for Hexavalent Chromium
- 9.3 Surface Wipe Criteria Requirements & Recommendations
- 9.4 Environmental Evaluation of Surface Wipe Sampling
- 9.5 Sample of Surface Contamination Sampling Form
- 9.6 SHSD Job Performance Measure (JPM) Completion Certificate

10.0 Procedure Documentation

ISM Review - Hazard Categorization:	<input type="checkbox"/> High;	<input checked="" type="checkbox"/> Moderate;	<input type="checkbox"/> Low/Skill of the craft
Validation:	<input type="checkbox"/> Formal Walkthrough	<input checked="" type="checkbox"/> Desk Top Review	<input checked="" type="checkbox"/> SME Review

Re	Revision Log
0	New document. Prepared By R. Selvey, CIH 02/25/2000; Technical Reviewed By: N. Bernholc, CIH 02/27/00; RCD Facility Support Approved By: 04/22/01 N. Foster Procedure Committee Review; QA Review : E. Tucker; SHSD Approved By: R. Selvey 03/02/2000
1	Revised for minor correction noted in training classes. Reviewed By: R. Selvey 10/6/00
2	Added new format, SBMS header and reviewed sections on Hazard assessment, PPE. Added Waste Disposal and Environmental Impact text. Reviewed By: R. Selvey 02/05/01
3	Minor format change. Converted SOP number from IH-FP-3.2 to new system IH75190. Reviewed By: R. Selvey 03/09/01
4	Revised to include RCD Facility Support Procedure Committee Review comments. Reviewed By: R. Selvey 04/22/01
5	Updated Table 1 adding Arsenic and Cadmium Media. Update Table 3 with Arsenic and Cadmium Release Criteria and update EPA Lead Criteria. Reviewed By: R. Selvey 04/10/02
6	Updated Table 1 to correct error in lead criteria. Insert Section 7 and transfer information from section 4. Renumbered attachments. Reviewed By: R. Selvey 4/17/02
7	Added Best Management Practice release criteria for Arsenic and Cadmium to Table 3. Reviewed By R. Selvey 08/16/02:
8	Added Best Management Practice release criteria for Nickel to Table 3. Reviewed By: R. Selvey 10/17/02
9	Full review of SOP. Significant text changes. Deleted OSHA Method for procedure & PCB criteria. Updated Attachments 9.1 and 9.2. Added Attachment 9.3. Reviewed By: R. Selvey 05/21/04
10	Added reference and link to JRA-05 in 5.1. Added text to 6.2.2 to clarify using Table 1 to determine 100cm ² versus 1 sq ft. Changed "S-stroke" wording in 6.2.3.through 6.2.5 to avoid confusion with the S-stroke used the Health Physics terminology. The two patterns are different. Changed the qualification criteria in Section 7 to reflect the unified qualification policy. Updated the Sample form (Attachment 9.1) to reflect the <i>Compliance Suite</i> order of sample numbering. Reviewed By: R. Selvey 02/21/06
11	Reworded the "S-stroke" wording in 6.2.3.through 6.2.5 to avoid confusion with the S-stroke used the Health Physics terminology. Passage on "dabbing" was modified to indicate that the dabbing action replacing pulling the media, but does not replace the S-pattern. Minor typo corrections in Section 5 and 6. Reviewed By: R. Selvey 02/21/06
12	Section 6.3 was added with a reference to new Attachment 9.4; Table 1: was updated to include hexavalent chromium. Attachment 9.4 was added to include Liberty Mutual Wipe Sample Method. Liberty Mutual method was added. Section 8 References and Attachment 9.4 was added and included in Section 9.0 Attachments. Reviewed By: J. Peters 11/28/06; Reviewed By: R. Selvey 12/05/06
13	Added Section 4.1, 4.2 and 5.6. Revised 5.2. Added document control to attachment 9.3 and 9.4. Reviewed By: R. Selvey 05/23/07
14	Table 3: Updated to include Cobalt and description of calculation. Changed IH training link in Step 7.1. Reviewed By: M.Chuc 09/22/08 Reviewed By: R. Selvey 10/13/08
15	Added Attachment 9.5. Reviewed By: R. Selvey 02/09/09
16	Edited section 4.0 and 5.2 for brevity. Added definition for Release and Housekeeping Criteria. Changed Cr6 release level based on OSHA recommendation. Added ANSI Caution to Attachment 9.1 sign. Revised directions in Attachment 9.2. Reviewed By: R. Selvey 03/21/11
17	Full review of steps 1 to 7. Expanded and revised Release and Housekeeping Criteria definitions in Section 3 and in Table3. Reviewed By: R. Selvey 04/27/11
18	Corrected error in units in section 3: mg/100cm ² to ug/100 cm ² . Reviewed By: R. Selvey 05/10/11
19	Edited Section s 2 and 7 to remove reference to rescinded HP65100. Changed format of Section 9. Reviewer: R. Selvey 03/04/14
20	Total review and revision. Replaced Table 3 with Appendix 9.3 and added OSHA Technical Manual ratio. Removed criteria for Al, Ba, Co, Cu, Hf, In, Mn, Mo, Pt, Rh, Se, Ag, Ta, Te, Tl, Sn, W, Y, Yt, and Zr. Added link to e-Exam and e-form. Added short-life disclaimer to Cr6 in Attachment 9.2. Revised by: R. Selvey 06/13/8/16

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21	Revised Attachment 9.3 to correct Cr+6. Added column for ug/sq ft. Corrected error in Table 1 Attachment 3. Revised by; R. Selvey 09/13/16.
22	Revised Attachment 9.3 to remove no-regulated Nickel and CrIII and adjusted values for Arsenic and CrVI to match OSHA Housekeeping philosophy. Added proposed changes for all release criteria to allow comments on impact. Revised by; R. Selvey 05/01/17.
23	Team reviewed revision to Attachment 9.3. Values aligned with OSHA, EPA/HUD and DOE policies. Approved by: R. Selvey 06/23/17

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Attachment 9.1

Samples of Signs for Areas and Equipment

CAUTION

Cadmium Surface Contamination

Some surfaces in this area have Cadmium levels above BNL Guidelines

- Do NOT perform operations that causes the dust to become airborne (such as using an air hose to clean surfaces or dry sweeping)
- Contact SHSD IH Group x-7475 prior to Building Renovations or Demolition
- Wash hands prior to eating, drinking, chewing gum, or smoking
- Do not eat or drink in this area.

CLEAN

The material on this pallet is below (i.e. cleaner than) the SHSD Best Management Practice Surface Release Guidelines for Lead and Cadmium

It is appropriate to be released and used anywhere at BNL without any specific precautions.

Exceeds Guidelines for Lead or Cadmium

The material on this pallet is above (i.e. not cleaner than) the SHSD Best Management Practice Surface Release Guidelines for Lead and/or Cadmium

Specific precautions are needed in areas where this material is used or stored.

- No operations that cause airborne dust (such as air hoses, blowers, or dry sweeping)
- Wash hands prior to eating, drinking, chewing gums, or smoking.
- Do not eat or drink in this area.
- Notify occupants of the area of the presence of Lead/Cadmium on these surfaces.

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Attachment 9.2

WIPE SAMPLING TECHNIQUE FOR HEXAVALENT CHROMIUM

Note: Hexavalent Chromium has a short life on surfaces. Sampling and analyzed needs to be completed within a few days of generation. For sampling of long term dust accumulations, use Cr³ sampling.

Materials supplied by the lab:

Sampling media:

- For chrome plating: PVC or binderless quartz filter. All other operations:
 - 5 um, 37-mm PVC filter for smooth surfaces
 - 0.45 mm thick 37-or 47-mm binderless quartz fiber filter for rough surfaces (preferred media for both smooth and rough surfaces)
- Immediately after sampling, place the filter sample in a vial containing 10% Na₂CO₃ with 2% NaHCO₃ to stabilize the Cr⁺⁶.
- Do not use Ghost wipe®, Whatman, mixed cellulose ester (MCE) or glass fiber filter as they convert Cr⁺⁶ to Cr⁺³.

Template (10 cm x 10 cm)

Teflon coated or plastic tweezers

Empty glass vials

Glass vials containing 5 ml aqueous solution of 10% Na₂CO₃ with 2% NaHCO₃ for chrome plating samples

Powderless gloves

Sampling Technique:

1. Prepare a sufficient number of vials, each labeled with a unique number.
2. Sketch a diagram of the room or area to be sampled.
3. Wear a new pair of clean gloves for each sample. **DO NOT** use powdered gloves.
4. Record the sample vial number and location where the sample is taken.
5. Remove the filter from the carrying container with a clean PTFE-coated tweezers or plastic tweezers. **DO NOT** use metal tweezers to handle the filters, as they could deposit Cr⁺⁶ onto the filters.
Note: Surfaces should not be wetted with water as the water will allow any metal interference to interact with Cr⁺⁶ thereby affecting the results.
6. Use firm pressure when wiping the surface. Start at the one corner moving to the opposite side then upward one wipe width and wipe back to the starting side. Repeat to cover the whole surface area. Fold inward and repeat wiping the entire surface again. Fold in and repeat a third time.
7. After wiping, fold the filter with the contaminant side inward. Place the filter immediately in the sample vial and cap.
Filter samples taken in chrome plating operation must be placed in a vial containing 10% Na₂CO₃ with 2% NaHCO₃ to stabilize the Cr⁺⁶.
8. Submit at least one blank wipe filter, treated in the same fashion, but without wiping.
9. Sample results will be reported as ug/100cm². OSHA's target concentration is 0.050ug/100 cm².
10. Ship samples immediately. If unable to ship immediately, keep cold then ship next day air to the lab.

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Attachment 9.3

Required and Recommended Surface Wipe Criteria

06/26/17

Compound	Criteria			Criteria type R = Requirement; G= Guidance, Recommended, Non-regulatory	OSHA PEL ug/m ³
	ug/100cm ²	ug/ft ²			
Arsenic (As) 29CFR1910.1018	100	929	G	OSHA Regulated Areas [AFAP] & Operational Areas: Floors & accessible surfaces	10 ug/m ³
	6.7	62	G	Non-Operational Areas: Floors & accessible surfaces	
Beryllium (Be) 10CFR850	3.0	28	R	DOE Regulated Areas & Be Operational Areas: Floors & accessible surfaces [Housekeeping]	2 ug/m ³
	0.2	1.9	G	Non-Operational Areas & Public Areas: Floors & accessible surfaces	
	3.0	28	R	Equipment Release to Be Operational Areas	
	0.2	1.9	R	Equipment Release to Non-beryllium Area of a DOE facility & Public	
Cadmium (Cd) 29CFR1910.1027	50	465	G	OSHA Regulated Areas [AFAP] & Operational Areas: Floors & accessible surfaces	5 ug/m ³ [1,1027] 200 ug/m ³ [Z.2]
	3.3	31	G	Non-Operational Areas: Floors & accessible surfaces	
Chromium, hexavalent (Cr) VI 29CFR1910.1026	50	465	G	OSHA Regulated Areas [AFAP] & Operational Areas: Floors & accessible surfaces	5 ug/m ³
	3.3	31	G	Non-Operational Areas: Floors & accessible surfaces	
Lead (Pb) 29CFR1910.1025	500	4645	G	Accelerator Operational Areas & OSHA Regulated Areas [AFAP]: Floors & accessible surfaces	50 ug/m ³
	50	465	G	Laboratory Operational Areas: Floors & accessible surfaces	
	22	200	G	Non-Operational Areas: Floors & accessible surfaces	
	22	200	G	OSHA 1926.62 Construction Sites: change areas, storage facilities, & lunchrooms [Housekeeping]	
	4.3	40	G	Eating & food prep surfaces	
	43	400	G	Public/Lodging/Childcare- Window troughs	
	27	250	G	Public/Lodging/Childcare- Window sills	
	4.3	40	G	Public/Lodging/Childcare- Floors, Eating & food prep surfaces	
Acrylonitrile 29CFR1910.1045	43	400	G	OSHA Regulated Areas [AFAP] & Operational Areas: Floors & accessible surfaces	[2 ppm] 4.3 ug/m ³
Dibromodichloro-propane 29CFR1910.1044	1.0	9.3	G	OSHA Regulated Areas [AFAP] & Operational Areas: Floors & accessible surfaces	[1 ppb] 0.01 ug/m ³
Methylenedianiline 29CFR1910.1050	0.8	7.5	G	OSHA Regulated Areas [AFAP] & Operational Areas: Floors & accessible surfaces	[10 ppb] 0.08 ug/m ³

Definition (for purposes of the table above):

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AFAP: As Free As Practicable; Housekeeping- All surfaces shall be maintained as free as practicable of accumulations of [OSHA Regulated Substances]: Arsenic: 1910.1018(k); Cadmium: 1910.1027(k); Chromium: 1910.1026(j); Lead: 1910.1025(h); Acrylonitrile: 1910.1045(k) DBCP: 1910.1044(k); MDA: 1910.1050(l). The enumerated guidance criteria level is based on: OSHA Technical Manual; Section II: Chapter 2 Surface Contaminants, Skin Exposure, Biological Monitoring and Other Analyses; III. Wipe Sampling, Field Portable X-Ray Fluorescence Sampling, Dermal Sampling and Biological Monitoring; A. Surface Wipe Sampling.

Accessible surfaces: Surfaces that can reasonably be expected to be contacted during typical operations. This would include table tops, desks tops, and other surfaces where contact with hands, arms and body are likely. [BNL]

Eating & Food Prep Surfaces = Surfaces on which food preparation, eating & drinking are done. This includes lunchroom counters/tables; kitchen counter tops, stove tops; water cooler surfaces; and tables/desks in offices/conference rooms where food and beverage consumption is permitted. [BNL]

Equipment Release to Operational Area [Beryllium] = Maximum removable contamination on equipment that is being released to a facility using the beryllium. Equipment must be labeled and sealed in impermeable bag or container. [DOE 10CFR850.31]

Equipment Release to Operational Area [OSHA Regulated Substance] = Maximum removable contamination on equipment that is being released to a facility using the regulated substance. [BNL]

Equipment Release to Non-Operational Area or Public [Beryllium] = Maximum removable contamination on equipment that is being released to the general public or to a non-beryllium area of a DOE facility. Equipment release is conditioned on the recipient's commitment to implement controls that will prevent foreseeable beryllium exposure, considering the nature of the equipment or item and its future use and the nature of the beryllium contamination. [DOE 10CFR850.31]

Equipment Release to Non-Operational Area or Public [OSHA Regulated Substance] = Maximum removable contamination on equipment that is being released to the general public or to a Non-Operational Area. [BNL]

Housekeeping = Maximum level allowed on accessible surfaces in Operational Areas during Non-Operational periods. Surfaces contaminated with dusts and waste must not exceed a removable contamination level criterion during Non-Operational periods. This sampling would not include the interior of installed closed systems such as enclosures, glove boxes, chambers, or ventilation systems. [DOE 10CFR850.30]

Non-Beryllium Area = Area where beryllium is not used in a DOE facility. [DOE 10CFR 850.31]

Non-Operational Area [Beryllium] = Area where beryllium is not used and where workers are not trained in hazards and controls. Personal hygiene control practices are not in place (hand washing is not expected on exiting the area) and eating & drinking are permitted. [BNL]

Non-Operational Area [OSHA Regulated Substance] = Area where an OSHA Regulated Substance is not used and where workers are not trained in hazards and controls. Personal hygiene control practices are not in place (hand washing is not expected on exiting the area) and eating & drinking are permitted. [BNL]

Operational Area [Beryllium] = Area where workers are routinely in the presence of beryllium as part of their work activity. [DOE 10CFR850.3]

Operational Area [OSHA Regulated Substance] = Area where workers are routinely in the presence of an *OSHA Regulated Substance* as part of their work activity. Workers who handle the substance have been trained in hazards and controls. Substances are routinely used, handled or stored and personal hygiene control practices are in place (e.g. eating, drinking are prohibited in the area; hand washing is expected on exiting the area). Examples: lead shielding blocks, shops, and accelerator areas using organic and inorganic metallic compounds. [BNL]

OSHA Regulated Substance = A substance regulated in 29CFR1910.1003-1054 in the expanded health standards:

- o Metals:
 - o Arsenic 29CFR1910.1018;
 - o Cadmium 29CFR1910.1027;
 - o Chromium, hexavalent 29CFR1910.1026;
 - o Lead 29CFR1910.1025
- o Chemicals:
 - o Acrylonitrile 29CFR1910.1045;
 - o Benzene 29CFR1910.1028;
 - o Dibromodichloro- propane 29CFR1910.1044;
 - o Formaldehyde 29CFR1910.1048;
 - o Methylenedianiline 29CFR1910.1050;
 - o Methylene Chloride 29CFR1910.1052;
- o OSHA 13 carcinogens = 4-Nitrobiphenyl, Chemical Abstracts Service Register Number (CAS No.) 92933; alpha-Naphthylamine, CAS No. 134327; methyl chloromethyl ether, CAS No. 107302; 3,3'-Dichlorobenzidine (and its salts) CAS No. 91941; bis-Chloromethyl ether, CAS No. 542881; beta-Naphthylamine, CAS No. 91598; Benzidine, CAS No. 92875; 4-Aminodiphenyl, CAS No. 92671; Ethyleneimine, CAS No. 151564; beta-Propiolactone, CAS No. 57578; 2-Acetylaminofluorene, CAS No. 53963; 4-Dimethylaminoazo-benzene, CAS No. 60117; and N-Nitrosodimethylamine, CAS No. 62759. [OSHA]

The only official copy is on-line at the SHSD website.
Before using a printed copy, verify that it is current by checking the document issue date on the website.

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Public = Persons who are not: DOE employees, BSA employees, contractors, sub-contractors, and persons with Student, Intern, User or Guest appointments. The public includes visitors and family members living in residence at Upton. They are not trained by BNL in hazards and controls of toxic substances. [BNL]

Public/ Lodging/Childcare Areas = Area open to the public for periods longer than short visits or tours or areas intended for frequent access by visitors and/or family members. Eating and drinking is allowed in public areas. Occupants are not trained in the hazards of the metal or control measures. Hand washing is not expected on exit of the area. Public areas include: Science Museum (935), Coin Laundry (363), Berkner Hall (388), Swimming Pool (462), Gymnasium (461), Brookhaven Center (30), Research Support Building (400), BNL Upton on-site housing: Cavendish (153), Compton (170), Curie (258), Fleming (180), Guest House (257), Danish House (388), Apartments, Efficiencies; and areas with high occupancy by children: Child Development Center (370), Recreation Hall (317), School House (373) [BNL]

Regulated Area [Beryllium] = Area demarcated by the responsible employer in which the airborne concentration of beryllium exceeds, or can reasonably be expected to exceed, the action level. [DOE 10CFR850.3]

Regulated Area [OSHA Regulated Substance] = Area where an OSHA Regulated Substance is used in a manner that airborne exposure levels exceed the Permissible Exposure Limit. Area is formally demarcated and access to the area is controlled to those meeting the entry requirements in the OSHA regulation. Personal hygiene control practices are in place; eating and drinking are prohibited; hand washing is expected on exiting the area. OSHA standards require these areas to be "As Free As Practicable". The OSHA Technical Manual (G1) provides a recommended method to enumerate AFAP [BNL]

The only official copy is on-line at the SHSD website.
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IH 75190 Attachment 9.4

Environmental Evaluation of Surface Wipe Sampling for Chemicals/Metals

Operation Description: Field samples for potential metals or chemicals are collected on pre-moistened pads. This process concentrates toxic substances on the media. The wipes are either sent off-site for analysis or in some instances are analyzed at BNL by the IH Group using direct reading meters.

Frequency of Operation: 10 to 20 times per year.

Environmental impact:

- The wipes sampled at BNL are consumed in the analysis at the end of test by the off-site lab. Conformance with proper wipe disposal by the off-site vendor laboratory is validated to BNL IH Group's satisfaction in the AHIA Accreditation process.
- PPE used during sampling and the paper templates are disposed of at the direction of the EPD ECR. The current policy is for disposal as non-hazardous waste. This is justified because the concentration is too low to be of concern (a few micrograms per wipe surface).

Waste Disposal:

- PPE and paper templates are disposed of as non-hazardous waste, unless otherwise directed by EPD.

Analyte:

LEAD
BERYLLIUM
CADMIUM
Other:

DEPT:
BUILDING:

LOCATION NAME, ROOM NUMBER & DESCRIPTION:
--

Sample Media:

Ghost Wipe™
Cotton Gauze Size:
Filter Paper Type & Size:
Other:

Solvent:

Pre-Moistened
Distilled Water
Hexane
Isopropanol
Other:

Surface Area Measurement:

Template
Measured Area
Estimated Area
Other:

REASON FOR SAMPLING:
___ Area Characterization
___ Pre-Remediation
___ Post Remediation
Other:

Sample Identification

Sample Number				Sample Location	Surface Type <small>Metal / Plastic / Glass / Painted Wood / Wood / Painted Concrete / Concrete</small>	Surface Area
Bldg#	MMDDYY	Analyte Symbol	Sample #			
				Sample of online form Use <u>e-Forms</u> from SHSD web page current version		___ 1 ft ² ___ 100 cm ² other: _____
						___ 1 ft ² ___ 100 cm ² other: _____
						___ 1 ft ² ___ 100 cm ² other: _____
						___ 1 ft ² ___ 100 cm ² other: _____

___ Additional Samples next page

Total Number of Samples: _____

SAMPLE DATE:	RELINQUISHED TO SHSD IH LAB BY: (SIGNATURE):	DATE /TIME: /
SAMPLES TAKEN BY: (Print Name and Signature) /	RECEIVED BY SHSD IH LAB EMPLOYEE (SIGNATURE):	DATE /TIME: /

Surface Wipe Sampling for Metals Job Performance Measure (JPM) Completion Certificate

Candidate's Name	Life Number:	Qualification Number: HP-IHP- 75190
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Knowledge of the Principles of Surface Wipe Sampling Demonstrated by Written Exam

Criteria	Qualifying Standard
Hazard Analysis	Understands the need to perform a hazard analysis of the sampling area and potential exposure to the sampler.
Personal Protective Equipment	Understands the need to be aware of the potential surface contamination and airborne levels of contaminants and knows how to determine the need for PPE.
Sampling Protocol	Understands the exposure monitoring logic necessary to appropriately select sampling locations to accurately measure worker, public and environmental exposure potential.
Analysis of data	Understands the need to perform analysis on the sampling data to assess potential exposure to the sampler, worker, public and environment, and to recommend corrective actions as necessary.

Practical Skill Evaluation: Demonstration of Surface Wipe Methodology

Criteria	Qualifying Performance Standard	Unsat.	Recov.	Satisf.
Sampling Equipment	Knows where equipment needed for the procedure is located and how to properly sign it out.			
Moistening Media	a. Filter/gauze: Moistens media with the appropriate solvent. Applies solvent to moisten approximately 80% of the area of the media. Does not over moisten. b. For pre-moistened media, shows reduction in size of wipe.			
Size of Area & Use of Template	Understands the importance of quantifying the area sampled. Demonstrates placing template on surface or measuring the surface area.			
Folding Media at each wipe step	Demonstrates the inward folding of media after each wipe and placement of media into container so that surfaces loaded in the wiping are not exposed.			
NIOSH Method wipe pattern	Demonstrates the technique of three passes of wiping in "S" pattern, changing the direction on second pass, original direction on third pass.			
Choose correct solvent	Knows how to select correct solvent from Table 1.			
Select the correct number of samples	Knows how to choose the appropriate numbers of samples based on Table 2.			
Record forms	Shows how to correctly and completely fill all forms associated with this SOP.			

I accept the responsibility for performing this task as demonstrated within this JPM and the corresponding SOP.

Candidate Signature:	Date:
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I certify the candidate has satisfactorily performed each of the above listed steps and is capable of performing the task unsupervised.

Evaluator Signature:	Date:
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