WIPE SAMPLE KIT

ITEM **225-2401A**

Surface Contamination
Sampling and Evaluation
Procedures

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SURFACE CONTAMINATION
SAMPLING AND EVALUATION

INTRODUCTION:

In order to effectively evaluate the control of many industrial processes, the Industrial Hygienist or Safety & Health Professional may need to complement an air sampling program with the use of wipe sampling. Many chemical agents can gain entry into the body via the following mechanisms:

1) Ingestion of the contaminant from food, drink or chewing gum that may have contacted contaminated surfaces or contaminated hands.

2) Inhalation of the contaminant, or its combustion products, through smoking cigarettes, cigars or pipes that may have contacted contaminated surfaces or contaminated hands.

3) Inhalation of the contaminant through re-suspension of the material into the air.

4) Contaminant contact with inner surfaces of personal protective equipment (e.g. respirators).

Other advantages of wipe sampling include a quantitative evaluation of housekeeping practices and an evaluation of the potential for contact with skin irritants.

As a "rule of thumb", wipe sampling should be performed in the following situations:

a) The OSHA-PEL or ACGIH-TLV tables show a **"skin"** notation, or if the substance has a **dermal** LD-50 of 200 mg/Kg or less.

b) The substance has an acute **oral** LD-50 of 500 mg/Kg or less, and has a significant **oral** chronic toxicity.

c) The substance is a skin irritant, causes dermatitis, contact sensitization or is a corrosive.

Limitations:

Wipe sampling of surfaces which may contact the skin is often useful for substances that have skin absorption characteristics. However, evaluating skin surfaces (e.g. fingers, hands, etc.) for these rapidly absorbed substances may not be useful. Biological exposure monitoring through a medical surveillance program is often the method of choice in assessing the exposure of these chemicals.

Surface contaminant evaluation may be compromised if removal of the contaminant from the surface is difficult. In order to minimize the potential for false negatives, the selection of the sample wetting solution may need to be altered. Contact an AIHA-accredited analytical laboratory to choose an appropriate wetting solution. For example, in a matching operation involving heavy metals (e.g. chromium), oil mist from machinery and cutting fluids may cause the metallic dust to stick to surfaces. Normal wetting of the filter with distilled water may not recover all of the contaminant. A high-volatility solvent, such as isopropanol, may improve the recovery of the contaminant.

Lastly, for most contaminants, there are not surface contamination standards to use as a reference in assessing the level of contamination. The occupational health professional may need to develop a standard by which an area or process may be considered “clean”. Factors to consider should include: the material’s toxicity, route of exposure, nature of the operation/process, interaction with the other chemicals, and the effectiveness and feasibility of controls.

Sampling Procedure:

COLLECTION MEDIA

1) *GENERAL INFORMATION*

Table 1 (pg. 9-11) lists many common inorganic and organic surface contaminants. Included are the contaminant's name, recommended filter media and the appropriate wetting agent (solvent).

Please note that this list is not all inclusive. If the material of interest is not listed, you should contact an AIHA-accredited analytical laboratory for the correct filter and solution.

There are generally *4 types* of collection media recommended:

Ashless Paper Filters: Usually used in the collection of materials analyzed by atomic absorption spectrophotometry (AAS) or by inductively-couple plasma atomic emission spectrophotometry (ICP/AES).

DO NOT USE paper filters for substances to be analyzed by high performance liquid chromatography (HPLC).

Glass Fiber Filters: Usually used for the collection of materials to be analyzed by HPLC or gas chromatography (GC).

pH Test Paper: Useful in sampling for corrosive surfaces. This is a direct reading material, but the Industrial Hygienist must know exactly what the material is. In the case of an unknown contaminant, or a mixture of contaminants, a regular wipe sample should be taken for cation/anion analysis.

Wipes, Wash'n Dri™ Towelletes: Used in NIOSH method 9100 for surface sampling of lead.

2) ***PROCEDURE*** (please refer to Tables 1 and 2)

a) Prepare a sketch of the area to be sampled and indicate the exact locations where samples are to be taken. Be sure to show the location of any equipment or processes that may be contributing to the contamination problem. Also include any information relevant to the process, control measures currently in place, as well as a listing of protective equipment being used by personnel in the area.

b) Always wear a new, disposable latex glove with each individual sample. This will prevent cross-contamination of the samples and provide protection from the material.

c) Remove a clean filter and, if called for by the Contaminant Information Table, moisten the filter with the appropriate solvent.

NOTE: When sampling for skin surface contamination of personnel, *NEVER* use any solvent other than distilled water.

d) Place the sampling template on the surface to be sampled and completely wipe the 100 cm^2 area. If the surface is not flat, approximate the 100 cm^2 sample area.

e) Fold the filter, exposed side in, into quarters and place it in a new sample bag. Do not let the filter contact any other surfaces. Label the sample bag, and place a corresponding number on the label and same location sketch. Any additional notes or comments about the sample should be placed on the sample sheet.

f) At least one blank per sample area, treated in an identical fashion as the samples, should also be submitted.

3) ***SPECIAL INFORMATION***

a) ***Carcinogenic Amines***

A qualified field evaluation may be performed to detect the presence of the following carcinogenic amines:

- 4-Aminobiphenyl
- Benzidine
- 3, 3'-Dichlorobenzidine
- 4, 4'-Methylene bis (2-chloroaniline)
- α-Naphthylamine
- β-Naphthylamine

Moisten the paper filter with 5 cm sample area. After taking the sample, apply 3 drops of flouroescamine dye to the contaminated area of the filter.

As a reference standard, place an additional drop of flouroescamine on an area of the filter that is not contaminated. After waiting 6 minutes for the reaction to be complete, irradiate the filter with a 366 nm ultraviolet light. In the presence of these amines, the contaminated area of the filter will appear yellow. If a positive indication occurs, an additional sample will need to be taken with a glass fiber for HPLC analysis.

b) ***Radioactive Sources***

Radiation control measures require wipe sample testing to determine levels of surface contamination and leak testing for sealed source applications. ***Note:*** *You should first check your NRC or State license to determine whether or not you are authorized to conduct your own wipe sampling. If you are not authorized, contact the NRC or your State agency requesting permission, and the procedure, to do so.*

To conduct a radioactive source wipe sample test, the following procedure is recommended: (see next page)

Leak Testing a Sealed Source:

i. Wearing disposable rubber gloves, dampen a cotton swab with a solution of trisodium phosphate (TSP).

ii. Wipe the source package/container with the swab.

iii. If you have a radiation detection meter (i.e. a "thin-end" window survey meter), measure the activity of the swab. If the activity level exceeds 200 dpm, close the package back up and notify the manufacturer that you have a potential source leak.

The manufacturer should be able to provide additional guidance on how to handle the situation. If not, contact your licensing agency.

If you do not possess a survey meter, or if an independent analysis of the sample is warranted, place the swab inside the plastic sample bag. Label the bag with the name of the radioactive source and the date.

iv. A note marked *"Radioactive"* should be placed within the package.

v. Parcels with a surface activity of less than 0.0005 R/hour need not be labeled as radioactive material. If the activity exceeds this level, refer to the appropriate D.O.T specifications for labeling and shipment.

vi. Submit the sample to an NRC or State-accredited laboratory for analysis.

For Lead in Surface Wipe Samples:

(Extract of NIOSH method 9100)

i. Wearing disposable rubber gloves, dampen a cotton swab with a solution of trisodium phosphate (TSP).

ii. Wipe the source package/container with the swab.

iii. If you have a radiation detection meter (i.e. a "thin-end" window survey meter), measure the activity of the swab. If the activity level exceeds 200 dpm. Close the package back up and notify the manufacturer that you have a potential source leak.

The manufacturer should be able to provide additional guidance on how to handle the situation. If not, contact your licensing agency.

If you do not possess a survey meter, or if an independent analysis of the sample is warranted, place the swab inside the plastic sample bag. Label the bag with the name of the radioactive source and the date.

iv. A note marked *"Radioactive"* should be placed within the package.

v. Parcels with a surface activity of less than 0.0005 R/hour need not be labeled as radioactive material. If the activity exceeds this level, refer to the appropriate D.O.T. specifications for labeling and shipment.

vi. Submit the sample to an NRC or State-accredited laboratory for analysis.

Wipe Testing Contaminated Surfaces:

i. Wearing disposable rubber gloves, dampen a clean paper filter with a solution of trisodium phosphate (TSP) detergent or isopropanol.

ii. Wipe the surface using the wipe area template. If the surface area is less than 100 cm^2, correct the final readings for 100 cm^2 area.

iii. If you have a radiation meter (i.e. a "thin-end" window survey meter), measure the activity of the paper. Table 2 lists the acceptable activity levels for surface contamination. If you find levels in excess of these, refer to your licensing agency's notification and decontamination procedures.

If you do not possess a survey meter, or if an independent analysis of the sample is warranted, place the filter inside a plastic sample bag and label bag with the name of the radioactive source and the date.

iv. A note marked *"Radioactive"* should be placed within the package.

v. Parcels with a surface activity of less than 0.0005 R/hour need not be labeled as radioactive material. If the activity exceeds this level, refer to the appropriate D.O.T. specifications for labeling and shipment.

vi. Submit the sample to an NRC or State-accredited laboratory for analysis.

For Miscellaneous Surface Dust:

i. Microscopic slides, cover slips and Scotch® Magic™ Tape are supplied to allow for sampling for spores, pollen, dust mites, etc.

ii. A piece of tape is lightly applied to the surface in questions, then removed and transferred to a microscopic slide.

iii. Sample is labeled and sent for visual analysis under polarized light microscopy.

TABLE 1
Contamination Information Table

GFF = Glass Fiber Filter
pH = pH Test Paper
AFB = Ashless Filter Paper
EG = Ethylene Glycol
IPA = Isopropanol
DiH_2O = Distilled Water
WDT = Wash'n Dri™
* = Fill Vial
b = Consult Laboratory
c = Use as Supplied

NOTE: *Solvents are NOT furnished with kit.*

Contaminant	Filter	Solvent
2-Acetylaminofluorene	GFF	DiH_2O
Acrylamide	GFF	DiH_2O
Aldrin	GFF	Dry/EG
4-Aminodiphenyl	GFF	IPA
2-Aminopyridine	GFF	IPA
Ammonia	pH	DiH_2O
Aniline	GFF	IPA
Antimony (+ compounds)	AFP	DiH_2O
Arsenic (+ compounds)	AFP	DiH_2O
Barium (soluble compounds)	AFP	DiH_2O
Benzidine	AFP	IPA*
Benzoyl Peroxide	GFF	DiH_2O
Beryllium (+ compounds)	AFP	DiH_2O
Cadmium (+ compounds)	AFP	DiH_2O
Calcium Arsenate (as As)	AFP	DiH_2O
Calcium Hydroxide	pH	DiH_2O
Calcium Oxide	AFP	DiH_2O
Chlordane	GFF	Dry
Chlorinated Camphene	GFF	EG
Chlodiphenyl	GFF	Dry
Chromic Acid & Chromates (as CrO_3)	GFF	DiH_2O
Chromium, soluble Chromic and Chromous salts	AFP	DiH_2O
Chromium Metals and insoluble Salts	AFP	DiH_2O
Cobalt (+ compounds)	AFP	DiH_2O
Copper (+ compounds)	AFP	DiH_2O
Cyanides (as Cn)	AFP	DiH_2O
DDT	GFF	Dry
Diazinon	GFF	Dry / EG
o-Dichlorobenzene	GFF	
3,3'-Dichlorobenzidine	GFF	Dry
Dieldrin	GFF	Dry
Dinitrotoluene	AFB	Dry / EG
Endrin	GFF	Dry
Fluoride	AFP	DiH_2O
Gallium Arsenide (Ga+As)	AFP	DiH_2O

Contaminant	Filter	Solvent
Hydrochloric Acid	pH	DiH_2O
Lead (+ coumpounds)	WDT	b
Lead Chromate (as Pb)	WDT	b
Malathion	GFF	Dry/EG
4,4'-Methylene bis (2-chloroaniline)[MOCA]	GFF	Dry
α-Napthylamine	GFF	Dry/DiH_2O
β-Napthylamine	GFF	DiH_2O
Nickel Metal & Soluble Compounds (as Ni)	AFP	DiH_2O
Nitric Acid	pH	DiH_2O
N-Nitrosodimethylamine	GFF	a
Parathion	GFF	Dry/EG
Phosphoric Acid	pH	DiH_2O
Phosphorous (red)	AFP	DiH_2O
Platinum (soluble salts as Pt)	AFP	DiH_2O
Sodium Fluoroacetate	GFF	Dry
Sodium Hydroxide	AFP/pH	DiH_2O
Sulfuric Acid	pH	Dry/ DiH_2O
Tellurium (+ compounds)	AFP	DiH_2O
TEPP	GFF	Dry
Thallium	AFP	DiH_2O
Tin (as Sn)	AFP	DiH_2O
o-Toluidine	GFF	Dry/IPA
Trinitrotoluene	GFF	Dry/IPA
Uranium (soluble compounds)	AFP	DiH_2O
Warfarin	GFF	Dry

TABLE 2

ACCEPTABLE RADIATION SURFACE CONTAMINATION LEVELS

Nuclide	Removable Contamination (dpm/100 cm^2)
a) U-natural, U-235 U-238 and associated decay products	1000
b) Transuranics, Ra-226 Ra-228, Th-230, Th-228 Pa-231, Ac-227, I-125, I-129	20
c) Th-natural, Th-232, Sr-90 Ra-223, Ra-224, U-232, I-126, I-131, I-133	200
d) Beta-gamma emitters (nuclides with decay modes other than Alpha emission or spontaneous fission) except Sr-90 and others noted above	1000
e) H-3, C-14 except as DNA precursors, (as DNA precursors, use "d" above)	4000

FROM:

ANSI, *Control of Radioactive Surface Contamination on Materials, Equipment and Facilities to be Released for Uncontrolled Use*

Final draft, proposed ANSI Standard N-3, June 1974

225-2401A Wipe Sample Kit Replacement Parts

225-13-1	Stainless Steel Forceps
560-15	Template, 10 cm x 10 cm
560-21	Filters, Paper, 9 cm, bx/100
560-24	Filters, Glass Fiber, 7 cm, bx/100
560-27	pH Paper 1-14
560-28	Cotton Swabs, pkg/100
560-31	Dropper Bottle, pkg/3
560-34	Latex Gloves, pkg/100
560-37	Sample Bags, pkg/100
560-39	Marking Pen
560-40	Wash'n Dri™ Towelettes
560-42	Cover Slips, 24 x 50, 1 oz
560-43	Masking Tape
560-44	Microslide 3 x 1, #1, pkg/72
560-45	Scotch™ Magic Tape
560-46	Sample Containers, 50 ml tubes, pkg/20
560-98	Carrying Case

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NOTES

NOTES

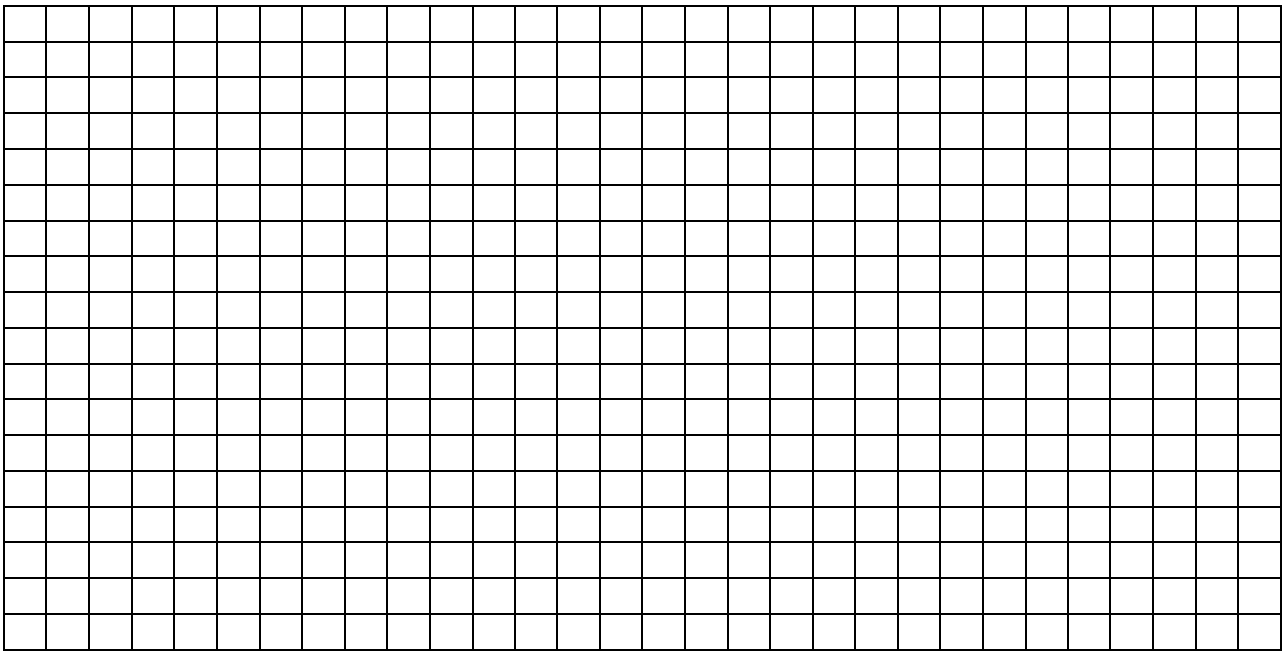
NOTES

Date: _____ Sampled by: _____

Area or Process Sampled: _____

SAMPLE AREA SKETCH

Instructions: Sketch sample area showing locations of samples with respect to processes, equipment, work stations and contaminated control equipment.



PERSONAL PROTECTIVE EQUIPMENT (PPE):

List PPE worn by area personnel: _____

_____

_____

_____

ADDITIONAL COMMENTS (e.g., process description): _____

_____

_____

_____

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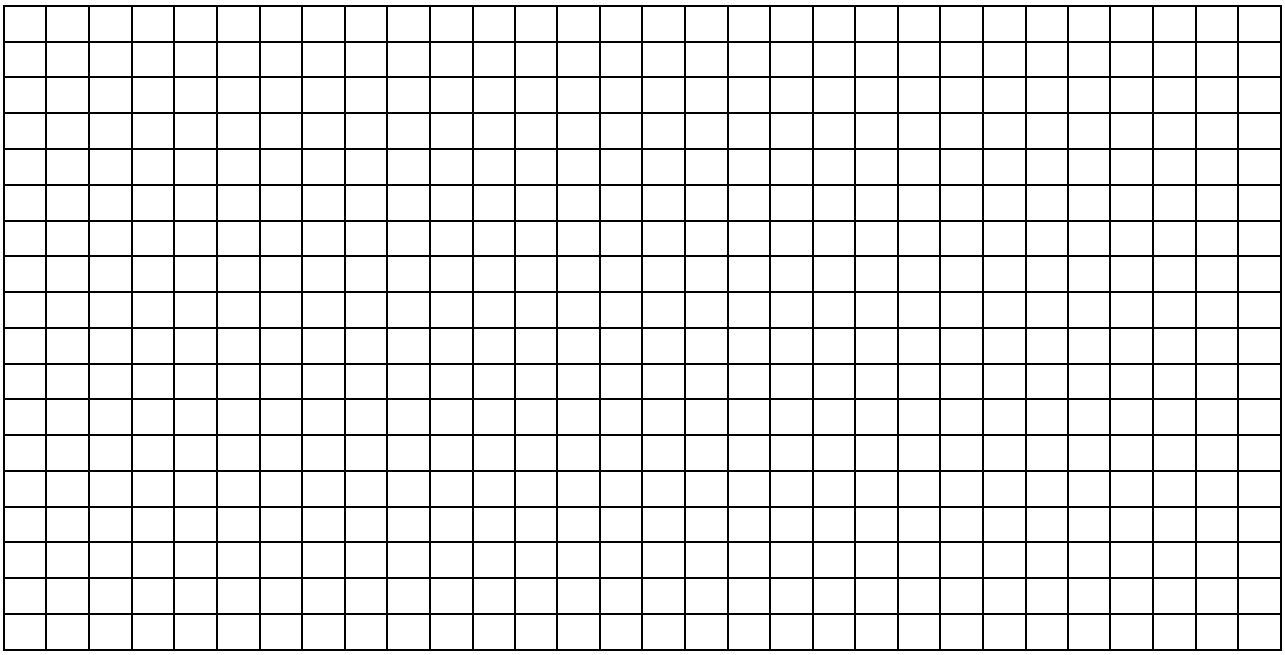
Date: _____ Sampled by: _____

Area or Process Sampled: _____

SAMPLE AREA SKETCH

Instructions: Sketch sample area showing locations of samples with respect to processes, equipment, work stations and contaminated control equipment.



PERSONAL PROTECTIVE EQUIPMENT (PPE):

List PPE worn by area personnel: _____

_____

_____

_____

ADDITIONAL COMMENTS (e.g., process description): _____

_____

_____

_____

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Date: _____ Sampled by: _____

Area or Process Sampled: _____

WIPE SAMPLE DATA SHEET

Instructions: Sketch the layout of the sample area on the back of this form. Enter the sample numbers on the form below and in the corresponding location on the sketch. Include any special information about the sample(s) in the comments space below, or on the back.

SAMPLE #	*SAMPLE LOCATION*	*COMMENTS*

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Date: _____ Sampled by: _____

Area or Process Sampled: _____

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