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FORMALDEHYDE SURVEILLANCE PROGRAM

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FORMALDEHYDE SURVEILLANCE PROGRAM

1.0 PURPOSE

The Office of Research Services, Division of Occupational Health and Safety (DOHS), established the Formaldehyde Surveillance Program at the National Institutes of Health (NIH) to:

1) Identify and quantify exposure levels of workers potentially exposed to formaldehyde.

2) Provide information on the effectiveness of the controls in use to minimize exposures.

The Formaldehyde Surveillance Program adopts the information and technical procedures as contained in the five appendices (A, B, C, D, and E) of the Occupational Safety and Health Administration standard, 29 CFR Part 1910.1048, Formaldehyde. Much of this information is implemented in a procedural, performance-based, approach that is similar to that used with other air contaminants. Therefore, the appendices are incorporated by reference and are attached to these guidelines.

2.0 SCOPE AND APPLICATION

The DOHS, Technical Assistance Branch (TAB) administers the Formaldehyde Surveillance Program. Surveys also provide documentation of surveillance activities to both The Joint Commission (TJC) and the College of American Pathologists (CAP).

The NIH Formaldehyde Surveillance Program applies to all occupational exposures to formaldehyde, i.e., from formaldehyde gas, its solution, and materials that release formaldehyde at the NIH. The Program covers all NIH locations. The Occupational Medical Service (OMS) provides medical surveillance of NIH employees.

This Program focuses on both typical and non-typical laboratory procedures, such as autopsy procedures, perfusion procedures, surgical pathology procedures, and clinical pathology procedures.

3.0 DEFINITIONS

For purposes of this program, the following definitions shall apply:

Action level (AL)
An airborne concentration in per million parts (ppm) of air, that is calculated as an eight (8)-hour time-weighted average (TWA) concentration, in which exposure above the AL triggers exposure monitoring and medical surveillance.

Authorized Person

Any person required by work duties to be present in regulated areas. This person must be trained to recognize formaldehyde hazards; must wear proper personal protective equipment (PPE); and must participate in the Formaldehyde Medical Surveillance Program.

Ceiling Level
An airborne concentration, per the American Conference of Governmental and Industrial Hygienists (ACGIH), that should not be exceeded during any part of the working exposure.

Emergency
Any occurrence such as, but not limited to, equipment failure, ruptures of containers, or failure of control equipment that results in an uncontrolled release of a significant amount of formaldehyde.

Employee exposure
The exposure to airborne formaldehyde that would occur without protection provided by use of a respirator.

Exposure limits
Referencing the exposure limits listed in Section 4.0, Exposure Limits, of this program.

Formaldehyde
The chemical substance, HCHO, Chemical Abstract Service (CAS) Registry No. 50-00-0 (i.e., formaldehyde gas, its solutions, and materials that release formaldehyde).

Integrated sampling
Sampling during the entire period in which a potential exposure occurs.

Permissible Exposure Limit (PEL)
The maximum concentration, determined as an 8-hour TWA or 15 minute STEL (defined below), to which an employee in the workplace may be exposed.

Regulated Area
Work areas where the concentration of airborne formaldehyde equals or exceeds the PEL (8-hr TWA or STEL). These areas must have all entrances or access ways posted with proper signage (see Section 5.2.1, Regulated Areas, Posting).

Supervisor
The NIH Institute or Center (IC) Director, designated representative, Research Director, Project Director, Branch Chief, Section Chief, or other immediate supervisor of an employee.

Short Term Exposure Limit (STEL)
A 15-minute time-weighted average (TWA) exposure which should not be exceeded at any time during a workday.

Similar Exposure Group (SEG)
A group of workers having a similar exposure profile, as per the job tasks performed.

Threshold Limit Value (TLV)
An airborne concentration of a chemical substance and represents the conditions under which it is believed that nearly all workers may be repeatedly exposed, day after day, over a working lifetime, without adverse health effects. The TLV is established through the ACGIH.

4.0 EXPOSURE LIMITS

OSHA 8-hr PEL: The employer shall assure that no employee is exposed to an airborne concentration of formaldehyde that exceeds 0.75 parts per million parts (ppm) as an 8-hour TWA.

OSHA STEL: The employer shall assure that no employee is exposed to an airborne concentration of formaldehyde that exceeds 2.0 ppm as a 15-minute STEL.

OSHA AL: Exposure above the AL, an airborne concentration of 0.5 ppm calculated as an 8-hr TWA, triggers exposure monitoring and medical surveillance.

ACGIH TLV Ceiling: The employer shall assure that no employee is exposed to an airborne concentration of formaldehyde that exceeds 0.1 ppm as a ceiling level (ACGIH 2017 TLV).

5.0 PROGRAM ELEMENTS

5.1 Exposure Monitoring

5.1.1 Identification of Exposed Employees

All NIH employees who may potentially be exposed to formaldehyde will be identified by their location and job activity. The TAB or the Industrial Hygiene services contractor will furnish this information to the TAB (see Appendix III, Evaluation of Formaldehyde at NIH Work Sites, for service contract protocol). A qualitative assessment may be performed to obtain the information relative to workplace exposures to formaldehyde that may require monitoring.

5.1.2 Initial Monitoring

In areas where it has been determined that a potential formaldehyde exposure may exist, employees will be monitored to determine their exposure to formaldehyde relative to the AL, PEL, (8hr-TWA and STEL), and TLV. Employee monitoring will be extrapolated to represent other employees performing the identical job task in the same laboratory.

The initial monitoring process shall be repeated each time there is a change in production, equipment, process, personnel, or control measures which may result in new or additional exposure to formaldehyde.

5.1.3 Exceptions

In lieu of monitoring, an objective assessment may be performed to determine the exposure. This assessment may include a review of data on similar exposure groups (SEGs), as per those workers

that have a similar exposure profile and job classification. Specifically, similar job tasks that have been previously monitored through integrated sampling (covering the entire period of exposure) could be reviewed and used as a representative comparison. When objective data is used, the employee's name and ID number, job task, and the Industrial Hygienist's (IH) reasoning for exempting the employee from monitoring will be documented. Original copies of the exemption form will be kept by DOHS.

5.1.4 Employee Complaint of Formaldehyde Exposure

An employee health complaint related to formaldehyde exposure, e.g., symptoms of respiratory or dermal conditions, will initiate personal monitoring of that employee and background monitoring of the job task. Monitoring of employees reporting signs or symptoms will be done promptly. Monitoring will be conducted in response to odor complaints that can be linked to formaldehyde.

5.1.5 Periodic Monitoring

a.) AL – Employees shown by monitoring to be exposed to formaldehyde at or above the AL will be re-monitored at least every six months.

b.) STEL – Employees shown by monitoring to be exposed to formaldehyde at or above the STEL will be re-monitored under the worst conditions at least once a year.

c.) Termination of Monitoring – Periodic monitoring may be terminated if the results from two consecutive sampling periods taken at least seven days apart show that employee exposure is below the exposure limits. The monitoring results will be representative of the work performed.

d.) Accuracy of Monitoring, as per the PEL or AL – Monitoring for employee exposures will be by a method that is reliable within "25% at the 95% confidence level for a PEL determination" or "35% at the 95% confidence level for an AL determination." Information on sampling techniques and sampling strategies for formaldehyde exposure is covered in the OSHA Formaldehyde standard, CFR Part 1910.1048, Appendix B, Sampling strategy and analytical method for formaldehyde (See Appendix I), and the Evaluation of Formaldehyde at NIH Work Sites document (see Appendix III).

e.) CAP locations may still be monitored annually. Locations that require annual monitoring under the CAP accreditation program will be reviewed with the Clinical Center Safety Officer on an annual basis.

5.1.6 Employee Monitoring

a.) Covered Employees – All NIH employees subject to monitoring for occupational exposure under the Formaldehyde standard will be included in personal air sampling tests by the TAB, DOHS.

b.) Employee Notification of Monitoring Results – NIH employees who are monitored

for formaldehyde under this Program will be notified of the results of the monitoring within 15 days of the receipt of results. Notification will be in writing either by posting the results (in the employee's work area) or by distributing copies of the results. Supervisors shall assure that the sampling results are made available to their employees. Screening samples are not reported.

c.) Observation of Monitoring – Employees, or their representatives, who are affected by this Program will be afforded the opportunity to observe any monitoring of employee exposure to formaldehyde that is required under this Program. The supervisor shall inform the affected employees when these tests are being conducted in their work area and explain the purpose of the sampling.

5.2 Regulated Areas

5.2.1 Posting

Work areas where the concentration of airborne formaldehyde equals or exceeds the PEL will have all entrance or access ways posted with signs reading:

DANGER

FORMALDEHYDE
IRRITANT AND POTENTIAL CANCER HAZARD

AUTHORIZED PERSONNEL ONLY

5.2.2 Access to Regulated Areas

Access to the posted area will be limited to authorize personnel who are trained to recognize formaldehyde hazards. It is the responsibility of the IC Safety Specialist to assure that all entrances are properly posted. It is the supervisor's responsibility to limit access to the posted area to authorized personnel only.

5.2.3 Research Contractors

The supervisor of the posted work area must inform the supervisors of both NIH and non-NIH employees who have need to be in the posted area, of the work site operations and the access restrictions in the regulated area.

5.3 Methods of Control

5.3.1 Engineering and Work Practice Controls

As a primary means of control, engineering and work practice controls are implemented to reduce and maintain employee exposure at or below exposure limits (as per Section 4.0, Exposure Limits).

Methods include local ventilation (fume hoods and down draft tables); isolation (air-tight storage containers); and safe work practices designed to limit exposure to formaldehyde (properly sealing storage containers).

5.3.2 Administrative Controls

Controls may be administrative measures that reduce the quantity or frequency of the use of formaldehyde and hence achieve compliance with the exposure limits. Administrative controls may not be utilized if individual employee exposure is reduced through a schedule that would add to the number of workers exposed in the operation.

5.3.3 Personal Protective Equipment (PPE)

In the unlikely event that compliance with the exposure limits cannot be achieved with engineering, work practice, or administrative controls to reduce exposure to the lowest feasible level, the use of respirators will be authorized.

Employee Notification: If an employee's exposure exceeds the exposure limits, a written plan regarding the control methods shall be developed and implemented by the TAB. Notice of the plan shall be given to employees. The TAB shall provide a copy of the plan to the employee and the employee's supervisor.

5.4 Respiratory Protection

5.4.1 Respirator Usage

a.) Control Measures - Where engineering controls, work practice controls, or administrative controls to reduce employee exposure to formaldehyde below the exposure limits are not feasible or until they are installed or instituted, respiratory protection is required.

b.) Special Work Application - In maintenance, repair or cleaning operations, where engineering or work practice controls are not feasible or practical, and in emergencies, for leakage or spill control and clean-up, respiratory protection is required.

5.4.2 The NIH Respiratory Protection Program

a.) Employee Assignment - Respiratory protection is available to all NIH employees who require it through the NIH Respiratory Protection Program (RPP), administered by TAB, DOHS, in accordance with OSHA Respiratory Protection standard, 29 CFR Part 1910.134(b),(d),(e),(f).

Employees to be assigned a respirator for protection from exposure to formaldehyde shall be medically cleared by OMS and are required to be quantitatively or qualitatively fit-tested for an appropriate respirator and given instructions in its use and care.

b.) Respirator Selection - The standard respirator issued by the NIH Respiratory Protection Program for protection from formaldehyde is the full-face, elastomeric, negative pressure respirator fitted with formaldehyde cartridges.

For those employees who cannot wear or experience difficulty in wearing negative pressure respirators, an acceptable powered air-purifying respirator (PAPR) fitted with formaldehyde cartridges will be made available. It is the responsibility or the employee's IC to supply and make available any PAPR type respirator, as required. The DOHS will assist in the selection of an acceptable PAPR and provide training in its care and use. Supervisors shall ensure that cartridges are replaced in the full-face respirator and PAPR after every three (3) hours of use or at the end of a work shift, whichever occurs first, unless the cartridge contains a National Institute of Occupational Safety and Health (NIOSH) end-of-service-life indicator.

For concentrations above 7.5-ppm formaldehyde, a self-contained breathing apparatus (SCBA) with a positive pressure full face-piece is required.

5.5 Selection and Use of Protective Equipment and Clothing

5.5.1 Exposure Criteria

a.) Eye and skin protection - In areas where liquids containing 1% or more of formaldehyde are used, any eye or skin contact with formaldehyde will be prevented by the use of protective clothing (e.g., apron) made of materials impervious to formaldehyde, and through the use of other personal protective equipment (PPE), such as chemical splash goggles and face shields. In cases where a face shield is worn, splash goggles are also required if there is the possibility of formaldehyde reaching the area of the eyes.

b.) Full Body Protection - Full body protection, including SCBA respirators, is required for entry into areas where concentrations exceed 100 ppm, and for emergency reentry into areas of unknown concentrations or where spills have occurred. Under these circumstances, only the NIH Fire Department and/or appropriate DOHS employee shall be permitted to enter the contaminated area.

5.5.2 Availability and Maintenance of PPE and Clothing

a.) Assignment of PPE - It is the responsibility of the supervisor, with advice from the IC Safety Specialist, to ensure the appropriate protective clothing and equipment is available to employees and to ensure that employees wear the appropriate PPE. The supervisor shall give employees instruction in the proper use and care of the PPE.

b.) Contaminated Clothing and PPE - It is the supervisor's responsibility to ensure that all protective equipment and clothing contaminated with formaldehyde is cleaned or laundered before it is reused.

Equipment and clothing contaminated by formaldehyde shall be stored in a vented storage

area and located in such a manner that employee exposure is minimized. Storage areas and containers for contaminated clothing and equipment will have labels and signs containing reading:

DANGER

FORMALDEHYDE-CONTAMINATED [CLOTHING] EQUIPMENT

AVOID INHALATION AND SKIN CONTACT

c.) PPE Maintenance - It is the supervisor's responsibility to ensure that the required PPE and clothing is cleaned and replaced, as necessary, to maintain its effectiveness. The supervisor shall ensure that employees do not take home formaldehyde contaminated equipment or clothing.

5.6 Hygiene

5.6.1 Change Rooms

In accordance with 29 CFR Part 1910.141, Sanitation, the supervisor shall assure that change rooms are provided for employees required to wear protective clothing.

Separate storage facilities are required for street clothing and protective clothing, along with a closed, properly labeled, disposal container as noted above for contaminated clothing.

5.6.2. Safety Showers and Eye Washes

If potential exists for accidental splashing of an employee's skin with formaldehyde solutions (1% or greater), quick drench safety showers will be located in accessible locations for immediate use. The shower will be located on the same level as the hazard and the path of travel will be free of obstructions that may inhibit the immediate use of the equipment. Where splashing of the eyes with solutions of 0.1% or greater may occur, eye wash facilities will be installed in the same fashion as the quick drench showers. (See American National Standards Institute (ANSI) Standard Z358.1, 2009, for further details.)

5.7 Housekeeping

The supervisor shall develop and maintain a program to detect leaks or spills, including regular inspections. In the event of accidental spills or leaks, the supervisor shall ensure that the NIH Fire Department (emergency phone 911) is contacted for assistance with cleanup. Waste materials containing formaldehyde must be placed in sealed containers bearing a label warning of formaldehyde's presence and or the hazards associated with formaldehyde (see example below), and disposed of through the NIH, Office of Research Facilities, Division of Environmental Protection (information: 301-496-7990; pick-up: 301-496-4710).

DANGER FORMALDEHYDE IRRITANT AND POTENTIAL CANCER HAZARD

5.8. MEDICAL SURVEILLANCE

The OMS shall institute medical surveillance programs for all employees exposed to formaldehyde at concentrations at or exceeding the AL. The surveillance program must consist of the following summarized elements (see 29 CFR Part 1910.1048, paragraph (l) for specifics; incorporated in Appendix I):

- Examination by a physician.
- Medical disease questionnaire prior to assignment to a job where formaldehyde exposure is at or above the AL or above the STEL, and annually thereafter.
- Medical examination for employees as determined by the physician to be at increased risk from exposure to formaldehyde, at the time of initial assignment, and at least annually thereafter for all employees required to wear a respirator to reduce exposure to formaldehyde.
- Examinations for employees exposed in an emergency.
- A copy of the OSHA Formaldehyde standard with Appendices A, C, D, and E (29 CFR Part 1910.1048) be provided to the examining physician.
- Medical Removal Program - supplements the existing surveillance requirements for those employees suffering significant eye, nose or throat irritation and for those suffering from dermal irritation or sensitization from occupational exposure to formaldehyde.
- Multiple physician review.

Currently, due to successive monitoring of Clinical Center pathology workers that have resulted in monitoring levels below the established OSHA AL and PEL, the OMS Medical Surveillance Protocol has been deactivated. If an increase in the AL or PEL is observed in future monitoring surveys, the OMS Medical Surveillance Protocol will be reactivated.

5.9 Hazard Communication

The NIH Hazard Communication Program (NIH HCP) shall govern communication of the hazards associated with formaldehyde in the workplace. The requirements of paragraph (m) of the Formaldehyde Standard, 29 CFR 1910.1048 (see appendix I) are covered under the NIH HCP.

5.10 Employee Training

It is the responsibility of the supervisor, assisted by the IC Safety Specialist, to ensure that all employees who are assigned to workplaces where there is a potential health hazard from formaldehyde participate in a HCP training program. All employees at the time of their initial assignment and whenever a new hazard from formaldehyde is introduced into their area, shall be provided with information and training on

formaldehyde. The training shall be repeated at least annually.

As an additional training component, the TAB may provide the Formaldehyde Fact Sheet and Training Aid (see Appendix IV), which states what topics need to be covered during training for all employees exposed to formaldehyde at 0.1 ppm, as an 8-hour TWA, and above. It is the supervisor's responsibility to make sure the employee reads through the provided information, signs the slip attached to the Fact Sheet acknowledging an understanding of the information provided, and returns the slip to the TAB.

5.11 RECORDKEEPING

5.11.1 Monitoring Data

The TAB, DOHS will maintain and update records of all monitoring data obtained to measure employee exposure to formaldehyde. The record includes:

a.) Date measurements were obtained.
b.) Operation or procedure being monitored.
c.) Method of sampling and analysis used.
d.) Number, duration, time, and results of samples taken.
e.) Types of protective equipment used.
f.) Employee names, IC, area supervisor, job classification, and exposure estimate of the employee whose exposuTres are represented by the actual monitoring results.

5.11.2 Objective Data

In those areas where objective data is used to determine exposure to formaldehyde, a record shall be maintained of the information used to support that determination. Such information may include quantities used, engineering controls in place, and work practices.

5.11.3 Respirator Fit-Testing Records

Respirator fit testing records for all NIH employees using negative pressure respirators for formaldehyde shall include the following information:

a.) A copy of the respirator fit testing protocol used.
b.) A copy of the results of any fit testing results performed.
c.) Manufacturer, model, and size of respirators available.
d.) Date of the most recent fit-test, name and ID number of each employee tested, and the respirator type and face-piece selected.

Exposure records, determinations, and fit testing records must be maintained for the duration of employment plus 30 years.

APPENDIX I**: OSHA FORMALDEHYDE STANDARD**

29 CFR Part 1910.1048: Formaldehyde

APPENDIX II**: FORMALDEHYDE SURVEY LOCATIONS**

NIH FORMALDEHYDE LOCATIONS, SUPERVISORS AND REPORT RECIPIENTS				
Location	**Supervisor/Safety Committee Member**	**IC**	**Ext.**	**Report Recipients (Safety Specialist) Recent monitoring dates (mo/yr)**
ACRF NCI/Lab of Pathology 10/2N100, 10/2A21 **Removed 2005; Reviewed 2010 & 2014**	Michael Newford	NCI		**(Michele Evans)** CAP locations; 2A21 - 6/10 (MEMO), follow-up 11/12 & 12/14; No formaldehyde used in 2N100 (reviewed 2010 & 2014)—moved to 2B58
ACRF NCI/Lab of Pathology 10/6N107 - 10/6N109 **Removed 2004**	Mr. Greg Jasper	NCI	435-2640	Ms. Patricia Fetsch (496-6355) **(*Michele Evans*)**
ACRF NCI/Lab of Pathology 10/2B58	Ms. Cindy Harris	NCI	402-0434	Ms. Patricia Fetsch (496-6355) **(Michele Evans)** CAP location (formaldehyde is not currently used, but these areas are equipped for its usage); follow-up 12/14
NIMH/Poolesville Animal Center, Bldg 110/RM 104A		NIMH	496-9334	(perform perfusions very infrequently for about 30 min at a time)
VRP/Poolesville Animal Center, Bldg 102	Kris Eckard	DIRS/VRP	402-5116	Kris Eckard (402-5116) (perform perfusions very infrequently for about 30 min at a time)
ACRF NCI/Lab of Pathology 10/2S258/2S261, & 10/2C533	Michael Newford	NCI	435-3543	Ms. Patricia Fetsch (496-6355) **(Michele Evans)** CAP locations 12/13 (2A22 – 2A28), follow-up 12/14, survey 3/15; 12/11 (2C533)—11/14 follow-up; 11/15 survey
ACRF NCI/Lab of Pathology 10/3S261 and 10/B1 Morgue	Michael Newford. Willie Young	NCI	496-5658	Ms. Patricia Fetsch (496-6355) **(Michele Evans)** CAP location 12/13 (2A07 side room—dumping task), 12/14 follow-up, 2/15 survey; 4/13 (2A07 tissue grossing), follow-up 12/14

ACRF/Clinical Pathology/ Microbiology Area 10/2C300 (see also DLM below)	Ms. Chung-Hee Row Mr. Jeb Monasterial Ms. Cheryl Starks	CC-DLM	496-3386	Chung-Hee Row (496-3386) Jeb Monasterial (496-4473) Cheryl Clarke (496-4473) **(Michele Evans)** 3/09 (2C324); 1/14 (2C360A/2C360C) – MEMO & CAP location, 12/14 follow-up; 5/10 (2C324) – MEMO & CAP location, 12/14 follow-up, 7/15 survey
DVR/DVSB 28A/ 107, 107A, 110 (multiple surveys completed)	Dr. Michael Eckhaus Kelly Prevost (107A)	DVR	496-4465	Michael Eckhaus (496-4465) **(John Barnhart)** 2/09-110 (MEMO), 12/13 follow-up; 7/10-Room 107 (MEMO), 12/13 follow-up; 7/13-Room 107A
NIDA Baltimore	Dr. Bruce Hope	NIDA	443-740-7585	Bruce Hope (443-740-7585) **(Delores Wilson)** 1/09 & 11/11
10/3C127E NIAAA	Dr. Annika Thorsell	NIAAA	451-6960	Annika Thorsell (451-6960) 4/11 MEMO; 12/13 follow-up (new survey in 2009)
14E/104A & 10/6D13-5N315 (moved to Building 10 in 2010)	Dr. Zu Xi Yu	NHLBI	496-5035	Zu Xi Yu (451-6960) 10/10 MEMO; 8/12 follow-up; 12/14 follow-up
NCI 10/B1B58 & B1B54	Ms. Catharine McCoy	NCI		Catharine McCoy **(Michele Evans)** 5/10 MEMO & CAP location; 8/12 follow-up; 12/14 follow-up
NIAID Twinbrook III Veterinary Pathology Laboratory 2W-03	Kevin Bock Dr. Orandle	NIAID		Kevin Bock Dr. Orandle 6/10 MEMO; 8/12 follow-up
NIDDK 14A/Rooms 165 & 167	Dr. Yossi Shiloach	NIDDK		Yossi Shiloach Loc Trinh 6/10-new survey in 2010; 12/14 follow-up
DOHS/IRF 3A115 & 3A119	CDR Jason Barr	DOHS/IRF		Jason Barr 10/10-new survey & MEMO; 8/12 follow-up
DOHS/IRF 2A115B	CDR Jason Barr	DOHS/IRF		Jason Barr 1/11; 5/14 survey & MEMO
DOHS/IRF 1B143	CDR Jason Barr	DOHS/IRF		Jason Barr 1/11-new survey & MEMO; 1/14 follow-up (no longer in use)
DOHS (BSC decon @ 10/5A32)	Mark Gibson	DOHS		Mark Gibson 5/11-new survey

NIDCR 30/325 (previously 213)	Alfredo Molinolo	NIDCR		Alfredo Molinolo 6/11 new survey & MEMO; 2/14 survey and MEMO (new space)
FDA 29A/2C20	Steve Rubin	FDA		Steve Rubin 7/11 new survey & MEMO; 12/13 follow-up
33	Jeff Potts	DOHS		Jeff Potts 7/11 new survey & MEMO; 1/14 follow-up (moving to new location at IRF—can be removed)
10/2D43	Carolyn Beebe Smith Thomas Burlin	NIMH		Carolyn Beebe Smith & Thomas Burlin 12/11 new survey & MEMO; 12/13 follow-up
5 Research Court/1A13	Scott Martin	NCATS		Scott Martin 2/12 new survey & MEMO (5RC closed in 2015)
10/2C410	Shakuntala Gurprasad	DLM		S. Gurprasad 6/13 new survey & MEMO; 6/15 survey
10/2C350	Laura Ediger	DLM		Laura Ediger 6/13 MEMO; 12/15 MEMO
10/2C390	Laura Roeder	DLM		Laura Roeder 7/13 new survey & MEMO
49/B1B35	Dr. Karen Berman; Jonathan Sirovatka	NIMH		Karen Berman 8/13 MEMO
9800 MCD	Sam Michael	NCATS		Sam Michael 5/12, follow-up 10/14
DOHS/IRF 2A110	Jason Barr	DOHS/IRF		Jason Barr 5/14 new survey & MEMO
DOHS/IRF 2B101A	Jason Barr	DOHS/IRF		Jason Barr 5/14 new survey & MEMO
DOHS/IRF Zone 6 (decon)	Jason Barr	DOHS/IRF		Jason Barr 5/14 new survey (decon); 5/15 survey
Triad/3610 (Baltimore)	Jana Drgonova	NIDA		Jana Drgonova 7/14 new survey
DOHS (BSC decon @ 10/2C331)	Mark Gibson	DOHS		Mark Gibson 6/15-new survey
10/2S261	Michael Newford	NCI		Michael Newford 7/15-new survey

10/3S261	David Kleiner	CC		David Kleiner 10/15-new survey
10/2S258	Joseph Chinquee	CC		Joseph Chinquee 10/15-new survey

APPENDIX III: EVALUATION OF FORMALDEHYDE AT NIH WORK SITES

Evaluation of Formaldehyde at Work Sites

1. This task requires performing formaldehyde-focused industrial hygiene surveys at the National Institutes of Health (NIH) to: (1) identify and quantify exposure levels of NIH workers to formaldehyde, and (2) provide information on the effectiveness of the controls that are being used to minimize exposures. Areas to be surveyed will include clinical, pathology, laboratory, and animal areas.

2. The surveys document compliance with the Occupational Safety and Health Administration (OSHA) Formaldehyde Standard, (29 CFR Part 1910.1048) and provide documentation of surveillance activities to The Joint Commission (TJC), the American Association for Accreditation of Laboratory Animal Care (AAALAC), and the College of American Pathologists (CAP). The task will include measurement, evaluation, and report preparation of monitoring employee exposures to formaldehyde in areas of the NIH as identified in Appendix II, Formaldehyde Survey Locations. Additional areas may be added as they are identified.

3. Prior to the start of the survey, NIH, Division of Occupational Health and Safety (DOHS) personnel will perform a preliminary walkthrough of the work sites.

4. The Industrial Hygiene (IH) services contractor will coordinate and schedule any monitoring activities that are particularly difficult to schedule or outside of regular NIH business hours. Prior to the start of the survey, personnel will take the contractor on a preliminary walkthrough of the work sites, if required. Questions arising during the survey should be directed to the Technical Assistance Branch (TAB) Representative (301-496-3457).

5. Employee Notification of Monitoring Results – NIH employees who are monitored for formaldehyde under this Program will be notified of the results of the monitoring within fifteen (15) days of the receipt of results. Notification will be in writing either by posting the results (in the employee's work area) or by distributing copies of the results. Supervisors shall assure that the sampling results are made available to their employees. Screening samples are not reported.

6. All monitoring reports must be submitted to (a) the Clinical Center Laboratory Manager and/or Supervisor, and (b) the Clinical Center Safety Officer within one (1) month after initiation of the site survey. Exceptions to the time requirement will be granted for those survey sites, such as autopsy, where the procedures to be monitored may not be conducted on a routine basis. The survey results from each work area will be provided as a separate report. In the event that personal monitoring results indicate an overexposure to formaldehyde, the contractor will notify the TAB Representative within (2) two business days and not wait for the completion of the survey report.

7. Each written report will contain at minimum the following information for each location:

    a. Employee names, Institute/Center (IC), job title, ID number, area supervisor, and determination of the individual employee(s) exposures as represented by the monitoring results.

b. Date measurements were made.

c. Procedure being monitored including the approximate quantity of formaldehyde used per procedure, frequency of procedure, duration of procedure and quantity of formaldehyde stored on a routine basis.

d. Method of sampling and of analysis.

e. Sample numbers and locations, duration, time of sampling, contaminant mass from badges, results in ppm, and calculations of 8-hour time-weighted average exposures.

f. Protective equipment or local exhaust ventilation used by employees during procedures.

g. Recommendations for reducing formaldehyde exposure if warranted.

8. Samples will be taken through either active sampling using OSHA Method 52, Chemical Sampling - Acrolein and/or Formaldehyde or NIOSH Method 2016; passive sampling using OSHA Method 1007, Formaldehyde (Diffusive Samplers). As referenced in OSHA Method 1007, passive sampling cannot be used when the sources of formaldehyde is formalin. Samples will be sent to an American Industrial Hygiene Association (AIHA) accredited laboratory for analysis.

9. All personnel conducting the monitoring activities will use professional judgment in modifying the sampling strategy, as needed, based on actual conditions experienced during the site sampling.

APPENDIX IV**: FORMALDEHYDE FACT SHEET AND TRAINING AID**

Formaldehyde Fact Sheet and Training Aid
(Adopted from OSHA standard 29 CFR 1910.1048)

Introduction

To protect workers exposed to formaldehyde and formalin products, the Occupational Safety and Health Administration (OSHA) standard (29 CFR 1910.1048) applies to formaldehyde gas, its solutions, and a variety of material such as trioxane, paraformaldehyde, and resin formulations, and solids and mixtures containing formaldehyde that serve as sources of the substance. In addition to setting permissible exposure levels (PEL), exposure monitoring and training, the standard requires medical surveillance and medical removal, record keeping, regulated areas, hazard communication, emergency procedures, primary reliance on engineering and work practices to control exposure, and maintenance and selection of personal protective equipment.

The PEL for formaldehyde in all workplaces (including general industry, construction, and maritime, but not in agriculture) covered by the OSH Act is ***0.75 ppm measured as an 8-hour time weighted average (TWA)***. The standard includes a ***2 ppm short-term exposure limit (STEL)*** (i.e., maximum exposure allowed during a 15-minute period). The "action level" is 0.5 ppm measured over 8 hours. Additionally, the ACGIH has a formaldehyde ceiling level TLV of 0.1 ppm—a level that should not be exceeded during any part of the workday. NIH has adopted the ACGIH TLV.

The OSHA standard requires that the employer conduct initial monitoring to identify all employees who are exposed to formaldehyde at or above the action level or STEL and to accurately determine the exposure of each employee so identified.

If the exposure level is maintained below the STEL, TLV, and action level, exposure monitoring may be discontinued until such there is a change which could affect exposure levels. The employer must also monitor employee exposure promptly, upon receiving reports of formaldehyde-related signs and symptoms.

Substance

Formaldehyde
(Methanol; 37% aqueous solution [usually containing 10 to 15% methanol] is called formalin; solid polymer is called paraformaldehyde)
CAS 50-00-0

Formula

HCHO

Physical Properties

Clear, colorless liquid
Formaldehyde: Boiling point -19 °C, melting point - 92° C
Formalin: Boiling point 96 °C, melting point - 15° C
Miscible with water

Odor : Pungent odor detectable at 1 ppm

Vapor Density: ~1 (air = 1.0)

Vapor Pressure: Formaldehyde: 10 mmHg at 88 °C
Formalin: 23 to 26 mmHg at 25 °C

Flash Point: 50° C for formalin containing 15% methanol

Autoignition Temperature: 424 °C for formalin containing 15% methanol

Toxicity Data

Lethal Dose oral (rat)
500 mg/kg

Lethal Dose skin (rabbit)
270 mg/kg

Lethal Concentration inhale (rat)
203 mg/m (2 hours)

Major Hazards

Probable human carcinogen (OSHA "select carcinogen"); moderate acute toxicity; skin sensitizer.

Toxicity

Formaldehyde is moderately toxic by skin contact and inhalation. Exposure to formaldehyde gas can cause irritation of the eyes and respiratory tract, coughing, dry throat, tightening of the chest, headache, a sensation of pressure in the head, and palpitations of the heart. Exposure to 0.1 to 5 ppm causes irritation of the eyes, nose, and throat; above 10 ppm severe lacrimation occurs, burning in the nose and throat is experienced, and breathing becomes difficult. Acute exposure to concentrations above 25 ppm can cause serious injury, including fatal pulmonary edema. Formaldehyde has low acute toxicity via the oral route. Ingestion can cause irritation of the mouth, throat, and stomach, nausea, vomiting, convulsions, and coma. An oral dose of 30 to 100 mL of 37% formalin can be fatal in humans. Formalin solutions can cause severe eye burns and loss of vision. Eye contact may lead to delayed effects that are not appreciably eased by eye washing.

Formaldehyde is regulated by OSHA as a carcinogen (Standard 1910.1048) and is listed in International

Agency for Research on Cancer (IARC) Group 2A ("probable human carcinogen"). This substance is classified as a "select carcinogen" under the criteria of the OSHA Laboratory Standard. Prolonged or repeated exposure to formaldehyde can cause dermatitis and sensitization of the skin and respiratory tract. Following skin contact, a symptom-free period may occur in sensitized individuals. Subsequent exposures can then lead to itching, redness, and the formation of blisters.

Flammability and Explosibility

Formaldehyde gas is extremely flammable; formalin solution is a combustible liquid (NFPA rating = 2 for 37% formaldehyde [15% methanol], NFPA rating = 4 for 37% formaldehyde [methanol free]). Toxic vapors may be given off in a fire. Carbon dioxide or dry chemical extinguishers should be used to fight formaldehyde fires.

Reactivity and Incompatibility

Formaldehyde may react violently with strong oxidizing agents, ammonia and strong alkalis, isocyanates, peracids, anhydrides, and inorganic acids. Formaldehyde reacts with HCl to form the potent carcinogen, bis-chloromethyl ether.

Storage and Handling

Because of its carcinogenicity and flammability, formaldehyde should be handled using the "basic prudent practices", supplemented by the additional precautions for work with compounds of high chronic toxicity and extremely flammable substances. In particular, work with formaldehyde should be conducted in a fume hood to prevent exposure by inhalation, and splash goggles and impermeable gloves should be worn at all times to prevent eye and skin contact. Formaldehyde should be used only in areas free of ignition sources. Containers of formaldehyde should be stored in flammable storage cabinets and in secondary containers in areas separate from oxidizers and bases.

Accidents or Possible Exposures

In the event of skin contact, immediately wash with soap and water and remove contaminated clothing. In case of eye contact, promptly wash with copious amounts of water for 15 min (lifting upper and lower lids occasionally) and obtain medical attention from Occupational Medical Services located in Building 10, Room 6C306; telephone 496-4411. If formaldehyde is ingested, obtain medical attention immediately. If large amounts of this compound are inhaled, move the person to fresh air and seek medical attention at once. In the event of a spill, remove all ignition sources, soak up the formaldehyde with a spill pillow or absorbent material, place in an appropriate container, and dispose of properly. Respiratory protection may be necessary in the event of a large spill or release in a confined area. In this situation, close all windows and leave the lab immediately (always make sure the lab door is closed behind you to prevent the vapors from moving into the hallway). Call 911 and alert operator of the spill. **Do not re-enter the room until appropriate authorities determine the area is safe.**

Disposal

Excess formaldehyde and waste material containing this substance should be placed in an appropriate

container, clearly labeled, and handled according to your institution's waste disposal guidelines. For further information, contact the Division of Environmental Protection (DEP) at 301 496-7990; for pick-up, call 301 496-4710.

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I have read through the Formaldehyde Fact Sheet and Training Aid regarding the hazards associated with formaldehyde exposure and I understand these hazards. (Please send back to Building 13, Room 3K04; Attn: TAB.)

Name _____ Date _____

APPENDIX V: **OSHA Formaldehyde Fact Sheet**

OSHA FORMALDEHYDE FACT SHEET