

AIMS
PO Box 269120

Sacramento, CA 95826-9120

HEALTH INSURANCE CLAIM FORM

APPROVED BY NATIONAL UNIFORM CLAIM COMMITTEE (NUCC) 02/12

CARRIER

PICA										PICA																																												
1. MEDICARE <input type="checkbox"/> (Medicare #) MEDICAID <input type="checkbox"/> (Medicaid #) TRICARE <input type="checkbox"/> (DOD#) CHAMPVA <input type="checkbox"/> (Member ID#) GROUP HEALTH PLAN <input type="checkbox"/> (ID#) FECA BLK LUNG <input type="checkbox"/> (ID#) OTHER <input checked="" type="checkbox"/> (ID#)										1a. INSURED'S I.D. NUMBER (For Program in Item 1)																																												
2. PATIENT'S NAME (Last Name, First Name, Middle Initial) Anderson, Tiffany										3. PATIENT'S BIRTH DATE MM DD YY 08 22 1970 M <input type="checkbox"/> F <input checked="" type="checkbox"/>										4. INSURED'S NAME (Last Name, First Name, Middle Initial)																																		
5. PATIENT'S ADDRESS (No., Street) 1900 Lakeshore Dr										6. PATIENT RELATIONSHIP TO INSURED Self <input type="checkbox"/> Spouse <input type="checkbox"/> Child <input type="checkbox"/> Other <input checked="" type="checkbox"/>										7. INSURED'S ADDRESS (No., Street)																																		
CITY Lodi					STATE CA					8. RESERVED FOR NUCC USE										CITY					STATE																													
ZIP CODE 95242					TELEPHONE (Include Area Code) (209) 3310208															ZIP CODE					TELEPHONE (Include Area Code) ()																													
9. OTHER INSURED'S NAME (Last Name, First Name, Middle Initial)										10. IS PATIENT'S CONDITION RELATED TO:										11. INSURED'S POLICY GROUP OR FECA NUMBER VE0700184																																		
a. OTHER INSURED'S POLICY OR GROUP NUMBER										a. EMPLOYMENT? (Current or Previous) <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO										a. INSURED'S DATE OF BIRTH MM DD YY SEX M <input type="checkbox"/> F <input type="checkbox"/>																																		
b. RESERVED FOR NUCC USE										b. AUTO ACCIDENT? <input type="checkbox"/> YES <input type="checkbox"/> NO PLACE (State)										b. OTHER CLAIM ID (Designated by NUCC)																																		
c. RESERVED FOR NUCC USE										c. OTHER ACCIDENT? <input type="checkbox"/> YES <input type="checkbox"/> NO										c. INSURANCE PLAN NAME OR PROGRAM NAME																																		
d. INSURANCE PLAN NAME OR PROGRAM NAME										10d. CLAIM CODES (Designated by NUCC)										d. IS THERE ANOTHER HEALTH BENEFIT PLAN? <input type="checkbox"/> YES <input type="checkbox"/> NO <i>If yes, complete items 9, 9a and 9d.</i>																																		
READ BACK OF FORM BEFORE COMPLETING & SIGNING THIS FORM. 12. PATIENT'S OR AUTHORIZED PERSON'S SIGNATURE. I authorize the release of any medical or other information necessary to process this claim. I also request payment of government benefits either to myself or to the party who accepts assignment below. SIGNED <u>Signature on file</u> DATE <u>05/12/16</u>																				13. INSURED'S OR AUTHORIZED PERSON'S SIGNATURE I authorize payment of medical benefits to the undersigned physician or supplier for services described below. SIGNED <u>Signature on file</u>																																		
14. DATE OF CURRENT ILLNESS, INJURY, or PREGNANCY (LMP): MM DD YY 06 29 2011 QUAL 431										15. OTHER DATE QUAL MM DD YY										16. DATES PATIENT UNABLE TO WORK IN CURRENT OCCUPATION FROM MM DD YY TO MM DD YY																																		
17. NAME OF REFERRING PROVIDER OR OTHER SOURCE										17a.					17b. NPI					18. HOSPITALIZATION DATES RELATED TO CURRENT SERVICES FROM MM DD YY TO MM DD YY																																		
19. ADDITIONAL CLAIM INFORMATION (Designated by NUCC)																				20. OUTSIDE LAB? <input type="checkbox"/> YES <input type="checkbox"/> NO \$ CHARGES																																		
21. DIAGNOSIS OR NATURE OF ILLNESS OR INJURY Relate A-L to service line below (24E) A. <u>M25.56</u> B. _____ C. _____ D. _____ E. _____ F. _____ G. _____ H. _____ I. _____ J. _____										ICD Ind. 0					22. RESUBMISSION CODE ORIGINAL REF. NO.																																							
24. A. DATE(S) OF SERVICE From MM DD YY To MM DD YY 04 26 16 04 26 16										B. PLACE OF SERVICE 11					C. EMG					D. PROCEDURES, SERVICES, OR SUPPLIES (Explain Unusual Circumstances) CPT/HCPCS MODIFIER ML 101 95					E. DIAGNOSIS POINTER A					F. \$ CHARGES 1625 00					G. DAYS OR UNITS 26					H. EPSTD Family Plan					I. ID. QUAL. NPI					J. RENDERING PROVIDER ID. # 1982751558				
25. FEDERAL TAX I.D. NUMBER 26-1114252										SSN EIN <input type="checkbox"/> <input checked="" type="checkbox"/>					26. PATIENT'S ACCOUNT NO. 130779					27. ACCEPT ASSIGNMENT? (For govt. claims, see back) <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO					28. TOTAL CHARGE \$ 1625 00					29. AMOUNT PAID \$ 0 00					30. Rsvd for NUCC Use																			
31. SIGNATURE OF PHYSICIAN OR SUPPLIER INCLUDING DEGREES OR CREDENTIALS (I certify that the statements on the reverse apply to this bill and are made a part thereof.) Michael Bronshvag MD Internal Medicine 05/12/16 SIGNED DATE										32. SERVICE FACILITY LOCATION INFORMATION Stockton - ExamWorks 3555 Deer Park Drive, Suite 150 Stockton, CA 95219										33. BILLING PROVIDER INFO & PH # ExamWorks, Inc. 11010 White Rock Road, Suite 120 Rancho Cordova, CA 95670																																		
										a. 1982751558					b. G15805					a. 1982751558					b.																													

PATIENT AND INSURED INFORMATION

PHYSICIAN OR SUPPLIER INFORMATION

Request for Taxpayer Identification Number and Certification

Give Form to the requester. Do not send to the IRS.

Print or type
See Specific Instructions on page 2.

1 Name (as shown on your income tax return). Name is required on this line; do not leave this line blank.
ExamWorks, Inc.

2 Business name/disregarded entity name, if different from above
ExamWorks, Inc.

3 Check appropriate box for federal tax classification; check only one of the following seven boxes:
 Individual/sole proprietor or single-member LLC
 C Corporation
 S Corporation
 Partnership
 Trust/estate
 Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=partnership) >
 Note: For a single-member LLC that is disregarded, do not check LLC; check the appropriate box in the line above for the tax classification of the single-member owner.
 Other (see instructions) >

4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3):
 Exempt payee code (if any) _____
 Exemption from FATCA reporting code (if any) _____
(Applies to accounts maintained outside the U.S.)

5 Address (number, street, and apt. or suite no.)
11010 White Rock Road, Suite 120

6 City, state, and ZIP code
Rancho Cordova, CA 95670

7 List account number(s) here (optional)

Requester's name and address (optional)

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the Part I instructions on page 3. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN* on page 3.

Note: If the account is in more than one name, see the instructions for line 1 and the chart on page 4 for guidelines on whose number to enter.

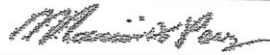
Social security number									
				-					
OR									
Employer identification number									
2	6	-	1	1	1	4	2	5	2

Part II Certification

Under penalties of perjury, I certify that:

- The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
- I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
- I am a U.S. citizen or other U.S. person (defined below); and
- The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions on page 3.

Sign Here Signature of U.S. person > 

Date > 01/05/2016

General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.
 Future developments. Information about developments affecting Form W-9 (such as legislation enacted after we release it) is at www.irs.gov/fw9.

Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following:

- Form 1099-INT (interest earned or paid)
- Form 1099-DIV (dividends, including those from stocks or mutual funds)
- Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)
- Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)
- Form 1099-S (proceeds from real estate transactions)
- Form 1099-K (merchant card and third party network transactions)

- Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)
 - Form 1099-C (canceled debt)
 - Form 1099-A (acquisition or abandonment of secured property)
- Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.
- If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See *What is backup withholding?* on page 2.
- By signing the filled-out form, you:
- Certify that the TIN you are giving is correct (or you are waiting for a number to be issued),
 - Certify that you are not subject to backup withholding, or
 - Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income, and
 - Certify that FATCA code(s) entered on this form (if any) indicating that you are exempt from the FATCA reporting, is correct. See *What is FATCA reporting?* on page 2 for further information.

MICHAEL M. BRONSHVAG, M.D.
Diplomate in Neurology, ABP&N
Diplomate in Internal Medicine, ABIM

April 26, 2016

Nancy Urton, Adjuster
AIMS
P.O. Box 269120
Sacramento, CA 95826-9120

Sara A. Skolnik, Esq.
Stockwell, Harris, Woolverton & Helphrey
1007B West College Avenue, Suite 301
Santa Rosa, CA 95401

Tiffany Anderson
1900 Lakeshore Drive
Lodi, CA 95242

Disability Evaluation Unit
160 Promenade Circle, Suite 300
Sacramento, CA 95834-2963

QUALIFIED MEDICAL REEVALUATION

Re: ANDERSON, Tiffany
Dates of Injury: 06/19/2008, 07/02/2009, 03/26/2009, 06/29/2011, CT-11/30/2011
Employer: San Joaquin County Mosquito & Vector Control
WCAB Case #s: ADJ7004221, ADJ7004227, ADJ7010682, ADJ7976768, ADJ9066508
Claim #: VE0700184

Dear All:

Tiffany Anderson, was seen for a Qualified Medical Reevaluation on April 26, 2016, at 3555 Deer Park Drive, Suite 150, Stockton, California 95219.

Pursuant to Title 8 Cal Code of Regulations, Section 9795 (b) and (c), this report is submitted as a basic comprehensive medical-legal evaluation, ML 101-95. Time spent face-to-face with the claimant was 60 minutes, record review required 90 minutes, research required 120 minutes, and report preparation required 120 minutes. Total time spent on this case was 390 minutes.

11010 White Rock Road, Suite 120, Rancho Cordova, CA 95670
Phone: (800) 458-1261 Fax: (916) 920-2515

Re: Tiffany Anderson
Date: April 26, 2016
Page 2

PROBLEM STATEMENT

As you will note, I had seen the claimant, Tiffany Anderson, previously. I am provided at this time with a letter from Attorney Skolnik. I am also provided with a letter from claimant Tiffany Anderson.

Attorney Skolnik notes the April 2016 letter documents the brain scan. It documents the nuclide bone scan. Referral to Dr. Carey is noted. It is mentioned that there is separate PQME evaluation relevant to knee injuries. Attorney Skolnik was asking me - if possible - to write a final report. The letter of Tiffany Anderson documents her perception of work efforts at San Joaquin County Mosquito District. The substance of the 26 February 2016 letter documented her perception of how she was being treated and why she thinks she was not being treated correctly or appropriately, and she expresses concern about other workers as well. I am going to send a copy of this letter to Dr. Ben Carey, psychiatrist, who has recently evaluated the claimant.

HISTORY OF PRESENT ILLNESS

The claimant outlined her duties as a pesticide application person between 2004 and December 2011. The claimant is now 45 years old and resides in Lodi. She, at one time, had been represented by attorney Stein. The claimant complains of depressive difficulties, inability to complete tasks, and sleep derangement. She notes that her symptoms began in 2005 (about a year after she began to work for the County), and worsened into December 2011 and she feels that she is worsening now. She thinks that there have been 14 work-related deaths in her sphere of employment. She tells me she is more depressed, more forgetful, with decreased ability and she has lost interest in life. The claimant, relevant to these psychological issues declined treatment offered medically and wanted to treat herself with self-education. She notes that her claims are unsettled and she is therefore reliving all of these difficulties. She notes that the Grand Jury has been alerted to these issues. The claimant has right knee difficulties. It is her thought or fear that inappropriate chemicals in the water penetrated her injured knee and made her injured knee worse.

She is also fearful that someone was putting poison in her truck. The claimant stated that this is the first time she has ever told anybody about this.

She notes that she had orthopaedic surgery from Dr. Murata in 2011, but her right knee continues to be a problem.

Accordingly, the claimant describes being exposed to formaldehyde in 2004 - 2009 and this occurred without her knowledge. She states that she was exposed to other chemicals not fully identified without knowledge or consent. She denied any difficulties prior to starting the job in

Re: Tiffany Anderson
Date: April 26, 2016
Page 3

2004. She, thus, is describing emotional trauma, duress, anxiety, and a full medical and physical and cancer screening, but she has no medical coverage. If it her specific request that she be screened for all cancers that are caused by formaldehyde.

She states that she has difficulties with prolonged standing, stooping, kneeling, and balancing. She notes that there is pain in the right knee and the right leg swells. She feels that her central nervous system has been affected, and she has difficulty with nervousness, depression, proper concentration, and sleep. She notes crying spells. She feels that massage and oils have been of some benefit to her. She describes three surgeries, plus exposure to chemicals at work, and stress at work. The right knee surgeries were 2008, 2010, and 2011.

CURRENT TREATMENT

At this time, the claimant has no medical coverage. She also notes that she is tentatively negative about accepting medical treatment and prefers self-education.

MEDICAL REVIEW OF SYSTEMS

The claimant does not describe difficulties of this type before 2004.

JOB DESCRIPTION

As mentioned above - mosquito control - San Joaquin County - 2004-2011.

SOCIAL HISTORY

The height is 5'4. The weight is 125 pounds. The claimant had been under the care of Dr. Murata and currently apparently is not receiving any ongoing care and has no medical coverage. She notes nervousness, depression, difficulty sleeping, crying spells, and a great deal of worries. She adds that her eyes give her a problem and she has had gynecologic and skin issues as well.

Her family history is not fully known, but the claimant's mom died in 2015 due to lung disease. The claimant thinks her immune system is faulty. She does not smoke or drink. She denies drug misuse. She notes that her mother smoked. The claimant is a lifelong California resident - divorced, with a high school GED. She is able to read and write well and had skills in writing, office work, and research. She had been a pesticide applicator in 2004 - 2011. The claimant states that she has difficulty working at this time because she has difficulty with stability. She wants to resolve her claims and a challenging aspect of this is that she feels that she has been mistreated and wants that corrected. In other words, the claimant specifically says that she just does not want to put all of this behind her. She has a driver's license. She is right-handed. She

Re: Tiffany Anderson
Date: April 26, 2016
Page 4

can walk five blocks, climb a flight of steps, and lift about 50 pounds. She has had to curtail, jobs, gym, and family relationships. She used to engage in sports, but she describes that she now has lack of me time. The Epworth score is 6.

RECORDS REVIEW

At this point, I turn my attention to the medical records kindly provided. The MRI brain scan and the nuclide bone scan are normal.

PHYSICAL EXAMINATION

At this point, I turn my attention to the physical examination I perform at this time.

The general appearance and mental status demonstrate the claimant to be awake and alert and cooperative. She expresses concern about her condition and is troubled by what she describes as the way she was treated.

Please note that I do not personally have the data or the ability to examine, accept, and rebut the several descriptions expressed by the claimant.

Please note that every now and then, a claimant who insists she or he is being poisoned turns out to be poisoned. (Most of the time, the claimant is not being poisoned, but that is no reassurance the people that were rendered ill or dead.)

However, the contradictory nature of the claimant's requests...

- a. She wants this thing settled
 - b. She wants it settled the way she thinks it should be settled, rather than forgetting things
- ... is a challenging point.

The claimant describes that in the past anxiolytics were of no help. She states that the detailed interview of Dr. Carey upset her very much. She notes that the pesticides she was employing included a hormonally active chemical, an actual bacterium, and a pesticide that worked in an excitatory faction on the adult mosquitos. She adds that formaldehyde was discontinued in 2009 and maybe she was better. She added that the injury occurred in June 2011 when her knee struck a post. She is critical of the care provided after that event. She notes that when she attempted to return to work in June 2011, she was worse. She feels that her central nervous system is shot, and she has cognitive difficulties, sinus head pain, overall head pain, and a rash.

The blood pressure is currently measured at 168/106 (elevated) with a pulse of 62. Vision and hearing are grossly normal. Eyes, fundusopic exam, and cranial nerves are normal. ENT exam

Re: Tiffany Anderson
Date: April 26, 2016
Page 5

is normal. Neck shows no abnormality of trachea, veins, or thyroid. Lungs, heart, and pulses are normal. Abdominal and skin examinations are normal.

The musculoskeletal examination reveals diffuse symptoms, but range of motion of all joints is full, except that the claimant has tenderness to palpation and impaired range of motion in the right knee.

The neurological examination demonstrates no gross sensory or motor deficits. Tone, stance, and speech are normal. The tendon reflexes are 1+.

INITIAL IMPRESSION

Accordingly, the claimant presents with a number of issues, which may not be that easy to clarify.

- a. Toxic exposures.
- b. Knee issues, possibly complicated by a 2011 T-bar event.
- c. Hostile environment.
- d. Dermatologic and gynecologic issues

She feels that she has been treated in a substandard fashion, and this has had an effect upon her emotional, cognitive, and overall functioning.

She feels that she is at increased risk for cancer. She describes impairment of cognitive and neurological functions.

At this point, I turn my attention - once again - to the detailed report of Dr. Carey. He noted as of April 2016 that the patient was TTD as of December of 2015, but deferred to the trier relevant to causation and - thus - compensability. He advised treatment in any event, but noted that this might not be - at all - a work-related and compensable issue. The patient had told me that the event of the interview was traumatic to her.

My own physical examination at this time does not document any active disease process. The MRI brain scan and nuclide bone scan are normal. The nuclide bone scan is a reasonable test for the presence of cancer, but the claimant's fear that she might be at increased risk for cancer in the future is not without, at least, some foundation.

Re: Tiffany Anderson
Date: April 26, 2016
Page 6

TEMPORARY TOTAL DISABILITY

Based on medical and neurological issues, I find no temporary total disability. I refer and defer to others relevant to orthopaedic, musculoskeletal issues, and psychiatric issues.

PERMANENT DISABILITY

I will request some further blood tests to see if anything worrisome does or does not show up. At the present time, since I have not identified a specific neurological or internal medical disease or diagnosis, I must be tentative relevant to the MMI issue.

SUBJECTIVE FACTORS

Right knee difficulties, widespread musculoskeletal difficulties, psychological difficulties.

OBJECTIVE FACTORS

The claimant appears precise and articulate and I demonstrate no overt cognitive or neurological - brain issues. However, I take note of the input of Dr. Carey as well.

AMA IMPAIRMENT RATING

It is not clear to me to what extent AMA *Guides* rating is required relevant to right knee, other orthopaedic issues, and psychiatric issues.

At the present time, I will be tentative relevant to the possibility of their being ratable issues in my sphere of expertise.

CAUSATION

It is unclear to me whether the causation of this claimant's evident distress is some underlying characterological or medical - psychiatric disorder, and to what extent her difficulties are caused by actual, possible, or potential psychological issues on the job, and to what extent they are caused by a toxin or poison. I do not have any objective evidence of toxin or poison at this time, but I will get some further testing as well.

APPORTIONMENT

Since I have not opined positively on causation, I defer on apportionment.

Re: Tiffany Anderson
Date: April 26, 2016
Page 7

STUDIES RECEIVED

Lab studies as received, plus the report of Dr. Carey. I have no further data except the letter of the claimant (which I am sharing with the parties so that this will not be an *ex parte* communication), plus the letter from attorney Skolnik.

STUDIES PERFORMED

None.

STUDIES REQUESTED

Set of chemistries including hormonal chemistries.

On written approval from the carrier, we will schedule these diagnostic tests.

RESEARCH PERFORMED

Please refer to the refereed open source data I have selected, read, reviewed, and provided relevant to formaldehyde, cancer, and mosquito insecticides.

FURTHER COMMENT

If questions remain or arise that I can answer at this time, kindly write me back and I will respond immediately.

Please note that, at this time, I am neither confirming nor out of hand dismissing the concerns of the claimant.

As you will note, I am requesting some further testing and will review those tests and report further.

At the present time, I am not requesting a repeat evaluation of the claimant, but I am not excluding that as a possibility and if the parties want me to see the claimant back again, I will see the claimant back again.

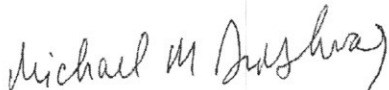
Thanks again.

Re: Tiffany Anderson
Date: April 26, 2016
Page 8

I certify that I took the complete history from the claimant, conducted the examination, reviewed all available medical records, and composed and drafted the conclusions of this report. The conclusions and opinions within this report are solely mine. I declare under penalty of perjury that the information contained in this report and its attachments, if any, is true and correct to the best of my knowledge and belief, except as to information that I have indicated I received from others. As to that information, I declare under penalty of perjury that the information accurately describes the information provided to me and, except as noted herein, that I believe it to be true. In accordance with Labor Code Section 5703(a) (2), there has not been a violation of Labor Code Section 139.3, and the contents of the report are true and correct to the best of my knowledge. This statement is made under penalty of perjury.

Pursuant to 8 Cal. Code Regs. Section 49.2-49.9, I have complied with the requirement for face-to-face time with the client in this evaluation. If necessary, I have discussed apportionment in the body of this report. If I have assigned disability caused by factors other than the industrial injury, that level of disability constitutes the apportionment. The ratio of nonindustrial disability, if any, to all described disability represents my best medical judgment of the percentage of disability caused by the industrial injury and the percentage of disability caused by other factors, as defined in Labor Code Sections 4663 and 4664.

Respectfully,



Michael M. Bronshvag, M.D.
Diplomate in Neurology, ABP&N
Diplomate in Internal Medicine, ABIM
Date of Report: April 26, 2016
Signed this 07 day of May 2016, in Sacramento County
anderstz.m05-cc-sb

ANDERSONarts

RESEARCH PERFORMED Please refer to the refereed open source data I have selected, read, reviewed, and provided relevant to formaldehyde, cancer, and mosquito insecticides.

Mosquito Insecticide

Insecticides are a quick, powerful way to get rid of mosquitoes around the yard, but, unfortunately, they are only temporary. The effect usually lasts only as long as the insecticide is present, so as soon as it drifts away or dries out, the mosquitoes are back.

Mosquito control officials use insecticides only when mosquitoes are especially thick and only in combination with other form of mosquito control. The same should apply to use around the house. By itself, insecticide is not a long-term solution.

Insecticides are commonly dispensed through a fog or ultra-low volume mist. They are available at most home and garden stores and come in hand-held applicators or devices that can be attached to a lawn mower.

Two popular insecticides are:

- **Malathion** – an organophosphate often used to treat crops against a wide array of insects. It can be sprayed directly onto vegetation, such as the bushes where mosquitoes like to rest, or used in a 5 percent solution to fog the yard. In the small amounts used for mosquito control, it poses no threat to humans or wildlife. In fact, malathion is also used to kill head lice.
- **Permethrin** – one of a group of chemicals called pyrethroids, it is a synthetic form of a natural insecticide found in chrysanthemum flowers. It usually is mixed with oil or water and applied as a mist, about 1/100th of a pound per acre. Like malathion, permethrin kills mosquitoes by disrupting their central nervous systems. Not harmful to people and animals in small amounts, but it is toxic to fish and bees.

Both malathion and permethrin are also available in sprays for use inside the home.

The insecticides will work for several days when applied to shrubbery or grass, but will break down over time, especially in rain. When released into the air through fog or mist, they usually are good only for a few hours before they become too dissipated to be effective.

ou are here: [NPIC Home Page](#) —> [Pest Control Information](#) —> [Understanding and Controlling Mosquitoes](#) —> Pesticides Used in Mosquito Control

Pesticides Used in Mosquito Control

There are a variety of products available on the market for the public and for professionals when it comes to mosquito control. **Larvicides** are chemicals designed to be applied directly to water to control mosquito larvae. **Adulticides** are used in fogging and spraying to control adult mosquitoes. **Synergists** are not toxic to the mosquitoes themselves, but they make adulticides more effective. Some **communities** provide mosquito control as a service to the public and may

apply pesticides from trucks or planes. To find out whether or not your community sprays for mosquitoes, try contacting your [local health department](#) or [local mosquito control district](#).

If you decide to use a pesticide for mosquito control, always remember to [read and follow the label instructions](#) carefully.

If you have questions about this, or any pesticide-related topic, please call NPIC at **1-800-858-7378** (8:00am - 12:00pm PST), or email us at npic@ace.orst.edu.

Pesticides for Adult (flying) Mosquitoes

- [Controlling Adult Mosquitoes](#) - Environmental Protection Agency (EPA)
- [Pyrethrins Fact Sheet](#) - NPIC
- [Pyrethrins Registration Eligibility Decision](#) - Environmental Protection Agency (EPA)
- [Pesticide Toxicity Profile: Synthetic Pyrethroid Pesticides \(mammalian and wildlife toxicity tables\)](#) - University of Florida Extension Service
- [Permethrin & Resmethrin TEACH Chemical Summary](#) - Environmental Protection Agency (EPA)
- [Resmethrin Technical Fact Sheet](#) - NPIC
- [Resmethrin Registration Eligibility Decision](#) - Environmental Protection Agency (EPA)
- [Permethrin, Resmethrin, Sumithrin: Synthetic Pyrethroids for Mosquito Control](#) - Environmental Protection Agency (EPA)
- [Anvil and Mosquito Control](#) - New York State Department of Health
- [Scourge and Mosquito Control](#) - New York State Department of Health
- [Naled for Mosquito Control](#) - Environmental Protection Agency (EPA)
- [Malathion for Mosquito Control](#) - Environmental Protection Agency (EPA)
- [Malathion and Mosquito Control Information Sheet](#) - New York State Department of Health
- [Malathion Registration Eligibility Decision](#) - Environmental Protection Agency (EPA)
- [Safety of Pesticides Used to Control Adult Mosquitoes](#) - California Department of Health Services

Pesticides for Larval Mosquitoes (young mosquitoes in water)

- [Controlling Mosquitoes at the Larval Stage](#) - Environmental Protection Agency (EPA)
- [Methoprene](#) - NPIC
- [Insect Growth Regulators: S-Hydroprene, S-Kinoprene, Methoprene, S-Methoprene Fact Sheet](#) - Environmental Protection Agency (EPA)
- [Methoprene Pesticide Fact Sheet](#) - Environmental Protection Agency (EPA)
- [Bacillus thuringiensis \(Bt\) General Fact Sheet](#) - NPIC
- [Bacillus thuringiensis \(Bt\) Technical Fact Sheet](#) - NPIC

Pesticide Synergists

- [Piperonyl Butoxide General Fact Sheet](#) - NPIC
- [Piperonyl Butoxide Technical Fact Sheet](#) - NPIC
- [MGK 264 Reregistration Eligibility Decision](#) - Environmental Protection Agency (EPA)

[Return to Mosquito Information](#)

If you have questions about this, or any pesticide-related topic, please call NPIC at **1-800-858-7378** (8:00am - 12:00pm PST), or email at npic@ace.orst.edu.

Formaldehyde and Cancer Risk

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ON THIS PAGE

- What is formaldehyde?
- How is the general population exposed to formaldehyde?

-

What are the short-term health effects of formaldehyde exposure?

-

Can formaldehyde cause cancer?

-

What have scientists learned about the relationship between formaldehyde and cancer?

-

What has been done to protect workers from formaldehyde?

-

How can people limit formaldehyde exposure in their homes?

-

Where can people find more information about formaldehyde?

What is formaldehyde?

Formaldehyde is a colorless, flammable, strong-smelling chemical that is used in building materials and to produce many household products. It is used in pressed-wood products, such as particleboard, plywood, and fiberboard; glues and adhesives; permanent-press fabrics; paper product coatings; and certain insulation materials. In addition, formaldehyde is commonly used as an industrial [fungicide](#), [germicide](#),

and disinfectant, and as a preservative in mortuaries and medical laboratories. Formaldehyde also occurs naturally in the environment. It is produced in small amounts by most living organisms as part of normal metabolic processes.

How is the general population exposed to formaldehyde?

According to a 1997 report by the U.S. Consumer Product Safety Commission, formaldehyde is normally present in both indoor and outdoor air at low levels, usually less than 0.03 parts of formaldehyde per million parts of air (ppm). Materials containing formaldehyde can release formaldehyde gas or vapor into the air. One source of formaldehyde exposure in the air is automobile tailpipe emissions.

During the 1970s, urea-formaldehyde foam insulation (UFFI) was used in many homes. However, few homes are now insulated with UFFI. Homes in which UFFI was installed many years ago are not likely to have high formaldehyde levels now. Pressed-wood products containing formaldehyde resins are often a significant source of formaldehyde in homes. Other potential indoor sources of formaldehyde include cigarette smoke and the use of unvented fuel-burning appliances, such as gas stoves, wood-burning stoves, and kerosene heaters.

Industrial workers who produce formaldehyde or formaldehyde-containing products, laboratory technicians, certain health care professionals, and mortuary employees may be exposed to higher levels of formaldehyde than the general public. Exposure occurs primarily by inhaling formaldehyde gas or vapor from the air or by absorbing liquids containing formaldehyde through the skin.

What are the short-term health effects of formaldehyde exposure?

When formaldehyde is present in the air at levels exceeding 0.1 ppm, some individuals may experience adverse effects such as watery eyes; burning sensations in the eyes, nose, and throat; coughing; wheezing; nausea; and skin irritation. Some people are very sensitive to formaldehyde, whereas others have no reaction to the same level of exposure.

Can formaldehyde cause cancer?

Although the short-term health effects of formaldehyde exposure are well known, less is known about its potential long-term health effects. In 1980, laboratory studies showed that exposure to formaldehyde could cause nasal cancer in rats. This finding raised the question of whether formaldehyde exposure could also cause cancer in humans. In 1987, the U.S. Environmental Protection Agency (EPA) classified formaldehyde as a probable human carcinogen under conditions of unusually high or prolonged exposure (1). Since that time, some studies of humans have suggested that formaldehyde exposure is associated with certain types of cancer. The International Agency for Research on Cancer (IARC) classifies formaldehyde as a human carcinogen (2). In 2011, the National Toxicology Program, an interagency program of the Department of Health and Human Services, named formaldehyde as a known human carcinogen in its *12th Report on Carcinogens* (3).

What have scientists learned about the relationship between formaldehyde and cancer?

Since the 1980s, the National Cancer Institute (NCI), a component of the National Institutes of Health (NIH), has conducted studies to determine whether there is an association between occupational exposure to formaldehyde and an increase in the risk of cancer. The results of this research have provided EPA and the Occupational Safety and Health Administration (OSHA) with information to evaluate the potential health effects of workplace exposure to formaldehyde.

The long-term effects of formaldehyde exposure have been evaluated in epidemiologic studies (studies that attempt to uncover the patterns and causes of disease in groups of people). One type of epidemiologic study is called a cohort study. A cohort is a group of people who may vary in their exposure to a particular factor, such as formaldehyde, and are followed over time to see whether they develop a disease. Another kind of epidemiologic study is called a case-control study. Case-control studies begin with people who are diagnosed as having a disease (cases) and compare them to people without the disease (controls), trying to identify differences in factors, such as exposure to formaldehyde, that might explain why the cases developed the disease but the controls did not.

Several NCI surveys of professionals who are potentially exposed to formaldehyde in their work, such as anatomists and embalmers, have suggested that these individuals are at an increased risk of leukemia and brain cancer compared with the general population. However, specific work practices and exposures were not characterized in these studies. An NCI case-control study among funeral industry workers that characterized exposure to formaldehyde also found an association between increasing formaldehyde exposure and mortality from myeloid leukemia (4). For this study, carried out among funeral industry workers who had died between 1960 and 1986, researchers compared those who had died from hematopoietic and lymphatic cancers and brain tumors with those who died from other causes. (Hematopoietic or hematologic cancers such as leukemia develop in the blood or bone marrow. Lymphatic cancers develop in the tissues and organs that produce, store, and carry white blood cells that fight infections and other diseases.) This analysis showed that those who had performed the most embalming and those with the highest estimated formaldehyde exposure had the greatest risk of myeloid leukemia. There was no association with other cancers of the hematopoietic and lymphatic systems or with brain cancer.

A number of cohort studies involving workers exposed to formaldehyde have recently been completed. One study, conducted by NCI, looked at 25,619 workers in industries with the potential for occupational formaldehyde exposure and estimated each worker's exposure to the chemical while at work (5). The results showed an increased risk of death due to leukemia, particularly myeloid leukemia, among workers exposed to formaldehyde. This risk was associated with increasing peak and average levels of exposure, as well as with the duration of exposure, but it was not associated with cumulative exposure. An additional 10 years of data on the same workers were used in a follow-up study published in 2009 (6). This analysis continued to show a possible link between formaldehyde exposure and cancers of the hematopoietic and lymphatic systems, particularly myeloid leukemia. As in the initial study, the risk was highest earlier in the follow-up period. Risks declined steadily over time, such that the cumulative excess risk of myeloid leukemia was no longer statistically significant at the end of the follow-up period. The researchers noted that similar patterns of risks over time had been seen for other agents known to cause leukemia. A cohort study of 11,039 textile workers performed by the National Institute for Occupational Safety and Health (NIOSH) also found an association between the duration of exposure to formaldehyde and leukemia deaths (7). However, the evidence remains mixed because a cohort study of 14,014 British industry workers found no association between formaldehyde exposure and leukemia deaths (8).

Formaldehyde undergoes rapid chemical changes immediately after absorption. Therefore, some scientists think that formaldehyde is unlikely to have effects at sites other than the upper respiratory tract. However, some laboratory studies suggest that formaldehyde may affect the lymphatic and hematopoietic systems. Based on both the epidemiologic data from cohort and case-control studies and the experimental data

from laboratory research, NCI investigators have concluded that exposure to formaldehyde may cause leukemia, particularly myeloid leukemia, in humans.

In addition, several case-control studies, as well as analysis of the large NCI industrial cohort (6), have found an association between formaldehyde exposure and nasopharyngeal cancer, although some other studies have not. Data from extended follow-up of the NCI cohort found that the excess of nasopharyngeal cancer observed in the earlier report persisted (9).

Earlier analysis of the NCI cohort found increased lung cancer deaths among industrial workers compared with the general U.S. population. However, the rate of lung cancer deaths did not increase with higher levels of formaldehyde exposure. This observation led the researchers to conclude that factors other than formaldehyde exposure might have caused the increased deaths. The most recent data on lung cancer from the cohort study did not find any relationship between formaldehyde exposure and lung cancer mortality.

What has been done to protect workers from formaldehyde?

In 1987, OSHA established a Federal standard that reduced the amount of formaldehyde to which workers can be exposed over an 8-hour workday from 3 ppm to 1 ppm. In May 1992, the standard was amended, and the formaldehyde exposure limit was further reduced to 0.75 ppm.

How can people limit formaldehyde exposure in their homes?

The EPA recommends the use of "exterior-grade" pressed-wood products to limit formaldehyde exposure in the home. These products emit less formaldehyde because they contain phenol resins, not urea resins. (Pressed-wood products include plywood, paneling, particleboard, and fiberboard and are not the same as pressure-treated wood products, which contain chemical preservatives and are intended for outdoor use.) Before purchasing pressed-wood products, including building materials, cabinetry, and furniture, buyers should ask about the formaldehyde content of these products. Formaldehyde levels in homes can also be reduced by ensuring adequate ventilation, moderate temperatures, and reduced humidity levels through the use of air conditioners and dehumidifiers.

Formaldehyde

Formaldehyde is widely used in many products. Long-term exposure may affect health.

[en español](#)

What is formaldehyde?

Formaldehyde is a colorless, flammable gas or liquid that has a pungent, suffocating odor. It is a volatile organic compound, which is an organic compound that easily becomes a vapor or gas. It is also naturally produced in small, harmless amounts in the human body. The chemical symbol for formaldehyde is CH₂O.

Formaldehyde is released into the air by burning wood, kerosene, or natural gas; from automobiles and diesel exhaust; and from cigarettes and other tobacco products. It is found in the air at home, at work, and outdoors, especially in smog. It is also found in some foods.

Formaldehyde is used as a tissue preservative in medical laboratories and as an embalming fluid in mortuaries. It is also used as a preservative in some foods and as an antibacterial ingredient in cosmetics, household antiseptics, medicines, dishwashing liquids, fabric softeners, carpet cleaners, lacquers, and wood products. It is used as a preservative in some paints, paper coatings, and cosmetics; in the permanent press coating on fabrics; in carpets; and in some foam insulation materials.

Formaldehyde is used industrially in the manufacturing of other chemicals, pesticides, fertilizers, latex rubber, photographic film, and preservatives; in glues and adhesives for pressed wood products such as particle board and plywood; in leather tanning; and as an industrial fungicide, germicide, and disinfectant.

How might I be exposed to formaldehyde?

You can be exposed to formaldehyde by breathing it or absorbing it through your skin. You can be exposed by breathing indoor or outdoor air that contains it, especially smog. You can also be exposed by smoking cigarettes or other tobacco products, breathing cigarette and other tobacco smoke, or breathing smoke from gas cookers and open fireplaces.

You can be exposed to formaldehyde at home if you use unvented gas or kerosene heaters indoors. You can be exposed by using household products such as construction materials, latex paints, fingernail polish, cosmetics, disinfectants, glues, lacquers, manufactured pressed wood products, fiberglass, new carpets, permanent press fabrics, paper products, and some cleaners.

You can be exposed to formaldehyde at work if you work in a hospital, laboratory, mortuary, or chemical plant. You can be exposed to higher amounts of formaldehyde if you are a doctor, nurse, dentist, veterinarian, pharmacist, pathologist, embalmer, clothing or furniture factory worker, or teacher or student working in a laboratory with preserved specimens.

How can formaldehyde affect my health?

Formaldehyde is listed as a human carcinogen in the [Thirteenth Report on Carcinogens](#) published by the National Toxicology Program because it causes cancer of the throat, nose, and blood. Drinking large amounts of formaldehyde can cause coma and death due to respiratory failure. Drinking formaldehyde can also cause convulsions, intense pain in the mouth and stomach, nausea, vomiting, signs of shock, vertigo, stupor, and diarrhea. Direct contact of the eyes with formaldehyde can cause permanent eye damage or loss of vision.

Exposure to high levels of formaldehyde can cause a build-up of fluid in the lungs, severe shortness of breath, bronchitis, and rapid heart rate. Continued exposure can also cause severe allergic reactions of the skin and eyes, skin allergies and rashes, and asthma-like allergies with coughing, wheezing, chest tightness, and a drop in body temperature.

Exposure to low levels of formaldehyde can irritate and burn the eyes, nose, throat, and skin. In women, exposure can cause menstrual disorders. People with asthma may be more sensitive to exposure to formaldehyde.

For poisoning emergencies or questions about possible poisons, please contact your local poison control center at 1-800-222-1222.

This description is based on the information found in the Web links listed with this topic.

Web Links from MedlinePlus (National Library of Medicine)

[Indoor Air Pollution](#)
[Formaldehyde \(National Institute for Occupational Safety and Health\)](#)
[Formaldehyde \(Occupational Safety and Health\)](#)
[Formaldehyde and Cancer Risk \(National Cancer Institute\)](#)
[Formaldehyde Haz-Map \(National Library of Medicine\)](#)
[Formaldehyde Hazardous Substances Data Bank \(National Library of Medicine\)](#)
[Formaldehyde ToxFAQs \(Agency for Toxic Substances and Hazardous Waste\)](#)
[Map of Releases of Formaldehyde in the United States. TOXMAP \(National Library of Medicine\)](#)
[What You Should Know About Formaldehyde in Mobile Homes \(Federal Emergency Management Agency\) \(PDF — 1.50 MB\)](#)

Article

THE TOXIC EFFECTS OF FORMALDEHYDE AND FORMALIN

1. Martin H. Fischer

± Author Affiliations

1. From the Pathological Laboratory of Rush Medical College, Chicago.

ABSTRACT

The results of this investigation may be summarized as follows:

1. The inhalation of formaldehyde gas in even small quantities is followed by bronchitis and pneumonia. Pneumonia is due to the inhalation of the gas and not to secondary infection.
2. Formalin belongs to that rare group of poisons which are capable of producing death suddenly when swallowed.

3. The introduction of formalin into the stomach is followed by the production of a gastritis which varies greatly in character. The duodenum and upper jejunum may also be involved in the inflammatory process.
4. Intraperitoneal injections of formalin cause peritonitis of a fibrino-haemorrhagic character. A definite reaction is obtained when very dilute formalin (1-1000) is employed. In the peritoneal cavity formalin exercises a destructive action upon all organs (pancreas, liver, peritoneal fat, Fallopian tubes, etc.) with which it comes in contact and causes inflammation in these organs.
5. The lethal dose of formalin when injected intraperitoneally into guinea pigs is approximately 2 cc. of 1-1000 formalin for each 100 gm. of body weight.
6. The injection of formalin into the lungs is followed by pneumonia and bronchitis.
7. The inflammation which follows subcutaneous injections of formalin is characterized by intense exudation.
8. The injection of formalin into the muscles produces myositis.
9. The injection of formalin into the anterior chamber of the eye causes the accumulation of an exudate containing leucocytes and fibrin. When formalin is dropped into the conjunctival sac iritis follows and may be severe enough to destroy the eye.
10. Formalin in whatever way introduced into the body is absorbed, and is then capable of producing lesions in the parenchymatous organs.
11. Changes in the liver after absorption of formalin consist of mild or severe grade of cloudy swelling accompanied by vacuolation of the protoplasm, changes in the nuclei and leucocytic infiltration. Focal necrosis may result. Similar changes follow the inhalation of formaldehyde.
12. The injection of formalin or the inhalation of the vapors of formaldehyde produces cloudy swelling of the parenchyma of the kidney. Focal necrosis may result.
13. Pneumonia and bronchitis are found in all animals after the injection of formalin.

14. The leucocytic infiltration which follows the introduction of formalin into an organ has these general characteristics: The eosinophiles are the first leucocytes to appear; these are followed by the other polynuclear leucocytes; last appear the large and small mononuclear leucocytes. Similar phenomena occur in the trachea, bronchi and lungs of animals subjected to formaldehyde inhalations.

15. Formalin is, directly or indirectly, chemiotactic for leucocytes. The tissues which are not infiltrated with leucocytes after the injection of formalin are those which have been so injured by the chemical that an inflammatory reaction is impossible.

16. Animals subjected to chronic poisoning with formalin administered by intraperitoneal injection develop fibrinous peritonitis, associated with marked eosinophilia. The changes in the kidneys and liver consist of cloudy swelling, fatty degeneration, focal necrosis and leucocytic infiltration.

Recommended for you

1. A histological study of typhoid fever

F. B. Mallory, J Exp Med

2. Action of formaldehyde on enzymes and on certain pboteids

C. L. Bliss et al., J Exp Med

3. Neutrophil contributions to the induction and regulation of the acute inflammatory response in teleost fish

Jeffrey J. Havixbeck et al., J Cell Biol, 2016

1. TARTRATE NEPHRITIS, WITH ESPECIAL REFERENCE TO SOME OF THE CONDITIONS UNDER WHICH IT MAY BE PRODUCED

Frank P. Underhill et al., J Exp Med, 1913

2. Long-term reversal of diabetes by the injection of immunoprotected islets.

P Soon-Shiong et al., Proc Natl Acad Sci U S A, 1993

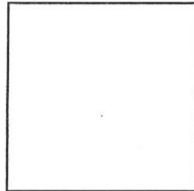
3. Pig but not human interferon-gamma initiates human cell-mediated rejection of pig tissue in vivo.

P Sultan et al., Proc Natl Acad Sci U S A, 1997

Formaldehyde

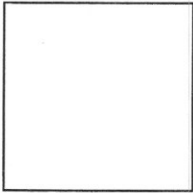
Formaldehyde

50-00-0



Hazard Summary—Created in April 1992; Revised in January 2000

Formaldehyde is used mainly to produce resins used in particleboard products and as an intermediate in the synthesis of other chemicals. Exposure to formaldehyde may occur by breathing contaminated indoor air, tobacco smoke, or ambient urban air. Acute (short-term) and chronic (long-term) inhalation exposure to formaldehyde in humans can result in respiratory symptoms, and eye, nose, and throat irritation. Limited human studies have reported an association between formaldehyde exposure and lung and nasopharyngeal cancer. Animal inhalation studies have reported an increased incidence of nasal squamous cell cancer. EPA considers formaldehyde a probable human carcinogen (Group B1).



Please Note: The main sources of information for this fact sheet are EPA's *Health and Environmental Effects Profile for Formaldehyde* and the Integrated Risk Information System (IRIS), which contains information on oral chronic toxicity and the RfD, and the carcinogenic effects of formaldehyde including the unit cancer risk for inhalation exposure.

Uses

- Formaldehyde is used predominantly as a chemical intermediate. It also has minor uses in agriculture, as an analytical reagent, in concrete and plaster additives, cosmetics, disinfectants, fumigants, photography, and wood preservation. (1,2)
- One of the most common uses of formaldehyde in the U.S is manufacturing urea-formaldehyde resins, used in particleboard products. (7)
- Formaldehyde (as urea formaldehyde foam) was extensively used as an insulating material until 1982 when it was banned by the U.S. Consumer Product Safety Commission. (1,2)

Sources and Potential Exposure

- The highest levels of airborne formaldehyde have been detected in indoor air, where it is released from various consumer products such as building materials and home furnishings. One survey reported formaldehyde levels ranging from 0.10 to 3.68 parts per million (ppm) in homes. Higher levels have been found in new manufactured or mobile homes than in older conventional homes. (1)
- Formaldehyde has also been detected in ambient air; the average concentrations reported in U.S. urban areas were in the range of 11 to 20 parts per billion (ppb). The major sources appear to be power plants, manufacturing facilities, incinerators, and automobile exhaust emissions. (7)
- Smoking is another important source of formaldehyde. (1)
- Formaldehyde may also be present in food, either naturally or as a result of contamination. (1)

Assessing Personal Exposure

- Blood levels of formaldehyde can be measured. However, these measurements are only useful when exposure to relatively large amounts of formaldehyde has occurred. (2)

Health Hazard Information

Acute Effects:

- The major toxic effects caused by acute formaldehyde exposure via inhalation are eye, nose, and throat irritation and effects on the nasal cavity. Other effects seen from exposure to high levels of formaldehyde in humans are coughing, wheezing, chest pains, and bronchitis. (1,2)
- Ingestion exposure to formaldehyde in humans has resulted in corrosion of the gastrointestinal tract and inflammation and ulceration of the mouth, esophagus, and stomach. (1,2)
- Acute animal tests in rats and rabbits have shown formaldehyde to have high acute toxicity from inhalation, oral, and dermal exposure. (3)

Chronic Effects (Noncancer):

- Chronic exposure to formaldehyde by inhalation in humans has been associated with respiratory symptoms and eye, nose, and throat irritation. (1,2,4,5)
- Repeated contact with liquid solutions of formaldehyde has resulted in skin irritation and allergic contact dermatitis in humans. (5)
- Animal studies have reported effects on the nasal respiratory epithelium and lesions in the respiratory system from chronic inhalation exposure to formaldehyde. (1,2,4,5)
- The Reference Dose (RfD) for formaldehyde is 0.2 milligrams per kilogram body weight per day (mg/kg/d) based on a decrease in body weight gain and effects on the stomach in rats. The RfD is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily oral exposure to the human population (including sensitive subgroups) that is likely to be without appreciable risk of deleterious noncancer effects during a lifetime. It is not a direct estimator of risk but rather a reference point to gauge the potential effects. At exposures increasingly greater than the RfD, the potential for adverse health effects increases. Lifetime exposure above the RfD does not imply that an adverse health effect would necessarily occur. (6)
- EPA has high confidence in the study on which the RfD was based since it consisted of an adequate number of animals of both sexes, as well as a thorough examination of toxicological and histological parameters; medium confidence in the database as several additional chronic bioassays and reproductive and developmental studies support the critical effect and study; and, consequently, medium confidence in the RfD. (6)
- EPA has not established a Reference Concentration (RfC) for formaldehyde. (6)
- The Agency for Toxic Substances and Disease Registry (ATSDR) has established a chronic inhalation minimal risk level (MRL) of 0.003 ppm (0.004 milligrams per cubic meter, mg/m³) based on respiratory effects in humans. The MRL is an estimate of the daily human exposure to a hazardous substance that is likely to be without appreciable risk of adverse noncancer health effects over a specified duration of exposure. (7)

Reproductive/Developmental Effects:

- An increased incidence of menstrual disorders were observed in female workers using urea-formaldehyde resins. However, possible confounding factors were not evaluated in this study. (1,2)
- A study of hospital equipment sterilizing workers did not report an association between formaldehyde exposure and increased spontaneous abortions. (1,2)
- Developmental effects, such as birth defects, have not been observed in animal studies with formaldehyde. (1,2)

Cancer Risk:

- Occupational studies have noted statistically significant associations between exposure to formaldehyde and increased incidence of lung and nasopharyngeal cancer. This evidence is considered to be "limited," rather than "sufficient," due to possible exposure to other agents that may have contributed to the excess cancers. (1,6)
- Animal studies have reported an increased incidence of nasal squamous cell carcinomas by inhalation exposure. (1,6)
- EPA considers formaldehyde to be a probable human carcinogen (cancer-causing agent) and has ranked it in EPA's Group B1. (6)

- EPA uses mathematical models, based on animal studies, to estimate the probability of a person developing cancer from breathing air containing a specified concentration of a chemical. EPA calculated an inhalation unit risk estimate of 1.3×10^{-5} ($\mu\text{g}/\text{m}^3$)⁻¹. EPA estimates that, if an individual were to continuously breathe air containing formaldehyde at an average of $0.08 \mu\text{g}/\text{m}^3$ ($8.0 \times 10^{-5} \text{ mg}/\text{m}^3$) over his or her entire lifetime, that person would theoretically have no more than a one-in-a-million increased chance of developing cancer as a direct result of breathing air containing this chemical. Similarly, EPA estimates that breathing air containing $0.8 \mu\text{g}/\text{m}^3$ ($8.0 \times 10^{-4} \text{ mg}/\text{m}^3$) would result in not greater than a one-in-a-hundred thousand increased chance of developing cancer, and air containing $8.0 \mu\text{g}/\text{m}^3$ ($8.0 \times 10^{-3} \text{ mg}/\text{m}^3$) would result in not greater than a one-in-ten-thousand increased chance of developing cancer. For a detailed discussion of confidence in the potency estimates, please see IRIS. (6)

Physical Properties

- The chemical formula for formaldehyde is CH_2O and the molecular weight is 30.03 g/mol. (1)
- The vapor pressure for formaldehyde is 10 mm Hg at -88°C , and its log octanol/water partition coefficient ($\log K_{ow}$) is -0.65 . (1)
- Formaldehyde is a colorless gas with a pungent, suffocating odor at room temperature; the odor threshold for formaldehyde is 0.83 ppm. (1,8)
- Formaldehyde is readily soluble in water at room temperature. (1)
- Commercial formaldehyde is produced and sold as an aqueous solution containing 37 to 50 percent formaldehyde by weight. (1)



Conversion Factors:

To convert concentrations in air (at 25°C) from ppm to mg/m^3 : $\text{mg}/\text{m}^3 = (\text{ppm}) \times (\text{molecular weight of the compound})/(24.45)$. For formaldehyde: $1 \text{ ppm} = 1.23 \text{ mg}/\text{m}^3$.

Health Data from Inhalation Exposure



AIHA ERPG--American Industrial Hygiene Association's emergency response planning guidelines. ERPG 1 is the maximum airborne concentration below which it is believed nearly all individuals could be exposed up to one hour without experiencing other than mild transient adverse health effects or perceiving a clearly defined objectionable odor; ERPG 2 is the maximum airborne concentration below which it is believed nearly all individuals could be exposed up to one hour without experiencing or developing irreversible or other serious health effects that could impair their abilities to take protective action.

ACGIH STEL--American Conference of Governmental and Industrial Hygienists' short-term exposure limit expressed as a time-weighted average exposure; the concentration of a substance which should not be exceeded at any time during a workday.

LC_{50} (Lethal Concentration₅₀)--A calculated concentration of a chemical in air to which exposure for a specific length of time is expected to cause death in 50% of a defined experimental animal population.

NIOSH IDLH--National Institute of Occupational Safety and Health's immediately dangerous to life or health limit; NIOSH recommended exposure limit to ensure that a worker can escape from an exposure condition that is likely to cause death or immediate or delayed permanent adverse health effects or prevent escape from the environment.

NIOSH REL--NIOSH's recommended exposure limit; NIOSH recommended exposure limit for an 8- or 10-h time-weighted average exposure and/or ceiling.

OSHA PEL--Occupational Safety and Health Administration's permissible exposure limit expressed as a time-weighted average; the concentration of a substance to which most workers can be exposed without adverse effect averaged over a normal 8-h workday or a 40-h workweek.

The health and regulatory values cited in this factsheet were obtained in 1999.

^aHealth numbers are toxicological numbers from animal testing or risk assessment values developed by EPA.

^bRegulatory numbers are values that have been incorporated in Government regulations, while advisory numbers are nonregulatory values provided by the Government or other groups as advice. OSHA numbers are regulatory, whereas NIOSH, ACGIH, and AIHA numbers are advisory.

References



STATE OF CALIFORNIA
 Division of Workers' Compensation
 Disability Evaluation Unit



EMPLOYEE'S DISABILITY QUESTIONNAIRE

DEU Use Only

This form will aid the doctor in determining your permanent impairment or disability. Please complete this form and give it to the physician who will be performing the evaluation. The doctor will include this form with his or her report and submit it to the Disability Evaluation Unit, with a copy to you and your claims administrator.

Employee

Tiffany
 First Name

K
 MI

Anderson
 Last Name

549-23-5133
 SSN (Numbers Only)

1900 Lakeshore Drive
 Street Address 1/PO Box (Please leave blank spaces between numbers, names or words)

Street Address 2/PO Box (Please leave blank spaces between numbers, names or words)

International Address (Please leave blank spaces between numbers, names or words)

Los Angeles
 City

CA
 State

95242
 Zip Code

8-22-70
 Date of Birth
 MM/DD/YYYY

4/19/04 6/29/11
 Date of Injury
 MM/DD/YYYY
Cumulative Specific

San Joaquin County Mosquito & Vector Control District
 Employer

Special District tax payer entity
 Nature of Employers Business

Claim Number 1 VE0700184

Claim Number 2 _____

Claim Number 3 _____

Claim Number 4 _____

Claim Number 5 _____

PLEASE ANSWER THE FOLLOWING QUESTIONS FULLY:

How was your evaluating doctor selected? (check one)

From a list of doctors provided by the State of California, Division of Workers' Compensation.

Other (explain) Other (IME through out protocol by defense (D) through Wilson)

What is the name of the doctor who will be doing the evaluation? _____

When is your examination scheduled? _____

What were your job duties at the time of your injury?

Complete description is found under Health Dept State law NPDES Application

What is the disability resulting from your injury?

How does this injury affect you in your work?

terminated from employment as a result

Have you ever had a disability as a result of another injury or illness? yes

If so, when? 2004-2011

Please describe the disability?

all resulting from this job. No injuries existed prior to employment

Date 4/20/16
MM/DD/YYYY

Signature [Signature]

Re: Tiffany Anderson
Date: April 26, 2016
Page 9



ExamWorks, Inc.
11010 White Rock Road, Suite 120
Rancho Cordova, CA 95670
Phone: (800) 458-1261
Fax: (916) 920-2515
www.examworks.com

PROOF OF SERVICE BY MAIL
1013 A, 2015.5 C.C.P.

I declare under penalty of perjury that: I am a citizen of the United States and am employed in the County of Sacramento; I am over eighteen years and not a party to the within action; my business address is 11010 White Rock Road, Ste 120, Rancho Cordova, CA 95670.

On **MAY 12 2016** I served a copy of the attached Medical Legal report and invoice, by placing a true copy thereof enclosed in sealed envelope with postage fully prepaid, in the United States mail at Rancho Cordova, California, addressed as follows:

Nancy Urton, Adjuster
AIMS
P.O. Box 269120
Sacramento, CA 95826-9120

Sara A. Skolnik, Esq.
Stockwell, Harris, Woolverton & Helphrey
1007B West College Avenue, Suite 301
Santa Rosa, CA 95401

Tiffany Anderson
1900 Lakeshore Drive
Lodi, CA 95242

Disability Evaluation Unit
160 Promenade Circle, Suite 300
Sacramento, CA 95834-2963

Executed on **MAY 12 2016** at Rancho Cordova, California.

Signed _____