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LABORATORY SAFETY AND WASTE MANAGEMENT SESSION

Chairman: Alvin Young, Major, USAF, Ph.D.
Office of Environmental Medicine
Veterans Administration, Washington, DC

Tuesday
October 27

0830 Laboratory design considerations for the handling and analyses of chlorinated dioxins and related compounds.
G.G. Outterson and C.H. Hickman, Battelle Columbus Laboratories, Columbus, OH

0855 Safety precautions for the handling of TCDD.
H. Beck, Bundesgesundheitsamt, Berlin, FRG.

0915 A medical surveillance program for scientists exposed to dioxins and furans.
G. D. Lathrop and W.H. Wolfe, USAF School of Aerospace Medicine, San Antonio TX.

0940 Physical and chemical properties of dioxins in relation to their disposal.
W. Shaub, National Bureau of Standards, Washington, DC

1005 Break

1015 Laboratory handling and disposal of chlorinated dioxin wastes.
L.G. Taft and B.C. Garrett, Battelle Columbus Laboratories, Columbus, OH

1040 A program for monitoring potential contamination in the laboratory following the handling and analyses of dioxins and furans.
F.D. Hileman, Monsanto Research Corporation, Dayton, OH

1105 Safe Handling of toxic chemicals: Perspectives of a bench chemist and laboratory manager.
J.H. Futrell, Professor of Chemistry, University of Utah, Salt Lake City, UT

1130 The design, implementation and evaluation of the industrial hygiene program used during the disposal of Herbicide Orange.
J.W. Tremblay, Lockwood, Andrews and Newnam Associates, San Antonio, TX

- Dioxin Symposium Presentation
Dr Alvin Young
26 Oct 1981

LABORATORY SAFETY

AND

WASTE MANAGEMENT

In 1972, Jensen reported on two cases of chloracne in employees of an outside contractor that had been working on a piece of equipment exposed (but thought to have been decontaminated) to TCDD three years earlier in an industrial explosion in Derbyshire, England in 1968. A young son of one of these employees also developed chloracne. The presumed source of the child's contamination was the father's working clothes.

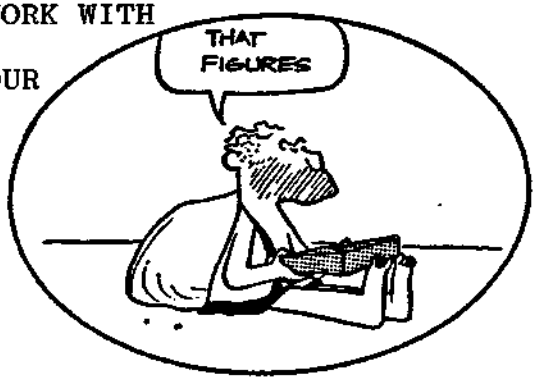
The lessons

→ Its difficult to clean-up dioxin once in the work place

→ Waste management is important. (used equipment)

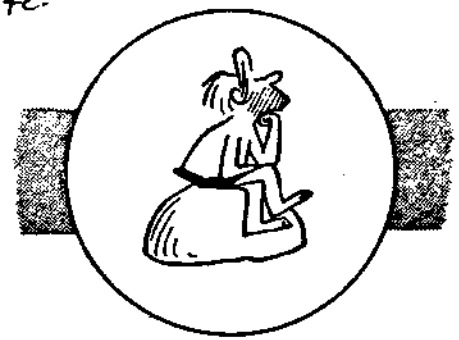
Carefully → ~~Handle~~ ~~Inspect~~ ~~Use~~ contaminated clothing.

SO YOU WANT TO WORK WITH DIOXINS IN YOUR LABORATORY?



Lessons: LAB Safety Program Required

ARE YOU PREPARED TO ADDRESS ISSUES OF



EQUIPMENT?
How extensive do you plan to go! High Resolution etc.
Are your facilities capable of handling your instrumentation requirements

WASTES?
Chemical, solid, animal waste must be handled in accordance with government guidelines that frequently do not provide sufficient detail to accomplish the task.

LEGAL?
Whoes responsible!

PUBLIC RELATIONS?
- News Media Inquiry
- Community Pressures
- Termination of Grants

HEALTH?
- Surveillance Protocol
- Type of Exam
- Frequency of Examination
- Must begin before lab start up!

FACILITIES DESIGN

HANDLING?
verify Clearances of Lab.

SAFETY?
Transport of Samples within the Lab
[redacted] Protocols
Safety officer/Inspector
Surveillance of the lab surfaces and air!

Contamination of Animal Facilities
- own Experience of Contaminated Redbarn

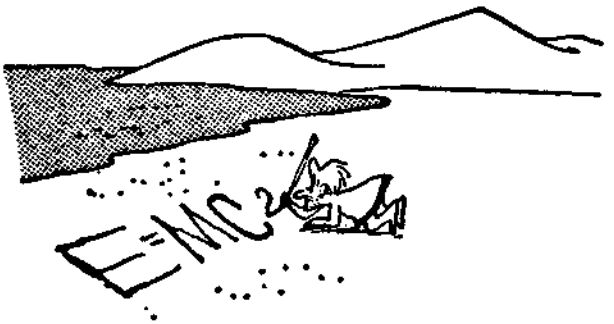
ANALYTICAL REQUIREMENTS

FOR

DIOXIN ANALYSIS

"Elaborate Facilities and Highly

Sophisticated Equipment"



What happens to the molecules that are injected into your instrumentation?

HANDLING PROCEDURES

- Preparation of Standards
- Sample Preparation
- Written Protocols!

AN Isolated Room

ONE Laboratory Prepared samples @ Stories away from their analytical lab. Transported in an elevator used by students!

The various substrates present individual extraction problems & the sophistication of the procedures frequently means that the laboratory personnel need to have reinforced the concerns of safety.

Dr Beck
Dr Fretwell

LABORATORY SAFETY

- Safety precautions for handling TCDD
- Medical Surveillance Program
  - Health Protocol
  - Health Advisory Board
- Legal Responsibilities
  - Are you prepared to address the issue of women working in the laboratory. Consent forms?
  - Can you insure that your laboratory procedures do not result in contamination "outside" of your own laboratory.
    - Need for Laboratory Contamination monitoring

WASTE MANAGEMENT

- Type and quantities of Laboratory Wastes
- Conform to Regulations
  - Storing
  - Shipping
- Adequate Disposal Program

DIOXINS AND PUBLIC RELATIONS

- Agency/Institution should be fully aware of Lab activities
- Laboratory Staff Informed
- Written Laboratory Protocols
- Indepth Health Surveillance
- Prepared Response to News Media Inquiry

Key = Professional Program

LHO Safety Section designed to address all of these topics. Individual perspectives will be important because we dont have a standard LHO Safety manual available. Perhaps a goal of our session?

ARE YOU PREPARED TO ADDRESS ISSUES OF

Dr Ouellette
Dr Fuchsel

EQUIPMENT?

WASTES? — Dr Tapp, Dr Straub

LEGAL?

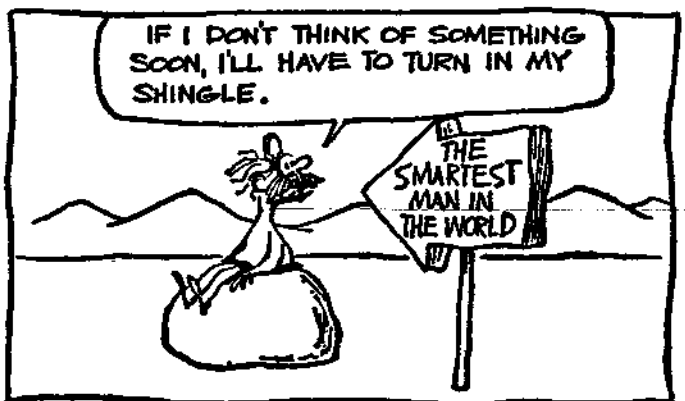
HEALTH? — Dr Wolfe

HANDLING? — Dr Beck

SAFETY? — Dr Beck, Dr Hileman

PUBLIC RELATIONS? — Mr Tomlinson


GO AHEAD, ASK ME ANYTHING.
THE SMARTEST MAN IN THE WORLD


IF I DON'T THINK OF SOMETHING SOON, I'LL HAVE TO TURN IN MY SHINGLE.
THE SMARTEST MAN IN THE WORLD

ABSTRACTS OF LABORATORY SAFETY & WASTE MANAGEMENT SESSION

International Symposium on Chlorinated Dioxins
25-29 October 1981
Arlington, Virginia

Overview: Laboratory Safety and Waste Management

A.L. Young, Office of Environmental Medicine (102), Veterans Administration, 810 Vermont Avenue, NW, Washington, DC 20420 (Phone: 202-389-5411)

Numerous analytical and toxicological laboratories are currently conducting or purposing to conduct experiments with toxic chlorinated dioxins and related compounds. It is important that these laboratories have adequate safety and waste management procedures. For example, the facility should be appropriately designed for handling hazardous materials in a variety of sample matrices. Protocols should be written and evaluated for

the safe handling of analytical standards and contaminated samples. The laboratory should have a written and instituted medical surveillance for all laboratory personnel. Special care should be given to the handling, storing, shipping, and disposal of laboratory wastes.

LABORATORY DESIGN CONSIDERATIONS FOR THE HANDLING AND ANALYSIS OF CHLORINATED DIOXINS AND RELATED COMPOUNDS

G.G. Outterson and C.H. Hickman, Hazardous Materials Research, Battelle Columbus Laboratories, Columbus, OH 43201 (Phone: 614-424-5609)

The objectives of designing a laboratory specifically for working with hazardous materials are to protect the workers, prevent any environmental insult and to provide for the scientific integrity of the experiments being conducted.

Guidelines are offered for the design or retrofitting of such a laboratory. Three major considerations are described including engineering design, administration controls and personal protective equipment.

Examples showing implementation of the guidelines are given.

SAFETY PRECAUTIONS FOR THE HANDLING OF TCDD

H. Beck, Bundesgesundheitsamt (Federal Health Office), Berlin, Federal Republic of Germany

For more than 80 years there have been numerous reports on a severe form of acne and related symptoms observed especially in workers of the chemical industry and laboratory staff which could be attributed to the action of TCDD and/or that of aromatic chlorine compounds of similar structure. The necessity arises to prescribe

particularly stringent safety precautions for laboratory experiments with these extremely toxic substances. At the same time a critical evaluation of the necessity of these experiments should be carried out. In 1976, safety precautions for the handling of TCDD have been elaborated in the Federal Health Office which are presented in detail. Numerous technical details as well as possibilities for improvisation are discussed. Moreover, simple possibilities for the safe disposal of contaminated wastes and solutions are described. Finally, the necessity of medical check-ups of laboratory staff involved is emphasized.

A MEDICAL SURVEILLANCE PROGRAM FOR SCIENTISTS EXPOSED TO DIOXINS AND FURANS

W. H. Wolfe and G. D. Lathrop, Epidemiology Laboratory, USAF School of Aerospace Medicine, Brooks AFB, San Antonio, TX 78235 (Phone: 512-536-2604)

The rationale for medical surveillance of individuals exposed to toxic substances and the components and objectives of a comprehensive surveillance program is discussed. The applicability of these principles and concepts to dioxins and furans is then considered, emphasizing the broad range of biomedical effects suspected to be caused by these substances. A format for the medical evaluation of individuals occupationally exposed to these chemicals is presented and selected medical examination procedures are discussed. The importance of a comprehensive unified program of surveillance involving medical evaluation, industrial hygiene techniques, epidemiologic analysis, and long-term population tracking is presented.

PHYSICAL AND CHEMICAL PROPERTIES OF DIOXINS IN RELATION TO THEIR DISPOSAL

W. M. Shaub and W. Tsang, Chemical Kinetics Division, Center for Chemical Physics, National Bureau of Standards, Washington, DC 20234 (Phone: 301-921-2173)

The physical and chemical properties of polycholorinated dibenzo-p-dioxins have been considered in relation to prospects for their formation and destruction in incinerator environments. Detailed equilibrium and chemical kinetic considerations have been used in performing qualitative assessments. It is concluded that there are no apparent thermodynamic barriers to their destruction and that kinetic control is a dominating factor in practical incinerator environments. This analysis as well as a consideration of some existing experimental data are used to suggest some useful guidelines and to indicate research which should be carried out in the future regarding dioxin disposal.

A PROGRAM FOR MONITORING POTENTIAL CONTAMINATION IN THE LABORATORY FOLLOWING THE HANDLING AND ANALYSES OF CHLORINATED DIBENZO-P-DIOXINS AND DIBENZOFURANS

F. D. Hileman, T. Mazer and D. E. Kirk, Monsanto Research Corporation, P.O. Box 8, Station B, Dayton, OH 45407 (Phone: 513-268-3411)

A program of safety wiping has been established to monitor the workplace for polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans. The procedure uses isooctaine wetted wipes to obtain the samples followed by a simple alumina column cleanup procedure and GC/MS analysis of the samples. A quality control program has been set up as a check on the effectiveness of the procedure. Detection limits of 5 nanograms per wipe are routinely obtained for the tetrachlorodibenzo-p-dioxins and tetrachlorodibenzo-furans.

SAFE HANDLING OF TOXIC CHEMICALS: PERSPECTIVES OF A BENCH CHEMIST AND LABORATORY MANAGER

J. H. Futrell, Department of Chemistry, University of Utah, Salt Lake City, UT 84112 (Phone: 801-581-7307)

In a university environment we have evolved a number of working rules for handling and analysis of toxic samples: (1) Secure storage and isolation of samples during workup; (2) Use of less toxic surrogate compounds

for calibration and testing of analytical scheme; (3) Dedicated instruments, work area and personnel; (4) Limited number of competent, knowledgeable, motivated personnel doing actual analyses; (5) Redundant containment, verified by wipe tests; (6) Medical surveillance; (7) Close supervision and, (8) Careful disposal of contaminated waste. We have also found it advantageous to have a toxicologist working with the analytical team and an analyst working with the toxicologists. With close collaboration and good communication of these groups serious exposure incidents have been avoided and a safe working environment has been maintained.

THE DESIGN, IMPLEMENTATION AND EVALUATION OF THE INDUSTRIAL HYGIENE PROGRAM USED DURING THE DISPOSAL OF HERBICIDE ORANGE

J. W. Tremblay, Lockwood, Andrews & Newnam, Inc., 4803 NW Loop 410, San Antonio, TX 78229 (Phone: 512-680-3003)

During the summer of 1977, the United States Air Force (USAF) disposed of 2.22 million gallons of Herbicide Orange (HO), a 50/50 mixture of 2,4-D and 2,4,5-T. The HO contained approximately 23 kilograms of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD). Disposal of the HO was accomplished by high-temperature incineration at sea aboard the incinerator ship, M/T Vulcanus. Under provisions of United States Environmental Protection Agency (EPA) permits, the USAF was required to conduct comprehensive quality control, environmental and industrial hygiene control, environmental and industrial hygiene monitoring. The disposal operations were accomplished in compliance with all EPA permit requirements. This paper focuses on the industrial hygiene workplace air sampling for 2,4-D, 2,4,5-T and TCDD. The sample collection methods, equipment and materials as well as sample handling, processing and analytical techniques are described. Results of the industrial hygiene sampling program are reviewed. Noted levels for 2,4-D and 2,4,5-T were well below permissible exposure level of 10 mg/m^3. TCDD was not detected in any industrial hygiene air samples, with lower limit of detection on the order of $30ng/m^3$. It is concluded that similar sampling and analysis regimens may be used for workplace monitoring of 2,4-D, 2,4,5-T and TCDD. Needed research to simplify TCDD air sampling is suggested.