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26 September 2010

CAPT Tim Radtke, CIH
Department of the Interior
Office of Occupational Health and Safety
755 Parfet Street
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CAPT Radtke:

I have enclosed a report of exposure assessments for Bozeman Fish Health Center as part of the DOI Exposure Assessment and Medical Surveillance Inclusion project. In the report you will find two attachments and guidance for reading and interpreting assessment results. One attachment presents the processes, tasks, and agents that were evaluated during the 7 May 2010 on-site visit with details of the associated exposure profiles that were developed. The other provides a health risk-based prioritized summary list of process-task-agent groups for control and further information gathering.

An Access database containing complete data and supporting documentation is available for download at www.BleicherCIH.com/DoIeA4TR.html (please note that the page address is case sensitive). This database file will be updated periodically as assessments and profiles are completed for additional facilities.

Please do not hesitate to contact me if you have any questions.

Sincerely,

David P. Bleicher, CIH

Enclosure: Bozeman Fish Health Center Occupational Exposure Assessment

Bozeman Fish Health Center
Occupational Exposure Assessment and Medical Surveillance Inclusion
For
Department of Interior, Safety Council/Office of Health and Safety
On-site: 7 May 2010

Exposure assessments have been conducted as a part of the Department of Interior's Exposure Assessment and Medical Surveillance Inclusion Determination initiative. The objective of this effort is to document work processes at DOI facilities, describe the individual tasks associated with those processes, identify hazardous agents that are used or generated during the task, and characterize employee exposure to those agents. The ultimate goal is to identify similarly exposed groups (SEGs) within and between bureaus in order to facilitate exposure management requirements including exposure control, validation of medical surveillance, and prioritized use of limited occupational health resources.

Methods.

Exposure assessments were conducted following the strategy set forth by the American Industrial Hygiene Association's Exposure Assessment Strategies Committee for assessing and managing occupational exposures[1].

An on-site visit to Bozeman Fish Health Center was conducted on 7 May 2010 by David P. Bleicher, CIH to characterized selected processes and collect information needed to develop task-agent exposure profiles. A number of methods were available and used to gather this information. Characterization of processes, tasks, conditions and controls, and agent identification was obtained through observation of work sites and facilities, documentation of procedures, material safety data sheets, and importantly, worker interview. Data useful for estimating exposure was obtained through screening and short term measurement, historical sampling data, mathematical modeling, and the scientific literature.

Two reports are provided for this facility (Attachments A and B). One presents the processes, tasks, and agents that were evaluated during the site visit along with details of the associated exposure profile. The other is a health risk-based prioritized summary list of process-task-agent groups for control and further information gathering.

Task-Agent Exposure Profile Detail Report.

Task-agent exposure profiles are based on observation and employee description of processes. Due to the nature of many DOI missions, processes and tasks can be highly variable—task duration, frequency, and operating conditions can differ from one iteration to another. Therefore, process and task characterizations were frequently, and necessarily, reported as "typical" with a range of conditions described. Judgments about worker exposure are based on the tasks as presented in this report. When actual processes or the conditions under which they are carried out differ from those recorded, the exposure profile and classification should not be generalized without appropriate consideration of variables.

Reading the Report.

[1] Bullock, Wm.H. and J.S.Ignacio, Eds. 2006. A Strategy for Assessing and Managing Occupational Exposures, 3rd. AIHA Press, Fairfax.

The Task-Agent Exposure Profile Detail Report is arranged in hierarchical fashion by Division or Project, Process, Task, and Agent. Process entries include a brief description of the process and when appropriate, unique operating conditions. Task entries include a brief characterization of the task, a description of any controls in place, the duration and frequency of occurrence, and appropriate recommendations. It should be noted that many task characterizations and agent exposure profiles will immediately suggest rather obvious recommendations. Some of these have been included in the report. However, in many cases it would not be appropriate to make definitive control recommendations without more careful consideration of control strategies and factors that would affect their efficacy (e.g. design, economic, and cultural factors) which is beyond the scope of the exposure assessment project.

Exposure Profile. Information used to develop the exposure profile is found for each Agent under a Task. It is important to understand that the exposure profile accounts for engineered and administrative controls and reflects potential worker exposure in the absence of personal protective equipment such as respirators.

- Exposure Category: Exposures have been categorized as Acceptable, Unacceptable, or Uncertain.
- OEL: The Occupational Exposure Limit or OEL is the threshold value used as a standard for comparison with the exposure estimate. OELs may describe full shift or short-term acceptable or unacceptable exposure limits.
- Exposure Rating & Exposure Estimate: When possible the Exposure Rating is based on quantitative data which yields an Exposure Estimate. In practice, very little quantitative information is available to support a judgment. In the absence of strong quantitative data, it is often practical and reasonable to categorized an exposure as acceptable, unacceptable, or uncertain based on qualitative or semi-quantitative information. However, in these cases it is difficult to assign intermediate exposure ratings as a fraction of the OEL, therefore an exposure rating of 4 is assigned to clearly unacceptable exposures and a rating of 1 for those that are clearly acceptable.
- Health Effects Rating: The Health Effects Rating reflects both the severity and permanence of the health impacts of an unacceptable exposure.
- Uncertainty Rating: The Uncertainty Rating provides an indicator of the level of certainty associated with the exposure profile. For example; exposure estimates based on definitive monitoring studies would be highly certain while profiles based on screening measurement, mathematical modeling, data from similar activities, or qualitative judgment may add degrees of uncertainty. Other factors that may affect the industrial hygienist's assignment of an uncertainty rating are inadequate understanding of health impacts by scientific community and excessive generalization of the task activity or conditions during the characterization process.
- Basis & Discussion: The Basis for the estimated exposure, its assignment to an exposure category, and the factors affecting certainty is given. A brief Discussion of available information and factors leading to judgments about the exposure profile is also provided.
- Risk/Control Priority: A Risk/Control Priority is calculated as the product of the Health Effects Rating and the Exposure Rating. Ratings range from 0 for the lowest risk exposures to a high of 16.
- FIG Priority: When uncertainty exists in the exposure profile, further information gathering may be required to resolve it. FIG Priority is calculated as the product of the Risk/Control Priority and the Uncertainty Rating. Both the Risk/Control Priority and the FIG Priority values may be used to more efficiently direct resources to control exposures and resolve exposure questions. FIG priority ratings range from a low of 0 to a high of 32.

Medical Surveillance. The exposure profile provides validation of, or indicates justification for, medical surveillance programs. In the report, medical surveillance is Justifiable when the exposure category is unacceptable or uncertain. Note that justifiable means simply that an unacceptable (or uncertain) exposure is identified. It does not suggest that medical surveillance is required, needed or even useful. On the other hand, some exposures are designated as Triggered or Critical Exposures. For unacceptable or uncertain exposure to some agents, medical surveillance may be triggered or required by regulation. A critical exposure refers to unacceptable or uncertain exposure to an agent which may pose very severe and irreversible health effects if not controlled. Examples include potent human carcinogens.

David P. Bleicher, CIH
26 September 2010

Attachment A: Task-Agent Exposure Profile Detail Report
Attachment B: Health Risk and Further Information Gathering Priorities Report

Task-Agent Exposure Profile Detail Report

Bozeman Fish Health Center

Histology Laboratory

Process: *Tissue Processing*

Fish tissues are received and processed for microscopic examination.

Operating Conditions:

Histology Laboratory

Task: Dissection

Frequency:

Duration: 4 - 8 hours

Sample dissection is conducted to obtain desired tissue samples for processing. Nearly all samples are in ethanol. Rarely (approximately 1%) samples preserved in formalin Davidson's solutions are dissected. Task may require from two minutes to a full shift. Note: after dissection, some samples may require additional fixing in Davidson's solution.

Controls:

Dissection is conducted under a free standing hood on a bench. Hood is equipped with an activated charcoal filter with discharge into the laboratory.

Recommendation

AGENT Ethanol

OEL: 1000 ppm

Exposure Estimate: ppm

Health Effects Rating: 2 Severe, reversible health effects of concern

Exposure Rating: 1 (<10% OEL; 95th %tile <0.1 OEL)

Exposure Category Acceptable

Uncertainty: 1 Uncertain

Risk/Control Priority: 2

Basis: Qualitative Judgement

FIG Priority: 2

Discussion: Although task may require full shift potential exposure, procedure is conducted under an activated charcoal filtered hood. Vapor control dependant on sorbent bed efficiency.

Medical Surveillance

Justifiable: no

Triggered or Critical Exposure no

Reference:

Task: Fit Cover Slips

Frequency:

Duration:

Cover slips are fitted after tissue processing is completed using Micro Mount. Task may be automated or conducted manually.

Controls:

Charcoal filtered processor.

Recommendation

AGENT Ethylbenzene

OEL: 100 ppm

Exposure Estimate: ppm

Health Effects Rating: 2 Severe, reversible health effects of concern

Exposure Rating: 1 (<10% OEL; 95th %tile <0.1 OEL)

Exposure Category: Acceptable

Uncertainty: 0 Certain

Risk/Control Priority: 2

Basis: Qualitative Judgement

FIG Priority: 0

Discussion: OEL is PEL. Product contains up to 60% xylenes and 10% Ethylbenzene. OEL is not expected to be exceeded based on quantity of material used.

Medical Surveillance

Justifiable: no

Triggered or Critical Exposure: no

Reference:

AGENT Xylenes

OEL: 100 ppm

Exposure Estimate: 0.1 ppm

Health Effects Rating: 2 Severe, reversible health effects of concern

Exposure Rating: 1 (<10% OEL; 95th %tile <0.1 OEL)

Exposure Category: Acceptable

Uncertainty: 0 Certain

Risk/Control Priority: 2

Basis: Qualitative Judgement

FIG Priority: 0

Discussion: OEL is PEL. Product contains up to 60% xylenes and 10% Ethylbenzene. OEL is not expected to be exceeded based on quantity of material used.

Medical Surveillance

Justifiable: no

Triggered or Critical Exposure: no

Reference:

Task: Load Reagents in Tissue Processor

Frequency:

Duration: 1 - 4 hours

Task requires dilution of ethanol and transfer of Pro-par from 1 gallon into 1 L containers. Task is repeated 3-4 times per year.

Controls:

Task is conducted under a small enclosed canopy hood.

Recommendation

AGENT Ethanol

OEL: 1000 ppm

Exposure Estimate: ppm

Health Effects Rating: 2 Severe, reversible health effects of concern

Exposure Rating: 1 (<10% OEL; 95th %tile <0.1 OEL)

Exposure Category: Acceptable

Uncertainty: 0 Certain

Risk/Control Priority: 2

Basis: Engineering Controls in Place

FIG Priority: 0

Discussion: OEL is PEL. Work is conducted within an enclosed exhaust hood.

Medical Surveillance

Justifiable: no

Triggered or Critical Exposure: no

Reference:

AGENT Pro-Par Proprietary solvent

OEL: 196 ppm

Exposure Estimate: 0 ppm

Health Effects Rating: 1 Reversible health effects of concern

Exposure Rating: 1 (<10% OEL; 95th %tile <0.1 OEL)

Exposure Category: Acceptable

Uncertainty: 0 Certain

Risk/Control Priority: 1

Basis: Engineering Controls in Place

FIG Priority: 0

Discussion: Proprietary paraffinic solvent with manufacturer's OEL of 196 ppm as total hydrocarbon. Task is conducted within an enclosed canopy exhaust hood.

Medical Surveillance

Justifiable: no

Triggered or Critical Exposure: no

Reference:

Task: Load Tissue Proccessor

Frequency:

Duration: extended shift

Dissected samples are placed in cassettes and then loaded into the tissue processor. Processing is automated requiring 15 hours. The processor is typically allowed to operate over night. Agents must be replenished 3-4 times per year.

Controls:

The auto processor is equipped with charcoal filtration.

Recommendation

AGENT Ethanol

OEL: 1000 ppm

Exposure Estimate: ppm

Health Effects Rating: 2 Severe, reversible health effects of concern

Exposure Rating: 1 (<10% OEL; 95th %tile <0.1 OEL)

Exposure Category: Acceptable

Uncertainty: 0 Certain

Risk/Control Priority: 2

Basis: Qualitative Judgement

FIG Priority: 0

Discussion: OEL is PEL. Low levels of agent may be released. Processor is equipped with charcoal filtration.

Medical Surveillance

Justifiable: no

Triggered or Critical Exposure: no

Reference:

AGENT Pro-Par proprietary solvent

OEL: 196 ppm

Exposure Estimate: ppm

Health Effects Rating: 1 Reversible health effects of concern

Exposure Rating: 1 (<10% OEL; 95th %tile <0.1 OEL)

Exposure Category: Acceptable

Uncertainty: 0 Certain

Risk/Control Priority: 1

Basis: Qualitative Judgement

FIG Priority: 0

Discussion: Proprietary paraffinic solvent with manufacturer's OEL of 196 ppm as total hydrocarbon. Product also contains Propylene glycol. Processor is equipped with charcoal filtration.

Medical Surveillance

Justifiable: no

Triggered or Critical Exposure: no

Reference:

Task: Mix Acetic Acid Reagent

Frequency: 2 - 3 days/wk

Duration: <1/2 hour

A 1% solution is mixed using glacial acetic acid which is pipetted to measure and then combined with water.

Controls:

Work is conducted on the laboratory bench.

Recommendation

AGENT Acetic Acid, Glacial

OEL: 15 ppm

Exposure Estimate: ppm

Health Effects Rating: 2 Severe, reversible health effects of concern

Exposure Rating: 1 (<10% OEL; 95th %tile <0.1 OEL)

Exposure Category: Acceptable

Uncertainty: 0 Certain

Risk/Control Priority: 2

Basis: Qualitative Judgement

FIG Priority: 0

Discussion: OEL is TLV-STEL. Agent is highly corrosive. Direct skin exposure or exposure to mist or splash presents a severe health risk. Appropriate personal barrier protections were reported.

Medical Surveillance

Justifiable: no

Triggered or Critical Exposure: no

Reference:

Task: Receive Samples

Frequency:

Duration:

Fish samples are received at the laboratory in three conditions--preserved in ethanol, freshly killed, or alive. Frequency varies with the season and project requirements but may occur daily or bimonthly. Typically 5-10 samples are received at a time.

Controls:

Recommendation

AGENT Ethanol

OEL: 1000 ppm

Exposure Estimate: 0 ppm

Health Effects Rating: 2 Severe, reversible health effects of concern

Exposure Rating: 1 (<10% OEL; 95th %tile <0.1 OEL)

Exposure Category: Acceptable

Uncertainty: 0 Certain

Risk/Control Priority: 2

Basis: Qualitative Judgement

FIG Priority: 0

Discussion: No contact with agents until subsequent processing tasks.

Medical Surveillance

Justifiable: no

Triggered or Critical Exposure: no

Reference:

Task: Receive Samples in Davidson's or Formalin Solutions

Frequency:

Duration: <1/2 hour

Samples may be received in Davidson's solution or 10% neutral buffered formalin solution. Samples are held for 12 to 48 hours before decanting fixative and replacing it with 70% ethanol. This may be repeated. Repetition is triggered by presence of formaldehyde odor.

Controls:

Task is conducted under a local exhaust enclosure hood. Routine measurement of face velocity is contracted. Records of face velocity show a mean of 82 fpm on low fan setting and mean 124 fpm on high.

Recommendation

AGENT Ethanol

OEL: 1000 ppm

Exposure Estimate: ppm

Health Effects Rating: 2 Severe, reversible health effects of concern

Exposure Rating: 1 (<10% OEL; 95th %tile <0.1 OEL)

Exposure Category: Acceptable

Uncertainty: 0 Certain

Risk/Control Priority: 2

Basis:

FIG Priority: 0

Discussion: OEL is STEL. Typically 3-5 samples are processed requiring 100-200 ml ethanol per sample. The decanting task is conducted under the exhaust hood over sink and is of short duration.

Medical Surveillance

Justifiable: no

Triggered or Critical Exposure: no

Reference:

AGENT Formadahyde

OEL: 0.3 ppm

Exposure Estimate: 0 ppm

Health Effects Rating: 3 Irreversible health effects of concern

Exposure Rating: 1 (<10% OEL; 95th %tile <0.1 OEL)

Exposure Category: Acceptable

Uncertainty: 1 Uncertain

Risk/Control Priority: 3

Basis: Qualitative Judgement

FIG Priority: 3

Discussion: OEL is TLV-C. Other applicable OELs are REL (0.016 ppm) and REL-C (0.1 ppm). Typically 3-5 samples are processed requiring replacement of 100-200 ml of fixative per sample. Decanting task is conducted under the canopy exhaust hood over sink and is of short duration.

Medical Surveillance

Justifiable: no

Triggered or Critical Exposure: yes

Reference: 29 CFR 1910.1048

Task: Steiner Staining

Frequency:

Duration:

Steiner Staining process (described in agent profile documentation). Task involves treatment of tissue with a number of reagents including an oxidizer solution, 0.1% and 1 % silver nitrate, hydroquinone, and 10% zinc formalin.

Controls:

Bench top hood with charcoal filtration is used for transfers and tissue treatment. Enclosed canopy exhaust hood over sink is used for reagent mixing.

Recommendation

AGENT Formadahyde

OEL: 0.3 ppm

Exposure Estimate: ppm

Health Effects Rating: 3 Irreversible health effects of concern

Exposure Rating: 1 (<10% OEL; 95th %tile <0.1 OEL)

Exposure Category: Acceptable

Uncertainty: 0 Certain

Risk/Control Priority: 3

Basis: Engineering Controls in Place

FIG Priority: 0

Discussion: OEL is TLV-C. Other applicable OELs are REL (0.016 ppm) and REL-C (0.1 ppm). Work is conducted under mechanical ventilation.

Medical Surveillance

Justifiable: no

Triggered or Critical Exposure: yes

Reference: 29 CFR 1910.1048

Molecular Biology Laboratory

Process: *PRC Staining with Ethidium Bromide*

Staining PRC gells with ethidium bromide. Process involves preparation of stock solution, preparation of working solution from stock solution, staining, destaining, and reading in transilluminator.

Operating Conditions:

Molecuclar Biology Laboratory

Task: Dilute of Stock Solution and Stain Tissue.

Frequency: Monthly

Duration: <1/2 hour

500 uL of stock solution is combined with 1 L water at lab bench using micro pipette, mixing into plastic covered container. Working solution preparation requires approximately 2 minutes. Gels are treated for 25-30 minutes in covered container before transferring to a sterile water bath for clearing using spatulas. Gels remain in the water bath for approximately 10 minutes. They are then transferred to the transilluminator using spatulas. Rinse water is emptied into sanitary sewer. Waste stain is disposed of as hazardous waste. Gels are autoclaved. Benches and work surfaces are then cleaned with 3% bleach solution (from 5.25% household potassium hypochlorite) using manual spay dispenser bottles. Surface may be further cleaned with 70% ethanol.

Controls:

Recommendation

AGENT Ethidium bromide

OEL:

Exposure Estimate: 0

Health Effects Rating: 4 Life threatening or disabling injury or illness

Exposure Rating: 1 (<10% OEL; 95th %tile <0.1 OEL)

Exposure Category Acceptable

Uncertainty: 0 Certain

Risk/Control Priority: 4

Basis: Qualitative Judgement

FIG Priority: 0

Discussion: Skin absoption is a recognized route of entry. Appropriate personal barrier protections were reported. Inhalation exposure potential to stock and working solutions is neglegable. As a reference, solutions of <10 ug/ml may be disposed of in sanitary sewer per Princeton waste disposal guidance (http://web.princeton.edu/sites/ehs/chemwaste/etbr.html). Stock solution is <66.67 ug/ml (1 g/15 ml reported) and working solution is 0.035 ug/ml (reported).

Medical Surveillance

Justifiable: no

Triggered or Critical Exposure no

Reference:

Task: Prepare Stock Solution of Ethidium Bromide

Frequency: Single Event

Duration: <1/2 hour

Stock solution of ethidium bromide is prepared from finely divided powdered product in small container (<8 oz volume). Compound is weighed on micro-balance under Lab Con Co. hood (a UV hood without exhaust capability). Less than 1 g of compound is combined with 15 ml water. Process requires 2-3 minutes and is conducted about once every 5 years.

Controls:

Lab Con Co. UV hood.

Recommendation

Consider procuring pre-prepared liquid solutions to eliminate the task and hazard associated with handling ethidium bromide powder.

AGENT Ethidium bromide

OEL:

Exposure Estimate:

Health Effects Rating: 4 Life threatening or disabling injury or illness

Exposure Rating: 1 (<10% OEL; 95th %tile <0.1 OEL)

Exposure Category Uncertain

Uncertainty: 2 Highly Uncertain

Risk/Control Priority: 4

Basis: Qualitative Judgement

FIG Priority: 8

Discussion: Airborne exposure limits have not been established. Agent is highly toxic by inhalation and is a potent mutagen. A single transfer of finely divided powder is made within a UV hood without exhaust ventilation. Stock and working solutions do not pose inhalation exposure concern. Recommendations for use typically call for laboratory hood or full face APR.

Medical Surveillance

Justifiable: yes

Triggered or Critical Exposure no

Reference:

Health Risk and Further Information Gathering Priorities

Bozeman Fish Health Center

Division, Shop, Project	Process	Task	Agent	Exposure Catagory	Justified Medical Surveillance	Triggered Surveillance	Health Risk Priority	FIG Priority
Molecular Biology Laboratory	PRC Staining with Ethidium Bromide	Prepare Stock Solution of Ethidium Bromide	Ethidium bromide	Uncertain	yes	no	4	8
Molecular Biology Laboratory	PRC Staining with Ethidium Bromide	Dilute of Stock Solution and Stain Tissue.	Ethidium bromide	Acceptable	no	no	4	0
Histology Laboratory	Tissue Processing	Receive Samples in Davidson's or Formalin Solutions	Formadahyde	Acceptable	no	yes	3	3
Histology Laboratory	Tissue Processing	Steiner Staining	Formadahyde	Acceptable	no	yes	3	0
Histology Laboratory	Tissue Processing	Dissection	Ethanol	Acceptable	no	no	2	2
Histology Laboratory	Tissue Processing	Fit Cover Slips	Ethylbenzene	Acceptable	no	no	2	0
Histology Laboratory	Tissue Processing	Receive Samples in Davidson's or Formalin Solutions	Ethanol	Acceptable	no	no	2	0
Histology Laboratory	Tissue Processing	Fit Cover Slips	Xylenes	Acceptable	no	no	2	0
Histology Laboratory	Tissue Processing	Mix Acetic Acid Reagent	Acetic Acid, Glacial	Acceptable	no	no	2	0
Histology Laboratory	Tissue Processing	Load Reagents in Tissue Processor	Ethanol	Acceptable	no	no	2	0
Histology Laboratory	Tissue Processing	Load Tissue Proccessor	Ethanol	Acceptable	no	no	2	0
Histology Laboratory	Tissue Processing	Receive Samples	Ethanol	Acceptable	no	no	2	0
Histology Laboratory	Tissue Processing	Load Reagents in Tissue Processor	Pro-Par Proprietary solvent	Acceptable	no	no	1	0
Histology Laboratory	Tissue Processing	Load Tissue Proccessor	Pro-Par proprietary solvent	Acceptable	no	no	1	0