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CAPT Tim Radtke, CIH
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CAPT Radtke:

I have enclosed a report of exposure assessments for Bozeman Fish Technology 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 5-6 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/DoleA4TR.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 Technology Center Occupational Exposure Assessment

Bozeman Fish Technology Center
Occupational Exposure Assessment and Medical Surveillance Inclusion
For
Department of Interior, Safety Council/Office of Health and Safety
On-site: 5-6 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 exposures¹.

An on-site visit to Bozeman Fish Technology Center was conducted on 5-6 May 2010 by David P. Bleicher, CIH to characterize 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 categorize 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 Technology Center

Facilities (Maintenance)

Process: Electrical and HVAC Inspection and Maintenance

Function and operation checks and preventive maintenance of air handling units, pumps, and boilers are conducted.

Operating Conditions:

Work occurs in the mechanical spaces in buildings.

Task: Conduct Checks and Inspection of Electrical and HVAC Systems

Frequency: Daily

Check function and operation of air handling units, pumps and boilers.

Duration: 1/2 - 1 hour

Controls:

Recommendation

AGENT Noise

OEL: 85 dBA

Exposure Estimate: dBA

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: Sound level and dosimetry data are not available for this task. Based on duration of potential exposure the OEL is not expected to be exceeded during this task.

Medical Surveillance

Justifiable: no

Triggered or Critical Exposure: yes

Reference: 29 CFR 1010.95

Task: Conduct Preventive Maintenance

Frequency: Bi-Monthly

Replace belts and filters and lubricate equipment using grease gun or oil can.

Duration: 1 - 4 hours

Controls:

Recommendation

AGENT Lubricants; oil, grease

OEL:

Exposure Estimate:

Health Effects Rating: 0 Reversible health effects of little concern

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

Exposure Category: Acceptable

Uncertainty: 0 Certain

Risk/Control Priority: 0

Basis: Qualitative Judgement

FIG Priority: 0

Discussion: Primary route of exposure to lubricants and oils is dermal contact. Prolonged contact is not expected during this task.

Medical Surveillance

Justifiable: no

Triggered or Critical Exposure: no

Reference:

Process: *Painting and Coating*

Interior and exterior of buildings, plant furnishings and equipment are painted.

Operating Conditions:

Task: Chemical Paint Stripping

Use chemical paint stripper to remove paint from wood trim and metal parts in preparation for coating.

Frequency: Quarterly

Duration: 1 - 4 hours

Controls:

Most work is conducted outdoors.

Recommendation

AGENT Methylene chloride

OEL: 10 ppm

Exposure Estimate: ppm

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: 1 Uncertain

Risk/Control Priority: 4

Basis: Qualitative Judgement

FIG Priority: 4

Discussion: OEL is TLV. Agent is a volatile material with significant inhalation and skin absorption exposure potential and critical health effects.

Medical Surveillance

Justifiable: yes

Triggered or Critical Exposure: yes

Reference: 29 CFR 1910.1052

Task: Etch and Wipe Surface

A product is used on metal to prepare surface for coating. Task may require dilutions of product. Product is brushed or wiped on with a rag. Task was not well described by worker and consequently the product and agents not known for this task.

Frequency: Bi-Annually

Duration: 1/2 - 1 hour

Controls:

Recommendation

AGENT Unknown

OEL:

Exposure Estimate:

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

Exposure Rating: 4 (>10% OEL; 95th %tile > OEL)

Exposure Category: Uncertain

Uncertainty: 2 Highly Uncertain

Risk/Control Priority: 16

Basis: Qualitative Judgement

FIG Priority: 32

Discussion: Product and agents could not be described by worker.

Medical Surveillance

Justifiable: yes

Triggered or Critical Exposure: no

Reference:

Feed and Nutrition Laboratory

Process: *Feed Mixing*

Ingredients are combined in several different mixer types-- Horizontal paddle mixer, vertical hobart, and V- mixer.

Operating Conditions:

Task: Bag Feed

Frequency: 2 - 3 days/wk

Feed is moved from the cooling table or vacuum coater into bags manually.

Duration: 1/2 - 1 hour

Controls:

Recommendation

AGENT Particulates, NOC/R

OEL: 15 mg/m3

Exposure Estimate: mg/m3

Health Effects Rating: 1 Reversible health effects of concern

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

Exposure Category: Acceptable

Uncertainty: 1 Uncertain

Risk/Control Priority: 1

Basis: Qualitative Judgement

FIG Priority: 1

Discussion: OEL is PEL for total dust. Organic particulate may initiate allergic and irritant responses. Manual transfer is expected to release low levels of particulate.

Medical Surveillance

Justifiable: no

Triggered or Critical Exposure: no

Reference:

Task: Mix Feed

Frequency: 2 - 3 days/wk

Dry and liquid ingredients are added to mixers according to varying formulas. As many as 400 different formulas may be used per year. Ingredients are weighed and mixed at the mixing bench in 5 to 100 kg batches. A batch requires 10-15 minutes to weigh and mix. Two to 11 batches may be mixed per day.

Duration: <1/2 hour

Controls:

Workers shower "in and out" for odor control. A surgical mask used is typically used during this task. A PAPR with N100 may be used.

Recommendation

AGENT Particulates, NOC/R

OEL: 15 mg/m3

Exposure Estimate: mg/m3

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: OEL is PEL for total dust. Organic particulate may initiate allergic and irritant responses. Dust is generated when loaded, however, mixers are covered or enclosed while mixing.

Medical Surveillance

Justifiable: no

Triggered or Critical Exposure: no

Reference:

Task: Operate Feed Dryer

Frequency: 2 - 3 days/wk

Heated air is passed over feed to dry it. Starting moisture content is 35% and is reduced to <5% . Exhausted air passes through a cyclone. The "grit pot" is open to processing room. Product is then placed on the cooling table. Two to 11 batches, each requiring 10-20 minutes are processed per day.

Duration: <1/2 hour

Controls:

Vacuum assisted, push pull system with cyclone (grit is directly discharged into processing room).

Recommendation

AGENT Noise

OEL: 85 dBA

Exposure Estimate: 82 dBA

Health Effects Rating: 3 Irreversible health effects of concern

Exposure Rating: 3 (50-100% OEL; 95th %tile 0.5-1.0 OEL)

Exposure Category: Acceptable

Uncertainty: 0 Certain

Risk/Control Priority: 9

Basis: Mathematical Modeling

FIG Priority: 0

Discussion: Sound level measurements of dry during this task demonstrate a high of 85 dBA. At this level and with a reported 4 hour exposure time, worker dose will be approximately 50 percent of the allowable.

Medical Surveillance

Justifiable: no

Triggered or Critical Exposure: yes

Reference: 29 CFR 1010.95

AGENT Particulates, NOC/R

OEL: 15 mg/m3

Exposure Estimate: mg/m3

Health Effects Rating: 1 Reversible health effects of concern

Exposure Rating: 2 (10-50% OEL; 95th %tile 0.1-0.5 OEL)

Exposure Category: Acceptable

Uncertainty: 1 Uncertain

Risk/Control Priority: 2

Basis: Qualitative Judgement

FIG Priority: 2

Discussion: OEL is PEL for total dust. Organic particulate may initiate allergic and irritant responses. Particulate generated by air system used to blow product out of the batch dryer is released from the cyclone into the processing area.

Medical Surveillance

Justifiable: no

Triggered or Critical Exposure: no

Reference:

Task: Pellet Formation

Frequency: 2 - 3 days/wk

Mixed product is added to the extruder in dry form or as a moist mash. Two to 11 batch transfers are made per day.

Duration: 4 - 8 hours

Controls:

Recommendation

AGENT Noise

OEL: 85 dBA

Exposure Estimate: dBAHealth Effects Rating: Irreversible health effects of concernExposure Rating: (<10% OEL; 95th %tile <0.1 OEL)Exposure Category: Uncertainty: UncertainRisk/Control Priority:

Basis: Qualitative Judgement

FIG Priority:

Discussion: Sound level data was not available for the large extruder.

Medical Surveillance

Justifiable: yes

Triggered or Critical Exposure: yes

Reference: 29 CFR 1010.95

AGENT Particulates, NOC/ROEL: mg/m3Exposure Estimate: mg/m3Health Effects Rating: Reversible health effects of concernExposure Rating: (<10% OEL; 95th %tile <0.1 OEL)Exposure Category: Uncertainty: CertainRisk/Control Priority:

Basis: Qualitative Judgement

FIG Priority:

Discussion: OEL is PEL for total dust. Organic particulate may initiate allergic and irritant responses. Dust generation occurs only during the transfer. OEL is not expected to be exceeded during this task alone.

Medical Surveillance

Justifiable: no

Triggered or Critical Exposure: no

Reference:

Process: *Ingredient Grinding*

Raw product is loaded into an air swept pulverizer to be ground. Products are soybean meal, soy protein concentrate, corn gluten meal, corn, wheat, wheat gluten meal, fish meal, poultry meal, blood meal (dusty), and barley.

Operating Conditions:

Work is conducted in a warehouse-like production area (processing room).

Task: Grind Ingredients

Frequency: 2 - 3 days/wk

Feed ingredients are ground using an air swept pulverizer. The hopper is loaded inside the processing room. Task requires 35 gallon plastic cans to be changed. Grinding blood meal was described as a particularly dusty task.

Duration: 1 - 4 hours

Controls:

Local exhaust ventilation with bag house removes and collects ground products.

Recommendation

AGENT Noise

OEL: 85 dBA

Exposure Estimate: 89.5 dBA

Health Effects Rating: 3 Irreversible health effects of concern

Exposure Rating: 4 (>10% OEL; 95th %tile > OEL)

Exposure Category: Unacceptable

Uncertainty: 0 Certain

Risk/Control Priority: 12

Basis: Mathematical Modeling

FIG Priority: 0

Discussion: Sound level measurements demonstrated hazardous noise within the warehouse during this task. Sources of hazardous noise include the pulverizer, fan motors, and outside pneumatic hammer in the bag house. At the upper end of the reported duration and at the approximate median sound level, a dose of greater than 280% of the allowable will be achieved.

Medical Surveillance

Justifiable: yes

Triggered or Critical Exposure: yes

Reference: 29 CFR 1010.95

AGENT Particulates, NOC/R

OEL: 15 mg/m3

Exposure Estimate: mg/m3

Health Effects Rating: 1 Reversible health effects of concern

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

Exposure Category: Acceptable

Uncertainty: 1 Uncertain

Risk/Control Priority: 1

Basis: Qualitative Judgement

FIG Priority: 1

Discussion: OEL is PEL for total dust. Organic particulate may initiate allergic and irritant responses. Local exhaust ventilation provides a degree of control of dust.

Medical Surveillance

Justifiable: no

Triggered or Critical Exposure: no

Reference:

Task: Operating Hammer Mill

Frequency: Bi-Monthly

Hammer mills are operated to process feed ingredients.

Duration: 1 - 4 hours

Controls:

Recommendation

AGENT Noise

OEL: 85 dBA

Exposure Estimate: dBA

Health Effects Rating: 3 Irreversible health effects of concern

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

Exposure Category: Uncertain

Uncertainty: 1 Uncertain

Risk/Control Priority: 3

Basis: Qualitative Judgement

FIG Priority: 3

Discussion: Sound level and dosimetry data are not available for this task.

Medical Surveillance

Justifiable: yes

Triggered or Critical Exposure: yes

Reference: 29 CFR 1010.95

AGENT Particulates, NOC/R

OEL: 15 mg/m3

Exposure Estimate: 0 mg/m3

Health Effects Rating: 1 Reversible health effects of concern

Exposure Rating: 3 (50-100% OEL; 95th %tile 0.5-1.0 OEL)

Exposure Category: Uncertain

Uncertainty: 2 Highly Uncertain

Risk/Control Priority: 3

Basis: Qualitative Judgement

FIG Priority: 6

Discussion: OEL is PEL for total dust. Organic particulate may initiate allergic and irritant responses. Engineering controls not available, driving workers to don filtering face piece respirators.

Medical Surveillance

Justifiable: yes

Triggered or Critical Exposure: no

Reference:

Hatchery

Process: Anesthetize Fish

Tricane is used to anesthetize fish in order to facilitate fish handling.

Operating Conditions:

Material is mixed on a stainless steel bench in the containment area of the hatchery.

Task: Dilute and Use Tricane Stock Solution

Frequency: Monthly

Duration: 4 - 8 hours

Stock Tricane solution is diluted by measuring with a graduated cylinder and pouring into 1 or 2 gallons of water depending on need. For anesthetic uses the stock solution is diluted as 5 ml/gal. When used to euthanize fish, the solution is diluted as 10 ml/gal. Netted fish are dropped into a container final solution. Fish are removed with a net, or, the liquid is poured through the liquid. For large projects, 20-30 ml of stock solution may be required. More typically, 4-10 ml are used.

Controls:

Recommendation

AGENT Tricane

OEL:

Exposure Estimate:

Health Effects Rating: 1 Reversible health effects of concern

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

Exposure Category: Acceptable

Uncertainty: 1 Uncertain

Risk/Control Priority: 1

Basis: Qualitative Judgement

FIG Priority: 1

Discussion: Tricane is an irritant. Quantity is for stock solution. Low concentrations are not expected to produce severe irritant effects with short term exposure. Health impacts of long duration immersion of hands (typical of the task) are not known. Glove use is reportedly recommended, but was not observed during the task.

Medical Surveillance

Justifiable: no

Triggered or Critical Exposure: no

Reference:

Task: Prepare Anesthetic (Tricane)

Frequency: Quarterly

Duration: <1/2 hour

Tricane is a fine powder which is mixed in water. Five grams are weighed and then added to 1 liter of water to make a stock solution. Product is dissolved over a magnetic mixer.

Controls:

Recommendation

AGENT Tricane

OEL:

Exposure Estimate:

Health Effects Rating: 1 Reversible health effects of concern

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

Exposure Category Acceptable

Uncertainty: 1 Uncertain

Risk/Control Priority: 1

Basis: Qualitative Judgement

FIG Priority: 1

Discussion: Tricane is an irritant. The primary routes of exposure are inhalation of dust and skin contact. Uncertainty is due to insufficient health effects data.

Medical Surveillance

Justifiable: no

Triggered or Critical Exposure no

Reference:

Process: De-liming Tanks

Lime is removed from tanks using an acid solution and pressure washer.

Operating Conditions:

Work is conducted in containment and hatchery areas, but not in the quarantine area.

Task: De-liming Tanks, Acid Application

Frequency: Single Event

Product is "Lightening" containing phosphoric and hydrochloric acids. Product is transferred to applicator bottles then sprayed on tank surfaces. After 5-30 minutes, the surfaces are rinsed using a pressure washer.

Duration: 1/2 - 1 hour

Controls:

Recommendation

AGENT Hydroden chloride

OEL: 2 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: OEL is TLV-C. Dermal and eye contact with concentrated product may result in tissue damage. Inhalation to dilute mist may result in upper respiratory irritation. Quantities were not determined. Duration of exposure to mist is between short. Appropriate personal barrier protections limit contact exposure.

Medical Surveillance

Justifiable: no

Triggered or Critical Exposure no

Reference:

AGENT Noise

OEL: 85 dBA

Exposure Estimate: dBA

Health Effects Rating: 3 Irreversible health effects of concern

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

Exposure Category: Uncertain

Uncertainty: 2 Highly Uncertain

Risk/Control Priority: 3

Basis: Qualitative Judgement

FIG Priority: 6

Discussion: Hazardous noise is assumed by workers during operation of pressure washer. Sound level and dosimetry data were not available for this task. Short duration will reduce worker dose over the shift.

Medical Surveillance

Justifiable: yes

Triggered or Critical Exposure: yes

Reference: 29 CFR 1010.95

AGENT Phosphoric acid

OEL: 3 mg/m3

Exposure Estimate: mg/m3

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

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

Exposure Category: Uncertain

Uncertainty: 1 Uncertain

Risk/Control Priority: 2

Basis: Qualitative Judgement

FIG Priority: 2

Discussion: OEL is TLV-STEL. Dermal and eye contact with concentrated product may result in tissue damage. Inhalation to dilute mist may result in upper respiratory irritation. Quantities were not determined. Duration of exposure to mist is between short. Appropriate personal barrier protections limit contact exposure.

Medical Surveillance

Justifiable: yes

Triggered or Critical Exposure: no

Reference:

Process: *Disinfect Eggs with Betadine Solution*

A working solution of Betadine PVP is mixed from a one gallon container of 10% povidone iodine at a rate of 40 ml per gallon of water. Product is measured using a graduated cylinder. Eggs contained in mesh are dipped for 10 minutes then delivered to egg trays.

Operating Conditions:

Task: Mix Betadine Solution and Treat Eggs

Frequency: Quarterly

A working solution of Betadine PVP is mixed from a one gallon container of 10% povidone iodine at a rate of 40 ml per gallon of water. Product is measured using a graduated cylinder. Eggs contained in mesh are dipped for 10 minutes then delivered to egg trays.

Duration: <1/2 hour

Controls:

Recommendation

AGENT Povidone iodine

OEL:

Exposure Estimate:

Health Effects Rating: 0 Reversible health effects of little concern

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

Exposure Category: Acceptable

Uncertainty: 0 Certain

Risk/Control Priority: 0

Basis: Qualitative Judgement

FIG Priority: 0

Discussion: Exposure to low concentrations via inhalation and dermal contact are not expected to result in health effects of concern. Prolonged contact with wet solution may cause skin irritation.

Medical Surveillance

Justifiable: no

Triggered or Critical Exposure: no

Reference:

Process: Prepare Foot Bath Disinfectant

Mix and load foot bath mats with VirKon R Aquatic animal premises' disinfectant and cleaner.

Operating Conditions:

Task: Mix and Load Foot Bath Mats.

Frequency: Monthly

Measure dry product with a marked scoop and place it in a bucket. Then fill the bucket to 3 gallons with water. Mix to dissolve and pour on foot baths. One gallon of solution is required per foot bath mat. The task, including loading mats, requires 10 minutes.

Duration: <1/2 hour

Controls:

Recommendation

AGENT Potassium peroxymonosulfate

OEL: 1 mg/m3

Exposure Estimate: mg/m3

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 full shift TWA set by manufacturer. Quantity is for product. Skin and eye contact and inhalation of dry product can result in severe burns or ulceration of tissues. These health effects are not of concern when contacting properly diluted working solution. Greatest risk is contact or inhalation of dry product while measuring and transferring to a bucket. Use of eye protection was not recorded.

Medical Surveillance

Justifiable: no

Triggered or Critical Exposure: no

Reference:

AGENT Sulfamic acid OEL: 1.5 mg/m3
 Exposure Estimate: mg/m3 Health Effects Rating: 2 Severe, reversible health effects of concern
 Exposure Rating: (<10% OEL; 95th %tile <0.1 OEL) Exposure Category: Acceptable
 Uncertainty: Certain Risk/Control Priority: 2
 Basis: Qualitative Judgement FIG Priority: 0

Discussion: OEL is 15 minute STEL set by manufacturer. Quantity is for product. Skin and eye contact and inhalation of dry product can result in severe burns or ulceration of tissues. These health effects are not of concern when contacting properly diluted working solution. Greatest risk is contact or inhalation of dry product while measuring and transferring to a bucket. Use of eye protection was not recorded.

Medical Surveillance Justifiable: no
Triggered or Critical Exposure: no
Reference:

Process: Remove Labels from Feed Cups

Acetone is used to remove permanent marker notations from plastic feed cups.

Operating Conditions:

Process is conducted in the hatchery and containment buildings.

Task: Remove Label Markings

Tas is conducted throughout hatchery and containment buidings. Acetone is dispensed using a squeeze wash bottle to wet a rag. Twenty cups may be cleaned in an event requiring a total of ten minutes.

Frequency: Quarterly

Duration: <1/2 hour

Controls:

Recommendation

AGENT Acetone OEL: 750 ppm
 Exposure Estimate: ppm Health Effects Rating: 2 Severe, reversible health effects of concern
 Exposure Rating: (<10% OEL; 95th %tile <0.1 OEL) Exposure Category: Acceptable
 Uncertainty: Certain Risk/Control Priority: 2
 Basis: Qualitative Judgement FIG Priority: 0

Discussion: OEL is TLV-STEL. Based on quantity of agent used, OEL is not expected to be exceeded during this task.

Medical Surveillance Justifiable: no
Triggered or Critical Exposure: no
Reference:

Process: Sanitization of Equipment and Tanks

Equipment and tanks are sanitized by shocking with 200 ppm hypochlorite solution. A 24 hour contact time is allowed after which dechlorinator added and circulated for another 24 hours. Residual is tested using a Hach kit for total chlorine. If Chlorine is detected, dechlorination and testing is repeated. Finally, the system is drained.

Operating Conditions:

Work is conducted in the hatchery tank room (Sturgeon grow-out), containment and quarantine units.

Task: Chlorination

Frequency: Single Event

Seven to 15 % sodium hypochlorite solution is added to the sump directly from 5 gallon containers. Every system is typically treated once per year, requiring the process to be conducted semi-monthly. Task requires less than 5 minutes.

Duration: Incidental

Controls:

Recommendation

AGENT Chlorine

OEL: 0.5 ppm

Exposure Estimate: 0 ppm

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: OEL is REL-C. In the absence of spill, potential for exposure is negligible.

Medical Surveillance

Justifiable: no

Triggered or Critical Exposure: no

Reference:

AGENT Sodium Hypochlorite

OEL: 2 mg/m3

Exposure Estimate: mg/m3

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 WEEL-C. Primary hazard is eye and skin contact as a result of splash. Risk is elevated due to high concentration products (up to 15 % agent). Appropriate personal barrier protections are reported. Five gallons are used for larger systems while 1/2 gallon is used for small systems.

Medical Surveillance

Justifiable: no

Triggered or Critical Exposure: no

Reference:

Task: Dechlorination

Frequency: Semi monthly

Dechlorination requires the use of a granulated salt of Sodium Thiosulfate which is added to the sump. Task requires approximately 5 minutes.

Duration: <1/2 hour

Controls:

Recommendation

AGENT Sodium thiosulfateOEL: Exposure Estimate: Health Effects Rating: Reversible health effects of little concernExposure Rating: (<10% OEL; 95th %tile <0.1 OEL)Exposure Category: Uncertainty: CertainRisk/Control Priority:

Basis: Qualitative Judgement

FIG Priority:

Discussion: Exposure presents little health concern as used in this task due to low level toxicity and irritant effects with prolonged respiratory and skin contact. One to 15 pounds of agent are used depending on system.

Medical Surveillance

Justifiable: no

Triggered or Critical Exposure: no

Reference:

Process: Sanitize Hatchery Tools

Hatchery tools such as nets, measuring boards and other water contact equipment are sanitized using a solution of Clockwork brand sanitizer.

Operating Conditions:

Process is conducted in the containment and hatchery buildings.

Task: Mix Sanitizer and Treat Equipment

Frequency: Weekly

Two hundred ml of product are measured using a graduated cylinder and transferred to 20 gallons of water in a 35 gallon garbage can. Equipment is then soaked in this solution.

Duration: <1/2 hour

Controls:

Recommendation

AGENT Ammonium Chloride CompoundsOEL: Exposure Estimate: Health Effects Rating: Reversible health effects of concernExposure Rating: (<10% OEL; 95th %tile <0.1 OEL)Exposure Category: Uncertainty: CertainRisk/Control Priority:

Basis: Qualitative Judgement

FIG Priority:

Discussion: Product is corrosive and may damage eyes and skin. Greatest health risk is due to eye and skin contact with concentrated product. Appropriate personal barrier controls were reported.

Medical Surveillance

Justifiable: no

Triggered or Critical Exposure: no

Reference:

Process: Treating Fish and Eggs

Formalin solution is diluted and used to treat use to treat fish and eggs for parasites.

Operating Conditions:

Work is conducted in the containment areas.

Task: Mix and load Waterer

Frequency: Annually

Duration: <1/2 hour

Formalin (37%) from 1 gallon containers is measured using a graduated cylinder, mixed with water and loaded into a 1 gallon poultry waterer. Solution is "metered" using either a hole drilled into bottom tray or a bent pipette to siphon solution to meter into flowing water. Task is conducted in the containment building. Standard protocol requires 3 treatments separated by a day. 300-600 ml of stock solution are used per treatment. Individual tanks are treated only once per day and 4-5 tanks may be treated per day.

Controls:

Recommendation

AGENT Formadahyde

OEL: 0.2 ppm

Exposure Estimate: 0.3 ppm

Health Effects Rating: 3 Irreversible health effects of concern

Exposure Rating: 4 (>10% OEL; 95th %tile > OEL)

Exposure Category Unacceptable

Uncertainty: 0 Certain

Risk/Control Priority: 12

Basis: Existing Quantitative Data

FIG Priority: 0

Discussion: OELs are TLV-C (0.3 ppm), REL (0.016 ppm), and REL-C (0.1 ppm). Short term personal sampling conducted during this task demonstrated a concentration of 0.3 ppm. Task may be repeated up to 5 times per day. This could yield a full shift TWA of 0.047 ppm or almost 3 times the REL.

Medical Surveillance

Justifiable: yes

Triggered or Critical Exposure yes

Reference: 29 CFR 1910.1048

Laboratory

Process: Histology

Fish tissue samples are received from the field or may be collected on the hatchery site. Samples may arrive in fixative consisting of either 10% neutral buffered formalin solution or Davidson's fixative. Samples are received in pre-labeled cassettes. Samples are typically dissected in the field and placed into cassettes. Fixative is decanted under a laboratory fume hood, walked to an adjacent space, desiccated in the tissue processor, embedded in wax, sectioned with microtome, and then transferred to adjacent lab for auto staining.

Operating Conditions:

Biological laboratory, decanting and preparation of solutions for automated equipment are conducted under laboratory hood.

Task: Auto Stainer

Frequency: Monthly

Duration: 1 - 4 hours

Tissue sections are stained using an automated staining instrument. Reagents must be loaded into the instrument as required for each stain procedure.

-Hematoxylin and Eosin stain: Pro-PAR, etoh, hematoxylin, differentiating solution (dilute hydrochloric solution is pre mixed), bluing Sodium bicarbonate solution is premixed.

--PAS Staining: Acetic acid 3%; periodic acid (0.5%) and premixed Schiff's reagent (hydrochloric acid, sodium bisulfite).

Mixing of stock solutions is conducted under hood in adjacent lab room. Exposure may occur due to splash and spill during mixing and transfer to the auto stainer. Task may require up to 2 hours to periodically load trays. A single tray requires 45 minutes to complete the staining cycle. Stained slides are removed from Pro-Par and then transferred to the hood where cover slips are added.

Controls:

Work is conducted under a laboratory hood.

Recommendation

AGENT Pro-Par Proprietary solvent

OEL: 196 mg/m3

Exposure Estimate: mg/m3

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 parafinic solvent with manufacturer's OEL of 196 ppm as total hydrocarbon. Product also contains Propylene glycol ether. Tasks are conducted within laboratory hoods. Primary risk of exposure to agents is direct contact as a result of splash or spill when mixing and transferring reagents.

Medical Surveillance

Justifiable: no

Triggered or Critical Exposure: no

Reference:

Task: Decant Fixative

Frequency: Monthly

Duration: 1/2 - 1 hour

Sample containers are 20 ml and contain 10 ml of fixative. Fifty to 100 samples are processed in a single event and require 20-90 minutes. Events may occur every 1-2 months.

Controls:

Task is conducted under fume hood. Measured mean face velocity with single sash panel open was 69 fpm.

Recommendation

AGENT Formadahyde

OEL: 0.1 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: Engineering Controls in Place

FIG Priority: 3

Discussion: OEL is REL-C. Fixative is 10% formalin solution. One to 1.5 L of fixative are decanted per event. Work is conducted under laboratory fume hood.

Medical Surveillance

Justifiable: no

Triggered or Critical Exposure: yes

Reference: 29 CFR 1910.1048

Task: Fix Samples in the Field.

Frequency: Quarterly

Fish specimens are dissected in the field, placed in cassettes, and then placed into a container of 10% formalin or Davison's solution (<22 % Formalin). Davidson's requires 48 hours contact before the specimen is transferred to 70% ethanol in the laboratory.

Duration: 4 - 8 hours

Controls:

Work is conducted in the containment area or outside.

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. OEL is not expected to be exceeded based on quantity of agent used.

Medical Surveillance

Justifiable: no

Triggered or Critical Exposure: no

Reference:

AGENT Formadahyde

OEL: 0.75 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: 1 Uncertain

Risk/Control Priority: 3

Basis: Qualitative Judgement

FIG Priority: 3

Discussion: OEL is PEL-TWA. Another applicable OEL is the REL-TWA of 0.016 ppm. Fixatives contain from 10 to about 22% formalin (or approximately 4 and 8% formaldehyde. Profile is based on PEL. Fixative is contained in covered containers. Uncertainty is due to low value of REL.

Medical Surveillance

Justifiable: no

Triggered or Critical Exposure: yes

Reference: 29 CFR 1910.1048

Task: Prepare Acetic Acid Solution

Frequency: Monthly

An acetic acid solution is prepared by combining 13.5 ml glacial acetic acid to 436.5 ml of water. Task requires only a couple minutes and is repeated every 1- 2 months.

Duration: <1/2 hour

Controls:

Work is conducted under a laboratory hood.

Recommendation

AGENT Acetic acid, glacial

OEL: 15 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: OEL is TLV-STEL. Agent is highly corrosive. Direct skin exposure or exposure to mist or splash presents a severe health risk. Appropriate barrier protections were reported.

Medical Surveillance Justifiable: no
Triggered or Critical Exposure no
Reference:

Task: Prepare Periodic Acid Solution

Frequency:

A solution of periodic acid is mixed as 2.25 g periodic acid added to 450 ml of water. Task is conducted every 1-2 months.

Duration: <1/2 hour

Controls:

Weighing and mixing are conducted under a laboratory hood.

Recommendation

AGENT Periodic acid

OEL:

Exposure Estimate: 0

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: Qualitative Judgement

FIG Priority: 0

Discussion: Agent is highly corrosive and will cause burns to any area of contact. It may be readily absorbed into the skin and is extremely destructive to the upper respiratory system and eyes. Appropriate personal barrier protections were reported.

Medical Surveillance Justifiable: no
Triggered or Critical Exposure no
Reference:

Task: Process Tissue

Frequency: Monthly

After decanting fixative, samples are delivered to the automated tissue processor. The processor first dehydrates samples then "rehydrated" in parafin wax. Processor runs over night for 10-12 hours.

Duration: extended shift

Controls:

Task is automated.

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: OEL is PEL. Process is expected to release low levels of ethanol relative to OEL.

Medical Surveillance

Justifiable: no

Triggered or Critical Exposure: no

Reference:

AGENT Formadahyde

OEL: 0.75 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: Qualitative Judgement

FIG Priority: 0

Discussion: OEL is PEL. Residual agent may be released in very low amounts over an extended period, much of which occurs when the laboratory is unoccupied.

Medical Surveillance

Justifiable: no

Triggered or Critical Exposure: yes

Reference: 29 CFR 1910.1048

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: 1 Uncertain

Risk/Control Priority: 1

Basis: Qualitative Judgement

FIG Priority: 1

Discussion: Proprietary parafinic solvent with manufacturer's OEL of 196 ppm as total hydrocarbon. Product also contains Propylene glycol ether.

Medical Surveillance

Justifiable: no

Triggered or Critical Exposure: no

Reference:

Task: Tissue Embedding

Frequency: Monthly

After tissues have been processed they are embedded in parafin.

Duration: 1 - 4 hours

Controls:

Recommendation

AGENT Parachlorometaxylenol OEL: mg/m3

Exposure Estimate: mg/m3 Health Effects Rating: 0 Reversible health effects of little concern

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

Uncertainty: 0 Certain Risk/Control Priority: 0

Basis: Qualitative Judgement FIG Priority: 0

Discussion: Agent is a surfactant that is a mild irritant to eyes and sensitive tissues. Direct contact with product is negligible.

Medical Surveillance Justifiable: no

Triggered or Critical Exposure no

Reference:

AGENT Paraffin Wax Fume OEL: 2 mg/m3

Exposure Estimate: mg/m3 Health Effects Rating: 0 Reversible health effects of little concern

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

Uncertainty: 0 Certain Risk/Control Priority: 0

Basis: Qualitative Judgement FIG Priority: 0

Discussion: Product melting point is 115-154 F. Wax is not heated significantly beyond melting point.

Medical Surveillance Justifiable: no

Triggered or Critical Exposure no

Reference:

Task: Transfer Samples: Hood to Tissue Processor

Frequency: Bi-Monthly

After decanting, samples are transferred in trays to tissue processor in an adjacent laboratory.

Duration: Incidental

Controls:

Recommendation

AGENT Formadahyde OEL: 0.1 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: 1 Uncertain Risk/Control Priority: 3

Basis: Qualitative Judgement FIG Priority: 3

Discussion: OEL is REL-C 15 min. Other applicable OEL is TLV-C of 0.3 ppm. Small, uncontrolled release of vapor over a short duration is expected.

Medical Surveillance Justifiable: no

Triggered or Critical Exposure yes

Reference: 29 CFR 1910.1048

Process: Proximate Analysis

Proximate analysis is used to determine moisture content, ash, protein, fat and carbohydrate in fish and feed samples.

Operating Conditions:

Analytical Laboratory

Task: Fat Fraction Analysis

Frequency: Bi-Monthly

Samples are macerated. Analysis is automated using an Ankom XT10 in a modified soxhlet analysis. Three to five runs are conducted during a typical analysis event. The task requires the analyst to fill a collection jar with petroleum ether from a 1 gallon jug and then to transfer from this jar to the extraction chamber. Used solvent is allowed to evaporate in the hood. Transfers require no more than a minute.

Duration: <1/2 hour

Conducted by all of crew less research biologist

Controls:

Apparatus contained, and analysis conducted, within laboratory fume hood.

Recommendation

AGENT VM&P Naphtha

OEL: 1800 mg/m3

Exposure Estimate: 0 mg/m3

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: OEL is REL-C. Synonym is Petroleum ether. 350 ml are transferred during each of 3 to 5 transfer event. Transfers are conducted under laboratory fume hood. Duration of potential exposure during transfers is very short. Agent has very low vapor pressure. Effective vapor control within laboratory hood.

Medical Surveillance

Justifiable: no

Triggered or Critical Exposure: no

Reference:

Health Risk and Further Information Gathering Priorities

Bozeman Fish Technology Center

Division, Shop, Project	Process	Task	Agent	Exposure Category	Justified Medical Surveillance	Triggered Surveillance	Health Risk Priority	FIG Priority
Facilities (Maintenance)	Painting and Coating	Etch and Wipe Surface	Unknown	Uncertain	yes	no	16	32
Hatchery	Treating Fish and Eggs	Mix and load Waterer	Formadahyde	Unacceptable	yes	yes	12	0
Feed and Nutrition Laboratory	Ingredient Grinding	Grind Ingredients	Noise	Unacceptable	yes	yes	12	0
Feed and Nutrition Laboratory	Feed Mixing	Operate Feed Dryer	Noise	Acceptable	no	yes	9	0
Facilities (Maintenance)	Painting and Coating	Chemical Paint Stripping	Methylene chloride	Uncertain	yes	yes	4	4
Hatchery	Sanitization of Equipment and Tanks	Chlorination	Chlorine	Acceptable	no	no	4	0
Hatchery	De-liming Tanks	De-liming Tanks, Acid Application	Noise	Uncertain	yes	yes	3	6
Feed and Nutrition Laboratory	Ingredient Grinding	Operating Hammer Mill	Particulates, NOC/R	Uncertain	yes	no	3	6
Feed and Nutrition Laboratory	Feed Mixing	Pellet Formation	Noise	Uncertain	yes	yes	3	3
Laboratory	Histology	Transfer Samples: Hood to Tissue Processor	Formadahyde	Acceptable	no	yes	3	3
Laboratory	Histology	Decant Fixative	Formadahyde	Acceptable	no	yes	3	3
Laboratory	Histology	Fix Samples in the Field.	Formadahyde	Acceptable	no	yes	3	3
Facilities (Maintenance)	Electrical and HVAC Inspection and Maintenance	Conduct Checks and Inspection of Electrical and HVAC Systems	Noise	Acceptable	no	yes	3	3
Feed and Nutrition Laboratory	Ingredient Grinding	Operating Hammer Mill	Noise	Uncertain	yes	yes	3	3
Laboratory	Histology	Prepare Periodic Acid Solution	Periodic acid	Acceptable	no	no	3	0
Laboratory	Histology	Process Tissue	Formadahyde	Acceptable	no	yes	3	0
Feed and Nutrition Laboratory	Feed Mixing	Operate Feed Dryer	Particulates, NOC/R	Acceptable	no	no	2	2
Hatchery	De-liming Tanks	De-liming Tanks, Acid Application	Hydroden chloride	Acceptable	no	no	2	2
Hatchery	De-liming Tanks	De-liming Tanks, Acid Application	Phosphoric acid	Uncertain	yes	no	2	2
Hatchery	Sanitization of Equipment and Tanks	Chlorination	Sodium Hypochlorite	Acceptable	no	no	2	0
Hatchery	Prepare Foot Bath Disinfectant	Mix and Load Foot Bath Mats.	Potassium peroxymonosulfate	Acceptable	no	no	2	0
Laboratory	Histology	Fix Samples in the Field.	Ethanol	Acceptable	no	no	2	0
Laboratory	Histology	Process Tissue	Ethanol	Acceptable	no	no	2	0
Hatchery	Prepare Foot Bath Disinfectant	Mix and Load Foot Bath Mats.	Sulfamic acid	Acceptable	no	no	2	0

Division, Shop, Project	Process	Task	Agent	Exposure Category	Justified Medical Surveillance	Triggered Surveillance	Health Risk Priority	FIG Priority
Hatchery	Remove Labels from Feed Cups	Remove Label Markings	Acetone	Acceptable	no	no	2	0
Laboratory	Histology	Prepare Acetic Acid Solution	Acetic acid, glacial	Acceptable	no	no	2	0
Laboratory	Histology	Process Tissue	Pro-Par Proprietary solvent	Acceptable	no	no	1	1
Hatchery	Anesthetize Fish	Dilute and Use Tricane Stock Solution	Tricane	Acceptable	no	no	1	1
Feed and Nutrition Laboratory	Ingredient Grinding	Grind Ingredients	Particulates, NOC/R	Acceptable	no	no	1	1
Feed and Nutrition Laboratory	Feed Mixing	Bag Feed	Particulates, NOC/R	Acceptable	no	no	1	1
Hatchery	Anesthetize Fish	Prepare Anesthetic (Tricane)	Tricane	Acceptable	no	no	1	1
Laboratory	Proximate Analysis	Fat Fraction Analysis	VM&P Naphtha	Acceptable	no	no	1	0
Feed and Nutrition Laboratory	Feed Mixing	Mix Feed	Particulates, NOC/R	Acceptable	no	no	1	0
Feed and Nutrition Laboratory	Feed Mixing	Pellet Formation	Particulates, NOC/R	Acceptable	no	no	1	0
Laboratory	Histology	Auto Stainer	Pro-Par Proprietary solvent	Acceptable	no	no	1	0
Hatchery	Sanitize Hatchery Tools	Mix Sanitizer and Treat Equipment	Ammonium Chloride Compounds	Acceptable	no	no	1	0
Hatchery	Sanitization of Equipment and Tanks	Dechlorination	Sodium thiosulfate	Acceptable	no	no	0	0
Hatchery	Disinfect Eggs with Betadine Solution	Mix Betadine Solution and Treat Eggs	Povidone iodine	Acceptable	no	no	0	0
Facilities (Maintenance)	Electrical and HVAC Inspection and Maintenance	Conduct Preventive Maintenance	Lubricants; oil, grease	Acceptable	no	no	0	0
Laboratory	Histology	Tissue Embedding	Parachlorometaxyleneol	Acceptable	no	no	0	0
Laboratory	Histology	Tissue Embedding	Paraffin Wax Fume	Acceptable	no	no	0	0