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4 October 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 Rocky Mountain Arsenal National Wildlife Refuge 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 20-21 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](http://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: Rocky Mountain National Arsenal Wildlife Refuge Occupational Exposure Assessment

Rocky Mountain Arsenal National Wildlife Refuge  
Occupational Exposure Assessment and Medical Surveillance Inclusion  
For  
Department of Interior, Safety Council/Office of Health and Safety  
On-site: 20-21 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<sup>1</sup>.

An on-site visit to Rocky Mountain Arsenal National Wildlife Refuge was conducted on 20-21 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.*

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<sup>1</sup> Bullock, Wm.H. and J.S.Ignacio, Eds. 2006. A Strategy for Assessing and Managing Occupational Exposures, 3<sup>rd</sup>. 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

4 October 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

## Rocky Mountain Arsenal National Wildlife Refuge

### Habitat Restoration

**Process:** Hazard Fuels Reduction

Fuels are reduced to minimize impact and intensity of wildfire.

**Operating Conditions:**

Process occurs principally on prairie and may include some brush control under cottonwood trees. Span of control limited.

**Task:** Holding

Holders apply water from engines or a bladder bag on back, and use manual hand tools to contain the burn.

**Frequency:**

**Duration:** extended shift

**Controls:**

**Recommendation:**

**AGENT** Carbon Monoxide

**OEL:** 25 ppm

**Exposure Estimate:** ppm

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

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

**Exposure Category:** Unacceptable

**Uncertainty:** 1 Uncertain

**Risk/Control Priority:** 16

**Basis:** Available Literature

**FIG Priority:** 16

**Discussion:** OEL is TLV. Another applicable OEL is REL-C (200 ppm). Extensive baseline data collected in 2004 showed that 8% of firefighters on the fire line at prescribed burns exceeded OEL. High shift-weighted exposures were typically driven by several peak exposure events. Occurrence and intensity of peak exposure were often a result of wind-driven shifts of the fire. Workers reported strict adherence to weather minimum policies which should serve to reduce such peak events to some degree. Uncertainty due to area size and fuel types relative to that in referenced study, extended shifts, and mostly acceptable shift TWAs vice fireline TWAs.

**Medical Surveillance** Justifiable yes

Triggered or Critical Exposure no

Reference:

**AGENT** Particulates, NOC/R

OEL: 5 mg/m3

Exposure Estimate: mg/m3

Health Effects Rating: 1 Reversible health effects of concern

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

Exposure Category: Unacceptable

Uncertainty: 2 Highly Uncertain

Risk/Control Priority: 4

Basis: Available Literature

FIG Priority: 8

**Discussion:** Hazardous components are described as total suspended particulate [OEL=PEL (15 mg/m3)] and as combined respirable irritants [acrolein (TLV =0.1 ppm), formaldehyde (TLV=0.3 ppm), and PM3.5 (EPA, 3 ppm). Extensive baseline data collected in 2004 showed that 30% of firefighters on the fire line at prescribed burns exceeded acceptable exposure for combined respiratory irritants. Highest exceedences were 4 to 6 times the acceptable exposure. High shift-weighted exposures were typically driven by several peak exposure events. Occurrence and intensity of peak exposure were often a result of wind-driven shifts of the fire. Workers reported strict adherence to weather minimum policies which should serve to reduce such peak events to some degree. Uncertainty due to area size and fuel types relative to that in referenced study, extended shifts, and mostly acceptable shift TWAs vice fireline TWAs.

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

**Task:** Lighter, Broadcast Burns

Frequency:

Drip torch fuel is mixed in Jerry jugs is loaded into drip torches used to light along a perimeter. Flare pistols may be used to launch into the interior of a burn area. Fusee flares may also be used. Typically, all employees remain on the perimeter. Lighters and holders work in tandem along perimeter. First, the perimeter is contained and then the head fire is lit. Frequency is variable occurring from 0 to 5 times per year. Task is conducted during the spring or fall and occasionally, during winter.

Duration: 4 - 8 hours

**Controls:**

Administrative controls in place provide for rotation to limit exposure to smoke. Humidity, wind direction and velocity, and fuel moisture are considered and will impact smoke exposure. Employees conducting this task have recorded OJT in task books.

**Recommendation:**

**AGENT** Carbon Monoxide

OEL: 25 ppm

Exposure Estimate: ppm

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

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

Exposure Category: Unacceptable

Uncertainty: 1 Uncertain

Risk/Control Priority: 16

Basis: Available Literature

FIG Priority: 16

**Discussion:** OEL is TLV. Another applicable OEL is REL-C (200 ppm). Extensive baseline data collected in 2004 showed that 8% of firefighters on the fire line at prescribed burns exceeded OEL. High shift-weighted exposures were typically driven by several peak exposure events. Occurrence and intensity of peak exposure were often a result of wind-driven shifts of the fire. Workers reported strict adherence to weather minimum policies which should serve to reduce such peak events to some degree. Uncertainty due to area size and fuel types relative to that in referenced study, extended shifts, and mostly acceptable shift TWA vice fireline TWA.

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

**AGENT** Particulates, NOC/R

OEL: 5 mg/m3

Exposure Estimate: mg/m3

Health Effects Rating: 1 Reversible health effects of concern

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

Exposure Category: Unacceptable

Uncertainty: 2 Highly Uncertain

Risk/Control Priority: 4

Basis: Available Literature

FIG Priority: 8

**Discussion:** Hazardous components are described as total suspended particulate [OEL=PEL (15 mg/m3)] and as combined respirable irritants [acrolein (TLV =0.1 ppm), formaldehyde (TLV=0.3 ppm), and PM3.5 (EPA, 3 ppm). Extensive baseline data collected in 2004 showed that 30% of firefighters on the fire line at prescribed burns exceeded acceptable exposure for combined respiratory irritants. Highest exceedences were 4 to 6 times the acceptable exposure. High shift-weighted exposures were typically driven by several peak exposure events. Occurrence and intensity of peak exposure were often a result of wind-driven shifts of the fire. Workers reported strict adherence to weather minimum policies which should serve to reduce such peak events to some degree. Uncertainty due to area size and fuel types relative to that in referenced study, extended shifts, and mostly acceptable shift TWA vice fireline TWA.

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

**Task:** Mop Up

Frequency:

Firefighters monitor burn area and identify hot spots which they will extinguish within one or two chains (66 ft per chain) of the perimeter. Note that individual firefighters may shift from task to task such as from igniter to controller to mop up as the fire progresses.

Duration: extended shift

Controls:

Recommendation:

**AGENT** Carbon Monoxide

OEL: 25 ppm

Exposure Estimate: ppm

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

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

Exposure Category: Unacceptable

Uncertainty: 1 Uncertain

Risk/Control Priority: 16

Basis: Available Literature

FIG Priority: 16

**Discussion:** OEL is TLV. Another applicable OEL is REL-C (200 ppm). Extensive baseline data collected in 2004 showed that 8% of firefighters on the fire line at prescribed burns exceeded OEL. Mean carbon monoxide concentration during the mop up task was more than twice that of the lighting task and approximately 25% less than the holding task. High shift-weighted exposures were typically driven by several peak exposure events. Occurrence and intensity of peak exposure were often a result of wind-driven shifts of the fire. Workers reported strict adherence to weather minimum policies which should serve to reduce such peak events to some degree. Uncertainty due to area size and fuel types relative to that in referenced study, extended shifts, and mostly acceptable shift TWA vice fireline TWA.

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

**AGENT** Particulates, NOC/R

OEL: 5 mg/m3

Exposure Estimate: mg/m3

Health Effects Rating: 1 Reversible health effects of concern

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

Exposure Category: Unacceptable

Uncertainty: 2 Highly Uncertain

Risk/Control Priority: 4

Basis: Available Literature

FIG Priority: 8

**Discussion:** Hazardous components are described as total suspended particulate [OEL=PEL (15 mg/m3)] and as combined respirable irritants [acrolein (TLV =0.1 ppm), formaldehyde (TLV=0.3 ppm), and PM3.5 (EPA, 3 ppm). Extensive baseline data collected in 2004 showed that 30% of firefighters on the fire line at prescribed burns exceeded acceptable exposure for combined respiratory irritants. Highest exceedences were 4 to 6 times the acceptable exposure. High shift-weighted exposures were typically driven by several peak exposure events. Mean respirable particulate concentration during the mop up task were comparable to the lighter task an approximately 1/2 that for the holding task. Occurrence and intensity of peak exposure were often a result of wind-driven shifts of the fire. Workers reported strict adherence to weather minimum policies which should serve to reduce such peak events to some degree. Uncertainty due to area size and fuel types relative to that in referenced study, extended shifts, and mostly acceptable shift TWA vice fireline TWA.

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

**Process:** Mow Vegetation

Vegetation is cut using a number of tractors. Process is conducted primarily for weed control but may also be conducted for fire suppression.

Operating Conditions:

Prairie.

**Task:** Operate John Deer 5400 Tractor

Frequency: Bi-Monthly

Operate John Deer 5400 tractor with open cab. Equipment is used primarily for mowing in locations that have been designated clean by EPA. Task is seasonal. Equipment is used as backup for other tractors fitted with filtered and conditioned cabs which operate daily.

Duration: 4 - 8 hours

Controls:

Equipment is fitted with an overhead canopy.

Recommendation:

**AGENT** Heat

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: Acceptable

Uncertainty: 1 Uncertain

Risk/Control Priority: 4

Basis: Qualitative Judgement

FIG Priority: 4

**Discussion:** Task may be conducted during high heat stress conditions. Heat stress may be increased by use of filtering face piece (partial re-breathing). Metabolic heat generation is low. Procedures for monitoring and managing heat stress were not reported.

**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: 4 (>10% OEL; 95th %tile > OEL) Exposure Category: Uncertain  
 Uncertainty: 2 Highly Uncertain Risk/Control Priority: 12  
 Basis: Qualitative Judgement FIG Priority: 24

Discussion: Sound level and dosimetry data are not available for this task. Similar equipment may produce sound levels greater than 85 dBA. Duration of exposure is reported as 4-8 hours.

Medical Surveillance Justifiable yes  
 Triggered or Critical Exposure yes  
 Reference: 29 CFR 1010.95

**AGENT** Particulates, NOC/R

OEL: 5 mg/m3  
 Exposure Estimate:  mg/m3 Health Effects Rating: 1 Reversible health effects of concern  
 Exposure Rating: 4 (>10% OEL; 95th %tile > OEL) Exposure Category: Uncertain  
 Uncertainty: 2 Highly Uncertain Risk/Control Priority: 4  
 Basis: Qualitative Judgement FIG Priority: 8

Discussion: OEL is PEL for respirable fraction. .

Medical Surveillance Justifiable yes  
 Triggered or Critical Exposure no  
 Reference:

**Process:** Weed Management

Herbicides are applied using a variety of application equipment types to control herbaceous and woody weed species.

**Operating Conditions:**

Work is conducted on range (spot and broadcast) and around facilities (spot spray only).

**Task:** Apply Escort Herbicide, Broadcast Spray, UTV w. Boom

Task differs from spot spraying from UTV in that application may be controlled from the cab of the UTV. (Sequence: turn off agitator from cab, turn on valves at the boom, then turn on from cab). A foam marker is applied simultaneously from the right or left tip from a 2-3 gallon tank for foam and dye. Boom spraying is used after spot spraying to finish off a tank.

Frequency: 2 - 3 days/wk

Duration: 1/2 - 1 hour

**Controls:****Recommendation:**

**AGENT** Metsulfuran methyl

OEL:

Exposure Estimate:

Health Effects Rating: 1 Reversible health effects of concern

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

Exposure Category: Acceptable

Uncertainty: 0 Certain

Risk/Control Priority: 1

Basis: Qualitative Judgement

FIG Priority: 0

**Discussion:** Product is Escort XP flowable formulation which contains 60% metsulfuran methyl. Agent is an irritant. Eye and skin contact with mist or drips is the primary route of exposure. Prolonged exposure to dilute agent may result in irritant effects. Adequate personal barrier protection was reported. Boom application results in finer mist which increases the potential for drift. Operator remains in the cab during application. Inhalation exposure is not expected to result in health effects of concern.

|                             |                                |    |
|-----------------------------|--------------------------------|----|
| <b>Medical Surveillance</b> | Justifiable                    | no |
|                             | Triggered or Critical Exposure | no |
|                             | Reference:                     |    |

**Task:** Apply Escort Herbicide, Spot Spray, UTV

Frequency: 2 - 3 days/wk

UTV is driven up to 3 mile to the worksite. Taking into account wind direction, spray out of the area to avoid contact with treated area. Typically one tank of 25 gallons is sprayed per day. The UTV is equipped with 2 hose reels. If a single worker is spraying, duration can 3-4 hours. If two workers are spraying duration may be 2 hours. Excess mixed herbicide at the end of the shift may be applied to areas that are scheduled for broadcast treatment.

Duration: 1 - 4 hours

**Controls:**

Kestral brand anemometer is used to measure wind speed and temperature. Treatment will not be made when wind speed exceeds 10mph or when temperature exceeds 85F.

**Recommendation:****AGENT** Heat

OEL:

Exposure Estimate:

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

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

Exposure Category: Acceptable

Uncertainty: 1 Uncertain

Risk/Control Priority: 4

Basis: Qualitative Judgement

FIG Priority: 4

**Discussion:** Although high heat conditions were reported for this task. Task is not conducted at temperatures greater than 85F. Metabolic heat generation in low.

|                             |                                |    |
|-----------------------------|--------------------------------|----|
| <b>Medical Surveillance</b> | Justifiable                    | no |
|                             | Triggered or Critical Exposure | no |
|                             | Reference:                     |    |

**AGENT** Metsulfuran methyl

OEL:

Exposure Estimate:

Health Effects Rating:  Reversible health effects of concern

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

Exposure Category:

Uncertainty:  Certain

Risk/Control Priority:

Basis: Qualitative Judgement

FIG Priority:

Discussion: Product is Excort XP flowable formulation which contains 60% metsulfuran methyl. Agent is primarily an irritant. Eye and skin contact with mist for drips is the primary route of exposure. Prolonged exposure to dilute agent may result in irritant effects. Adequate personal barrier protection was reported. Inhalation exposure is not expected to result in health effects of concern.

Medical Surveillance Justifiable no  
Triggered or Critical Exposure no  
Reference:

**Task:** Apply Herbicide using Spra-Coupe

Frequency: Daily

A number of herbicides are broadcast using the Spra-Coupe with boom. At least one hour is required per load of 200-300 gallons. Clean up is conducted in the field. If the sam product will be used the next day, equipment may not be rinsed.

Duration: 4 - 8 hours

Controls:

Equipment is fitted with an enclosed cab with air conditioning. Air conditioning reportedly does not function well.

Recommendation:

**AGENT** 2, 4-D, amine

OEL: 10 mg/m3

Exposure Estimate: mg/m3

Health Effects Rating:  Reversible health effects of concern

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

Exposure Category:

Uncertainty:  Uncertain

Risk/Control Priority:

Basis: Engineering Controls in Place

FIG Priority:

Discussion: OEL is TLV. Agent is used as a tank mix with dicamba. Quantities were not reported. Exposure to 2,4-D has been associated with central and peripheral nervous system effects, liver and kidney damage. OEL is TLV which is base on central nervous system and irritant effects. Primary route of exposure during this task is dermal and eye contact with spray and mist. Equipment is operated from within an enclosed cab, which will provide protection from exposure to mist when functioning properly. Uncertainty is due to reported problems with air system function.

Medical Surveillance Justifiable no  
Triggered or Critical Exposure no  
Reference:

**AGENT** AminopyralidOEL: 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: Engineering Controls in Place

FIG Priority: 

**Discussion:** Product is Milestone, a soluble liquid containing 2 pounds aminopyralid per gallon. EPA reports low acute and chronic toxicity via contact, ingestion and inhalation. Equipment is operated from within an enclosed cab, which will provide protection from exposure to mist when functioning properly.

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

**AGENT** Dimethylamine

OEL: 5 ppm

Exposure Estimate: ppm

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

Basis: Engineering Controls in Place

FIG Priority: 

**Discussion:** OEL is TLV-STEL. Agent is Dicamba and is used in tank mixes with 2,4-D. Agent is corrosive to eye and skin tissue and may be a dermal sensitizer. Risk of health effects is expected to be greater with exposure to undiluted product. Primary route of exposure during this task is dermal and eye contact with spray and mist. Equipment is operated from within an enclosed cab, which will provide protection from exposure to mist when functioning properly. Uncertainty is due to reported problems with air system function.

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

**AGENT** GlyphosateOEL: 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: Engineering Controls in Place

FIG Priority: 

**Discussion:** Most likely route of exposure from spray mist which may result in irritant effects. Short term inhalation exposure is not expected to produce significant health effects of concern. Equipment is operated from within an enclosed cab, which will provide protection from exposure to mist when functioning properly.

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

**AGENT** ImidizoleOEL: 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: Engineering Controls in Place

FIG Priority: 

**Discussion:** Product is Plateau. Agent has low acute and chronic toxicity. Equipment is operated from within an enclosed cab, which will provide protection from exposure to mist when functioning properly.

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

**AGENT** Metsulfuran methylOEL: 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: Engineering Controls in Place

FIG Priority: 

**Discussion:** Product is Escort XP flowable formulation which contains 60% metsulfuran methyl. Agent is primarily an irritant. Primary route of exposure is eye and skin contact with spray or mist. Inhalation exposure is not expected to result in health effects of concern. Equipment is operated from within an enclosed cab, which will provide protection from exposure to mist when functioning properly.

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

**Task:** Clean Spray Equipment

Frequency: 2 - 3 days/wk

Spray equipment is cleaned by rinsing with water. The tank is loaded with water and sprayed in an area that contains unwanted vegetation. If the same product is to be used the following day, the equipment will be rinsed only once. Otherwise it will be rinsed twice.

Duration: 1/2 - 1 hour

Controls:

Recommendation:

**AGENT** Metsulfuran methylOEL: 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:** Negligible exposure to highly dilute agent of low toxicity is expected.

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

**Task:** Mix and Load Escort Herbicide in UTV

Frequency:

Mix and load herbicide into "Spray Gator" UTV with a 100 gallon tank. Tank is filled to 80-85 gallons with water or to 25 gallons for spot spraying. The unit is then moved to the pesticide shop for mixing. Product is measured with a device integrated into the container. Rate of application is typically 2 oz product per acre and approximately 12.5 gallons finished mix per acre for boom spraying. The electric pump is started which provides agitation. Product is added slowly to the tank while standing upwind. A blue dye is added for spot spray. With a 3 oz measure, multiple measurements and pours may be required. A dust plume of fine particulate is reported.

Duration: <1/2 hour

**Controls:**

Task is conducted by BLM certified pesticide applicator.

**Recommendation:**

**AGENT** Metsulfuran methyl

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:** Product is Excort XP flowable formulation which contains 60% metsulfuran methyl. Agent is an irritant. Eye and skin contact is the primary route of exposure to concentrate agent. Adequate barrier protection was reported. Quantities of material transferred are small. Integrated measuring device reduces potential for particulate release. Inhalation exposure is not expected to result in health effects of concern.

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

**Task:** Mix and Load Spra-Coupe

Frequency: Daily

Herbicides are mixed and loaded into the Spra-Coupe which is equipped with a 200-300 gallon tank. The dedicated 3-wheeled equipment is designed for pesticide application to large acreage. Up to 80 acres may be treated per day. A load can be emptied in less than 1 hour. The Spra-Coupe is towed behind a 1-2K gallon water tank truck to the worksite. Mixing and loading occur on-site. A maximum of 6 loads may be mixed per day. Approximately 10 minutes are required to mix and load one tank. Several different herbicides may be mixed and loaded, depending on operational objectives, including: 2,4-D with Dicamba mixture, glyphosate, metsulfuron methyl, Milstone, or Plateau.

Duration:

**Controls:**

Equipment is fitted with an enclosed cab.

**Recommendation:**

**AGENT** 2, 4-D, amine

OEL: 10 mg/m3

Exposure Estimate: mg/m3

Health Effects Rating: 1 Reversible health effects of concern

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

Exposure Category: Acceptable

Uncertainty: 0 Certain

Risk/Control Priority: 1

Basis: Qualitative Judgement

FIG Priority: 0

**Discussion:** OEL is TLV. Agent is used as a tank mix with dicamba. Quantities were not reported. Exposure to 2,4-D has been associated with central and peripheral nervous system effects, liver and kidney damage. OEL is TLV which is base on central nervous system and irritant effects. Primary route of exposure during this task is dermal and eye contact as a result of spill or splash. Appropriate personal barrier protections were reported.

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

**AGENT** Aminopyralid

OEL:

Exposure Estimate:

Health Effects Rating: 1 Reversible health effects of concern

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

Exposure Category: Acceptable

Uncertainty: 0 Certain

Risk/Control Priority: 1

Basis: Qualitative Judgement

FIG Priority: 0

**Discussion:** Product is Milestone a soluble liquid containing 2 pounds aminopyralid per gallon. EPA reports low acute and chronic toxicity via contact, ingestion and inhalation. Skin barrier protections recommended and reportedly used for this task.

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

**AGENT** Dimethylamine

OEL: 15 ppm

Exposure Estimate: ppm

Health Effects Rating: 1 Reversible health effects of concern

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

Exposure Category: Acceptable

Uncertainty: 0 Certain

Risk/Control Priority: 1

Basis: Qualitative Judgement

FIG Priority: 0

**Discussion:** OEL is TLV-STEL. Agent is corrosive to eye and skin tissue and may be a dermal sensitizer. Risk of health effects is expected to be greater with exposure to undiluted product. Greatest risk of exposure is due to spill or splash during mixing and loading. Appropriate personal barrier protections were reported.

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

**AGENT** GlyphosateOEL: 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:** Most likely route of exposure is skin and eye contact, resulting in irritant effects. Short term inhalation exposure is not expected to produce significant health effects of concern. Barrier protections including eye and skin protection are used during this task.

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

**AGENT** ImidazoleOEL: 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 Plateau. Agent has low acute and chronic toxicity. Mild irritation may result with direct contact of eyes or skin to undiluted product.

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

**AGENT** Metsulfuran methylOEL: 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 Escort XP flowable formulation which contains 60% metsulfuran methyl. Agent is primarily an irritant. Primary route of exposure is eye and skin contact with spray or mist. Task requires transfer of relatively large quantities of product. Adequate barrier protection was reported. Inhalation exposure is not expected to result in health effects of concern.

**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: 4 (&gt;10% OEL; 95th %tile &gt; OEL)

Exposure Category: Uncertain

Uncertainty: 1 Uncertain

Risk/Control Priority: 12

Basis: Qualitative Judgement

FIG Priority: 12

Discussion: Sound level and dosimetry data were not available for this task. Hearing protection worn and task judged by operator to be noise hazardous. In combination with application task, duration is approximately full shift.

**Medical Surveillance**

Justifiable yes

Triggered or Critical Exposure yes

Reference: 29 CFR 1010.95

**Task:** Mix, Load and Apply Herbicide, Hand Sprayer

Frequency: Monthly

A one quart hand sprayer bottle is filled 1/2 full of water. Herbicide product is measured using a graduated cylinder, which is triple rinsed with rinsate added to the bottle. The bottle is then filled to desired volume. Task typically requires one load per day which requires 10 minutes to mix and 30 minutes to one hour to spray. Task may be conducted by Americorps and Mile High Youth Corps members. Frequency is project based for Youth Corps; monthly for employees. One worker will follow mechanical cutting of woody vegetation to treat stumps. Herbicides used in this task include imazapyr alone and in product mix with glyphosate.

Duration: 4 - 8 hours

Controls:

Recommendation:

**AGENT** Glyphosate

OEL:

Exposure Estimate:

Health Effects Rating: 1 Reversible health effects of concern

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

Exposure Category: Acceptable

Uncertainty: 0 Certain

Risk/Control Priority: 1

Basis: Qualitative Judgement

FIG Priority: 0

Discussion: Most likely route of exposure is skin and eye contact, resulting in irritant effects. Short term inhalation exposure is not expected to produce significant health effects of concern. Barrier protections including eye and skin protection are used during this task.

**Medical Surveillance**

Justifiable no

Triggered or Critical Exposure no

Reference:

**AGENT** ImidizoleOEL: 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 Arsenal. Agent has low acute and chronic toxicity. Mild irritation may result with direct contact of eyes or skin to undiluted product.

Medical Surveillance Justifiable no  
 Triggered or Critical Exposure no  
 Reference:

**Task:** Mix, Load, and Apply Herbicide, Back Pack Sprayer

Frequency: Bi-Monthly

Duration: &lt;1/2 hour

Two gallon back pack sprayer is filled 1/2 full of water. Herbicide product is measured using a graduated cylinder, which is triple rinsed with rinsate added to the tank. The tank is then filled to the desired volume. Task typically requires one load per day which requires 10 minutes to mix and 30 minutes to one hour to spray. To clean the equipment, the tank is field rinsed, or alternatively less than one gallon of water is run through the equipment into the sink and containment system. Any of the following agents may be mixed and sprayed during this task: glyphosate, 2,4-D with Dicamba mixture, metsulfuron methyl, imidizol, aminopyralid, and dimethylamine.

Controls:

Recommendation:

**AGENT** 2, 4-D, amine

OEL: 10 mg/m3

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

Basis: Qualitative Judgement

FIG Priority: 

Discussion: OEL is TLV. Exposure to 2,4-D has been associated with central and peripheral nervous system effects, liver and kidney damage. OEL is TLV which is base on central nervous system and irritant effects. Primary route of exposure during this task is dermal and eye contact as a result of spill or splash. Appropriate personal barrier protections were reported.

Medical Surveillance Justifiable no  
 Triggered or Critical Exposure no  
 Reference:

**AGENT** AminopyralidOEL: 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 Milestone a soluble liquid containing 2 pounds aminopyralid per gallon. EPA reports low acute and chronic toxicity via contact, ingestion and inhalation. Skin barrier protections recommended and reportedly used for this task.

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

**AGENT** Dimethylamine

OEL: 15 ppm

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

Basis: Qualitative Judgement

FIG Priority: 

**Discussion:** OEL is TLV-STEL. Agent is corrosive to eye and skin tissue and may be a dermal sensitizer. Risk of health effects is expected to be greater with exposure to undiluted product. Greatest risk of exposure is due to spill or splash during mixing and loading. Appropriate personal barrier protections were reported.

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

**AGENT** GlyphosateOEL: 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:** Most likely route of exposure is skin and eye contact, resulting in irritant effects. Short term inhalation exposure is not expected to produce significant health effects of concern. Barrier protections including eye and skin protection are used during this task.

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

**AGENT** Imidizole

OEL:

Exposure Estimate:

Health Effects Rating: 1 Reversible health effects of concern

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

Exposure Category: Acceptable

Uncertainty: 0 Certain

Risk/Control Priority: 1

Basis: Qualitative Judgement

FIG Priority: 0

Discussion: Product is Arsenal. Agent has low acute and chronic toxicity. Mild irritation may result with direct contact of eyes or skin to undiluted product.

Medical Surveillance Justifiable no  
 Triggered or Critical Exposure no  
 Reference:

**Task:** Operate Spray Truck

Frequency: Daily

Operate spray truck equipped with multiple Dositrons and a 450 gallon water tank. Six Dositrons allow application of 6 different products either singly or in combination with multiple chemicals. Dositrons are operated from the truck cab. Loading involves pouring product into a 25 gal tank or removing the cap from a bulk (2.5 gal) container and replacing with a siphon fitted lid. Reloading may be required 3-4 times per day. Task occurs daily, weather conditions permitting, from March through October.

Duration: 4 - 8 hours

**Controls:**

Application is conducted from an enclosed conditioned cab. Dositrons are operated from the truck cab.

**Recommendation:****AGENT** 2, 4-D, amine

OEL: 10 mg/m3

Exposure Estimate: mg/m3

Health Effects Rating: 1 Reversible health effects of concern

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

Exposure Category: Acceptable

Uncertainty: 1 Uncertain

Risk/Control Priority: 1

Basis: Engineering Controls in Place

FIG Priority: 1

Discussion: Exposure to 2,4-D has been associated with central and peripheral nervous system effects, liver and kidney damage. OEL is TLV which is base on central nervous system and irritant effects. Equipment is operated from within an enclosed cab, which will provide protection from exposure to mist. Appropriate personal barrier protections that will protect from spill or splash during loading were reported.

Medical Surveillance Justifiable no  
 Triggered or Critical Exposure no  
 Reference:

**AGENT** AminopyralidOEL: 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: Engineering Controls in Place

FIG Priority: 

**Discussion:** Product is Milestone, a soluble liquid containing 2 pounds aminopyralid per gallon. EPA reports low acute and chronic toxicity via contact, ingestion and inhalation. Equipment is operated from within an enclosed cab, which will provide protection from exposure to mist when functioning properly. Eye and skin contact may occur during loading of Dositrons.

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

**AGENT** Dimethylamine

OEL: 5 ppm

Exposure Estimate: ppm

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

Basis: Engineering Controls in Place

FIG Priority: 

**Discussion:** OEL is TLV-STEL. Agent is Dicamba and is used in tank mixes with 2,4-D. Agent is corrosive to eye and skin tissue and may be a dermal sensitizer. Risk of health effects is expected to be greater with exposure to undiluted product. Primary route of exposure during this task is dermal and eye contact during loading of Dositrons. Equipment is operated from within an enclosed cab.

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

**AGENT** GlyphosateOEL: 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: Engineering Controls in Place

FIG Priority: 

**Discussion:** Most likely route of exposure from spill or splash during loading and product transfer which may result in irritant effects. Short term inhalation exposure is not expected to produce significant health effects of concern. Equipment is operated from within an enclosed cab, which will provide protection from exposure to mist when functioning properly.

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

**AGENT** ImidazoleOEL: 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:** Agent has low acute and chronic toxicity. Equipment is operated from within an enclosed cab, which will provide protection from exposure to mist when functioning properly. Dositrons limit handling of product.

|                             |                                |    |
|-----------------------------|--------------------------------|----|
| <b>Medical Surveillance</b> | Justifiable                    | no |
|                             | Triggered or Critical Exposure | no |
|                             | Reference:                     |    |

**AGENT** Metsulfuran methylOEL: 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: Engineering Controls in Place

FIG Priority: 

**Discussion:** Product is Escort XP flowable formulation which contains 60% metsulfuran methyl. Agent is primarily an irritant. Primary route of exposure is eye and skin contact during loading and transfer of product. Inhalation exposure is not expected to result in health effects of concern. Equipment is operated from within an enclosed cab, which will provide protection from exposure to mist when functioning properly.

|                             |                                |    |
|-----------------------------|--------------------------------|----|
| <b>Medical Surveillance</b> | Justifiable                    | no |
|                             | Triggered or Critical Exposure | no |
|                             | Reference:                     |    |

**Visitor Services****Process:** Trails Maintenance

Trails maintenance may include mowing, construction, and weed control.

**Operating Conditions:**

Process occurs throughout the summer from April through September. Work is typically conducted in the morning.

**Task:** Apply Herbicide

Frequency: 2 - 3 days/wk

2, 4-D herbicide is applied using a UTV equipped with a spray boom. Tank size not known. Task requires approximately 2 hours per day. Five days are required to cover 8 miles of trail each month.

Duration: 1 - 4 hours

**Controls:**

Herbicide is mixed and loaded by a DOI certified habitat restoration personnel.

**Recommendation:**

**AGENT** 2, 4-D, amine

OEL: 10 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: Uncertain

Uncertainty: 2 Highly Uncertain

Risk/Control Priority: 1

Basis: Qualitative Judgement

FIG Priority: 2

Discussion: Exposure to 2,4-D has been associated with central and peripheral nervous system effects, liver and kidney damage. OEL is TLV which is base on central nervous system and irritant effects. Primary route of exposure during this task is dermal and eye contact with spray and mist. Appropriate personal barrier protections were reported. Exposure is uncertain because the reporting employee was not certain of the product, reporting it as 2, 4-D and describing it as "glyphosate like." Label and MSDS were not available.

Medical Surveillance Justifiable yes  
Triggered or Critical Exposure no  
Reference:

**AGENT** Heat

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: Acceptable

Uncertainty: 0 Certain

Risk/Control Priority: 4

Basis: Qualitative Judgement

FIG Priority: 0

Discussion: High heat conditions were reported. Task is restricted to morning hours. Tyvek coveralls limit evaporative cooling. Metabolic heat generation is low.

Medical Surveillance Justifiable no  
Triggered or Critical Exposure no  
Reference:

## Wildlife Division

### Process: Biomonitoring

Wildlife species are used as sentinels of environmental chemical exposure and investigating wildlife die off. American Kestrel and European Staring are monitored by non-lethal and lethal techniques. Process may also include collecting blood samples, dissection and necropsy.

#### Operating Conditions:

Collection is conducted in the field. Dissections may be conducted in the laboratory.

### Task: Clean Bird Nest Boxes

Frequency:

Nesting material is removed from nest boxes used by European Starlings and American Kestrals. Nesting material is manually removed and disposed of on ground outside the nest box. Task requires approximately 4 hours per day for a period of 2 weeks.

Duration:

Controls:

Recommendation:

**AGENT** HistoplasmosisOEL: Exposure Estimate: Health Effects Rating:  Severe, 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:** Development and amplification of the causal agent require volumes of feces and nesting material in contact with soil. Exposure is associated with disturbance of soil and nesting material. Feces and nesting material that are disturbed and handled during this task are not in contact with soil.

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

**AGENT** PsittacosisOEL: Exposure Estimate: Health Effects Rating:  Severe, reversible health effects of concernExposure Rating:  (<10% OEL; 95th %tile <0.1 OEL)Exposure Category: Uncertainty:  UncertainRisk/Control Priority: 

Basis: Qualitative Judgement

FIG Priority: 

**Discussion:** Occupational risk to this agent is considered highest for employees of pet shops and veterinarians. Outbreaks of psittacosis have been associated with poultry processing. Risk to biologist conducting this task involving American Kestrel and European Starling are considered low.

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

**Task:** Dissect and Prepare Samples

Frequency: Daily

Birds are dissected to obtain internal organs, primarily brain and liver, and samples are prepared for analysis. Task is conducted in the laboratory. Approximately 20 birds may be processed per day. Approximately 2 ml of isopropanol are used per bird for wetting and cleaning. Task is conducted daily for a period of approximately 2 weeks. Tissue sections are placed in jars and then frozen.

Duration: 4 - 8 hours

Controls:

Recommendation:

**AGENT** Isopropanol

OEL: 400 ppm

Exposure Estimate: 44 ppm

Health Effects Rating: 2 Severe, 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: 4

Basis: Mathematical Modeling

FIG Priority: 4

Discussion: OEL is PEL. Agent is used as a wetting agent and for cleaning. Box model based on highly uncertain and conservative assumptions of laboratory volume and ventilation rates shows low concentrations of agent are expected to be generated during this task.

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

**Task:** Observe, Collect, and Handle Bird Specimens

Frequency: Daily

Nest boxes are monitored seasonally between mid March and August. Task may result in contact with dead, dying or diseased animals. Birds or eggs may be collected from nest boxes. CO2 may be used for field euthanasia. Specimens are then bagged and chilled prior to transporting to the laboratory for freezing and held for processing at the end of the field season. Duration of tasks are variable but typically require 1-2 hours per day. Blood samples may be collected in the field using a needle, syringe, and collection tubes. Ethanol is used as a wetting agent for feathers.

Duration: 4 - 8 hours

Controls:

Recommendation:

**AGENT** Ethanol

OEL: 1000 ppm

Exposure Estimate: 0 ppm

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

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

Exposure Category: Acceptable

Uncertainty: 0 Certain

Risk/Control Priority: 2

Basis: Qualitative Judgement

FIG Priority: 0

Discussion: OEL is TLV-STEL. Ethanol is used in the field in small quantities as a wetting agent. OELs are not expected to be exceeded during this task.

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

**AGENT** Heat

|                             |  |                                |  |
|-----------------------------|--|--------------------------------|--|
| Exposure Estimate:          | <input type="text"/>   | OEL:                           | <input type="text"/>   |
| Exposure Rating:            | <input type="text" value="1"/> (<10% OEL; 95th %tile <0.1 OEL)   | Health Effects Rating:         | <input type="text" value="4"/> Life threatening or disabling injury or illness |
| Uncertainty:                | <input type="text" value="1"/> Uncertain   | Exposure Category:             | <input type="text" value="Acceptable"/>  |
| Basis:                      | Qualitative Judgement  | Risk/Control Priority:         | <input type="text" value="4"/>   |
| Discussion:                 | Conditions of high heat were reported during this task. Duration is relatively short. Metabolic heat generation is moderate. Heat stress monitoring and management procedures were not reported. |                                |  |
| <b>Medical Surveillance</b> |  | Justifiable                    | <input type="text" value="no"/>  |
|                             |  | Triggered or Critical Exposure | <input type="text" value="no"/>  |
|                             |  | Reference:                     | <input type="text"/>   |

**AGENT** Psittacosis

|                             |  |                                |   |
|-----------------------------|--|--------------------------------|---|
| Exposure Estimate:          | <input type="text"/>   | OEL:                           | <input type="text"/>  |
| Exposure Rating:            | <input type="text" value="1"/> (<10% OEL; 95th %tile <0.1 OEL)   | Health Effects Rating:         | <input type="text" value="2"/> Severe, reversible health effects of concern |
| Uncertainty:                | <input type="text" value="1"/> Uncertain   | Exposure Category:             | <input type="text" value="Acceptable"/>                                     |
| Basis:                      | Qualitative Judgement  | Risk/Control Priority:         | <input type="text" value="2"/>  |
| Discussion:                 | Occupational risk is considered highest for workers such as pet shop employees and veterinarians. Outbreaks of psittacosis have been associated with poultry processing. Risk to biologist conducting this task involving American Kestrel and European Starling are considered low. |                                |   |
| <b>Medical Surveillance</b> |  | Justifiable                    | <input type="text" value="no"/>   |
|                             |  | Triggered or Critical Exposure | <input type="text" value="no"/>   |
|                             |  | Reference:                     | <input type="text"/>  |

**AGENT** Ultraviolet radiation

|                             |  |                                |   |
|-----------------------------|--|--------------------------------|---|
| Exposure Estimate:          | <input type="text"/>   | OEL:                           | <input type="text" value="3"/> mj/cm2                                 |
| Exposure Rating:            | <input type="text" value="2"/> (10-50% OEL; 95th %tile 0.1-0.5 OEL)  | Health Effects Rating:         | <input type="text" value="3"/> Irreversible health effects of concern |
| Uncertainty:                | <input type="text" value="1"/> Uncertain   | Exposure Category:             | <input type="text" value="Uncertain"/>                                |
| Basis:                      | Qualitative Judgement  | Risk/Control Priority:         | <input type="text" value="6"/>  |
| Discussion:                 | Actinic UV exposure to skin can result in sunburn, carcinogenesis, and photosensitization. Eye exposure can result in photokeratitis and cataract generation. Prolonged outdoor work by refuge employees increases risk of health impact. Exposure is increased at higher elevations (approximately 10% for every 1000 m). Personal barrier protections reported were limited to normal work uniform (short sleeved) and sun glasses. Quantitative exposure data was not available for this and similar tasks. |                                |   |
| <b>Medical Surveillance</b> |  | Justifiable                    | <input type="text" value="yes"/>                                      |
|                             |  | Triggered or Critical Exposure | <input type="text" value="no"/>                                       |
|                             |  | Reference:                     | <input type="text"/>  |

**Process:** *Bison Darting*

A powder propelled dart gun is used to anesthetizing bison. As many as six darts may be fired. Darts contain carfentiniil and xylazine. Process also requires dart gun training, during which 40 rounds are fired.

Operating Conditions:

**Task:** Fire Powder Propelled Dart Gun.

Frequency:

A dart gun is fired during training (40 rounds) and when used to anesthetize bison in the field (6 rounds).

Duration:

Controls:

Recommendation:

**AGENT** Noise OEL: 140 dB

Exposure Estimate: dB Health Effects Rating: 3 Irreversible health effects of concern

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

Uncertainty: 2 Highly Uncertain Risk/Control Priority: 12

Basis: Qualitative Judgement FIG Priority: 24

Discussion: OEL is ceiling limit for impulse noise. Sound level data were not available for this task.

---

**Medical Surveillance** Justifiable yes

Triggered or Critical Exposure yes

Reference: 29 CFR 1010.95

**Task:** Load Darts

Frequency:

Darts are typically loaded prior to going the the field, but may be prepared in the field. Products used are carfentanil and xylazine. Splash and accidental injection are primary exposure routes of concern.

Duration:

Controls:

Recommendation:

**AGENT** Carfentanil 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: Acceptable

Uncertainty: 1 Uncertain Risk/Control Priority: 4

Basis: Qualitative Judgement FIG Priority: 4

Discussion: Agent is a class 2 scheduled drug and a synthetic opiate with a clinical potency 10,000 times that of morphine. Manufacturer recommended personal barrier protections were reportedly used.

---

**Medical Surveillance** Justifiable no

Triggered or Critical Exposure no

Reference:

**AGENT** XylazineOEL: 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: Agent slightly hazardous in cases of skin contact (sensitizer) or eye contact (irritant). Adequate personal barrier protections were reported for this task.

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

**Process:** Necropsy

Necropsies are conducted as part of a biological monitoring effort as well as to determine the cause of death of wildlife. Process requires opening animals to make observations about the condition of tissues and sectioning tissues that will be transported to the laboratory for processing.

## Operating Conditions:

Birds and other smaller animals are brought to the laboratory for necropsy while bison, deer and fish are processed in the field.

**Task:** Preserve Tissue Samples

Frequency: Single Event

Samples for histopathological analysis are preserved using premixed 10% neutral buffered formalin solution. Work is conducted on an open lab bench. Up to 10 specimens may be processed in 20 ml jars. Task is conducted infrequently and may require up to 2 hours.

Duration: 1 - 4 hours

Controls:

Recommendation:

**AGENT** Formaldehyde

OEL: 0.75 ppm

Exposure Estimate: ppm

Health Effects Rating:  Irreversible health effects of concernExposure Rating:  (10-50% OEL; 95th %tile 0.1-0.5 OEL)Exposure Category: Uncertainty:  UncertainRisk/Control Priority: 

Basis: Qualitative Judgement

FIG Priority: 

Discussion: OEL is PEL-TWA. Other OELs are TLV-C (0.3 ppm), REL-TWA (0.016 ppm), and REL-C (0.1 ppm). Greatest exposure will occur when fixative is being transferred. Exposure rating assumes containers are covered except for transferred of tissue or fixative. PEL not expected to be exceeded. Uncertainty is due to low REL Ceiling and TWA.

**Medical Surveillance** Justifiable no  
 Triggered or Critical Exposure yes  
 Reference: 29 CFR 1910.1048

**Process:** Prairie Dog Management

Prairie dog populations are managed when there is a conflict with restoration or clean up objectives. Process involves trapping and relocating animals.

Operating Conditions:

**Task:** Apply Insecticide Dust

Frequency: Daily

Prior to release at a new location, prairie dogs are "dusted" with an insecticide. Product information was not provided. Task was described as requiring a spray application. Typically, 20 animals are treated per day.

Duration: <1/2 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: 1 Uncertain

Risk/Control Priority: 16

Basis: Qualitative Judgement

FIG Priority: 16

Discussion: Product and agent used in this task could not be identified.

|                             |                                |     |
|-----------------------------|--------------------------------|-----|
| <b>Medical Surveillance</b> | Justifiable                    | yes |
|                             | Triggered or Critical Exposure | no  |
|                             | Reference:                     |     |

**Task:** Flush and Net Prairie Dogs

Frequency: 2 - 3 days/wk

This task uses water to flush burrows from one end and netting prairie dogs as they leave a second burrow opening. The task is typically used as a follow up to live trapping. Task requires 70 F or higher temperatures. Animals must be handled and wrapped in a towel for transfer to a cage.

Duration: 1 - 4 hours

Controls:

Recommendation:

**AGENT** Blastomycosis

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: 0 Certain

Risk/Control Priority: 1

Basis: Available Literature

FIG Priority: 0

Discussion: CDC has reported cases of blastomycosis in association with relocating prairie dogs in Colorado. However, CDC concludes that the risk for exposure to blastomycosis remains small even in areas where the disease is endemic.

|                             |                                |    |
|-----------------------------|--------------------------------|----|
| <b>Medical Surveillance</b> | Justifiable                    | no |
|                             | Triggered or Critical Exposure | no |
|                             | Reference:                     |    |

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

Basis: Available Literature

FIG Priority: 

Discussion: CDC reports that proven cases of human plague contracted from prairie dogs are virtually non-existent.

Medical Surveillance Justifiable no  
 Triggered or Critical Exposure no  
 Reference:

**Task:** Live Trap and Relocate Prairie Dogs

Frequency: Daily

Traps are baited with an oat-corn mixture and set in burrows. Captured animals are transferred to release site. Task may occur daily for approximately 9 months of the year.

Duration: 1 - 4 hours

Controls:

Recommendation:

**AGENT** BlastomycosisOEL: 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: Available Literature

FIG Priority: 

Discussion: CDC has reported cases of blastomycosis in association with relocating prairie dogs in Colorado. However, CDC concludes that the risk for exposure to blastomycosis remains small even in areas where the disease is endemic.

Medical Surveillance Justifiable no  
 Triggered or Critical Exposure no  
 Reference:

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

Basis: Available Literature

FIG Priority: 

Discussion: CDC reports that proven cases of human plague contracted from prairie dogs are virtually non-existent.

Medical Surveillance Justifiable no  
 Triggered or Critical Exposure no  
 Reference:

# Health Risk and Further Information Gathering Priorities

## Rocky Mountain Arsenal National Wildlife Refuge

| Division, Shop, Project | Process                | Task  | Agent                 | Exposure Category | Justified Medical Surveillance | Triggered Surveillance | Health Risk Priority | FIG Priority |
|-------------------------|------------------------|---|-----------------------|-------------------|--------------------------------|------------------------|----------------------|--------------|
| Wildlife Division       | Prarie Dog Management  | Apply Insecticide Dust                      | Unknown               | Uncertain         | yes                            | no                     | 16                   | 16           |
| Habitat Restoration     | Hazard Fuels Reduction | Lighter, Broadcast Burns                    | Carbon Monoxide       | Unacceptable      | yes                            | no                     | 16                   | 16           |
| Habitat Restoration     | Hazard Fuels Reduction | Holding                                     | Carbon Monoxide       | Unacceptable      | yes                            | no                     | 16                   | 16           |
| Habitat Restoration     | Hazard Fuels Reduction | Mop Up                                      | Carbon Monoxide       | Unacceptable      | yes                            | no                     | 16                   | 16           |
| Habitat Restoration     | Mow Vegetation         | Operate John Deer 5400 Tractor              | Noise                 | Uncertain         | yes                            | yes                    | 12                   | 24           |
| Wildlife Division       | Bison Darting          | Fire Powder Propelled Dart Gun.             | Noise                 | Uncertain         | yes                            | yes                    | 12                   | 24           |
| Habitat Restoration     | Weed Management        | Mix and Load Spra-Coupe                     | Noise                 | Uncertain         | yes                            | yes                    | 12                   | 12           |
| Wildlife Division       | Biomonitoring          | Observe, Collect, and Handle Bird Specimens | Ultraviolet radiation | Uncertain         | yes                            | no                     | 6                    | 6            |
| Wildlife Division       | Necropsy               | Preserve Tissue Samples                     | Formaldehyde          | Acceptable        | no                             | yes                    | 6                    | 6            |
| Habitat Restoration     | Hazard Fuels Reduction | Lighter, Broadcast Burns                    | Particulates, NOC/R   | Unacceptable      | yes                            | no                     | 4                    | 8            |
| Habitat Restoration     | Hazard Fuels Reduction | Holding                                     | Particulates, NOC/R   | Unacceptable      | yes                            | no                     | 4                    | 8            |
| Habitat Restoration     | Hazard Fuels Reduction | Mop Up                                      | Particulates, NOC/R   | Unacceptable      | yes                            | no                     | 4                    | 8            |
| Habitat Restoration     | Mow Vegetation         | Operate John Deer 5400 Tractor              | Particulates, NOC/R   | Uncertain         | yes                            | no                     | 4                    | 8            |
| Wildlife Division       | Biomonitoring          | Dissect and Prepare Samples                 | Isopropanol           | Acceptable        | no                             | no                     | 4                    | 4            |
| Habitat Restoration     | Weed Management        | Apply Escort Herbicide, Spot Spray, UTV     | Heat                  | Acceptable        | no                             | no                     | 4                    | 4            |
| Habitat Restoration     | Mow Vegetation         | Operate John Deer 5400 Tractor              | Heat                  | Acceptable        | no                             | no                     | 4                    | 4            |
| Wildlife Division       | Biomonitoring          | Observe, Collect, and Handle Bird Specimens | Heat                  | Acceptable        | no                             | no                     | 4                    | 4            |
| Wildlife Division       | Bison Darting          | Load Darts                                  | Carfentanil           | Acceptable        | no                             | no                     | 4                    | 4            |
| Visitor Services        | Trails Maintenance     | Apply Herbicide                             | Heat                  | Acceptable        | no                             | no                     | 4                    | 0            |
| Wildlife Division       | Prarie Dog Management  | Live Trap and Relocate Prarie Dogs          | Plague                | Acceptable        | no                             | no                     | 3                    | 0            |
| Wildlife Division       | Prarie Dog Management  | Flush and Net Prarie Dogs                   | Plague                | Acceptable        | no                             | no                     | 3                    | 0            |
| Wildlife Division       | Biomonitoring          | Observe, Collect, and Handle Bird Specimens | Psittacosis           | Acceptable        | no                             | no                     | 2                    | 2            |
| Wildlife Division       | Biomonitoring          | Clean Bird Nest Boxes                       | Psittacosis           | Acceptable        | no                             | no                     | 2                    | 2            |
| Wildlife Division       | Biomonitoring          | Clean Bird Nest Boxes                       | Histoplasmosis        | Acceptable        | no                             | no                     | 2                    | 0            |

| Division, Shop, Project | Process               | Task   | Agent              | Exposure Category | Justified Medical Surveillance | Triggered Surveillance | Health Risk Priority | FIG Priority |
|-------------------------|-----------------------|--|--------------------|-------------------|--------------------------------|------------------------|----------------------|--------------|
| Wildlife Division       | Biomonitoring         | Observe, Collect, and Handle Bird Specimens          | Ethanol            | Acceptable        | no                             | no                     | 2                    | 0            |
| Visitor Services        | Trails Maintenance    | Apply Herbicide                                      | 2, 4-D, amine      | Uncertain         | yes                            | no                     | 1                    | 2            |
| Habitat Restoration     | Weed Management       | Mix, Load, and Apply Herbicide, Back Pack Sprayer    | 2, 4-D, amine      | Acceptable        | no                             | no                     | 1                    | 1            |
| Habitat Restoration     | Weed Management       | Mix and Load Escort Herbicide in UTV                 | Metsulfuran methyl | Acceptable        | no                             | no                     | 1                    | 1            |
| Habitat Restoration     | Weed Management       | Mix, Load, and Apply Herbicide, Back Pack Sprayer    | Dimethylamine      | Acceptable        | no                             | no                     | 1                    | 1            |
| Habitat Restoration     | Weed Management       | Apply Herbicide using Spra-Coupe                     | Dimethylamine      | Acceptable        | no                             | no                     | 1                    | 1            |
| Habitat Restoration     | Weed Management       | Apply Herbicide using Spra-Coupe                     | 2, 4-D, amine      | Acceptable        | no                             | no                     | 1                    | 1            |
| Habitat Restoration     | Weed Management       | Operate Spray Truck                                  | Dimethylamine      | Acceptable        | no                             | no                     | 1                    | 1            |
| Habitat Restoration     | Weed Management       | Operate Spray Truck                                  | 2, 4-D, amine      | Acceptable        | no                             | no                     | 1                    | 1            |
| Habitat Restoration     | Weed Management       | Mix and Load Spra-Coupe                              | Dimethylamine      | Acceptable        | no                             | no                     | 1                    | 0            |
| Habitat Restoration     | Weed Management       | Mix, Load and Apply Herbicide, Hand Sprayer          | Imidizole          | Acceptable        | no                             | no                     | 1                    | 0            |
| Habitat Restoration     | Weed Management       | Mix, Load, and Apply Herbicide, Back Pack Sprayer    | Glyphosate         | Acceptable        | no                             | no                     | 1                    | 0            |
| Habitat Restoration     | Weed Management       | Apply Herbicide using Spra-Coupe                     | Metsulfuran methyl | Acceptable        | no                             | no                     | 1                    | 0            |
| Habitat Restoration     | Weed Management       | Mix and Load Spra-Coupe                              | Metsulfuran methyl | Acceptable        | no                             | no                     | 1                    | 0            |
| Wildlife Division       | Prarie Dog Management | Flush and Net Prarie Dogs                            | Blastomycosis      | Acceptable        | no                             | no                     | 1                    | 0            |
| Habitat Restoration     | Weed Management       | Apply Escort Herbicide, Broadcast Spray, UTV w. Boom | Metsulfuran methyl | Acceptable        | no                             | no                     | 1                    | 0            |
| Habitat Restoration     | Weed Management       | Clean Spray Equipment                                | Metsulfuran methyl | Acceptable        | no                             | no                     | 1                    | 0            |
| Habitat Restoration     | Weed Management       | Apply Escort Herbicide, Spot Spray, UTV              | Metsulfuran methyl | Acceptable        | no                             | no                     | 1                    | 0            |
| Habitat Restoration     | Weed Management       | Mix, Load, and Apply Herbicide, Back Pack Sprayer    | Aminopyralid       | Acceptable        | no                             | no                     | 1                    | 0            |
| Wildlife Division       | Bison Darting         | Load Darts   | Xylazine           | Acceptable        | no                             | no                     | 1                    | 0            |
| Habitat Restoration     | Weed Management       | Mix and Load Spra-Coupe                              | 2, 4-D, amine      | Acceptable        | no                             | no                     | 1                    | 0            |
| Wildlife Division       | Prarie Dog Management | Live Trap and Relocate Prarie Dogs                   | Blastomycosis      | Acceptable        | no                             | no                     | 1                    | 0            |
| Habitat Restoration     | Weed Management       | Operate Spray Truck                                  | Metsulfuran methyl | Acceptable        | no                             | no                     | 1                    | 0            |
| Habitat Restoration     | Weed Management       | Operate Spray Truck                                  | Glyphosate         | Acceptable        | no                             | no                     | 1                    | 0            |
| Habitat Restoration     | Weed Management       | Apply Herbicide using Spra-Coupe                     | Imidizole          | Acceptable        | no                             | no                     | 1                    | 0            |

| Division, Shop, Project | Process         | Task  | Agent        | Exposure Category | Justified Medical Surveillance | Triggered Surveillance | Health Risk Priority | FIG Priority |
|-------------------------|-----------------|---|--------------|-------------------|--------------------------------|------------------------|----------------------|--------------|
| Habitat Restoration     | Weed Management | Apply Herbicide using Spra-Coupe                  | Aminopyralid | Acceptable        | no                             | no                     | 1                    | 0            |
| Habitat Restoration     | Weed Management | Apply Herbicide using Spra-Coupe                  | Glyphosate   | Acceptable        | no                             | no                     | 1                    | 0            |
| Habitat Restoration     | Weed Management | Mix and Load Spra-Coupe                           | Imidazole    | Acceptable        | no                             | no                     | 1                    | 0            |
| Habitat Restoration     | Weed Management | Mix and Load Spra-Coupe                           | Aminopyralid | Acceptable        | no                             | no                     | 1                    | 0            |
| Habitat Restoration     | Weed Management | Mix, Load and Apply Herbicide, Hand Sprayer       | Glyphosate   | Acceptable        | no                             | no                     | 1                    | 0            |
| Habitat Restoration     | Weed Management | Mix and Load Spra-Coupe                           | Glyphosate   | Acceptable        | no                             | no                     | 1                    | 0            |
| Habitat Restoration     | Weed Management | Operate Spray Truck                               | Aminopyralid | Acceptable        | no                             | no                     | 1                    | 0            |
| Habitat Restoration     | Weed Management | Mix, Load, and Apply Herbicide, Back Pack Sprayer | Imidazole    | Acceptable        | no                             | no                     | 1                    | 0            |
| Habitat Restoration     | Weed Management | Operate Spray Truck                               | Imidazole    | Acceptable        | no                             | no                     | 1                    | 0            |