NIOSH HEALTH HAZARD EVALUATION REPORT

HETA #2004-0012-2948
U.S. Customs and Border Protection
Canine Enforcement Training Center
Front Royal, Virginia

December 2004

DEPARTMENT OF HEALTH AND HUMAN SERVICES
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

PREFACE

The Hazard Evaluation and Technical Assistance Branch (HETAB) of the National Institute for Occupational Safety and Health (NIOSH) conducts field investigations of possible health hazards in the workplace. These investigations are conducted under the authority of Section 20(a)(6) of the Occupational Safety and Health (OSHA) Act of 1970, 29 U.S.C. 669(a)(6) which authorizes the Secretary of Health and Human Services, following a written request from any employers or authorized representative of employees, to determine whether any substance normally found in the place of employment has potentially toxic effects in such concentrations as used or found.

HETAB also provides, upon request, technical and consultative assistance to federal, state, and local agencies; labor; industry; and other groups or individuals to control occupational health hazards and to prevent related trauma and disease. Mention of company names or products does not constitute endorsement by NIOSH.

ACKNOWLEDGMENTS AND AVAILABILITY OF REPORT

This report was prepared by Chad Dowell of HETAB, Division of Surveillance, Hazard Evaluations and Field Studies (DSHEFS). Analytical support was provided by Ardith Grote, Division of Applied Research and Technology (DART) and DataChem Laboratories, Salt Lake City, Utah. Desktop publishing was performed by Shawna Watts. Editorial assistance was provided by Ellen Galloway.

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For the purpose of informing affected employees, copies of this report shall be posted by the employer in a prominent place accessible to the employees for a period of 30 calendar days.

Highlights of the NIOSH Health Hazard Evaluation

Evaluation of Pseudo Drug Preparation

NIOSH received a management request from the U.S. Customs and Border Protection to conduct a health hazard evaluation survey at the Canine Enforcement Training Center. The evaluation looked at potential exposures and health effects from pseudo drugs prepared at the Center.

What NIOSH Did

- We collected air samples in the pseudo drug building for acetic acid, benzaldehyde, methyl benzoate, piperonal, and total particulates.
- We collected a bulk sample of the pseudo drug for silica content analysis.
- We talked to workers and management about the chopping of marijuana bales.

What NIOSH Found

- Total particulate and acetic acid air concentrations were above the OSHA exposure limit.
- Cellulose air concentrations were above the ACGIH exposure limit.
- Two employees reported being sick following the chopping of marijuana bales inside a building.

What Customs Managers Can Do

- Install ventilation in the mix room.
- Purchase bulk powdered chemicals in smaller drums.
- Evaluate current respiratory protection program and training.
- Allow gasoline-powered engines to be used outdoors only.
- Monitor for carbon monoxide when gasoline-powered engines are used.

What the Customs Employees Can Do

- Use slow, smooth movements when handling powders.
- Keep the distance powder is dropped to a minimum.
- Substitute moldy bales of marijuana with less moldy.
- Operate gasoline-powered engines only outside.

What To Do For More Information:
We encourage you to read the full report. If you would like a copy, either ask your health and safety representative to make you a copy or call 1-513-841-4252 and ask for HETA Report #2004-0012-2948

Health Hazard Evaluation Report 2004-0012-2948
U.S. Customs and Border Protection
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SUMMARY

The National Institute for Occupational Safety and Health (NIOSH) received a request for a Health Hazard Evaluation (HHE) at the U.S. Customs and Border Protection's Canine Enforcement Training Center (CETC) in Front Royal, Virginia. The request concerned potential exposures from the preparation of pseudo narcotics. NIOSH conducted an initial site visit on November 12 – 14, 2003, and follow up visits on March 1 and 4, 2004.

Preparation of pseudo narcotics includes the mixing of acetic acid, benzaldehyde, methyl benzoate, piperonal, cab-o-sil,® and microcrystalline cellulose. Seven personal breathing zone (PBZ) air samples were collected for total particulates on workers in the mix room. Nine general area (GA) air samples were collected for total particulates in the mix and package rooms. Two PBZ air samples were collected for acetic acid on workers in the mix room and four GA air samples were collected in the mix and package room. Three GA air samples were collected for benzaldehyde and piperonal and four GA air samples for methyl benzoate in the mix room.

The particulates contained cab-o-sil® and microcrystalline cellulose. All of the PBZ air samples collected for total particulates on workers in the mix room exceeded the OSHA PEL for particulates not otherwise classified (PNOC) and the ACGIH TLV for cellulose. Concentrations ranged from 21 to 110 milligrams per cubic meter (mg/m^3) with an average of 43 mg/m^3. Workers lean forward and place their heads inside drums, scooping out powder near the bottom. This accounts for the high exposure to airborne dust. One of two PBZ air samples collected for acetic acid on workers in the mix room exceeded the NIOSH REL, OSHA PEL, and ACGIH TLV. This sample was collected on the worker who measures acetic acid. All other air samples collected were below relevant evaluation criteria.

There is a potential for excessive particulate and acetic acid exposure in the mix room of the pseudo drug building. Based on a description of other work activities not directly observed, there is a potential for respiratory hazards during the chopping of marijuana bales. Recommendations such as ventilation improvements, modified work practices, and use of respiratory protection are included in this report.

Keywords: SIC 9229 (Public Order and Safety, Not Elsewhere Classified), pseudo drugs, acetic acid, benzaldehyde, methyl benzoate, piperonal, cab-o-sil,® microcrystalline cellulose, carbon monoxide, marijuana, mold, canine training

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INTRODUCTION

On October 10, 2003, the National Institute for Occupational Safety and Health (NIOSH) received a request for a Health Hazard Evaluation (HHE) at the U.S. Customs and Border Protection's Canine Enforcement Training Center (CETC) in Front Royal, Virginia. The request concerned potential exposures from the preparation of pseudo narcotics. NIOSH conducted an initial site visit on November 12 – 14, 2003, and follow up visits on March 1 and 4, 2004.

The initial site visit began with an opening conference and facility tour of the "pseudo building." The evaluation consisted of general area (GA) and personal breathing zone (PBZ) air sampling for acetic acid, benzaldehyde, methyl benzoate, piperonal, and total particulates. In addition, one bulk sample of the pseudo drug was analyzed for silica content. This report presents the results of our evaluations, including conclusions and recommendations.

BACKGROUND

CETC develops course content and provides training for all U.S. Customs Service Canine Enforcement Officers and other federal, state, local, and foreign law enforcement agencies. Currently there are over 500 canine teams throughout the United States. The CETC has a staff of approximately 40, which consists of instructors, animal caretakers, storage specialists, and administrative personnel. The CETC's average canine population is 100 to 150 dogs, with yearly training output of greater than 100 canine enforcement teams.

Storage specialists are responsible for the training aids used at the CETC and throughout the United States. Training aids can consist of the odors of marijuana, hashish, heroin, cocaine, methamphetamine, ecstasy, currency, and other non-narcotic hazardous substances. At the CETC, pseudo ecstacy, heroin, methamphetamine, and cocaine are prepared four times a year by storage specialists.

The pseudo narcotics are produced in the "pseudo building," which is a separate building approximately 17 feet wide by 38 feet long. The building is equally divided into two rooms, the mixing room and the storage room. The preparation of pseudo narcotics includes the use of acetic acid, benzaldehyde, methyl benzoate, piperonal, cab-o-sil,® and microcrystalline cellulose. The liquid ingredients are measured using a graduated cylinder; dry ingredients are measured using a scale on an open table in the mixing room.

The preparation process begins with the mixing of the liquid chemical odorants and a limited amount of cab-o-sil® or microcrystalline cellulose in a large glass jar or a glass dish. The contents of the initial mixing and the remainder of the cab-o-sil® and microcrystalline cellulose are then added to a small Paterson Kelly blender where they are blended for 15 to 20 minutes depending on what odor is being produced. After the mix is blended in the small blender, it is transferred to the larger Paterson Kelly blender, using a 5-gallon bucket. Additional cab-o-sil® and microcrystalline cellulose are added to bring the mix to the final weight. The mix is again blended for 15 to 20 minutes and then transferred to a 55-gallon trash can. The trash can is lined with a bag that is used to seal the trash can to the bottom of the blender during the transfer. After the preparation is completed, the pseudo drug is transferred and weighed into smaller bags for shipment throughout the country.

In addition to the preparation of pseudo drugs at the CETC, bales of marijuana are chopped for use in training aids. The marijuana is chopped using a gasoline-powered yard chipper/shredder. The chopped marijuana is transferred and weighed into smaller bags for shipment to the different ports throughout the country. The process is normally conducted outside; however when it is cool outside the process is conducted inside an enclosed building. The chopping of marijuana bales was not observed by NIOSH; discussion and recommendations are based on descriptions from management and employees.

METHODS

This evaluation assessed exposure to acetic acid, benzaldehyde, methyl benzoate, piperonal, silica, and total particulates in the pseudo building during the preparation of pseudo ecstacy, heroin, methamphetamine, and cocaine. Air samples were only collected on the specific days the chemicals were used; however, this report does not distinguish between the days chemicals were used to protect the proprietary mixture of the individual pseudo drugs.

Acetic Acid

Two PBZ air and four GA air samples were collected for acetic acid analysis. Acetic acid air samples were collected on silica gel sorbent tubes at a calibrated flow rate of 100 cubic centimeters per minute (cc/min). The sorbent tubes were analyzed using a NIOSH draft method for acetic acid. Silica gel tubes were desorbed with water and then analyzed by high performance liquid chromatography (HPLC) with a Supelco Discovery HS C-18 column and a gradient mobile phase of acetonitrile and water. The limit of detection (LOD) and limit of quantification (LOQ) for acetic acid air samples is 0.002 and 0.008 microgram per sample (µg/sample), respectively. The corresponding minimum detectible concentration (MDC) and minimum quantifiable concentration (MQC) for this method are 0.0001 and 0.0004 parts per million (ppm), respectively, based on a sample volume of 6.1 liters.

Benzaldehyde and Piperonal

Three GA air samples for benzaldehyde analysis and three GA air samples for piperonal analysis were collected during the preparation of pseudo drugs. Side-by-side sample collection was performed with XAD-7 sorbent tubes and stainless steel thermal desorption tubes in two configurations, 3-bed and Tenax. No validated method exists for these two compounds; therefore, results should be considered estimates. XAD-7 sorbent tubes were desorbed with methylene chloride and then analyzed by a thermal desorber interfaced directly to a gas chromotograph and mass-selective detector (TD-GC-MSD) with a 15-meter RTX-5Amine fused silica capillary column.

The 3-bed thermal desporption tubes contained the following sorbent materials: the first section contains Carbopack Y™, the second section contains Carbopack B™, and the last section contains Carboxen 1003™. The Tenax thermal desportion tubes contained only one bed of sorbent, Tenax TA. Prior to sampling, the thermal desporption tubes were conditioned by heating at 320°C-375°C for 1.5 hours. Samples were collected at a calibrated flow rate of 50 cc/min. The 3-bed thermal desorption tubes were then dry purged with helium for 30 minutes at 100 cc/min prior to analysis. Tenax-TA tubes were analyzed without any prior drying. The samples were desorbed in a Perkin-Elmer ATD 400 automatic thermal desorption system at 300°C for 10 minutes. A 30 meter DB-1 fused silica capillary column was used for analyses. Stock solutions in methanol, containing known amounts of benzaldehyde and piperonal, were used to prepare standards to estimate concentrations. All standard spikes were prepared on Tenax-TA tubes. The LOD and LOQ for benzaldehyde air samples are 0.021 and 0.070 µg/sample. The LOD and LOQ for piperonal air samples are 0.029 and 0.097 µg/sample. The LOD for benzaldehyde and piperonal was based on the lowest prepared spiked standard. The corresponding MDC and MQC for benzaldehyde for this method are 0.00078 and 0.0025 ppm, respectively, based on a sample volume of 6.1 liters. The corresponding MDC and MQC for the piperonal method are 0.00078 and 0.0026 ppm, respectively, based on a 6.1 liter sample.

Methyl Benzoate

Four GA air samples were collected for methyl benzoate analysis during the preparation of pseudo drugs. Sampling was conducted with stainless steel thermal desoprtion tubes containing the following sorbent materials: Carbopack Y™, Carbopack B™, and Carboxen

1003™. Prior to sampling, the thermal desoprtion tubes were conditioned by heating at 375°C for 2 hours. Samples were collected at a calibrated flow rate of 50 cc/min. The thermal desorption tubes were dry purged with helium for 30 minutes at 100 cc/min prior to analysis. The samples were then desorbed in a Perkin-Elmer ATD 400 automatic thermal desorption system at 300°C for 10 minutes. A 30-meter DB-1 fused silica capillary column was used for analyses. Stock solutions in methanol, containing known amounts of various solvents identified on the thermal desorption tubes, were used to prepare standards to estimate concentrations. The LOD and LOQ for methyl benzoate are 0.02 and 0.06 µg/sample. The corresponding MDC and MQC for this method are 0.0005 and 0.002 ppm, respectively, based on a sample volume of 6.1 liters. Results should be considered estimates since a validated method was not used.

Total Particulate

Seven PBZ and nine GA air samples were collected for total particulate analysis during the preparation of pseudo drugs. Air samples were collected on tared 37-millimeter (mm) diameter, (5-micrometer [µm] pore-size) polyvinyl chloride (PVC) filters at a calibrated flow rate of 2 liters per minute (Lpm). The filters were gravimetrically analyzed (filter weight) according to NIOSH Method 0500.[1] The LOD for total particulate air samples was 0.02 milligram per sample (mg/sample). The MDC for this method is 0.03 milligram per cubic meter (mg/m^3), based on a sample volume of 692 liters.

Silica

A bulk sample of the pseudo drugs, containing the cab-o-sil,® was analyzed for quartz and cristobalite content. The sample was analyzed for silica according to NIOSH Method 7500[1], modified for the analysis of bulk material. The sample was quantitated against a 30 µm silica standard. The LOD and LOQ for quartz bulk samples are 0.8% and 2%, respectively. The LOD and LOQ for cristobalite bulk samples are 1% and 2%, respectively.

EVALUATION CRITERIA

As a guide to the evaluation of the hazards posed by workplace exposures, NIOSH field staff employ environmental evaluation criteria for the assessment of a number of chemical and physical agents. These criteria are intended to suggest levels of exposure to which most workers may be exposed up to 10 hours per day, 40 hours per week for a working lifetime without experiencing adverse health effects. It is, however, important to note that not all workers will be protected from adverse health effects even though their exposures are maintained below these levels. A small percentage may experience adverse health effects because of individual susceptibility, a pre-existing medical condition, and/or a hypersensitivity (allergy). In addition, some hazardous substances may act in combination with other workplace exposures, the general environment, or with medications or personal habits of the worker to produce health effects even if the occupational exposures are controlled at the level set by the criterion. These combined effects are often not considered in the evaluation criteria. Also, some substances are absorbed by direct contact with the skin and mucous membranes, and thus potentially increases the overall exposure. Finally, evaluation criteria may change over the years as new information on the toxic effects of an agent become available.

The primary sources of environmental evaluation criteria for the workplace are: (1) NIOSH Recommended Exposure Limits (RELs),[2] (2) the American Conference of Governmental Industrial Hygienists' (ACGIH®) Threshold Limit Values (TLVs®),[3] and (3) the U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PELs).[4] Employers are encouraged to follow the OSHA limits, the NIOSH RELs, the ACGIH TLVs, or whichever are the more protective criteria.

OSHA requires an employer to furnish employees a place of employment that is free from recognized hazards that are causing or are

likely to cause death or serious physical harm [Occupational Safety and Health Act of 1970, Public Law 91–596, sec. 5(a)(1)]. Thus, employers should understand that not all hazardous chemicals have specific OSHA exposure limits such as PELs and short-term exposure limits (STELs). An employer is still required by OSHA to protect their employees from hazards, even in the absence of a specific OSHA PEL.

A time-weighted average (TWA) exposure refers to the average airborne concentration of a substance during a normal 8- to 10-hour workday. Some substances have recommended STEL or ceiling values which are intended to supplement the TWA where there are recognized toxic effects from higher exposures over the short term.

Acetic Acid

Inhalation of acetic acid can cause irritation of the nose and throat. Higher concentrations can cause inflammation of the airways and accumulation of fluid in the lungs. Acetic acid vapors and liquid can cause eye irritation. Concentrated solutions can cause severe burns and permanent eye damage. Acetic acid is also a strong irritant to the skin. Acetic acid is a normal body component and does not accumulate in the body. It is rapidly transformed and excreted, or used in the production of chemicals required for bodily functions.[5]

The NIOSH REL, OSHA PEL, and ACGIH TLV for acetic acid are 10 ppm. NIOSH and ACGIH have also established a short-term exposure limit (STEL) of 15 ppm.[2,3]

Benzaldehyde

Occupational exposure to benzaldehyde can occur through dermal contact and inhalation. Inhalation of benzaldehyde can cause irritation of the eyes, nose, and throat. A concentration of 20 mg/m^3 was found irritating to the eyes and respiratory tract in a study of human volunteers.[6] Acute toxicity of benzaldehyde administered orally varied by animal species; oral lethal dose of 50% (LD50) for rats and mice was 1300 milligrams per kilogram (mg/kg) and 27.8 mg/kg respectively.[6,7] Toxicological data indicate that adverse acute and chronic effects occur only at fairly high dosages and overall toxicity is moderate. The American Industrial Hygiene Association (AIHA) Workplace Environmental Exposure Level (WEEL) for benzaldehyde is 2 ppm. [6] In addition to the WEEL, AIHA has established a STEL of 4 ppm.

Methyl Benzoate and Piperonal

Methyl benzoate and piperonal are widely used as flavoring and odorant agents. No information is available on occupational exposure.

Total Particulates

Microcrystalline cellulose and cab-o-sil® are considered “nuisance” dust by OSHA and are classified as particulates not otherwise regulated (PNOR). OSHA has established a PEL for PNOR (total dust) of 15 mg/m^3. ACGIH has established a TLV of 10 mg/m^3 for cellulose. Both criteria were established to minimize mechanical irritation of the eyes and nasal passages and to prevent visual interference. NIOSH has not established an REL for PNOR or cellulose.

RESULTS

PBZ and GA air sampling was conducted on November 12 – 14, 2003, and March 1 and 4, 2004, for acetic acid, benzaldehyde, methyl benzoate, piperonal, and total particulates. In addition to the air samples, a bulk sample was collected on November 14, 2003 for silica analysis. Piperonal and silica were not detected (ND [less than the MDC]).

Acetic Acid

Two PBZ air samples for acetic acid were collected on workers in the mix room, where the acetic acid is used. The two PBZ air concentrations were 2.4 and 11 ppm. The higher sample was collected on the worker who measured the acetic acid. This worker’s

exposure to acetic acid is over the OSHA PEL of 10 ppm.

Four GA air samples for acetic acid were collected throughout the pseudo drug building. GA air concentrations for acetic acid ranged from ND (less then 0.0001 ppm) to 7.3 ppm. Three of the four GA air samples were collected in the mix room. These samples ranged from 1.1 to 7.3 ppm with an average of 3.6 ppm. The remaining GA air sample, collected in the package room, was ND.

Benzaldehyde

Three GA air samples for benzaldehyde were collected in the mix room. GA air concentrations for benzaldehyde ranged from 0.067 to 0.28 ppm, with an average of 0.16 ppm, well below the WEEL of 2 ppm. Samples were collected on XAD-7, 3-bed, and Tenax thermal desorption tubes, however only the 3-bed thermal desorption tube results are stated in the text. This is based on the lab recommendation because of better recovery on the 3-bed thermal desorption tubes.

Methyl Benzoate

Four GA air samples were collected throughout the pseudo drug building. GA air concentrations for methyl benzoate ranged from 0.0034 to 0.43 ppm, with an average of 0.21 ppm. The highest three concentrations were collected in the mix room.

Total Particulates

Seven PBZ air samples were collected on the two workers in the mix room of the pseudo drug building. PBZ air concentrations ranged from 21 to 110 mg/m^3 with an average of 43 mg/m^3. All of the PBZ air samples exceed the ACGIH TLV of 10 mg/m^3 for cellulose and the OSHA PEL of 15 mg/m^3 for PNOC.

Nine GA air samples were collected throughout the pseudo drug building. GA air concentrations ranged from ND (less than 0.03 mg/m^3) to 13 mg/m^3. Six of the nine GA air samples were collected from the mix room. These samples ranged from 2.9 to 13 mg/m^3 and had an average of 7.1 mg/m^3. The remaining three samples collected in the package room ranged from ND to 0.16 mg/m^3 with an average of 0.048 mg/m^3.

DISCUSSION

PBZ air concentrations for total particulates were much higher than the GA air concentrations. In previous air sampling conducted by Federal Occupational Health, GA air concentrations for total dust were below the PEL.[8] When workers have to lean over and reach into drums, GA air sampling is not representative of the employee's exposures. Exposure sampling is best conducted using PBZ air samples for particulates when employees reach into drums.

During the site visit, workers talked about the installation of a fan in a window and an opening in the bottom of the exit door to increase cross ventilation in the room. A vertical air shower should be used instead, because cross ventilation can pull the dust into the workers' breathing zone. A vertical air shower would push airborne dust out of the worker's breathing zone, until the dust is captured and exhausted from the work area (see Figure 1).[9] Without the air shower, eddy currents can form around the worker and stir up dust.

The drums containing bulk microcrystalline cellulose and the drums used to transfer product in the mix room have a height of approximately 34 inches. When manually transferring powder from these drums, workers must lean forward and place their heads inside the drum to scoop out the powder near the bottom. In this position, the worker is exposed to a high level of airborne dust, even under a ventilated booth. Maintaining a space between the worker's face and the top of the drum enables the booth ventilation to capture the dust before it reaches the worker's breathing zone.

During the preparation of all pseudo drugs, workers used disposable filtering face pieces. CETC's respiratory protection program covers the pseudo drug process and requires either

disposable filtering face pieces or half-face respirators with acid gas/N95 combination cartridges. During the preparation process, workers were wearing the filtering face pieces upside down. This provided no respiratory protection against the high levels of airborne dust.

While not observed by the NIOSH industrial hygienist, workers and management expressed concern about the chopping of marijuana bales. Concerns included potential carbon monoxide (CO) and dust exposures associated with the gasoline-powered chopper and moldy marijuana bales. Management reported that two workers became ill and were transported to the hospital for CO exposure the last time bales were chopped. The chopping was conducted with a gasoline-powered yard chipper/shredder inside a closed garage because of the cool temperature outside. All gasoline-powered engines produce CO. The use of gasoline engines inside buildings has caused many cases of CO poisonings and fatalities.[10] Gasoline-powered choppers produce hazardous levels of CO when used in doors, even for short periods of time.

In addition to the potential CO exposure, workers were concerned about potential exposure to dust from the chopping of marijuana bales. In agriculture, low quality hay or straw bales used for dairy cow bedding commonly contain high levels of microorganisms such as bacteria or fungi.[11,12,13] Bales of marijuana have the potential to contain the same high levels of microorganisms if mold is present. Workers may be exposed to airborne microorganisms from the dust generated when the bales are chopped. One worker reported the presence of a moldy bale while chopping the last time. Mold indicates severe contamination by microorganisms. Visibly moldy bales of marijuana pose the greatest exposure risk.

CONCLUSIONS AND RECOMMENDATIONS

Air monitoring performed during the preparation of pseudo drugs revealed worker exposure above the TLV for cellulose, PEL for total particulates, and the REL and PEL for acetic acid. While not observed by the NIOSH industrial hygienist, the chopping of marijuana bales has the potential for CO and dust exposures. The following recommendations should reduce employee exposure during the preparation of pseudo drugs and chopping of marijuana bales.

1. Use a semi downdraft ventilation booth to control dust exposure. All tasks associated with the manual transfer of powdered ingredients (weighing, scooping, etc.) should be performed inside the booth under the air shower. Figure 1 shows how the semi downdraft booth should be configured.

2. Limit bulk and transfer drum height to 25 inches. Use shorter drums to eliminate the need for workers to place their heads inside the drum. Maintaining a space between the worker's face and the top of the drum enables the booth ventilation to capture the dust before it reaches the worker's breathing zone.

3. Re-evaluate the written respiratory program based on OSHA's Respiratory Protection Standard (29 CFR 1910.134). The program should outline the appropriate respirator based on the hazard, change-out schedules, and employee training on how to wear a respirator and store it safely.

4. Use engineering controls, as mentioned in recommendation #1; such controls are the preferred method to protect workers from exposure. Until controls are implemented, workers in the pseudo mix room should wear a powered air-purifying respirator (PAPR) equipped with a hood or helmet (protection factor equal to or greater than 25) and N95 cartridges during the preparation of all pseudo drugs. During the preparation of pseudo drugs that require acetic acid, PAPR equipped with a hood or helmet and acid gas/N95 combination cartridges should be used in the pseudo

mix room. Because of the infrequent use, cartridges should be replaced at the end of each shift.

5. Instruct workers to use slow, smooth movements when handling powder to keep airborne dust concentrations low. Keep to a minimum both the powder transport distances between bulk/transfer drums and process containers and the height from which the powder is dropped into containers.

6. Substitute visibly moldy bales of marijuana with less contaminated marijuana bales before chopping. In addition, workers should wear at a respirator with the minimum protection equal to that of a half-face respirator (protection factor equal to or greater than 10) with N95 cartridges during the chopping process.

7. Use gasoline engines outside; NOT inside buildings or in partially enclosed areas. Use CO monitors to ensure that CO levels do not exceed an 8-hour TWA of 35 ppm or a 5-minute ceiling of 200 ppm in the area where gasoline engines are used. In addition, train employees to recognize symptoms of CO poisoning.

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Figure 1
U.S. Customs and Border Protection
Canine Enforcement Training Center
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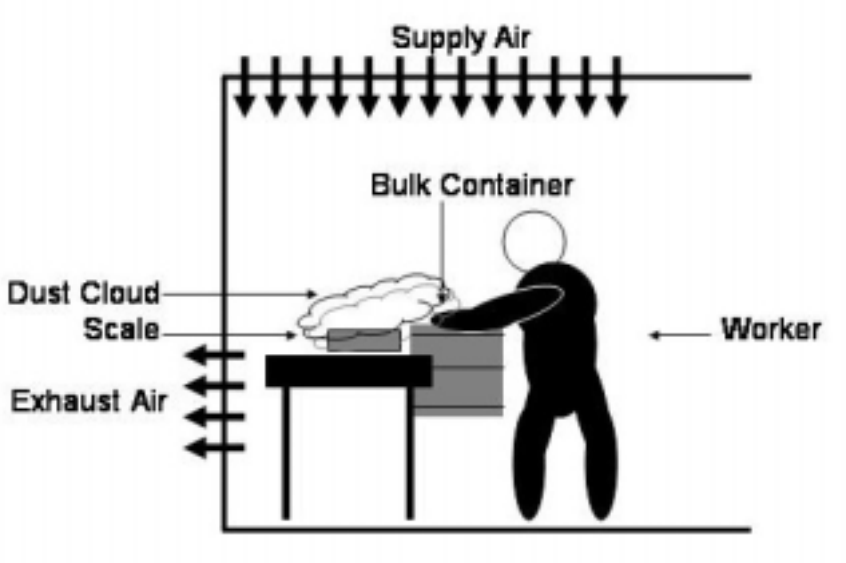
Semi Downdraft Ventilation Booth



Filtered air enters from the ceiling of the booth, collects dust as it flows past the worker, and exhausts out the back of the booth through grates (side view).

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