

Spray Paint and Paint Booth Operations

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SPRAY PAINT AND PAINT BOOTH OPERATIONS

A SAFETY SUPPORT KIT

PROTECT YOURSELF FROM SPRAY PAINTING HAZARDS

PROTECTIVE EQUIPMENT ONLY WORKS WHEN WORN

Industrial Safety Fact Sheet

SUBJECT: Accident Prevention in Spray Paint Booth Operations

1. The National Safety Council estimates that the value of goods and services each worker must produce to offset the cost of work injuries is \$350. Work injuries in the United States cost more than \$37.3 billion in 1985. More than 13 percent of all accidents or 9 million injuries occurred in industrial places according to the National Health Review Survey.
2. Injuries, death, and disability are results of accidents. Costs combined with worker pain, disability, and loss of life emphasize the importance of accident prevention in spray paint booth operations and in all industrial maintenance operations.
3. Accidents from the storage, handling, and application of paint products are numerous and can occur at any level from organizational through IMDS/IMGS, and depot-level maintenance operations. Most accidents result from overexposure; for example, failure to use properly maintained protective equipment, and lack of knowledge involving proper storage, handling, and characteristics of various paints and solvent components used in the workplace.
4. Use of protective equipment, familiarity with hazardous materials safety data sheets on each chemical, following manufacturer's instructions, compliance with safety and OSHA requirements, teamwork, and individual awareness are necessary for effective controls of hazardous conditions to prevent disabling injuries and death.
5. Good judgment and proper supervision of subordinates are instrumental in accident prevention. Incidents of skin irritation, inhalation of hazardous vapors from solvents and paints, chemical reactions from improper mixing, solvent decomposition, paint solvent fires, blindness, and so forth, can be avoided by becoming aware of the hazard, controlling the hazard, minimizing exposure to the hazard, using protective equipment, analyzing job processes for safety features, and by simply following the rules. No one can prevent accidents like you can.

TAILGATE SESSIONS
FOR PERSONNEL PERFORMING SPRAY PAINT OPERATIONS

Tailgate Sessions

Short Safety Briefings for Spray Paint and Paint

Booth Operations Personnel

What is a tailgate session? Tailgate sessions got their name from employees sitting on the tailgate of a truck while receiving a short safety briefing for an upcoming job.

The use of this type training for maintenance personnel has obvious advantages:

- . It shows safe performance is one of the work standards.
- . It allows sharing of safety information about upcoming jobs.
- . It can be done with minimal planning during nonpeak work hours.
- . It shows supervisory support of safe activities.
- . It can be keyed to specific individuals or work groups without requiring entire unit participation.
- . It lends authenticity to the safety program by keying on the job at hand and therefore avoids generalization.
- . It raises safety awareness level of personnel.

Implementation

- . Identify topics that are pertinent to the unit's maintenance activities (see list of additional tailgate topics for recommendations).
- . Develop hip-pocket tailgate sessions on selected topics.
- . Distribute tailgate sessions to supervisors and discuss when and where they are to be used (sessions are included in this kit).
- . Have individuals from the command group or element occasionally conduct tailgate sessions to reiterate and reinforce their concern for safety.
- . Continually revise and update the tailgate sessions to ensure applicability.

TAILGATE SESSIONS
FOR PERSONNEL PERFORMING SPRAY PAINT OPERATIONS

A SAFETY SUPPORT KIT

SPRAY PAINTING HAZARDS

The most common health hazards involved with overexposure to paint and solvents are respiratory tract irritation, nervous system depression, headache, dizziness, unconsciousness, coma, and allergic sensitivity. Chronic exposure may result in asthma-like respiratory disease with symptoms of overexposure often delayed.

Paint application and spray booth operations have numerous hazards. The most common causes of injury are fume inhalation, skin exposure, fire, improper ventilation, and other unsafe practices. Thinners used with paints may have harmful effects. Continued breathing of fumes during and after painting operations should be avoided. Toxic fumes will persist (in some cases, for many days) indoors after painting operations. Avoid inhaling solvent vapors. Avoid skin contact with paint materials, particularly if there are cuts or open wounds on the hands. Solvents and thinners should not be used to remove paint on your hands. Unwashed hands may convey paints to food which is eaten. Many painting materials contain lead sulfide, lead carbonate, chromium compounds, and other poisonous materials. Lead chromate is particularly dangerous, and may enter the body system during eating if transferred to the food. Many of the thinners are also poisonous and can enter the body through the skin, through inhalation, or through ingestion. Preparations containing benzene should not be used for spraying.

The mist that comes from a spray gun is highly flammable. A spark will cause it to flash. Smoking is prohibited in paint shops. Open cans containing paint removers, thinners, and paints are a fire hazard. Empty drums or other containers in which solvents, thinners, and similar materials have been shipped are potential hazards since they often contain enough vaporized material of a flammable nature to cause explosions. Accumulated spray in booths and in cracks and corners of the paint shop is particularly dangerous because it is conducive to spontaneous combustion. Oil- or solvent-soaked cloths, if not promptly disposed of, may cause fire by spontaneous combustion. Fires that occur in spray booths result from six principal causes: broken electric lamps and other electrical defects; cleaning interior of booths, fans, and motors with highly flammable solvents; accumulations of deposits in the booths, tubes, and vent pipes; defective fans and motors used for ventilating the booths; poorly designed vent tubes; or static electricity. Electrical mercury switches and vapor-proof lighting fixtures with protective screens should be installed to reduce electrical spark hazard. If it is at all practical, painting of material should be accomplished in the paint booths or paint rooms. Adequate forced draft ventilation for indoor work should be provided to carry off fumes. Respirators should be worn during all spray painting operations. All personnel who work in or near a spray painting booth must wear a respirator when spray painting operations are underway. If the booth is working properly, personnel outside the booth do not require respirators. Respirator usage is based on atmospheric concentrations of vapors.

Paints should be stored in a steel cabinet preferably in a small building away from work buildings. Once opened, cans containing paint removers, thinners, paints, and paint materials should be covered tightly before being stored or put

away overnight. Do not apply heat or flame to drums, cans, or other containers that have contained solvents, thinners, or other paint materials. Observe safe operating procedures at all times, particularly when handling cleaning materials.

Personnel should be familiar with emergency and first aid procedures as outlined in the material safety data sheet. This data sheet includes medical information to follow if the product is inhaled, ingested, or comes in contact with eyes and skin.

CLEANING AND PREPARING SURFACE TO BE PAINTED

Surfaces to be painted must be thoroughly cleaned. All rust, corrosion, oil, grease, moisture, dirt, loose and blistered paint, and other surface contaminants must be removed prior to performing any repainting operations.

The major methods for preparing the surface for repainting and for removing old surfaces are through abrasive sanding, paint stripping, and solvent cleaning methods. Light sandblasting and orbital sanding of old paint must be accomplished carefully. Concerns must be focused upon the possibility that the old coating may contain heavy metals such as zinc chromate and lead. Therefore, sanding and abrading of any coating suspected to contain heavy metals should be accomplished while using an approved toxic dust respirator and eye protection.

Welding and cutting on items painted with any type of paint should not be done until the paint has been abraded to the bare metal, which includes abrading the backside if it has been painted. If you use a torch to burn off old paints, you are putting a lot of the pigment, metals, and binder fumes into the air, which may be harmful.

The primers may vary in chemical content and associated hazards. Always be familiar with the manufacturer's material safety data sheets and wear required protective equipment. One aspect all primers have in common is that they are generally flammable materials. They should be kept away from sources of heat, spark, and open flame. Storage facilities should be proper for paints and flammable materials whether in inside approved storage cabinets or in outside storage cabinets. Only the amount of paint necessary for one day's work should be present in the work area.

TYPES OF SPRAY GUNS/SPRAY EQUIPMENT

The most commonly used painting device is the air spray gun. It is available with many variations to provide a wide range of fluid delivery rates, with special features to accommodate different fluid configuration. The gun comprises a valve to control the flow of fluid, a valve to control the flow of air, and a spray nozzle. A second air-control valve is often provided to regulate the shape of the spray pattern. As well as the normal regulatory requirements, the pressured containers used to supply the gun must have a pressure gage, relief gages, and a shutoff valve at the hose connection.

In high-volume product processing, the airless spray unit is sometimes encountered. This device generates a spray of fluid without the use of compressed air. It consists of a valve to control the flow of the paint and a nozzle that shapes the flow into a stream of high-velocity fluid. Fluid pressures from this sprayer usually range from about 300 psi to 3,000 psi.

Air and airless spray equipment are also used in electrostatic spray operations. For this purpose, the appropriate atomizer is built into a spray gun that is provided with a high-voltage electrical output. Voltages applied to the gun range from about 35,000 to somewhat over 100,000 volts in most equipment. Current drawn from the device is near zero, and this is why the equipment is called electrostatic. There is less overspray with this method because the paint particles are charged and are attracted to the grounded conductive workpiece. Another common electrostatic atomizer used when painting production equipment on conveyers is the electrostatic disc or bell. All spray guns, as well as equipment and workpieces being painted, are required to be grounded. Transformers and other electrical portions supplying power to the gun will be outside of the spraying area.

TYPES OF SPRAY BOOTHS

A "spray booth" has been defined in NFPA 70 (National Electric Code) as a "power-ventilated structure provided to enclose or accommodate a spraying operation, to confine and limit the escape of spray, vapor, and residue, and to safely conduct or direct them to an exhaust system." Within this definition, a wide variety of configurations have been developed in both general-purpose form and in forms to suit the special requirements of individual processes. While in most cases the booth structure does physically surround the spray operation, some types leave the spray operation unenclosed and accommodate its requirements by surrounding the operation with a controlled stream of air that is being drawn into the booth. Based on the requirements of OSHA and other regulatory requirements, any large-scale painting operation (other than touch-up) must be accomplished in a spray booth.

The most common general-purpose paint spray booth is the open-face or open-front arrangement. It is a box-like structure that stands on the floor and has one open side to provide access for the operator. The width of the booth may range from 3 feet to 30 feet. Height and depth of the booth may also vary depending upon the size and type of equipment being painted. If the painting process requires the use of conveyers, there will also be openings for entry and exit of the workpieces. Interior lighting may be provided through explosion-proof fixtures inside the booth or by using external lighting and directing the light through wired glass panels in the booth.

Paint spray booths can be classified into two basic designs based upon the direction of airflow. Side-draft booths have a horizontal airflow. These booths take advantage of the momentum of the spray mist and can be used when painting small to medium articles. Downdraft booths have vertical airflow. These booths provide greater protection while allowing more freedom of movement for the painter.

SPRAY BOOTH CONSTRUCTION

According to the Occupational Safety and Health Standards contained in 29 CFR 1910.107, paint spray booths must meet certain construction standards. The booths must be substantially constructed of securely supported steel or concrete or masonry for high-volume operations. Aluminum or other substantial noncombustible material may be used for intermittent or low-volume operations. All spray booths must be designed to sweep air currents toward the exhaust outlet in order to minimize vapor accumulation. Spray booths having a frontal area of more than 9 square feet must have a metal deflector or curtain not less than 2 1/2-inches deep over the opening. Openings in the booth for conveyer belts will be as small as possible. Additionally, belts and pulleys on conveyers must be guarded.

Space within the spray booth on the downstream and upstream sides of filters will be protected with automatic sprinkler systems to reach all areas of the booth. Filters will not be placed in the booth in an area which impedes the enclosure of the booth.

OSHA also requires that the interior surfaces of spray booths are smooth. Floors should be constructed of noncombustible material or adequately protected and covered if made of combustible material. Solvents used in cleaning should not have flashpoints less than 100 F., and cleaning tools must be made of nonsparking material.

Booths must have a space of at least 3 feet on all sides clear of storage or combustible construction. Unprotected personnel may not enter the paint area until at least 30 minutes after the operation or cleaning has terminated. All personnel working in spray booths must wear respirators.

VENTILATION AND ELECTRICAL REQUIREMENTS

OSHA places various requirements on ventilation and electrical aspects of paint spray booth operations. All flame- and heat-producing appliances should be kept away from spray booths. There should be no electrical equipment, to include portable lamps, in the spraying area unless it is specifically approved for this location and grounded. All wiring should be in rigid conduit with no taps, splices, or terminal connections. All fixtures and motors should be explosion-proof. Motors for exhaust fans should never be inside the booth or ducts. All metal parts of spray booths, exhaust ducts, and piping systems containing combustible liquids must be grounded. Lighting and electrical fixtures within 20 feet of any spray area will be static-protected.

All spraying areas are required to have mechanical ventilation adequate to remove flammable vapors and mists to a safe location and to confine combustible residues so that the lives of other workers are not endangered. Mechanical ventilation is required to be in operation at all times whenever painting is performed and for a sufficient time thereafter to dissipate vapors. Each booth is to have an independent exhaust system that vents outside of the building. When several booths (when combined frontal area is less than 18 square feet) share a common exhaust, it should be connected so that one fan cannot operate without all of them in operation. Air exhausted from spray operations should never be recirculated. Ventilation systems should be periodically checked to ensure that they are operating correctly and that specified flow rates are being maintained. (Spray booths with overspray collection filters must have visible gages or audible alarms which indicate that the required air velocity is maintained in the booth. These should be checked periodically to ensure adequate airflow is being drawn through the booth.)

Operators should always be near respirators and protective equipment whenever performing spraying operations. Since human beings are also conductors of electricity, gripping the spray gun with a bare hand or wearing electrically conductive shoes, provided the floor is grounded, are two methods for grounding the operator. To avoid this situation, operators should always wear rubber-soled shoes, nonstatic clothing, and avoid actions that lead to grounding of the operator or static electricity.

Electrostatic spray systems should be equipped with electrical interlocks to deenergize the electrostatic power supply any time the spray guns are not actually in use.

PROTECTIVE EQUIPMENT AND RESPIRATORY PROTECTION

Clothing used when performing spray painting operations should provide full skin coverage to prevent unnecessary skin exposure to irritating chemical components of the paint. When handling thinners, paints, solvents, etc., or while using respirators not equipped with eye protection, safety eye wear with side shields and splash guards should be used.

OSHA regulations for respirator use may be found in 29 CFR 1910.134. Typically, an approved chemical/mechanical filtered respirator designed to remove a combination of particulates and vapor is required when spray painting and an approved supplied-air, pressure demand or continuous flow, type C respirator or hood for confined areas. Outdoor use normally requires use of an approved respirator for paint, enamel mists, and organic vapors. TB Med 502 covers the maintenance and care of all types of respirators. A respirator will not function indefinitely without cleaning and upkeep for continued protection. Filters should be replaced when breathing becomes difficult while wearing the respirator. Replace the charcoal filter when the odor of solvents is present.

An important means of self-protection is the practice of personal hygiene. Contaminated clothing should be removed and washed prior to reuse. Workers performing painting operations or handling materials used in these processes should always wash hands before eating, smoking, or using the washroom. Solvents or thinners should never be used to remove paint or primer from the skin. Never eat in the work area where food can become contaminated, and smoke in designated areas only.

REMEMBER: ACCIDENTS ALWAYS HAPPEN TO THE "OTHER GUY." TO EVERYONE ELSE, YOU ARE THE OTHER GUY. NO ONE CAN PREVENT ACCIDENTS LIKE YOU CAN.

List of Additional Tailgate Topics

Inspection of Lifting Devices IAW TB 43-0142

Submitting DA Form 2028 on TM

Submitting QDR/EIR On Equipment and Tools

Unit SOP Requirements (DA Pam 750-35)

First Aid

Necessity for Inspection of Components

Fire Prevention

When and When Not To Improvise

Using TMs--How to Get, Use, Change (DA Pam 25-30)

Ground Guides In and Around Motor Pool, Track Park, and Maintenance Shop

Prejob Checks

After-Job Checklists

How to Inspect Tools

Protective Equipment

Material Hazards

**SPRAY PAINTING
HAZARDOUS MATERIALS
SAFETY BRIEFINGS FOR USE
BY THE SUPERVISOR**

PR-4010 PAINT REMOVER
MIL-R-81903

Like most paint removers, PR-4010 is a mixture of methylene chloride and some other chemicals which give it special characteristics. The main additives in this compound are formic acid and acetic acid. Together, they give the thick red syrup its pungent odor. They also present a moderate health hazard to unprotected workers.

Contact with the skin or eyes is painful and will cause damage in a short time. Breathing too much of the vapor will make you sick to your stomach and bring on a drunk-like confusion. If you were in an enclosed area with a strong accumulation of vapors, unconsciousness and even suffocation might result. Methylene chloride, the major component of the remover, is known to put a strain on the heart if it's breathed in excessive amounts.

You don't need elaborate equipment to protect you from injury, but you must use the equipment you're given. If the ventilation system can't keep the air contamination down, you'll need to be fitted with a respirator. In any circumstances, wear rubber or plastic gloves and splash-proof eye protection. If the job requires a lot of remover, or causes drips and spills, you might need a rubber apron.

The most important first aid step is to remove yourself or another victim from contact with the paint stripper. In case of overexposure to the vapor, get to fresh air. An unconscious person might need artificial respiration. In the event of skin or eye contact, remove saturated clothing and apply lots of clean water to the injured area. Continue washing for at least 15 minutes or until medical help arrives. They won't arrive unless someone calls them, so make sure someone calls them and calmly explain to them what happened and where.

The paint remover itself isn't a flammable material but it will give off very poisonous smoke if it's involved in a fire. Exposing the vapor to hot surfaces or an electric arc can also generate a deadly poison. Store the liquid in a cool location, away from direct sunlight. Since pressure can build up in a drum, vent the opening slowly. If a small leak occurs, clean it up immediately. A large spill will allow a lot of the liquid to vaporize so get unprotected personnel away from the area. Only people with the proper protective gear should try to contain a large spill. Call the engineer's spill control people immediately for cleanup or disposal.

117B PRETREATMENT PRIMER

Several manufacturers produce a 2-part primer, also called wash primer, under this stock number. There is some variation in the formulas but they all meet MIL SPEC P-15328. The thin blue liquid has an alcohol odor. In fact, a mixture of alcohol is the largest part of the A and B components. The alcohol and other chemicals produce serious health and fire hazards.

Short-term health effects include skin irritation, caused by the alcohol and the phosphoric acid content of part B. Your eyes are particularly sensitive to damage, especially from the part B mixture. A level of vapor that seems irritating will also begin to have some intoxicating effects, much like drunkenness. If you remain in an area contaminated with the alcohol vapors, unconsciousness will follow the dizziness and drowsiness. One major component, zinc chromate, is suspected to cause cancer in humans. Only an extremely small amount of the chromate is allowed in workplace air. Fortunately, the zinc chromate pigment doesn't readily become airborne. Some mechanical action, like spraying the liquid or sanding the dried coating, will make a mist or dust of the hazardous metal allowing it to be inhaled or ingested.

The best way to control the solvent vapors and the pigment is to keep a strong flow of air through the work site. It should carry the material away from you and lower the amount of contaminants in the breathing zone. When the job makes good ventilation impossible, you must protect yourself with a proper respirator. Goggles and gloves will prevent the irritating effects of surface contact.

Anyone feeling dizzy or sick from breathing the vapors must go immediately to fresh air. If the feeling doesn't pass in a minute or so, call for medical aid. In either case, let me (supervisor) know about it so I can find out where the problem is coming from. If you get splashed by the liquid, wash the affected area in the safety shower or eyewash fountain. The acid in the part B activator will cause a more serious burn than the part A solvents. Call the doctor any time your eyes are injured.

Because of the alcohol content, the prewash is extremely flammable. It must be kept from sparks and flames, including the static sparks that are generated by pouring from one container to another. Bonding and grounding of all containers are required when pouring from one to another. Store the containers in a cool location, with their covers tightly closed. If a fire breaks out, use only dry chemical or carbon dioxide extinguishers. Remember that a hand-held extinguisher has a very limited capacity, so don't play around with a fire. It's better, in most cases, to get everybody out and call the firefighters. It's alright to knock down a really small flare-up, but don't let yourself get caught or overcome by smoke.

The mixes come in containers to make either 1 gallon or 5 gallons when combined, so big spills are not usually a problem. The chances of fire go up when a couple of gallons get loose, so be careful to shut down spark sources and evacuate anyone who isn't needed for the cleanup. If you think you might need help, call the engineer's spill control experts.

TOLUENE

We use large amounts of toluene as solvents, explosive mixes, and so forth. The material, also identified as toluol, presents a fire hazard and moderate threats to health if it is not handled properly.

The clear liquid smells a lot like gasoline and should be handled like gasoline even though it is not quite as flammable. A small fire involving toluene can be extinguished with a dry chemical or carbon dioxide extinguisher. Like other liquid fuel fires, it only spreads if hit with water. The fire department knows how to deal with such situations, so leave the heroics to them. If we're careful, we won't have to put out any fires. We can prevent them by eliminating any sparks or heat sources and storing toluene containers away from oxidizing materials. Even empty containers will retain explosive mixtures of vapor and air. They must be treated with the same respect we give any explosive. Because the vapors are much heavier than air, they will flow from job process or an unsecured can. The presence of a flame or other ignition source anywhere the vapors might reach can cause a flashback.

In normal operations, controls keep the level of airborne vapors below the percentage that will cause a fire or a health hazard. Accidental spills, however, allow dangerous vapors to collect. Clean up small spills quickly, observing the requirements of the SOP. If you can't get it under control in a few minutes, call the spill assistance personnel at the Engineers.

Whenever possible, good workplace ventilation removes toluene vapors from the air, making respiratory protection unnecessary. In exceptional cases, you will be issued the proper respirator for the concentration that is present. Breathing excessive levels of toluene vapors can cause nausea and grogginess or unconsciousness. Swallowing the liquid will have the same results, with added damage to your digestive system. Prolonged contact with the skin can cause irritation and cracking. The effect on the eyes is naturally more severe. Wearing splash-proof goggles and synthetic rubber gloves reduces the hazard. In unusual situations, where you might face strong concentrations of vapor, you should get to fresh air before headaches and confusion start. In case of accidental splash, wash the eyes with large amounts of water until the medical team arrives. The health clinic must also be notified in case someone drinks the liquid. Tell them what was consumed and follow their instructions.

VM&P NAPHTHA (100%)

VM&P Naphtha, also called mineral spirits, is used as a thinner or vehicle in many paints, varnishes, and other coatings. (That's the VM&P--varnish maker's and painter's.) The clear, pleasant smelling liquid is toxic, but only moderately so. It also is a serious fire hazard. Naphtha is a major component of our (insert the material being used containing Naphtha), and we also use it in a pure form as a thinner.

Drinking the thinner is the short route to severe damage of the digestive system and other internal organs. Breathing it in heavy doses can bring on an intoxicating effect as well as headaches, upset stomach, and a burning sensation in the breathing tract. It can also cause unconsciousness which may go to a coma. Long contact with the skin causes dryness and irritation.

Using protective equipment will prevent these problems. Safety glasses or splash goggles are required, depending on the likelihood of a serious splash. There's usually no need for a lot of skin contact. But if you have to handle the liquid, use rubber gloves. Spray painting and even extensive brush painting will release a lot of vapors to the air. Some finishes contain solvents and pigments that are a lot worse than naphtha, so a respirator is needed for most big jobs. Make sure that the one you use is good for organic vapors and is not just a filter to take out heavy mist.

Anyone who shows a drunken or groggy reaction to breathing the solvent will need medical attention. Get them to fresh air and keep them warm and quiet until help arrives. Washing well will prevent serious trouble from skin contact with the material. In case of eye contact, the washing should go on until medical specialists take over the first aid.

Naphtha is very flammable so it must be used and stored away from sources of ignition. That includes both flames and electric sparks. Acids and oxidizers of any sort increase the fire and explosion threat. The smoke from naphtha itself is poisonous but not a special hazard. When you have to use an extinguisher, don't use water. Instead use a dry chemical extinguisher which is appropriate for flammable gases and liquids. The amount of good you can do with a portable extinguisher is very limited, so don't hang around a blaze.

Spills offer a good chance for fire to start, so clean up small amounts quickly. Try to contain large spills with absorbents or barriers until a cleanup crew arrives. The vapors are very heavy and they can create an invisible spill, flowing downhill until they reach a flame. In the same way, "empty" containers can hold an explosive combination of air and naphtha vapor. Keep ignition sources away and don't use empty cans to store other chemicals which might react with traces of the solvent.

METHYLENE CHLORIDE

Methylene chloride is found in a variety of paint removers and other compounds which require a stable solvent. It is sometimes used in a pure form. Our _____ (process) consumes _____ (volume) of it per _____ (time). It is one of the safest of the solvents made by combining carbon and chlorine. Besides the usual health concerns that go with most solvents, this one has a couple of characteristics that require special attention.

It's a clear liquid with a sweet, pleasant odor, so it would be possible to swallow some. That kind of poisoning would be serious but not very likely. Breathing it and splashing it on the skin are more common ways of being injured by methylene chloride. It removes the fats and oils from your skin. That way the solvent causes cracking and splitting which opens dry skin to infection. A short contact with the liquid is not usually harmful unless it gets in your eyes. Even then, the irritation is more painful than damaging. Strong concentrations of the vapors in your breathing air present a more serious threat. The effects of overexposure are much like drunkenness. There is an unusual hazard to watch for. That is the reaction of the heart to high levels of methylene chloride in the blood. Your body changes the chemical, and the result is much like a case of carbon monoxide poisoning. That puts a strain on the heart which shows itself as chest pain. Remember that smokers carry a carbon monoxide load around all the time, and the effects will add up. Good ventilation will usually keep the air in the shop clean enough, but if you have to use the solvent in a tight space, a suitable respirator will be needed. Synthetic rubber gloves and a pair of goggles will prevent any danger of contact.

First aid for excessive respiration of the vapors is to go to fresh air at once and settle down until the medics arrive. If breathing has stopped, perform artificial respiration. Medics should also be called in case of any eye contact with the liquid. Flush the eyes with a good flow of water until help comes.

Under almost any working conditions, methylene chloride is not flammable. It needs a little care in storage. Just keep it away from oxidizers and corrosive materials. Fires which heat containers of methylene chloride can cause them to burst or release toxic gases. Even empty containers will hold enough vapors to explode if exposed to extremely high heat, like a welding torch.

If a small leak occurs, clean it up immediately; in case of a large leak or spill, evacuate all unprotected personnel and ventilate the area. The engineers should be notified immediately so that they can respond with the proper people and equipment. Vapors from spilled material or process leaks will flow into low areas like sumps, pits, and cellars. Anyone entering an area flooded with methylene chloride vapors would be in great danger of suffocation because all breathable air will be displaced.

ACETONE

This mini-lesson concerns acetone, a material used in many of our processes. It is procured in a wide variety of sizes, from pint bottles to bulk shipment. Acetone, as a liquid, is a component of many mixes, and its vapor is present in various locations as a result of drying operations.

While it is one of the least toxic of the common solvents, it is recognized as a moderately dangerous poison. The common way to get an overdose is through breathing an acetone-contaminated atmosphere, but it also has an irritating effect on the skin and eyes. Of course, drinking the stuff will do permanent damage to your internal organs. If you breath enough acetone, it acts like an anesthetic gas, causing dizziness and unconsciousness.

Like every chemical, acetone presents no problem when the correct protective measures are used. We keep the concentration of vapor low through good ventilation. If that doesn't work, you will be issued a respirator that can handle the atmosphere. Rubber or neoprene gloves will prevent skin irritation. Splash-proof goggles or a clear face shield will protect the eyes from carelessly handled liquid. Eyeglasses or chipping goggles will not do the job. If a spill occurs and clothing becomes wet, change out of saturated clothing immediately.

If someone is knocked out by acetone vapors, he is going to need fresh air and medical care immediately. A splash victim should be doused with lots of water, that's why an eyewash fountain and deluge shower are usually needed.

Acetone is about the same fire and explosion hazard as gasoline. Like gasoline, the vapor stays low and will flow downhill to a flame source. Use the same fire extinguisher as on any small flammable liquid fire, but don't stand there with a little CO extinguisher and a big fire. The solvent has to be stored away from oxidizers and ignition sources. Remember that no flammable liquid container can ever be considered empty. Residual vapor is more explosives than the liquid itself.

If you have the right equipment, including a respirator, you can clean up a small spill with absorbent and water, but watch for fire hazards when you do. Call the engineers in case of a big spill, after you get everybody out and shut down heat and spark sources.

XYLENE

Xylene is a clear liquid solvent that we use as a (use for your shop). It comes in (volume for your shop) containers. It shares many of the characteristics of related compounds of hydrogen and carbon. That includes a moderate threat to the health of those who use it carelessly.

The most dangerous way of getting some into you is to swallow it. Fortunately, it's not the sort of thing you would drink by accident. You are more likely to get a harmful dose by breathing a concentration of its vapor. The liquid is very irritating to the eyes and less harmful to the skin. When you have a large quantity of xylene to handle, safety glasses are not enough. You should use splash-proof goggles. Gloves and body protection of synthetic rubber are needed when you come into prolonged contact with the liquid. Forced ventilation is the best way to keep the air quality satisfactory. For short temporary jobs, the use of a respirator is OK. We have different respirators to use, depending on the strength of the vapor.

If a concentrated mixture causes headaches, dizziness, or intoxication, fresh air will usually restore the victim. Medical help should be called. That's also true in case of eye injury. Wash the eyes with a good flow of water for at least 15 minutes. Skin irritation usually is prevented by washing well. Constant skin exposure can cause dryness or cracking and allow infection.

Xylene is flammable, with a sensitivity to ignition somewhere between gasoline and diesel fuel. It must be stored away from any material that will contribute oxygen to a fire or any that will attack the container. When xylene burns it gives off the usual sort of smoke. The gases are poisonous, of course, but not anything out of the ordinary. A small fire fueled by xylene is fought with type B or C extinguishers. Large fires, like large spills, should be left to the experts. Spend your efforts getting everybody out.

PAINF REMOVER
MIL-R-25134B

Under this stock number, we get paint remover in 55-gallon drums. For small jobs, other sizes are available. Most contain a large proportion of methylene chloride. The mixture is about 70-percent methylene chloride, with ethyl alcohol and ammonia additives. There is also a very small amount of sodium chromate in it. The result is a thick yellow liquid that gets a strong odor from the ammonia. Any one of the components by itself could cause a problem. As a result, we have to remember that this paint remover is a moderate threat to health if we don't take the proper precautions.

Breathing its vapor affects your nervous system, a lot like drunkenness. This can eventually lead to unconsciousness or even stop your breathing. The methylene chloride changes your blood chemistry so that it will put a strain on your heart.

Contact with bare skin is irritating and will injure it if you don't remove the stripper quickly. This is particularly true in the event of eye contact. Because it's thick like syrup, the risk of splash isn't as great as it could be. But it's still possible. You can also get it in your eyes, on your hands, or tools.

There is one more major health concern. There is a lot of concern that the kind of chromate in this stripper may cause cancer. Until someone comes up with a definite decision, the only smart thing is to reduce contact with the material and its vapor as much as possible. Inhalation of aerosols of the material will result in exposure to the chromate.

You can avoid contact by using the remover in a spray booth when possible, and wearing your respirator if you have to work in a contaminated atmosphere. A face shield or liquid-proof goggles will protect your eyes, and rubber gloves will minimize skin contact. When you're applying a lot of stripper, get a rubber apron or chemical resistant coveralls.

Someone who shows signs of overexposure to stripper vapors might need to be helped to fresh air. Since a slow exposure can reduce a person's judgment, watch each other for signs of confusion or clumsiness. Skin or eye contact requires a thorough washdown with large amounts of fresh water. Anyone who is affected by the stripper should report it to me and the health clinic. Of course, if someone passes out or has an eye injury, don't delay in calling for an ambulance. An unconscious worker might need rescue breathing assistance until medical help arrives. The paint remover isn't flammable, but if it is burned or heated, it can give off very poisonous gases. Don't use it around a torch or arc welder. Store it in a cool location, out of the sunlight. Large drums that are heated can contain pressure, so wear eye protection and open containers slowly. In case of a large leak or spill, evacuate the immediate area and call for help from the engineers.

Checklist for Spray Painting Operations

1. Are materials safety data sheets available and read by all personnel?
(29 CFR 1910.1200 and TM 43-0139)
2. Are respirators maintained in all operations requiring their use and are personnel trained in proper use? (29 CFR 1910.134(b)(2)(3) and TB Med 502, ch 2-7a)
3. Are all flammable materials kept in approved flammable storage areas?
(29 CFR 1910.106(d)(3-6))
4. Are only approved solvents used in cleaning equipment? (Gasoline and other associated flammables are not authorized) (29 CFR 1910.107(a)(5); TB Med 502, ch 2-8e)
5. Are respirators worn by more than one worker thoroughly cleaned and disinfected after each use? (29 CFR 1910.134(b)(5); TB Med 502, ch 2-8)
6. Are personnel who use respirators given a physical examination to determine if they are physically able to perform the work and use this equipment?
(29 CFR 1910.134(b)(10); TB Med 502, ch 2-10)
7. Is spray painting conducted within buildings where standard spray booths or rooms are constructed and arranged in accordance with NFPA standard No. 33, "Standard for Spray Finishing Using Flammable Materials?"
(29 CFR 1910.94(c)(3)(4)(5))
8. Is a sufficient number of extinguishers suitable for class B fires available at the operation site? (29 CFR 1910.107(f))
9. Are "No Smoking" signs conspicuously posted at all spraying areas and paint storage areas? (29 CFR 1910.107(g)(7); ANSI Z9.3, App A, ch 8)
10. Is the spray booth constructed of steel, concrete, masonry material, or other noncombustible materials used for intermittent or low-volume spraying?
(29 CFR 1910.107(b); ANSI Z9.3, App A, ch 3)
11. Are spray booths designed to sweep air currents toward the exhaust outlet?
(29 CFR 1910.107(b); ANSI Z9.3, App A, ch 3)
12. Are interior surfaces of spray booths smooth and continuous without edges, and otherwise designed to prevent pocketing of residues and facilitate cleaning and washing without injury? (29 CFR 1910.107(b)(2); ANSI Z9.3, App A, ch 3)
13. Are all electrical fixtures grounded before starting any painting procedures? (TM 43-0139, para 1-3b(7))
14. Are all electrical fixtures grounded and are lighting and ventilation fixtures and motors explosion-proof in spray booth areas?
(29 CFR 1910.107(c)(9) and d))

15. Are spray areas cleaned often to remove flammable residue and are only nonsparking scrapers and tools used for this procedure? (29 CFR 1910.107(g); ANSI Z9.3, App A, ch 8)
16. Do solvents used for cleaning the spray booth have a flashpoint of 100 F., and above? (29 CFR 1910.107(g)(5))
17. Are metal waste cans used to immediately store rags contaminated with paint residue and thinners? Are these cans dumped at least daily or at the end of each shift? (29 CFR 1910.107(g)(3); ANSI Z9.3, App A, ch 8)
18. Are quantities of flammable and combustible liquids kept in the vicinity of spray operations limited to the minimum amount necessary to perform one day/shift of work? (29 CFR 1910.107(e)(2); ANSI Z9.3, App A, ch 6)
19. Are floor surfaces of spray booth and operator's working area covered with noncombustible material of such character as to facilitate the safe cleaning and removal of residues? (29 CFR 1910.107(b)(3))
20. Are spray booths so installed that all portions are readily accessible for cleaning and a clear space of not less than 3 feet on all sides kept free from storage or combustible construction? (29 CFR 1910.107(b)(9); ANSI Z9.3, App A, ch 3)
21. When spraying areas are illuminated through glass panels or other transparent materials, are fixed-lighting units used as a source of illumination? (29 CFR 1910.107(b)(10); ANSI Z9.3, App A, ch 3)
22. Do panels effectively isolate the spraying area from the area in which the lighting unit is located, and is it constructed of noncombustible material of such a nature and protected whereby breakage will be unlikely? (29 CFR 1910.107(b)(10); ANSI Z9.3, App A, ch 3)
23. Are panels so arranged that normal accumulation of residue on the exposed surface will not be raised to a dangerous temperature by radiation or conduction from the source of illumination? (29 CFR 1910.107(b)(10); ANSI Z9.3, App A, ch 3)
24. Are open-flame or spark-producing equipment prohibited within 20 feet of the spray area, unless separated by a partition? (29 CFR 1910.107(c)(2); ANSI Z9.3, App A, ch 4)
25. Are electrical wiring and equipment located in spraying areas and not subject to deposits of combustible residues of the explosion-proof type approved for Class I, Group D, locations? (29 CFR 1910.107(c)(6); ANSI Z9.3, App A, ch 4)
26. Does electrical wiring, motors, and other equipment outside of, but within 20 feet of any spraying area and not separated therefrom by partitions, have spark-producing protection? (29 CFR 1910.107(c)(6)(General); ANSI Z9.3, App A, ch 4))

27. Are procedures and protective equipment monitored by an industrial hygienist to ensure adequate worker protection? (29 CFR 1910.1000; ANSI Z9.3.12; TB Med 502, ch 2)
28. Does only one person perform spray paint operations at a time? (TM 43-0139, para 1-3b(1))
29. Is mechanical ventilation kept in operation at all times while spraying operations are being conducted and for a sufficient time thereafter to allow vapors from drying coated articles and drying finishing material residue to be exhausted? (29 CFR 1910.107(d)(2); ANSI Z9.3, App A, ch 5)
30. Do you ensure that no open or glass containers are used to bring flammable liquids into the spray finishing room? (ANSI Z9.3, App A, ch 6; 29 CFR 1910.107(e)(3))
31. When transferring flammable liquids from one container to another, do you ensure both containers are bonded and grounded to prevent static discharge? (ANSI Z9.3, App A, ch 6; 29 CFR 1910.107(e)(9))
32. If using spray paint booth alternately for drying, do you ensure conformance with those standards? Do you purge the area of spray vapors for at least 3 minutes before drying apparatus is energized? (29 CFR 1910.107(t)(4); ANSI Z9.3, App A, ch 11)

NAME OF OFFICE

STANDING OPERATING PROCEDURES NO. _____

DATE _____

Spray Painting Operations

1. Purpose. To establish safe operating procedures and assign responsibilities to cover paint handling, storage, and application operations to include paint spray booths.
2. Applicability. This procedure applies to the handling, storage, and application of paint by spray methods, handling and storage of paint and associated solvents and thinners.
3. Responsibility. The immediate supervisor is responsible for:
 - a. Application and enforcement of this procedure.
 - b. Ensuring that only qualified personnel are permitted to engage in spray paint application operations.
 - c. Ensuring that the building leader and subordinates are thoroughly briefed regarding the requirement that only authorized personnel are allowed to engage in these operations.
 - d. That spray paint application and materials handling are limited to that allowed by regulation.
4. Location of Operations. Building _____.
5. Material limits. The amount of paint operations performed and material on hand will be limited to the number and quantity needed to perform the job safely and efficiently.
6. Personnel limits. The number of personnel exposed to spray paint operations and associated hazards will be the minimum required to safely perform the operation.
7. Safety requirements. Industrial requirements include those below.
 - a. Materials safety data sheets will be obtained from the manufacturer and/or hazardous materials microfiche on all chemicals used within the operation. Chemicals without this information will not be used until this information has been procured and coordination with the industrial hygienist has been accomplished. All personnel involved in paint mixing and application are required to read these data sheets prior to performing these duties.

b. Personnel will be aware of and trained in the hazards of all chemicals used and personal protective equipment maintenance.

c. Smoking, spark, and open flame will not be permitted in any paint storage, mixing, or application area.

d. Industrial hygienists will monitor worker exposure and suitability of protective equipment. Personnel will be medically screened before being placed in spray paint application positions and will be subject to medical surveillance while performing these duties based on hazards to which the worker is exposed; for example, exposure to lead (chronic effects), and suitability of protective equipment.

e. Paint spray equipment, grounding systems, electrical systems, and storage facilities will be periodically inspected to ensure safe operation and OSHA compliance. Deficiencies will be corrected as soon as possible.

f. Personnel will only use solvents and thinner approved for use with the particular compound they are using. This will prevent hazardous chemical reactions.

g. Personnel will be trained in fire prevention techniques and proper methods for cleaning up spills and waste disposal. Waste paint and solvent will not be dumped into sewage or drainage systems.

h. Rags contaminated with flammable residue will be stored in approved metal cans which are emptied daily. Storage of paint and associated flammables will be in approved cabinets or storage areas away from heat, sparks, and sources of ignition. Smoking will not be allowed in any area involving mixing or storage of flammables.

i. Personnel will be provided protective equipment, and these items will be worn. Ventilation will be adequate, and all protective equipment will be maintained in a proper manner.

j. All unprotected personnel will be at least 50 feet from a spray paint operation while operation is ongoing. Unprotected workers will not enter the area until at least 30 minutes after operation has ceased.

8. Spray paint operations.

a. All eating and smoking is prohibited in the paint booth application area.

b. Personnel will be well-trained in safe procedures, fire prevention, and the hazards of each material used. Protective equipment and ventilation will be adequate for the operation involved.

c. Only approved methods of disposal will be authorized.

9. Posting. After this sample SOP has been developed and approved by the concerned command, a copy should be posted in an area accessible to all employees.

SUBMITTED BY: _____

RECOMMENDING APPROVAL: _____

APPROVAL: _____

**SAMPLE JOB SAFETY
BREAKDOWN SHEETS**

These Sample Job Safety Breakdown Sheets may be used to prepare similar analysis of local operations. Although modification is necessary to suit individual needs, the samples provide a workable method of safety evaluation and job/task analysis.

JOB SAFETY BREAKDOWN SHEET
SAMPLE

INSTRUCTION UNIT: YOUR MAINT SECTION	OPERATION: Painting	JOB: Painter
STEPS	KEY POINTS	SAFETY INSTRUCTIONS
1. Inspect and Prepare Work Area	a. Lights	Turn on lights in paint booth, assure all are operative.
	b. Sprinkler heads	Check sprinkler heads, assuring that each is covered with tissue.
	c. Paint filters	Check paint booth exhaust filters for cleanliness; be sure all are in place.
	d. Exhaust systems	Turn on exhaust system. Assure system is operative by observing flow indicators.
	e. Paint booth	Remove all debris and extraneous material from within booth and around the outside to a distance of not less than 3 feet. Check fire extinguisher, initial tag monthly.
2. Operations	Personal protective clothing and equipment	a. Inspect all PCE for suitability for use.
		b. Flame retardant coveralls will be clean at the start of each day and free of tears/holes.
		c. Steel-toed shoes or boots will be worn at all times. Industrial safety glasses, goggles, or face shield will be worn as necessary.
		d. Avoid wearing loose clothing and jewelry.
		e. Approved hearing protection will be worn as necessary, for example, in posted noise hazardous areas.

JOB SAFETY BREAKDOWN SHEET
SAMPLE

INSTRUCTION UNIT: YOUR MAINT SECTION	OPERATION: Painting	JOB: Painter
STEPS	KEY POINTS	SAFETY INSTRUCTIONS
		<p>f. Approved pressure demand or continuous flow, Type C, full-facepiece hood or helmet supplied-air respirators will be worn by all personnel assigned to spray paint operations. All employees wearing respirators will be properly trained in use/care of respirators.</p> <p>g. Be certain gloves are free of holes and not paint-soaked.</p>
	Tools and equipment	<p>a. Lifting devices, cables, chains slings, jacks, hoists, and so forth, will be checked daily and properly tagged/stenciled for rated lifting capacities, load testing and inspection due dates.</p> <p>b. Inspect all tools and equipment for defects. Replace all excessively worn or defective tools immediately and report faulty and unsafe equipment to supervisor. Inspect—</p> <p>1. hammers for loose heads and cracked handles.</p> <p>2. wrenches for wear and cracks.</p> <p>3. chisels, punches, and so forth, for mushroomed heads.</p>
	Paint	<p>Mix and thin paint inside paint booth with exhaust ventilation operating. All containers will be static-bonded and grounded. Place excess paint and thinner containers in proper</p>

JOB SAFETY BREAKDOWN SHEET
SAMPLE

INSTRUCTION UNIT: YOUR MAIN SECTION	OPERATION: Painting	JOB: Painter
STEPS	KEY POINTS	SAFETY INSTRUCTIONS
		<p>storage cabinets. All safety equipment/clothing will be worn during mixing operations.</p> <p>Paint booth</p> <p>Booth doors must be closed during operations.</p> <p>Items to be painted</p> <p>Secure or chock all items to prevent movement while painting. Items are to be free of all foreign matter.</p> <p>Fire prevention</p> <p>Open flame or smoking is forbidden within 20 feet of paint booth.</p>
3. Safety	Lifting	<p>a. Avoid awkward positions to prevent strain; be sure of room to move freely; when lifting keep back straight, bend at knees and lift with leg muscles.</p> <p>b. Guard against skin punctures from wire ends and sharp edges by wearing gloves. Report all injuries to supervisor immediately.</p> <p>c. Utilize all available exhaust systems to prevent breathing fumes.</p> <p>d. Wash hands and face thoroughly with soap and water before eating.</p> <p>Work area (housekeeping)</p> <p>a. Keep area free of combustible materials such as clothing, paper, rags, wood, greases, and so forth.</p> <p>b. Work area will be clean and free of any tripping or slipping hazards.</p>

**JOB SAFETY BREAKDOWN SHEET
SAMPLE**

INSTRUCTION UNIT: YOUR MAINT SECTION	OPERATION: Painting	JOB: Painter
STEPS	KEY POINTS	SAFETY INSTRUCTIONS
		<p>c. Remove any obstacles which would present a hazard while removing or installing heavy components.</p> <hr/> <p>d. If equipment must be elevated from floor level, assure that adequate floor stands/blocking are used.</p> <hr/> <p>e. When in doubt about safety and fire regulations, consult your supervisor.</p> <hr/> <p>f. When in doubt as to the safety of any operation, consult your supervisor.</p>

JOB SAFETY BREAKDOWN SHEET
SAMPLE

INSTRUCTION UNIT: YOUR MAIN SECTION	OPERATION: Painting	JOB: Painter
STEPS	KEY POINTS	SAFETY INSTRUCTIONS
1. Turn main power (electrical) switch to the "OFF" position.	Double check	Attach "LOCKOUT" tag. Wear approved eye protection with side shields and industrial type safety shoes throughout the operation. Goggles or face shield will be worn as necessary.
2. Remove paint filters metal grids	Serviceability	Use caution upon removal to prevent damage to grids. only.
3. Remove filters.	Disposal of contaminated filters	Put in 55-gallon drums and cover with absorbent material.
4. Clean booth.	Electric scaling machine	Wear approved dust respirator.
5. Minor repairs and/or replacement	Windows. Lamps (burned out). Sprinkler heads	Use extreme caution when removing, cleaning or replacing these items. Use paper tissues over sprinkler heads.
6. Clean up debris.	Complete	Exercise good judgment due to possible dust factor in relation to wearing respirator. All debris will be put in 55-gallon drums and filled with water.
7. Preparation to coat booth with Nana-peel.	Transfer Nana-peel into agitator. Accessories.	DO NOT OVERFILL.
	Agitator	Attach all accessories securely to agitator. Do not block exits or aiseways with agitator.
	Electric switch	Upon completion of spraying filter frames, remove "LOCKOUT" tag from switch and turn the exhaust system on. Close all available doors to preclude vapor escape into the surrounding work areas.

JOB SAFETY BREAKDOWN SHEET
SAMPLE

INSTRUCTION UNIT: YOUR MAINT SECTION	OPERATION: Painting	JOB: Painter
STEPS	KEY POINTS	SAFETY INSTRUCTIONS
	Exhaust	Make sure exhaust system is working.
	Empty containers	Disposal of empty containers must be in a closed container.
8. Paint interior of booth.	Personal protection.	Ear protection will be worn in paint booths identified as noise hazardous and any time the floor cleaning machine is in operation. Painters and any persons within the confines of the booth while spraying is in process will wear an approved supplied air respirator and helmet. The use of forklifts, unless approved for use in Class I, Group D location, is prohibited within the spraying area and booth. Employee will not place himself between area being sprayed and ventilation.
9. Upon completion.	Remove all accessories.	Use extreme caution to prevent slippage and back injury due to manual handling and lifting. Doors to remain closed and the ventilation system in operation to remove all vapors from the booth and until the Nana-peel is completely dry.
10. Replace filters.	Position quantity.	Face of filter toward painter, as many as required to effectively collect the overspray particles.
11. Check alarm system.	Bells and/or lights or both.	If bell and/or lights <u>DO NOT</u> go off after an approximate 1-minute lapse of time, system is working improperly. In this case a velocity check must be made by

**JOB SAFETY BREAKDOWN SHEET
SAMPLE**

INSTRUCTION UNIT: YOUR MAINT SECTION	OPERATION: Painting	JOB: Painter
STEPS	KEY POINTS	SAFETY INSTRUCTIONS
		contacting the Safety Office and adjustments to controls made. When bells and/or lights go off within timeframe, booth is at this time operable.

12. Turn booth over to using activity.

NOTE: A copy of this must accompany personnel when cleaning booths.

List of required equipment and tools:

- Approved electric scaling machine
- Spray gun with hoses
- Paint agitator (15 gallon)
- Stepladder
- Scaffold
- Nana-peel
- Portable hoist
- Broom
- Light bulbs
- Glass panels
- Respirators (Approved dust respirator and supplied air respirators w/helmets.)
- Safety glasses, goggles or face shield
- Safety shoes
- Hearing protection
- Flame-retardant coveralls
- Flame-retardant cap (to cover all hair)

Respiratory Protection for all Paint Systems
(Alkyd, CARC, Oil Resin, Etc.)

1. Spray Painting Indoors. An approved pressure demand or continuous flow, Type C, respirator is the standard respirator to be worn when paint spraying indoors; however, alternatives are permitted by preventive medicine personnel (ref: Technical Guide (TG), No. 144, Guidelines for Controlling Health Hazards in Painting Operations, Aug 1987).

a. Large vehicular or walk-in booths.

(1) If the diisocyanate concentration is below the standard, a full-face organic vapor cartridge respirator with a paint prefilter is adequate.

(2) If the solvent concentration is less than 10 times the standard, a full-face organic vapor cartridge respirator is adequate.

(3) If the pigment containing lead or chromate concentration is less than 10 times the standard, a full-face organic vapor cartridge respirator with a HEPA (high-efficiency particulate air) filter is required.

b. Spray cabinet or conveyer-type booths.

(1) If the contaminant (solvent, pigment, or diisocyanate) concentration is below the standard, no respiratory protection is required.

(2) If the diisocyanate concentration exceeds the standard, a supplied air respirator is adequate.

(3) If the solvent concentration exceeds the standard, but is less than 10 times the standard, a supplied air, organic vapor respirator is required.

(4) If the pigment containing lead or chromate concentration exceeds the standard, but is less than 10 times the standard, a supplied air, organic vapor with the HEPA filter is required.

2. Spray Painting Outdoors.

a. If in a confined space, a supplied air (pressure demand or continuous flow, Type C), respirator is required. See Table G-1, TG No. 144, for additional circumstances/alternatives.

b. If not in a confined space, a supplied-air respirator is required.

3. Brush or Roller Paint Indoors or Outdoors (open or confined spaces).

A supplied air (pressure demand or continuous flow, Type C) respirator. See Table G-1, TG 144, for additional circumstances/alternatives.

d. Application of a water base paint does not normally require respiratory protection; however, local preventive medicine/industrial hygiene personnel will determine the requirements.

NOTE 1: Approved respirators which provide more protection than the recommended device may be substituted in accordance with TB Med 502.

NOTE 2: A confined space, for the purpose of determining respiratory protection required during operations, is defined as:

A. General.

(1) Any area where dilution ventilation cannot take place or airflow is obstructed; or

(2) Under or in vehicles/equipment.

B. Indoors - Not in Spray Paint Booths.

(1) Less than 10,000 cubic feet; or

(2) Ceiling height less than 16 feet; or

(3) Touchup paint area contains partitions, balconies, or other structural barriers to the extent that they obstruct cross ventilation; or

(4) Outside air is not mechanically distributed at a minimum rate of 3.2 cfm per square foot of the bay/room/area where the touchup painting takes place.

C. Outdoors.

(1) Where two or more sides are blocked by building, partitions, or barriers; or

(2) Under a canopy or roof less than 16 feet in height.

Source: Office of the Surgeon General, DASG-PSP-0, Technical Guide No. 144, Guidelines for Controlling Health Hazards in Painting Operations, Aug 87.

**HAZARDOUS MATERIAL
USED IN SPRAY PAINT OPERATIONS**

MATERIALS AND SUPPLIES USED IN SPRAY PAINTING OPERATIONS

Due to the number of solvents, thinners, and paints used within the Army, it is not possible to list all of them. Items that have a Federal Stock Number (FSN) can be located on the Department of Defense (DOD) Hazardous Materials Micro- fiche, DOD 6050.5-LR (can be ordered on publications requisition), in order to evaluate hazards, storage, and personal protective equipment requirements. If the material does not meet the description on the microfiche, it is omitted from the microfiche or is a local purchase item. Hazardous materials safety data sheets should be obtained from the procurement source or manufacturer before using the chemical.

In accordance with 29 CFR 1910.1200, all workers are to have ready access to hazardous materials safety data sheets on all chemicals used within the operation. It is the supervisor's responsibility to maintain this information and use it to be informed of proper procedures, hazards, and requirements for compliance.

Dichloromethane
(Paint Remover)

Hazard class: ORM and poisonous substance.

Safety precautions: Avoid exposure to strong oxidizing agents and exercise caution when opening containers to prevent spurling of contents. Vapors are heavier than air and will travel along the ground to accumulate in low-lying areas. Use caution when entering these areas.

Effects of overexposure:

- a. Skin: Irritation and defatting of tissue.
- b. Eyes: Severe irritation and possible permanent damage.
- c. Inhalation: Headache, dizziness, and intoxication.

Protective equipment: Neoprene gloves and cup-type protective goggles are required. A neoprene solvent-resistant apron and boots should also be worn. Local exhaust ventilation should be used to keep vapors below allowable levels. In areas of high concentration, a self-contained breathing apparatus with positive pressure should be used.

First aid: Contact medical assistance.

- a. Skin: Wash with plenty of soap and water.
- b. Eyes: Flush with water for 15 minutes.
- c. Inhalation: Move to fresh air and give oxygen and CPR if needed.
- d. Ingestion: Give victim 1 quart of water and induce vomiting. Call a physician immediately.

Spills/disposal: Contain spillage and absorb with absorbent material. Store wastes in a covered drum for disposal or reclamation. Dispose of in accordance with local, state, and Federal regulations.

Lead

(Contained in certain paints and dust from removal of old paint)

Hazard class: No hazard class, toxic substance under 29 CFR 1910.1025.

Safety precautions: Prevention of adverse health effects for most workers from exposure to lead throughout a working lifetime requires that worker blood-lead levels be maintained at or below 40 micrograms per 100 grams of whole blood. This level should be below 30 micrograms for personnel desiring children. Usual methods of control are by using proper protective equipment, health monitoring, ventilation, and hygiene to minimize exposure.

Methods of exposure: Lead can be absorbed into the body by inhalation (breathing) and ingestion (eating). When lead is scattered into the air as a dust it can be inhaled into the lungs. You can also absorb lead through the digestive system if it is eaten or swallowed. The most common methods for this are by handling food, cigarettes, chewing tobacco, makeup, etc., with lead-contaminated hands. Even though the worker may not be aware of any immediate symptoms of disease, the effects of lead are cumulative and lead stored in body tissues can slowly cause irreversible damage to the body.

Effects of chronic overexposure:

a. Damage to blood-forming, nervous, urinary and reproductive system, loss of appetite, metallic taste in mouth, nausea, headache, excessive tiredness, weakness, muscle soreness, numbness, colic, etc.

b. Damage to the central nervous system and the brain, which may be preceded by poor memory, tremor, and convulsions.

c. Kidney disease, (few symptoms until disease is advanced), urinary dysfunction.

d. Decreased sex drive, sterility, impotence, and increased likelihood of offspring with birth defects, mental retardation, behavioral disorders or death in the first year of life.

e. Decreased hemoglobin and ultimate anemia.

Protective equipment: Clean and dry coveralls, appropriate goggles and respirators, gloves, hand and face washing facilities, and medical surveillance. In cases where workers are exposed to lead above the permissible exposure limit, change rooms (all clothing is changed to include shoes and underwear), showers, and in some cases separate lunchrooms to prevent contamination of fellow workers and the family, home, and car of the lead worker.

First aid: There is no first aid for lead exposure. Damage to the body is not immediately correctable and usually is advanced before it is detected. The only first aid available is the proper use of protective equipment and taking steps to minimize exposure proactively (before it causes damage).

Xylene

Hazard class: Flammable liquid.

Safety precautions: Do not store with strong oxidizing agents, strong acids, or strong bases. Keep containers cool, dry, and away from sources of heat, spark, and ignition. Provide adequate ventilation. Avoid breathing vapors and skin contact. Store in an approved storage cabinet or outside building for flammable liquids.

Effects of overexposure:

- a. Skin/eyes: Severe irritation.
- b. Inhalation: Respiratory tract irritation.
- c. Other side effects include nausea, vomiting, and liver and kidney damage in humans.

Protective equipment: Impervious protective gloves and safety chemical goggles are required when handling this material. Clothing and other items should be appropriate to prevent prolonged contact with the chemical. Mechanical exhaust should be used to keep vapor concentrations at allowable levels. In areas of high vapor concentration, an approved respirator for organic vapors should be used.

First aid: Contact medical assistance.

- a. Skin/eyes: Flush with large amounts of water for 15 minutes.
- b. Inhalation: Move victim to fresh air and give CPR and oxygen if needed.
- c. Ingestion: Rinse mouth and get medical assistance immediately.

Spills/disposal: Contain spill and absorb with absorbent material. Keep wastes and spilled chemical away from sources of heat, spark, and ignition. Dispose of in accordance with local, state, and Federal regulations.

Acetone

Hazard class: Flammable liquid.

Safety precautions: Avoid exposure to oxidizers, chloroform, alkalies, acids, and sources of heat, spark, and ignition. Keep in tightly closed containers in a cool, ventilated place. Do not store near heat or sunlight and avoid damage to container.

Effects of overexposure:

- a. Skin/eyes: Redness, irritation to respiratory system, headache.
- b. Inhalation: Irritation to respiratory system, headache.

Protective equipment: Impervious gloves and safety goggles or face shield are required. Full protective clothing, eyewash, and deluge shower are also recommended. Local ventilation should be adequate to keep vapor concentration within allowable limits. Otherwise, workers should wear a self-contained breathing apparatus or gas mask.

First aid: Contact medical assistance.

- a. Skin/eyes: For skin exposure, remove contaminated clothing and wash with plenty of soap and water. Flush eyes with large amounts of water.
- b. Ingestion: Give two large glasses of water and induce vomiting. If unconscious, give nothing by mouth.
- c. Inhalation: Move victim to fresh air and give CPR and oxygen if needed.

Spills/disposal: Small spills can be absorbed with sand or other nonstatic material and then placed into closed metal containers away from sources of heat, spark, and ignition. Large spills should be contained. Large amounts of liquids should be pumped out and the remainder absorbed with sand. Do not dump waste into drainage system. Send waste for recovery or disposal in accordance with local, state, and Federal regulations.

Toluene

Hazard class: Flammable liquid.

Safety precautions: Keep away from strong oxidizers and sources of heat, spark, and open flames. Keep container tightly closed. Wash thoroughly after handling this material. Store in approved cabinet or storage building for class 1B flammable liquids.

Effects of overexposure:

- a. Inhalation: Dizziness, coma, respiratory failure.
- b. Skin/eyes: Moderate to severe irritation.

Protective equipment: Impervious gloves and chemical goggles are required. Full protective clothing, safety showers, and eyewash stations are required. Mechanical and local ventilation should be adequate to keep vapor concentration within allowable limits. If vapor exceeds allowable limits, an approved respirator for toluene must be worn.

First aid: Contact medical assistance.

- a. Skin/eyes: Flush with large amounts of water for 15 minutes.
- b. Ingestion: Rinse mouth and contact a doctor.
- c. Inhalation: Move victim to fresh air and perform CPR if needed.

Spills/disposal: Dispose as chemical waste. Incinerate or dispose of in accordance with local, state, and Federal regulations.

Methylene Chloride
(Often found in paint removers)

Hazard class: ORM and poisonous substance.

Safety precautions: Store in cool place and avoid breathing vapors.

Effects of overexposure: Contact with the skin or eyes is painful and will cause damage in a short time. Most common signs are nausea, numbness, dizziness, disorientation, etc. It is known to put a strain on the heart if breathed in excessive amounts.

Protective equipment: Rubber gloves and safety glasses are required when handling this material. When vapor concentrations are above allowable limits, personnel must wear respirators with organic vapor canister or self-contained breathing apparatus.

First aid: Contact medical assistance.

- a. Skin/eyes: Flush with water.
- b. Inhalation: Move to fresh air and perform CPR if needed.
- c. Ingestion: Induce vomiting and get medical attention.

Spills/disposal: Soak up small spills and use proper protective equipment. In large spills, evacuate area, contain liquid and transfer to closed metal containers. Keep out of water supply. Waste solvent should be sent to a reclaiming facility.

1,1,1 Trichloroethylene

Hazard class: ORM and poisonous substance.

Safety precautions: Store away from strong alkalies and avoid damaging containers. Never use welding or cutting torch near containers (even empty), they can ignite explosively.

Effects of overexposure:

- a. Eyes: Severe irritation.
- b. Skin: Irritation and prolonged exposure results in drying of tissue.
- c. Inhalation: Nasal irritation, nausea, headaches.
- d. Ingestion: Gastrointestinal irritation, vomiting, diarrhea, and chemical pneumoconiosis.

Protective equipment: Polyethylene/pva gloves and chemical splash-proof goggles must be worn. Wear impervious clothing and boots to prevent skin contact. Mechanical ventilation is needed to keep vapor concentration within allowable limits. In concentrated areas, a self-contained breathing apparatus with full face piece with positive pressure is needed.

First aid: Contact medical assistance.

- a. Skin/eyes: Wash skin with soap and water. Flush eyes with plenty of water.
- b. Inhalation: Move person to fresh air, perform CPR if needed.
- c. Ingestion: Give water and induce vomiting immediately. Contact a physician.

Spills/disposal: Use absorbent material to clean up small spills and place in a closed metal container away from ignition or place under and evaporation hood. In large spills, evacuate area. Trained personnel in protective equipment should isolate spill, pump out large amounts of material. Residue should be cleaned with absorbent material and shoveled into metal containers. Dispose of in accordance with local, state, and Federal laws.

PROTECT YOURSELF FROM SPRAY PAINTING HAZARDS

PROTECTIVE EQUIPMENT ONLY WORKS WHEN WORN