Environmental Guidelines

Spray Painting Operations

2011

These Guidelines were adapted from OHSA Standard “Finishing using flammable and combustible materials”, A Practical Guide to Reduce Air Emissions from University of Northern Iowa, the Code of Practice for Spray Painting from the WorkSafe Western Australia Commission, and the US EPA Automotive Refinishing Partnership.

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Environmental Guidelines for Spray Painting Operations

1. What are Environmental Guidelines?

- The Environmental Guidelines are technical documents to encourage the use of the best management practices and cost-effective technologies to improve environmental conditions at the workplace and the surrounding community.

- These Guidelines provide information as to the likely environmental impacts of Spray Painting Operations and proposed methods of controlling these impacts.

2. Why the concern about Spray Painting Operations?

Spray Painting is associated with a number of environmental, health and safety concerns. The main environmental and health concern is due to spraying painting putting harmful chemicals into the air. These chemicals are known as volatile organic compounds (VOC) and can affect human health.

- Eye and respiratory tract irritation, headaches, dizziness, visual disorders, and memory impairment are among the immediate symptoms that some people have experienced soon after exposure to some organics. Many organic compounds are known to cause cancer in animals; some are suspected of causing, or are known to cause, cancer in humans.

- The ability of organic chemicals to cause health effects varies greatly, from those that are highly toxic, to those with no known health effect. As with other pollutants, the extent and nature of the health effect will depend on many factors including level of exposure and length of time exposed.

- VOCs are found in paints and lacquers, paint strippers, cleaning supplies, varnishes and waxes. VOCs evaporate into the air when these products are used or stored without a cover.

- VOCs are considered air pollutants because they create unwanted ozone smog in the lower atmosphere as they react with nitrogen oxides (NO\textsubscript{x}) in the presence of heat and sunlight. The presence of ozone in the lower atmosphere is toxic to human beings and many other living things that breathe it.

- In addition, waste management within these facilities is important. Throughout the spray painting operation, there is a generation of both liquid and solid waste. If not managed properly, this waste namely, used solvents, waste paint, used rags, and solvent containers, could become a hazard to water quality, and could significantly increase the risk of fire.

3. Is this applicable to Guyana?

- In Guyana, the importation of re-conditioned vehicles coupled with the need for new finishes has led to the development of many Automobile Spraying Painting Shops. Further, many vehicles are involved in accidents and require repairs and spraying. There are also some old vehicles that are sprayed to improve their conditions.
In the absence of an appropriate regulatory framework for land-use planning and zoning, many of these Spraying Painting Shops have been established in residential areas in close proximity to homes. The placement of Painting Shops in residential areas is a nuisance to many and a source of many complaints to the Environmental Protection Agency mainly because of the lack of infrastructure to manage the environmental impacts of these operations.

Given the environmental and health effects associated with these substances, the Environmental Protection Agency has developed these Guidelines that would assist in the safeguarding of the health and safety of workers as well as those who reside in close proximity to the Spray Painting Shops.

4. General Steps of the Automobile Refinishing Process

The automobile refinishing process includes four basic steps:

1. **Pre-paint surface preparation**: This step includes washing of the vehicle and surface preparation. The main purpose is the removal of contaminants such as grease, tar, wax and silicone, all of which can have an adverse effect on the bond between the coating and the substrate; it also aims for the surface to be even by applying filling material when necessary. Sanding of surface can also be included in this step.

2. **Undercoat application**: The application of undercoats (prep coats, primer-surfacers, primer-sealers, and sealers) has the purpose of preparing the surface for the top coat, enhancing its adherence to the surface.

3. **Application of the top coat**: At this stage, the final coat application is done. Depending on the type of coat, application technique and other factors, two or three layers may be necessary.

4. **Spray equipment cleaning operations**: Equipment used in the spray painting operations such as painting guns are cleaned using organic solvents to eliminate paints remnants and to avoid these from affecting work quality.

5. What does it mean? – Important definitions used in this Guideline

- **Spray booth**: A power-ventilated structure provided to enclose or accommodate a spraying operation to confine and limit the escape of spray, vapour, and residue, and to safely conduct or direct them to an exhaust system. There are three types of spray booth: downdraft, semi-downdraft, and cross-draft.

- **Water wash spray booth**: A spray booth equipped with a water washing system designed to minimize dusts or residues entering exhaust ducts and to permit the recovery of overspray finishing material.

- **Dry spray booth**: A spray booth not equipped with a water washing system. A dry spray booth may be equipped with: a distribution or baffle plates to promote an even flow of air through the booth or cause the deposit of overspray before it enters the exhaust duct; overspray dry filters to minimise dusts or residues entering exhaust ducts.
Waterborne coatings: Coatings which contain water as the main solvent but also contain other solvents, such as glycol ethers, to improve application. These coatings are ideal primers because they have greater resistance to heat and abrasion and provide excellent adhesion. Waterborne primers and primer-surfacers have a low VOC content.

6. What to consider?

6.1. Where should I operate a Spray Painting workshop?

These workshops should not be placed in close proximity to dust producing facilities as dust will affect greatly the coating quality. In addition to their location, practices of the operators and the site infrastructure of these operations play an important role in minimizing health effects to workers and the surrounding neighbourhood.

- Automobile Spray Painting Shops should be located in commercial or industrial areas. These shops should not be placed in close proximity to dust producing facilities as dust will affect greatly the coating quality.

- New automobile spray-painting shops should maintain a buffer area of at least 50m (~164ft) from the nearest residence.

6.2. How to control air emissions of hurtful contaminants?

Emission control systems such as carbon adsorption, thermal incineration, catalytic incineration and condensers are used in order to significantly reduce VOC from surface coating operations. Although effective, these systems may not be economically feasible for small-to-medium size automobile paint shops.
6.3. How can I minimize VOC emissions?

This involves the type of paint used and the amount of paint, or layers, applied to the surfaces being painted, the place where the spray painting is carried out, the painting technique, equipment and other practices.

The following aspects are to be considered in order to mitigate or minimize VOC emissions: Site General Conditions; Spray Practices and Equipment; Surface Prep; Selection and Application of Prep Coats, Primer-Surfacers and Sealers, and Top Coats; Equipment Cleaning; and Solvents management, reuse and recycling.

6.3.1. Site General Conditions

- Spraying operations must be done in specially constructed, enclosed areas called spray booths.
- The booth must be built solidly, the walls must be smooth and without edges that can trap residue.
- Spray rooms must be built of non-flammable materials, such as steel, concrete and masonry. Floors and fire doors must also be non-flammable because the chemicals used in spray painting are combustible in the event of a fire.
- A spray booth must have a powered ventilation system that either keeps vapours and paint spray confined and separate from other work areas or that provides an exhaust vent to remove them;
- To avoid nuisance emissions to the environment, operators must put in place appropriate mechanisms in the spray booth exhaust vent, such as filters or water wash system.
- If using filters for the spray booth, regular filter changes reduce releases of pollutants from the shop.
- Among spray booths – downdraft, semi-down, and cross-draft – downdraft is the most effective at removing hazardous overspray since paint vapors and overspray are carried downward, so they do not even pass by the painter’s breathing zone. Use of the other types of spray booths demand careful consideration of the painter’s orientation towards the exhaust ventilation system.
- The floor must be covered with a non-combustible and easily cleaned material such as steel, concrete or brick.
- The exhaust duct from the spraying painting booth should project at least 2 meters above the highest roof in the surrounding area.

As such, the most applicable means of reducing VOC emissions is to minimize the volume of VOC and HAP (hazardous air pollutants) being used.
6.3.2. Spray Practices and Equipment

- All Spray Painting Shop personnel should be trained in the proper use of refinishing materials.
- When using spray equipment, hold the gun perpendicular to the surface being sprayed and maintain the distance between the gun tip and painting surface according to equipment specifications.

This will help assure the proper film thickness, and minimize the use of additional layers, which will help to reduce VOC’s emissions.

- Choose spray equipment that will achieve the highest transfer efficiency (e.g. HVLP – High Volume Low Pressure paint gun). Determine the type of coating that will be sprayed through the equipment and ensure to use the paint gun that works best for the application of such coating. Achieving high transfer efficiency means that a high percentage of the paint sprayed will actually be attached to the surface painted, minimizing the residues of paint in the air, thus VOC emissions.
- Follow the manufacturer suggestions regarding air pressure and tip sizes for the specific product and equipment being used. This will aid to achieve high transfer efficiency.

6.3.3. Surface Prep

- Always wash dirt and grime from the vehicle using water or a soap and water mixture. Water borne cleaners are effective in removing dirt and grime. Taking this step will reduce the use of solvent cleaners thus VOCs emissions and exposure.
- Use waterborne cleaners when possible; these can be used to remove sanding, sludge, fingerprints, waxes and other contaminants.
- If waterborne cleaners prove unsatisfactory due to the substrate make-up of contaminants, use solvent-based cleaners sparingly. Solvent-based cleaners are mostly used to remove grease, road tar, silicone, and driveline oils, amongst others.
6.3.4. Selection and Application of Prep Coats, Primer-Surfacers and Sealers, and Top Coats

- Use products that may alleviate the need for additional surface coating operations.
- Avoid zinc-phosphate primers with high volatile organic compounds (VOC) content.
- Apply only the number of coats needed to achieve a quality finish.
- Avoid the use of lacquer-based topcoats.
- Keep the use of paint additives to a minimum.
- When available, use waterborne coats.
- To reduce VOC emissions, limit material costs, and achieve a better quality product, perform body work using a minimal amount of primer-surfacer.

This practice will avoid the need for additional layers of top coat, hence reducing the exposure and emissions of VOCs.

- Always choose a colour of prep coats, primer surfacers or primer-sealer that can be easily covered with the topcoat to be sprayed, or choose a tint-able primer-sealer and tint it to an easily covered shade.
- Use low VOC waterborne primer-surfacers, primer-sealers such as Chrome-Free Etch Primer, Epoxy Primer-Sealers, and top coats products such as low VOC Lacquer Topcoats.

6.3.5. Equipment Cleaning

- When assessing the cleaning process, all cleaning tasks should be reviewed to determine if cleaning is necessary.
- Use low VOC cleaning solvents. Alternatives include formulas containing acetone, dibasic esters (DBE) and terpenes.
- Use available automatic cleaning systems if possible. **The result is rapid cleaning and extended solvent cleaning-life while reducing solvent waste and the emissions from evaporation.** If an automatic cleaning system is not available, use an enclosed container to submerge the equipment in the cleaning solvent.

6.3.6. Solvents management, reuse and recycling

- Solvents must be stored in a ventilated area; all solvents should be stored in covered containers when not in use.
- Leaving solvents open creates unnecessary solvent waste and VOC emissions
- A standard should be set to assure that used solvent is disposed of or recycled only when it loses its cleaning effectiveness, not just because it looks dirty.
✓ Settling is the simplest method for solvent recycling. It consists of putting the used solvent in a container and letting the particulate matter settle out. The container should be designed to allow for the removal of the solvent without shaking up the sludge which has settled.

✓ Other methods for solvent recycling that may be available are filtering and distilling, these also can be implemented whenever possible.

6.4. **How to manage waste?**

The following measures and principles must be considered for waste management in spray painting shops:

✓ Disposal of waste solvents, wash water, etc. into the drain or waterways must be strictly prohibited.

✓ All contaminated solvents and solvents used to clean equipment should be collected and stored in a drum for final disposal in an EPA approved Landfill.

✓ Keep solvent laden dirty rags in a closed container and labelled “HAZARDOUS WASTE”. Dispose of such materials in a Hazardous Waste Landfill.

✓ Waste paint should not be disposed into the drain or waterways; the Hazardous Waste Landfill at Haag’s Bosch can be contacted for disposal services.

✓ Empty solvent containers can be reused to store either recycled solvent or waste solvent awaiting disposal.
6.5. How to handle Spills?

The main environmental concern about solvent or paint spills is water pollution and VOC emissions and its effect on human health. Management of paint and solvents must be carried out in a precautionary manner in order to avoid spills. Employers must obtain and use a spill kit in the event of a spill. It is important that employees know how to manage spills and leaks if they do occur. The volume of possible spills in spray painting operations is not very large but regardless of the amount, spills have to be contained and clean-up activities must follow the incident.

These measures will allow for a quick response and will help to prevent pollution of waterways or close drains:

- Equipment for the containment of spills must be stored in areas where spillages could occur.
- Absorbent material should be used for clean-up activities, as well as protective gear, such as: gloves and goggles.
- Recovery of spill solvent may be assessed; if possible, the recovered solvent could be used in cleaning tasks.
- Drain covers or drain valves should be installed to stop spills or leaks entering water drains or the public sewerage system.
- Sealing solvent-soaked materials into a drum for recovery or disposal in a Hazardous Waste Landfill.

7. Health and Safety Measures

- Appropriate personal protective equipment must always be worn as an added control measure during spray painting. Suitable personal protective equipment to be used includes: eye protection; respiratory protection; hand, foot and head protection; and clothing for protection against chemicals.
- Protective equipment must be properly selected and fitted for the individual and the task; readily available; clean and functional; appropriately stored and not left in a spray booth; and properly maintained.
- The employer must ensure that all workers know about personal protective equipment (PPE), how to use it, wear it or put it on properly.
- Employers must ensure all employees have ready access to the Material Safety Data Sheet (MSDS) for any hazardous substance used in the course of their work. MSDS provide the information needed to enable safe handling of hazardous substances at work, health hazard information, and information concerning the type of personal protective equipment required.
Environmental Guidelines for Spray Painting Operations

8. Noise emissions

Equipment used in spray painting activities may be a source of noise. Spray painting operations must comply with the limits established in the Guyana Standard Guidelines for noise emission into the environment, according to the area where the facility is located.

<table>
<thead>
<tr>
<th>Categories</th>
<th>Daytime Limits in dB(A)</th>
<th>Nighttime Limits in dB(A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>75</td>
<td>60</td>
</tr>
<tr>
<td>Institutional</td>
<td>75</td>
<td>60</td>
</tr>
<tr>
<td>Educational</td>
<td>75</td>
<td>60</td>
</tr>
<tr>
<td>Industrial</td>
<td>100</td>
<td>80</td>
</tr>
<tr>
<td>Commercial</td>
<td>80</td>
<td>65</td>
</tr>
</tbody>
</table>

9. Do I need an Environmental Authorisation?

All operators of medium¹ and large² scale spray painting operations are required to apply to the Environmental Protection Agency (EPA) for Environmental Authorisation.

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¹ Medium scale spray painting operators manage a workload of 5 to 14 cars per month and operate on daily basis with a fixed schedule.
² Large scale spray painting operators manage a workload of 15 cars or more per month and operate on daily basis with a fixed schedule.
9.1. What do I have to do?

The first step is to apply to the **Environmental Protection Agency (EPA)** for Environmental Authorisation. The developer must submit to the Agency a completed Application Form, along with proof of payment of the scheduled fee for processing the Application, and the following required information:

<table>
<thead>
<tr>
<th>New Projects</th>
<th>Existing Projects</th>
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</thead>
<tbody>
<tr>
<td>Identification of the Permit Applicant (National ID Card, Passport).</td>
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</tr>
<tr>
<td>A ‘No-Objection’ Letter for the operation from the relevant Local Authority – NDC/RDC/Town Council. Note the Approved Site Plan by the NDC/RDC/Town Council would be accepted as “no-objection”.</td>
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</tr>
<tr>
<td>‘No Objection’ from the Village Council and Ministry of Amerindian Affairs if project falls within Amerindian titled lands.</td>
<td>Map showing surrounding land uses, identification of receiving water(s) and the location of any existing discharge structures and the location of any discharge.</td>
</tr>
<tr>
<td>Land use suitability letter/Outline Planning Permission from the Central Planning &amp; Housing Authority.</td>
<td>Site Plan showing the layout of the Operation.</td>
</tr>
<tr>
<td>Map showing surrounding land uses, identification of receiving water(s) and the location of any existing or proposed intake and discharge structures and the location of any discharge.</td>
<td>Project Description (summary).</td>
</tr>
<tr>
<td>Draft Site Plan (approved by the NDC/RDC/Town Council, as applicable to project site) showing the layout of the Operation (submit a final version after all necessary adjustments have been made).</td>
<td>Business Registration/Certificate of Incorporation (if applicable).</td>
</tr>
<tr>
<td>Project Description (summary).</td>
<td>Indication of whether or not a Permit or Licence from any other Government entity is required or have been obtained. Submit Permit, Licence, or Proof of Application from relevant sector Agency.</td>
</tr>
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References


