

# **Analysis of Targeted Emission Reduction Possibilities in the Paso Del Norte**

## **Task 4: Volatile Organic Compound Emissions from Automotive Paint and Body Shops**

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The contents of this report are solely the responsibility of the authors and do not necessarily represent the official views of the TCEQ or UTEP.

**Abstract**

This project identifies and quantifies the VOC emissions from automotive paint and body shops in Ciudad Juárez using appropriate U.S. EPA-approved emission estimation methodologies. The VOC emissions resulting from this industry in Ciudad Juárez, in general, are difficult to be regulated or controlled due to many factors that are convoluted by state and local regulations, enforcement, security, politics, and the nature of business.

Fugitive emissions from the automobile paint and body shops are relatively insignificant compared to the area sources emissions reported for the city. Based on the average amount of paints and distillates used by the shops, as estimated from the surveyed data, the total VOC emissions from the paint shops in Ciudad Juárez was estimated to be 1.1 tons/yr.

Paint shops were observed to have very poor housekeeping of used paint and solvent residues which could result in soil contamination and air contamination. To assist in the good housekeeping practice for the industry, a similar Spanish version of the environment self-evaluation check list (U.S EPA, 2008) should be developed and distributed to the shops. In addition, it is recommended to promote the use of solvent recovery system to reduce VOC emissions at the shops with financial subsidies for the shops to purchase these devices.

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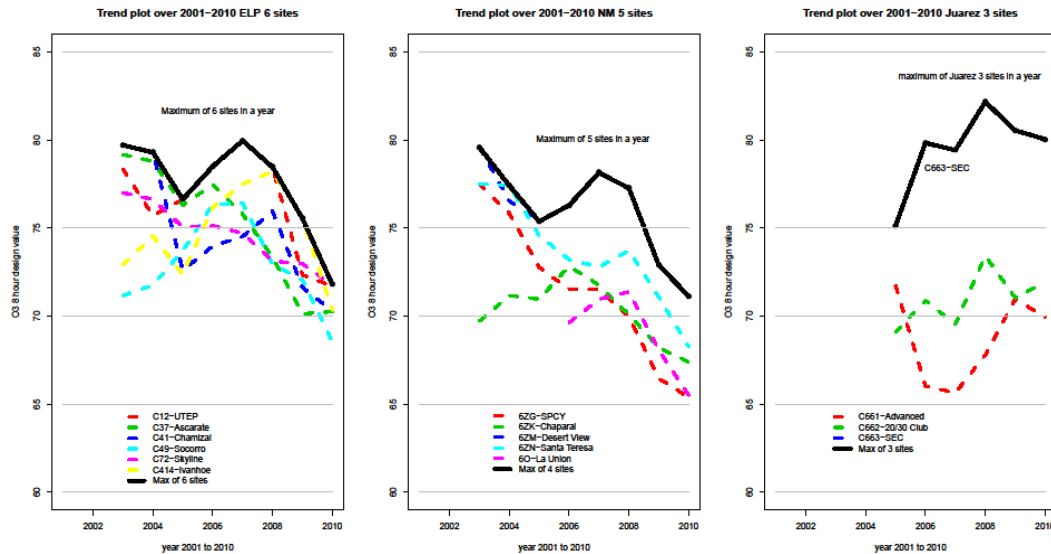
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## Chapter 1 Introduction

El Paso County was classified as an area of serious nonattainment of the 1-hour ozone National Ambient Air Quality Standard (NAAQS) under the federal Clean Air Act amendments in 1990. Subsequently, the Texas Commission on Environmental Quality (TCEQ) prepared a State Implementation Plan (SIP) for El Paso to reduce emissions of volatile organic compounds (ozone precursors) and achieved ozone attainment status for the county. The 1-hour NAAQS for ozone has been revoked since 1999 in all areas of the US, although some former 1-hour ozone nonattainment areas have continuing obligations to comply with the anti-backsliding requirements described in 40 CFR 51.905(a). The 8-hour ozone NAAQS of 0.08 ppmv (parts per million in volume) was adopted in 1997, replacing the 0.12 ppmv 1-hour ozone standard, and further modified by the U.S. Environmental Protection Agency (EPA) to 0.075 ppmv (73 FR 16436) in 2008. The EPA announced it would reconsider the 2008 NAAQS in 2009 and further proposed to lower the primary ozone standard to a range between 0.060 ppmv and 0.070 ppmv in 2010. In September 2011, the EPA Administrator rescinded the proposed revision and retained the 0.075 ppmv standard which remains in effect.

Air quality in El Paso has been improved since 1990. Currently, El Paso attains the 0.075 ppmv NAAQS for ozone. Figure 1.1 shows the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured reported for the three cities (El Paso, Texas, Ciudad Juárez, Chihuahua, and Sunland Park, New Mexico) in the Paso del Norte region (PdN), reported by the El Paso Metropolitan Planning Organization (Li et al 2011a). These cities encompassed in the PdN share a common airshed that has historically had similar air pollution problems.

Formation of tropospheric ozone involves numerous complicate photochemical and meteorological processes. It is, however, formed in the atmosphere primarily due to reactions of anthropogenic NO<sub>x</sub> and VOC emitted from urban regions. Data from a recent emissions inventories review indicate that area sources account for ~15% of NO<sub>x</sub> and ~45% of VOC emissions in the PdN (Li et al 2011b). Area sources are those air pollution sources considered too small and too numerous to be handled individually as point source emissions.



**Figure 1.1 Three-year moving average ozone design values at a) El Paso; b) Sunland Park; and c) Cd. Juárez stations for the PdN region**

Area sources are primarily subdivided into two groups characterized by the emission mechanism: 1) evaporative emissions, and 2) fuel combustion emissions. Sources of evaporative losses include gasoline service stations, solvent use, such as dry cleaning, degreasing, surface coating operations, automotive paint shops, architectural coatings, and leaking underground storage tanks. Standard emission inventories in México focus primarily, although not exclusively, on combustion processes. Little information exists on fugitive area emissions, particularly on emissions from gasoline stations and automotive paint shops.

There are approximately 150 to 200 automobile paint and body shops of various sizes operating in Ciudad Juárez. Most of these businesses are family-operated, small-size shops working on spot repair jobs and many times painting objects other than automobile bodies. The majority of the operations are highly mobile and seasonal and are not registered with the city's regulatory authority. Operators of these shops are typically not trained or educated through any formal apprenticeship programs and lack knowledge in health, safety, and environmental protection that is important in their profession.

In support of the State of Texas' effort to improve the quality of the PM and volatile organic compound (VOC) emissions inventories for the PdN region, the University of Texas at El Paso (UTEP), in collaboration with the Universidad Autónoma de Ciudad Juárez (UACJ) and the Instituto Tecnológico de Ciudad Juárez (ITCJ), was tasked by TCEQ to conduct a targeted emission inventory in Ciudad Juárez. The objectives of this task (Task 4) were to 1) update the existing emissions inventory data and 2) quantify the emission reductions and calculate the benefits of an expanded program of disseminating high-volume, low-pressure paint guns to those shops.

### **1.1 Project Description**

Fugitive VOC emissions from automotive paint and body shops have been identified by TCEQ as another major contributor to the PdN's ozone pollution. This task conducted a literature review on VOC emissions from automotive paint and body shops in Ciudad Juárez and identified all locations on a map. A survey was then conducted on 10 percent of the total number of the shops identified to characterize the types and quantities of chemicals used, types and quantities of paint guns used, points of emissions, operating hours, and the types of emission control devices installed, if any. Fugitive emissions from the shops were quantified using appropriate U.S. EPA-approved emission estimation methodologies.

### **1.2 Project Tasks**

This section defines the subtasks for implementing Task 4: VOC Emissions from Automotive Paint and Body Shops of the targeted emission inventory for Ciudad Juárez project. The subtasks are listed below followed by a description of the work performed.

#### **1.2.1 Identify the Locations of Automotive Paint and Body Shops with Geographical Coordinates on a Map**

UTEP conducted a literature review of all available information and documented the VOC emissions from the automotive paint and body shops in Ciudad Juárez. The locations of all automotive paint and body shops are graphically presented on a map with known geographical coordinates.

### **1.2.2 Conduct a Survey for Operations and Emission Control Practices at the Automotive Paint and Body Shops**

A survey form was developed and applied to 10 percent of the shops identified in Subtask 1.2.1.

At each of the shops, the data collected include, but are not limited to:

- a) Types of chemicals/paints used
- b) Quantities of chemicals/paints consumed each month
- c) Types and quantities of paint guns used
- d) Indoor or outdoor operations
- e) Ventilation system
- f) Emission control practice
- g) Operating hours
- i) Street address and/or geographic coordinates
- j) Amount of vehicles repaired per day, week, or month

### **1.2.3 Quantify VOC Emissions at the Automotive Paint and Body Shops**

Based on the information collected from Subtasks 1.2.1 and 1.2.2, emission factors from appropriate EPA models were used to develop fugitive VOC emissions for the paint and body shops as well as for this source category.

## **Chapter 2 Compilation of Available Data (Literature Review)**

This chapter presents the information on the locations, practice, and VOC emissions for the archived automotive and paint shops in Ciudad Juárez. General descriptions of the city's and PdN's area source emissions of VOCs, NO<sub>x</sub>, and other pollutants can be found in the Task 3 report and in the reports previously prepared by the research team (Li et al 2011a, 2011b).

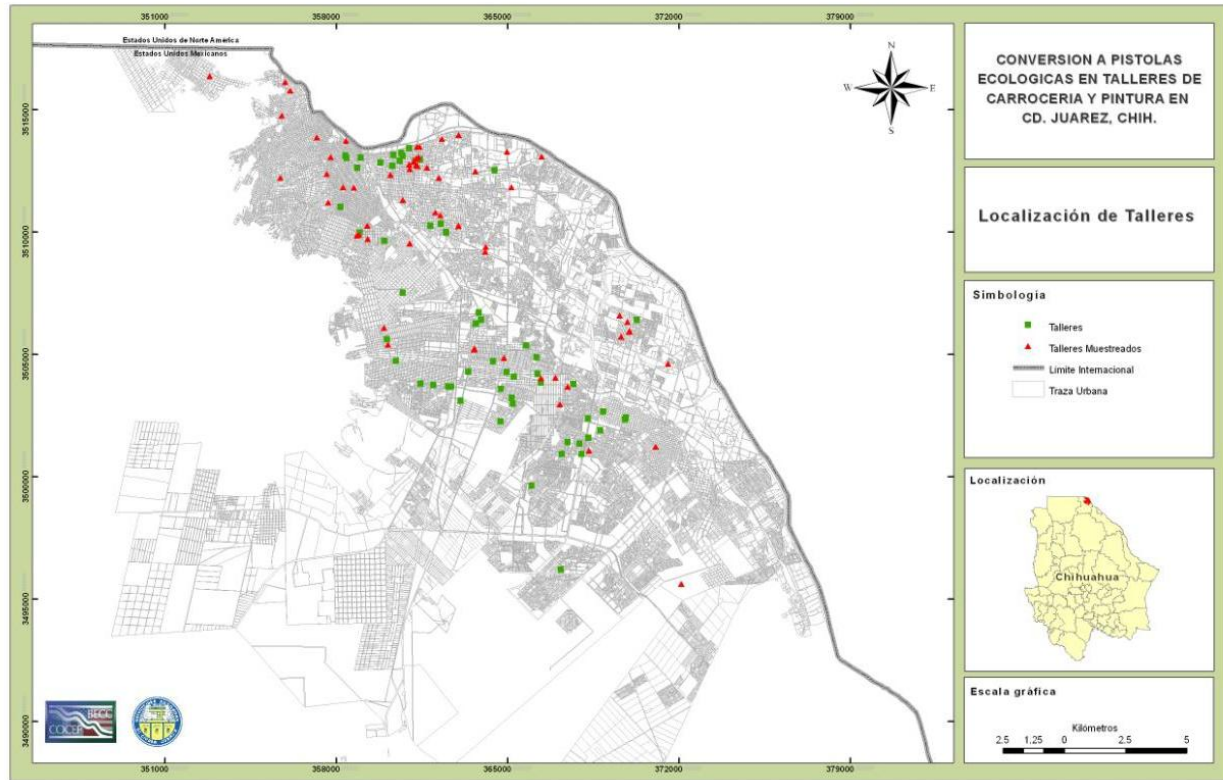
### **2.1 Paint Shop Study Report by UACJ 2011**

A UACJ final report (UACJ, 2011), obtained from personal communications with Ms. Briselda Duarte of BECC, presents findings of a paint shop study conducted during 2010 in Ciudad Juárez. The report was prepared on the basis of the region's census data and a field survey campaign. As mentioned previously that the automobile paint and body shop operation in Ciudad Juárez is highly mobile such that an accurate count of the shops in the city is near impossible. Indeed, the Dirección de Ecología Municipal of Ciudad Juárez "counted" 200 shops in a census of paint shops conducted in 1999 while a study conducted by the UACJ in 2007, titled "Inventario de Fuentes fijas de contaminación en Ciudad Juárez", found 167 shops in the city. In the UACJ 2011 report, it also stated a total of 164 shops in a different section.

The UACJ final report states that based on the data from the 2007 study, 139 shops were selected for the survey which was conducted by UACJ students during a 3-month period. The survey found that, of all the paint shops visited, 56 of them had closed (presumably due to violence and crime issues), 29 refused to participate in the survey, and only 59 (42%) actually participated in the survey. One noticed that there was an inconsistency in the total number of shops reported in the report. Nevertheless, it was judged unimportant whether the total number of the shops is 139 (as shown in a survey map) or 144 (as reported in the text), as both numbers appeared in the report. Special note is made on the protracted process of surveying due to many paint shop owners and operators not willing to participate in the survey in fear of jeopardizing their jobs, negatively affecting the city authorities' opinions on their business, and/or misuse of information by the surveyors.

The report indicates that approximately 20% of the shops have a cabin or enclosed area for painting but only a few of them have some types of vapor extraction and filtering system; 63% of the shops use traditional high pressure paint guns, 27% use low pressure guns and the remaining 10% use both types of guns. As part of the UACJ's project, a training program for paint shop operators was initiated and 60 low-volume low-pressure (LVLP) paint guns were distributed to the same number of shops, some at a workshop held on April 15, 2011 and the rest were delivered to the paint shops that did not have a representative at the workshop. In addition, the report (in page 6 of the report) states that only 28 paint shop operators attended the good-practices workshop and gives no indication of how many shops were represented by the attendees. Recipients of the LVLP guns did not agree to exchange their paint guns for the new ones because they intended to use their old paint guns to save costs. The report also shows the 139 paint shops in a regional map and differentiates those shops that participated in the survey from those who did not, although there is no differentiation between those that refused to be surveyed and those that were no longer in operation. Unfortunately, basic information such as the names, addresses, geographical coordinates, or contact persons could not be found in the report.

Two project-related Excel format documents were also provided by BECC (through Ms. Briselda Duarte). The first document contains the 57 paint shops that were no longer in operation at the time of survey and the second document contains the 49 paint shops to whom the LVLP paint guns had been distributed. This list was somehow incomplete (e.g., 6 without addresses, 2 with duplicate addresses, and 2 with duplicate street name and no street number). Although riddled with inconsistencies, this set of data was considered the most complete updated database and was used as the basis for our paint shop survey. Figure 2.1 shows the locations of these paint shops.



**Figure 2.1 Map of Ciudad Juárez with approximate locations of 139 paint shops reported by UACJ (2011). At least 56 of these points correspond to shops that were no longer operational by 2010.**

## **2.2 Paint Shop Study Report by ERG 2011**

The Center for Energy and Environmental Resources of the University of Texas at Austin and Eastern Energy Group, Inc. developed an emissions inventory for the municipality of Juárez for 2008 (ERG, 2011) and estimated the 2008 automobile body refinishing VOC emissions in Ciudad Juárez to be 313.3 tons per year (tpy). The report indicates that the Mexican Secretary of Environment and Natural Resources (Secretaría de Medio Ambiente y Recursos Naturales or SEMARNAT) had revised the specific emission factor developed for the 1999 México National Emissions Inventory to 318.96 kg VOC/employee (or 703.18 lb VOC/person). The ERG report did not contain a paint shop facility listing that could be used in this study.

### **2.3 Paint Shop Study Report by U.S.EPA 1999**

The U.S. Environmental Protection Agency in conjunction with the Center for Information on Air Pollution on the US- México Border (Centro de Información sobre Contaminación de Aire en la Frontera de la EE. UU.-México [CICA]) conducted a study on automobile body shop emissions in Ciudad Juárez (U.S. EPA, 1999). The U.S. EPA study did not determine the exact number of auto body shops operating in the Ciudad Juárez area because many of the operations are unlicensed small business and the number of operations fluctuated in accordance with local economics, politics, and safety. The report also states that previous studies from 1993-1994 funded by TNRCC (now TCEQ) and EPA had estimated that approximately 200 paint shops existed in Ciudad Juárez at that time, and that another study conducted by Dr. Octavio Chavez under contract with TNRCC had estimated over 150 shops, although it could not be determined which shops, if any, were listed in both datasets. The report did not provide references for the aforementioned TNRCC projects. The U.S.EPA (1999) study used a list provided by the Directory of Urban Development and Ecology (Dirección de Desarrollo Urbano y Ecología, or DDUE) in Ciudad Juárez that contained approximately 200 shops which could not be cross-checked with the surveys from the two previous studies. A group of team members were trained to perform the survey between September and October of 1996 on a total 156 paint shops. Furthermore, information on the total amount of paint and solvent sold by the four major paint distributors in the city was used to compare with those derived in the survey and to develop emission estimates.

The report indicated that approximately 95% of the surveyed shops did less than 6 jobs per week, where a job was defined as any application of paint to an automotive fixture; and over 90% of the shops reported performing only small touch-up or spot repairs. The majority of the shops responded that the majority of their jobs were performed in the summer and early fall which are times that are more conducive for ozone formation. The report estimated that VOC emissions from these auto body shops were 162.2 tpy with an upper limit of 324.4 tpy, considering a probable 300 shop population.

Comparisons between paint sales and survey reported use of paint were considered reasonable; whereas the amount of solvents sales and used were found to differ by “nearly and order of magnitude”. The authors inferred that auto repair shops in Ciudad Juárez consumed only a small amount of the solvents sold and that due to the informality of paint shops “any future attempt to obtain more detailed information would likely require the direct involvement of Mexican environmental officials.”

The U.S. EPA (1999) report concludes that auto body shops “have a limited contribution to VOC emissions” and that “the vast majority of the sources included in the survey are quite small, making most command and control options unrealistic and cost inefficient.” It then offers the following three recommendations for VOC emission reductions from auto body paint shops based on their potential implementation along with potential percentage reduction on emissions: 1) “general overall training and environmental awareness program (10-30%)”; 2) “spray equipment replacement & education program (10-30%)”; and 3) “introduction of low VOC paints and solvents (20-70%)”.

### **Chapter 3 Experimental Design of Paint Shop Surveys**

A survey form was developed to collect data about the amount of solvent and paint used by the paint shops in Ciudad Juárez. The survey was conducted at randomly selected paint shops to acquire information on the number of vehicles painted per week, operation conditions, emission control devices in use, and methods for clean up and disposal of unusable residues at each shop. The survey is composed of five sections:

- 1) Interviewer's basic information. This section records the name of the surveyor, date and time of survey, and surveyor's signature.
- 2) Description and location of the paint shop. This section records the name of the address, franchise owner, and both days and hours of operation.
- 3) Operations information. This section records the number of partial (minor) and full (complete automobile) repairs in relation to the day of the week.
- 4) Emission control practices. This section inquires information on the types and amounts of solvents used, how they were recovered, reused and/or disposed, the types and amounts of paint used and their manufacturers, the types of paint guns used and percentage of their total usage; and
- 5) Notes and comments

The data collected in the survey was used to develop VOC emission estimates for a typical paint shop and for the region. Appendix A shows a copy of the survey form used in the study. All filled out forms are included in Appendix B.

#### **3.1 Selection of Survey Sites**

Using the list of 50 paint shops that received LVLP paint guns (UACJ, 2011) and taking note that no addresses were provided for six of the paint shops listed, the remaining shops were assigned a randomly generated number using Excel's RND() function and then sorted by the number to determine the surveying order. The order, presented in Table 3.1, takes into account the transient nature of most paint shops in Ciudad Juárez. In Ciudad Juárez, the number of paint shops and their locations change very often making it difficult to locate a particular paint shop

at the time of surveying. The random order generated a list of shops for sampling. If a shop is determined (by physical inspection of its associated address) to be no longer in operation, the next shop in the ordered list is selected to make up the sample size. Since the actual population of paint shops in Ciudad Juárez could not be determined, and the best estimate of the number of existing shops is between 85 (UACJ, 2011) and 300 (U.S.EPA, 1999), a total of 15 shops were targeted for survey, which accounts for approximately 10% of a possible population of 150 shops in the city.

### **3.2 Surveying Method**

Due to limited resources (time and number of surveyors), it was decided that a new paint shop located near the address of a non-operational or non-existing paint shop selected from the list be used as a substitute. Furthermore, due to safety concerns (increased violence and road block) of travel within Ciudad Juárez, the survey team was asked to survey a nearby paint shop instead if the initially selected paint shop is no longer in service once the survey team arrived in the neighborhood. This was done to take advantage of the trip made and get information from a paint shop that happened to be located near the targeted paint shop. Surveys were performed between May 20 and 22, 2013 by a team that consisted of 3 members. The survey team took as many photographs (including time stamp and location that demonstrated the general appearance, equipment, material and emission control methods) as allowed at different paint shops. In total, 14 shops were surveyed, corresponding to 8 shops from the list and 6 substitution shops (for the 6 shops no-longer in service). Table 3.2 summarizes the shops and their locations where surveys were conducted.

**Table 3.1 Randomly Prearranged Surveying Order**

Order	Paint Shop Name	Address	RAND	Num
1	Taller González	Ave. Jilotepec # 7455	0.010	18
2	Servicio Delgado	Chapultepec y Anahuac, Col. Hidalgo	0.019	47
3	Taller Carrocería Segaso	Municipio Libre Sur # 2776	0.058	42
4	Taller Carrocería Castañeda	Vicente Guerrero y Argentina	0.060	40
5	Taller Calleros	Efrén Ornelas # 1521	0.061	12
6	Taller Mireles	Pino Suárez # 131	0.076	14
7	Taller Quezada	Ave. Jilotepec	0.122	1
8	Taller Carrocería L.A. Body Shop	Posada Pompa # 4647	0.148	37
9	Taller Herrera	Ave. Jilotepec # 7119	0.152	10
10	Taller Carrocería y pintura	Posada Pompa # 4628	0.253	27
11	Taller Carrocería y pintura	Vicente Suárez y Mpo. Libre	0.305	39
12	Taller Gaspar	Atenango # 3736	0.320	8
13	Taller Rodríguez	Antigua de Comercio	0.357	3
14	Taller carrocería y pintura	Armando González s/n	0.367	4
15	Taller Carrocería Quiñones	Costa Rica y Chapala # 1190	0.368	30
16	Taller Ortíz	Ave. Jilotepec e Iztazihuatl # 7662	0.396	17
17	Taller Colorado	Melquiades Alanis # 6231 Col. Universidad	0.451	45
18	Taller Carrocería Lalo's	Centeno # 6909 La Cuesta	0.457	29
19	Taller Carrocería Humer	Margaritas # 2121 y Texcoco	0.473	32
20	Taller Ruiz	Heróico Colegio Militar	0.511	16
21	Taller Carrocería y pintura	Hermanos Escobar # 211	0.521	28
22	Taller Campes Body Shop	Colombia # 362 Nte.	0.564	38
23	Taller Morreal	Berkelio # 240	0.576	19
24	Taller Carrocería Chabelo	Panamá # 473	0.578	31
25	Taller del Norte	Ave. Tecnológico # 5748 La Cuesta	0.582	44
26	Taller Autoservicio Vázquez	Vicente Suarez # 1537	0.594	36
27	Taller Multiservicio El Aguila 2	Valentín Fuentes	0.596	34
28	Taller La Iguana	Melquiades Alanis # 5205 Partido Díaz	0.611	46
29	Taller Escareño	Blvd. Oscar Flores # 5551	0.642	5
30	Taller Carrocería Impacto	Ecuador y Texcoco # 485	0.645	35
31	Taller Carrocería MM Competición	Neptuno # 1982	0.671	33
32	Taller Montecarlo	Ave. Tecnológico # 5657	0.680	43
33	Taller Pérez	Electricistas # 7445	0.691	13
34	Taller Carrocería Martín González	Rocha Savedra # 2035	0.704	41
35	Taller Vulcano	Blvd. Oscar Flores S. # 5834 Lomas del Rey	0.770	50
36	Taller Montero	Ave. Jilotepec	0.788	15
37	Taller Alvarez	F. Avila, Col. Avila	0.801	11
38	Taller Fong	Pino Suárez # 131	0.813	9
39	Taller Hugo's	Ramón Corona y Mejía	0.817	48
40	Taller López	Carlos Villarreal # 1885	0.886	7
41	Taller Pedroza	J.T. Rodríguez s/n	0.955	6
42	Taller Hernández	Berkelio # 240	0.965	2
43	Taller Díaz	Blvd. Oscar Flores S. # 2937 Melchor Ocampo	0.980	49
44	Taller Carrocería Automaster			21
45	Taller Servicio Mike's			22
46	Taller Carrocería Eduardo			23
47	Taller Carrocería Municipal			24
48	Taller Carrocería Pepe's			25
49	Taller Centro de Servicios			26

**Table 3.2 List of Paint Shops Surveyed and their Addresses**

<b>Paint Shop Name</b>	<b>Address</b>
Taller López	Carlos Villareal #1885 Col. Partido romero
Auto climas mult. Carrocería y pintura	Ignacio Mejía #485 zona centro
Body Work Paint	Ramón Corona #243 norte zona centro
Carrocería L.A. Body Shop	Posada Pompa #4647 Col. Magistral
Taller Meny	Manuel Gómez Morín #1614 Col. Satélite
MM Competición	Neptuno #1982 Col. Satélite
Carrocería Lalos	Centeno # Col. El Granjero
Vucano	Blvd. Oscar Flores #5834 Col. Romas del rey
Hummer	Texcoco #2121 Col. Margaritas
Segaso	Municipio L. Sur #2776 Col. Melchor Ocampo
Hummer Automotriz	Reforma y Municipio Libre Col. Melchor O
Automax	Av. Tecnológico #5257 Col. La Cuesta
Impacto	Ecuador y Texcoco #485 Col. Partido Romero
Multiservicios RT	Av. Jilotepec #7260 Col. Del Real

### 3.3 QA/QC Procedures

The three members of the surveying team were trained prior to performing the survey. All three members were present during the survey for safety concern and for assuring proper documentation of all survey forms. At the end of each of day, the team met with the team supervisor (Dr. Arturo Woocay) for debriefing and inspection of surveys and photographs. By the end of the week, the team, as a group, transcribed their survey results which included their comments and observations. Although these QA/QC procedures relied upon obtaining a consensus among the surveyors with respect to the information provided, none of the paint shops surveyed provided any written records of their operations, sales, transactions, inventories or material purchasing. The data acquired through the survey relied on the memory and veracity of the interviewees.

### 3.4 Analysis of the Survey

A total of fourteen questionnaires were completed and used in estimating the VOC emissions from the city automotive body paint shops. From the survey, twelve out of fourteen of the automotive body paint shops stated the use of “low volume, low pressure” (LVLP) paint guns. Three stated using standard paint guns with one from these three also used a LVLP gun. Table 3.3 shows the list of paint shops that use the LVLP paint guns. All paint shops stated to have discontinued the use of Lacquer paints and stated the use of Enamel paints. All fourteen body shops reported the use of petroleum distillates as the solvent for surface preparation. In addition, two shops reported the use of degreaser and acrylic for surface preparation.

The survey also included questions regarding the painting operations/conditions and the results are shown in Table 3.4. This table shows that 11 out of 14 paint shops used a painting booth with a hood. Almost all paint shops surveyed operate from Monday to Saturday and from 9:00 AM to 5:00 or 6:00 PM with the exemptions of one shop that does not operate on Tuesday, Thursday and Saturday and two shops that also operate on Sundays. Table 3.5 shows the operating days and operating hours for the paint shops surveyed. The average jobs for most of the shops are minor repairs. From the survey, it is determined that, on average, a shop performs two minor repairs per week, with a maximum of 6 and a minimum of 1. For major repairs, the number is much lower at an average of less than  $\frac{3}{4}$  of a car per week, with a maximum of 2 and a minimum of 0. Tables 3.6 summarizes the results for minor auto repairs performed per week at each shop that participated in the survey while Table 3.7 shows that same answers for major repairs.

### 3.5 VOC Control Devices

The survey team was not allowed to inspect or take pictures of the VOC emission control devices and the painting facilities. However, the VOC control devices used in the paint shops could be identified from the interviews with the operators. Although almost all surveyed paint shops have some types of enclosure to control paint mist, the VOC emission control systems were considered inadequate because the filters and/or exhaust hoods used in the shops do not effectively capture the VOCs or prevent them from entering into the atmosphere and these

shops are not likely to be licensed or regulated by the city authorities for emission control and/or waste disposal.

**Table 3.3 Use of Paint Guns at Paint Shops**

Paint shop	Standard paint gun	LVP paint guns
Taller Lopez		•
Auto climas mult. Carrocería y pintura	•	•
Body Work Paint	•	
Carrocería L.A. Body Shop		•
Taller Meny		•
MM Competición		•
Carrocería Lalos	•	
Vucano		•
Hummer		•
Segaso		•
Hummer Automotriz		•
Automax		•
Impacto		•
Multiservicios RT		•

**Table 3.4 Painting Conditions of Surveyed Paint Shops**

Paint Shop	Operation Conditions
Taller Lopez	Painting booth and Hood
Auto climas mult. Carrocería y pintura	Painting booth and Hood
Body Work Paint	Painting booth and Hood
Carrocería L.A. Body Shop	Open air
Taller Meny	Open air
MM Competición	Painting booth and Hood
Carrocería Lalos	Open air
Vucano	Painting booth and Hood
Hummer	Painting booth and Hood
Segaso	Painting booth and Hood
Hummer Automotriz	Painting booth, filter and Hood
Automax	Painting booth and filter
Impacto	Painting booth and filter
Multiservicios RT	Painting booth and filter

**Table 3.5 Paint Shops Operating Hours and Days**

<b>Paint shop</b>	<b>Sunday</b>	<b>Monday</b>	<b>Tuesday</b>	<b>Wednesday</b>	<b>Thursday</b>	<b>Friday</b>	<b>Saturday</b>	<b>Operating Hours</b>
Taller Lopez		•	•	•	•	•	•	9:00am-19:00pm
Auto climas mult. Carrocería y pintura		•	•	•	•	•	•	9:00am-15:00pm
Body Work Paint		•		•		•		10:00am-16:00pm
Carrocería L.A. Body Shop	•	•	•	•	•	•	•	9:30am-18:00pm
Taller Meny	•	•	•	•	•	•	•	9:00am-18:00pm
MM Competición		•	•	•	•	•	•	10:00am-18:00pm
Carrocería Lalos		•	•	•	•	•	•	9:00am-18:00pm
Vucano		•	•	•	•	•	•	10:00am-18:00pm
Hummer		•	•	•	•	•	•	9:00am-18:00pm
Segaso		•	•	•	•	•	•	9:00am-17:00pm
Hummer Automotriz		•	•	•	•	•	•	9:00am-17:00pm
Automax		•	•	•	•	•	•	9:00am-19:00pm
Impacto		•	•	•	•	•	•	9:00am-18:00pm
Multiservicios RT		•	•	•	•	•	•	9:00am-19:00pm

**Table 3.6 Minor Auto Repairs Performed per Week**

<b>Paint Shop</b>	<b>Sunday</b>	<b>Monday</b>	<b>Tuesday</b>	<b>Wednesday</b>	<b>Thursday</b>	<b>Friday</b>	<b>Saturday</b>
Taller Lopez	-	1	1	1	1	1	1
Auto climas mult. Carrocería y pintura	-	0	.25	0	0	0	0
Body Work Paint	-	0	-	0	.166	0	-
Carrocería L.A. Body Shop	0	1	0	1	1	0	0
Taller Meny	0	1	0	0	1	0	0
MM Competición	-	1	0	0	0	0	0
Carrocería Lalos	-	1	0	1	0	1	0
Vucano	-	0	0	1	0	1	0
Hummer	-	1	0	1	0	1	0
Segaso	-	0	1	1	0	0	0
Hummer Automotriz	-	0	0	1	0	0	0
Automax	-	0	0	1	0	0	0
Impacto	-	0	1	1	1	0	0

**Table 3.7 Major Auto Repairs Performed per Week**

<b>Paint Shop</b>	<b>Sunday</b>	<b>Monday</b>	<b>Tuesday</b>	<b>Wednesday</b>	<b>Thursday</b>	<b>Friday</b>	<b>Saturday</b>
Taller Lopez	-	0	0	1	0	0	0
Auto climas mult. Carrocería y pintura	-	0	0	.25	0	0	0
Body Work Paint	-	0	-	.125	-	0	-
Carrocería L.A. Body Shop	0	0	1	0	0	0	0
Taller Meny	0	0	1	0	0	0	0
MM Competición	-	0	0	.25	0	0	0
Carrocería Lalos	-	0	0	0	0	0	1
Vucano	-	0	0	.25	0	0	0
Hummer	-	0	0	.25	0	0	0
Segaso	-	0	0	1	0	0	0
Hummer Automotriz	-	0	2	0	0	0	0
Automax	-	0	1	0	0	0	0
Impacto	-	0	1	0	0	0	0
Multiservicios RT	-	1	1	1	0	0	0

## **Chapter 4 VOC Emissions from Paint Shops in Ciudad Juárez**

Information obtained from the survey was used to develop emission estimates for individual shops and for the automobile paint and body shop industry in Ciudad Juárez. Two sources of VOC emissions are considered for the auto body paint shops: 1) Fugitive VOC emissions from the paint used; and 2) Fugitive emissions from the solvent used.

### **4.1 Fugitive VOC Emissions from Painting**

According to the U.S. EPA (1994), “the solid portion of coating remains on substrate to form the film; therefore, the VOC content of a coating ideally would be related to its volume solids. There is yet, however, no generally accepted method for the determination of the solids content of the coating”. Therefore, EPA related the mass of VOC in a coating to the combined volumes of VOC and solids as the mass of VOC per unit volume of coating minus volume of water and any negligible photo chemically reactive (“exempt”) compounds. The VOC contents applied in this study represented the amount of VOC in the coating as it is applied, that is after the coating has been reduced or diluted by the painter prior to its application (U.S. EPA, 1994). The VOC emission factors for paint coating and solvent usage were used in another EPA study to determine the fugitive VOC emissions from automobile body shops in Ciudad Juárez (U.S. EPA, 1999). Three types of paints (Enamel, Urethane and Clear Coats) were used by the body shops in Ciudad Juárez and therefore three emission estimates were developed for use of Enamel paint, Urethane paint, and “other” paint. They were developed based on the emission factors used by U.S. EPA (1999).

Because our survey did not make distinction among the coating types (primer, base coat or clear coat) an average of the emission factors for the three types of coating presented in Table 2 of U.S. EPA (1999) were used. In this study, VOC emissions from the use of Enamel paint was estimated to be 639.09 gr/ltr, a figure obtained by averaging the emission factors for Primer Enamel, Base Coat Enamel, and Clear Coat Enamel (611.13 gr/ltr, 635.10 gr/ltr, and 671.05 gr/ltr, respectively) as reported by U.S. EPA (1999). Similarly, VOC emissions for use of Urethane paint were developed by averaging EPA’s emission factors for Primer Urethane, Base

Coat Urethane, and Clear Coat Urethane (515.27 gr/ltr, 623.12 gr/ltr, and 527.25 gr/ltr, respectively). For the “other” type of paint, the figure (838.81 gr/ltr) represents the average of emission factors for Primer Coat, Base Coat and Clear Coat. These emission factors were compared to those reported in another study (U.S. EPA, 1994) and it was found that the VOC emission estimate for use of Enamel paint falls well within the range of 575.17 to 718.65 gr/ltr, as reported in Table 3.1 of U.S. EPA (1994). Emission factors for the “other” type paint and Urethane paint used in the study could not be compared since there are no emission factors reported in the literature for these types of paint. However, they do not differ much from those reported by U.S. EPA (1999) for similar types of coating. These emission factors were used for estimating VOC emissions from painting in the shops by multiplying the emission factor for each type of paint by the amount of paint used. Table 4.1 shows the VOC emission estimates for the automotive paint shops surveyed.

#### **4.2 Fugitive VOC Emissions from Solvent Use**

Fugitive VOC emissions were estimated with the use of the petroleum distillates emissions factor of 768.11 gr/ltr, a value reported by the U.S. EPA (1999). This figure is similar to the value (765 gr/ltr) reported in Table 3.1 of an U.S. EPA study (U.S. EPA 1994). VOC emissions from solvent use were estimated by multiplying the emission factor of 768.11 gr/ltr by the corresponding amount of solvent use in liters for each of the paint shops. Table 4.2 shows the solvent use VOC emissions estimated for the automotive paint shops surveyed.

#### **4.3 VOC Emissions for Ciudad Juárez Automobile Painting Industry**

VOC emission estimates developed in Sections 4.1 and 4.2 for the shops were used to project the VOC emissions from the auto painting industry in Ciudad Juárez. It was assumed that every shop in the industry uses the same proportion of the types of paint as surveyed in this study and that all shops use petroleum distillates as their solvent.

Three scenarios were evaluated in this study:

- 1) All shops use the average amount of paints and distillates as estimated from the survey;

- 2) All shops use the maximum amount of paints and distillates as estimated from the survey; and
- 3) All shops use the minimum amount of paints and distillates as estimated from the survey.

**Table 4.1 VOC Emissions from Painting**

Paint shop	Total Enamel used (lbs/mo.)	Total Urethane used (lbs/mo.)	Total other used (lbs/mo.)	VOC Emissions (Kg/mo.)	VOC Emissions (tons/mo.)
Taller Lopez	2	8	0	5.720	0.00631
Auto climas mult. Carrocería y pintura	4	0	0	2.556	0.00282
Body Work Paint	4	0	0	2.556	0.00282
Carrocería L.A. Body Shop	0	8	0	4.442	0.00490
Taller Meny	0	16	3	11.4	0.01257
MM Competición	4	24	16	29.302	0.0323
Carrocería Lalos	12	12	0	14.332	0.01580
Vucano	0	2.5	2.5	3.485	0.00384
Hummer	1	15	0	8.967	0.00988
Segaso	0	6	0	3.331	0.00367
Hummer Automotriz	0	16	0	8.883	0.00979
Automax	2	8	0	5.720	0.00631
Impacto	0	12	0	6.663	0.00734
Multiservicios RT	0	8	0	4.442	0.00490
Total Emissions					0.12324

**Table 4.2 VOC Emissions from Solvent Use**

Paint shop	Total solvent used (lts/mo.)	VOC Emissions (Kg/mo.)	VOC Emissions (tons/mo.)
Taller Lopez	80	61.449	0.0677
Auto climas mult. Carrocería y pintura	6	4.609	0.0051
Body Work Paint	2	1.536	0.0017
Carrocería L.A. Body Shop	32	24.580	0.0271
Taller Meny	24	18.435	0.0203
MM Competición	40	30.724	0.0339
Carrocería Lalos	10	7.681	0.0085
Vucano	5	3.841	0.0042
Hummer	30	23.043	0.0254
Segaso	8	6.145	0.0068
Hummer Automotriz	32	24.580	0.0271
Automax	10	7.681	0.0085
Impacto	27	20.739	0.0229
Multiservicios RT	25	19.203	0.0212
Total Emissions			0.2803

Table 4.3 shows the estimated VOC emissions from the use of paint for the Juárez auto painting industry for the 3 emission scenarios whereas Table 4.4 shows that for solvent use for the industry. Overall, fugitive emissions from the automobile paint and body shops are relatively insignificant compared to the area sources emissions reported for the city.

**Table 4.3 VOC Emissions from Painting in Ciudad Juárez**

Scenario	Total Enamel used (lts/mo.)	Total Urethane used (lts/mo.)	Total other used (lts/mo.)	Enamel VOC Emissions (gr/mo.)	Urethane VOC Emissions (gr/mo.)	Other VOC Emissions (gr/mo.)	VOC Emissions (Kg/mo.)	VOC Emissions (tons/mo.)
First Scenario	43.49	435.58	27.66	27794.02	241838.38	23201.49	292.83	0.3228
Second Scenario	113.00	879.50	85.50	72217.17	488307.2	71718.26	632.24	0.696
Third Scenario	36	383.5	31.5	23007.24	212923.04	26422.52	262.35	0.289

**Table 4.4 VOC Emissions from Solvent Use in Ciudad Juárez**

Scenario	Total solvent used (lts/mo.)	VOC Emissions (Kg/mo.)	VOC Emissions (tons/mo.)
First scenario	1345	1033.72	1.14
Second Scenario	3771	2896.54	3.19
Third Scenario	417	320.30	0.35

#### 4.4 VOC Mitigation Strategies and Cost Estimates

Our survey indicated that the use of the LVLP paint guns is still a desirable practice for the paint shops in Ciudad Juárez. Paint shops have continued to use LVLP paint guns since the pilot study in 2011 when LVLP paint guns were offered free of charge to the shops. Thus, it is recommended that the offer of free LVLP paint guns be continued. LVLP paint guns use low volume of air at low pressure (9.5 to 10 psi) to atomize coatings and because atomize spray leaves the gun at lower velocity than in conventional air spraying, lower particle “bounce” can be achieved and as a result higher transfer efficiency. LVLP guns use a substantially smaller volume of air for paint atomization than the HVLP spray guns (45% to 60% less). Consequently, energy cost for air compression is less than HVLP and standard spray guns (U.S. EPA, 1994).

The mechanism used in atomization and delivery of the paint directly affects the efficiency of the painting process. Transfer efficiency is the ratio of the amount of coating solids deposited onto the surface of the coated part to the total amount of coating solids that exit the spray gun nozzle. The waste paint directed outside the main spray pattern and not deposited onto the vehicle surface is referred to as overspray. Testing conducted by the National Institute for Occupational Safety and Health (NIOSH) in an equipment manufacturer’s test facility, demonstrated that over spray concentration was reduced by a factor of 2, and there was a 30% increase in the ratio of paint film thickness to mass of paint applied when a HVLP spray gun was used. The results indicate that using a HVLP paint gun can reduce paint usage and over spray

production, resulting in noticeable lower worker exposures (Heitbrink, 1996; U.S. EPA, 1997; U.S. EPA, 1998; NIOSH, 1996). While the initial cost of acquiring a HVLP or LVLP paint gun can be greater as compared to standard paint guns, the benefits in paint saving, health improvement, and VOC emissions reduction can easily justify the use of these equipment. However, for this study the emission benefit of switching from standard paint guns to LVLP paint guns is difficult to assess since the benefit could only be measured by the amount of paint saved while the decrease of paint used may very well be caused by the depressed economy rather than by the use of paint saving instrument. Furthermore, since in this study detail information about the painting process could not be assessed. The amount of energy saving and potential benefits of the LVLP paint guns could not be measured. Nevertheless, a cost analysis for acquiring a HVLP and LVLP paint gun is presented below since there are potential benefits associated to the use of a LVLP paint gun.

Costs presented in this section for the HVLP and LVLP paint guns should be considered for comparison purposes only because the parameters used to estimate the costs were based on the assumption that none of the not surveyed paint shops in the city industry have either a HVLP or LVLP paint gun. Furthermore, the characteristic of the painting process and their technical needs for a painting gun may vary significantly. Thus, costs can vary significantly. Costs were estimated by considering a Transtar 1.3 mm HVLP paint gun and a Transtar 1.3 mm LVLP from Transtar Autobody Technologies, Inc. It was assumed that for small to medium paint shops two paint guns are needed. Thus, the unit cost of each of the paint guns was multiplied by the number of shops and the result is the total cost of acquiring either a HVLP or a LVLP paint gun. Table 4.5 presents the unit cost and total cost in dollars of acquiring HVLP and LVLP paint guns for 42 (not-surveyed) paint shops in Ciudad Juárez.

**Table 4.5 HVLP and LVLP Unit and Total Costs**

Type of Paint gun	Unit Cost	Total Cost
Transtar 1.3 mm HVLP	\$163.99	\$13,775.16
Transtar 1.3 mm LVLP	\$217.49	\$18,269.16

From the survey, it was determined that only 14% of the paint shops have a solvent recovery system. In Ciudad Juárez, it is not a common practice to contract companies to haul the paint or solvent residues (or the waste); instead a common practice is to leave the solvent to dry out uncontrolled. A potential mitigation strategy is to provide a solvent recovery system to any shops interested in reducing VOC emissions.

A cost analysis was performed considering two solvent recovery systems designed for small and medium shops. The Persyst Enterprises, Inc. Side winder M2 solvent recovery system and Safety-Kleen Minimizer III Recycling System-110V were considered. The costs in dollars of the solvent recovery systems are presented as capital costs. Table 4.6 presents the capital costs of both solvent recovery systems.

**Table 4.6 Solvent Recovery Systems Capital Costs**

Solvent Recovery System	Capital Cost
Side winder M2	\$3,943.09
Minimizer III Recycling System-110V	\$6,055.00

## **Chapter 5 Summary and Recommendations**

Fugitive VOC emissions from the automobile paint and body shops in Ciudad Juárez were estimated and the results were presented in Chapter 4. Overall, the VOC emissions resulting from this industry in Ciudad Juárez are difficult to be regulated or controlled. This can be attributed to the following reasons. First, the number of paint shops in Ciudad Juárez fluctuates fairly often over time as this type of business tends to be family- owned, small-size, seasonal, unregistered business. A timely reliable archive of the shops and quantification of their business practice and fugitive emissions are extremely difficult without the help and significant commitment of the local authorities. Even so, efforts for rendering such information could be severely hindered by local politics, crime rates, safety concerns, public attention, distrust of the authorities, etc. that are ubiquitous currently in the city. Second, the information such as paint and solvent use, business practice, and number of jobs conducted provided by the participating paint shops were somehow incomplete for the same considerations as mentioned in the previous paragraph.

The informal nature of the paint shops in Ciudad Juárez makes it difficult to determine the exact location and number of paint shops in the city. This limits the possibility of determining a representative sample size. Currently, no database containing information regarding the location, operation and quantity of the paint shops in Ciudad Juárez is available. It is therefore recommended to directly involve Mexican environmental and city authorities to develop a database with this type of information. The information reported in this survey was derived based on the data provided by paint shops personnel which can only be considered the best available without verification. Thus, it is recommended as a good practice for paint shops to keep records of their operations and painting process. Future research to document the painting procedures and use of chemicals by the paint and body shops in Ciudad Juárez is needed.

Based on the information gathered and observations made at the field the following recommendations are made.

- Paint shops were observed to have very poor housekeeping of used paint and solvent residues which could result in soil contamination and air contamination. All paint shops visited in this study left rags with solvents to evaporate for future disposal. It is recommended that the shops use marked and properly sealed containers to store the used and empty paint containers and rags.
- To assist in the good housekeeping practice for the industry, a similar Spanish version of the environment self-evaluation check list (U.S EPA, 2008) should be developed and distributed to the shops.
- It is recommended to promote the use of solvent recovery system to reduce VOC emissions at the shops with financial subsidies for the shops to purchase these devices.

## References

Li, W.W., Fitzgerald, R., Yang, H.L., Yang, H.Y., Olvera, H., Cheu, K.R.L., 2011a. Conceptual Model for Ozone Reduction in El Paso, Texas. Submitted to the El Paso MPO, Dept. of Civil Engineering, the University of Texas at El Paso. El Paso, TX, 272 pages.

Li, W.W., Yang, H.Y., Olvera, H., Cheu, K.R.L. Fitzgerald, R., Yang, H.L., 2011b. Emission Inventory Review and Improvement Plan. Submitted to the El Paso MPO, Dept. of Civil Engineering, the University of Texas at El Paso. El Paso, TX, 79 pages.

National Institute for Occupational Safety and Health (NIOSH, 1996) "NIOSH Hazard Controls" Publication No.96-106, Cincinnati, Ohio

Heitbrink, W.A., Verb, R.H., Fischbach, T.J., Wallace, M.E. A Comparison of Conventional and High Volume-Low Pressure Spray-Painting Guns. Am. Ind. Hyg. Assoc. J. (57)/March 1996 pp. 304-310.

U.S. Environmental Protection Agency (EPA, 2008). A self-evaluation checklist of best practices for auto refinish shops and schools. Available online Accessed June 15 2013. <http://purl.access.gpo.gov/GPO/LPS122216>

U.S. Environmental Protection Agency (EPA, 1997). "New Chemicals Environmental Technology Initiative: Automotive Refinishing Industry Isocyanate Profile". Research Triangle Park: EPA, EPA contract 68-D4-0098.

U.S. Environmental Protection Agency (EPA, 1998). "Autobody Refinishing General Best Shop Practices. Research Triangle Park: EPA, EPA-744-R-98-008.

U.S. Environmental Protection Agency (EPA), 1999. "Emissions and Prevention/Control Techniques for Automobile Body Shops in Ciudad Juárez, México. U.S.-México Border Information Center on Air Pollution (Centro de Información sobre Contaminación de Aire en la Frontera de la EE. UU.-México)". Research Triangle Park: EPA, EPA 456/R-99-006.

U.S. Environmental Protection Agency (EPA), 1994. "Alternative control Techniques Document: Automobile Refinishing". Research Triangle Park: EPA-435/R-94-031.

Universidad Autónoma de Ciudad Juárez (UACJ), 2011. "Conversión a Pistolas Ecológicas en Talleres de Carrocería y Pintura de Ciudad Juárez, CHIH. Ciudad Juárez: UACJ-BECC".

Eastern Energy Group (ERG), 2011. "2008 Emissions Inventory of the Municipality of Juárez, Chihuahua, Mexico". The University of Texas at Austin & Eastern Energy Group, Center for Energy and Environment Resources. Austin: UT Austin.

**APPENDIX A**

## **UTEP Ciudad Juárez Area Source Emissions Inventory**

<b>Autobody Shop</b>	<b>Year: 2013</b>
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**UTEP Operator (s):** Name(s): \_\_\_\_\_ Signature(s): \_\_\_\_\_

Date and Time of Visit: Date: \_\_\_\_\_ Time: \_\_\_\_\_  
 \_\_\_\_\_ AM/PM

**FACILITY DESCRIPTION/LOCATION**

Facility Name: \_\_\_\_\_

Location Street and Number: \_\_\_\_\_ Colonia: \_\_\_\_\_

Operating Days: Sun Mon Tue Wed Thu Fri Sat  
 Operating Hours: from \_\_\_\_\_ AM to \_\_\_\_\_ PM

**PRODUCTION INFORMATION:**

How many vehicles do you paint per week?

Day	Sunday	Monday	Tuesday.	Wednesday	Thursday	Friday	Saturday
Partial/Minor Repair							
Full/Complete Repair							

**OPERATIONS INFORMATION**

Solvent Used? (circle the report time in each question)

Toluene \_\_\_\_\_ liters per day month or year  
 Xylene \_\_\_\_\_ liters per day month or year  
 Petroleum Distillates \_\_\_\_\_ liters per day month or year  
 Others ? \_\_\_\_\_ liters per day month or year

Used Solvents? (Circle one in each question)

Do you have a solvent recovery system? Yes or No  
 Do you reuse solvents? Yes or No  
 Do you reuse solvents? Yes or No

How do you handle scrap solvents? Unattended Put down the drain stored for  
collection

How much paint do you use per week/month/year (circle one)

lacquer \_\_\_\_\_ liters  
 enamel \_\_\_\_\_ liters  
 waterborne \_\_\_\_\_ liters  
 urethane \_\_\_\_\_ liters  
 other \_\_\_\_\_ liters, describe \_\_\_\_\_

Manufacturer of the paint?

Mexico \_\_\_\_\_ / \_\_\_\_\_ percent  
 United States \_\_\_\_\_ / \_\_\_\_\_ percent  
 Other (Where?) \_\_\_\_\_ / \_\_\_\_\_ percent

What type of spray gun do you use? If more than one, give percentage for each one.

Standard air gun \_\_\_\_\_ high-volume low-pressure (HVLV) \_\_\_\_\_  
 \_\_\_\_\_  
 Standard electric gun \_\_\_\_\_  
 Other \_\_\_\_\_ describe \_\_\_\_\_  
 \_\_\_\_\_

What is your painting work environment and emission control?

Work space (Circle one)	Emission Control (Check with "√")		
	Exhaust	Vent/Hood	Filter
Open Air			
In shelter with booth			
Under roof without booth			
Enclosed booth			

**Comments/Notes:**

## **UACJ Ciudad Juárez Emisiones por Fuentes de Área**

<b>Taller de Pintura</b>	<b>Año: 2013</b>
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**Entrevistador UACJ (s):** Nombre(s): \_\_\_\_\_ Firma(s): \_\_\_\_\_

Fecha y Hora de visita: Fecha: \_\_\_\_\_ Hora: \_\_\_\_\_  
AM/PM

### **DESCRIPCIÓN/UBICACIÓN DE ESTACIÓN**

Nombre del Negocio: \_\_\_\_\_

Localización Calle y Número: \_\_\_\_\_ Colonia: \_\_\_\_\_

Días de operación: Dom Lun Mar Mier Jue Vie Sab

Horas de operación: De \_\_\_\_\_ AM a \_\_\_\_\_ PM

### **INFORMACION DE PRODUCCION:**

Cuantos vehículos pinta a la semana?

Día	Domingo	Lunes	Martes.	Miércoles	Jueves	Viernes	Sábado
Parcial/Menor Reparación							
Todo/Completo Reparación							

### **INFORMACION DE LAS OPERACIONES**

Solvente Usado? (circule el time del reporte en cada pregunta)

Tolueno \_\_\_\_\_ litros por día mes o año

Xyleno \_\_\_\_\_ litros por día mes o año

Destilados de Petróleo \_\_\_\_\_ litros por día mes o año

Otros ? \_\_\_\_\_ litros por día mes o año

Solventes usados? (Circule un en cada pregunta)

Cuenta con un sistema de recuperación de solventes? Si o No

Reutiliza los solventes? Si o No

Como desecha los solventes? Los deja evaporar Al drenaje Los guarda para su recolección

Cuanta pintura utiliza por semana/mes/año (circule uno)

Laca \_\_\_\_\_ litros  
 Esmalte \_\_\_\_\_ litros  
 Transmitidas por agua \_\_\_\_\_ litros  
 uretano \_\_\_\_\_ litros  
 otro \_\_\_\_\_ litros, describa \_\_\_\_\_

Manufactura de la pintura?

México \_\_\_\_\_ / \_\_\_\_\_ porcentaje  
 Estados Unidos \_\_\_\_\_ / \_\_\_\_\_ porcentaje  
 Otro (Donde?) \_\_\_\_\_ / \_\_\_\_\_ porcentaje

Que tipo de pistola para pintar usa? Si es mas de una proporcione porcentaje de use para cada una

Pistola de aire estándar \_\_\_\_\_ Pistola de alto volumen baja presión (HVLP) \_\_\_\_\_  
 \_\_\_\_\_  
 Pistola eléctrica estándar \_\_\_\_\_  
 Otra \_\_\_\_\_ describa \_\_\_\_\_  
 \_\_\_\_\_

Balo que condiciones pinta y cuáles son sus controles de emisión?

Espacio de trabajo (Circule uno)	Control de Emisión (Marcar con "√")		
	Escape	Ventilación/Campana	Filtro
Aire libre			
Bajo techo con cabina			
Bajo techo sin cabina			
En cabina cerrada			

**Comentarios/Notas:**

**APPENDIX B**

**UACJ Ciudad Juárez Emisiones por Fuentes de Área**

<b>Taller de Pintura</b>	<b>Año: 2013</b>
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Entrevistador UACJ (s): Nombre(s): ERICK AYALA Firma(s): [Signature]  
 Fecha y Hora de visita: Fecha: 21 Mayo 2013 Hora: 10:30 (AM/PM)

**DESCRIPCIÓN/UBICACIÓN DE ESTACIÓN**

Nombre del Negocio: Taller López  
 Localización Calle y Numero: CARLOS VILLARREAL #1885 Colonia: Partido Romo  
 Días de operación: Dom Lun Mar Mier Jue Vie Sab  
 Horas de operación: De 9:00 AM a 7:00 PM

**INFORMACION DE PRODUCCION:**

Cuantos vehículos pinta a la semana?

Día	Domingo	Lunes	Martes.	Miércoles	Jueves	Viernes	Sábado
Parcial/Menor Reparación	-	1	1	1	1	1	1
Todo/Completo Reparación	-	0	0	1	0	0	0

**INFORMACION DE LAS OPERACIONES**

Solvente Usado? (circule el time del reporte en cada pregunta)

Tolueno - litros por día mes o año  
 Xyleno - litros por día mes o año  
 Destilados de Petróleo Thinax 20 litros por día mes o año POY SEMANA  
 Otros ? \_\_\_\_\_ litros por día mes o año

Solventes usados? (Circule un en cada pregunta)

Cuenta con un sistema de recuperación de solventes? Si o (No)  
 Reutiliza los solventes? (Si) o No

Como desecha los solventes? Los deja evaporar Al drenaje Los guarda para su recolección

Cuanta pintura utiliza por semana/mes/año (circule uno)

Laca - litros  
 Esmalte 2 litros POY MES  
 Transmitidas por agua - litros  
 uretano 8 litros POY MES  
 otro - litros, describa \_\_\_\_\_

Manufactura de la pintura?

México \_\_\_\_\_ / \_\_\_\_\_ porcentaje  
 Estados Unidos 100 / 100 porcentaje *50% "Sayer Lack" y "Diamond"*  
 Otro (Donde?) \_\_\_\_\_ / \_\_\_\_\_ porcentaje

Que tipo de pistola para pintar usa? Si es mas de una proporcione porcentaje de use para cada una

Pistola de aire estándar \_\_\_\_\_ Pistola de alto volumen baja presión (HVLP) ✓  
 Pistola eléctrica estándar \_\_\_\_\_  
 Otra \_\_\_\_\_ describa \_\_\_\_\_

Bajo que condiciones pinta y cuáles son sus controles de emisión?

Espacio de trabajo (Circule uno)	Control de Emisión (Marcar con "✓")		
	Escape	Ventilación/Campana	Filtro
Aire libre			
Bajo techo con cabina	✓		
Bajo techo sin cabina			
En cabina cerrada			

**Comentarios/Notas:**

Se observó acumulamiento de latas de pintura en la mesa de trabajo, así como trapos, estaba sucio además.

Todo el piso estaba pavimentado. Como la cabina era un poco chica, colocaron una lona para protegerse del sol.

Además de latas y botes de pintura también había de thinner, coca cola y botes de plástico en general.

Las paredes de la cabina eran de bloques.

Alrededor del taller había sólo casas.

**UACJ Ciudad Juárez Emisiones por Fuentes de Área**

<b>Taller de Pintura</b>	<b>Año: 2013</b>
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Entrevistador UACJ (s): Nombre(s): ERICK AYALO  
 Fecha y Hora de visita: Fecha: 21 Mayo/2013

Firma(s): [Signature]  
 Hora: 10:56 AM/PM

**DESCRIPCIÓN/UBICACIÓN DE ESTACIÓN**

Nombre del Negocio: Autoclímas multiservicios carrocería y pintura  
 Localización Calle y Numero: Calle IGNACIO MORA # 485 Colonia: ZONA CENTRO  
 Días de operación: Dom Lun Mar Mier Jue Vie Sab  
 Horas de operación: De 9:00 AM a 3:00 PM

**INFORMACION DE PRODUCCION:**

Cuantos vehículos pinta a la semana?

Día	Domingo	Lunes	Martes.	Miércoles	Jueves	Viernes	Sábado
Parcial/Menor Reparación	-	0	1/4	0	0	0	0
Todo/Completo Reparación	-	0	0	1/4	0	0	0

**INFORMACION DE LAS OPERACIONES**

Solvente Usado? (circule el time del reporte en cada pregunta)

Tolueno - litros por día mes o año

Xyleno - litros por día mes o año

Destilados de Petróleo thinny 6 litros por día mes o año

Otros? Desengrasante 1.5 litros por día mes o año

Solventes usados? (Circule un en cada pregunta)

Cuenta con un sistema de recuperación de solventes? Si o No

Reutiliza los solventes? Si o No

Como desecha los solventes? Los deja evaporar Al drenaje Los guarda para su recolección

Cuanta pintura utiliza por semana/mes/año (circule uno)

Laca - litros

Esmalte 4 litros al mes

Transmitidas por agua - litros

uretano - litros

otro - litros, describa -

2

Manufactura de la pintura?

México 100 / 100 porcentaje  
 Estados Unidos \_\_\_\_\_ / \_\_\_\_\_ porcentaje  
 Otro (Donde?) \_\_\_\_\_ / \_\_\_\_\_ porcentaje

Que tipo de pistola para pintar usa? Si es mas de una proporcione porcentaje de use para cada una

Pistola de aire estándar  Pistola de alto volumen baja presión (HVLP)

Pistola eléctrica estándar \_\_\_\_\_

Otra \_\_\_\_\_ describa \_\_\_\_\_

Bajo que condiciones pinta y cuáles son sus controles de emisión?

Espacio de trabajo (Circule uno)	Control de Emisión (Marcar con "✓")		
	Escape	Ventilación/Campana	Filtro
Aire libre			
Bajo techo con cabina		✓	
Bajo techo sin cabina			
En cabina cerrada			

**Comentarios/Notas:**

Todo el piso está pavimentado. El dueño no nos permitió tomar fotos a la cabina.

Comentó que sí tenían sistema de recuperación de solventes el cual era como una especie de filtro que sólo permitía dejar pasar partículas pequeñas. Los líquidos pesados los dejaba enclausurados. La cabina era amplia y alta y tenía abanicos para la ventilación en la parte superior de las paredes.

Tenían muy poca clientela.

**UACJ Ciudad Juárez Emisiones por Fuentes de Área**

<b>Taller de Pintura</b>	<b>Año: 2013</b>
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Entrevistador UACJ (s): Nombre(s): Erick Ayala Firma(s): [Signature]  
 Fecha y Hora de visita: Fecha: 21 Mayo 2013 Hora: 11:28 (AM/PM)

**DESCRIPCIÓN/UBICACIÓN DE ESTACIÓN**

Nombre del Negocio: carrocería y pintura Body work paint  
 Localización Calle y Numero: Ramón Corona #243 Norte Colonia: Zona Centro  
 Días de operación: Dom Lun Mar Mier Jue Vie Sab  
 Horas de operación: De 10:00 AM a 4:00 PM

**INFORMACION DE PRODUCCION:**

Cuantos vehículos pinta a la semana?

Día	Domingo	Lunes	Martes.	Miércoles	Jueves	Viernes	Sábado
Parcial/Menor Reparación	-	0	-	0	1/6	0	-
Todo/Completo Reparación	-	0	-	1/8	0	0	-

1 cada mes y medio  
1 cada 2 meses

**INFORMACION DE LAS OPERACIONES**

Solvente Usado? (circule el time del reporte en cada pregunta)

Tolueno - litros por día mes o año  
 Xyleno - litros por día mes o año  
 Destilados de Petróleo thinner 2 litros por día (mes) o año  
 Otros ? - litros por día mes o año

Solventes usados? (Circule un en cada pregunta)

Cuenta con un sistema de recuperación de solventes? Si o (No)  
 Reutiliza los solventes? (Si) o No

Como desecha los solventes? Los deja evaporar Al drenaje Los guarda para su recolección

Cuanta pintura utiliza por semana/mes/año (circule uno)

Laca - litros  
 Esmalte 4 litros al mes  
 Transmitidas por agua - litros  
 uretano - litros  
 otro - litros, describa \_\_\_\_\_

Manufactura de la pintura?

México 100 / 100 porcentaje "Adler"  
 Estados Unidos \_\_\_\_\_ / \_\_\_\_\_ porcentaje  
 Otro (Donde?) \_\_\_\_\_ / \_\_\_\_\_ porcentaje

Que tipo de pistola para pintar usa? Si es mas de una proporcione porcentaje de use para cada una

Pistola de aire estándar  Pistola de alto volumen baja presión (HVLP) \_\_\_\_\_  
 \_\_\_\_\_ Pistola eléctrica estándar \_\_\_\_\_  
 Otra \_\_\_\_\_ describa \_\_\_\_\_

Bajo que condiciones pinta y cuáles son sus controles de emisión?

Espacio de trabajo (Circule uno)	Control de Emisión (Marcar con "✓")		
	Escape	Ventilación/Campana	Filtro
Aire libre			
Bajo techo con cabina	✓		
Bajo techo sin cabina			
En cabina cerrada			

**Comentarios/Notas:**

La persona comentó que no abre muy seguido debido a la falta de trabajo y por regular los trabajos son para familiares y amigos. El piso era de tierra la mayor parte y la cabina estaba construida de triplay y cartón grueso.


NO nos permitió tomar fotos más que afuera del local.

se veía muy abandonado y poca circulación de vehículos. Además de que sólo había un vehículo dentro del local.

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**UACJ Ciudad Juárez Emisiones por Fuentes de Área**

<b>Taller de Pintura</b>	<b>Año: 2013</b>
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Entrevistador UACJ (s): Nombre(s): Erick Ayala Firma(s):   
 Fecha y Hora de visita: Fecha: 21/ma 9/0/2013 Hora: 12:37 AM/PM

**DESCRIPCIÓN/UBICACIÓN DE ESTACIÓN**

Nombre del Negocio: Carriceria L.A. BODY SHOP  
 Localización Calle y Numero: posada pompa #4647 Colonia: magisterial  
 Días de operación: Dom Lun Mar Mier Jue Vie Sab  
 Horas de operación: De 9:30 AM a 6:00 PM

**INFORMACION DE PRODUCCION:**

Cuantos vehículos pinta a la semana?

Día	Domingo	Lunes	Martes.	Miércoles	Jueves	Viernes	Sábado
Parcial/Menor Reparación	0	1	0	1	1	0	0
Todo/Completo Reparación	0	0	1	0	0	0	0

**INFORMACION DE LAS OPERACIONES**

Solvente Usado? (circule el time del reporte en cada pregunta)

Tolueno - litros por día mes o año  
 Xyleno - litros por día mes o año  
 Destilados de Petróleo thinner 8 litros por día mes o año por semana  
 Otros ? \_\_\_\_\_ litros por día mes o año

Solventes usados? (Circule un en cada pregunta)

Cuenta con un sistema de recuperación de solventes? (Si) o No  
 Reutiliza los solventes? (Si) o No

Como desecha los solventes? Los deja evaporar Al drenaje Los guarda para su recolección

Cuanta pintura utiliza por semana/mes/año (circule uno)

Laca - litros  
 Esmalte - litros  
 Transmitidas por agua - litros  
 uretano 2 litros a la semana  
 otro \_\_\_\_\_ litros, describa \_\_\_\_\_

4

Manufactura de la pintura?

México 50 / 100 porcentaje "Flax"  
 Estados Unidos 50 / 100 porcentaje "Sherwin Williams"  
 Otro (Donde?) \_\_\_\_\_ / \_\_\_\_\_ porcentaje

Que tipo de pistola para pintar usa? Si es mas de una proporcione porcentaje de use para cada una

Pistola de aire estándar \_\_\_\_\_ Pistola de alto volumen baja presión (HVLP)

Pistola eléctrica estándar \_\_\_\_\_

Otra \_\_\_\_\_ describa \_\_\_\_\_

Bajo que condiciones pinta y cuáles son sus controles de emisión?

Espacio de trabajo (Circule uno)	Control de Emisión (Marcar con "✓")		
	Escape	Ventilación/Campana	Filtro
Aire libre			
Bajo techo con cabina			
Bajo techo sin cabina			✓
En cabina cerrada			

**Comentarios/Notas:**

Todo el piso está pavimentado.

Hay un poco de acumulamiento de material y equipo en las mesas de trabajo, en el piso y en el área en general.

El señor comentó de la pistola otorgada por parte de la UACJ y que aún la tienen en uso.

se observó un estante lleno de latas vacías y medio llenas cerca del área de trabajo.

La cabina era abierta pero contaba con filtro en el techo.

Alrededor había sólo cosas muy pegadas.

**UACJ Ciudad Juárez Emisiones por Fuentes de Área**

<b>Taller de Pintura</b>	Año: 2013
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Entrevistador UACJ (s): Nombre(s): Samuel H. Firma(s): Vicente Fuentes G.  
 Fecha y Hora de visita: Fecha: 22. Mayo 13. Hora: 2:20 AM/PM

**DESCRIPCIÓN/UBICACIÓN DE ESTACIÓN**

Nombre del Negocio: TALLER ~~MANUEL~~ "MENY"  
 Localización Calle y Numero: ~~MANUEL~~ MANUEL GOMES #1614 Colonia: EL SATELITE  
 Días de operación: Dom Lun Mar Mier Jue Vie Sab  
 Horas de operación: De 9 AM a 6 PM

**INFORMACION DE PRODUCCION:**

Cuantos vehículos pinta a la semana?

Día	Domingo	Lunes	Martes.	Miércoles	Jueves	Viernes	Sábado
Parcial/Menor Reparación	—	1	—	—	1	—	—
Todo/Completo Reparación	—	—	1	—	—	—	—

1 CADA  
20  
DIAZ

**INFORMACION DE LAS OPERACIONES**

Solvente Usado? (circule el time del reporte en cada pregunta)

Tolueno — litros por día mes o año  
 Xyleno — litros por día mes o año  
 Destilados de Petróleo 6 litros por día mes o año SEMANA  
 Otros ? — litros por día mes o año

Solventes usados? (Circule un en cada pregunta)

Cuenta con un sistema de recuperación de solventes? Si — o No  
 Reutiliza los solventes? Si o No

Como desecha los solventes? Los deja evaporar Al drenaje Los guarda para su recolección

Cuanta pintura utiliza por semana/mes/año (circule uno)

Laca — litros  
 Esmalte — litros  
 Transmitidas por agua — litros  
 uretano 16 lts litros  
 otro BICAPA litros, describa 3 litros

Manufactura de la pintura?

México FLIX / 100% porcentaje "MAX"  
 Estados Unidos \_\_\_\_\_ / \_\_\_\_\_ porcentaje  
 Otro (Donde?) \_\_\_\_\_ / \_\_\_\_\_ porcentaje

Que tipo de pistola para pintar usa? Si es mas de una proporcione porcentaje de use para cada una

Pistola de aire estándar \_\_\_\_\_ Pistola de alto volumen baja presión (HVLP)

Pistola eléctrica estándar \_\_\_\_\_

Otra \_\_\_\_\_ describa \_\_\_\_\_

Bajo que condiciones pinta y cuáles son sus controles de emisión?

Espacio de trabajo (Circule uno)	Control de Emisión (Marcar con "✓")		
	Escape	Ventilación/Campana	Filtro
Aire libre	✓		
Bajo techo con cabina			
Bajo techo sin cabina			
En cabina cerrada			

**Comentarios/Notas:** En cuanto al horario y dias de operacion esta abierto los 7 dias de la semana.

Se tiene alrededor de 1 ó 2 trabajos por semana de reparacion de un golpe chico que requiera pintar una parte del vehiculo.

Para reparacion completa que deva pintarse todo el vehiculo tienen uno al mes.

El area donde pintan solo esta cubierta por una lona y cuenta con dos paredes para evitar el aire, pero no esta encerrado ni cuenta con extractores o ventilador. En su mayor parte utilizan solo Tiner STD. como solvente. Dado el caso que sobre material de algun trabajo realizado este se guarda para ser reutilizado, o se compra solo lo necesario " comenta el entrevistado.

**UACJ Ciudad Juárez Emisiones por Fuentes de Área**

<b>Taller de Pintura</b>	Año: 2013
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Entrevistador UACJ (s): Nombre(s): Samuel Hdez Firma(s): [Signature]  
 Fecha y Hora de visita: Fecha: 22 Mayo 13 Hora: 2:35 AM/PM (PM)

**DESCRIPCIÓN/UBICACIÓN DE ESTACIÓN**

Nombre del Negocio: MM COMPETICION  
 Localización Calle y Numero: Neptuno #1982 Colonia: SATELITE  
 Días de operación: Dom — Lun — Mar — Mier — Jue — Vie — Sab —  
 Horas de operación: De 10 AM a 6 PM

**INFORMACION DE PRODUCCION:**

Cuantos vehículos pinta a la semana?

Día	Domingo	Lunes	Martes	Miércoles	Jueves	Viernes	Sábado
Parcial/Menor Reparación	—	1	—	—	—	—	—
Todo/Completo Reparación	—	—	—	1/4	—	—	—

1 CADA 4 SEMANAS

**INFORMACION DE LAS OPERACIONES**

Solvente Usado? (circule el time del reporte en cada pregunta)

Tolueno — litros por día mes o año  
 Xyleno — litros por día mes o año  
 Destilados de Petróleo — litros por día mes o año  
 Otros ? TINHER 40 lts litros por día (mes) año

Solventes usados? (Circule un en cada pregunta)

Cuenta con un sistema de recuperación de solventes? Si — o (No)  
 Reutiliza los solventes? (Si) o No

Como desecha los solventes? (Los deja evaporar Al drenaje) Los guarda para su recolección

Cuanta pintura utiliza por semana/mes/año (circule uno)

Laca — litros  
 Esmalte 1 litros SEMANA  
 Transmitidas por agua — litros  
 uretano 4-6 litros SEMANA  
 otro BICAPA litros, describa 3-4 lts

6

Manufactura de la pintura?

México "FLEX" / "IPESA" / 100% porcentaje

Estados Unidos WANDA- / porcentaje

Otro (Donde?) / porcentaje

Que tipo de pistola para pintar usa? Si es mas de una proporcione porcentaje de use para cada una

Pistola de aire estándar \_\_\_\_\_ Pistola de alto volumen baja presión (HVLP)

Pistola eléctrica estándar \_\_\_\_\_

Otra \_\_\_\_\_ describa \_\_\_\_\_

Bajo que condiciones pinta y cuáles son sus controles de emisión?

Espacio de trabajo (Circule uno)	Control de Emisión (Marcar con "✓")		
	Escape	Ventilación/Campana	Filtro
Aire libre			
Bajo techo con cabina		/	
Bajo techo sin cabina			
En cabina cerrada			

**Comentarios/Notas:**

Referente a la manufactura de las pinturas utilizan siempre pinturas mexicanas y en raras y escasas ocasiones utilizan una llamada "WANDA" de manufactura Americana.

El taller aún cuenta con la pistola para pintar que se les dio anteriormente. Y se esta interezado en el caso de que hubiese algun otro curso de capacitacion.

En cuanto a las condiciones con que se pintan, tienen que colocar unas paredes removibles y ventiladores para evacuar los gases del cuarto. Esto lo hacen para tener una mayor área de trabajo cuando no se esta pintando un vehiculo.

**UACJ Ciudad Juárez Emisiones por Fuentes de Área**

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<b>Taller de Pintura</b>	<b>Año: 2013</b>
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Entrevistador UACJ (s): Nombre(s): Fernando Pérez Firma(s): Fernando Pérez  
 Fecha y Hora de visita: Fecha: 20/Mayo/2013 Hora: 12:21 AM/PM

**DESCRIPCIÓN/UBICACIÓN DE ESTACIÓN**

Nombre del Negocio: Taller carrocería lalo's  
 Localización Calle y Numero: Calle Acuña Cul. el ~~gigante~~ Colonia: la ovesta  
 Días de operación: Dom  Lun  Mar  Mier  Jue  Vie  Sáb   
 Horas de operación: De 9 AM a 6 PM

**INFORMACION DE PRODUCCION:**

Cuantos vehículos pinta a la semana?

Día	Domingo	Lunes	Martes.	Miércoles	Jueves	Viernes	Sábado
Parcial/Menor Reparación <sup>3</sup>		1		1		1	
Todo/Completo Reparación <sup>1</sup>							1

**INFORMACION DE LAS OPERACIONES**

Solvente Usado? (circule el time del reporte en cada pregunta)

Tolueno — litros por día mes o año  
 Xyleno — litros por día mes o año  
 Destilados de Petróleo 10 litros por día mes o año  
 Otros? — litros por día mes o año

Solventes usados? (Circule un en cada pregunta)

Cuenta con un sistema de recuperación de solventes? Si  o  No  
 Reutiliza los solventes? Si  o  No

Como desecha los solventes? Los deja evaporar Al drenaje  Los guarda para su recolección

Cuanta pintura utiliza por semana/mes/año (circule uno)

Laca — litros  
 Esmalte 3/sem litros  
 Transmitidas por agua — litros  
 uretano 3/sem litros  
 otro — litros, describa —

7

Manufactura de la pintura?

México *1* 100 / 100 porcentaje  
 Estados Unidos 0 / 100 porcentaje  
 Otro (Donde?) 0 / 100 porcentaje

Que tipo de pistola para pintar usa? Si es mas de una proporcione porcentaje de use para cada una

Pistola de aire estándar ✓ a 4016/in<sup>2</sup> Pistola de alto volumen baja presión (HVLP) \_\_\_\_\_  
 \_\_\_\_\_ Pistola eléctrica estándar \_\_\_\_\_  
 Otra \_\_\_\_\_ describa \_\_\_\_\_

Balo que condiciones pinta y cuáles son sus controles de emisión?

Espacio de trabajo (Circule uno)	Control de Emisión (Marcar con "✓")		
	Escape	Ventilación/Campana	Filtro
Aire libre			
Bajo techo con cabina			
Bajo techo sin cabina	✓		
En cabina cerrada			

**Comentarios/Notas:**

No cuenta con suficiente espacio, trabajan en la banqueta, dejan evaporar el solvente al aire libre.

se observó mucho acumulamiento de latas de pintura y solventes en el piso junto con alguna basura y trapos.

Cuentan con poca iluminación ya que solo son unas 3 lámparas de gas.

Los carros están muy juntos dentro del taller.

**UACJ Ciudad Juárez Emisiones por Fuentes de Área**

<b>Taller de Pintura</b>	<b>Año: 2013</b>
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Entrevistador UACJ (s): Nombre(s): Erivx Ayala Firma(s): [Signature]  
 Fecha y Hora de visita: Fecha: 20/05/2013 Hora: 1:19 AM/PM PM

**DESCRIPCIÓN/UBICACIÓN DE ESTACIÓN**

Nombre del Negocio: Taller Vulcan  
 Localización Calle y Numero: Blvd. OSCAR Flores #5834 Colonia: Lomas del Rey  
 Días de operación: Dom Lun Mar Mier Jue Vie Sab  
 Horas de operación: De 10:00 AM a 6:00 PM

**INFORMACION DE PRODUCCION:**

Cuantos vehículos pinta a la semana?

Día	Domingo	Lunes	Martes.	Miércoles	Jueves	Viernes	Sábado
Parcial/Menor Reparación	0	0	0	1	0	1	0
Todo/Completo Reparación	0	0	0	1/4	0	0	0

1 cada mes

**INFORMACION DE LAS OPERACIONES**

Solvente Usado? (circule el time del reporte en cada pregunta)

Tolueno - litros por día mes o año  
 Xyleno - litros por día mes o año  
 Destilados de Petróleo 5 litros por día mes o año  
 Otros ? - litros por día mes o año

Solventes usados? (Circule un en cada pregunta)

Cuenta con un sistema de recuperación de solventes? Si o No  
 Reutiliza los solventes? Si o No

Como desecha los solventes? Los deja evaporar Al drenaje Los guarda para su recolección

Cuanta pintura utiliza por semana/mes/año (circule uno)

Laca 2.5 litros por mes  
 Esmalte - litros  
 Transmitidas por agua - litros  
 uretano 2.5 litros por mes  
 otro 2.5 litros, describa Al mes  
 bicapa

Manufactura de la pintura?

México 100 / 100 porcentaje <sup>"Flex"</sup>  
 Estados Unidos \_\_\_\_\_ / \_\_\_\_\_ porcentaje  
 Otro (Donde?) \_\_\_\_\_ / \_\_\_\_\_ porcentaje

Que tipo de pistola para pintar usa? Si es mas de una proporcione porcentaje de use para cada una

Pistola de aire estándar \_\_\_\_\_ Pistola de alto volumen baja presión (HVLP) ✓

Pistola eléctrica estándar \_\_\_\_\_

Otra \_\_\_\_\_ describa \_\_\_\_\_

Bajo que condiciones pinta y cuáles son sus controles de emisión?

Espacio de trabajo (Circule uno)	Control de Emisión (Marcar con "✓")		
	Escape	Ventilación/Campana	Filtro
Aire libre			
Bajo techo con cabina			
Bajo techo sin cabina			
En cabina cerrada	✓		

**Comentarios/Notas:**

pinta un vehículo completo al mes.

El piso está pavimentado y se observaron muchos botes de basura. El espacio es amplio y la cabina es cerrada y el único escape que tiene la cabina es la puerta.

se observaron pocos vehículos dentro

Las demás partes del taller era para mecánica y ahí sólo había tejamanes.

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**UACJ Ciudad Juárez Emisiones por Fuentes de Área**

<b>Taller de Pintura</b>	<b>Año: 2013</b>
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Entrevistador UACJ (s): Nombre(s): Erick Ayala Firma(s): [Firma]  
 Fecha y Hora de visita: Fecha: 21 Mayo 2013 Hora: 10:02  AM/PM

**DESCRIPCIÓN/UBICACIÓN DE ESTACIÓN**

Nombre del Negocio: Hummer  
 Localización Calle y Numero: TEXCOCO #2121 Colonia: MAYAGUAYTAS  
 Días de operación: Dom    Lun    Mar    Mier    Jue    Vie    Sab     
 Horas de operación: De 9:00 AM a 6:00 PM

**INFORMACION DE PRODUCCION:**

Cuantos vehículos pinta a la semana?

Día	Domingo	Lunes	Martes.	Miércoles	Jueves	Viernes	Sábado
Parcial/Menor Reparación	-	1	0	1	0	1	0
Todo/Completo Reparación	-	0	0	1/4	0	0	0

**INFORMACION DE LAS OPERACIONES**

Solvente Usado? (circule el time del reporte en cada pregunta)

Tolueno    litros por día mes o año  
 Xyleno    litros por día mes o año  
 Destilados de Petróleo thiner 1 litros por día mes o año  
 Otros ?    litros por día mes o año

Solventes usados? (Circule un en cada pregunta)

Cuenta con un sistema de recuperación de solventes? Si    o (No)  
 Reutiliza los solventes? (Si) o No

Como desecha los solventes? Los deja evaporar Al drenaje Los guarda para su recolección

Cuanta pintura utiliza por semana/mes/año (circule uno)

Laca    litros  
 Esmalte 1 litros al mes  
 Transmitidas por agua    litros  
 uretano 15 litros al mes  
 otro    litros, describa

9

Manufactura de la pintura?

México \_\_\_\_\_ / \_\_\_\_\_ porcentaje  
 Estados Unidos 100 / 100 porcentaje marca "Diamond"  
 Otro (Donde?) \_\_\_\_\_ / \_\_\_\_\_ porcentaje

Que tipo de pistola para pintar usa? Si es mas de una proporcione porcentaje de use para cada una  
 Pistola de aire estándar \_\_\_\_\_ Pistola de alto volumen baja presión (HVLP) ✓

Pistola eléctrica estándar \_\_\_\_\_  
 Otra \_\_\_\_\_ describa \_\_\_\_\_

Bajo que condiciones pinta y cuáles son sus controles de emisión?

Espacio de trabajo (Circule uno)	Control de Emisión (Marcar con "✓")		
	Escape	Ventilación/Campana	Filtro
Aire libre			
Bajo techo con cabina	✓		
Bajo techo sin cabina			
En cabina cerrada			

**Comentarios/Notas:**

En el momento en que se realizó la entrevista estaban trabajando. Se observó un poco de acumulamiento y desorden de material y botes de pintura.

El piso tenía pavimento en la cabina y en el resto era de tierra.

Tenían una cabina sólo con escape y puertas de metal.

Al rededor sólo había casas.

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**UACJ Ciudad Juárez Emisiones por Fuentes de Área**

<b>Taller de Pintura</b>	<b>Año: 2013</b>
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Entrevistador UACJ (s): Nombre(s): Frick Ayala  
 Fecha y Hora de visita: Fecha: 21 Mayo 2013

Firma(s): [Signature]  
 Hora: 12:06 AM/PM

**DESCRIPCIÓN/UBICACIÓN DE ESTACIÓN**

Nombre del Negocio: Taller Segaso  
 Localización Calle y Numero: Municipio Libre Sur #2776 Colonia: Malchor Ocampo  
 Días de operación: Dom Lun Mar Mier Jue Vie Sab  
 Horas de operación: De 9:00 AM a 5:00 PM

**INFORMACION DE PRODUCCION:**

Cuantos vehículos pinta a la semana?

Día	Domingo	Lunes	Martes.	Miércoles	Jueves	Viernes	Sábado
Parcial/Menor Reparación	-	0	1	1	0	0	0
Todo/Completo Reparación	-	0	0	1	0	0	0

1 cada 6 meses

**INFORMACION DE LAS OPERACIONES**

Solvente Usado? (circule el time del reporte en cada pregunta)

Tolueno - litros por día mes o año  
 Xyleno - litros por día mes o año  
 Destilados de Petróleo Thinax 8 litros por día (mes) o año  
 Otros ? \_\_\_\_\_ litros por día mes o año

Solventes usados? (Circule un en cada pregunta)

Cuenta con un sistema de recuperación de solventes? Si o (No)  
 Reutiliza los solventes? (Si) o No

Como desecha los solventes? (Los deja evaporar Al drenaje) Los guarda para su recolección

Cuanta pintura utiliza por semana/mes/año (circule uno)

Laca - litros  
 Esmalte - litros  
 Transmitidas por agua - litros  
 uretano 6 litros por mes  
 otro \_\_\_\_\_ litros, describa \_\_\_\_\_

Manufactura de la pintura?

México 70 / 100 porcentaje  
 Estados Unidos 30 / 100 porcentaje  
 Otro (Donde?) \_\_\_\_\_ / \_\_\_\_\_ porcentaje

Que tipo de pistola para pintar usa? Si es mas de una proporcione porcentaje de use para cada una

Pistola de aire estándar \_\_\_\_\_ Pistola de alto volumen baja presión (HVLP) ✓

Pistola eléctrica estándar \_\_\_\_\_

Otra \_\_\_\_\_ describa \_\_\_\_\_

Bajo que condiciones pinta y cuáles son sus controles de emisión?

Espacio de trabajo (Circule uno)	Control de Emisión (Marcar con "✓")		
	Escape	Ventilación/Campana	Filtro
Aire libre			
Bajo techo con cabina			✓
Bajo techo sin cabina			
En cabina cerrada			

**Comentarios/Notas:**

Todo el piso estaba pavimentado.  
 Estaba muy bien equipada la cabina y tenía calefacción.  
 También estaba ordenado el lugar, sin basura.  
 Tenían un perro amarrado cerca de la cabina.  
 Contaban con un filtro en la parte inferior de la cabina pegada a la pared.  
 Las paredes eran de bloque.

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**UACJ Ciudad Juárez Emisiones por Fuentes de Área**

<b>Taller de Pintura</b>	<b>Año: 2013</b>
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Entrevistador UACJ (s): Nombre(s): ERICK AYOLA Firma(s): [Signature] H. M. A.  
 Fecha y Hora de visita: Fecha: 21 MAYO 2013 Hora: 14:53 AM/PM

**DESCRIPCIÓN/UBICACIÓN DE ESTACIÓN**

Nombre del Negocio: Hummel Automotriz  
 Localización Calle y Numero: Reforma y municipio libre Colonia: Melchor Ocampo  
 Días de operación: Dom Lun Mar Mier Jue Vie Sab  
 Horas de operación: De 9:00 AM a 5:00 PM

**INFORMACION DE PRODUCCION:**

Cuantos vehículos pinta a la semana?

Día	Domingo	Lunes	Martes.	Miércoles	Jueves	Viernes	Sábado
Parcial/Menor Reparación	0	0	0	1	0	0	0
Todo/Completo Reparación	0	0	2	0	0	0	0

**INFORMACION DE LAS OPERACIONES**

Solvente Usado? (circule el time del reporte en cada pregunta)

Tolueno - litros por día mes o año  
 Xyleno - litros por día mes o año  
 Destilados de Petróleo 7 Litros 8 litros por día mes o año por semana  
 Otros ? - litros por día mes o año

Solventes usados? (Circule un en cada pregunta)

Cuenta con un sistema de recuperación de solventes? Si - o No  
 Reutiliza los solventes? Si - o No

Como desecha los solventes? Los deja evaporar Al drenaje Los guarda para su recolección

Cuanta pintura utiliza por semana/mes/año (circule uno)

Laca - litros  
 Esmalte - litros  
 Transmitidas por agua - litros  
 uretano 4 litros por semana  
 otro - litros, describa -

11

Manufactura de la pintura?

México \_\_\_\_\_ / \_\_\_\_\_ porcentaje  
 Estados Unidos 100 / 100 porcentaje "Dupont" y "Nason"  
 Otro (Donde?) \_\_\_\_\_ / \_\_\_\_\_ porcentaje

Que tipo de pistola para pintar usa? Si es mas de una proporcione porcentaje de use para cada una  
 Pistola de aire estándar \_\_\_\_\_ Pistola de alto volumen baja presión (HVLP) ✓

\_\_\_\_\_ Pistola eléctrica estándar \_\_\_\_\_  
 Otra \_\_\_\_\_ describa \_\_\_\_\_

Bajo que condiciones pinta y cuáles son sus controles de emisión?

Espacio de trabajo (Circule uno)	Control de Emisión (Marcar con "✓")		
	Escape	Ventilación/Campana	Filtro
Aire libre			
Bajo techo con cabina			
Bajo techo sin cabina			
En cabina cerrada			✓

**Comentarios/Notas:**

La cabina esta completamente sellada y contaba con filtro y calefacción. Dentro de ésta sólo tenían el equipo y material a utilizar. Estaba muy limpio y ordenado.

Contaban con luces de gas <sup>(que usan balastro)</sup> en las orillas del techo. Las puertas estaban muy bien selladas y sólo tenían 2 ventanas chicas.

La pintura que usaban era sólo americana.

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**UACJ Ciudad Juárez Emisiones por Fuentes de Área**

<b>Taller de Pintura</b>	<b>Año: 2013</b>
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Entrevistador UACJ (s): Nombre(s): ERICK AYALA Firma(s): Erick  
 Fecha y Hora de visita: Fecha: 20 Mayo 2013 Hora: 12:52 AM/PM (P)

**DESCRIPCIÓN/UBICACIÓN DE ESTACIÓN**

Nombre del Negocio: Automax  
 Localización Calle y Numero: Av. Tecnológico, Co # 5257 Colonia: La Cuesta  
 Días de operación: Dom    Lun    Mar    Mier    Jue    Vie    Sab     
 Horas de operación: De 9:00AM a 7:00 PM

**INFORMACION DE PRODUCCION:**

Cuantos vehículos pinta a la semana?

Día	Domingo	Lunes	Martes.	Miércoles	Jueves	Viernes	Sábado
Parcial/Menor Reparación	0	0	0	1	0	0	0
Todo/Completo Reparación	0	0	1	0	0	0	0

**INFORMACION DE LAS OPERACIONES**

Solvente Usado? (circule el time del reporte en cada pregunta)

Tolueno    litros por día mes o año  
 Xyleno    litros por día mes o año  
 Destilados de Petróleo 2.5 litros por día mes o año por semana  
 Otros ?    litros por día mes o año

Solventes usados? (Circule un en cada pregunta)

Cuenta con un sistema de recuperación de solventes? Si    o (No)  
 Reutiliza los solventes? Si    o (No)

Como desecha los solventes? Los deja evaporar Al drenaje Los guarda para su recolección

se compra el que se utiliza

Cuanta pintura utiliza por semana/mes/año (circule uno)

Laca    litros  
 Esmalte 2 litros por mes  
 Transmitidas por agua    litros  
 uretano mes 8 litros por mes  
 otro    litros, describa

12

Manufactura de la pintura?

México \_\_\_\_\_ / \_\_\_\_\_ porcentaje  
 Estados Unidos 100 / 100 porcentaje  
 Otro (Donde?) \_\_\_\_\_ / \_\_\_\_\_ porcentaje

Dupont + marca

Que tipo de pistola para pintar usa? Si es mas de una proporcione porcentaje de use para cada una

Pistola de aire estándar \_\_\_\_\_ Pistola de alto volumen baja presión (HVLP)

Pistola eléctrica estándar \_\_\_\_\_

Otra \_\_\_\_\_ describa \_\_\_\_\_

Bajo que condiciones pinta y cuáles son sus controles de emisión?

Espacio de trabajo (Circule uno)	Control de Emisión (Marcar con "✓")		
	Escape	Ventilación/Campana	Filtro
Aire libre			
Bajo techo con cabina			
Bajo techo sin cabina			
En cabina cerrada			<input checked="" type="checkbox"/>

**Comentarios/Notas:**

1 plataforma de trabajo completo cada 2 semanas  
 trabajo pintado

comentó que los trabajos son muy variados.

Están pegados (a un lado) de la Av. Tecnológico.

El local es de doble piso era bastante amplio

La cabina era completamente cerrada y sólo tenía una ventana.

Tenían un sistema de filtro con campana bastante grande.

Estaba muy ordenado y limpio.

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**UACJ Ciudad Juárez Emisiones por Fuentes de Área**

<b>Taller de Pintura</b>	<b>Año: 2013</b>
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Entrevistador UACJ (s): Nombre(s): Erick Ayala Firma(s): [Signature]  
 Fecha y Hora de visita: Fecha: 21 Mayo/2013 Hora: 10:15 AM/PM

**DESCRIPCIÓN/UBICACIÓN DE ESTACIÓN**

Nombre del Negocio: Impacto  
 Localización Calle y Numero: Ecuador y Taxloco #485 Colonia: Partido Ramayo  
 Días de operación: Dom    Lun    Mar    Mier    Jue    Vie    Sab     
 Horas de operación: De 9:00 AM a 6:00 PM

**INFORMACION DE PRODUCCION:**

Cuantos vehículos pinta a la semana?

Día	Domingo	Lunes	Martes.	Miércoles	Jueves	Viernes	Sábado
Parcial/Menor Reparación	-	0	1	1	1	0	0
Todo/Completo Reparación	-	0	1	0	0	0	0

**INFORMACION DE LAS OPERACIONES**

Solvente Usado? (circule el time del reporte en cada pregunta)

Tolueno - litros por día mes o año  
 Xyleno - litros por día mes o año  
 Destilados de Petróleo thinner 27 litros por día (mes) o año  
 Otros ? - litros por día mes o año

Solventes usados? (Circule un en cada pregunta)

Cuenta con un sistema de recuperación de solventes? Si o (No)  
 Reutiliza los solventes? (Si) o No

Como desecha los solventes? (Los deja evaporar) Al drenaje Los guarda para su recolección

Cuanta pintura utiliza por semana/mes/año (circule uno)

Laca - litros  
 Esmalte - litros  
 Transmitidas por agua - litros  
 uretano 12 litros por mes  
 otro - litros, describa -

Manufactura de la pintura?

México 80 / 100 porcentaje "Sigo Flex"  
 Estados Unidos 20 / 100 porcentaje "Dupont"  
 Otro (Donde?) \_\_\_\_\_ / \_\_\_\_\_ porcentaje

Que tipo de pistola para pintar usa? Si es mas de una proporcione porcentaje de use para cada una

Pistola de aire estándar \_\_\_\_\_ Pistola de alto volumen baja presión (HVLP) ✓

Pistola eléctrica estándar \_\_\_\_\_

Otra \_\_\_\_\_ describa \_\_\_\_\_

Bajo que condiciones pinta y cuáles son sus controles de emisión?

Espacio de trabajo (Circule uno)	Control de Emisión (Marcar con "✓")		
	Escape	Ventilación/Campana	Filtro
Aire libre			
Bajo techo con cabina	✓		
Bajo techo sin cabina			
En cabina cerrada			

**Comentarios/Notas:**

Hay mucho acumulamiento de partes de carro en todo el terreno. Además tienen latas de pintura regadas y acumuladas dentro de la cabina.

Todo el piso tenía pavimento.

Estaba muy desordenado y había muy poco espacio para los vehículos, además estaba un poco sucio.

Al rededor había sólo casas.

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**UACJ Ciudad Juárez Emisiones por Fuentes de Área**

<b>Taller de Pintura</b>	Año: 2013
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Entrevistador UACJ (s): Nombre(s): Erick Ayala Firma(s): [Signature]  
 Fecha y Hora de visita: Fecha: 21 Mayo 2013 Hora: 3:09 AM/PM

**DESCRIPCIÓN/UBICACIÓN DE ESTACIÓN**

Nombre del Negocio: Mecánica en general y carrocería y pintura. "Multiservicios RT"  
 Localización Calle y Numero: Av. Jilotepec #7260 Colonia: Del Real  
 Días de operación: Dom Lun Mar Mier Jue Vie Sab  
 Horas de operación: De 9:00 AM a 7:00 PM

**INFORMACION DE PRODUCCION:**

Cuantos vehículos pinta a la semana?

Día	Domingo	Lunes	Martes.	Miércoles	Jueves	Viernes	Sábado
Parcial/Menor Reparación	-	0	1	1	0	0	0
Todo/Completo Reparación	-	1	1	1	0	0	0

3 por mes

**INFORMACION DE LAS OPERACIONES**

Solvente Usado? (circule el time del reporte en cada pregunta)

Tolueno - litros por día mes o año  
 Xyleno - litros por día mes o año  
 Destilados de Petróleo Thinol 25 litros por día mes o año  
 Otros? Acrílico 20 litros por día mes o año

Solventes usados? (Circule un en cada pregunta)

Cuenta con un sistema de recuperación de solventes? Si o No  
 Reutiliza los solventes? Si o No

Como desecha los solventes? Los deja evaporar Al drenaje Los guarda para su recolección

Cuanta pintura utiliza por semana/mes/año (circule uno)

Laca - litros  
 Esmalte - litros  
 Transmitidas por agua - litros  
 uretano 8 litros 4 mes  
 otro - litros, describa -

14

Manufactura de la pintura?

México \_\_\_\_\_ / \_\_\_\_\_ porcentaje  
 Estados Unidos 100 / 100 porcentaje "DuPont"  
 Otro (Donde?) \_\_\_\_\_ / \_\_\_\_\_ porcentaje

Que tipo de pistola para pintar usa? Si es mas de una proporcione porcentaje de use para cada una  
 Pistola de aire estándar \_\_\_\_\_ Pistola de alto volumen baja presión (HVLP)

Pistola eléctrica estándar \_\_\_\_\_  
 Otra \_\_\_\_\_ describa \_\_\_\_\_

Bajo que condiciones pinta y cuáles son sus controles de emisión?

Espacio de trabajo (Circule uno)	Control de Emisión (Marcar con "✓")		
	Escape	Ventilación/Campana	Filtro
Aire libre			
Bajo techo con cabina			✓
Bajo techo sin cabina			
En cabina cerrada			

**Comentarios/Notas:**

NO se nos permitió tomar fotos a la cabina pero se observó que era chica y tenía cortina metálica.  
 En la parte de la cabina estaba pavimentado y el resto del terreno tenía Piedra y arena.