Community Scale Estimation of Toxic Air Pollutants from Stationary Sources

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ABSTRACT

The California Air Resources Board (ARB) has initiated a number of research and outreach activities to address environmental justice issues in California communities. As part of this effort, the ARB is developing technical guidelines to assess the cumulative impact of air pollution at the community level. To develop the tools required for the guidelines, a case study was initiated in the Barrio Logan and Logan Heights communities of San Diego. These communities were selected because of their sizable resident population in an industrial area and their proximity to heavily used roadways, railways, and port facilities. While emissions from mobile sources are also included in the inventory, the focus of this work was on refining the stationary source emission inventory. An emission inventory of major stationary sources was based on data in the California Emission Inventory Development and Reporting System (CEIDARS), the statewide emission inventory database system for California. Small facilities not included in CEIDARS in the Barrio Logan/Logan Heights region were identified from business license and San Diego Air Pollution Control District (APCD) permit lists. Using these databases, 167 small facilities were identified, most of which fell into the categories of auto repair and autobody shops and welding operations. Air toxics emissions from these small, neighborhood facilities were estimated using San Diego APCD permit information and site-specific information. In the absence of facility-specific toxics emission information, generic air toxics emission profiles were developed and used. The stationary source emission inventories developed for this work, along with mobile source emission inventories, are being utilized to model the air quality of the community.

INTRODUCTION

Over the last two decades, California Air Resource Board (ARB) programs have been successful in reducing the public health risk from air pollution statewide. However, some communities remain concerned about possible toxic emissions particularly in low-income and minority communities. Consequently, the ARB has initiated an effort to address these possible environmental justice issues Highlights of this new effort include strengthening community outreach and education and developing technical guidelines which local agencies and planners can use to assess exposure to air toxics at a neighborhood scale. These guidelines will also provide a methodology for reducing the health risk from exposure to air pollution and information that can be used in land-use and permitting decisions.

The ARB maintains detailed air pollutant emission inventories in its California Emission Inventory Development and Reporting System (CEIDARS) database. These inventories are used to satisfy requirements for the Clean Air Act, to track emissions reductions of air pollutants, and to judge the effectiveness of control technology applications statewide. They include emissions from stationary sources, on-road and off-road mobile sources, area sources, and biogenic sources. However, because of the methods used to calculate these inventories, they may not be appropriate for community-scale investigations. For example, most facilities that emit 10 tons or more per year of criteria air pollutants are listed in the CEIDARS point source database as discrete point sources. However, most industrial and commercial facilities in California emit less than 10 tons of criteria pollutants per year. At this time,

only a few of these facilities are included in CEIDARS as individual point sources. The emissions from the small facilities not in CEIDARS are calculated en masse on a regional basis. These emissions estimates are typically calculated using surveys and/or sales data collected for a region or statewide, and then emissions are allocated spatially using surrogates such as employment or population. Although these methods are useful for accounting for small stationary sources on a regional basis, the lack of spatial resolution using standard surrogates makes them inadequate for microscale, community-based air quality assessments. For these reasons, a more detailed emission inventory is necessary to adequately address environmental justice concerns at the community level.

Although estimating emissions from all sources is essential in developing a useful community-based assessment, this study is solely focused on emission inventories from stationary sources. In this report, we have outlined a technical approach for the development of community-based emission inventories for small facilities, and have shown an application of this approach in assessing both major and small facilities located in the Barrio Logan community of San Diego, California. The utility of this approach was evaluated by comparison to ARB's current regional inventories.

TECHNICAL APPROACH

Development of a Facilities List. The first step in a community assessment is the identification of all potential emission sources within the community of interest. To this end, facilities need to be identified using multiple databases, such as local air pollution control district permit files, business license lists, commercially available business lists, existing emission inventory data, and the electronic yellow pages. A site visit is required to verify that each facility listed is in operation and that all operational facilities in the community are included. Also, facility-specific information needs to be collected on the types and locations of stacks, building and plot size, and the types and levels of intensity of industrial activities conducted on-site. Whether emissions from each process at the facility appear to be generated from point, area, or volume sources should also be noted during the site visits. This comprehensive list forms the basis for subsequent emission inventory efforts.

Emission Inventory from Small Stationary Sources using Available Information. Most small sources of toxic air contaminants are not typically included in regional inventory assessments as individual point sources. Nevertheless, their emissions should be estimated to determine how they might impact community health risk. The following approach could be used to quantify these emissions.

If available, data sources, such as permits and surveys on product usage, should be collected from state or local agencies, as appropriate. In California, many facilities have equipment regulated by local air districts through permits. These permits may also include emissions estimates as part of the permitting process. For those facilities whose emissions were not calculated as part of the permitting process, the permit records may provide information on process rates associated with their permits. This information can be collected and used in conjunction with material safety data sheets (MSDS), speciation profiles, and published emission factors to estimate emissions.

Facilities which operate without permits from the local air district are typically assumed not to generate air emissions. Alternatively, they may generate air emissions in quantities below thresholds that would require a permit, or they may generate emissions from unregulated equipment or sources. Site-specific data should be used to complete the emission inventory of unpermitted facilities since so little information is available for facilities of this type. However, if specific data cannot be collected, useful information can be obtained from existing local air district or ARB surveys of similar facilities or processes, if available. Also, information on local air district regulations should be collected, such as the maximum allowable emissions of each device below which permits are not required.

MSDSs list the chemical contents of products. They should be collected if the identity of the products used at the facility can be determined. Activity information can be estimated from local air district regulations of maximum allowable emissions for unpermitted processes. Emissions can then be calculated. Where MSDSs are not available, groups of MSDSs from similar products or other relevant databases should be consulted. One example is the California Air Pollution Control Officers Association's database of generic automotive coating formulations[1], which can be used to generate generic chemical profiles for autobody shops. Emission factors and/or speciation profiles[2,3] may also be available for certain processes.

Emission Inventory Development Using Site Visits. When the available data are outdated or too limited to calculate emissions with adequate reliability, facility site visits should be conducted on selected groups of similar facilities. Site visits are used to collect information about the types of on-site activities at each facility, the products used, and the associated process rates. Survey forms designed for emission inventory calculations should focus on the types of processes likely to generate emissions from stationary and mobile equipment, such as solvent/coating applications, combustion sources including vehicles used on-site, and metal fabrication activities such as welding, soldering, and abrasive blasting. Examples of the survey forms are shown in Figure 1a-c. The number of facility visits for each type of facility should be sufficiently large to be statistically significant. Emissions can then be estimated using these data in conjunction with MSDSs, emission factors, and speciation profiles. The calculated emission values can be averaged to generate generic facility profiles for each type of facility inspected. This facility profile can then be applied to all similar facilities that were not surveyed.

CASE STUDY: STATIONARY SOURCE EMISSION INVENTORY OF THE BARRIO LOGAN COMMUNITY

Identification of Facilities Operating within the Community. The ARB's first community scale emission inventory effort was carried out for the Barrio Logan region of San Diego, California. The Barrio Logan community is approximately a three square mile area and corresponds to the Barrio Logan and Logan Heights districts as defined by the San Diego Association of Governments. To capture all relevant facilities in the Barrio Logan community, ARB staff used the CEIDARS point source database, information from the San Diego Air Pollution Control District (APCD) permit files[4], and a business license database from the Office of the Treasurer of the City of San Diego[5]. When these databases were searched by zip code, roughly 1,500 businesses were identified. This list was reduced to approximately 300 facilities by deleting businesses outside of the defined Barrio Logan region, and by deleting businesses that are likely nonpolluting, such as service oriented businesses (accountants, health professions, law and insurance firms, certain retail operations, etc.). Cleaning/maintenance operations and contracting/construction businesses headquartered in Barrio Logan were assumed to operate outside of the study community, and thus, were also deleted. While ARB staff attempted to contact all listed facilities by telephone, these contacts were of limited value due to the reluctance of the facility employees to provide detailed information about their operations over the telephone. Consequently, site visits were required to verify the location and type of activity at each facility. Approximately 200 facilities were visited to collect specific information on facility physical characteristics, types of on-site processes and activities, and assignment of standard industrial classification (SIC)[6] codes. During the course of the site visits, the survey forms were refined to more precisely collect facility information.

From the information collected during site visits, 38 facilities were excluded from the emission inventory because they were either out of business, outside of the study region, or were determined not to have significant on-site emissions. Also, ARB staff were unable to contact 57 of the listed facilities. Because the operation of those facilities could not be verified, they could not be further analyzed, and, thus, were not included in the inventory. We believe that the exclusion of these facilities did not result

Table 1. Facilities included in the Barrio Logan emission inventory.

Facility Type	Sources of Emission Inventory Data (number of facilities)						
	CEIDARS	CEIDARS and site visits	SDAPCD permit files	site visits	SDAPCD permit files and site visits	composite profiles[a]	district regulation thresholds and other sources
large facilities	35	3					
various permitted facilities			19				
auto repair				24	8	57	
welding/metal fabrication				16	2	6	
warehouses				8	1		
gas stations			4				
various unpermitted facilities							22
total number of facilities in each category	*35*	*3*	*23*	*48*	*11*	*63*	*22*

[a]Emissions were calculated from composite profiles for 57 auto repair shops and 6 welding/metal fabrication facilities as shown. These generic profiles were constructed using the product usage data obtained during site visits of facilities conducting similar activities.

in a serious underestimation of the emissions in the Barrio Logan community because these facilities were small and conducted types of activities that would not significantly impact the inventory. The final Barrio Logan stationary source inventory included 205 facilities (Table 1).

Development of an Emission Inventory from Small Stationary Sources in Barrio Logan. Of the 205 facilities in the inventory, 38 were major source facilities, which had San Diego APCD permits and were also in the CEIDARS point source database. Emissions data for these facilities were retrieved from the CEIDARS database and included in the inventory without further manipulation. Emission from the thirty additional facilities that had San Diego APCD permits, but were not reported in CEIDARS, were quantified from information contained in the San Diego APCD permit files, such as process rates and product information. In some cases, permit information was supplemented with specific data obtained from visits of the facilities.

Of the remaining 137 unpermitted facilities, two types were predominant: autobody and auto repair (89 facilities) and welding and metal fabrication (24 facilities). Because of the limited amount of information available for these operations, a number of both types of these facilities were chosen for site visits. ARB staff visited 32 auto repair shops in the community, and developed emission inventory estimates for these facilities based on product usage data obtained during visits and the chemical composition of the products, which were obtained from MSDSs and ARB speciation profiles[2,3]. ARB staff also visited 18 welding and metal fabrication shops in Barrio Logan, and calculated inventories using a method similar to that used for auto repair shops.

Twenty-two unpermitted facilities did not fall into any of the above categories, but these facilities performed a number of emission-producing activities, such as wood finishing, engraving, and machine cleaning and repair. Emissions for these facilities were calculated using permit threshold regulatory limits, speciation profiles, and information collected during site visits.

Diesel Particulate Matter (PM) Inventory for Barrio Logan. We found that diesel PM emission data for the facilities in the Barrio Logan community were limited. First, many of the major facilities in Barrio Logan reported diesel PM emissions from stationary engines as a single total for the facility, so that emissions from each individual engine could not be determined. Therefore, the diesel PM emissions from engines were divided equally among the engines at the facility. In order to spatially allocate these emissions, the location of each stationary engine was determined by using data from health risk assessment reports submitted to the San Diego APCD. Alternatively, if the risk assessment data were not available, all emissions from these sources were assumed to be emitted from a theoretic stack located at the center of the facility. CEIDARS inventory data containing criteria (i.e., particulate matter) emissions from diesel-powered compression ignition engines are reported in this inventory as diesel PM, while other diesel sources, such as boilers, were speciated using ARB profiles[2,3].

Developing a diesel PM inventory for the small facilities not in the CEIDARS point source database posed even greater difficulties. For example, many small facilities in Barrio Logan associated with the ship repair industry have permits for portable diesel engines. Because of their portability and the lack of information regarding their location, emissions from portable engines could not be spatially allocated, and, hence, they were excluded from this inventory. Emissions from these sources are, however, included as part of the regional off-road mobile source emission model, which will be used to supplement the emission inventory developed for this study.

Finally, major facilities and also small facilities such as warehouses, distribution centers, and retail businesses, may have substantial diesel PM emissions from on-road and off-road mobile sources operating on their property. These sources include truck idling and running emissions on-site, as well as emissions from the operation of forklifts and transportation refrigeration units. Emissions from these engine types are also accounted for in the CEIDARS database, but not in the point source inventory. Rather they are included in the mobile source inventory and so are not estimated at the spatial resolution required for a community assessment. We are currently developing a method to estimate the Barrio Logan contribution to these regional off-road mobile emission estimates.

To shed light on diesel fuel usage in the Barrio Logan community, the activity level of all diesel sources was determined for each facility that was visited. Diesel PM emission inventories were then calculated using emission factors for truck idling and running emissions[7], transportation refrigeration units[8], forklifts[8], mobile cranes[9], stationary diesel engines[9], and boilers[9].

Comparison of the Small Source Emission Inventory to the CEIDARS Database. The emission inventory obtained for the Barrio Logan community is shown in Table 2. The vast majority of emissions of pollutants originated from the 38 facilities in the CEIDARS database. However, permitted equipment and processes from non-CEIDARS facilities accounted for about 44% of the toluene, 31% of the perchloroethylene, and 14% of the methyl ethyl ketone in the Barrio Logan inventory (Table 3). Taken together, the emissions from CEIDARS facilities and facilities having permitted equipment and processes accounted for nearly all of the emissions of most toxic pollutants in the inventory. In contrast, the contribution of 89 auto-related facilities to the inventory was low (Table 3). For example, the most significant emissions from these facilities were methanol, naphthalene, and toluene, which only accounted for 17%, 15%, and 13%, respectively, of the totals reported. Emissions from small welding and metal fabrication facilities were also low but may be significant in terms of health risk at the community level. For example, 3% of the total hexavalent chromium emissions from all facilities in the database was from one welding operation.

Table 2. Barrio Logan emission inventory.

Pollutant Name	CAS		Total emissions (205)[a] (lbs/yr)	Emissions from facilities in CEIDARS database (38) (lbs/yr)	% of total in CEIDARS
Diesel PM	9901		17675.6	16475.0	93.2
Methanol	67561		2683.5	2117.3	78.9
Isopropyl alcohol	67630		1384331.1	1381871.8	99.8
n-Butyl alcohol	71363		164712.0	164180.7	99.7
Benzene	71432		1791.1	1677.0	93.6
Methylene chloride	75092		24500.8	24478.6	99.9
Propylene oxide	75569		22716.4	22716.4	100.0
Methyl ethyl ketone	78933		35962.8	28250.9	78.6
Trichloroethylene	79016		2327.2	2327.2	100.0
Naphthalene	91203		687.2	310.2	45.1
Ethyl benzene	100414		7226.4	6861.7	95.0
Methyl isobutyl ketone	108101		17036.7	16227.2	95.2
Toluene	108883		19073.5	7918.0	41.5
Perchloroethylene	127184		2055.8	1411.1	68.6
Xylenes	1330207		53351.8	48954.1	91.8
Lead	7439921		22.8	19.8	86.9
Manganese	7439965		1234.5	1216.6	98.6
Nickel	7440020		187.4	185.0	98.7
Chlorine	7782505		529.0	528.9	100.0
Cr(VI)	18540299		16.5	15.8	95.6

[a] Number in parentheses represents the number of facilities

The inventories in Table 3 show that only 7% of diesel PM emissions came from all inspected non-CEIDARS facilities. However, the inventory may be a significant underestimation of the diesel PM emissions from small facilities because nearly all of the emissions in this category came from only nine warehouses, out of an estimated total of 50 in Barrio Logan. Hence, in future assessments diesel emissions will be quantified from all sources, including warehouses and distribution centers, as well as CEIDARS point source facilities.

CONCLUSION

In this study, we found that only 38 facilities located in the Barrio Logan area are included in the CEIDARS point source database. However, using the technical approach developed for this work, we were able to develop emission inventories for an additional 167 facilities within just a three square mile area. With few exceptions, these additional facilities did not greatly contribute to the emission inventory; the regional inventory derived from the CEIDARS database is sufficient to capture most air pollutants from stationary sources located in the Barrio Logan community. Still, emissions from large point sources alone may not be adequate for a neighborhood scale. For example, when emissions of air toxics from small facilities are modeled, local areas of elevated exposure and associated health risk may

result, if the facilities are co-located in proximity to sensitive receptors. These areas would remain undetected in the absence of a microscale analysis.

Currently we are utilizing the emission inventories that we developed in this report in an air dispersion modeling exercise to determine the relative importance of both large and small facilities in a community assessment. The next step is to verify the accuracy of the CEIDARS emissions database and to use monitoring as a tool to investigate potential "hot spots" in the community. Also, the diesel PM inventory of CEIDARS and non-CEIDARS facilities will be examined to improve both the spatial allocation methods and emission rates of diesel exhaust within communities. In addition to the Barrio Logan study described here, other community evaluations will be conducted and used to develop ARB's technical guidelines for community scale assessments.

DISCLAIMER

The opinions, findings, and conclusions expressed in this paper are those of the staff and not necessarily those of the California Air Resources Board.

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Table 3. Comparison of emissions from several types of facilities in the Barrio Logan community.

Pollutant Name	Total emissions (205)[a] (lbs/yr)	Emissions fr. facilities with SDAPCD permits (23)[b] (lbs/yr)	% of total	Emissions fr. auto repair facilities (89) (lbs/yr)	% of total	Emissions fr. welding facilities (24) (lbs/yr)	% of total	Emissions fr. warehouses (9) (lbs/yr)	% of total	Emissions fr. other facilities (22) (lbs/yr)	% of total
Diesel PM	17675.6	0.0	0.0	27.3	0.2	134.1	0.8	1039.2	5.9	0	0.0
Methanol	2683.5	115.0	4.3	451.2	16.8	0	0.0	0	0	0	0.0
Isopropyl alcohol	1384331.1	1329.3	0.1	223.2	0.0	62.8	0.0	0	0	844.0	0.1
n-Butyl alcohol	164712.0	289.7	0.2	217.2	0.1	24.4	0.0	0	0	0	0.0
Benzene	1791.1	111.0	6.2	2.1	0.1	0	0.0	0	0	1.0	0.1
Methylene chloride	24500.8	5.0	0.0	8.4	0.0	0	0.0	0	0	8.8	0.0
Propylene oxide	22716.4	0.0	0.0	0.0	0.0	0	0.0	0	0	0	0.0
Methyl ethyl ketone	35962.8	5175.7	14.4	1967.6	5.5	21.9	0.1	0	0	546.7	1.5
Trichloroethylene	2327.2	0.0	0.0	0.0	0.0	0.0	0.0	0	0	0	0.0
Naphthalene	687.2	92.6	13.5	100.7	14.7	4.6	0.7	0	0	179.1	26.1
Ethyl benzene	7226.4	194.6	2.7	131.5	1.8	3.1	0.0	0	0	35.5	0.5
Methyl isobutyl ketone	17036.7	489.0	2.9	311.2	1.8	8.1	0.0	0	0	1.2	0.0
Toluene	19073.5	8379.9	43.9	2568.5	13.5	39.3	0.2	0	0	167.8	0.9
Perchloroethylene	2055.8	628.7	30.6	1.6	0.1	0.0	0.0	0	0	14.4	0.7
Xylenes	53351.8	2220.4	4.2	1847.8	3.5	196.4	0.4	0	0	133.1	0.2
Lead	22.8	0.0	0.2	2.0	8.8	0.9	3.9	0	0	0	0.0
Manganese	1234.5	0.4	0.0	0.7	0.1	16.8	1.4	0	0	0	0.0
Nickel	187.4	0.4	0.2	0.0	0.0	1.3	0.7	0	0	0.7	0.4
Chlorine	529.0	0.0	0.0	0.1	0.0	0	0.0	0	0	0	0.0
Cr(VI)	16.5	0.1	0.6	0.0	0.1	0.6	3.6	0	0	0	0.0

[a] Numbers in parentheses represent the number of facilities in each category.

[b] In this category are facilities having SDAPCD permits but not reporting emissions to CEIDARS, except for auto repair facilities, welding facilities and warehouses that have permits. These types of facilities were inventoried with similar unpermitted facilities (columns 5, 7, and 9)

Figure 1a. Example of a survey form.

California Air Resources Board
SIC Emissions Study

1) Facility Name _____ Date _____

2) Facility Address _____ Inspectors Initials _____
street address

_____
city, state, ZIP

Daily Visit No. _____

3) Contact Information _____
name position phone

GENERAL FACILITY INFORMATION

4) Scale Factors:

Facility Size (circle 1)		
	< 1/4 acre	1/4 - 1 acre
	1-2 acres	2-5 acres
	>5 acres	

Number of cars parked at facility _____

Number of trucks parked at facility _____

Number of Employees at Facility _____

Number	Type of Units Serviced PER	Time
	ie vehicles, radiators	Unit time, ie days, months, etc

5) General Onsite Activities

TYPE	DESCRIPTION

6) On-Site Combustion Emissions including ovens, IC engines, forklifts, idling vehicles, etc

Describe Vehicle / Engine Type _____
provide engine type, fuel, size - such as large diesel forklift

Describe Use of Engine _____
provide use estimate, i.e., hours per year, amt. fuel burned per year, etc.

Engine Horsepower _____

Comments _____

_____

Figure 1b. Example of a survey form.

Application of Coatings / Solvents

Product Name ________________ **Component** **Percent**

Mftr / Phone Number / ZIP Code ________________

Use Rate ________ Hazwaste Collection ________
ie gallons per month ie gallons per month

Application Method ________ Container Volume ________
ie spray can, gun, or hand applied ie 12 oz

How Often Used ________ Duration of each use ________
ie 2-3 jobs per week ie 10 minutes per job

Product Name ________________ **Component** **Percent**

Mftr / Phone Number / ZIP Code ________________

Use Rate ________ Hazwaste Collection ________
ie gallons per month ie gallons per month

Application Method ________ Container Volume ________
ie spray can, gun, or hand applied ie 12 oz

How Often Used ________ Duration of each use ________
ie 2-3 jobs per week ie 10 minutes per job

Product Name ________________ **Component** **Percent**

Mftr / Phone Number / ZIP Code ________________

Use Rate ________ Hazwaste Collection ________
ie gallons per month ie gallons per month

Application Method ________ Container Volume ________
ie spray can, gun, or hand applied ie 12 oz

How Often Used ________ Duration of each use ________
ie 2-3 jobs per week ie 10 minutes per job

Product Name ________________ **Component** **Percent**

Mftr / Phone Number / ZIP Code ________________

Use Rate ________ Hazwaste Collection ________
ie gallons per month ie gallons per month

Application Method ________ Container Volume ________
ie spray can, gun, or hand applied ie 12 oz

How Often Used ________ Duration of each use ________
ie 2-3 jobs per week ie 10 minutes per job

Product Name ________________ **Component** **Percent**

Mftr / Phone Number / ZIP Code ________________

Use Rate ________ Hazwaste Collection ________
ie gallons per month ie gallons per month

Application Method ________ Container Volume ________
ie spray can, gun, or hand applied ie 12 oz

How Often Used ________ Duration of each use ________
ie 2-3 jobs per week ie 10 minutes per job

Figure 1c. Example of a survey form.

Welding / Soldering / Dust Operations

Process Characteristics - Describe operation and presence of controls / local exhaust if any

_____ _____

_____ _____

Soldering

Type of material used _____ and Mass used per unit time _____

or

Length used per job _____ width of solder _____

Number jobs processed per unit time _____

Other Information, including product / manufacturer of flux if any and volume of use

_____ _____

_____ _____

Welding

Flame	Circle which used: Rod or Wire	**Flame**	Rod or Wire
☐ Propane/Brazing	Circle material: stainless, mild steel, Al	☐ Propane/Brazing	Stnlss, M.S., other
☐ Oxy/acetylene	alloy number: _____	☐ Oxy/acetylene	alloy _____
Arc Welding	and	**Arc Welding**	and
☐ Wirefeed	mass used/unit time _____	☐ Wirefeed	mass/time _____
Wirefeed with	or	Wirefeed with	or
☐ Gas = MIG	length used per job _____	☐ Gas = MIG	lngth/job _____
☐ Tungsten Inert Gas		☐ Tungsten Inert Gas	
☐ Shielded Metal Arc	diameter of wire or rod _____	☐ Shielded Metal Arc	wire/rod D _____
☐ Other (specify)	number of jobs/unit time _____	☐ Other (specify)	jobs/time _____

Comments _____

_____

_____

Sanding / Grinding / Dusts

Describe Process

_____ _____

If abrasive blasting, provide abrasive throughput in unit

or provide make / model of machine _____

If grinding, describe how process is completed

Describe what type of tool _____

Describe average duration of use on each job _____

Describe area ground during each job on average and/or provide range _____

Describe number of jobs conducted per unit time _____

Describe how much material is removed, and composition of material _____

Comments _____

KEYWORDS

Emission Inventories
Community Scale Assessment
Air Toxics

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