Establishing Graffiti Emissions as a Nonpoint Source Sector

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19th International Emission Inventory Conference

September 29, 2010

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Costs and Regulatory Efforts

Costs associated with graffiti

- Nationally – estimates of $8 to $18 billion dollars per year,
- Clark County, Nevada – estimate of $30 million dollars per year, and
- Other costs: aesthetic, socioeconomic, environmental.

Regulatory efforts to mitigate graffiti

- Banning sale of spray paint and other contraband to minors or young adults,
- Banning sale of spray paint and other contraband to private citizens,
  - *National Paint & Coatings Assoc. v. City of Chicago*
- Preemptive requirement to use anti-graffiti material when building, and
  - *City of Los Angeles*
- Civil and criminal penalties.

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Nonpoint Source

" . . . Individual sources that have not been inventoried as specific point or mobile sources . . . [they] are typically too small, numerous, or difficult to inventory using the methods for the other classes of sources."

(40 C.F.R. §51.50)

Scope of Graffiti Sector

Includes not only emissions from the actual act of graffiti (e.g., spray painting), but also those that are proximally related to the act.

For example, portable fuel container (PFC) emissions include not only emissions from the PFC, but also emissions from spillage that occurs when PFCs are filled.

Ambit of Graffiti Sector

Sources within ambit of graffiti sector:

- Anti-graffiti coatings to protect structures from graffiti,
- Paints used to cover graffiti,
- Solvents and paint strippers used to remove graffiti, and
- Aerosol spray paints to produce graffiti.

Sources outside ambit of graffiti sector:

- Portable generators to power spray guns, pressure wash, abrasive blasting,
- PFCs to store gasoline for generators,
- Solvents used to clean painting equipment, and
- Vehicles used to transport equipment & clean-up crews.

Current Classification of Graffiti Sector Emissions

Graffiti Sector Emission	Currently Classified under SCC	1st Level Description	2nd Level Description	3rd Level Description	4th Level Description
Anti-Graffiti Coating used to expedite abatement	2401001050	Solvent Utilization	Surface Coating	Architectural Coatings	Total: All Solvent Types
Water-Based Paint used to cover graffiti	2401003000	Solvent Utilization	Surface Coating	Architectural Coatings – Water-based	All Other Architectural Categories
Solvent used to remove graffiti	2401100000	Solvent Utilization	Surface Coating	Industrial Maintenance Coatings	Total: All Solvent Types Thinning and Clean-Up of Solvent-Based
Aerosol Spray Paint used to generate graffiti	2460510000	Solvent Utilization	Miscellaneous Non-Industrial: Consumer and Commercial	Coatings and Related Products: Aerosol Spray Paints	Total: All Solvent Types

Proposed Classification of Graffiti Sector Emissions

Graffiti Sector Emission	SCC
Anti-Graffiti Coating to expedite abatement (publicly funded)	2401001012
Anti-Graffiti Coating to expedite abatement (privately funded)	2401001013
Water-Based Paint used to cover graffiti (publicly funded)	2401003100
Water-Based Paint used to cover graffiti (privately funded)	2401003200
Solvent to remove graffiti (publicly or privately funded)	2401100100
Aerosol Spray Paint used to generate graffiti (on public or residential property)	2460510100
Aerosol Spray Paint used to generate graffiti (on commercial or industrial property)	2460510200

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Methodology for Estimating Emissions

Source: **Paint used to cover graffiti**

Funding: **Public**

Proposed SCC: **2401003100**

Method using U.S. Census Bureau data:

- Determine average VOC content,
- Calculate total water-based paint (paint) emissions based on U.S. Census Bureau data,
- Determine throughput of paint used to cover graffiti, and
- Calculate emissions (local emissions are population-weighted).

Method using land-based emission factors:

- Determine area of urban environment,
- Calculate land-based emission factor (lbs/acre/year), and
- Calculate emissions.

Land-Based Emission Factors

Location	Area (sq. mi.)	Paint Usage (gallons)	Year	Land-based Emission Factor for Paint (lbs/acre/year)	Overall Land-based Emission Factor (lbs/acre/year)
Los Angeles (near Hollywood)	0.2	30,000	1993	137.00	400.00
Los Angeles County (urban environment only)	732.5	167,000	2007	0.21	0.61
Denver	153.3	19,100	2010	0.11	0.32
Clark County, Nevada (urban environment only)	291.4	35,449	2006	0.11	0.32
U.S. (urban environment only)	92,552.3	5,500,000	2008	0.05	0.15

Methodology for Estimating Emissions

Source: **Paint used to cover graffiti**

Funding: **Private**

Proposed SCC: **2401003200**

- Business and commercial property owners are generally required by code to abate graffiti.
- There is a lack of available data documenting private sector paint usage.
- To estimate emissions, U.S. Census Bureau data was used which tracks establishments by employment size --- establishment is defined as " . . . a single physical location at which business is conducted or services or industrial operations are performed." (U.S. Census Bureau)
- Emissions based on assumed paint usage of 1 gal/yr for every 2 establishments having at least 5 employees.

Methodology for Estimating Emissions

Source: **Spray paint**
Location: **Public or residential property**
Proposed SCC: **2460510100**

Spray paint is the primary source of VOCs from devices that generate graffiti (other devices include etching acid, and indelible markers).

Emission estimates were based on the following factors:

- Throughput of publicly funded paint used to cover graffiti,
- Average amount of surface area covered by a can of spray paint,
- Average amount of surface area covered by a gallon of paint,
- Average VOC content of spray paint, and
- Ratio of paint covering graffiti and surface area coverage of graffiti.

Methodology for Estimating Emissions

Source: **Spray paint**

Location: **Commercial or industrial property**

Proposed SCC: **2460510200**

Methodology same as that used to estimate spray paint emissions that are used on public or residential property (i.e., SCC 24605610100):

- Only difference is throughput of product, and
- Throughput is based on paint usage for privately funded water-based paint emissions (i.e., SCC 2401003200).

Methodology for Estimating Emissions

Source: **Anti-graffiti coating**

Funding: **Public and private**

Proposed SCCs: **2401001012 & 2401001013**

Emission estimates were based on the following :

- VOC content of product, and
- Throughput of product (population-weighted), based on CARB inventory.

Publicly and privately funded emissions are based on ratio of public and private funding of paint used to cover graffiti.

Methodology for Estimating Emissions

Source: **Solvent used to remove graffiti**

Funding: **Public or private**

Proposed SCC: **2401100100**

Emission estimates were based on the following:

- Consumer and commercial products survey for all graffiti removal products performed by CARB, and
- Population-weighting.

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Emissions Estimates

Graffiti Sector Emission	SCC	U.S. Graffiti Sector Emissions (tpy)	Clark County Graffiti Sector Emissions (tpy)
Anti-graffiti coating to expedite abatement (publicly funded)	2401001012	18.13	0.12
Anti-graffiti coating to expedite abatement (privately funded)	2401001013	4.99	0.03
Water-based paint used to cover graffiti (publicly funded)	2401003100	1,619.84	10.57
Water-based paint used to cover graffiti (privately funded)	2401003200	515.25	2.91
Solvent used to remove graffiti (publicly or privately funded)	2401100100	591.55	3.86
Aerosol spray paint used to generate graffiti (on public or residential property)	2460510100	1,602.80	10.46
Aerosol spray paint used to generate graffiti (on commercial or industrial property)	2460510200	509.82	2.88
	TOTALS:	**4,862 tons/year**	**31 tons/year**

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Conclusion (1 of 2)

1. Using the methodologies described, it was estimated that during 2008 the amount of VOC emissions from the graffiti sector were:

- 4,862 tons nationwide, and
- 31 tons from Clark County.

2. Within Clark County, the graffiti sector emissions were greater than several sectors routinely included in the NEI:

- Auto Body Refinishing Sector (28 tons),
- Traffic Marking Sector (25 tons),
- Structure Fires Sector (13 tons),
- Pesticide Sector (9 tons),
- Vehicle Fires Sector (6 tons), and
- Open Burning Sector (< 1 ton).

Conclusion (2 of 2)

3. By including graffiti sector emissions in EPA's triennial effort to establish a national emissions inventory, policymakers would be in a better position to understand graffiti's impact on air quality, and public agencies would be able to provide important environmental information to a younger generation that could play a significant role in attempts to mitigate the costs associated with graffiti.

Questions ?