What is actually emitted from Area Sources: Interim Results of a Special Study of Metals Recyclers

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What are they?

- Recycled metals
- Simple to sophisticated process and controls
- Not all the same focus
- Considered an Area Source
- No zoning
- Permit by Rule

What are the issues?

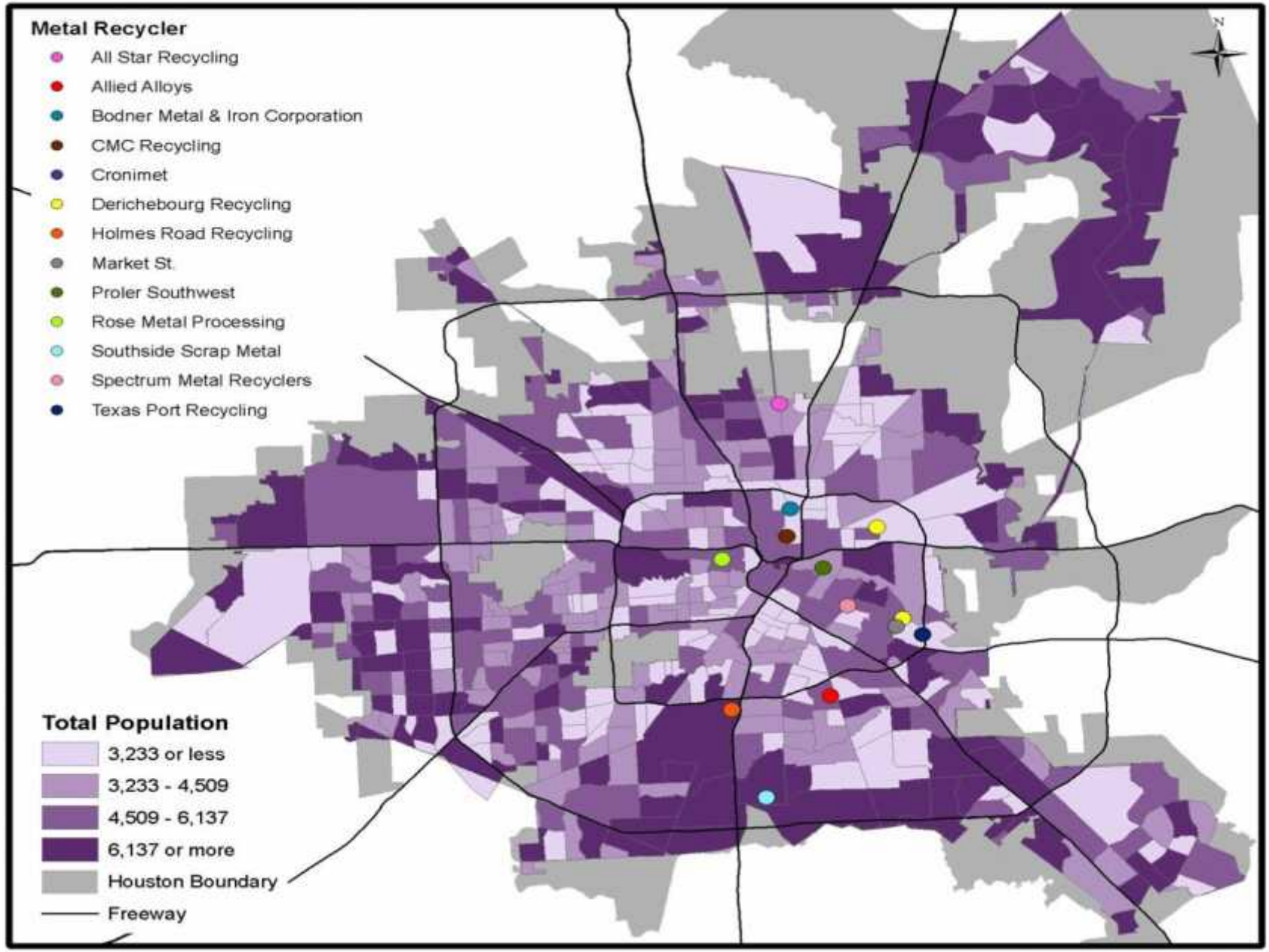
- Torch Cutting (metals, PM, odor, fire)
- Shredding, Shearing (metals, PM, noise, explosions)
- Crushing (metals, PM, explosions, noise)
- Conveyors (PM)
- Stockpiles (metals, PM, fires)
- Unpaved area (PM, MS4)
- Runoff (metals, organic fluids)
- Fluid Transfers (VOC emissions, spills, fire)

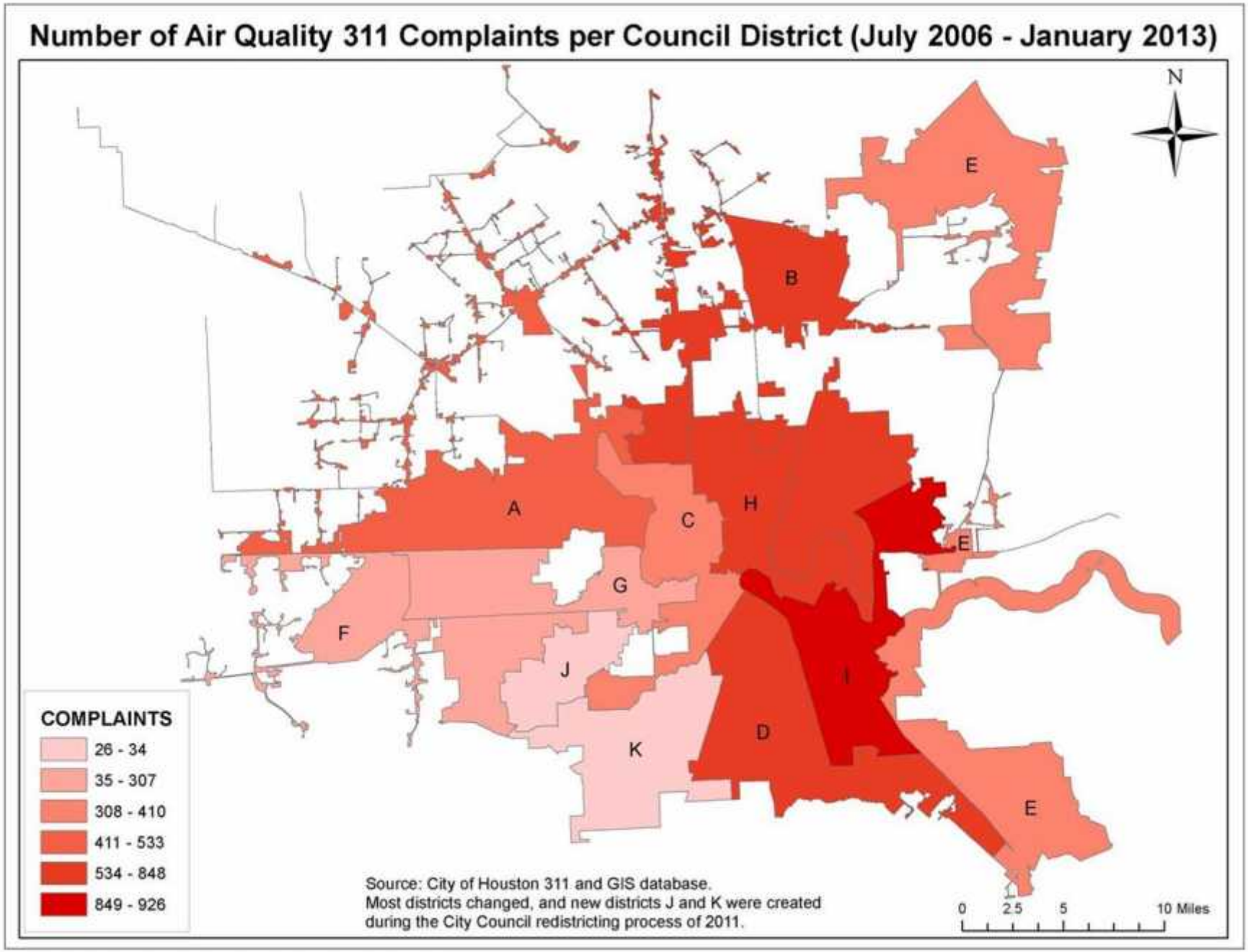
Torch Cutting

Detailed Study of 5 Locations

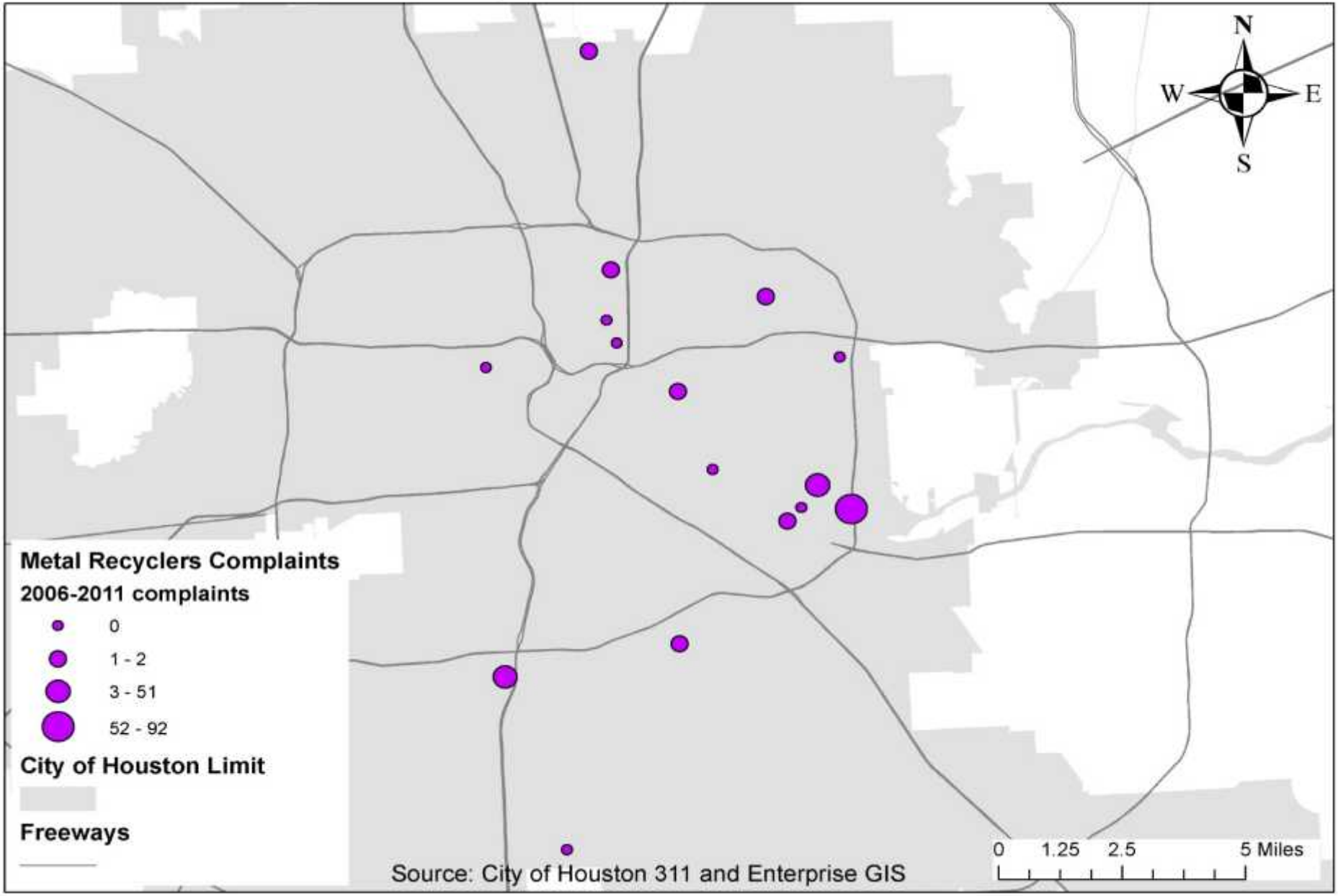
- Particulate ambient air monitoring (48 days)
- 5 medium sized metal recyclers in 4 different communities
- Similar in size, processing an estimated 200 to 500 tons per day of stainless steel and various other recyclable metals
- Torch cutting
- Same regulatory authorization and are
- Located in mixed industrial-residential areas.

Metal Recycling Sites and Houston Population




Number of Air Quality 311 Complaints per Council District (July 2006 - January 2013)
N
E
B
A
C
H
E
G
F
J
I
D
K
E
COMPLAINTS
26 - 34
35 - 307
308 - 410
411 - 533
534 - 848
849 - 926
Source: City of Houston 311 and GIS database.
Most districts changed, and new districts J and K were created during the City Council redistricting process of 2011.
0
2.5
5
10 Miles

189 Air Quality 311 Complaints related to Metal Recyclers
July 2006 - September 2011



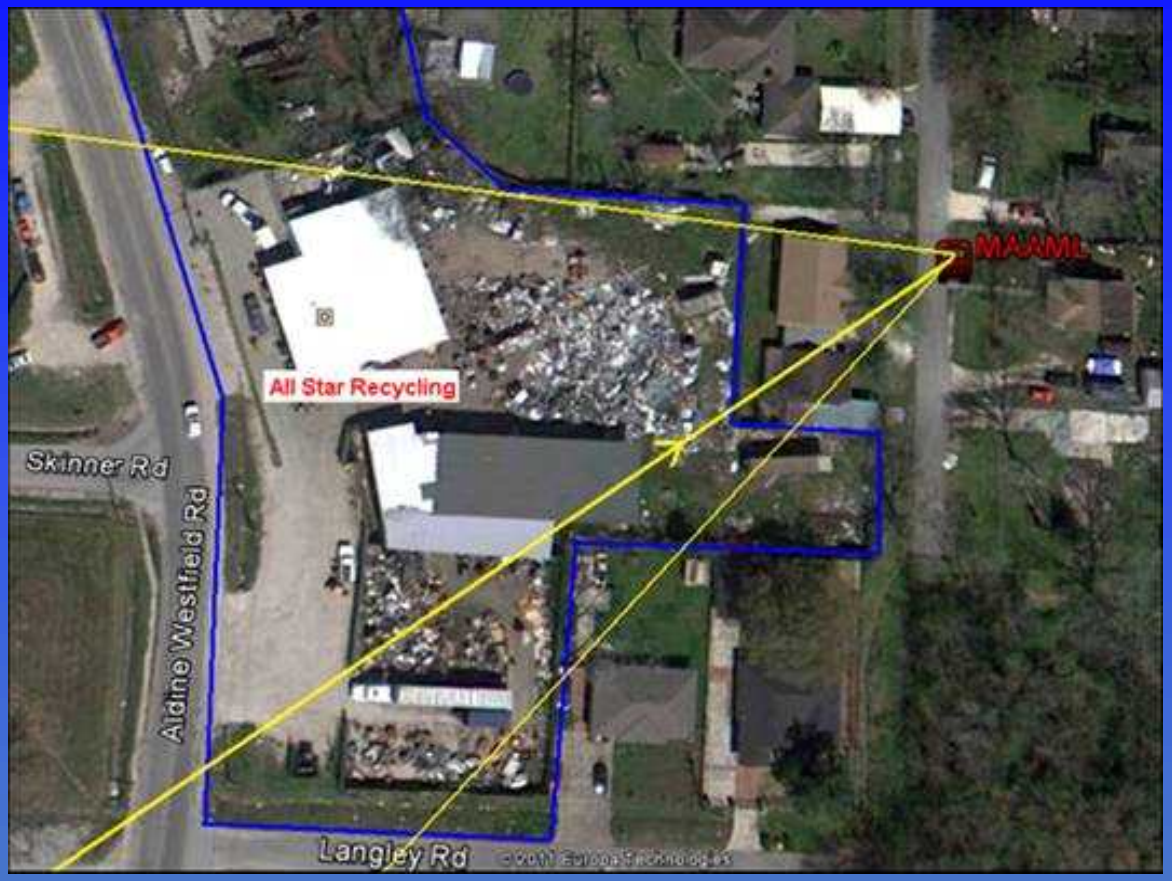
Location
Location
Location

- EPA lifetime exposure risk is based on 70 years of exposure, 24hrs/day, to an average population during 70 years of life that may affect 1/1,000,000 in the exposed population.
- OSHA exposure risk is based on a healthy adult workforce population exposed for 40hrs/wk over a 40 year working career that would produce less than 1/1000 cases of a work related illness.

LOCATION: Adjacent to a Bayou and a neighborhood

Deployment was a block from the facility, there are homes closer than this ;

Potential soil & water contamination issues.



Location: Another facility in a residential area

There is a home between the MAAML and the facility

Location: Another site located in industrial area near a bayou with a typical deployment near a property line.

Potential soil & water contamination issues

Location: Industrial area with other nearby sources for VOCs and dust (particulate matter). Complicates assessment.

Health Effects: Particulates

- Short term exposure to particulate air pollution is associated with sickness and death

- Especially with respect to fine particulate matter of aerodynamic diameter smaller than 2.5 µm (PM2.5) (Pope and Dockery, 2006).

A Matter of Size

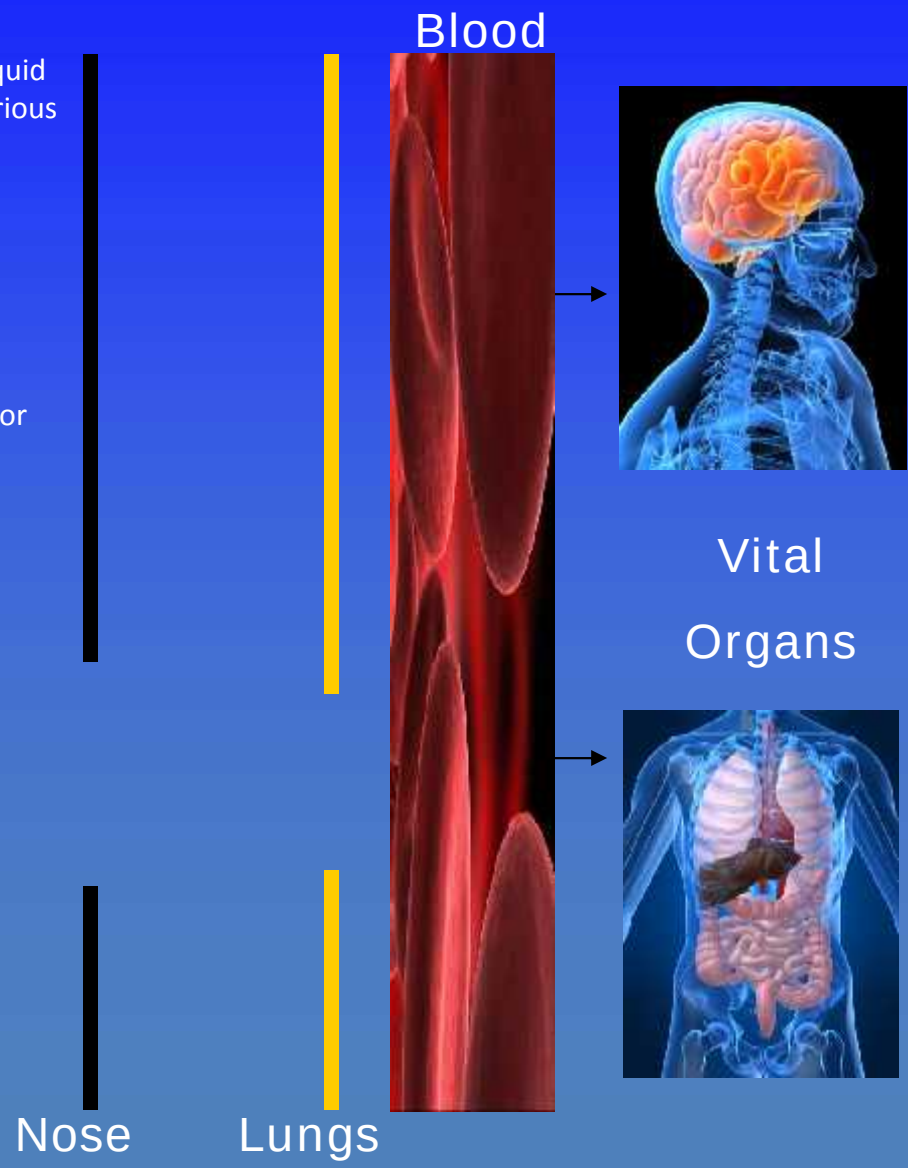
Health Effects

Particle pollution - especially fine particles - contains microscopic solids or liquid droplets that are so small that they can get deep into the lungs and cause serious health problems. Numerous scientific studies have linked particle pollution exposure to a variety of problems, including:

- premature death in people with heart or lung disease
- nonfatal heart attacks
- irregular heartbeat
- aggravated asthma
- decreased lung function
- increased respiratory symptoms, such as irritation of the airways, coughing or difficulty breathing.

~U.S. EPA

- Smaller particles remain suspended in the air longer than larger ones.
- Particles larger than 10 microns settle by gravity within hours unless supported by high winds.
- Particles smaller than 1 micron may remain suspended in the air for weeks!



Health Effects: Particulate Composition

- Chemical composition of particulates is another important consideration when studying the health impact
- Some particulates contain toxic components
- This work focuses on carcinogenic particulates

(De Hartog et al., 2006; Franklin et al., 2008).

What metals we looked for

- All TSP samples were analyzed for silver (Ag), cadmium (Cd), total chromium (Cr), copper (Cu), manganese (Mn), nickel (Ni), lead (Pb), zinc (Zn), iron (Fe) and cobalt (Co). Some TSP samples were collected for mercury (Hg) and at one site processing stainless steel, a few TSP & PM10 samples for hexavalent chromium (CrIV).

What Metals We Found

- Carcinogenic metals found in the ambient air downwind of the metal recycler: Ni, Cd, CrVI, and Co.
- None of these metals were found in the ambient air in the background.

Who Lives There

Community	Metal Recycler	Dominant Ethnicity	Population Density (per sq. mile)	Dominant Age	Median Household Income	% Less than High School Degree
Washington Ave	Facility 1	White	3,979	25-34	$61,910	16
Magnolia Park/ Harrisburg	Facility 2/ Facility 3	Hispanic	4,188	25-34	$28,257	57
South Park	Facility 4	African American	4,545	34-54	$32,635	46
Sunnyside	Facility 5	African American	937	25-34	$48,694	10

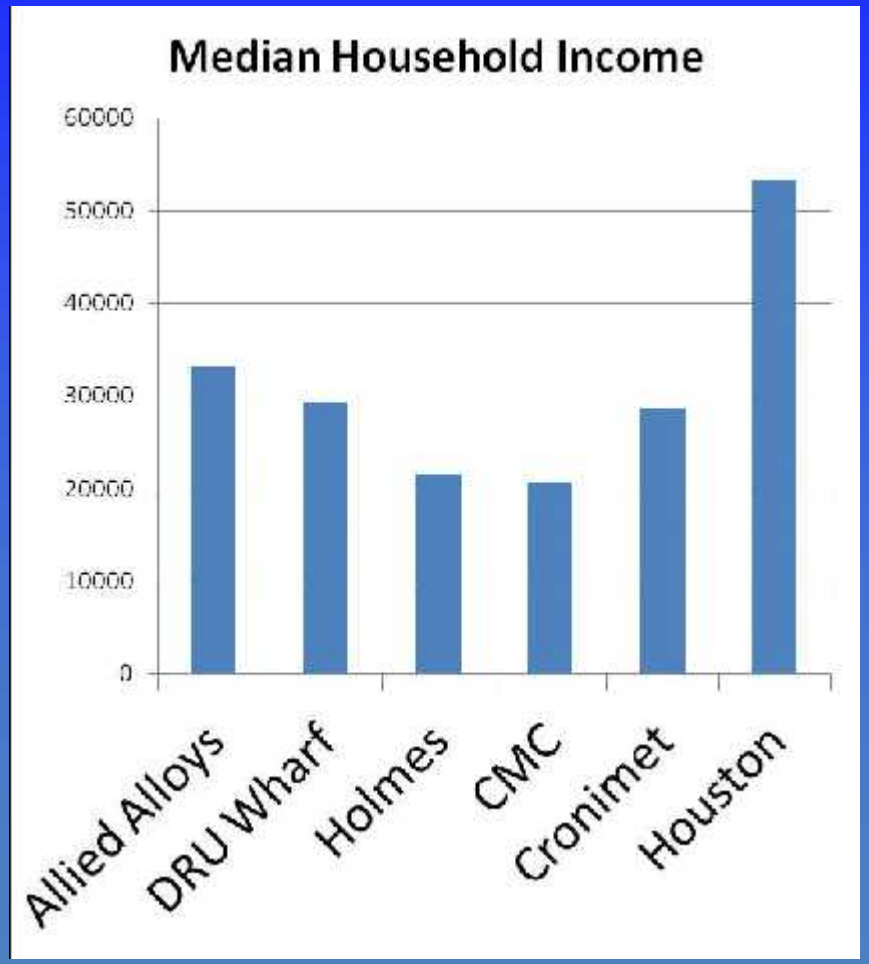
Most Metals Not in the Background: Percent detected

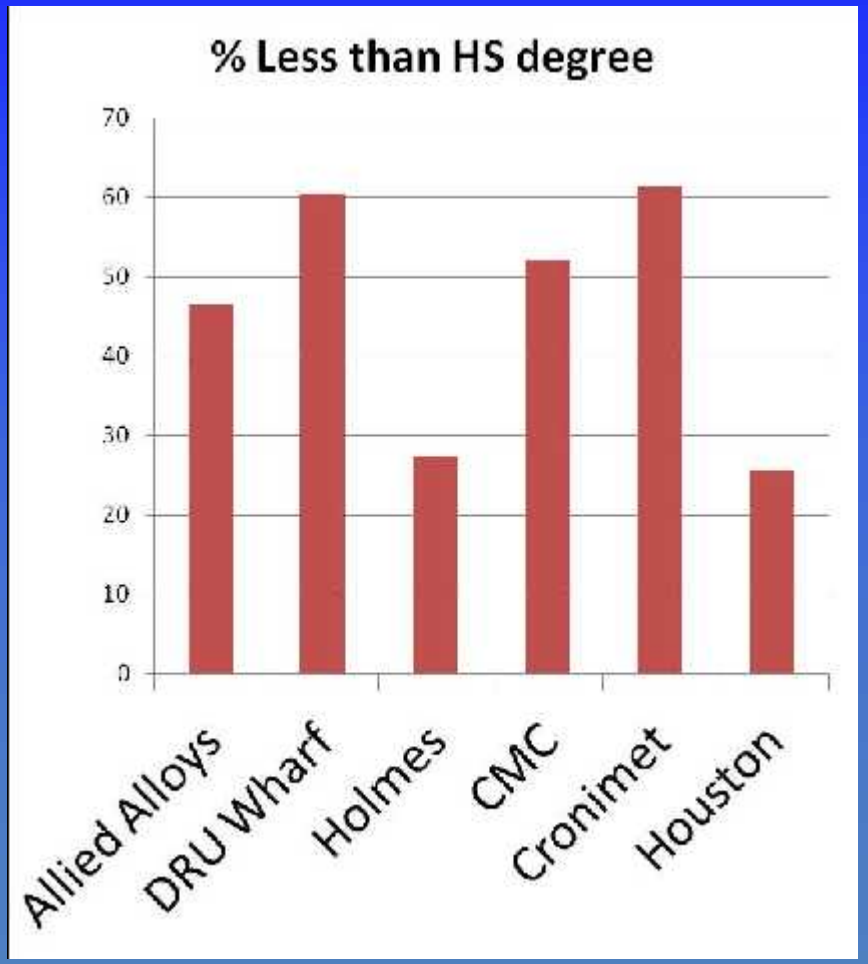
Metal	Metal Recycler	Background Areas
Fe	100	100
Mn	98	64
Cu	96	71
Cr	92	0
Ni	73	0
Pb	69	0
Co	18	0
Cd	6	0
Hg	2	0
Ag	0	0

Neighborhood Features

	Parks/trails	Schools	Fire stations	Churches	Community Centers	Hospitals
Facility 1	5	9	1	7	2	3
Facility 2	3	16	1	11	1	---
Facility 3	5	9	2	10	1	---
Facility 4	---	8	1	---	---	---
Facility 5	1	4	---	16	1	---

Demographics Near 5 Recyclers: Disadvantaged Population





Risk Methodology

RAGS Part F

- Risk = IUR x EC
- Toxicity data from region 3 calculator

- Exposure concentration measured then assessed using EPA ProUCL

Concentrations Exceed EPA Screening Levels

Facility	Metal	Inhalation Unit Risk per $\mu g/m^3$	Measured Concentration ($\mu g/m^3$)	Annual Concentration ($\mu g/m^3$)[b]			Residential Carcinogenic Screening Level ($\mu g/m^3$)	Exceeded
			8 hour[a]	1 shift/day	2 shifts/day	3 shifts/day		
1	CrVI[a]	1.20E-02	4.44E-03	1.27E-03	2.54E-03	3.81E-03	2.03E-04	√√√
	Ni	2.40E-04	8.22E-02	2.35E-02	4.70E-02	7.05E-02	1.01E-02	√√√
2	CrVI[a]	1.20E-02	2.88E-02	8.23E-03	1.65E-02	2.47E-02	2.03E-04	√√√
	Ni	2.40E-04	3.82E-01	1.09E-01	2.18E-01	3.27E-01	1.01E-02	√√√
3	CrVI[a]	1.20E-02	1.24E-01	3.54E-02	7.09E-02	1.06E-01	2.03E-04	√√√
	Ni	2.40E-04	5.55E-01	1.59E-01	3.17E-01	4.76E-01	1.01E-02	√√√
	Co	9.00E-03	1.69E-02	4.83E-03	9.66E-03	1.45E-02	2.70E-04	√√√
4	CrVI[a]	1.20E-02	5.23E-02	1.49E-02	2.99E-02	4.48E-02	2.03E-04	√√√
	Ni	2.40E-04	1.09E+00	3.11E-01	6.23E-01	9.34E-01	1.01E-02	√√√
	Co	9.00E-03	1.38E-01	3.94E-02	7.89E-02	1.18E-01	2.70E-04	√√√
5	CrVI[a]	1.20E-02	2.08E-02	5.94E-03	1.19E-02	1.78E-02	2.03E-04	√√√
	Ni	2.40E-04	2.43E-01	6.94E-02	1.39E-01	2.08E-01	1.01E-02	√√√
	Cd	1.80E-03	5.32E-02	1.52E-02	3.04E-02	4.56E-02	1.35E-03	√√√

Note: CrVI was measured at only one facility and estimated from Total Cr at the others

Total Risk Range by Facility from Carcinogenic Metals in Air

shifts/day	Facility 1	Facility 2	Facility 3	Facility 4	Facility 5
1	8.57E-06	5.13E-05	2.08E-04	2.52E-04	4.74E-05
	to	to	to	to	to
	1.03E-06	6.16E-06	2.50E-05	3.02E-05	5.69E-06
2	1.71E-05	1.03E-04	4.16E-04	5.03E-04	9.48E-05
	to	to	to	to	to
	2.06E-06	1.23E-05	4.99E-05	6.04E-05	1.14E-05
3	2.57E-05	1.54E-04	6.24E-04	7.55E-04	1.42E-04
	to	to	to	to	to
	3.09E-06	1.85E-05	7.49E-05	9.06E-05	1.71E-05

Note: CrVI was measured at only one facility and estimated from Total Cr at the others

Risk Ranges from 1 to 800 extra cancer case in one million people

Efforts made by Holmes Road Recycling to improve their facility

The following list of site improvements has been implemented by Holmes Road Recycling to improve operating conditions and reduce potential pollution concerns since the BPCP first began working with them in 2010:

- a. Purchased a self-contained carbon filtered vehicle liquid eradication system.
- b. Retrofitting system to install a double carbon filter system.
- c. Reduced the torch tip size to reduce emissions.
- d. Reduced the number of torch cutters from 15 to 2.
- e. Purchased 2 shears to cut metal therefore requiring less torch cutters.
- f. Purchase and Installed water monitors to help control smoke and dust.
- g. Purchased water truck to control dust.
- h. Purchased EPA approved dust suppressant to apply to the driveways and lots.
- i. Purchased MiniRae monitor to check and monitor VOC's.
- j. Purchased weather and wind monitoring system.
- k. Poured over 2 acres of concrete to control dust and ground pollution.
- l. Built an 18 inch concrete berm around the facility to contain storm water.
- m. Developed and implemented a program to test employees for levels of heavy metals.
- n. Participate in the TERP program to ensure we are using the current tier level of motors in our equipment. All equipment is currently Tier IV.
- o. In process of purchasing Torching Solutions SPARCS System and will test this system in conjunction with the City of Houston Bureau of Air Quality to determine the effectiveness of the system.

Possible Engineering Solutions

- Reduce fine emissions by using other cutting methods (shears or shredders).
- Reduce torch cutting emissions by adding moisture or a shielding gas to the torch mix (50mm of water has been reported to reduces PM emissions by 90%).
- Barriers (walls or fences) reduce emissions, odors, noise and discourage theft.
- A baghouse around a shredder will reduce particulate emissions and tend to reduce VOC emissions too.
- Keeping the scrap yard clean implies it is safer and will reduce the potential for accidents and runoff issues.
- Check with regulatory experts before making major changes that may affect site operation and status under the law (EPA, TCEQ, OSHA etc.).

Next Steps

- Expanding our list of sampling sites;
- Assessing improvements made by REs - inform affected residents;
- Petition state for rule-making - improve regulations;
- Purchase PM 10 samplers - improve Cr+6 detection;
- Community based participatory research via Grant.

Grant Application

- National Institute of Environmental Health Sciences;
- Assessing and Addressing Community Exposure to Environmental Contaminants;
- Partners: UTSPH (SWCOEH), Rice U., Air Alliance Houston, HDHHS (BPCP)
  - Determine health risks related to exposures to air emissions
  - Translate and disseminate evidence-based findings health promotion planning method
  - Develop, conduct and evaluate public health action plan
    - Recommend best practices
    - Promote policy changes
    - Enhance community capacity
- Five year-plan process if grant is awarded.

Questions?

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