December 9, 2019

City of Chicago, Department of Public Health
Attn: Environmental Permitting and
Inspections 333 South State Street, Room 200
Chicago, IL 60604

Re: Supplemental Comments on Proposed Rules For Large Recycling Facilities

To Whom It May Concern:

This letter provides supplemental comments on the Department of Health's Proposed Rules For Large Recycling Facilities ("Proposed Rules"). These supplemental comments provide additional information in support of comments previously submitted on June 21, 2019 ("the June 21 Comments")[1], on behalf of the Southeast Environmental Task Force ("SETF") and the Chicago South East Side Coalition to Ban Petcoke, active community groups dedicated to improving the Calumet neighborhood's environment; the Little Village Environmental Justice Organization ("LVEJO"), which is committed to organizing with the Little Village community to accomplish environmental justice, and to achieve the self- determination of immigrant, low-income, and working-class families; and the Natural Resources Defense Council ("NRDC") and our roughly 10,000 members and activists in the City of Chicago, including those who reside on the Southeast Side and along the I-55 Southwest corridor. We appreciate the opportunity to provide these supplemental comments.

Introduction

In the June 21 Comments, we urged the Chicago Department of Public Health ("CDPH") to strengthen its Proposed Rules in order to better protect Chicago's residents, including several environmental justice communities, from the well-documented health and environmental hazards presented by operations of large recycling facilities in the city. We write now to supplement those comments with respect to auto shredder residue ("ASR") and torch cutting, both of which require more stringent regulations than those proposed by CDPH in order to protect public health and the environment in nearby communities.

Additional Comments Concerning ASR

As set out in the June 21 Comments, ASR poses significant threats to human health and the environment. Air impacts from ASR include inhalable toxic heavy metals, for example hexavalent chromium, as well as volatile organic compounds, which also contain a variety of volatile toxic air contaminants. These contaminants cause cancer, asthma, and damage to the naval passages and skin.[2] We therefore urged CDPH to modify its Proposed Rule to require that

[1] Ex. 1, Comments on Proposed Rules for Large Recycling Facilities. (June 21, 2019) (attached).
[2] Ex. 1 at 3.

all recycling operations that involve ASR, including processing, storage, staging, conveyance, and transport, be fully enclosed and employ robust air pollution and fire protection controls as well as other needed protective measures.[3]

We now supplement those comments with additional information concerning the toxicity of ASR and the resulting need to properly treat and store ASR. We submit these supplemental comments with respect to ASR given multiple industry commenters' assertions that "ASR is nonhazardous" and does not pose a leaching hazard.

In addition to the metals noted above, ASR contains levels of lead, copper and zinc in finely divided form that may exceed health protective concentrations.[4] ASR may also contain hazardous levels of cadmium and PCBs.[5] The toxic metals and/or chemicals in ASR pose dangers both as components of fugitive dust throughout the recycling process[6] and through leakage during storage[7] and transport.[8]

The hazards of ASR can be reduced through treatment using methods to stabilize and/or solidify the waste and, as urged in the June 21 Comments, the Proposed Rules should require that recycling facilities designate on-site and off-site methods that will be used to address ASR wastes.[9] Because of the particular toxicity of *untreated* ASR, which some facilities covered by the proposed rules will generate and handle, the Proposed Rules should be modified to prohibit any storage of untreated ASR on-site.[10] That is, all ASR must be treated onsite (after being moved within the facility via totally enclosed handling steps) or immediately shipped offsite for treatment. Further, while treating of ASR reduces the mobility of toxic heavy metals in the residue, it does not completely eliminate the toxic characteristics of the metals.[11] The Proposed Rules should, as set forth in our original comments, therefore be modified to require enclosure of all ASR throughout the recycling process, including during processing, conveyance, storage

3 Ex.1 at 17-21.

4 Ex. 2, California Department of Toxic Substances Control, *DRAFT Evaluation and Analysis of Metal Shredding Facilities and Metal Shredder Wates,* January 2018 at 41-42, available at https://dtsc.ca.gov/wp-content/uploads/sites/31/2017/01/Metal-Shredder-Analysis-DRAFT.pdf ("DTSC Metal Shredding January 2018")(As noted in the June 21 Comments, this report is marked "DRAFT" and "Do not cite or quote." A final report has not been published; the Draft is cited here because of the important scope of the work and relevant draft findings.)

5 *Id.*

6 *See, for example,* Ex. 3, Arturo J. Blanco, Loren Raun and Don Richter, Houston Department of Health & Human Services, Bureau of Pollution Control and Prevention, "What is actually emitted from Area Sources: Results of a Special Study of Metals Recyclers," available at https://www3.epa.gov/ttnamti1/files/2012conference/3BRaun.pdf .

7 Ex. 1 at 21; Ex. 2 at 50-51.

8 Ex. 2 at 52.

9 Ex. 1 at 21.

10 As noted in the June 21 Comments, ASR is a special waste under Illinois regulations and all aspects of the ASR waste stream – both untreated and treated – should be properly scored and characterized for their toxicity and managed appropriately during collection, treatment, conveyance, storage and transport. Ex. 4, Illinois EPA, "Do I Have a Special Waste?" available at https://www2.illinois.gov/epa/topics/waste-management/waste-disposal/special-waste/Pages/do-i-have.aspx . *See also,* 35 Ill. Admin. Code 808. Further,

11 Ex. 2 at 43.

and transportation. Further, the Proposed Rules should be modified to ensure that storage of treated ASR is conducted on surfaces and in containers that will prevent leakage to ground water or surface water through run-off.[12]

Additional Comments Concerning Torch Cutting

We submit supplemental comments on the impacts to air quality from torch cutting given industry commenter's assertion that torch cutting is an "inconsequential" source of air pollution (and thus should be omitted from the required air quality modeling analysis). Torch cutting is used in the recycling process to break apart large metal pieces. Torch cutting typically uses gas, but torches may also use plasma or powder.[13] [14] Torch cutting vaporizes metal, resulting in airborne toxic metals as well as dust and opacity (the latter potentially in excess of state opacity standards) and, depending on the type of torch used, may create large amounts of smoke and noise.[15] Torch cutting is especially concerning because it generates fine particulate matter air pollution (PM 2.5).[16] Even short term exposure to particulate matter air pollution is associated with morbidity and mortality, especially with respect to fine particulate matter (PM 2.5).[17] Metals generated in fine particles by torch cutting include nickel, cadmium, hexavalent chromium,

12 *See* Ex. 2 at 111 (Noting that the study's conclusion that chemically treated metal shredder residue ("CTMSR") found no greater impact from landfills that handled CTMSR assumed containment of the waste in lined portions of the landfills: "Because DTSC's conclusions are based on comparative analyses using data from landfills that are currently receiving CTMSR, DTSC's conclusions would continue to be supported only if the solid waste landfills to which CTMSR is sent meet the same general description as those to which it has been sent historically. The landfills that have historically received CTMSR have disposed or used as ADC in a composite-lined portion of their solid waste landfill unit which meet all requirements applicable to disposal of municipal solid waste in California after October 9, 1993, and the landfills are authorized to accept it by the appropriate [water quality control authority].").

13 Ex. 5, OSHA, Guidance for the Identification and Control of Safety and Health Hazards in Metal Scrap Recycling at 9-10 ("OSHA Guidance"), available at https://www.osha.gov/Publications/OSHA3348-metal-scrap-recycling.pdf.

14 Torch cutting should be considered distinct from "cutting," which is considered an "insignificant" activity under IAC Section 201.210, available at http://www.ilga.gov/commission/jcar/admincode/035/035002010F02100R.html The regulatory history of Section 201.210 points to insignificant activities being minor sources of air pollution that do not contribute significantly to the health and environmental goals underlying Title V of the Clean Air Act. *See* 415 ILCS Section 5/39.5/(5)(w), available at http://www.ilga.gov/legislation/ilcs/ilcs4.asp?ActID=1585&ChapterID=36&SeqStart=44100000&SeqEnd=45600000; Illinois Pollution Control Board Rulemaking R94-14 (June 1994) ("IPBC Rulemaking") available at https://pcb.illinois.gov/Cases/GetCaseDetailsByID?caseID=4982 . In contrast, as detailed above, torch cutting at recycling facilities contributes significant hazardous air pollution in communities located nearby and research indicates that increased fine size particulate matter generated by torch cutting increases cancer risk in those communities. *See* above at p.3 and Ex. 6. Further, testimony during the IPCB Rulemaking by an Illinois EPA representative strongly suggested that even insignificant activities that in fact have a significant environmental impact may be regulated as part of a CAAPP permit. Ex. 6, Testimony of Christopher Romaine *during* IPCB Rulemaking at 8-9 (June 1994) ("Based on the list of insignificant activities submitted in a CAAPP application, the Agency or USEPA may find during the course of permitting that an activity should not qualify as insignificant.").

15 OSHA Guidance at 11; *see also* Ex. 7, Michigan Department of Environmental Quality, Violation Notice to RJ Industrial Recycling (June 25, 2016), available at https://www.deq.state.mi.us/aps/downloads/SRN/N7885/N7885_VN_20160525.pdf.

16 Ex. 8, L. Raun, K. Pepple, D. Holyt, D. Richner, A.Blanco, and J. LI, *Unanticipated potential cancer risk near metal recycling facilities*, Environmental Impact Assessment Review 41 at 71 (2013) ("Raun, et. al.").

17 *Id.* at 71; *see also, e.g.,* Ex. 9, World Health Organization, "Health Effects of Particulate Matter Policy implications for countries in eastern Europe, Caucuses, and central Asia" at 6 (2013), available at http://www.euro.who.int/__data/assets/pdf_file/0006/189051/Health-effects-of-particulate-matter-final-Eng.pdf ("The health effects of inhalable PM are well documented. They are due to exposure over both the short term (hours, days) and long term (months, years) and include: • respiratory and cardiovascular morbidity, such as aggravation of

and copper, all of which are carcinogenic.[18] In a study based on monitoring at five recycling facilities in Houston, researchers concluded that the increased cancer risk from ambient air concentrations of these metals generated at the recycling facilities ranged from 1 case in 1 million to 8 cases in 10,000.[19] Torch cutting also generates hazardous lead dust.[20]

Because of these substantial dangers of ambient air contamination generated by torch cutting, the Proposed Rules should be modified to require that all torch cutting at recycling facilities be conducted only in fully enclosed and properly ventilated structures.

Thank you for your consideration of these comments. Please contact us if you have any questions or comments.

Sincerely,

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asthma, respiratory symptoms and an increase in hospital admissions; • mortality from cardiovascular and respiratory diseases and from lung cancer.”).

18 *Id.* at 73.

19 *Id.* at 75.

20 Ex. 10, New York State Dept. of Health, *Metal Recycling Industry Project*, available at https://www.health.ny.gov/environmental/workplace/metal_recycling/metal_recycling_report.htm.

Exhibit 1.

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I. Introduction

These long overdue regulations proposed by the Chicago Department of Public Health (CDPH) are welcome as an important first step toward overseeing and controlling the many environmental impacts of recycling facilities, which have long gone un- or under-regulated by all levels of government here in Chicago and across the U.S. For years, community members – including residents of Chicago's Southeast Side, Pilsen, and Little Village communities (not to mention Lincoln Park) – have raised concerns about air and water pollution, noxious odors, noise pollution, and other impacts of recycling facilities. Regulators are finally taking a closer look in response, with auto shredders in particular the subject of enhanced scrutiny by environmental and public health agencies across the country in recent years. Our hope is that the final regulations adopted by CDPH will help reduce the impact of these facilities on the surrounding communities through:

- enhanced evaluation of proposed new and expanded facilities, along with existing facilities, that takes into account the existing burdens on communities, in particular the disproportionate impacts of these and other industrial facilities on environmental justice communities;
- robust performance standards that address the full array of potential impacts from recycling facilities, existing and new/expanded, ideally by building control into the frontend design;

- stringent monitoring requirements that ensure continuous compliance and relieve community members and regulators from the burden of surveillance and enforcement; and
- extensive public participation across the board.

II. Summary of Comments

The first several sections of these comments address the threats to public health, safety, welfare and the environment created by recycling facilities. They also address the characteristics of the Chicago neighborhoods that are at the most risk because of the clustering of large recycling facilities. Section V proposes enhanced monitoring, control and assessment measures to address the air pollution impacts caused by recycling facilities. Section VI asserts that additional measures are necessary to control the air, water and waste impacts of the hazardous auto shredder residue released by scrap metal facilities. Section VII asserts that additional measures must be employed at facilities handling construction and demolition materials to prevent the illegal processing and release of toxic substances. The concluding Section addresses the Rules' environmental impact assessment provision, the need for CDPH to address the cumulative impacts arising from clustered facilities, and public participation.

III. Summary of Environmental and Health Issues Associated with (Metal) Recycling Facilities

On an annual basis, the United States processes 56 million tons of scrap iron and steel, including 10 million tons of scrap automobiles, along with millions of additional tons of other scrap metals.[1] Other states, such as California, have found that despite recycling facilities falling under the jurisdiction of various environmental and health agencies, certain aspects of the operation of metal and auto shredders are inadequately or unregulated, resulting in the release of toxic emissions into the local community. Specifically, as noted in a 2018 draft report by the California Department of Toxic Substances Control ("DTSC") on its wide-ranging review of metal shredders and metal shredder residue,

> In conducting the evaluation of metal shredding facilities and their hazardous waste management practices, DTSC found numerous examples of accidents, improper hazardous waste storage, soil contamination, and hazardous waste releases outside the facilities that were found to be contaminating the surrounding community.[2]

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[1] Ex. 1, Occupational Health and Safety Administration ("OSHA"), *Scrap Metal Recycling*, available at https://www.osha.gov/SLTC/recycling/recycling_scrap_metal.html.

[2] Ex. 2, California Department of Toxic Substances Control, *DRAFT Evaluation and Analysis of Metal Shredding Facilities and Metal Shredder Wastes*, January 2018, available at https://dtsc.ca.gov/wp-content/uploads/sites/31/2018/05/Metal-Shredder-Analysis-DRAFT.pdf ("DTSC Metal Shredding January 2018"), at 112. (While the report is marked "DRAFT" and "Do not cite or quote," it appears that DTSC has not finalized a

The agency also performed "an analysis of the treatment and storage activities at the metal shredding facilities, the chemical and physical hazards that those activities present, the types of accidents that could occur, and the risks those activities pose to nearby communities," finding that "the hazardous waste management activities pose substantial risks to nearby communities."[3] Thus, while metal recycling is relevant to reducing a municipality's overall environmental impact, the negative impacts from the process itself must be addressed by the City.[4]

The recycling process is complex, particularly where the commodities being recycled are made of up different types of substances, some of which are coated in toxic substances, release hazardous substances when processed, and/or are themselves hazardous. Despite the risks of processing these materials, metal recycling facilities have a long and disastrous history of being under-regulated, leading to explosions and emissions that have harmed workers and residents. There are important environmental and public safety concerns with the continued operation of metal shredding facilities in particular and large recyclers in general. A brief summary is as follows.

Air Emissions. Metal shredders and metal recyclers produce numerous concerning air pollutants from a range of specific sources. First, the process of shredding (such as in a hammermill) or cutting (as with torchcutting) metal vaporizes the material and creates dust and hazardous air emissions that can affect the local air quality. For example, in 2012, hexavalent chromium (Chrome VI) was detected in the air outside of five of Houston's metal shredding facilities as part of a study conducted by the Houston Department of Health and Human Services, Bureau of Pollution Control and Prevention.[5] This detection came after nearby residents had made 139 reports to Houston's 311 help line about red smoke, yellow smoke, explosions, fires, and children having trouble breathing.[6] Chromium metal is added to alloy steel to increase the metal's hardenability and corrosion resistance, but is released into the air when that metal is heated during cutting or welding.[7] Chrome VI can cause cancer, asthma and damage to the nasal passages and skin.[8]

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version of the report, so we are providing the draft version for purposes of our comments due to the important scope of the work and relevant draft findings.)

[3] *Id.*

[4] We note that, due to multiple city agencies having responsibilities with respect to environmental regulation of recycling facilities and due to zoning and land use ordinances and policies that largely govern siting processes, more reforms will be needed beyond the current proposed CDPH regulations.

[5] *See* Ex. 3, Ingrid Lobet, "Danger in air near metal recyclers," *Houston Chronicle*, December 29, 2012, available at https://www.houstonchronicle.com/news/houston-texas/houston/article/Danger-in-air-near-metal-recyclers-4154951.php#photo-3961405 ("Danger in air") and Ex. 4, Ingrid Lobet, "Metal recycling companies grow, but questions raised," *Houston Chronicle*, December 20, 2012, available at https://www.chron.com/news/article/Metal-Recycling-Companies-Grow-But-Questions-4152230.php.

[6] Ex. 3, Danger in air.

[7] Ex. 5, OSHA, *Hexavalent Chromium*, available at https://www.osha.gov/SLTC/hexavalentchromium/.

[8] Ex. 6, OSHA, *Small Entity Compliance Guide for Hexavalant Chromium*, available at https://www.osha.gov/Publications/OSHA_small_entity_comp.pdf, at 3.

The 2012 Houston study furthermore looked at a total of 11 metals and 75 volatile organic compounds (VOCs), along with PM10 as a whole, near metal recyclers.[9] The study found significant cancer risks around the facilities using measured air quality data, including risks that were much greater than those calculated via the National Air Toxics Assessment (NATA). In addition, the Houston study points to sources of air pollution besides the shredder itself. Specifically, photos accompanying the study presentation implicate yard activities as significant emissions sources, showing white and brown visible emissions associated with outdoor torch cutting and movement of metals by construction vehicles, respectively.

In 2007, the SA Recycling Terminal Island facility in California experienced an explosion, which resulted in an enforcement action by the Los Angeles District Attorneys' office when the facility continued to operate after the explosion damaged its air pollution control system, resulting in the release of an estimated 52 pounds per hour of VOCs and 28.3 tons of PM over the course of 120 days.[10] Further sampling by DTSC in 2008 found that the shredder had also released lead and mercury above the regulatory threshold during the same period.[11]

In addition, once ferrous metals have been sorted out, metal shredder facilities produce a byproduct that can become airborne and that is referred to by many names, among them auto shredder residue, metal shredder aggregate, light fibrous material, and auto fluff. Section VI describes in more detail the hazards of this byproduct. From approximately 2009 until Sims Metal Management settled with the California Attorney General's Office in 2014, nearby residents in Redwood City had observed white fluff originating from the facility.[12] DTSC sampled at the facility as well as in nearby locations and identified exceedances for zinc, lead and copper and determined that Sims had illegally disposed hazardous shredder residue.[13] Similarly, in 2015 DTSC issued the SA Recycling Bakersfield facility a letter for improperly managing shredded materials, which resulted in their escaping the property boundary as hazardous waste.[14] It is our understanding that residents of Lincoln Park have reported concerns with auto fluff in the community that they attribute to the General Iron auto shredding operation.

Fires and explosions. There are inherent risks in the process of shredding metal, from the equipment used by shredders to the items being shredded themselves, such as improperly drained

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[9] Ex. 7, Arturo J. Blanco, Loren Raun and Don Richner, Houston Department of Health & Human Services, Bureau of Pollution Control and Prevention, "What is actually emitted from Area Sources: Results of a Special Study of Metals Recyclers," available at https://www3.epa.gov/ttnamti1/files/2012conference/3BRaun.pdf ("Houston DHHS Metal Recycler Study")

[10] Ex. 8, Geoff Mohan, "Auto shredder to pay $2.9 million to settle toxic waste case," Los Angeles Times, September 8, 2011, available at https://latimesblogs.latimes.com/greenspace/2011/09/toxics-agency-settles-with-auto-shredder.html ("LA Sims Settlement"); DTSC Metal Shredding January 2018, at 59.

[11] Ex. 8, LA Sims Settlement; Ex. 2, DTSC Metal Shredding January 2018, at 60 (citing *People of the State of California v. SA Recycling, LLC and Simsmetal West, LLC*, California Superior Court, Los Angeles County, case no. BC458943, Stipulated Judgment and Order, filed August 31, 2011).

[12] Ex. 2, DTSC Metal Shredding January 2018, at 64-65.

[13] *Id.*

[14] *Id.* at 66.

gas tanks.[15] OSHA also warns that metals aluminum or iron in dust form can be explosible and lead to worker deaths or injuries.[16] These risks are anticipated by operators of metal shredding facilities; one CEO has even stated that his facility has "never had a shredder operate for a year without an explosion or two or three. It just doesn't happen."[17] That facility, in New Brunswick, Canada, was ordered by the provincial government to shut down immediately after a series of explosions.[18] When the provincial government allowed it to continue operating during "probationary periods," the explosions continued.[19] Similarly, in Houston, the Texas Port Recycling facility had 41 fires and explosions during a four-month period in 2007 and 2008.[20] In California, DTSC found that four of its six metal shredding facilities had had fires on their properties from 2008 to 2018, including some that had required local fire departments to advise nearby residents to stay indoors and close their air intake systems.[21]

An air monitoring study of a 2014 fire at a Redwood City, California, metal shredding facility that lasted roughly 18 hours (based on the time the fire was reported until the time it was extinguished) also has demonstrated significant negative impacts to air quality from metal shredder fires.[22] The study, conducted by Thomas Cahill, a professor emeritus of physics and atmospheric science at the University of California, Davis, found impacts from aerosols attributable to the fire that "grossly violated" the DTSC's deposition standards, even though they were 20 miles away from the site of the fire.

Water and soil contamination. Byproducts from metal shredding may also contaminate soils, groundwater and nearby waterways when byproduct management methods are not required or ignored. A study of the soil and groundwater at the SA Recycling Terminal Island facility from 1990 to 1994 showed contamination by petroleum hydrocarbons, metals, polychlorinated biphenyls and polycyclic aromatic hydrocarbons.[23] In 2011, U.S. EPA found exceedances for lead, zinc, copper and cadmium in the soils surrounding the Sims Metal Management facility in Redwood City from shredding residue, scrap metal and other debris that Sims had been storing

[15] Ex. 3, Danger in air.
[16] Ex. 9, OSHA, *Combustible Dust: an Explosion Hazard*, available at https://www.osha.gov/dsg/combustibledust/index.html.
[17] Ex. 10, Julia Wright, "Meet the 'Scrap King': controversial scrap yard CEO visits St. John," *CBC*, November 23, 2018, available at https://www.cbc.ca/news/canada/new-brunswick/herb-black-american-iron-metal-explisions-1.4919034.
[18] Ex. 11, Silas Brown, "AIM says Saint John facility may close if deal with province can't be reached," *Global News*, November 30, 2018, available at https://globalnews.ca/news/4716033/aim-says-saint-john-facility-may-close/.
[19] Ex. 12, Connell Smith, "AIM's operating permit renewed, but scrap yard still on probation," *CBC*, March 7, 2019, available at https://www.cbc.ca/news/canada/new-brunswick/scrap-recycler-explosion-blasts-waterfront-noise-dust-environment-1.5047432
[20] Ex. 3, Danger in air.
[21] Ex. 2, DTSC Metal Shredding January 2018, at 57, 64.
[22] *See* Ex. 13, Cahill, Thomas, *(DRAFT) Final Report of Schnitzer Steel Products*, Prepared for the Alameda County District Attorney, April 2, 2014, at 42-43. (Note that we are in the process of obtaining permission from the Alameda County District Attorney's office to share this report with CDPH.)
[23] Ex. 2, DTSC Metal Shredding January 2018, at 59.

outside the facility boundary since the 1990s.[24] In 2010 and 2011, the SA Recycling Terminal Island facility exceeded its water quality standards for chemical oxygen demand, specific conductance and zinc.[25] In 2014 and 2015, SA Recycling Anaheim facility received notices of violation of their storm water permit for chemical oxygen demand and lead and was required by the Santa Ana Regional Water Quality Control Board to implement a corrective action plan that included the best available technology treatment method.[26] In 2015, DTSC sampled soil from the areas where scrap metal was processed and from where non-ferrous metals were removed from metal shredder aggregate at the Schnitzer Steel Products and found exceedances for chromium, lead, nickel, zinc, copper and lead.[27] Also in 2015, following a DTSC inspection of the Ecology Auto Parts facility where metal processing operations were being conducted on bare ground, samples taken from soil near the aggregate lines showed exceedances for lead, cadmium, zinc, and copper.[28] In some cases, litigation has been necessary to require management practices to prevent further water and soil contamination. In 2019, after seven years of litigation, Seattle Iron & Metals agreed to implement numerous control measures at its auto recycling facility, including introducing a height limit on its auto shredder residue piles, updating its storm water pipes, and installing a shredder containment structure and dust containment wind fences.[29]

Disparate, cumulative impact. Many metal shredding facilities operate in highly populated areas, individually and collectively posing a severe risk to the surrounding community when they contaminate the surrounding water and air. Often, these facilities are in low-income African-American, Latinx and immigrant communities, which also display sociodemographic characteristics that make them more susceptible to environmental burdens from a cumulative impacts' perspective. For example, Magnolia Park, home of a Cronimet metal processor, is simultaneously one the oldest historical Latinx neighborhoods in Houston and one of two locations in Houston associated with high cancer risk.[30] Furthermore, these communities are also home to other facilities that produce harmful emissions and environmental impacts, as recognized in the Houston air study.[31]

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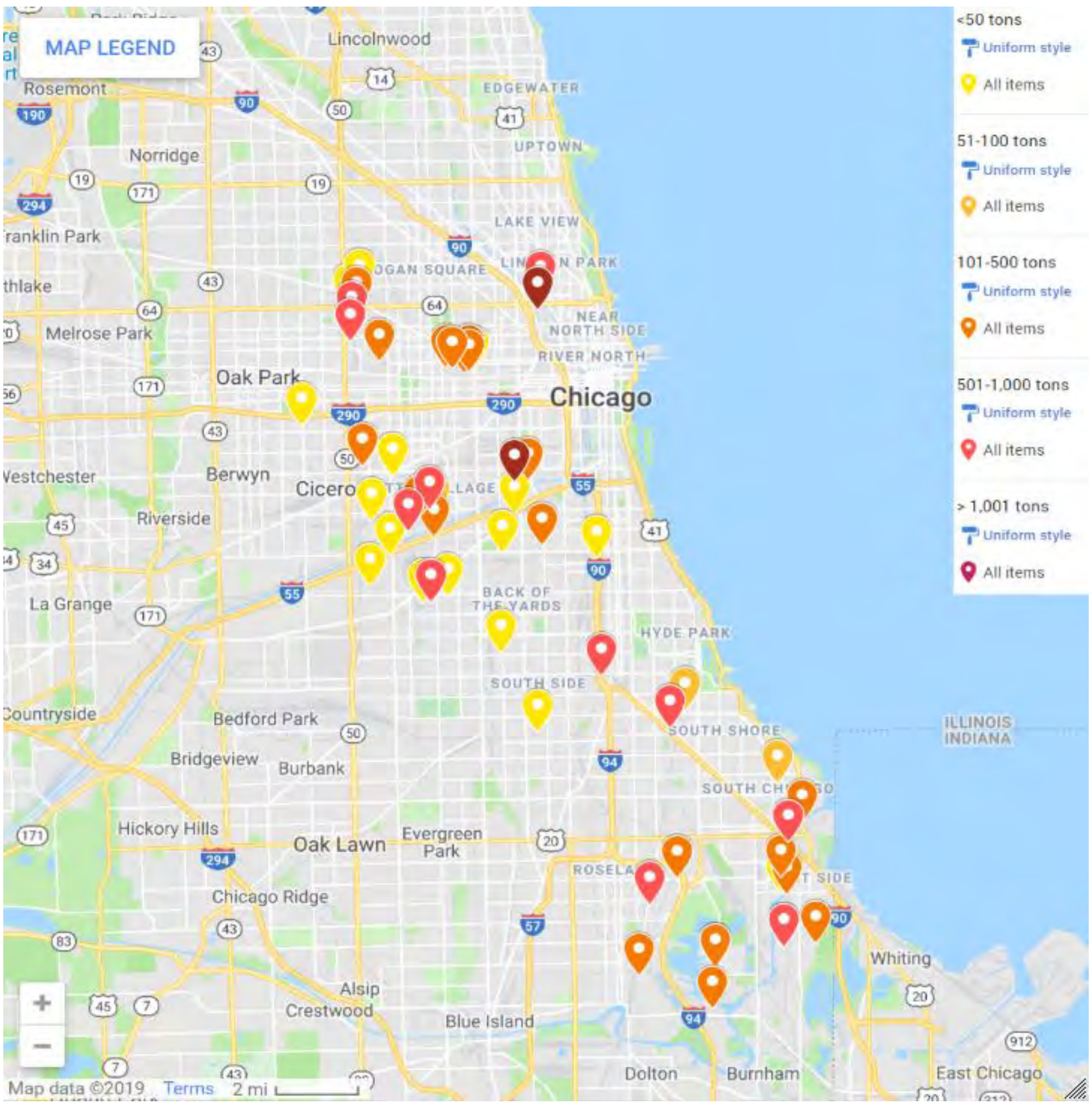
[24] *Id.*, at 63.
[25] *Id.*, at 58, citing SWRCB Letter to Ms. Nancy Felix, S.A. Recycling L.L.C., Annual Report Review – Second Benchmark Value Exceedance: NPDES General Permit (Permit) for Storm Water Discharges Associated with Industrial Activity (Order No. 97-03 DWQ; NPDES No. CAS000001), WDID# 4 19I021125, July 5, 2012.
[26] Ex. 2, DTSC Metal Shredding January 2018, at 62.
[27] *Id.*, at 61-62.
[28] *Id.*, at 66-67.
[29] Ex. 14, *Puget Soundkeeper Alliance v. Seattle Iron & Metals, Corp.* Case No. 12-01201RSM, Proposed Consent Decree (January 17, 2019), available at https://pugetsoundkeeper.org/wp-content/uploads/2019/01/Dkt82-1_Proposed-Consent-Decree-Soundkeeper-v.-SIM.pdf. (The proposed Consent Decree was subsequently approved by the Court.)
[30] Ex. 3, Danger in air.
[31] Ex. 7, Houston DHHS Metal Recycler Study.

IV. The Chicago Communities Bearing the Greatest Burden

As noted above, the communities where recycling facilities are located are often more vulnerable and already overburdened by other facilities and the truck traffic that accompanies them. Chicago is no exception, where the threat of significant, adverse and disproportionate impacts associated with concentrated industrial facilities and attendant vehicles are evidenced in neighborhoods on the Southeast and Southwest Sides. Large recycling facilities cluster in these communities, along with the West Side, where their cumulative impacts are heightened due to not only this physical proximity, but also the socio-demographics of the surrounding community.

Figure 1. Map of Preliminary List of (Metal) Recyclers that Would Be Subject to the Rules



Compiled by NRDC using an Excel spreadsheet provided by David Graham, Deputy Commissioner, CDPH, on May 24, 2019. Note that due to uncertainty over the tonnage for the Again Auto Parts, we have omitted this facility from the map.

These neighborhoods are also environmental justice communities, with greater numbers of low-income and minority residents by comparison to Chicago generally. CDPH must take these disparate and cumulative impacts into consideration in adopting its final rules for large recycling facilities, along the lines set forth in these comments.

The following comments focus on the Southeast and Southwest side facilities because these communities are/have been the focus areas for our groups to date. Metal Management Midwest Inc., located at 2500 S. Paulina St., sits in the southwest side cluster of metal recyclers. It is located within a mile of 13,330 households where over 22,000 individuals live below the poverty level. 38% of the households make less than $25,000 a year. The surrounding neighborhood is 74% Latinx with a significant number linguistically isolated (13%). Almost 30% of the residents are minors, with almost 3,000 of those children under 5 years old. As noted below, this facility was the subject of a 2017 U.S. EPA enforcement action that alleged violations of standards that originate in the Clean Air Act and its implementing regulations. Other large recycling facilities (by virtue of area or input) that are part of the Southwest Side cluster include, but are not limited to: Action Iron & Metal, Inc. (3345 W. 31st), C&J Auto Parts (3200 S. Archer Ave.), Chicago Industrial Catalytic Ltd (4427 W. 45th St.), Chuangyi Metals Corp. (3939 S. Karlov), E&O Plastic Recycling (2959 W. 47th St.), Earthlink Recycling Corporation (3333 W. 36th St.), Eco Green Recycling Inc. (1965 W. Pershing Pl.), El Paso Auto Parts (3245 S. Kostner Ave.), Elemento S.A. Inc. (3252 W. 31st St.), Jeff Thompson (2100 S. Kilbourn Ave.), McCoy Auto Parts (2301 S. Pulaski Rd.), Mr. Loop Paper Recycling (2401 S. Laflin St.), Northwest 1 Trucking and Metal Recycling (3200 S. Kedzie Ave.), Reliable Asphalt (3741 S. Pulaski), Stockyard Materials (4031 S. Ashland Ave.) and U-Pic-A-Part (3250 S. St. Louis Ave.).

Apart from metal recycling facilities, the Southwest Side is also home to other large recycling facilities that bring in more emissions and harms to the surrounding community. Many of these large recycling facilities, including the auto and metal shredders,[32] are located within 600 feet of a sensitive area (residential use, park, hospital, clinic, church, daycare center or school, among other areas):

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[32] Fig. 1 includes the following auto and metal recycling facilities: Action Iron & Metal, Inc., which accepts up to 20 tons per day of recyclable material, including scrap metal, tires with rims and end-of-life vehicles; C&J Auto Parts, which accepts up to 10 tons per day of recyclable materials including batteries and vehicles; Elemento S.A., Inc., which accepts up a daily average of 750 tons per week of recyclable materials, including scrap metal; El Paso Auto Parts, which accepts up to 50 tons per day of Type C materials (motor vehicles and vehicle parts); McCoy Auto Parts, Inc., which accepts up to 10 tons per day of Type C materials; and Jeff Thompson, which accepts up to 500 tons per day of recyclable materials, including scrap metal.

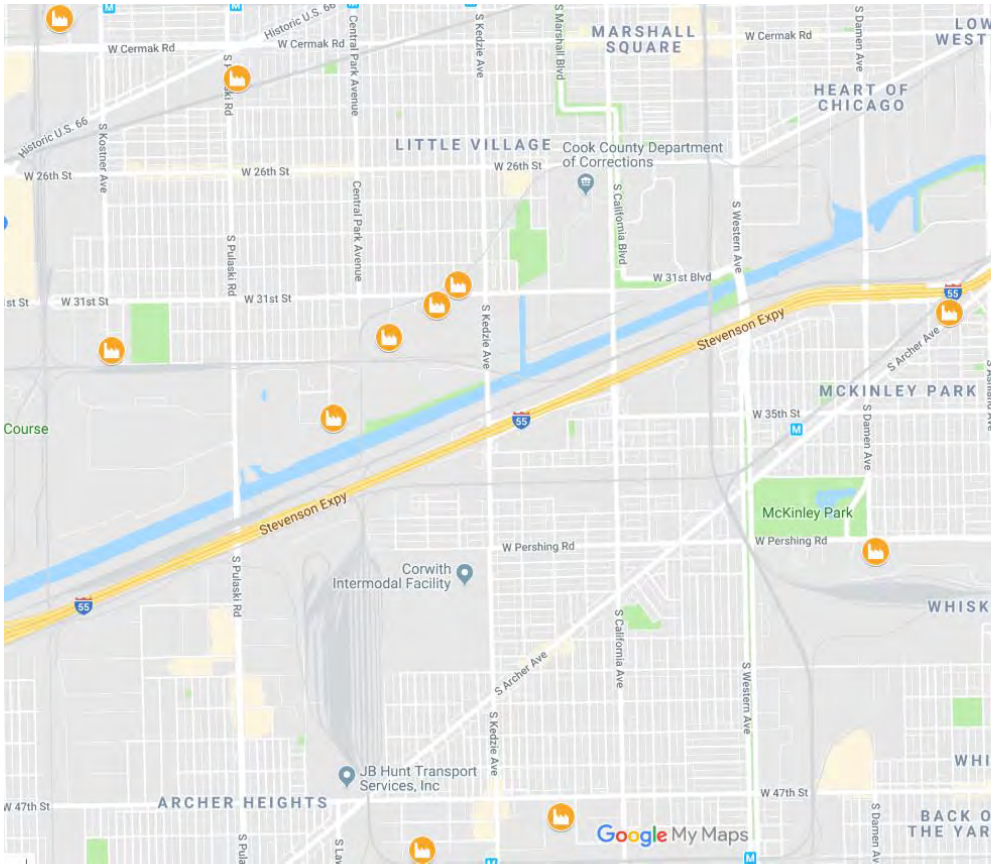

Figure 2. Large Recycling Facilities within 600 ft. of a Sensitive Area (Southwest)

Chicago's Southeast Side is home to another cluster of large recycling facilities. These facilities include, but are not limited to:

- Metal Management Midwest Inc (3200 E. 96th St.), located within a mile of 5,629 households where over 60% of the community lives below the poverty line, with almost 40% of households making less than $25,000 a year. The surrounding neighborhood is 93% minority and 61% Latinx. Almost half of the residents are minors (40%) and 9% are children under 5 years old.
- Mittal Steel (3133 E 106th) and Cronimet (10602 S. Buffalo Ave.), located within a mile of approximately 6,000 households, where about 60% of the community lives below the poverty line, with more than 30% of households making less than $25,000 a year. The surrounding neighborhood is approximately 85% minority and over 70% Latinx. 39% are minors and 8% are children under 5 years old.
- Nichelson Industrial Services (8501 S. Baltimore Ave.), located within a mile of 10,170 households where over 61% of individuals live below the poverty level. 43% of the households make less than $25,000 a year. The surrounding neighborhood is 98% minority and 74% African-American. Almost 40% of the residents are minors, with almost 2,286 of those children under 5 years old.

- Waste Management (13707 S. Jeffrey), located within a mile of 3,137 residents where over 40% below the poverty level. 27% of the households make less than $25,000 a year. The surrounding neighborhood is 91% minority and 83% African-American. 33% of the residents are minors.
- South Shore Recycling (11600 S. Burley Ave-C), located within a mile of 6,815 residents where over 37% live below the poverty level. 19% of the households make less than $25,000 a year. The surrounding neighborhood is 74% minority and 71% Latinx. 34% of the residents are minors and 7% are children under 5 years old. This is also the location of the proposed relocation of the existing General Iron facility, which presently operates in a predominantly white, gentrifying community area on Chicago's north side. As noted below, this facility was the subject of a 2018 U.S. EPA enforcement action that alleged violations of standards that originate in the Clean Air Act and its implementing regulations.

Other Southeast Side large recycling facilities are Akat Scrap Metal Inc. (12100 S. Cottage Grove Ave.), All American Recycling (11900 S. Cottage Grove Ave.), Chicago Rail & Port (3250 E. 106th St.), Cronimet Corp. (3219 E. 106th St.), ELG Metals, Inc. (10301 S. Muskeon), Emesco Marine Services Corp. (12100 S. Stony Island Ave.), Maryland Pig Iron of Illinois (12901 S. Stony Island Ave.), Mr. Nuvareach Scrap Metal Corp. (641 E. 108th St.), Napuck Salvage of Waupaca, LLC (11610 S Ave.) and Reserve FTL (11600 S. Burley Ave.).

As on the Southwest Side, there are numerous large recycling facilities on the Southeast Side located within 600 feet of a sensitive area (residential use, park, hospital, clinic, church, daycare center or school, among other areas), of which most are auto and metal shredders[33]:

[33] Fig. 2 includes the following auto and metal recycling facilities: Nickelson Industrial Services, Inc., which accepts up to 70 tons per day of scrap metal, including aluminum; Metal Management Midwest, Inc, which accepts up to 800 tons per day of recyclable material; ELG Metals, Inc., which accepts up to 450 tons per day of recyclable material; Cronimet Corp., which accepts up to 400 tons per day of non-ferrous and ferrous metal scrap; Napuck salvage of Waupaca, LLC, which accepts up to a weekly average of 400 tons a day, including aluminum, ferrous metal and non-ferrous metal scraps; All American Recycling, which accepts up to 250 tons per day of aluminum, ferrous and non-ferrous metal scrap; and Mr. Nuvareach Scrap Metal Corp., which accepts up to 1,000 tons of recyclable material, including aluminum, ferrous and non-ferrous metal scrap and motor vehicles and vehicle parts.

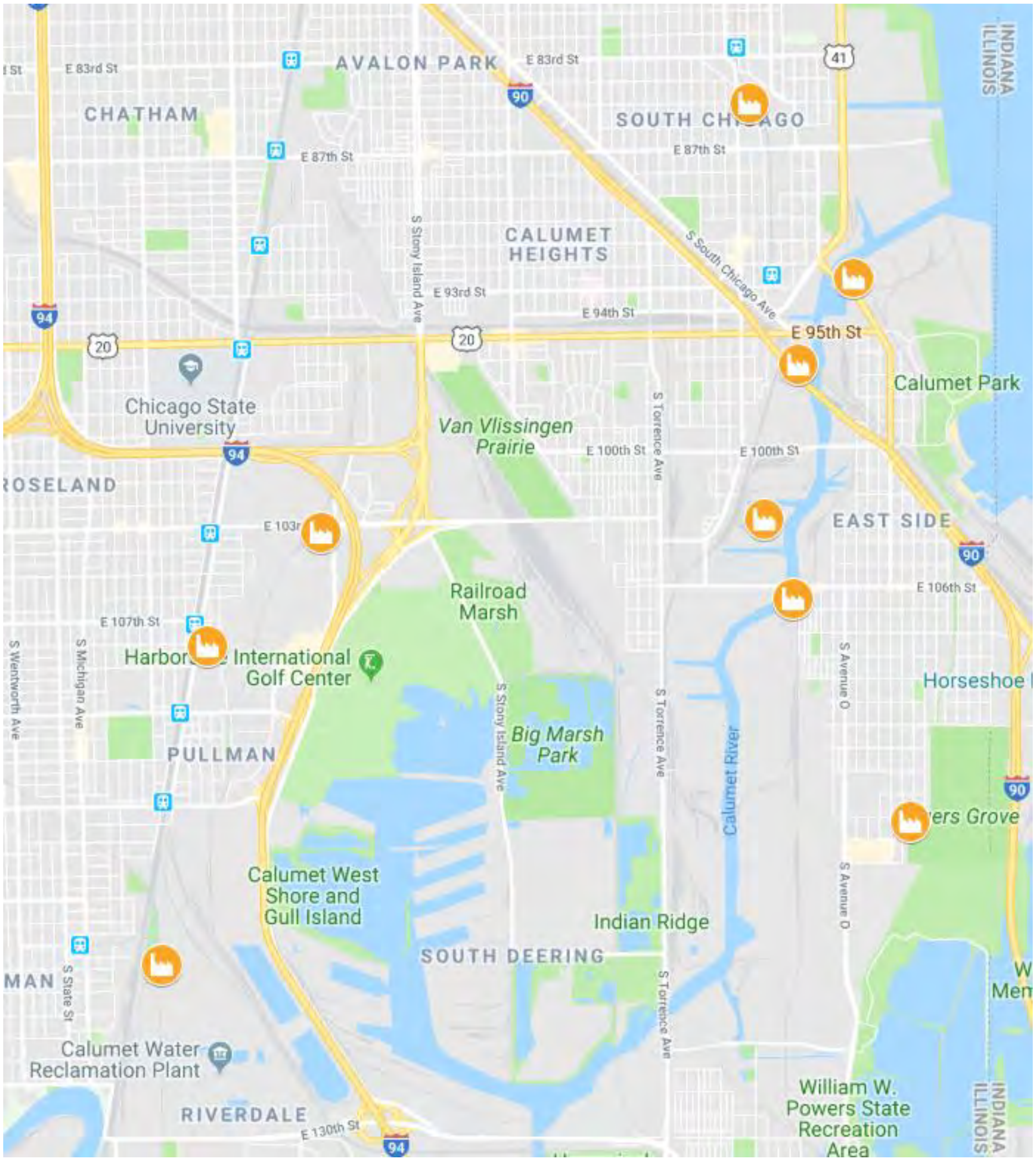

Figure 3. Large Recycling Facilities within 600 ft. of a Sensitive Area (Southeast)

In addition to the numerous scrap metal and auto shredders that already exist in the aforementioned overburdened communities, the placement of these facilities attracts other businesses that rely on a source of recycled metal, such as steel producers and distributors. For example, Atlas Tube is primarily engaged in the production of welded or seamless steel pipe and tubes and heavy riveted steel pipe from purchased materials. It is located within a two-mile radius of South Shore Recycling, All American Recycling, and Waste Management. While Atlas Tube is not within a mile of any residents, the company is just over a mile from the Altgeld Gardens community and within a three-mile radius of 79,507 residents, 90% of whom are people of color, who are at risk of impacts from Atlas Tube's pollution and that of any truck traffic necessary to bring recycled metal to the Atlas Tube site for processing. In addition, the facility is located in close proximity to a number of natural areas that serve as important recreational amenities for area residents.

Similarly, Kloeckner Metals is a seller and distributor of steel and non-ferrous metals located within a two-mile radius of Azcon Metals, Scrap Metals LLC, and Waste Management. Its site on 13535 South Torrence is less than half a mile from Carver Military Academy High School and 0.6 miles from Altgeld Gardens, located within a mile of 7,838 residents where over 44% live below the poverty level and 25% of the households make less than $25,000 a year. The surrounding neighborhood is 62% minority. Almost 34% of the residents are minors. Again, nearby residents are at risk of exposure to harmful pollution from Kloeckner in combination with the many other nearby sources.

V. The Proposed Rules Must Be Significantly Enhanced to Address the Impacts of Air Pollution from Recycling Facilities

Recycling facilities can be significant sources of harmful particulate matter, especially inhalable fine particulate matter, which can contain toxic heavy metals, as well as volatile organic compounds, which can also contain a host of volatile toxic air contaminants. These facilities generate and emit air pollutants not only from processing of materials in various ways, but also from handling and storing materials and from the transport of such materials to and from the facility. Significant pollution problems arise from facilities conducting a range of processing and handling activities in the open air with little to no effective pollution controls or work practices – often affecting neighbors immediately adjacent such as residences, parks and other community features and sensitive land uses. Often multiple recycling facilities all impact the same community.

For far too long, such recycling facilities have largely escaped both assessment of and requirements to control their air pollution, flying under the radar of state and federal air pollution laws and regulations and virtually untouched by local regulations. As described above, new efforts to characterize air pollution from recycling facilities, in particular auto shredding operations, have arisen across the country in the past few years. These analyses have generated much-needed and disturbing information about the air pollution profiles of recycling facilities, confirming what neighboring residents have suspected and asserted for years.

A brief summary of the air impacts from recycling operations is provided above. In addition, here in Chicago, U.S. EPA has in recent years issued Notices of Violation to two auto shredders for failing to disclose and control air pollution from their shredders.[34] Prior to these actions,

[34] *See* Ex. 15, *In the Matter of Metal Management Midwest, Inc., d/b/a Sims Metal Management, 2500 South Paulina Street, Chicago, Illinois*, Docket No. CAA-05-2019-006, Consent Agreement and Final Order (December 20, 2018), available at http://pilsenperro.org/wp-content/uploads/2018/12/Sims-Metal-Management-CAA-05-2019-0006-CAFO-12-20-2018-15-PGS-.pdf; Ex. 16, In the Matter of General Iron Industries, Inc., Chicago, Illinois,

Illinois EPA brought legal action against an auto shredder in nearby Blue Island over materials emanating from its auto shredder and impacting the surrounding community.[35] Auto shredders in Chicago have also been the source of fires[36], which as shown in California air studies can have huge negative impacts on air quality due to the emissions of a wide range of volatile and semi-volatile toxic compounds. Neighbors of auto shredders and other metal handlers in Chicago also have reported particulate pollution and metallic tastes in their mouths close to shredders, consistent with a study of air pollution from scrap yards conducted in Houston, where photos capture brown and white visible pollution from movement of scrap metal by construction vehicles and from metal fumes due to outdoor torch cutting, respectively.[37] For these reasons, we strongly support Chicago stepping up to finally assess and control air pollution from recycling facilities.

With respect to air pollution, the proposed standards include two new sets of requirements. First, the regulations adopt a limited set of fugitive dust Air Quality Standards and Monitoring provisions, applicable to all Large Recycling Facilities. Second, a "Consequential Facility" must conduct air quality monitoring largely tracking the monitoring provisions of the existing fugitive dust rules, as well as include in its permit application an Air Quality Impact Assessment.

A. Air Quality Standards and Monitoring, Section 4.8

The proposed provisions in Section 4.8 for Air Quality Standards and Monitoring track the existing Bulk Material Rules, including fugitive dust plans, visible emissions and opacity limits, fenceline air monitoring requirements, and Reportable Action Levels and Contingency Plans based on actual air monitoring data. In contrast to the Bulk Material Rules, however, the proposed Recycling Rules apply only the visible emissions and opacity limits to all Large Recycling Facilities, with the remaining air provisions such as monitoring applying solely to the smaller sub-set of Consequential Facilities. We provide the following comments in order to improve and strengthen these requirements.

Visible Dust. The proposed regulations include a "Visible Dust" provision that appears to be weaker than both the corresponding provision of the Bulk Material Rules and the visible emission limit contained in the Illinois State Implementation Plan ("SIP"), as it may be read to allow facilities to create visible emissions beyond the fenceline before recording and taking corrective action to eliminate the visible dust.[38] In contrast, the Bulk Material Rules and the

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Notice and Finding of Violation, EPA-5-18-IL-14 (July 18, 2018), available at https://www.epa.gov/sites/production/files/2018-07/documents/general_iron_industries_inc._nov-fov.pdf.

[35] Ex. 17, Recycling Today Staff, "Illinois EPA scrutinizes Chicago area shredding plant," April 27, 2014, available at https://www.recyclingtoday.com/article/illinois-auto-shredder-epa-investigation/.

[36] Ex. 18, Recycling Today Staff, "Fire hits Chicago scrap yard," December 8, 2015, available at https://www.recyclingtoday.com/article/fire-scrap-recycling-chicago-general-iron/.

[37] Ex. 7, Houston DHHS Metal Recycler Study.

[38] *See* Proposed Rule at Section 4.8.2.1, "Visible Dust." ("Any Fugitive Dust that is visible and travels beyond the boundaries of the Facility shall be documented by the Owner or Operator, who shall immediately implement corrective action such that no visible Fugitive Dust leaves the Facility boundaries.")

Illinois SIP create outright prohibitions on visible dust or emissions beyond the fenceline – meaning that facilities must take proactive steps to prevent such pollution rather than reactive steps after the fact.[39] CDPH should amend the proposed visible dust provision to prohibit visible dust emissions beyond the fenceline of any recycling facility.

Opacity. Also, in Section 4.8.2, CDPH proposes to include a 10% opacity limit on any storage pile, transfer point, roadway or parking area for all Large Recycling Facilities. However, the provision requiring opacity *monitoring* to ensure compliance with this limit, Section 4.8.3.12, is (inadvertently) contained in Section 4.8.3, which pertains to air monitoring only for Consequential Facilities. CDPH should amend these sections to make clear that all Large Recycling Facilities subject to the 10% opacity standard must conduct regular opacity monitoring to ensure compliance with this opacity limit. We recommend that manual opacity monitoring using EPA Method 9 be conducted once daily at all locations where the 10% opacity limit applies when there has been less than 0.1 inches of precipitation in the previous 24-hour period.[40] Daily monitoring is needed because the quarterly monitoring approach (adopted from the original Bulk Material Rules) does not ensure continuous compliance with the opacity limit in the proposed rules.[41] In addition, we recommend the development of site-specific night-time opacity monitoring protocols in order to ensure that facilities meet the 10% opacity limit during night-time hours.[42]

Fugitive Dust Plans & Standards for Controlling Fugitive Dust and Other Air Pollution. Currently, the proposed requirement to prepare, implement and maintain compliance with a facility-specific Fugitive Dust Plan is housed in Section 4.8.3 and thus applies only to Consequential Facilities; and the requirement to prepare a Fugitive Dust Plan likewise is contained in Section 3.8.22 regarding Air Quality Impact Assessments in Design Reports, again applicable only to Consequential Facilities. The proposed rules also lack additional performance standards like those in Part E of the Bulk Material Rules pertaining to outdoor storage and handling of non-coke/coal materials (e.g., cessation of operations during high wind events). As a

[39] *See* 35 Ill. Admin. Code at 212.301, "Fugitive Particulate Matter": "No person shall cause or allow the emission of fugitive particulate matter from any process, including any material handling or storage activity, that is visible by an observer looking generally toward the zenith at a point beyond the property line of the source"; Bulk Material Rules at Section 3.0(2)(a), "Visible Dust": "The Facility Owner or Operator shall not cause or allow any Fugitive Dust that is visible beyond the property line of the Facility."
[40] *See* Ex. 19, Ohio EPA, Draft Air Pollution Permit-to-Install and Operate, Omnisource, July 31, 2008, at 13 of 38 (requiring daily checks for any visible emissions of fugitive dust from sources subject to opacity limits). Note that we cite this permit for purposes of monitoring for opacity only, and not as an endorsement of any other determination reflected in the document.
[41] Since facilities should have trained staff conduct any required opacity monitoring, requiring daily instead of quarterly monitoring should impose little additional burden on facilities.
[42] This comment should not be construed as supporting extension of recycling facility operating hours into the night, especially for facilities in close proximity to residential areas. Instead, we have concerns that yard-related emissions may continue into the night even when active operations have ceased, thus warranting nighttime opacity monitoring to ensure continuous compliance with the opacity limits and protection of communities. Such protocols also are needed to assess opacity levels during regular operating hours in winter months, when daylight is limited.

result, the only proposed fugitive dust or other air quality standards that apply to all Large Recycling Facilities are the visible emissions and opacity limits discussed above.

Allowing all Large Recycling Facilities that are not "Consequential" to escape the requirement of preparing Fugitive Dust Plans and complying with specific air quality standards and practices is unwarranted with respect to their potential for harmful dust. Moreover, doing so would permit such Large Recycling Facilities to escape specific fugitive dust control measures that are required of (other) bulk material handling facilities conducting similar operations with similar dust profiles.

While Consequential Facilities may pose the greatest risk of air pollution impacting communities, other Large Recycling Facilities can also generate significant quantities of air pollution and may be located close to residential areas, parks, and other community features.[43] The Bulk Material Rules recognized that a wide range of material handling facilities should have to comply with robust fugitive dust measures that are objectively described in those Rules themselves, such as the use of covered conveyors to minimize the emissions of fugitive dust; control of all transfer points; and installation of weather stations (which can measure wind speed, wind direction, and precipitation, among other parameters) to inform cessation of operations during high winds.[44] These objective measures are critical means for not only ensuring that facilities meet the visible emissions and opacity limits by preventing the generation of fugitive dust before it can then disperse, but also, in combination with the opacity limits and opacity monitoring requirements, ensuring that facilities minimize fugitive dust to the greatest extent feasible as a general matter.

CDPH should likewise require all Large Recycling Facilities to prepare and submit Fugitive Dust Plans and comply with the types of fugitive dust controls contained in the Bulk Material Rules.[45] These requirements should be housed in Section 4 of the proposed regulations and implemented through CDPH's air permit and air certificate of operation programs, instead of via the every-three-year recycling permit program. Structuring the requirements in this manner instead of tying them to the recycling permit program will mean, in turn, that Existing Consequential Facilities (along with all other Large Recycling Facilities) will need to ensure compliance with air monitoring, Fugitive Dust Plan and air pollution controls in their next

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[43] Even small operations, located proximate to neighbors, can pose significant risks to community health. While we understand the rational of the proposed rule to focus on Large Recycling Facilities, and the subset of Consequential Facilities, CDPH should not assume that all small recycling facilities pose little or no risk to neighbors. As an example, see the City of Paramount investigations in the South Coast AQMD region in the Los Angeles area, where relatively small facilities proximate to residential areas posed large risks. *See* Ex. 20, South Coast Air Quality Management District, Summary of Efforts in Paramount, December 2017, at 2-3 of 7, available at https://www.aqmd.gov/docs/default-source/compliance/Paramount/summary-of-efforts-in-paramount.pdf?sfvrsn=8 (finding that three sites, Carlton Forge Works, Aerocraft and Anaplex, were responsible for elevated levels of Chromium IV and Nickel in 2013 (for Carlton) and 2016 (the other two facilities)).

[44] *See* Bulk Material Rules at Part B, Section 3.0(7), (8) and (6), and Part E, Section 7.0(4).

[45] With respect to the Bulk Material Rules Part E requirements for outdoor storage, we note our concern with allowing such outdoor storage and handling for recycling facilities, as taken up below.

certificate of operation, rather than delaying these critical measures until the next recycling permit renewal.

CDPH should also include the following additional air standards and controls in Section 4.8:

1. *Auto Shredders*. CDPH should require that all auto shredders use effective controls of VOCs – such as catalytic oxidizers or biological-based controls where feasible. Properly designed and maintained, such controls can ensure over 95% destruction of inlet VOC levels from shredders. In addition, shredders should capture at least 95% of all of exhaust and then control all sizes of PM emissions using baghouses or fabric filters with an efficiency of at least 99%. Relatedly, the VOC and PM10 emissions sampling plan proposed in 3.9.22.4 should be moved to Section 4.8 accompanying these control requirements. In addition, the sampling should be required on a more frequent periodic basis (such as annually) and/or whenever the feed stream changes significantly from when which prior sampling was required, instead of "at least every 5 years." More frequent sampling is necessary because the feed stream to the shredder can change in ways that alter the types of VOC and PM emissions and due to the inevitable deterioration of containment devices such as hoods over time.
2. *Auto Shredder Residue (Fluff) – Fugitive Dust*. Requirements to (a) conduct all auto shredder residue ("ASR") processing in fully enclosed buildings outfitted with robust air pollution controls, (b) move all ASR between the shredder and any subsequent enclosed residue processing buildings via fully enclosed conveyors, and (c) store any ASR in fully enclosed structures with appropriate air pollution controls.[46]
3. *Storage, Staging and Tipping Floor Areas*. Related to the concerns with ASR handling and storage, it appears that the current proposal allows all storage areas, staging areas and tipping floors to be outdoors, completely in the open air with no specific air pollution

[46] According to court documents in the case regarding Northern Metals, the former Minneapolis shredder created significant amounts of dust from processing of ASR subsequent to the auto shredder but before any treatment or storage of residue. *See* Ex. 21, *In the Matter of Revocation of Air Emission Permit 05300480-003*, OAH Docket No. 60-2200-33647, Memorandum in Support of MPCA's Motion for Summary Judgment, at paragraphs 22, 26 and 57-67 (describing processing of shredder residue to recover additional metals, including (a) at a Metals Recovery Plant in which "particulate matter coated the equipment in the building, as well as the floors and fixtures" and which had garage doors that remained open during processing and openings for conveyors, as well as (b) outdoors next to the Metals Recovery Plan without any controls). The proposed replacement shredding operation in Becker, Minnesota, appears to better control this processing step, with materials conveyed between the new shredder and the new Metals Recovery Plant via a covered conveyor, and the Metals Recovery Plant itself controlled by a baghouse. *See* Ex. 22, *In the Matter of the Decision on the Need for an Environmental Impact Statement for the Proposed Northern Metals*, LLC Becker Sherburne County City of Becker, Minnesota, Findings of Fact, Conclusions of Law and Order, June 13, 2018, available at https://www.pca.state.mn.us/sites/default/files/p-ear2-134b.pdf, at paragraphs 12 and 13. (Note that our citation of this decision is not an endorsement of its findings or conclusions, but is included solely to show that measures can and should be taken to control fugitive dust from the shredder residue processing step. We also note our concerns with allowing the Becker facility to store auto fluff in a covered three-walled bin instead of a full enclosure.)

control requirements.[47] This open-air operation runs counter to the positive movement towards enclosure of dust-generating activities seen with the Bulk Material Rules. As shown in Houston and California studies, yard activity itself can cause significant fugitive dust, especially when construction vehicles move metal materials to and from piles to other areas of the site and vice versa. Given the potential for heavy metal and other emissions from these areas, CDPH should require enclosure, consistent with requirements for treatment of petcoke, coal, and manganese. Such enclosures will not only protect against harmful air pollution, but will also prevent the creation of contaminated stormwater runoff on the front end and prevent visual blight and odors, further justifying the cost of enclosure.

4. *Torch Cutting*. A prohibition on outdoor torch cutting and accompanying requirement to conduct torch cutting in buildings outfitted with robust air pollution controls, along with requirements to minimize any torch cutting that cannot be conducted indoors. Again, the Houston experience identifies outdoor torch cutting as a significant source of air pollution, as well as steps that can be taken to minimize torch cutting at sites near communities and address any remaining pollution from torch cutting.
5. *Storage Tanks*. CDPH should require periodic FLIR monitoring of storage tanks containing high vapor pressure liquids in order to ensure that tank fittings are properly maintained and that all fugitive VOC emissions are thereby minimized.
6. *Fires*. Due to the impacts of fires on air quality, CDPH should require thermal camera hot spot identification and fire suppression systems at recycling facilities.

Air Monitoring Requirements. The fenceline monitoring component of CDPH's Bulk Material Rules has been a central and critical feature of those rules. The data generated by the monitoring program (and EPA's parallel monitoring requests under Section 114 of the Clean Air Act) has provided critical air pollution information to the agency, surrounding community and general public, serving as the basis for several enforcement actions against polluters, confirming community concerns, and raising awareness about pollution issues in industrial areas more broadly. Academic researchers and agency officials, at times in partnership with community advocates, are using the monitoring data to help assess the impacts of facilities on public health. And companies themselves have cited the monitoring as helpful in identifying their own un/under-controlled sources of air pollution - driving the adoption of more effective or enhanced control measures. In addition, technologies such as video monitoring are available as important compliments to more traditional air monitoring. In short, we support requiring recycling facilities to also to conduct robust fenceline air monitoring and implement Reportable Action Level programs.

[47] *See* Proposed Rules at Section 3.9.12.

CDPH should strengthen the proposed air monitoring requirements as follows:

1. Require all Large Recycling Facilities that have any outdoor operations located within 600 feet of a sensitive receptor to conduct initial fenceline monitoring. In addition, per our prior comments on the risks that can be posed by even small facilities, CDPH should also consider requiring such fenceline monitoring at small recycling facilities that have outdoor operations and are located very close (say less than 100 feet) to residential or other sensitive receptors.
2. Fenceline monitoring should include dry season total suspended particulate (TSP or PM) measurements which should then be analyzed for major pollutants expected from the facility – such as metals.
3. Due to the high likelihood of significant toxic metals emissions from certain Large Recycling Facilities, and similar to the manganese-specific dust regulations adopted earlier this year by CDPH, the regulations should de facto require fenceline filter-based metals air monitoring of auto shredders. While we appreciate the inclusion of an "Additional monitoring" provision at Section 4.8.3.2 and the range of facilities covered by the proposed recycling rules, leaving metals monitoring to case-by-case determinations does not provide the public with the assurances that these extremely harmful pollutants will be identified and addressed in a timely fashion. Moreover, as noted above, studies of the air quality impacts from auto shredder operations support the need to require metals monitoring of all such facilities, due to shredder, processing, fire-related, and yard/handling emissions.

B. Air Quality Impact Assessment, Section 3.9.22

As an initial matter, as noted above, CDPH should implement the air monitoring and control requirements of the proposed rules through its air certificate of operation and permit programs, rather than through the recycling permit program. Moving these provisions to Section 4 would leave solely the proposed emissions and air dispersion modeling study in the recycling permit program via the Design Report, to inform the overall decision of whether to permit recycling facilities to operate.

We strongly support requiring all Consequential Facilities to conduct emissions and air modeling studies and to publicly report the results of such studies as a condition of receiving their permits.[48] Doing so will help ensure that a more detailed understanding of a facility's air impacts is available to the public along with other information about facilities' operations and environmental impacts. Moreover, CDPH should strengthen the emissions and air modeling study provision by requiring the use of baseline air quality monitoring data, collected via

[48] We note that we have concerns with Existing Consequential Facilities deferring their air demonstrations to the next recycling permit cycle, potentially pushing out such demonstrations for years. However, ensuring that Existing Consequential Facilities are employing both air monitoring and control measures via Section 4 requirements implemented through the air permit and certificate of operations programs helps to reduce the air impacts of such facilities in the meantime.

monitors placed at the site (as opposed to remote monitors from other locations), in the demonstration. Because the proposed rules already contemplate fenceline monitoring of the site once operational, a requirement to use actual monitoring data from the site in the air quality demonstration would impose little additional burden on the company, while greatly enhancing the accuracy of the air demonstration to the agency's and the community's benefit.[49] (As discussed above, we believe filter-based metals monitoring should be required as well, and thus note here that filter-based metals monitoring data should be used in the air demonstration.)

In addition, all applicants should be required to include both their emission calculations for each source (including the bases for any assumptions used in those calculations) and their modeling files as a part of their recycling permit Design Report/Application.

VI. As Auto Shredder Residue Contains Hazardous Constituents, CDPH Must Mandate ASR Management Methods to Prevent Releases of Hazardous Substances.

Automotive shredder residue ("ASR" or "auto-fluff") is a byproduct of scrap metal recycling facilities. ASR is usually generated by hammermill industrial shredders when vehicles, household appliances, and other manufactured metal products are collected and reprocessed for commercial value.[50] Chemically, ASR is primarily composed of aluminum, carbon, and zinc.[51] However, ASR may also contain polymers and/or hazardous contaminants, including heavy metals, PCB's, and petroleum hydrocarbons.

[49] Alternatively, CDPH can consider allowing the use of mobile monitors by applicants to quickly generate baseline data at multiple locations for purposes of the air quality study.

[50] Ex. 23, Institute of Scrap Recycling Facilities (California Chapter), *Treatment of Auto Shredder Residue*, available at https://dtsc.ca.gov/wp-content/uploads/sites/31/2018/05/ISRI_ASR_Study_JPM_8_2_13.pdf.

[51] Ex. 24, Gerdau, *Material Data Safety Sheet for ASR*, available at https://www2.gerdau.com/sites/default/files/downloadable_files/Automobile%20Shredder%20Residue%20_ASR_%20MSDS%20_NA_%202-15-12.pdf.

Table 1
WET Metal Values in Untreated ASR (mg/L)

Sample Date	Cd	Pb	Zn	Cu
6/18/2009	0.086	**58.7**	**925**	1.25
7/28/2009	**1.29**	41.8	**1320**	2.66
8/21/2009	0.657	**88.3**	**1423**	0.426
11/12/2009	**1.25**	49.6	**1456**	5.98
5/19/2010	**2.57**	**155**	**864**	6.83
10/26/2010	**2.09**	**109**	**2603**	9.1
1/5/2011	**1.62**	**86.7**	**1685**	3.97
1/25/2011	0.64	**74.4**	**1025**	3.35
4/28/2011	**1.26**	**68.9**	**1110**	4.51
10/31/2011	**1.86**	29.4	**1970**	4.60
11/7/2011	**1.79**	**51.0**	**1525**	2.03
Regulatory Values (CCR, Title 22 Ch. 11, § 66261.24)	**1**	**50***	**250**	**25**

Bold numbers indicate values at or above the STLC value.
* Each of the reclassification letters issued to the shredders allows a soluble lead concentration of 50 mg/L. The requirements of the reclassification letters vary with respect to other Title 22 metals.

(Table 1 above is from Exhibit 23 to these comments, page 7). ASR can vary in chemical and physical composition depending on the treatment process. Untreated ASR may contain a heterogeneous mixture of materials, including plastics, rubber, foam, fabric, carpet, glass, wood, road dirt, debris, and other residual metals. Physically, ASR can range from small granular particles to identifiable pieces of material (i.e. small pieces of glass, wood, etc.).

ASR can be a characteristic hazardous waste under RCRA because of the toxicity of entrained metals and other components of the waste. As described in its Material Data Safety Sheet, ASR contains multiple toxic substances in addition to cadmium, lead and zinc. In Illinois, ASR is characterized as a special waste (specifically, "a waste material generated by shredding recyclable metals").[52] According to 35 IAC § 808, special wastes are given a "toxic score." The generator of a special waste has the burden of characterizing their waste according to ASTM test methods to determine the toxic score of the waste.[53] Because of the hazardous constituents of ASR, CDPH should mandate specific measures to control every aspect of ASR management. These measures include screening scrap materials, rejecting components in these wastes that commonly include hazardous substances, managing and storing ASR in full enclosures and requiring full disclosure of the treatment technologies that will be applied to ASR.

[52] Ex. 25, Illinois EPA, "Do I Have a Special Waste?" available at https://www2.illinois.gov/epa/topics/waste-management/waste-disposal/special-waste/Pages/do-i-have.aspx.
[53] *See* 35 Ill. Admin. Code 808.121(a)

CDPH should mandate strict controls to screen for and exclude hazardous materials to minimize the quantity of hazardous substances that will be entrained in ASR. CDPH should prohibit specific components that can accompany scrap metal wastes, including switches, batteries, gas and propane tanks and any components that contain traces of transmission fluid, gasoline, diesel fuel, lubricating oils and antifreeze. These prohibitions require stringent enforcement practices by the facilities. Visual gate inspections of incoming loads of scrap materials for prohibited components are essential but not adequate. Facilities should be required to employ photoionization detectors to screen for volatile organic compounds and other gases, as well as radiation detectors. Based on screening, facilities should be required to categorically reject "materials requiring special handing", and maintain documentation detailing the supplier, the screening technique that was utilized and the basis for rejecting the materials.

CDPH should mandate that all ASR-related operations (storage, management, processing and transportation) should take place in fully enclosed and controlled structures. This is necessary to prevent the release of hazardous substances into two environmental media. First, as discussed elsewhere in these comments, material, including entrained hazardous substances, can be released from outdoor ASR piles into the air. Second, rainfall and snowmelt can penetrate outdoor ASR piles, causing contaminated leachate (containing suspended solids and hazardous constituents). Enclosure prevents the uncontrolled release of airborne particulate matter. Enclosure also prevents rainfall and snowmelt from penetrating ASR piles, minimizing the release of contaminated leachate.

CDPH should mandate that facilities which generate, treat and/or store ASR must designate the on-site or off-site treatment method that will be employed to address their ASR wastes. With respect to treatment, *Stabilization*/*Solidification* are the preferred methods for heavy metals contained in ASR. *Stabilization* reduces the contaminants' mobility through physical or chemical reactions, and is effective for a wide range of constituents (e.g. lead, arsenic, and chromium). *Stabilization* causes precipitation, complexation, and/or adsorption of the contaminants. *Solidification* requires cement or another inorganic binder to solidify the material. Applying this to ASR treatment processes, the ASR is exposed to a blend of liquid polysilicates (either potassium silicate or sodium silicate) and additives (wetting agents). The liquid polysilicates and additives chemically bind to heavy metals in the solution (forming the "ASR matrix" and completing the *Stabilization* process). Inorganic binders and alkaline activators (cement, lime, or other pozzolanic materials) are then added to the ASR matrix to finalize the *Solidification* process.

VII. Construction and Demolition Debris Can Pose Lead and Asbestos Hazards, thus CDPH Should Mandate That Facilities Employ Specific and Empirical Testing Measures to Exclude Hazardous and Contaminated C&D Waste.

In a 2015 article in the Journal of Hazardous, Toxic, Radioactive Waste, researchers published the results of sampling construction and demolition ("C&D") waste for asbestos and lead.[54] Notably, the researchers acknowledged that existing regulations require asbestos and lead removal prior to demolition and renovation activities that lead to the generation of C&D waste. Nonetheless, actual sampling of the C&D waste stream revealed that 4.9% of C&D waste included asbestos and 14.4% of the C&D waste tested positive for lead-based paint. The authors traced the asbestos and lead contaminated C&D waste to projects that are either excluded from regulations or less likely to adhere to regulatory requirements, typically, demolition/renovation projects involving single family homes or multi-family dwellings with fewer than four units. The authors concluded, "[I]n the case of asbestos and lead, residential projects contributed overwhelmingly to positive detection, at 94% and 85%, respectively." Notably, certain residential waste streams were more likely to be contaminated. Gypsum waste presented both asbestos and lead hazards. Lead was also detected in painted/stained wood as well as painted brick and concrete. To a lesser extent, roofing materials also presented asbestos hazards.

According to existing Chicago requirements, only "non-hazardous" and "non-contaminated" waste qualifies as recyclable C&D waste. Yet, no specific protocols are imposed on recycling facilities to verify loads of C&D wastes are free of asbestos and lead hazards. Unless a load is entirely traceable to the work of professional contractors that employed pre-demolition asbestos and lead detection and removal measures, it is dangerous and naïve to assume asbestos and lead are not "along for the ride" with C&D waste streams, especially gypsum and painted wood, concrete and brick. Unless specific load screening measures are mandated, dust that is released from subsequent dumping, processing, separation and transport activities could include entrained asbestos and lead hazards. Just as importantly, a load that isn't effectively screened for lead and asbestos hazards may violate the fundamental, categorical legal requirement that only "non-hazardous" and "non-contaminated" C&D waste is eligible for processing.

The new regulations should include specific protocols for permitted facilities to verify that demolition projects are being professionally managed. If a certification doesn't accompany a load, the facility should be required to employ specific screening techniques before allowing the load to be deposited on the site. Visual inspection cannot form the basis for assessing whether wastes are lead-bearing and/or asbestos-containing. For lead, screening should instead include XRF reading on all painted surfaces. Common (but uncharacterized) asbestos containing materials should be rejected until appropriate sampling using a polarized light microscopy analysis is complete.

[54] Ex. 26, "Development and Application of A Framework to Examine the Occurrence of Hazardous Components in Discarded Construction and Demolition Debris: Case Study of Asbestos-Containing Material and Lead-Based Paint." J.Powell, P. Jain, A. Bigger and T. Townsend. J. Hazrd. Toxic Radioact. Waste, 2015, 19(4): 05015001.

VIII. CDPH Should Assert Its Authority to Require Environmental Impact Assessments, to Assess Cumulative Impacts on Public Health, Safety and Welfare Arising from Multiple Permitted Facilities, and to Provide for Public Participation.

A. Environmental Impact Assessments

Proposed Section 3.10 requires that an Environmental Impact Assessment ("EIA") shall be included in the Design Report "as applicable." However, the requirement to prepare an EIA, found in Section 17-13-0902-B of the Chicago Municipal Code, only applies to waste-related uses. Consequently, the obligation to conduct an EIA appears to apply only to a small percentage of large recycling facilities; most categories of recycling facilities are not traditionally regarded as waste-related uses as that term is used in Section 17-13-0902-B.

Limiting the applicability of the EIA (either purposefully or inadvertently) is a significant lost opportunity in the context of the proposed Rules. The EIA is extremely valuable because it requires the broadest range of factors to be evaluated as part of permitting decisions, such as the impact on the surrounding area and the dynamic physical environment, which include but are not limited to 1. critical wildlife habitats, 2. fluvial systems, 3. natural wetlands, 4. air quality, 5. water quality, 6. flora and fauna, 7. public health, 8. potential risks and effects of accidental releases, fires or explosions on surrounding communities, 9. alternatives to the proposed facility, their costs and their environmental impacts. Assessing these factors with respect to large recycling facilities would significantly enhance the scope, depth and quality of CDPH decision making, and provide a basis for CDPH to respond to the common concerns which are expressed by members of affected communities, their elected officials, and groups aligned with them.

The quality of CDPH's permit review will be significantly enhanced by asserting CDPH's authority to require permit applicants to complete EIAs. This would give discretionary authority to CDPH to require an EIA for facilities which otherwise may not be subject to Section 17-13-0902-B, for example, proposals for new, large facilities, or, proposals for significant modifications of existing consequential facilities. This would enable the permit applicant and CDPH to address the widest range of community concerns on the basis of an EIA, rather than mere assertions, aspirations and speculations.

Section 3.10 should be modified to allow CDPH to require an Environmental Impact Assessment as part of a permit application for facilities which are not encompassed in Section 17-13-0902-B. Correspondingly, Section 3.10 should be amended to include the EIA description found in 17-13-0902-B, but as an independently authorized feature of the Rules for Large Recycling Facilities.

B. Cumulative Impacts

CDPH should add a provision to the rules underscoring its authority to make permitting decisions based on the cumulative impacts of clustered large recycling facilities. That is, CDPH should expressly reserve the right to deny or modify permits to facilities that in combination with other facilities create impacts that could endanger public health, safety and welfare.

The Chicago Municipal Code provides CDPH with the authority and responsibility to assess and act upon cumulative impacts. Section 11-4-600 recognizes that air pollution can pose hazards to human health and the environment. This Section's focus is on air pollution hazards to health and the environment, not on the hazards of any specific air pollution source. Section 11-4-610 authorizes CDPH to take measures to address buildings, structures, facilities, devices, processes and other air pollution sources, within the city. CDPH's mandate is not limited to the narrow business of issuing a single permit to an individual facility, but rather, is explicitly framed as an omnibus authority to regulate "in the plural" to address air pollution that poses hazards. That is, once CDPH identifies air pollution that can pose hazards to human health and the environment, its obligation is to regulate the buildings, facilities, devices, processes, and other sources within the city to eliminate that hazard. Emission sources that can be subject to CDPH's activities are also broadly and inclusively defined, including any and all sources of air pollution, including the widest range of stationary and mobile sources.

This broad mandate carries over to CDPH's authority in permitting. Section 11-4-630 gives the Commissioner an omnibus authority in permitting to achieve the purposes of preventing air pollution hazards. Similarly, pursuant to Section 11-4-800, the Commissioner may issue regulations to implement the mandate to prevent air pollution hazards. At no point is the Commissioner restricted to addressing only the air pollution hazards attributable a single facility. Consistent with the purpose of protecting public health from air pollution hazards, the Commissioner has the authority and responsibility to assess if these hazards are the result of activities within the city, and to take the steps which are necessary to address hazards from contributing air pollution sources. This fundamental responsibility cannot be achieved if CDPH takes a narrow, facility-by-facility, pollutant-by-pollutant approach to its public health mandate. The Rules should be clear that CDPH retains the authority and responsibility to assess the air quality impacts of any individual facility in light of the cumulative air pollution hazards that will affect members of the public, even if those hazards are the result of other stationary and mobile sources. This is especially important in areas like the Southeast and Southwest Sides where facilities are clustered and where this trend is accelerating.

c. CDPH is to be commended for proactively providing for public participation opportunities in rulemaking and permitting. In its Rules, CDPH should expressly commit to the notice-and-comment public participation process it already (but informally) uses in regulatory and permitting activities for Large Recycling Facilities. This will provide consistency in practice, clarity for regulated entities, assurance for members of the public, and clear direction to future CDPH leaders and staff members.

Thank you for your consideration of these comments. Please contact us if you have any questions or comments. We would welcome the opportunity to meet to discuss these matters.

Sincerely,

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Exhibit 2.

California Department of Toxic Substances Control

DRAFT

Evaluation and Analysis of Metal Shredding Facilities and Metal Shredder Wastes

January 2018

Implementation of
California Health and Safety Code Section 25150.82

STATE OF CALIFORNIA

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ACRONYMS

ADC	Alternative Daily Cover
APCD	Air Pollution Control District
AQMD	Air Quality Management District
ARB	Air Resources Board
Cal/OSHA	California Occupational Safety and Health Administration (now the California Department of Industrial Relations, Division of Occupational Safety and Health)
CalEPA	California Environmental Protection Agency
CalRecycle	California Department of Recycling and Resource Recovery
CAR	Certified Appliance Recycler
CFC	chlorofluorocarbon
CTMSR	Chemically Treated Metal Shredder Residue
CUPA	Certified Unified Program Agency
DHS	Department of Health Services
DTSC	Department of Toxic Substances Control
EMP	Emissions Minimization Plan
HWTS	Hazardous Waste Tracking System
ISRI	Institute of Scrap Recycling Industries
LFM	light fibrous material
mg/kg	milligrams per kilogram
mg/l	milligrams per liter
MRSH	Materials that Require Special Handling
NAICS	North American Industry Classification System
NPDES	National Pollutant Discharge Elimination System
OCI	Office of Criminal Investigation
OPP	Official Policy and Procedure
PCB	polychlorinated biphenyl
PM	particulate matter
RCRA	Resource Conservation and Recovery Act
RTO	Regenerative Thermal Oxidizer
RWQCB	Regional Water Quality Control Board
SB	Senate Bill
SIC	Standard Industrial Classification
SMARTS	Storm Water Multiple Application and Report Tracking System
STLC	Soluble Threshold Limit Concentration
SWRCB	State Water Resources Control Board
TTLC	Total Threshold Limit Concentration
VOC	volatile organic compounds
WDID	Waste Discharger Identification
US EPA	United States Environmental Protection Agency

EXECUTIVE SUMMARY

The Department of Toxic Substances Control (DTSC) has conducted this Evaluation and Analysis (Analysis) of Metal Shredding Facilities and Metal Shredder Wastes to implement Health and Safety Code Sections 25150.82 through 25150.86, collectively referred to here as the Metal Shredding Facilities Law. Based on certain required findings and demonstrations, the law authorized DTSC to adopt alternative management standards for metal shredding facilities that differ from existing hazardous waste control law, and to classify metal shredder waste as nonhazardous waste. This report describes public health and environmental threats posed by metal shredding facilities, and begins the regulatory process to ensure these facilities comply with important public health and environmental protections.

DTSC reviewed hazardous waste management activities, the current regulatory oversight, and the history of releases, contamination, and enforcement actions at the facilities. DTSC directed a study to identify the highest level of treatment that could be achieved on metal shredder waste with current technology. DTSC also reviewed the current disposal practices of metal shredder waste at municipal solid waste landfills to identify the potential for migration of contaminants to groundwater, to surface waters, or through the air.

DTSC found numerous examples of accidents, improper storage of hazardous wastes, soil contamination, and releases of hazardous wastes that impacted surrounding communities. DTSC noted several legal actions taken against metal shredding facilities in response to these types of incidents. Additionally, DTSC is evaluating enforcement actions resulting from current investigations.

DTSC evaluated whether alternative management standards could be developed that would provide adequate protection for human health and safety and the environment. DTSC showed through a series of demonstrations that the most appropriate level of regulation for these kinds of facilities is a hazardous waste permit. Based on this Analysis, DTSC has chosen not to adopt alternative management standards for metal shredding facilities.

However, DTSC’s analysis demonstrated that continued disposal of chemically treated metal shredder residue (CTMSR) as nonhazardous waste in municipal solid waste landfills, including its use as alternative daily cover (ADC), has not resulted in harm to human health or safety or to the environment, and that CTMSR has not contributed to the solubilization and migration of heavy metals from solid waste landfills. DTSC has concluded that classification of CTMSR as a hazardous waste is not necessary to prevent or mitigate potential hazards to human health or safety or to the environment.

This report is intended to serve as a basis to establish enforceable operating requirements for metal shredding facilities through a hazardous waste permit. Through a formal and transparent permitting process, DTSC will ensure these facilities come into compliance with existing law, and that communities are adequately protected. This process will provide for a reasonable and orderly transition period for facilities to complete the permitting process. DTSC also intends to promulgate regulations that exclude CTMSR from classification as a hazardous waste, with certain limitations, under separate statutory authority.

DTSC anticipates conducting workshops on the proposed regulatory action in early 2018, and welcomes input from the public, the regulated community, and other stakeholders in the upcoming permitting process and the anticipated rulemaking process.

1 INTRODUCTION AND OVERVIEW

The Department of Toxic Substances Control (DTSC) prepared this Evaluation and Analysis of Metal Shredding Facilities and Metal Shredder Wastes (Analysis) under Health and Safety Code Sections 25150.82 through 25150.86, collectively referred to here as the Metal Shredding Facilities Law. During the research and preparation of this Analysis, DTSC consulted with other state and local governmental regulatory agencies including the California Air Resources Board, State Water Resources Control Board, California Department of Recycling and Resource Recovery (CalRecycle), California Department of Industrial Relations, Division of Occupational Safety and Health (Cal/OSHA), Regional Water Quality Control Boards (Regional Water Boards), local Air Quality Management Districts and Air Pollution Control Districts, and the Certified Unified Program Agencies (CUPAs). DTSC engaged with the metal shredding facilities and with the landfill owners and operators in conducting this evaluation. DTSC appreciates the cooperation and assistance of the regulated community, members of the public, and other stakeholders in conducting this evaluation and developing this Analysis.

1.1 Document Scope

This Analysis was prepared to evaluate metal shredding processes and wastes as they are operating under current conditions. The goal of the Analysis is to ensure that these processes are managed and regulated in a manner that protects public health and the environment and minimizes economic impacts to industry. The Analysis specifically considers the applicability of hazardous waste management regulations and determines whether additional requirements are needed or appropriate. This Analysis also considers whether alternative management standards specific to the generation, handling, transfer, storage, transportation, and disposal of hazardous wastes generated and managed at metal shredding facilities should be adopted by DTSC, and would be, if justified, an alternative to DTSC's existing hazardous waste management requirements.

This Analysis is divided into six sections: Section 1, an Introduction and Overview; Section 2, a presentation of the evaluations that DTSC is required to conduct; Section 3, a presentation of the analyses DTSC is required to perform; Section 4, a discussion of the demonstrations DTSC is required to make to allow alternative management standards to be proposed; Section 5, a discussion of the classification and disposal of chemically treated metal shredder residue; and Section 6, a presentation of DTSC's conclusions.

1.2 Terminology

Many terms have been used to describe the metal shredding industry and the wastes it manages. To ensure a clear and common understanding of the concepts discussed in this Analysis, DTSC provides the following definitions of terms used:

<u>Metal Shredding Facility</u>: The Metal Shredding Facilities Law defines a metal shredding facility as "an operation that uses a shredding technique to process end-of-life vehicles, appliances, and other forms of scrap metal to facilitate the separation and sorting of ferrous metals, non-ferrous metals, and other recyclable materials from nonrecyclable materials that are components of the end-of-life vehicles, appliances, and other forms of scrap metal. A metal shredding facility does not include a feeder yard, a metal crusher, or a metal baler, if that facility does not otherwise conduct metal shredding operations." *Also known as: Auto shredder, autoshredder, metal shredder, auto shredding facility, shredder.*

Metal Shredder Aggregate: The mixture of shredded material produced by the metal shredding hammer mill that typically contains recoverable ferrous and non-ferrous metals, plastics, rubber, glass, foam, fabrics, carpet, wood, residual automobile fluids, road dirt, and/or other debris. *Also known as: Aggregate, intermediate manufacturing process stream.*

Metal Shredder Residue: The portion of the metal shredder aggregate that remains after ferrous metals and non-ferrous metals have been separated, and before chemical stabilization occurs. *Also known as: Metal shredder waste, auto shredder waste, autoshredder waste, shredder residue, fluff, auto shredder fluff, recycling residue.*

Chemically Treated Metal Shredder Residue (CTMSR): Metal shredder residue that has been subject to a chemical stabilization treatment consisting of the addition of sodium or potassium silicate and an alkaline cement powder to reduce to the solubility of metals in the residue. *Also known as: Metal shredder waste, auto shredder waste, autoshredder waste, shredder residue, treated auto shredder waste, treated auto shredder residue, treated (stabilized) auto shredder waste, treated shredder waste, fluff, auto shredder fluff, and recycling residue.*

Metal Shredder Wastes: A collective reference to all wastes being managed at metal shredding facilities that emanate from the metal shredding process, including metal shredder aggregate, metal shredder residue, and Chemically Treated Metal Shredder Residue (CTMSR).

Department of Toxic Substances Control, or DTSC: DTSC originated as the Toxic Substances Control Division (TSCD) within the Department of Health Services (DHS), later expanding to a program (the Toxic Substances Control Program (TSCP)). In 1991, TSCP, by the action of the Governor, was reorganized as a department within the California Environmental Protection Agency (CalEPA). “DHS,” “TSCD,” and “TSCP” are referred to in this Analysis under the umbrella term of “DTSC” for ease of reference. *Also known as: DHS, TSCD, and TSCP.*

1.3 Metal Shredding Operations

There are estimated to be 2,500 scrap metal recycling facilities in California, which in 2014 collected and processed for export an estimated 7 million tons of scrap metal worth $5 billion.[1] Taiwan, Korea, and China received 71 percent of the scrap metal exports from California. Scrap metal recycling facilities include feeder yards that collect scrap metal from the public and businesses, automobile dismantlers that process end-of-life vehicles (approximately 1,200), and metal shredding facilities which shred and separate the scrap metal for export. There are currently six metal shredding facilities in California.

Metal shredding operations all follow the same basic process, as illustrated in Figure 1. The metal shredding facility receives scrap metal input materials, such as whole vehicles and large appliances, and certain hazardous wastes that are still present are removed from the input materials in a process commonly referred to as “de-pollution.”[2] The de-polluted input materials are processed through a

[1] See 2014 California Exports of Recyclable Materials, California Department of Resources Recycling and Recovery, Publication # DRRR-2015-1539, September 2015.
[2] Section 42175 of the Public Resources Code requires that hazardous materials be removed from major appliances and vehicles prior to crushing for transport or transferring to a baler or shredder for recycling. The law defines Materials that Require Special Handling (MRSH) as any material that, when removed from a major appliance, is a

hammer mill to break down large metal pieces into smaller pieces, resulting in metal shredder aggregate. Iron-containing metal, or ferrous metal, is separated out, and the remaining metal shredder aggregate is further processed to sort the non-ferrous metals. The material that is left after ferrous and non-ferrous metal separation is called “metal shredder residue,” which is chemically treated and sent to landfills. Each of these steps is discussed further below.

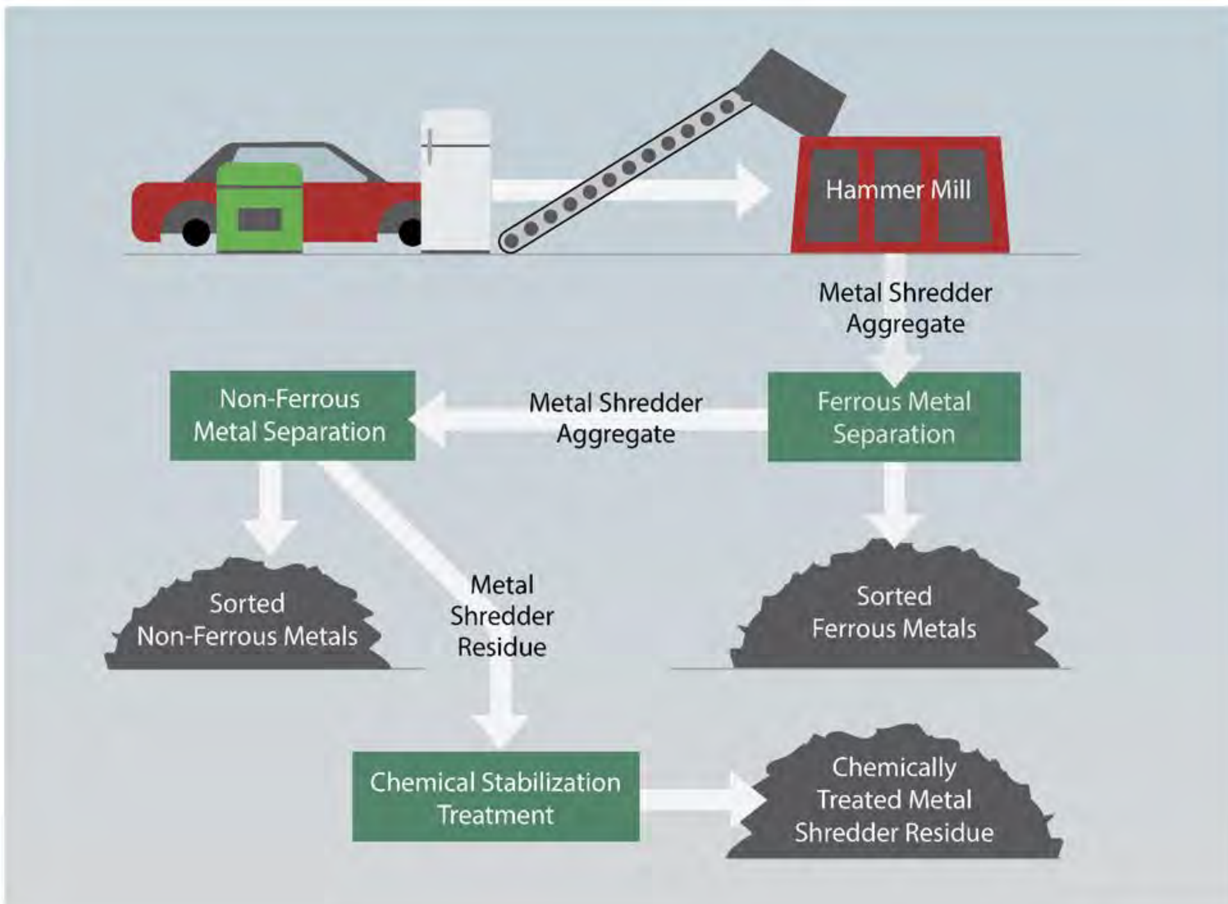


Figure 1. Diagram of a typical metal shredding operation.

Scrap Metal

The types of scrap metals that are sent to metal shredding facilities include end-of-life products that are primarily composed of metal, such as vehicles, appliances, construction and demolition materials, and manufacturing scrap. Much of the scrap metal that arrives at metal shredding facilities comes from metal recycling facilities, which sort, bale, and shear the metal to compress it for ease of transport. Scrap metal arrives at the metal shredding facility in a variety of ways, most commonly by truck or rail. When vehicles, appliances, and other scrap metal arrive at a metal shredding facility, they are subject to

hazardous waste regulated pursuant to Chapter 6.5 (commencing with Section 25100) of Division 20 of the Health and Safety Code.

the scrap metal exclusion, meaning the scrap metal is not regulated as a hazardous waste since it is being recycled.[3]

When the scrap metal arrives at the metal shredding facility, it is unloaded by large machinery and piled for ease of handling. Because scrap metal deliveries can be a mixture of various metals (ferrous and non-ferrous) and other materials, additional separation and processing steps, such as further sorting, de-pollution, and shearing occur before the scrap metal is ready to be shredded. All six metal shredding facilities in California have acceptance policies regarding what materials they will and will not accept as scrap metal.

De-pollution

Much of the scrap metal that metal shredding facilities receive to shred has the potential to contain hazardous materials, also known as materials that require special handling, or MRSH. The MRSH must be removed before the scrap metal can enter the shredder.[4] Typical hazardous materials found in scrap metal include gasoline, oil, antifreeze, lead-acid batteries, vehicle air bags, compressed gas cylinders (e.g., propane tanks, compressed gas tanks, and fire extinguishers), refrigerants in air conditioning or heat transfer systems, polychlorinated biphenyls (PCBs) containing capacitors, light ballasts, transformers, and items containing elemental mercury (e.g., tilt-switches or thermostats).

Metal shredding facilities that conduct the de-pollution operations on-site are subject to hazardous waste generator requirements, as the facility becomes a point of hazardous waste generation. Similarly, the metal shredding facility is subject to requirements for containerization, labeling, storage, and disposal or other means of hazardous waste management.

Scrap metal stored prior to shredding.

[3] See subdivision (3) of paragraph (a) of Section 66261.6 of Division 4.5 of Title 22, California Code of Regulations.
[4] See Public Resources Code section 42175

Hammer Mill

The de-polluted scrap metals are fed into a hammer mill to reduce the size to facilitate downstream sorting processes. The hammer mill can reduce scrap metal to pieces less than four inches in diameter. This shredded waste is called metal shredder aggregate.

A large hammer mill may contain up to 72 hammers, each weighing 1,000 pounds. The hammers are placed around a rotor in balanced positions, with the entire rotor assembly weighing up to 100 tons. The rotor is turned by an electric motor with up to 9,000 horsepower at over 400 revolutions per minute, generating hammer tip speeds of more than 100 miles per hour ("tip speed" refers to the speed at which the tip of the hammer is travelling in the hammer mill). The hammer mill is surrounded by grates with slots that allow the smaller pieces to pass through. Larger pieces continue to be shredded until they are small enough to fit through the slots.

Shredder and loading equipment at Schnitzer Steel, Inc., Oakland, CA.

An earlier photo of the shredder unit at SA Recycling, Anaheim, CA before it was enclosed.

Ferrous Metal Recovery

Ferrous metals are recovered from the metal shredder aggregate using magnets, leaving non-ferrous metals such as aluminum, copper, lead, and zinc.

Magnets at SA Anaheim, shown here before they were enclosed.

Pile of sorted ferrous metal following shredding of scrap metal at SA Terminal Island.

Non-ferrous Metal Recovery

Non-ferrous metals are recovered from metal shredder aggregate based on density and other physical properties. Generally, the non-ferrous metals are separated by first separating the metal shredder aggregate into different size fractions using trommels, then by feeding the segregated sizes into: (1) eddy-current separators to separate most aluminum, zinc and copper materials, (2) under air-actuated sensors to remove stainless steel and copper wire, and (3) through density separators to remove fine copper materials. Additionally, "hand picking" is used at some metal shredding facilities, a process by which individuals manually pick through the metal shredder residue to pull out any remaining non-ferrous metal pieces that the separation may have missed, before the metal shredder residue is subjected to the chemical stabilization treatment.

One of the metal shredding facilities does not conduct the non-ferrous metals separation on-site, but ships partially-processed material to a facility it owns in Arizona for further sorting.[5] The sorted and separated metals are sold in bulk to metal refiners for further purification, ultimately to be used in the manufacture of new metal products.

Eddy current separator, used for recovery of non-ferrous metals.

Hand picking station, Sims Metals, Redwood City, CA.

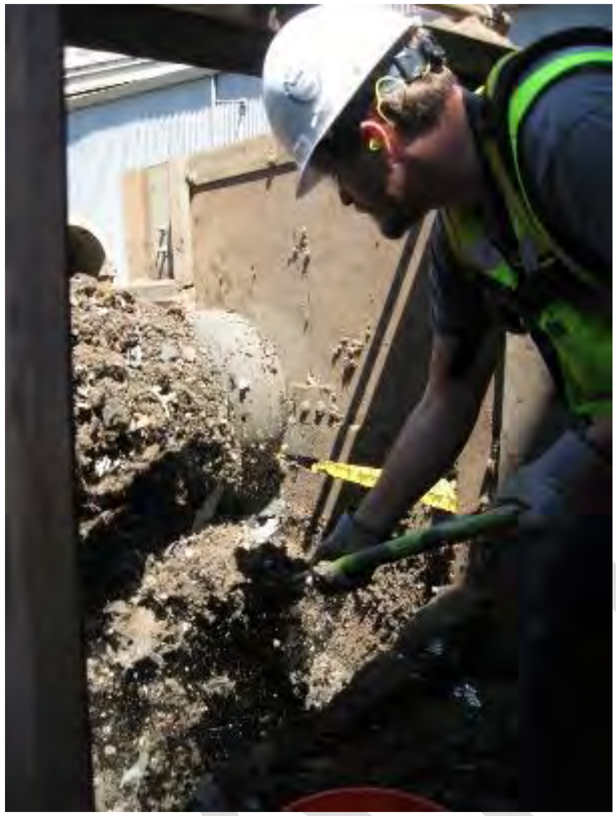
[5] Ecology Auto Parts of Colton, California, ships its aggregate for further processing to another facility owned by Ecology, located at 59260 Highway 72, in Salome, Arizona. The aggregate is shipped as an Excluded Recyclable Material in trucks owned and operated by Ecology.

Pile of sorted non-ferrous metal.

Metal Shredder Residue

A large amount of waste remains after all the metals that can be economically recovered have been removed. This remaining material, called metal shredder residue, consists of plastics, rubber, glass, foam, fabrics, carpet, wood, residual automobile fluids, road dirt, other debris, and a small amount of unrecoverable metals (typically non-ferrous). Approximately 25 percent of the original weight of a typical end-of-life vehicle remains after all the metals have been practicably removed.[6]

[6] See industry presentation, "Regulation of Auto Shredder Residue in California," Oakland Public Workshop, January 23, 2014.



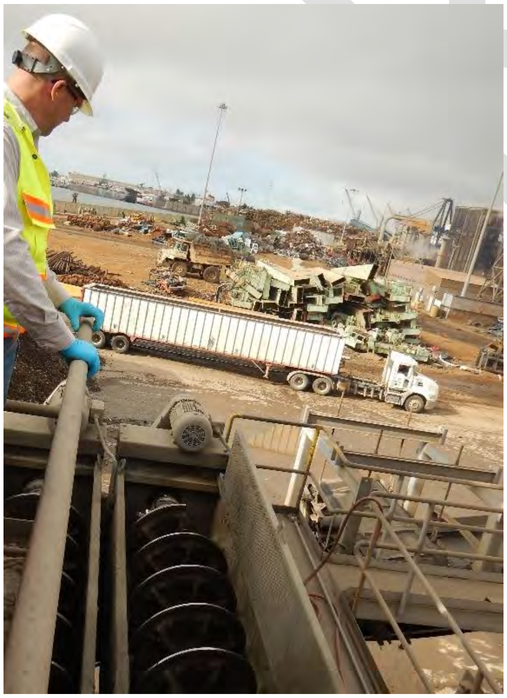
Metal shredder residue exiting the joint products plant following removal of non-ferrous metals.

Chemical Stabilization

Each of the facilities that conducts non-ferrous metal separation on-site treats the resulting metal shredder residue using a chemical stabilization process that applies a sodium or potassium silicate solution and an alkaline activator such as cement.[7] Chemical stabilization is used to reduce the mobility of toxic heavy metals in the residue. The initial step is a thorough wetting of the material with liquid silicate. After the material is wetted, cement powder is added and the material is mixed in a pug mill, yielding chemically treated metal shredder waste. This CTMSR is passed under a final magnet for additional recovery of ferrous metals before it is transported off-site for disposal.

[7] For Ecology Auto Parts, the metal shredder residue produced following the sorting of non-ferrous metals is generated in Arizona, and thus, is not governed by California hazardous waste control law.

Cement storage silos at SA Bakersfield.



Pug mill mixing screw at Schnitzer Steel, Oakland.

Chemically treated metal shredder residue is passed under a final magnet for recovery of ferrous metal at Schnitzer Steel, Inc., in Oakland.

1.4 Regulatory History of Metal Shredding Facilities and Metal Shredder Waste

All facilities that store, treat, or dispose of hazardous waste in California must obtain a permit or grant of authorization from DTSC. California's tiered permitting system includes a full permit, which is generally required for hazardous waste facilities that are managing federally regulated hazardous wastes; a standardized permit, generally available for facilities managing hazardous wastes that are not federally regulated; and three lower-tiered permits that are reserved for lower-risk and lower-volume waste streams.

Metal shredding facilities generally do not produce waste that exceeds the federal regulatory levels established by the U.S. Environmental Protection Agency (US EPA) under the Resource Conservation and Recovery Act (RCRA), and thus are not regulated under the full permit. Metal shredding facilities do, however, produce waste that exceeds California's more stringent regulatory thresholds as is recognized to be a hazardous waste.

Metal shredder residue was not managed as hazardous waste until 1984, when California adopted the Waste Extraction Test to determine whether a waste is hazardous due to the solubility of contaminants in the waste. Metal shredder residue was found to have high levels of lead, copper, and zinc which could be mobilized under the test conditions.

On March 9, 1984, DTSC informed all generators of metal shredder residue that their waste was classified as hazardous and must be managed in accordance with hazardous waste regulations.[8] The

[8] See DHS Letter to Dr. Kenneth Hekimian RE: Disposal of Automobile Shredder Wastes from Hugo Neu-Proler and Clean Steel, Inc., March 9, 1984.

requirement for disposal of metal shredder residue as a hazardous waste greatly increased the cost for the shredder operators and also created a concern about the limited capacity of hazardous waste landfills.

In 1985, Senate Bill (SB) 976 (Bergeson, Ayala and Seymour, Chapter 1395, Statutes of 1985) addressed the issue of limited capacity at hazardous waste landfills by requiring five Regional Water Quality Control Boards (RWQCBs)[9] to prepare a list of Class III nonhazardous waste landfills that would be authorized to accept and dispose of metal shredder residue.[10] Class III landfills are generally authorized to only accept nonhazardous waste. The RWQCBs identified 13 Class III landfills, including at least one in each of the five RWQCB jurisdictions, that could accept metal shredder residue. SB 976 did not require that the listed landfills accept metal shredder residue, and did not provide exemptions from other hazardous waste regulations. Metal shredder residue was designated nonhazardous for purposes of disposal only, and it retained the hazardous designation for purposes of storage, transportation, manifesting, and disposal fees. The RWQCBs required the 13 landfills to upgrade their facilities to accept metal shredder residue; doing so was financially prohibitive, and only a few Class III landfills that became authorized by SB 976 actually accepted the metal shredder residue. By its own operation, this statute expired on January 1, 1988.

In 1986, DTSC began working with a shredder in Los Angeles to determine if shredder waste could be treated with silicate and cement to reduce the solubility of metals so that it would qualify for a nonhazardous waste classification. Based on testing results of the treated waste, DTSC made the determination that CTMSR exhibited "mitigating physical or chemical characteristics which rendered it insignificant as a hazard to human health and safety, livestock, and wildlife" and classified the waste as nonhazardous. It cited as legal authority subdivision (e) of Section 66305 of Title 22 of the California Administrative Code.[11] This authority was later renumbered to subdivision (f) of Section 66260.200 of Title 22 of the California Code of Regulations. The letters granting the nonhazardous waste determinations are now referred to as "f letters."

In 1987, as DTSC continued to work with the industry to develop effective chemical stabilization for metal shredder residue, the State Water Resources Control Board (SWRCB) adopted Resolution 87-22, which established a policy to standardize the requirements for the Class III landfills to accept metal shredder residue for disposal. The policy attempted to resolve the conflict between the Legislature's direction to accept the metal shredder residue at Class III landfills, and the RWQB's longstanding policy to prevent hazardous wastes from being accepted by nonhazardous waste landfills. The SWRCB's Resolution 87-22 stated that metal shredder residue that was determined to be hazardous by DTSC, but was granted a variance for the purposes of disposal by DTSC, was suitable for disposal at designated Class III landfills.

In 1987, Assembly Bill (AB) 1542 (Bradley and Peace, Chapter 1483, Statutes of 1987), exempted untreated metal shredder residue that was disposed in an appropriate Class III landfill from hazardous waste disposal fees and taxes. The AB 1542 conditional exemption was effective only if the generator

[9] RWQCBs in the San Francisco, Central Valley, Los Angeles, Santa Ana, and San Diego regions.
[10] See former Section 25143.6 of the Health and Safety Code, now repealed (SB 976, Bergeson, Ayala and Seymour, Chapter 1395, Statutes of 1985, Section 1).
[11] See letter from Dr. David J. Leu, Department of Health Services, Toxic Substances Control Division to Jim Wothorspoon, Hugo Neu-Proler Company, February 21, 1986.

carried out specified monitoring, recordkeeping, and testing requirements; if the waste was disposed within 45 days of being generated; and if DTSC determined that the metal shredder residue would not pose a threat to human health or water quality. AB 1542 required the metal shredder residue generators to analyze their residue for total and soluble concentrations of chromium, cadmium, copper, lead, mercury, nickel, and zinc, and for total concentrations of PCBs.

On November 30, 1987, in anticipation of AB 1542 going into effect on January 1, 1988, DTSC rescinded all disposal variances it had previously issued to metal shredder residue generators in 1984 and 1985.[12] The timing of this rescission allowed metal shredder residue generators sufficient time to apply to DTSC for a new variance prior to the effective date of AB 1542.

Of the eight metal shredding facilities in California at that time, only Levins Metal Corporation (later to become Sims Metal Management) and Schnitzer Steel Products, used the AB 1542 nonhazardous disposal provision. Four of the facilities applied to DTSC for nonhazardous waste classifications by submitting testing data demonstrating their use of the silicate and cement treatment. DTSC approved the treatment based on the reduction in solubility of the metals. Nonhazardous waste classifications were granted to Ferromet (later to become SA Rancho Cucamonga; no longer in operation), Hugo Neu-Proler (later SA Terminal Island), Clean Steel (later Ecology Auto Parts), and Orange County Steel Salvage (later SA Anaheim). The two remaining facilities—Pacific Steel (no longer operating) and Golden State Metal (later SA Bakersfield)—were not disposing of metal shredder residue at that time. By its own operation, AB 1542 expired on January 1, 1989.

In 1988, DTSC also issued Official Policy and Procedure Number 88-6 (OPP 88-6) to ensure that a consistent regulatory approach would be applied to the management and disposal of auto shredder waste.[13] The policy was designed to assist staff in regulating generators, and provided clarification for several scenarios typically encountered at metal shredding facilities. Facilities that treat, store, or dispose of hazardous waste in California are required to have a hazardous waste permit. DTSC's OPP 88-6 focused on the chemical stabilization process being performed on the metal shredder residue, which required a hazardous waste facility permit. Through OPP 88-6 DTSC interpreted that the metal shredder aggregate that was undergoing separation at the metal shredding facilities was not yet a waste. If the chemical stabilization were to take place while the metal shredder aggregate was still undergoing separation processes, prior to the last separation process, the treatment would be considered "in-line" and would not require a permit. Each of the metal shredding facilities complied with OPP 88-6 by conducting a final ferrous metal separation step after the chemical stabilization. Each metal shredding facility now passes the CTMSR under a final magnet as a stage of ferrous separation to conform their operations to the OPP 88-6 policy and to avoid requiring a permit.

In 2002, DTSC conducted sampling at three auto shredding facilities to verify compliance with the existing statutes, regulations, and DTSC policy.[14] The investigation identified longstanding and continuing issues related to the treatment, storage, and handling of hazardous waste at the facilities. However, DTSC's historic waste classifications and policies remained in effect during the investigation, and were affirmed in 2005, when one of the metal shredding facilities was reorganized under a new

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[12] See DHS Letter to Adams RE: Auto Shredder Disposal Variances, November 30, 1987.
[13] See DHS Official Policy and Procedure Number 88-6 Auto Shredder Waste Policy and Procedure, 1988 (OPP 88-6).
[14] See DTSC draft report "California's Automobile Shredding Waste Initiative", 2002.

name, and requested that the previous "f letter" be transferred from the existing facility's location to that of a new facility.[15]

In 2008, based on the results sampling conducted during the 2002 investigation, DTSC determined that the conditions contained in DTSC's authorization letters and in OPP 88-6 were not sufficient to reduce the waste to a nonhazardous solid waste. DTSC informed the metal shredding facilities of DTSC's intention to rescind the nonhazardous classifications and OPP 88-6,[16] and to impose management standards (including requiring a permit or some other form of authorization to treat the metal shredder wastes). DTSC then began discussions with industry on the process to rescind the conditional nonhazardous waste classifications and require the waste to be managed as hazardous waste. In response, industry representatives provided DTSC with a significant amount of technical information supporting the treatment and legal arguments challenging the process to rescind the authorizations and policy. DTSC's proposed rescission was not finalized, and the "f letters" and policy continued to remain in place.

During this time, DTSC conducted in-depth investigations of specific metal shredding facilities. An explosion at the SA Terminal Island facility (then operated by a subsidiary of Sims) in 2007 resulted in the release of hazardous waste. In 2011, the multi-agency enforcement action against the company resulted in penalties of nearly $3 million and improved environmental protections. DTSC also investigated releases of light fibrous material (LFM) from the Sims facility in Redwood City beginning 2009. The enforcement action resulted in $2.4 million in penalties in 2015 and enclosure of the entire facility to prevent future releases into the surrounding community.

In 2012, DTSC again met with industry to discuss the "f letters" and OPP 88-6. DTSC raised questions about the efficacy of the treatment, the protectiveness of the policy, and the appropriateness of allowing the metal shredding facilities to perform hazardous waste treatment without a permit. DTSC invited industry to provide additional information that demonstrated the effectiveness of the chemical treatment through a treatability study, as well as to document the industry's claims that the current treatment was the best available.

In 2013, the Institute of Scrap Recycling Industries (ISRI) submitted a Draft Metal Shredder Residue Treatability Study Workplan to DTSC, presenting a methodology to determine the effectiveness of various application rates of the current treatment technology.[17] In late 2013 and early 2014, DTSC held a series of workshops with the public, other state and local government agencies, and the regulated community to receive feedback and input on the development of the treatability study.[18]

In 2014, Senator Jerry Hill introduced SB 1249 (Chapter 756, Statutes of 2014) in response to safety concerns at metal shredding facilities related to two recent fires in his district, and his concern that the

[15] See DTSC Letter to Lynn Delzell regarding the transfer of the Clean Steel nonhazardous waste classification ("f letter") to Pacific Rail Industries, dated August 1, 2005.
[16] See DTSC Letter to Metal Shredding Facilities repealing "f letters" and Policy and Procedure 88-6 effective January 1, 2009, dated September 29, 2008.
[17] See DTSC Letter to Margaret Rosegay, July 11, 2013, providing DTSC's review of the Draft Metal Shredder Residue Treatability Study Workplan (Treatability Study Workplan), dated May 9, 2013.
[18] Local Governmental Agency Workshops were held in Berkeley on November 7, 2013 and in Cypress on November 15, 2013. Public Workshops were held in Wilmington on January 14, 2014 and in Oakland on January 23, 2014. A meeting with Landfill Owners and Operators was held on December 16, 2013.

hazards associated with these operations were not adequately regulated. The Senate Committee on Environmental Quality noted that many of these facilities are in highly populated areas and have been found to have contaminated air and water surrounding their facilities.[19] The bill was amended to require DTSC to consider additional aspects of the industry and its wastes. SB 1249 was passed by the Legislature, signed by the Governor, and became effective on January 1, 2015. The final bill as chaptered authorizes DTSC to adopt regulations establishing management standards for metal shredding facilities for hazardous waste management activities within the department's jurisdiction, as an alternative to the requirements of existing hazardous waste control law, based on a comprehensive evaluation of the industry and its practices, which would identify the appropriate level of regulatory controls to place on the industry and the management of treated metal shredder residue.

1.5 Requirements of Legislation

SB 1249 enacted Health and Safety Code Sections 25150.82 through 25150.86. These provisions are collectively referred to in this document as the Metal Shredding Facilities Law. It requires DTSC to evaluate the risks posed by metal shredding facilities and the management of metal shredder aggregate. Based on the findings of its evaluation, SB 1249 authorizes DTSC to either develop alternative management standards for metal shredding facilities or to rescind any prior decisions and require the facilities and their hazardous wastes to be subject to full hazardous waste management requirements.

In Section 1 of the Metal Shredding Facilities Law, the Legislature expressed its intent "that the conditional nonhazardous waste classifications, as documented through the historical 'f letters,' be revoked and that metal shredding facilities be thoroughly evaluated and regulated to ensure adequate protection of the human health and the environment."

The general requirements of the Metal Shredding Law:

- Authorize DTSC, in consultation with CalRecycle, SWRCB, and affected local air quality management districts, to adopt regulations establishing management standards for metal shredding facilities for hazardous waste management activities as an alternative to current hazardous waste control law and regulations.
- Require DTSC, before adopting regulations establishing alternative management standards, to first prepare an analysis evaluating the hazardous waste management activities to which alternative management standards would apply.
- Prohibit DTSC from adopting management standards that are less stringent than applicable standards under federal law.
- Authorize the alternative management standards, to the extent consistent with the federal hazardous waste standards, to allow CTMSR to be classified and managed as nonhazardous waste.

[19] See SB 1249 Committee Analysis, Senate Committee on Environmental Quality, Committee Consultant Rachel Machi Wagoner, April 30, 2014, p. 3.

- Allow CTMSR that is classified as nonhazardous waste pursuant to the alternative management standards to be managed as either alternative daily cover or for beneficial reuse, or to be placed in a unit that meets specified state waste discharge requirements.

- Require that all hazardous waste determinations and policies, procedures or guidance issued by DTSC before January 1, 2014, governing CTMSR be inoperative if DTSC completes its analysis and does either of the following: 1) adopts new regulations establishing alternative management standards; or 2) rescinds the existing conditional nonhazardous waste classifications.

- Sunset DTSC's authority to adopt regulations on January 1, 2018.

- Authorize DTSC to collect an annual fee from metal shredding facilities to pay DTSC's costs for implementation. This bill also establishes a separate subaccount in the Hazardous Waste Control Account and requires the fees to be deposited into the account, to be available upon appropriation by the Legislature, and authorizes regulations relating to fee provisions to be adopted as emergency regulations.

- Repeal Section 25143.6 of the Health and Safety Code.[20]

In order to implement the Metal Shredding Facilities Law, the Legislature directed DTSC to evaluate:

1) The operative environmental and public health regulatory oversight of metal shredding facilities (HSC Section 25150.82(d)(1)); and

2) The hazardous waste management activities (HSC Section 25150.82(d)(2)).

The Legislature then directed DTSC, if it were to propose any alternative management standards, to prepare an analysis that would address the following:

1) The types of hazardous waste and the estimated amounts of each hazardous waste that are managed as part of the activity (HSC Section 25150.82(d)(3)(A));

2) The complexity of the activity, and the amount and complexity of operator training, equipment installation and maintenance, and monitoring that are required to ensure that the activity is conducted in a manner that safely and effectively manages each hazardous waste (HSC Section 25150.82(d)(3)(B));

3) The chemical or physical hazards that are associated with the activity and the degree to which those hazards are similar to, or different from, the chemical or physical hazards that are associated with the production processes that are carried out in the facilities that produce the hazardous waste that is managed as part of the activity (HSC Section 25150.82(d)(3)(C));

4) The types of accidents that might reasonably be foreseen to occur during the management of particular types of hazardous waste streams as part of the activity, the likely consequences of those accidents, and the reasonably available actual accident history associated with the activity (HSC Section 25150.82(d)(3)(D));

[20] Repeal of the requirement for five RWQCBs to prepare a list of Class III nonhazardous waste landfills that would be authorized to accept and dispose of metal shredder residue that was enacted by SB 976 (Bergeson, Ayala and Seymour, Chapter 1395, Statutes of 1985).

5) The types of locations where hazardous waste management activities associated with metal shredding and management of treated metal shredder waste may be carried out and the types of hazards or risks that may be posed by proximity to the land uses described in Section 25227 (HSC Section 25150.82(d)(3)(D)).[21]

The Legislature next directed DTSC to demonstrate, for any alternative management standards that DTSC is proposing, one of the following:

1) The requirements that the alternative management standards replace are not significant or important for either a) Preventing or mitigating potential hazards to human health or safety or to the environment posed by the activity; or b) Ensuring that the activity is conducted in compliance with other applicable requirements of this chapter and the regulations adopted pursuant to this chapter (HSC Section 25150.82(e)(1));

2) A requirement is imposed and enforced by another public agency that provides protection of human health and safety and the environment that is as effective as, and equivalent to, the protection provided by the requirement, or requirements, that the alternative management standards replace (HSC Section 25150.82(e)(2));

3) Conditions or limitations imposed as part of the alternative management standards will provide protection of human health and safety and the environment equivalent to the requirement, or requirements, that the alternative management standards replace (HSC Section 25150.82(e)(3)); or

4) Conditions or limitations imposed as part of the alternative management standards accomplish the same regulatory purpose as the requirement, or requirements, that the alternative management standards replace, but at less cost or with greater administrative efficiency, and without increasing potential risks to human health or safety or to the environment (HSC Section 25150.82(e)(4)).

SB 1249 also allows DTSC to classify and manage CTMSR as nonhazardous waste if the analysis demonstrates that classification and management as hazardous waste is not necessary to prevent or mitigate potential hazards to human health or safety or to the environment. SB 1249 authorizes the classification of CTMSR as nonhazardous waste to be included in any regulations to establish alternative management standards. The alternative management standards may allow CTMSR to be used as either alternative daily cover or for beneficial reuse, or to be placed as a nonhazardous waste in a land disposal unit that meets specified requirements.

However, SB 1249 requires the disposal of CTMSR to be regulated by existing hazardous waste control law unless alternative management standards are adopted by DTSC. If the department does not adopt alternative management standards that include the classification of CTMSR as nonhazardous waste, SB 1249 allows the current disposal of CTMSR to continue until the department rescinds the conditional nonhazardous waste classifications. If DTSC were to rescind the nonhazardous waste classifications without alternative management standards, or other new regulations in place which classify the waste

[21] HSC § 25227 cites sensitive land uses including hospitals for humans, schools for persons under 21 years of age, day care centers for children, and permanently occupied human habitations, other than those used for industrial purposes.

as nonhazardous, the waste would be required to be managed as hazardous waste. This provision in SB 1249 which allows DTSC to adopt alternative management standards and to classify metal shredder waste as nonhazardous sunsets as of January 1, 2018.

Importantly, SB 1249 does not affect or limit DTSC's other statutory authorities to regulate metal shredding operations or to classify wastes as hazardous or nonhazardous as appropriate to ensure proper management and disposal.

The information summarized in this report provides the evaluations, analyses, and demonstrations required by SB 1249.

2 EVALUATION

Pursuant to HSC Sections 25150.82(d)(1) and 25150.82(d)(2), the Metal Shredding Facilities Law requires DTSC to evaluate:

- The operative environmental and public health regulatory oversight of metal shredding facilities, identifying activities that need to be addressed by the alternative management standards or other advisable regulatory or statutory changes; and
- The hazardous waste management activities being conducted by metal shredding facilities or at landfills that handle metal shredder waste.

This section presents the information that DTSC gathered in performing the required evaluations.

2.1 Identification of Metal Shredding Facilities

Pursuant to SB 1249, DTSC first identified all metal shredding facilities that would be evaluated based on the statutory definition of a metal shredding facility and using available data as shown in Table 1.

Table 1.
Databases Searched for Potential Metal Shredding Facilities

Database	Identified metal handlers
Hazardous Waste Tracking System (HWTS)	1,325 entities with ID numbers with company featuring keywords (“metal” or “scrap”) or Standard Industrial Classification (SIC) codes related to metal recycling activities
California Department of Motor Vehicles list of Licensed Automobile Dismantlers	1,111 auto recyclers identified as automobile salvage/recycler
DTSC’s Certified Appliance Recycler (CAR) Program	343 registered facilities
State of California Auto Dismantlers Association	171 member companies
Dunn and Bradstreet Business Listings for specific North American Industry Classification System (NAICS) codes	999 business entities with NAICS codes for used motor vehicle parts, metal wholesalers, metal service centers, and recyclable mineral merchant wholesalers
Institute of Scrap Recycling Industries (ISRI)	241 California businesses
2014 North American Scrap Metals Directory	8 facilities

The data review identified approximately 2,000 businesses that managed scrap metal (some of the businesses were identified across multiple databases). In narrowing the scope to further identify only metal shredding facilities, DTSC identified 400 facilities that were shown in HWTS records to have shipped contaminated soil or other hazardous waste solids off-site for disposal. DTSC examined satellite images of the 400 facilities in Google Earth and identified 101 locations where metal processing equipment and piles of material indicating that metal shredding operations were visible.

DTSC next sought the assistance of the CUPAs in evaluating the 101 potential metal shredding operations within their respective jurisdictions.[22] The CUPAs confirmed that 74 of the identified locations did not perform any shredding activities, that 18 facilities had not been inspected and the CUPAs had no additional information on them, and that nine were potential metal shredding facilities. DTSC's Office of Criminal Investigations (OCI) then conducted follow-up inspections of the facilities identified by the CUPAs to determine if they met the statutory definition of a metal shredding facility.

OCI completed its initial inspection of the facilities in December 2015. The name and locations of metal shredding facilities authorized to operate in California are shown in Table 2. In addition to the facilities identified in Table 2, an SA Recycling facility in Rancho Cucamonga holds a valid "f letter" but was not operating as a metal shredding facility as of 2017.[23] DTSC identified two additional facilities which were not currently authorized to operate: Universal Recycling Services in Stockton and Kramar's Iron and Metal in Sun Valley. Due to pending enforcement activities by DTSC, these facilities were not included in the evaluation.

Table 2.

Authorized Metal Shredding Facilities Operating in California

Facilities Currently Holding an "f letter"	Original "f letter" Recipient	Original "f letter" Issue Date
SA Recycling, Terminal Island 901 New Dock Street Terminal Island, CA 90731	Hugo Neu-Proler Company 901 New Dock Street P. O. Box 3100 Terminal Island, CA 90731	February 21, 1986
Schnitzer Steel Products 1101 Embarcadero West Street Oakland, CA 94607-2536	Schnitzer Steel Products Foot of Adeline Street P.O. Box 747 Oakland, CA 94604	June 13, 1988
SA Recycling, Anaheim 3200 East Frontera Street Anaheim, CA 92806-2822	Orange County Steel Salvage, Inc. 3200 E. Frontera Road Anaheim, CA 92806	December 19, 1988
Sims Metal Management 699 Seaport Boulevard Redwood City, CA 94063-2712	LMC Metals 600 South 4th Street Richmond, CA 94804	May 31, 1989
SA Recycling, Bakersfield 2000 East Brundage Lane Bakersfield, CA 93307-2734	Golden State Metals, Inc. P.O. Box 70158 Bakersfield, CA 93387	February 25, 1992
Ecology Auto Parts, Inc. doing business as (DBA) Pacific Rail Industries 785 East M Street Colton, CA 92324-0000	Transferred from Clean Steel, Inc. August 1, 2005	Transferred from Clean Steel, Inc. August 1, 2005

[22] See DTSC Letter requesting assistance from the CUPAs, July 28, 2015.
[23] See DHS Letter to Mr. Thomas Hightower, Ferromet, Inc., February 23, 1990.

The locations of the six metal shredding facilities that were identified as currently active and operating under the authority of the "f letters" and OPP 88-6 are shown in Figure 2. Additionally, the locations of the five solid waste landfills that accept CTMSR as of 2017 are also presented in Figure 2.

Figure 2. Metal shredding facilities currently active and operating under the authority of the "f letters" and OPP 88-6 and landfills accepting CTMSR.

2.2 Survey of Metal Shredding Facilities

In 2015, DTSC sent questionnaires to the authorized metal shredding facilities and to the landfills currently accepting CTMSR as a preliminary assessment of their operational practices. The survey requested information on general operating conditions and practices, acceptance policies, volumes processed, environmental controls, and waste management practices related to the generation, treatment, storage, transportation, and disposal of metal shredder wastes. Responses were returned by all six metal shredding facilities, and from four of the five landfills. The complete responses to the questionnaires are provided in Appendices A and B.

General information about each of the metal shredding facilities and their operations is provided below. Additional information from these surveys has been integrated into the relevant sections of this Analysis.

SA Terminal Island

SA Terminal Island is located on 27 acres in the Terminal Island area of the Port of Long Beach. The area is entirely industrial. More than 95 percent of the facility site is covered with pavement or by structures.[24] The facility captures storm water and wash water from the yard and reuses it after chemical treatment and clarification. Water that is not reused is discharged to the Cerritos Channel, which flows to the Pacific Ocean.

SA metal recycling facility in Terminal Island CA.

The facility receives automobiles, consumer and industrial appliances, manufacturing scrap, curbside collection scrap, demolition scrap, miscellaneous scrap from consumers and homeowners, and industrial scrap. In some circumstances, appliances and vehicles have fluids, batteries, mercury switches, and other pollutants, which are removed on-site prior to being sent to the shredder. The facility reported that a total weight of approximately 300,000 metric tons of scrap metal was shredded for the year 2014. The scrap metal consisted of 42.16 percent automobiles, 43.63 percent appliances, and 14.21 percent miscellaneous. SA Terminal Island uses a 9,000-horsepower mega shredder manufactured by Riverside Engineering.

SA Terminal Island reported that there is no material storage on bare ground. The facility reported up to 100,000 tons of ferrous and non-ferrous scrap metal were stored on-site at any given time. The facility

[24] See Storm Water Pollution Prevention Plan, SA Recycling LLC dba SA Recycling, Waste Discharge Identification (WDID) number 419I021125, June 20, 2015.

reported that it typically stores 1,000 to 4,000 tons of metal shredder waste with its ferrous metals removed, prior to the removal of non-ferrous metals. SA Terminal Island reported that it typically stores 1,500 to 2,000 tons of CTMSR on-site at any given time, but that up to 10,000 tons could potentially be present at the site.

Schnitzer Steel Products

Schnitzer Steel Products (Schnitzer) is located on 26.5 acres in southern Oakland in the industrialized port area. The facility is adjacent to Oakland Inner Harbor and the Port of Oakland.[25] Approximately 57 percent of the site is composed of paved roads and other paved areas, 12 percent is composed of buildings and structures, and the remaining 31 percent is composed of unpaved dirt and gravel surfaces. The facility is bounded to the south by the Oakland Inner Harbor, to the east and west by the Port of Oakland, and to the north by Embarcadero West and the Union Pacific Railroad tracks. The facility is located approximately 0.3 mile south of Interstate 880. The nearest residential area is approximately one-half mile to the north of the facility, with other residents to the south in nearby Alameda.

Schnitzer Steel Products metal recycling facility, located in Oakland, CA.

The facility does not normally discharge storm water. Any storm water that falls on the facility is contained on-site and used as cooling water in the shredder. Containment is achieved by a combination of structural and physical features, including a 2,400-foot concrete wall with a raised walkway that runs the entire length of the shoreline, a 1,300-foot concrete wall that runs along the facility's western

[25] See Industrial Activities Storm Water Pollution Prevention Plan, prepared for Schnitzer Steel Products Company, Inc., Oakland, CA, WDID number 201I003365, June 2015.

boundary, a 1,000-foot concrete wall and 300-foot sheet pile wall that run along the facility's eastern boundary, and a 1,000-foot concrete wall that encloses the pier crane dock. Storm water is retained on-site in a 1.2-million-gallon storage tank pending use in the shredder. There are no storm water outfalls at the facility and no storm drains that connect to the separate municipal storm sewer system.

Schnitzer processes iron containing scrap including end-of-life vehicles, appliances, and demolition scrap; non-ferrous metals including copper, aluminum, and stainless steel; electronics scrap; and lead-acid batteries. Schnitzer's scrap acceptance policy prohibits items such as elemental mercury; nickel-cadmium, lithium ion, and alkaline batteries; scrap metals with free-flowing liquids (e.g. used oil); scrap metals with refrigerants; scrap metals with capacitors, ballasts, and transformers; munitions and other explosives; asbestos; radioactive scrap metal; and any wastes that contain hazardous materials.

Schnitzer reported that the scrap metal processed at its facility was composed of approximately 50 percent end-of-life vehicles, 10 percent appliances, and 40 percent other light tin or iron. Schnitzer also uses a 9,000-horsepower mega shredder manufactured by Riverside Engineering.

Schnitzer reported that between 70,000 and 80,000 tons of sorted scrap metals are stored outdoors at any given time. Additionally, on average there may be 300 to 500 tons of metal shredder aggregate which has had ferrous metal removed stockpiled near the shredder and the non-ferrous separation plant. The facility reported that the maximum amount of CTMSR typically stored at the facility is approximately 350 tons. Typically, 20 loads per day of CTMSR are transported off-site for disposal in a landfill. Each load weighs between 20 and 25 tons.

SA Anaheim

SA Anaheim is located on approximately 20 acres of a 40-acre site in Anaheim, near retail centers, warehouses, and residential neighborhoods. Scrap metal operations are conducted on the 20-acre portion. The remainder of the site is used as a railyard.[26] The facility is completely paved and is designed to collect storm water for recycling and on-site reuse. The site is surrounded by Highway 91 to the west and north, the Santa Ana River Basin to the south-southeast, and commercial properties including a hotel to the south-southwest. Other surrounding land areas are zoned heavy industrial.

SA Anaheim reported that end-of-life vehicles, consumer and industrial appliances, manufacturing scrap, curbside collection scrap, demolition scrap, miscellaneous scrap from consumer and homeowners, and industrial scrap are all processed at the facility. The facility receives scrap from industrial accounts, from other scrap metal recycling facilities, and from the public. Some materials are received with the fluids, batteries, mercury switches, and other pollutants already removed. In other circumstances, such pollutants are removed from the appliances and vehicles at the site, in a specially designated area, prior to being sent to the shredder.

[26] See Storm Water Pollution Prevention Plan SA Recycling LLC dba SA Recycling, WDID: 830MR000004, revision dated June 6, 2011.

SA metal recycling facility, located in Anaheim, CA.

SA Anaheim reported that approximately 225,000 metric tons of scrap metal were shredded in 2014. The scrap metal was composed of 39.25 percent end-of-life vehicles, 34.63 percent appliances, and 26.11 percent miscellaneous. The facility uses a 7,000-horsepower mega shredder manufactured by The Shredder Company.

The facility reported that it stores more than 20,000 tons of separated ferrous and non-ferrous scrap metal on-site at any given time. The separated ferrous and non-ferrous scrap is stored in containers and in piles in bermed areas that also serve as surface impoundments for storm water collection. These storage locations are in various areas of the site. There are typically 500 to 1,000 tons of metal shredder aggregate which has had the ferrous metal removed stored in the metals recovery plant. The facility reported storing less than 150 tons of CTMSR on-site at any one time.

Storm water collected from the parking lot and the central industrial operations main yard is captured and treated in the storm water treatment system prior to reuse or discharge. The facility has a multi-stage chemical treatment process to reduce the concentration of contaminants in the collected water. The facility has a 135,000-gallon aboveground storage tank. Water exiting the treatment system which is not reused on-site is discharged to the municipal storm drain that discharges to the Santa Ana River, which eventually discharges to the Pacific Ocean.

Sims Metal Management

Sims Metal Management (Sims) is located on 13.54 acres in the northern industrialized section of the Port of Redwood City and adjoins Redwood Creek, a tributary to San Francisco Bay.[27] The facility is

[27] See Storm Water Pollution Prevention Plan for Sims Metal Management, Redwood City, June 30, 2015.

surrounded by sensitive wetlands, including Bair Island State Marine Park, and extensive commercial salt evaporation ponds. Residential areas are located approximately two miles south of the facility.

Sims metal recycling facility, located in Redwood City, CA.

The facility reported that it stores approximately 3,400 tons of ferrous and non-ferrous scrap on-site at any given time. In addition, the facility stores 350 tons of CTMSR awaiting disposal.

The facility reported that approximately 90 percent of the site is either paved or beneath structures.[28] There are no storm drain connections from the facility to any off-site storm water drainage system. Run-off and on-site precipitation from storm events is collected in two storage ponds designed to contain enough volume to hold the precipitation from a 100-year storm event. One pond is lined while the other, which has a surface area of 95,000 square feet (2.2 acres), is unlined. The unlined pond is also used to store ferrous metal before it is loaded onto ships. The collected water is used for dust control in the yard, and for cooling and dust control in the shredder and material recovery plant.

The facility has installed 34-foot fencing on the east boundary, 20-foot fencing on the south boundary, and 25-foot fencing on the west boundary. The fence on the east side of the shredder stockpile is 22 feet high, with a “candy cane” curve installed at the top intended to capture fugitive emissions of LFM.

[28] See Emissions Minimization Plan, Regulation 6, Particulate Matter, Rule 4: Metal Recycling and Shredding Operations, Sims Metal Management, Redwood City, September 25, 2014.

SA Bakersfield

SA Bakersfield is located on 18.1 acres in central Bakersfield in a predominantly industrial area, and a mile from the nearest residences.[29] More than 95 percent of the facility is paved or beneath structures.

SA metal recycling facility, located in Bakersfield, CA.

The facility processes end-of-life vehicles, consumer and industrial appliances, manufacturing scrap, curbside collection scrap, demolition scrap, consumer/homeowner scrap, and industrial scrap. It receives scrap from industrial accounts, materials from other scrap metal recycling facilities, and materials from the public. The facility reported that it processed approximately 75,000 metric tons of scrap metal in 2014. The scrap was composed of 52.34 percent end-of-life vehicles, 30.10 percent appliances, and 17.56 percent miscellaneous. The facility uses a 6,000-horsepower mega shredder manufactured by The Shredder Company.

The facility reported that less than 6,000 tons at any given time of ferrous and non-ferrous scrap is stored in bins, boxes, and in piles in bermed areas that also serve as surface impoundments. Shredded scrap metal is not stored at the site, but 300 to 800 tons of metal shredder aggregate with ferrous metal removed is stored on concrete paved surfaces prior to further metal removal. Following the chemical stabilization treatment, there can be from 100 to 300 tons of CTMSR stored on-site at any one time.

[29] See Storm Water Pollution Prevention Plan, SA Recycling LLC dba SA Recycling, June 17, 2015.

SA Bakersfield reported that it has no active outfalls that are a point of discharge. Rather, it manages storm water through infiltration on the property. The storm water management includes settling/sedimentation, oil-water separation, filtration, and reuse.

Ecology Auto Parts

Ecology Auto Parts (Ecology) is located on approximately 22 acres in an industrial section of Colton, but with residences nearby. Ecology accepts various types of materials for shredding, including end-of-life vehicles, appliances, tin, and other forms of scrap metal. In most instances, auto bodies that have not been depolluted are not accepted directly at Ecology's shredder facility; most have fluids, batteries, mercury switches, and other pollutants removed before delivery to the shredder facility. Ecology estimated that it processed 264,000 tons of scrap metal in 2014, comprising 35 percent end-of-life vehicles, 56 percent appliances, and 9 percent miscellaneous. Ecology uses a 6,000-horsepower hammer mill manufactured by Metso Corporation.

Ecology Auto Parts metal recycling facility, located in Colton, CA.

Ecology is unique among the other shredding facilities in that it performs the initial removal of ferrous materials using magnets at the shredding facility in Colton, but then transports the remaining aggregate to a facility in Arizona for further processing to recover the non-ferrous metals. At one time, the facility recovered non-ferrous metals at the Colton facility and then chemically treated the remaining metal shredder aggregate on-site. However, since the metal shredder aggregate is currently sent off-site for further processing, Ecology is no longer operating the chemical stabilization treatment system.

Ecology reported that between 80 and 85 percent of the site is paved, and that the site is graded so that all storm water runoff is captured in a lined storm water pond with a capacity of one million gallons.[30] The captured water is transferred to a holding tank, also with a capacity of one million gallons, and reused for cooling in the hammer mill and for dust suppression throughout the facility. Ecology's retention pond was constructed with a capacity to accommodate the precipitation from a 100-year, 24-hour storm event.

2.3 Operative Environmental and Public Health Regulatory Oversight of Metal Shredding Facilities

This section presents the information that DTSC gathered to evaluate the operative environmental and public health regulatory oversight of metal shredding facilities, and to identify activities that need to be addressed by the alternative management standards or other advisable regulatory or statutory changes.

Table 3 provides information regarding the local environmental regulatory agencies that exercise jurisdiction over the metal shredding facilities.

[30] See Report of Investigation on Ecology Auto Parts, Inc., Colton dba: Pacific Rail Industries, December 16, 2015.

Table 3.
Local Environmental Regulatory Agencies That Oversee Metal Shredding Facilities

Metal Shredding Facility	Air District	RWQCB	CUPA
SA Recycling, Terminal Island 901 New Dock Street Terminal Island, CA 90731 Los Angeles County	**South Coast Air Quality Management District** 21865 Copley Drive Diamond Bar, CA 91765-4182	**Los Angeles Regional Water Quality Control Board** 320 West Fourth Street Los Angeles, CA 90013	**Los Angeles County Fire Department** 5825 Rickenbacker Road Commerce, CA 90040
Schnitzer Steel Products 1101 Embarcadero West Oakland, CA 94607-2536 Alameda County	**Bay Area Air Quality Management District** 939 Ellis Street San Francisco, CA 94109-7799	**San Francisco Bay Regional Water Quality Control Board** 1515 Clay Street Oakland, CA 94612	**Alameda County Environmental Health** 1131 Harbor Parkway, Suite 240 Alameda, CA 94502-
SA Recycling, Anaheim 3200 E Frontera Street Anaheim, CA 92806-2822 Orange County	**South Coast Air Quality Management District** 21865 Copley Drive Diamond Bar, CA 91765-4182	**Santa Ana Regional Water Quality Control Board** 3737 Main Street, Suite 500 Riverside, CA 92501-3348	**Anaheim City Fire Department** 201 South Anaheim Boulevard, Suite 300 Anaheim, CA 92805
Sims Metal Management 699 Seaport Boulevard Redwood City, CA 94063-2712 San Mateo County	**Bay Area Air Quality Management District** 939 Ellis Street San Francisco, CA 94109-7799	**San Francisco Bay Regional Water Quality Control Board** 1515 Clay Street, Suite 1400 Oakland, CA 94612	**San Mateo County Environmental Health** 2000 Alameda de las Pulgas San Mateo, CA 94403
SA Recycling, Bakersfield 2000 East Brundage Lane Bakersfield, CA 93307-2734 Kern County	**San Joaquin Valley Air Pollution Control District** 1990 East Gettysburg Avenue Fresno, CA 93726	**Central Valley Regional Water Quality Control Board** 1685 E Street Fresno, CA 93706-2007	**Kern County Environmental Health Services Department** 2700 M St., Suite 300 Bakersfield, CA 93301-2370
Ecology Auto Parts, Inc. DBA Pacific Rail Industries 785 East M Street Colton, CA 92324-0000 San Bernardino County	**South Coast Air Quality Management District** 21865 Copley Drive Diamond Bar, CA 91765-4182	**Santa Ana Regional Water Quality Control Board** 3737 Main Street, Suite 500 Riverside, CA 92501-3348	**San Bernardino County Fire Department Hazardous Materials Division** 620 South E Street San Bernardino, CA 92415

2.3.1 Air Quality: Regulation by Local Air Quality Management Districts or Air Pollution Control Districts

The federal Clean Air Act requires attainment of National Ambient Air Quality Standards (NAAQs) for criteria air pollutants causing human health impacts. The criteria pollutants include: ozone, particulate matter (PM), carbon monoxide, lead, nitrogen dioxide, and sulfur dioxide. The Clean Air Act established deadlines for all states to reach attainment levels for these pollutants. States are required to develop a State Implementation Plan (SIP) to attain the NAAQs by the attainment deadlines. SIPs must contain air pollution measures in adopted "regulatory" form and must be approved by US EPA as containing sufficient measures to attain NAAQs. California law makes the California Air Resources Board the lead agency for developing and implementing the SIP. Local air districts and certain other agencies prepare SIP elements and submit them to ARB for review and approval. ARB forwards SIP revisions to US EPA for approval and publication in the Federal Register. Local air districts are responsible for developing and implementing the portion of the SIP applicable within their boundaries, including adoption of control regulations for stationary sources, and implementation of other source control measures. Metal shredding facilities are stationary sources of air pollution subject to regulation by local air districts.

Metal shredding facilities and landfills that accept metal shredder waste are also regulated by California's Air Toxics "Hot Spots" program.[31] The program's goals are to collect emissions data, identify facilities having localized impacts, ascertain health risks, and notify nearby residents of significant risks. The program requires stationary sources to report the types and quantities of certain substances their facilities routinely release into the air. Each of the metal shredding facilities and landfills has submitted data on their emissions, including their annual emissions of particulate matter and lead. These data are reviewed by the local air district and, depending on the nature and quantity of the emissions, the facility may be required to prepare a formal health risk assessment, notify the public of potential risks, and take additional actions. The local air districts submit emissions and health risk information to ARB, which then provides that information to the public.[32]

Emissions from each of the metal shredding facilities are quantified and permitted by the local air districts. Total facility throughput is also often specified in the permits, along with the types and quantities of pollutants, such as volatile organic compounds (VOCs) and particulate matter. Visible emissions are also often specified.

The Ringelmann Smoke Chart, referenced in this section, is used to quantify visible emissions. The Ringelmann scale was officially promulgated by the U.S. Bureau of Mines and is used to determine whether emissions of smoke or dust are within limits or standards of permissibility established and expressed with reference to the chart.[33] It is widely used by law enforcement or compliance officers in jurisdictions that have adopted standards based on visible emissions.

A summary of the regulatory oversight of the metal shredding facilities by local air districts is shown in Table 4.

[31] See Air Toxics "Hot Spots" Information and Assessment Act (AB 2588, 1987, Connelly), as amended (SB 1731 1992, Calderon).
[32] Annual emissions data is available on the ARB website at: https://www.arb.ca.gov/app/emsinv/facinfo/facinfo.php
[33] United States Department of the Interior, Bureau of Mines, Information Circular 8333, 1967.

Table 4.

Regulatory Oversight of Metal Shredding Facilities by Local Air Districts

Facility	**Sims Metal Manageme**	**Schnitzer Steel Products**	**SA Terminal Island**	**SA Anaheim**	**SA Bakersfield**	**Ecology**
District	BAAQMD	BAAQMD	SCAQMD	SCAQMD	SJVAPCD	SCAQMD
Permit Identification	PTermitfor Plant #5152	Permit for Plant #208	Permit No. R-G27565	Permit No. G 16984	Permit Number(s): S-1256-7-2	Permit No. G32848
Point Source	Hood, H2O, Cyclone	Hood, H2O, Cyclone	Hood, H2O	Hood, H2O	Hood, H2O	Hood, H2O
VOC Control Technology	Scrubber	Scrubber	RTO, Scrubber	RTO, Scrubber	No RTO or Scrubber	RTO
Fugitive Emissions Requirements	Ringelmann less than 1.0, Emissions Minimization Plan	Ringelmann less than 1.0, Emissions Minimization Plan	Must be kept moist	Must be kept moist	5% max opacity, PM10 limit	Must be kept moist
Maximum Throughput Authorized	200 tons/hr max	720,000 tons/yr	108,333 tons/mo max	56,160 tons/mo	2,300 tons/day max	40,000 tons/mo max
Particulate Matter Emissions in 2015, tons/yr[34]	6.1	0.4	1.7	0.9	1	0
PM 10 Emissions in 2015, tons/yr	3.9	0.3	0.4	0.2	0.6	0
PM 2.5 Emissions in 2015, tons/yr	2.9	0.2	0.3	0.2	0.4	0
Lead Emissions in 2015, lbs/yr	N/A	0	13.4	1	N/A	N/A

The following is more detailed information regarding the air pollution control permits and compliance activities at each of the facilities.

[34] All emissions data from https://www.arb.ca.gov/app/emsinv/facinfo/facinfo.php

SA Terminal Island

SA Terminal Island is under the jurisdiction of the South Coast Air Quality Management District (SCAQMD). Air permits issued by SCAQMD include Permits to Operate for the shredder (R-G27565), the metals recovery plant (R-G18947), and the shredder air pollution control system (APCS) (R-G27566).

SA Terminal Island and the other facilities within the SCAQMD have the most extensive air pollution control equipment. Regenerative Thermal Oxidizers (RTOs) are required at the three facilities to remove VOCs from exhaust air. The RTO uses a substrate bed of ceramic material to absorb heat from the exhaust gas. Incoming gases are passed over this heated bed, which destroys the organic compounds by oxidizing (burning) them. The RTO requires a dust-free air stream, so demisters and PM filters are placed before the oxidizer. Any dust containing metal particles that enter the RTO can form slag, which reduces performance and can damage the unit. Subjecting organic compounds to the high temperatures in the oxidizer ideally yields only carbon dioxide and water vapor. Any halogenated compounds in the incoming exhaust stream, such as remaining chlorofluorocarbons (CFCs) in vehicle and appliance refrigerant systems, can create acid gasses when burned in the oxidizer, and are removed using a wet scrubber at the final stage of the air pollution control system following the RTO.

The facility employs a variety of measures to control off-site migration of contaminants. These include:

- RTO for control of VOCs
- A chemical scrubber to neutralize and remove acid gases from the shredder exhaust
- Water spray inside the shredder chamber to control temperature and reduce dust generation
- Overhead exhaust hood to collect particulate matter and VOCs generated from shredding
- Dust/mist collector to capture oils, particulate matter and moisture from shredder exhaust
- Various moisture-coalescing filters and high-efficiency dust filters
- Periodic sweeping of material stacking areas throughout the day to reduce dust generation
- A sweeper truck to clean the entrances and driveways in the yard
- Water applied to the yard, haul roads, and material piles to reduce dust generation

The facility is concrete-paved, and is designed to allow collection of the wash water for recycling and subsequent reuse on-site.

Schnitzer Steel Products

Schnitzer is under the jurisdiction of the Bay Area Air Quality Management District (BAAQMD). Air permits issued by BAAQMD include a Permit to Operate for Plant # 208, as well as application of BAAQMD Rule 4 for Metal Recycling and Shredding Operations, and BAAQMD Regulation 6 for particulate matter. The facility employs a variety of control measures to eliminate the potential for off-site contamination. These include:

- Shredder emissions abatement by a water spray system
- Irrigated cyclone scrubber (venture scrubber), mist eliminator, moving dry belt filter
- A simple cyclone downstream of the magnets
- Frequent sweeping of paved traffic surfaces with a mobile sweeper
- Frequent application of water to all traffic surfaces and stockpiles
- Use of mist turbines at key material handling areas to minimize fugitive emissions
- Enclosure of many material conveyance systems to minimize fugitive emissions

- Use of an industrial wheel wash at the facility exit to minimize tracking off-site

BAAQMD Regulation 6, Rule 4 for Metal Recycling and Shredding Operations requires metal recycling facilities to develop an Emissions Minimization Plan (EMP) to minimize the fugitive emissions of particulate matter from the facilities operating in the district. The EMP is to detail the management practices, measures, equipment, and procedures that are used to minimize fugitive emissions. Operations subject to the EMP include roadways and traffic areas, metal management, metal shredder waste management, and de-pollution operations. Schnitzer submitted its EMP to BAAQMD on October 27, 2014.

SA Anaheim

SA Anaheim is under the jurisdiction of SCAQMD. Air permits issued by SCAQMD include a permit to construct/operate the shredder (Permit to Construct/Modify No. 502884), the shredder air pollution control system (Permit to Construct No. 495678), and for the Metals Recovery Plant (G16984). The facility employs the following measures to control off-site migration:

- RTO for VOC control
- A chemical scrubber to neutralize and remove acid gases from the shredder exhaust
- Water spray inside the shredder chamber to control temperature and reduce dust generation
- Overhead exhaust hood to collect particulate matter and VOCs generated from shredding
- Dust/mist collector to capture oils, particulate matter, and moisture from shredder exhaust
- Various moisture-coalescing filters and high-efficiency dust filters.
- Periodic sweeping of material stacking areas throughout the day to reduce dust generation
- Use of a sweeper truck to clean the entrances and driveways in the yard
- Extensive application of water to the yard haul roads and piles of materials to reduce dust generation
- The entire Metals Recovery Plant operation, from receipt of aggregate via conveyer, through non-ferrous recovery operations, to loading out CTMSR in trucks, is conducted within a covered structure, although the sides are open

The entire facility is concrete-paved.

Sims Metal Management

Sims is under the jurisdiction of BAAQMD. Air permits issued by BAAQMD include Permit to Operate for Plant # 5152, as well as application of BAAQMD Rule 4 for Metal Recycling and Shredding Operations, and BAAQMD Regulation 6 for particulate matter. The facility employs a variety of measures to reduce the potential for off-site contamination. These include:

- Water spray inside the shredder chamber to control temperature and reduce dust generation
- An exhaust collection system
- A cyclone dust collection system for the shredder exhaust
- A wet scrubber system
- A fabric-covered fencing to reduce off-site emissions of LFM

BAAQMD Regulation 6, Rule 4 for Metal Recycling and Shredding Operations requires the facilities to develop an EMP to minimize the fugitive emissions of particulate matter from metal recycling facilities operating in the district. The EMP details the management practices, measures, equipment, and procedures that are used to minimize fugitive emissions. Operations subject to the EMP include roadways and traffic areas, metal management, metal shredder waste management, and de-pollution operations. Sims submitted its EMP to BAAQMD on September 25, 2014.

Sims has dry and wet cyclones and secondary high-efficiency particulate filtration units on the main shredding chamber exhaust. Various sprinklers, mist turbines, and sweepers are used to keep the ground area dust-free.

According to Sims, in response to recent enforcement actions (see Section 2.3), it has made a number of improvements to reduce the potential for fugitive emissions from transfer and loading operations. The facility has taken efforts to enclose its conveyor systems to eliminate them as a source of fugitive emissions of particulate matter and light fibrous material (LFM).

SA Bakersfield

SA Bakersfield is under the jurisdiction of the San Joaquin Valley Air Pollution Control District (SJVAPCD). Air emissions from the facility are governed under permits to operate the shredder and the air pollution control system (S-1256-7-2 and S-1256-3-10). The shredder is equipped with an exhaust collection system, which incorporates a mist/oil eliminator and a series of high-efficiency particulate filters on the main shredder exhaust. However, the shredder and the metals recovery plant are not enclosed. The facility employs a variety of measures to control off-site migration. These include:

- Water spray inside the shredder chamber to control temperature and reduce dust generation
- Overhead exhaust hood to collect particulate matter and VOCs generated from shredding
- Dust/mist collector to capture oils, particulate matter, and moisture from shredder exhaust
- Various moisture-coalescing filters and high-efficiency dust filters
- Material stacking areas are swept periodically throughout the day

A sweeper truck is used to clean the entrances and driveways in the yard. The SA Bakersfield facility is fully paved.

Ecology Auto Parts

Ecology is under the jurisdiction of SCAQMD. Air permits issued by SCAQMD include a Permit to Operate the Shredder (G32848 and A/N 567354) and a Permit to Operate the RTO (G32228). The facility employs a variety of measures to control off-site contamination. These include:

- RTO for VOC control
- Water spray inside the shredder chamber to control temperature and reduce dust generation
- Overhead exhaust hood to collect particulate matter and VOCs generated from shredding
- High-efficiency particulate air filtration system for ultra-fine particulate control
- A full-time mechanical street sweeper
- A water truck to wash down specific areas when needed
- Overhead, remote-controlled water cannon and mist turbines to spray down the shredder area
- Use of a water truck to wash down specific areas when needed

The entire shredding area, including the receiving and stockpile areas, is completely paved.

2.3.2 Water Quality: Regulation by the Regional Water Quality Control Boards

SWRCB implements federal requirements for storm water quality for industrial facilities using the industrial general permit (referred to as the "general permit"), which is used throughout California. Applicability of the general permit is based on the types of activities that occur that the facility using Standard Industrial Classification codes, recycling being one of the categories. RWQCBs administer the statewide general permit, in addition to any region-specific requirements for that permit. Once a facility is covered under the general permit they are assigned a waste discharge identification (WDID) number and must submit a Notice of Intent for coverage under the permit, explaining how they will adhere to all the requirements of the general permit. Additionally, a facility covered under the general permit is required to create and implement a storm water pollution prevention plan (SWPPP) with a site map, conduct water quality monitoring and reporting, and install best management practices.

SA Terminal Island

SA Terminal Island is under the jurisdiction of the Los Angeles RWQCB. Storm water discharges from SA Terminal Island are permitted under the SWRCB General Permit to Discharge Storm Water Associated with Industrial Activity. The WDID number is 4 19I021125.

Schnitzer Steel Products

Schnitzer is under the jurisdiction of the San Francisco Bay RWQCB. Storm water discharges from the Schnitzer facility are permitted by the East Bay Municipal Utilities District under Wastewater Discharge Permit No. 02300311.

SA Anaheim

SA Anaheim is under the jurisdiction of the Santa Ana RWQCB. Storm water discharges from SA Anaheim are permitted under the Sector-specific General Permit for Storm Water Runoff Associated with Industrial Activities from Scrap Metal Recycling Facilities within the Santa Ana Region. The WDID number is 8 30MR000004.

Sims Metal Management

Sims is under the jurisdiction of the San Francisco Bay RWQCB. Storm water discharges from Sims are permitted under WDID number 2 41I005107. Sims has also obtained a National Pollutant Discharge Elimination System (NPDES) permit under the authority of the federal Clean Water Act to discharge storm water into San Francisco Bay.

SA Bakersfield

SA Bakersfield is under the jurisdiction of the Central Valley RWQCB. Storm water discharges from SA Bakersfield are permitted under the SWRCB General Permit to Discharge Storm Water Associated with Industrial Activity, and the facility WDID number is 5 F15I021109.

Ecology Auto Parts

Ecology is under the jurisdiction of the Santa Ana RWQCB. Storm water discharges from Ecology are permitted under SWRCB General Permit to Discharge Storm Water Associated with Industrial Activity (WQ Order No. 97-03-DWQ). The facility is designated WDID number 8 361027274.

Ecology received a no-discharge exemption from the Santa Ana RWQCB in 2012 since it does not discharge storm water associated with industrial activities to surface waters. Instead, a retention pond was constructed with a capacity to accommodate the precipitation from a 100-year, 24-hour storm event.

2.3.3 Hazardous Waste: Regulation by DTSC

DTSC is responsible for ensuring that hazardous wastes generated and handled in California are managed safely and legally to prevent harm to public health and the environment. There are currently 113 facilities permitted by DTSC to store, treat, or dispose of hazardous waste in California. Additionally, there are over 100,000 businesses that generate hazardous waste, and approximately 900 transporters registered with DTSC to transport hazardous waste. Federal and California law creates the framework for the management of hazardous waste by generators, transporters, and storage, treatment, and disposal facilities. DTSC administers these laws in part by issuing permits and registering hazardous waste transporters. DTSC enforces these laws by inspecting hazardous waste generators, transporters, and facilities, and providing compliance assistance and training. DTSC’s compliance assistance activities include partnering with the CUPAs.

DTSC can conduct investigations of potential hazardous waste violations on its own initiative, or in response to complaints that have been submitted to CalEPA’s Environmental Complaint System, but the CUPAs have had the primary responsibility for conducting routine inspections of metal shredding facilities’ hazardous waste management activities.

2.3.4 Hazardous Waste and Hazardous Materials: Regulation by Local CUPAs

CalEPA oversees the statewide implementation of the Unified Program and its 81 certified local government agencies, known as CUPAs. The CUPAs administer and enforce a consolidated program that includes the following individual environmental and emergency management programs:

- Aboveground Petroleum Storage Act Program;
- Area Plans for Hazardous Materials Emergencies;
- California Accidental Release Prevention Program;
- Hazardous Materials Release Response Plans and Inventories;
- Hazardous Material Management Plan and Hazardous Material Inventory Statements;
- Hazardous Waste Generator and On-site Hazardous Waste Treatment (tiered permitting) Programs; and
- Underground Storage Tank Program.

The hazardous waste activities conducted by the metal shredding facilities are under the jurisdiction of the CUPA in their geographic area. But because of DTSC’s historical decisions to classify CTMSR as nonhazardous waste, and DTSC’s implementation of OPP 88-6, the CUPAs do not permit or inspect the metal shredding operations, the storage of metal shredder waste on-site, or the chemical stabilization treatment. The oversight provided by the CUPAs is limited to hazardous waste activities such as implementing DTSC’s Certified Appliance Recycler program, and overseeing the storage of traditional hazardous wastes, such as the materials that require special handling that are removed from appliances and vehicles prior to shredding. None of the metal shredding facilities is operating under the one of the lower-tiered permitting programs for which the CUPAs would have primary jurisdiction. Table 3 identifies the CUPAs that oversee each metal shredding facility.

2.4 Hazardous Waste Management Activities

This section provides a summary of the hazardous waste management activities at the facilities. It is important to note that DTSC's historic decisions and policies have affected the regulation and management of wastes and hazardous wastes at all California metal shredding facilities. For purposes of this Analysis, DTSC assessed the generation and management of hazardous wastes by metal shredding facilities based on existing law and regulation, without consideration of the "f letters" or OPP 88-6.

2.4.1 Hazardous Wastes Generated and Managed at Metal Shredding Facilities

Scrap Metal Feedstock: When vehicles, appliances and other scrap metals arrive at a metal shredding facility, they are subject to the scrap metal exclusion.[35] At this point, the scrap metal is not regulated as a hazardous waste.

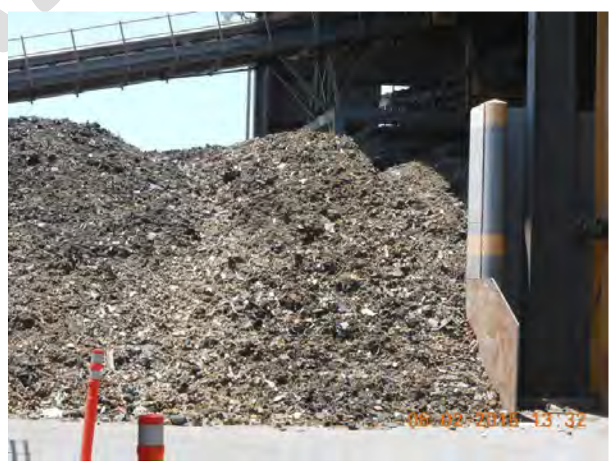
Scrap metal awaiting shredding

Metal Shredder Aggregate: After vehicles, appliances, and other scrap metal are shredded in the hammer mill, a combination of ferrous metals, non-ferrous metals, and nonrecyclable materials is generated. This combination of ferrous metals, non-ferrous metals, and nonrecyclable or reclaimable materials is referred to in this Analysis as metal shredder aggregate.

[35] See subdivision (3) of paragraph (a) of Section 66261.6 of Division 4.5 of Title 22, California Code of Regulations.

Pile of aggregate awaiting further processing at Schnitzer Steel Industries, Inc., Oakland, CA.

Stockpiled aggregate prior to processing in joint products plant, Schnitzer Steel, Inc., Oakland, CA.



Stored aggregate pile at Ecology, Colton, CA.

Metal shredder aggregate has been demonstrated to contain levels of lead, copper, and zinc in finely divided form that exceed their respective Soluble Threshold Limit Concentrations (STLCs) and Total Threshold Limit Concentrations (TTLCs). Historically, metal shredder aggregate has also contained levels of cadmium and PCBs in excess of their respective STLCs and TTLCs, although the presence of these constituents has decreased in recent years.[36] These constituents are listed in subdivision (a) of Section 66261.24 of Chapter 11, of Title 22 of the California Code of Regulations along with their respective STLCs and TTLCs. The STLC and TTLC are regulatory levels that determine whether a waste is considered hazardous because of its toxicity.

Due to challenges in sampling methodology, there is limited empirical data available demonstrating the toxicity of metal shredder aggregate at the precise point of shredding in the hammer mill. Sampling data from later stages of processing demonstrates the toxicity of the metal shredder wastes, and therefore provides the basis for a reasonable assumption that the metal shredder aggregate is generally hazardous.

Metal Shredder Residue: After the metal shredder aggregate has been treated to separate the ferrous and non-ferrous metals, the portion that remains is referred to in this Analysis as metal shredder residue. As with the metal shredder aggregate, the metal shredder residue also contains levels of lead, copper, and zinc that exceed their respective Soluble STLCs and TTLCs, and historically contained levels of cadmium and PCBs in excess of their respective STLCs and TTLCs.

Metal shredder residue exiting the joint products plant following removal of non-ferrous metals

[36] Metal Shredder Residue Treatability Study, prepared for the Institute of Scrap Recycling Industries, California Chapter, prepared by Terraphase Engineering, Inc., April 26, 2017.

CTMSR: To reduce the solubility of hazardous constituents in the metal shredder residue, the metal shredding facilities apply a chemical treatment of silicates and cement to reduce the solubility of the lead, copper and zinc. After this chemical treatment, it is referred to in this Analysis as CTMSR. Although the chemical treatment has been shown to reduce the solubility of the lead, copper, and zinc, it has not been successful in consistently reducing the soluble concentrations below their respective STLCs, and does not affect their total concentrations, which still exceed their respective TTLCs. (More detailed information regarding the characteristics of the metal shredder residue and CTMSR are presented below, as part of the information on a treatability study that was performed by the metal shredding industry.) Thus, although the solubility of metals in the waste is reduced by the treatment, CTMSR continues to exhibit hazardous characteristics after treatment, and is a hazardous waste.

Pile of chemically treated metal shredder residue, Schnitzer Steel, Inc., Oakland, CA

Treatability Study for Metal Shredder Residue and CTMSR: In 2016, metal shredding facilities at the direction of DTSC conducted a study to demonstrate the effectiveness of their treatment methods. The treatability study demonstrated different application rates of silicate and cement under full-scale operating conditions to determine if the treatment could be optimized, and if the optimized treatment could achieve the required reduction in soluble metals. The treatability study confirmed the treatment process used by metal shredding facilities can significantly reduce the solubility of regulated heavy metals contained within CTMSR, including lead. However, the treatability study confirmed that CTMSR remains a non-RCRA hazardous waste even after treatment.

Data collected in preparation for the treatability study showed that metal shredder residue prior to chemical treatment is nonhazardous waste under RCRA. Metal shredder residue is not regulated as a hazardous waste under the federal hazardous waste program because US EPA thresholds for regulated hazardous constituents were not met or exceeded. For instance, US EPA's toxicity characteristic regulatory threshold for lead is 5.0 milligrams per liter (mg/l), and the average and maximum concentrations found in 17 samples of untreated metal shredder residue were 0.99 and 2.60 mg/l, respectively.[37] In addition, the highest result for PCBs was 33 mg/kg.[38]

As a result of the bench-scale testing in the treatability study, three treatment reagent combinations were selected for evaluation during the subsequent demonstration of the treatment at the full-scale. The reagent combinations ranged from 0.5 to 0.7 gallons of silicate per ton, and from 5 to 12 percent cement. Treatment at the highest rates, 0.7 gallons of silicate per ton and 12 percent cement, was found to be most effective at reducing soluble metals. However, even metal shredder residue treated at the highest still exceeded regulatory thresholds for both total and soluble metals.

The treatability study showed that CTMSR remains a non-RCRA hazardous waste (i.e., the waste is a hazardous waste under California's Hazardous Waste Control Law and under Chapter 11 of Title 22 of the California Code of Regulations). This was demonstrated by the TTLC test results, which showed that CTMSR exceeded regulatory thresholds for lead and zinc, although STLCs were met occasionally.

In California, wastes that exceed the TTLC for regulated hazardous constituents, including lead and zinc, regardless of their STLCs, are classified as hazardous wastes. The TTLC limit for lead is 1,000 milligrams per kilogram (mg/kg) and the average concentration in CTMSR treated at the higher, most effective, rates was found to be 1,041 mg/kg.[39] Likewise, the TTLC limit for zinc is 5,000 mg/kg and the average concentration in CTMSR was found to be 6,468 mg/kg.[40] However, the maximum lead concentration observed in 120 samples treated at the higher rates was 11,300 mg/kg.[41] Similarly, the maximum zinc concentration was 15,500 mg/kg, which further indicates that significant concentration spikes are a possibility for individual sampling events.[42]

The treatability study also demonstrated that the treatment process used by metal shredding facilities could not consistently lower soluble concentrations for lead. The STLC limit for lead is 5 mg/l and the average concentration was found to be 13.4 mg/l.[43] The concentration of zinc in CTMSR did not exceed the zinc STLC of 250 mg/l. The average concentration measured was 180 mg/l.[44] The maximum observed

[37] Metal Shredder Residue Treatability Study, April 26, 2017, Discrete sample results found in Table A1, Baseline Analysis - Total and Extractable Metals Results for Untreated Samples Bench-scale Study, Metal Shredder Residue Treatability Study.
[38] Metal Shredder Residue Treatability Study, April 26, 2017, Discrete sample results found in Table A2, Baseline Analysis - PCBs, Moisture Content, pH, Alkalinity, Aquatic Toxicity Bioassay, and Ignitability, Results for Untreated Samples, Metal Shredder Residue Treatability Study.
[39] Metal Shredder Residue Treatability Study, April 26, 2017, Individual Sample Results for the high dosages found in Table B1, Pilot Study, Metal Shredder Residue Treatability Study.
[40] Ibid.
[41] Metal Shredder Residue Treatability Study, April 26, 2017, Results for sample SMM-2-H-8, Eurofins Calscience Analytical Report, Work Order Number 16-09-1887, page 678 of Part 5.
[42] Metal Shredder Residue Treatability Study, April 26, 2017, Results for sample SARB-1-3-H, Eurofins Calscience Analytical Report, Work Order Number 16-08-1653, page 1629 of Part 4.
[43] Metal Shredder Residue Treatability Study, April 26, 2017, Individual Sample Results for the high dosages found in Table B1, Pilot Study.
[44] Metal Shredder Residue Treatability Study, April 26, 2017, Individual Sample Results for the high dosages found in Table B1, Pilot Study.

concentration for lead was 91.3 mg/l.[45] The maximum observed concentration for zinc was 529 mg/l, which as noted previously is an indication that significant concentration spikes are possible in individual samples.[46]

The treatability study showed that soluble concentrations of cadmium, lead, and zinc usually decreased when application rates were increased. In most cases, the greatest percent reduction achieved during the full-scale demonstration was with a treatment rate of 0.7 gallons per ton silicate and 12 percent cement.[47] However, even though the treatment significantly reduces the solubility of regulated heavy metals, CTMSR still exceeds total thresholds for lead and zinc, and soluble thresholds for lead. that although the highest treatment rates used in the pilot-scale test generally achieved the highest reductions in soluble metals concentrations, the lead and zinc concentrations were not consistently reduced below their respective STLCs.[48] The treatment results also reflected the high degree of variability in metal shredder residue, as shown by the difference between single samples collected at a given point in time, compared to composite samples of daily production runs. Thus, the treatability study results indicate that, even at the highest levels of treatment evaluated during the study, regulatory thresholds for soluble and total metals were usually not achieved. While concentrations below STLCs of some soluble metals were achieved in individual samples, this was not consistent from sample to sample, or over a range of treatment rates.[49]

Hazardous Materials Removed from Received Scrap Metals: Scrap metal often contains hazardous materials when received by metal shredding facilities. Although many of the metal shredding facilities require these materials to be removed prior to their arrival at the facility, some are discovered as loads are checked. In some instances, a metal shredding facility will remove the hazardous materials rather than reject the load. Typical hazardous materials found in scrap metal include free-flowing hazardous liquids (e.g., gasoline, oil, antifreeze), flammable or combustible materials, corrosive materials (e.g., lead-acid batteries), radioactive materials, explosives in any form (e.g., vehicle air bag actuators, ammunition), pressurized containers (e.g., propane tanks, compressed gas tanks, fire extinguishers), refrigerants, capacitors, ballasts, transformers or other materials containing PCBs, and items containing elemental mercury (e.g., switches or thermostats).

[45] Metal Shredder Residue Treatability Study, April 26, 2017, Results for sample SMM-3-H-4, Eurofins Calscience Analytical Report, Work Order Number 16-09-1616, page 586 of Part 5.
[46] Metal Shredder Residue Treatability Study, April 26, 2017, Results for sample SSP-2-4-H, Eurofins Calscience Analytical Report, Work Order Number 16-09-0276, page 159 of Part 5.
[47] Ibid., page 68 of Part 5.
[48] Ibid., page 71 of Part 5.
[49] Metal Shredder Residue Treatability Study, April 26, 2017, Results for sample SSP-2-4-H, Eurofins Calscience Analytical Report, Work Order Number 16-09-0276, page 71 of Part 5.

Compressors removed from refrigerators and other appliances, Ecology, Colton, CA.

Storage area for materials requiring special handling, SA Recycling, Anaheim, CA. Two pallets of lead-acid batteries are shown in the foreground.

Waste mercury switches pulled from appliances, Ecology Auto Parts, Colton, CA.

__Air Pollution Control Equipment Dust and Filters:__ The air pollution control equipment operated by metal shredding facilities to capture particulate and emissions from the hammer mill and other operational equipment will capture contaminants in bag houses or filters. These filtered materials are expected to contain the same contaminants as the metal shredder aggregate, and are also expected to be hazardous wastes. The amount and characteristics of this type of waste have not been quantified by the metal shredding facilities. No residues from air pollution control equipment were analyzed as part of this analysis. Hazardous waste manifests use general hazardous waste codes that may not always specify the particular source of the waste stream. Therefore, DTSC has not been able to verify through the Hazardous Waste Tracking System (HWTS) whether this material is being managed as a hazardous waste.

Wastewater Treatment System Residuals: Most of the metal shredding facilities capture their surface water runoff and treat it to allow for its recycling and reuse as hammer mill quench water or for dust suppression. The treatment of the water includes the removal of contaminants and suspended solids. These filtered materials are expected to contain the same contaminants as the metal shredder aggregate, and are also expected to be hazardous wastes. The amount of this type of waste has not been quantified by the metal shredding facilities, and DTSC has been unable to verify through the HWTS whether this material is being managed as a hazardous waste. No samples from this waste stream were analyzed as part of this analysis and DTSC was not able to identify this waste stream in HWTS.

Storm Water Collection System Tank Bottoms: Most of the remaining metal shredding facilities have no surface water discharge, meaning they capture and store all surface water runoff in large tanks, and recycle and reuse it directly as hammer mill quench water and for dust suppression. The captured surface water runoff contains contaminants and suspended solids which, as the water is retained in the tank, settles to the bottom. These tank bottom materials are expected to contain the same contaminants as the metal shredder aggregate, and are also expected to be hazardous wastes. The amount of this type of waste has not been quantified by the metal shredding facilities. No samples from this waste stream were analyzed as part of this analysis and DTSC was not able to identify this waste stream in HWTS.

Metal Shredding Facility Equipment Maintenance Wastes: Each metal shredding facility operates gasoline and diesel-powered equipment, including forklifts, cranes, front-end loaders, and other mechanical equipment. This mechanical equipment requires routine maintenance for continued operation. The routine maintenance can generate a variety of hazardous wastes that must be disposed by the metal shredding facility, including used oil, hydraulic fluid, contaminated gasoline or diesel fuel, used oil filters, aerosol spray cans (paints and solvents), oily rags, absorbent material, and contaminated soil from spills or releases. Each of these wastes is a hazardous waste. The amount of this type of waste has not been quantified separately by the metal shredding facilities. No samples from this waste stream were analyzed as part of this analysis and DTSC was not able to identify this waste stream in HWTS.

Metal Shredding Facility Maintenance Wastes: Each metal shredding facility performs routine "housekeeping" of its facility, cleaning up dirt and debris that escapes from the scrap metal and metal shredder aggregate and metal shredder residue treatment activities. Most of the metal shredding facilities collect this dirt and debris using sweepers and vacuums. These housekeeping wastes are expected to contain the same contaminants as the metal shredder aggregate and metal shredder residue, and are also expected to be hazardous wastes. The amount of this type of waste has not been quantified by the metal shredding facilities. No samples from this waste stream were analyzed as part of this analysis and DTSC was not able to identify this waste stream in HWTS.

Summary of Hazardous Wastes Shipped Off-site on Manifests

DTSC does not have information with which it can quantify the individual waste streams which are generated by metal shredding facilities that are expected to be hazardous wastes. DTSC has access to copies of the hazardous waste manifests used to ship hazardous wastes from the metal shredding facilities to off-site hazardous waste facilities. (All hazardous waste shipments must be accompanied from the site where they are generated to the site where they are disposed by a hazardous waste manifest.) Table 5 provides the approximate quantities of hazardous waste manifested by the metal shredding facilities in 2016. The hazardous waste types listed correlate to the California Waste Codes that were used. These waste codes do not often correlate directly to the hazardous wastes discussed above. If these wastes are managed as hazardous wastes, they may be included in the category for soils and other solids.

Table 5.
Hazardous Wastes Manifested from Metal Shredding Facilities in 2016

Facility	Soils and Other Solids (tons)	Asbestos (tons)	Oils (tons)	PCBs (tons)	Solvents (tons)	Other Wastes (tons)
SA Recycling, Terminal Island	28.86	0	91.61	0.17	0	0.14
Schnitzer Steel Products	395.93	0	0	0	0	0
SA Recycling, Anaheim	53.35	0.11	24.14	0.65	5.50	0
Sims Metal Management	0.57	0	0	0	0	0
SA Recycling, Bakersfield	18.33	0	0.18	3.22	91.81	1.87
Ecology Auto Parts	135.44	0	0	0	0	0

2.4.2 Treatment, Storage and Handling of Metal Shredder Wastes at Metal Shredding Facilities

The treatment, storage, and disposal of any hazardous waste must be performed in accordance with the hazardous waste management statutes and regulations. Each of these terms is defined in the hazardous waste laws and regulations.

Treatment is defined as “any method, technique, or process which changes or is designed to change the physical, chemical, or biological character or composition of any hazardous waste or any material contained therein, or removes or reduces its harmful properties or characteristics for any purpose including, but not limited to, energy recovery, material recovery or reduction in volume.” (See Section 25123.5 of the Health and Safety Code, and Section 66260.10 of Division 4.5 of Title 22 of the California Code of Regulations.)

Storage is defined as "the holding of hazardous waste for a temporary period, at the end of which the hazardous waste is treated, disposed of or stored elsewhere." (See Section 25123 of the Health and Safety Code, and Section 66260.10 of Division 4.5 of Title 22 of the California Code of Regulations.)

Disposal is defined as "the discharge, deposit, injection, dumping, spilling, leaking or placing of any waste or hazardous waste into or on any land or water so that such waste or hazardous waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including ground waters," as well as "the abandonment of any waste." (See Section 25113 of the Health and Safety Code, and Section 66260.10 of Division 4.5 of Title 22 of the California Code of Regulations.)

Unless specifically excluded or exempted from regulation, treatment, storage,[50] and disposal of hazardous wastes can only be performed at a facility that has a hazardous waste permit issued by DTSC or that has received some other grant of authorization to conduct the activities (e.g., through statute or regulation). Apart from the "f letters" and OPP 88-6, none of the metal shredding facilities have been granted authorization for the treatment, storage, or disposal of hazardous waste. Storage of hazardous waste generated at the metal shredding facilities, for less than 90 days, would not require a permit if it is stored in appropriate containers and the metal shredding facilities comply with other applicable accumulation requirements.

<u>Treatment Processes</u>

Generally, a facility must apply for and obtain a hazardous waste permit or other form of authorization to conduct treatment on a hazardous waste. There are many treatment processes that can occur at a metal shredding facility, as described below.

<u>Metal Shredding Unit or Hammer Mill:</u> Hazardous waste regulations are not applicable to scrap metal entering the hammer mill since the crushed vehicles, appliances, and other forms of scrap metal are excluded from hazardous waste management when recycled. Therefore, a hazardous waste permit is not required to operate the hammer mill. In practice, however, hammer mills at metal shredding facilities rarely operate in isolation, and are usually adjacent to ferrous recovery equipment.

<u>Physical Separation of Ferrous Metals from Metal Shredder Aggregate:</u> The removal of ferrous metals from metal shredder aggregate using magnets may be considered a hazardous waste treatment activity, depending on the circumstances.

<u>Physical Separation of Ferrous Metals from Metal Shredder Aggregate:</u> The removal of ferrous metals from metal shredder aggregate using magnets may be considered a hazardous waste treatment activity, depending on the circumstances.

<u>Chemical Stabilization of Metal Shredder Residue:</u> The metal shredder residue that remains after ferrous and non-ferrous metals have been removed (which was shown to be a non-RCRA hazardous waste) is treated with silicate and cement to reduce the mobility of toxic metals in the waste, which is recognized to be a hazardous waste treatment activity.

[50] Generators typically cannot store hazardous waste onsite for longer than 90 days.

Tube for feeding cement into the pug mill for chemical treatment
of metal shredder residue, Sims Metal Management, Redwood City, CA.

Pug mill mixing screw, chemical treatment of metal shredder residue,
Sims Metal Management, Redwood City, CA

Storage Processes

The metal shredder aggregate stored in piles exhibits hazardous waste characteristics. California's hazardous waste laws generally allow the storage of hazardous wastes for 90 days or less without a permit or grant of authorization, but only if certain conditions are met (including that they are stored in tanks or containers). There are many storage activities that occur with the metal shredder aggregate, CTMSR, and components of the metal shredder waste, as it is processed at a metal shredding facility.

Storage of Metal Shredder Aggregate: Metal shredder aggregate is stored for varying periods of time at various stages of its processing in piles due to the quantities being managed. These piles at most of the metal shredding facilities are outside of buildings, and at some facilities are on bare ground. The metal shredder aggregate exhibits hazardous waste characteristics. The hazardous waste laws generally allow for storage of hazardous wastes for 90 days or less without a permit or grant of authorization, but only if certain conditions are met (including that the waste is stored in tanks or containers). The storage of hazardous waste in piles is regulated as a hazardous waste management activity; to the extent the aggregate includes hazardous wastes, a metal shredding facility would need to apply for and receive a hazardous waste permit, or obtain some other form of authorization, to conduct this activity.

Storage of Sorted Ferrous and Non-ferrous Metals: Sorted ferrous and non-ferrous metals are typically stored following the shredding and metals separation processes. The sorted metals are largely homogeneous materials which are not further processed at the metal shredding facilities. Because of their quantities, they are typically stored in piles. The sorted ferrous and non-ferrous metals are reclaimed materials and, because they have been segregated from the metal shredder aggregate (which may contain hazardous wastes, depending on the circumstances), are not expected to exhibit hazardous waste characteristics. Residual amounts of the hazardous constituents from the metal shredder aggregate, however, could remain in the sorted ferrous and non-ferrous metals. The storage and management of the ferrous and non-ferrous metals could consequently cause the residual hazardous waste constituents to separate from the recovered metals. This residue would be considered hazardous waste. Metal shredding facilities need to ensure that the hazardous wastes generated by the storage of the ferrous and non-ferrous metals are managed to minimize their releases. Storage of sorted ferrous and non-ferrous metal would not be regulated as a hazardous waste management activity, and a metal shredding facility would not need a hazardous waste facility permit to conduct this activity unless residual amounts of metal shredder aggregate, or hazardous constituents of the metal shredder aggregate, remain in the segregated metals.

Stockpiled aggregate, Schnitzer Steel, Inc., Oakland, CA.

Stockpiled aggregate, Ecology, Colton, CA.

<u>Storage of CTMSR:</u> CTMSR is stored in piles (sometimes outside of buildings) due to the quantities being managed for varying periods of time after treatment. CTMSR continues to exhibit hazardous waste characteristics, even after chemical treatment to stabilize the soluble metals in the waste. The storage

of hazardous waste in piles does not meet the storage in tanks or containers requirement, and therefore does not meet the conditions for storage for 90 days or less. Because of this, its storage would be regulated as a hazardous waste management activity, and a metal shredding facility would need to apply for and receive a hazardous waste permit, or obtain some other form of authorization, to conduct this activity.

CTMSR, Schnitzer Steel, Inc., Oakland, CA.

Pile of sorted ferrous metal, background, and scrap metal from the Oakland Bay Bridge demolition project, foreground, Schnitzer Steel, Inc., Oakland, CA.

Pile of sorted ferrous metal following shredding of scrap metal at SA Terminal Island.

Transportation Processes

There are many transportation processes that occur with the metal shredder aggregate as it is processed at a metal shredding facility, as described below:

Transfer of Metal Shredder Aggregates within the Facility: Metal shredder aggregate is transferred within the metal shredding facilities from the hammer mill to the different locations where it is further treated. This transfer occurs via conveyor belts and via heavy equipment such as trucks and front-loading tractors. These methods to convey this material within a site do not require a permit from DTSC, nor do they require the use of a registered hazardous waste transporter. However, the conveyance of this material is generally required to be performed in a manner that minimizes or prevents the release of hazardous wastes and hazardous waste constituents into the environment.

Conveyor belt lines used to transport material through the joint products plant and to the chemical treatment system at Schnitzer Steel, Inc., Oakland, CA.

Front loader used to feed stockpiled aggregate into the joint products plant,
Schnitzer Steel, Inc., Oakland, CA.

Transportation of Ferrous Metal from the Metal Shredding Facility: Ferrous metal is transferred from the metal shredding facilities primarily by way of ocean-going vessels to steel mills in Pacific Rim countries.

Loading sorted and shredded ferrous metals onto ship via
conveyor system, Sims Metal Management, Redwood City, CA.

Ferrous metal being loaded onto a truck for transportation at
Ecology Auto Parts, Colton, CA.

<u>Transportation of CTMSR from the Metal Shredding Facility</u>: CTMSR is transferred from the metal shredding facilities to the landfills where it is either being directly disposed, or used as alternative daily cover. CTMSR continues to exhibit hazardous waste characteristics, even after chemical treatment to stabilize the soluble metals in the waste. Its transportation is regulated as a hazardous waste management activity, and its transportation to another facility requires the use of a registered hazardous waste transporter.

Truck being loaded with CTMSR for transportation to
Altamont or Vasco Road Landfill, Schnitzer Steel, Oakland, CA.

<u>Transportation of Untreated Metal Shredder Aggregate from a Metal Shredding Facility</u>: One metal shredding facility, Ecology, transports its metal shredder aggregate (after ferrous metal has been removed) out of state for further processing. Ecology uses a facility in Arizona owned by the same company to recover non-ferrous metals from its metal shredder aggregate. Ecology ships the aggregate as an excluded recyclable material under the provisions of subdivision (d) of Section 25143.2 of the Health and Safety Code. DTSC is reviewing Ecology's assertion that the material is not subject to hazardous waste requirements and has not yet made a determination regarding the claimed exclusion. Because the aggregate is processed out of state, the facility does not generate CTMSR in California, and does not dispose of CTMSR in California landfills.

<u>Disposal Processes</u>

<u>Land Disposal</u>: The current practices employed by the metal shredding facilities to manage metal shredder wastes generally meet the definition of land disposal. The metal shredder wastes are being managed in piles in direct contact with bare soil or on paved surfaces that are designed to withstand traffic but not to prevent migration of hazardous waste or hazardous waste constituents. Particulate and LFM have been shown to be emitted from the metal shredding facilities and to deposit onto the ground outside the facility boundaries. Metal shredder aggregate or residue that falls from conveyors or outside of waste management units and is not retrieved or cleaned up, results in all operational areas of the metal shredding facilities being contaminated with the hazardous constituents present in the metal shredder wastes.

Solid Waste Landfill Disposal: CTMSR is currently managed at solid waste landfill facilities. The disposal processes will be discussed further in Section 5 of this Analysis.

Vasco Road Landfill, Livermore, CA with municipal solid waste in the foreground (lighter material) and stockpiled CTMSR in the distance (darker colored material).

2.5 Enforcement History

DTSC reviewed compliance and enforcement history from CUPAs, SWRCB, and DTSC's own investigations. Enforcement history was requested from each respective authority for a 10-year timespan, starting in 2007 and ending in 2016. The following databases and resources were used to obtain information on violations:

Storm Water Requirements: SWRCB's Storm Water Multiple Application and Report Tracking System (SMARTS) is a public database that keeps track of facilities that have storm water permits and all supporting documentation, including sampling results, notices of violation, and storm water pollution prevention plans.[51] Facilities were searched by their WDID number, and supporting documentation was reviewed to discern if there had been any enforcement actions regarding their storm water permit.

Soil/Groundwater Contamination: SWRCB's GeoTracker database is used to track facilities with groundwater contamination.[52] Additionally, DTSCs EnviroStor was consulted to see if any of the facilities had undergone cleanup activities.[53]

Fire/Explosions: A search of newspaper articles was conducted regarding any fires or explosions that had occurred at the metal shredding facilities and summarized.

CUPA Inspections: DTSC contacted CUPAs that oversee hazardous waste inspections for the metal shredding facilities in their jurisdictions for inspection reports during the 10-year time span.

DTSC Inspections or Investigations: DTSC reviewed all investigations for the six metal shredding facilities from 2007 to 2016 that were included in the report, including complaints received.

[51] See https://smarts.waterboards.ca.gov/smarts/faces/SwSmartsLogin.xhtml

[52] See https://geotracker.waterboards.ca.gov/

[53] See https://www.envirostor.dtsc.ca.gov/public/

Storm Water Violations: Two of the four metal shredding facilities that operate under an industrial general permit had issues with routine exceedances of the water quality thresholds (known as numeric action levels). The exceedances were for specific conductance, chemical oxygen demand, iron, and lead. The SWRCB requires subsequent proof of implementation of best management practices to mitigate any future exceedances of the numeric action levels.

One metal shredding facility had violations for both its NPDES permit and the Clean Water Act, enforced by US EPA, which identified material associated with metal shredding exiting the property boundary and contaminating surrounding areas. Subsequent soil and sediment samples from the areas surrounding the property revealed TTLC exceedances of lead, zinc, copper, and cadmium.

Soil/Groundwater Contamination: All six metal shredding facilities have been cited by DTSC and/or SWRCB for soil or off-site migration contamination, or have had monitoring conducted which revealed regulatory threshold exceedances. As a result of enforcement actions by RWQCBs, two facilities were required to install an impermeable concrete cap over part of their properties due to contamination found in both the soil and groundwater attributed to metal shredding activities. Three facilities required soil cleanup due to the presence of petroleum hydrocarbons, metals, PCBs, and other contaminants associated with metal shredding activities. Two facilities have had soils collected and analyzed by DTSC in areas where metal processing and storage operations occur, revealing STLC and TTLC exceedances for lead, copper, zinc, and cadmium. Two facilities had off-site migration of LFM, which lands on soil and can cause contamination of the surrounding properties.

Fire/Explosions: Four metal shredding facilities have had fires on their properties, either in the metal shredding machinery or in the piles of scrap metal, with a total of six known fires over the past 10 years. Two of the four had more than one fire from 2009 to 2013. One of the fires resulted in substantial damage to the air pollution control device on the shredder to reduce particulate emissions, resulting in the release of particulate matter and VOCs and enforcement action by the Los Angeles County District Attorney's Office.

CUPA Inspections

Typically, facilities are inspected by CUPAs for hazardous waste and materials management every three years. Minor violations were most commonly cited, and included improper containerization and labeling of hazardous wastes, improper tank certifications, inadequately maintained health and safety measures (such as exit signs, eyewash and shower installations, aisle space, and housekeeping), missing tank log inspections, improper storage, keeping containers closed when not in use, and failure to dispose of wastes within appropriate storage time limits.

Class I and II violations also occurred, including improper storage and inadequate hazardous waste plan for hazardous waste ammunitions, unknown fluids being stored, and inaccurate and out-of-date hazardous waste inventory.

DTSC Inspections/Investigations

DTSC has inspected or investigated all of the metal shredding facilities, several times in coordination with SWRCB. DTSC has responded to fires, collected soil samples that have led to or are in the process of supporting enforcement actions, and enforced off-site migration of contaminants associated with metal shredding facilities.

SA Terminal Island

Storm Water Requirements: In 2010 and again in 2011, the facility exceeded water quality benchmark standards for specific conductance and chemical oxygen demand (COD).[54] In 2011, the facility also exceeded water quality standards for zinc under its industrial storm water permit. The exceedances prompted the Los Angeles RWQCB to require the facility to ensure that it is in full compliance with the general permit, and that it has either implemented best management practices (BMPs) identified in its Storm Water Pollution Prevention Plan or has described which additional BMPs will be implemented, and updated its Storm Water Pollution Prevention Plan with the additional BMPs.[55] A response from SA Terminal Island indicated that significant structural changes were made, including "storage containers for [material recovery plant] finished product … a roof for [material recovery plant] storage bunkers," and "fully [enclosing] the shredder operation and 75% of the [material recovery plant] operation" to mitigate storm water quality exceedances.[56] In 2013, the facility was cited by the Los Angeles RWQCB for inadequately updating the Storm Water Pollution Prevention Plan, failing to update the site map to specifically address the pollutant sources, and failing to fully describe the pump station sizes in the storm water treatment system.[57] After a subsequent site inspection conducted two months afterward by the Los Angeles RWQCB, the facility was required to submit a description of the storm water

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[54] See SWRCB Letter to Ms. Nancy Felix, S.A. Recycling L.L.C., Annual Report Review – Second Benchmark Value Exceedance: NPDES General Permit (Permit) for Storm Water Discharges Associated with Industrial Activity (Order No. 97-03 DWQ; NPDES No. CAS000001), WDID# 4 19I021125, July 5, 2012.
[55] Ibid.
[56] See SA Recycling Letter to Mr. Sean Lee, Regional Water Quality Control Board, RE: July 5, 2012 Annual Report Review – Second Benchmark Value Exceedance: NPDES General Permit (Permit) for Storm Water Discharges Associated with Industrial Activity (Order No. 97-03 DWQ; NPDES No. CAS000001), WDID# 4 19I021125, July 19, 2012.
[57] See Los Angeles Regional Water Quality Control Board Notice to Comply for SA Recycling, WDID# 4 19I021125, Order No. 97-03, February 25, 2013.

treatment system to resolve discrepancies in the plan.[58] The RWQCB also required the facility to sample for priority pollutants using the correct detection limits, and to provide proof of proper grading to the pump stations.[59]

Soil Contamination: The Los Angeles RWQCB required SA Terminal Island to add an impermeable concrete cap to all or part of the property and to conduct semi-annual groundwater monitoring as part of remediation plans associated with contamination found in both the soil and groundwater.[60] Both actions were intended to prevent further soil and groundwater contamination from ongoing shredding activities. Investigations of soil and groundwater were conducted from 1990 to 1994 to assess the environmental impact from long-term scrap metal recycling at the facility. Soils were found to have been impacted by petroleum hydrocarbons, metals, polychlorinated biphenyls, and polycyclic aromatic hydrocarbons. Cleanup involved removing, backfilling the excavation, and placing a concrete cap over the affected area to prevent further contamination. Low-level detections of methyl tert-butyl ether and tert-butyl alcohol were present, but were attributed to an off-site source.

Fire/Explosions: On May 21, 2007, there was an explosion at SA Terminal Island that damaged the air pollution control system, which was used to control emissions of particulate matter and VOCs.[61] The shredder operated without its air pollution control system for 120 days following the explosion. DTSC described the matter as a significant and ongoing health risk to the employees and the surrounding community in its Statement of Facts in the Investigation of SA Recycling LLC, presented to the Los Angeles County District Attorney and State Attorney General's Office in Oakland, on April 22, 2009. An estimated 52 pounds per hour of VOCs were released into the air, and approximately 28.3 tons of particulate matter were emitted over the course of the 120 days that the shredder was in operation after the explosion. Although a chiller box was later installed to control the release of particulates and VOCs in the absence of the air pollution control system, it was estimated to have removed only 40 percent of total particulates. The Los Angeles County District Attorney's Office reached a $2.9 million settlement with SA Recycling for these violations.[62]

CUPA Inspections: One hazardous waste inspection report from 2015 was provided to DTSC from the 10-year timeframe requested. Records for the most recent inspection (conducted on August 27, 2015 were provided, in addition to the dates of additional inspections conducted between September 1999 to September 2016. SA Terminal Island was visited by the CUPA 18 times during that time, in 1999, 2003, 2011, 2015, and 2016.[63] On August 27, 2015, the Los Angeles Fire Department conducted a routine inspection and noted three minor violations.[64] The inspectors observed hazardous waste solids stored in an open metal container without the required labeling. They observed five open 12-foot roll-off

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[58] See California Regional Water Quality Control Board – Los Angeles Region, Industrial Storm Water Inspection Report for SA Recycling, WDID# 4 19I021125, April 19, 2013.
[59] Ibid.
[60] See California Regional Water Quality Control Board Los Angeles Region, Order No. R4-2012-0088, Termination of Waste Discharge Requirements for Discharges to Land/Groundwater.
[61] See Statement of Facts in the Investigation of SA Recycling LLC. Case No. 13450-19-078, April 22, 2009.
[62] People of the State of California v. SA Recycling, LLC and Simsmetal West, LLC, California Superior Court, Los Angeles County, case no. BC458943, Stipulated Judgment and Order, filed August 31, 2011.
[63] See LA County Fire Department, Facility Information Report for SA Recycling, retrieved on October 4, 2016.
[64] See Los Angeles County Fire Department – Health Hazardous Materials Division, Inspection Report for SA Recycling LLC on August 27, 2015.

dewatering bins at the storm water tank area that are required to be kept closed at all times except when adding or removing waste. They found that the facility did not have tank assessments for the 10 10,000-gallon hazardous waste holding tanks at the storm water tank area. An operator of a hazardous waste tank is required to obtain a written certification from a professional engineer.

DTSC Inspections or Investigations: In 2008, DTSC sampled the filter media of the air pollution control system and found quantities of lead and mercury above the regulatory threshold. DTSC concluded that during the period in 2007 when the shredder was operating without a functioning air pollution control system (see above description in "Fires/Explosions"), particulates containing lead and mercury were released into the surrounding community.[65] These findings were included in the case brought by the Los Angeles County District Attorney's Office against SA Recycling.[66]

Schnitzer Steel Products

Soil Contamination: Schnitzer was identified in GeoTracker for groundwater contamination that required remedial measures. The San Francisco Bay RWQCB required Schnitzer to add an impermeable concrete cap to part of the property and to conduct semi-annual groundwater monitoring as part of the remediation plans.[67] Both actions are intended to prevent further soil and groundwater contamination resulting from Schnitzer's operations.

In 1987 soil samples were collected during construction at the Schnitzer facility that showed elevated levels of PCBs, copper, lead, and zinc, prompting a more thorough investigation of potential soil and groundwater contamination from metal shredding activities. In 1987, Schnitzer installed a graded concrete cap along the inner-estuary shoreline to prevent storm water runoff into San Francisco Bay; it also installed an engineered riprap along the shore and implemented routine groundwater monitoring as part of an overall remedial action plan. The San Francisco Bay RWQCB required Schnitzer to maintain the concrete cap and riprap to ensure that the soil contaminants do not migrate from their current location. The San Francisco Bay RWQCB also required Schnitzer to place a deed restriction on the property to ensure that any future use of the property would take into account the residual soil contamination at the site.

During the excavation of nine pits for the construction of a wind wall on the eastern part of the property as part of Cleanup and Abatement Order R2-2013-001 issued by The San Francisco Bay RWQCB, oily soil was discovered in the subsurface along with a severed pipe leaking oily sludge in one of the pits.[68] The Bay RWQCB allowed Schnitzer to continue construction of the wind wall, provided it did not interfere with the evaluation and cleanup of the subsurface oily soil discovered during initial construction. Schnitzer filled in the pits with pea gravel and removed soil piles that had accumulated from the excavation of the pits. In response to the potential petroleum hydrocarbon contamination, the San

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[65] See Statement of Facts in the Investigation of SA Recycling LLC. Case No. 13450-19-078, April 22, 2009.
[66] People of the State of California v. SA Recycling, LLC and Simsmetal West, LLC, California Superior Court, Los Angeles County, case no. BC458943, Stipulated Judgment and Order, filed August 31, 2011.
[67] See California Water Quality Control Board, San Francisco Bay Region, Order No. 88-023 Site Cleanup Requirements for Schnitzer Steel Products Company, Inc., February 17, 1988.
[68] See San Francisco Bay Regional Water Quality Control Board Letter to Chris Orsolini, Schnitzer Steel Industries, Inc., Conditional Approval of Work Plan for sampling in the vicinity of nine pits; Requirement for Technical Report – Schnitzer Steel Products, 1101 Embarcadero West, Oakland, Alameda County, File No. 01S0067 (CFC), March 23, 2015.

Francisco Bay RWQCB required Schnitzer to evaluate the extent of the contamination and any migration pathways, to assess the potential surface water infiltration due to the pea gravel infill, and to sample soil, groundwater, standing water, and sludge. The San Francisco Bay RWQCB approved the cleanup work plan, with a draft report submitted on September 28, 2016.

Fire/Explosions: On April 8, 2009, a fire occurred at Schnitzer in a pile of debris at the site.[69] The smoke was reported to create air quality concerns for the local neighborhoods. On September 29, 2011, another fire occurred in a pile of scrap metal, which was reported to have sent a plume of smoke into the sky that was visible for miles.[70]

CUPA Inspections: Two hazardous waste inspection reports were provided to DTSC from the 10-year timeframe requested, one on February 13, 2007, and the second on September 14, 2015. The Alameda County Environmental Health Department conducted a routine inspection of the Schnitzer facility on the latter date.[71] The CUPA found six violations, all of which were minor. Schnitzer had violated two recordkeeping and documentation requirements related to eyewash and shower station installation, lack of exits signs in a specific area, and verification of employee training for hazardous waste handling. Schnitzer also violated three hazardous waste generator requirements for waste labels that did not have accumulation start dates, for unlabeled waste stored in open containers, and for missing tank inspection logs in a hazardous waste storage area. A general facility violation was also noted for visible oil stains and for improper storage of compressed gas cylinders.[72] During the previous inspection on February 13, 2007, no violations had been found.[73]

DTSC Inspections or Investigations: On March 17, 18, and 19, 2015, DTSC conducted a Compliance Investigation Inspection of Schnitzer.[74] During the inspection DTSC collected soil samples from bare ground where scrap metal was stored or being processed; from piles of material collected from the bare ground and from paved surfaces (swept material); and from areas adjacent to and under the joint products plant where the non-ferrous metals are removed from metal shredder aggregate. DTSC found that samples collected from various locations at the facility had the following characteristics:

- Five exceeded the STLC for chromium.
- Eleven exceeded the STLC for lead.
- One exceeded the STLC for nickel.
- Ten exceeded the STLC for zinc.
- Five exceeded the TTLC for copper.
- Twelve exceeded the TTLC for lead.

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[69] See Don Sanchez of ABC 7 News, "Fire Breaks Out at Steel Plant in Oakland," April 8, 2009, http://abc7news.com/archive/6751956/
[70] See Angela Woodall of East Bay Times, "Oakland Firefighters Extinguish Scrap Metal Blaze," September 29, 2011, http://www.eastbaytimes.com/2011/09/29/oakland-firefighters-extinguish-scrap-metal-blaze/
[71] See Alameda County Department of Environmental Health Inspection Report for Schnitzer Oakland, September 14, 2015.
[72] Ibid.
[73] See Alameda County Department of Environmental Health, Hazardous Waste Generator Inspection Report for Schnitzer Steel, February 13, 2007.
[74] See DTSC Letter to Orsolini, Re Report of Investigation on Schnitzer Steel Industries, Inc. Oakland Facility, August 18, 2015.

- Two exceeded the TTLC for nickel.
- Ten exceeded the TTLC for zinc.

One of the samples exceeded the federal limit for lead as measured by the Toxic Characteristic Leaching Procedure, indicating that the waste was also federally regulated as hazardous waste.

DTSC has shared a copy of the Report of Investigation with Schnitzer and is evaluating appropriate enforcement actions.

SA Anaheim

Storm Water Requirements: The facility holds a specific storm water permit for scrap metal recyclers administered by the Santa Ana RWQCB. A notice of violation was issued in 2014 for exceeding limits for chemical oxygen demand and iron for the sampling year 2012-13, and exceeding the annual average numeric action level for specific conductance, chemical oxygen demand, and iron.[75] In response, the facility was required to submit a corrective action plan to identify preventative measures and control measures to reduce the concentrations of each specific contaminant. In 2015, SA Anaheim received another notice of violation for exceeding the numeric action levels for chemical oxygen demand and lead after developing a corrective action plan resulting from the 2014 notice of violation.[76] SA Anaheim was required to develop a corrective action plan that included the best available technology treatment method. The RWQCB conducted an inspection in 2016, and found that no corrective actions were needed and all documentation required as part of the storm water permit was present.[77]

Soil Contamination: In June 1987, a Remedial Action Order was issued by DTSC requiring the facility, then known as Orange County Steel Salvage, to characterize contamination at its facility, and in the piles of metal shredder residue that had been accumulated. In June of 1991 DTSC approved a Remedial Action Plan for the site, which included plans to remove and dispose of the accumulated metal shredder residue to a hazardous waste landfill. Some areas of the site were found to have soil contaminated with PCBs, heavy metals, and oil and grease. Some areas had contamination that exceeded the TTLC of 50 mg/kg for PCBs. By December 1998, 31,250 cubic yards of PCB-contaminated soil had been removed. On October 30, 2002, DTSC certified that remediation of the site had been completed and that no further action was required.[78] No deed restriction was required for the property and, because no groundwater contamination was found, the groundwater monitoring wells were abandoned and removed per agreement with the Santa Ana RWQCB.

CUPA Inspections: Six hazardous waste inspection reports from 2008, 2010, 2013, and 2016 were provided to DTSC from the 10-year timeframe requested, with two of the six being re-inspections. On

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[75] See Santa Ana Regional Water Quality Control Board Letter to Lindsay Maine of SA Recycling, Notice of Violation with Industrial Activities from Scrap Metal Recycling Facilities Within the Santa Ana Region, Order No. R8-2012-0012 (Scrap Metal Storm Water Permit), April 3, 2014.

[76] See Santa Ana Regional Water Quality Control Board Letter to Lindsay Maine of SA Recycling, Notice of Violation of the Sector-specific General Permit for Storm Water Runoff Associated with Industrial Activities from Scrap Metal Recycling Facilities within the Santa Ana Region, Order No. R8-2012-0012 (Scrap Metal Storm Water Permit), June 29, 2015.

[77] See Santa Ana Regional Water Quality Control Board Inspection Report for SA Recycling LLC (WDID: 8 30MR000004), September 1, 2016.

[78] See DTSC Letter to Mr. George Adams, Jr., October 30, 2002.

March 13, 2008, during a routine inspection, the CUPA cited a minor violation for not properly marking and labeling containers, including the presence of unmarked containers.[79] On March 4, 2010, during a routine inspection, the CUPA cited a minor violation pertaining to damage to the concrete pad where metal turnings were stored, in addition to irregular inspection of oil drainage collection sump.[80] On February 20, 2013, the CUPA observed one Class II violation regarding containers that held mixed live ammunition with empty casings, with no accumulation start date and no hazardous waste plan for hazardous waste ammunitions.[81]

On February 12, 2016, the CUPA conducted a routine inspection and cited one Class II violation for containers with unknown fluids found stored, requiring a hazardous waste determination for the wastes.[82] One minor violation related to aisle space and housekeeping issues was also cited. On March 22, 2016, the CUPA determined that all violations from the February 12, 2016, inspection had been corrected.[83]

Sims Metal Management

Storm Water Requirements: On March 4, 2011, US EPA observed material outside the Sims property boundary, including "shredding residue, scrap metal, and other debris associated with industrial activities" while conducting a storm water inspection for its NPDES permit.[84] On August 25, 2011, US EPA returned and collected sediment and soil samples from areas surrounding the facility, which were found to have TTLC exceedances for lead, zinc, copper, and cadmium. US EPA determined that Sims had been operating that way since at least the early 1990s. On December 16, 2011, US EPA issued an Order for Compliance based on findings of violations of the Clean Water Act and the NPDES permit regulating storm water and non-storm water discharges from the facility.[85] In 2014, US EPA fined Sims $189,500 for polluting Redwood Creek and San Francisco Bay.[86]

Fires/Explosions: On November 10, 2013, a two-alarm fire originated from "crushed cars and scrap metal that were in a large pile about 30 feet high."[87,88] The fire sent a plume of smoke into the area that

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[79] See Anaheim Fire Department Hazardous Materials Section, Hazardous Waste Generator Inspection Report for SA Recycling, LLC, March 13, 2008.
[80] See Anaheim Fire Department Hazardous Materials Section, Hazardous Waste Generator Inspection Report for SA Recycling, LLC, March 4, 2010.
[81] See Anaheim Fire & Rescue Hazardous Materials Section, Hazardous Waste Generator Inspection Report for SA Recycling, LLC, February 20, 2013.
[82] See Anaheim Fire & Rescue Hazardous Materials Section, Hazardous Waste Generator Inspection Report for SA Recycling, LLC, February 12, 2016.
[83] See Anaheim Fire & Rescue Hazardous Materials Section, Hazardous Waste Generator Inspection Report for SA Recycling, LLC, March 22, 2016.
[84] See DTSC Statement of Facts in the Investigation of Sims Group USA Corporation, Case No. 14158-48.
[85] See US EPA Letter to Mr. Steven Shinn, Sims Metal Management, Findings of Violation and Order for Compliance, December 16, 2011.
[86] See "EPA fines Sims Metal plant in Redwood City $189,500 for polluting the Bay," The Mercury News, September 19, 2014.
[87] See Bay Area Air Quality Management District, "Incident Report, Sims Metal Management (A5152), Redwood City, CA," Compliance and Enforcement Division, November 10, 2013.
[88] See "Redwood City requires Sims Metal to take more than a dozen steps to prevent future fires," The Mercury News, February 21, 2014.

prompted the Redwood City Fire Department to advise nearby residents to avoid the smoke, stay indoors and close air intake systems to their homes. On December 17, 2013, another fire broke out at about 12:50 a.m. after a small explosion, which again prompted "health, emergency and air quality officials … to [advise] residents … to stay inside with the windows closed."[89] DTSC also received complaints filed by a local business via the CalEPA Environmental Complaint System stating that employees had sore throats due to the smoke and were unable to come to work.

CUPA Inspections: Five hazardous waste inspection reports from 2009, 2010, 2011, 2014, and 2016 were provided to DTSC from the 10-year timeframe requested. In 2009 and 2010, no violations were cited, and in 2011, one violation regarding an unlabeled drip pan was found but corrected on-site.[90,91,92] On March 18, 2014, four violations were cited pertaining to checking eyewash stations and fire extinguishers on a monthly basis, proper labeling of hazardous waste containers and tanks, keeping hazardous waste containers closed when not in use, and properly managing empty containers.[93] On April 18, 2016, two minor violations and one Class II violation were cited.[94] The minor violations included improper labeling for a container of hazardous waste antifreeze and improperly contained and labeled filters.

DTSC Inspections or Investigations: Following up on the US EPA report of the NPDES inspection (see *Storm Water Requirements* section above), DTSC conducted its own investigation of Sims after the soil and sediment sampling results indicated that "disposal of a non-Resource Conservation and Recovery Act (non-RCRA) hazardous waste" had occurred.[95] Results of the soil/sediment samples collected by US EPA revealed exceedances of DTSC's TTLCs for cadmium, copper, lead and zinc. Prior to DTSC visiting the facility with US EPA for a reinspection, the San Francisco Bay RWQCB submitted a report to DTSC regarding observations of "man-made fibrous material ('white fluff') originating from the [Sims] Metal Management site in Redwood City."[96] Release of light fibrous material has been an issue at the Sims facility since at least 2009, when discoloration, subsequently identified as light fibrous material, was found in the ponds at the neighboring Cargill Salt facility. Beginning on March 13, 2012, samples from various locations in and around the vicinity were collected, including treated shredder waste, fluff, soil,

[89] See "Redwood City Officials Meet with Recycling Plant After Second Blaze in Two Months," San Francisco Examiner, December 20, 2013.
[90] See San Mateo County Environmental Health Division, Hazardous Waste Generator Inspection Report for Sims, February 25, 2009.
[91] See San Mateo County Environmental Health Division, Hazardous Waste Generator Inspection Report for Sims Metal, November 18, 2010.
[92] See San Mateo County Environmental Health Division, Hazardous Waste Generator Inspection Report for Sims Metal, December 9, 2011.
[93] See San Mateo County Environmental Health Division, Hazardous Waste Generator Inspection Report for Sims Metal Management, March 18, 2014.
[94] See San Mateo County Environmental Health Division, Hazardous Waste Generator Inspection Report for Sims Metal Management, April 18, 2016.
[95] See DTSC Statement of Facts in the Investigation of Sims Group USA Corporation, Case No. 14158-48.
[96] Ibid.

soil/fluff combination, and HVAC air filters. Of the samples collected, exceedances were noted for zinc, lead, and copper, demonstrating the illegal disposal of hazardous shredder residue.[97]

DTSC referred the case to the California Attorney General's Office, alleging that Sims's scrap metal recycling operations released light fibrous material, some of which deposited onto nearby property. The release, migration, deposition, and accumulation of this hazardous waste outside the facility constituted the unlawful disposal of hazardous waste and a failure to minimize the possibility of a release of hazardous waste. The California Attorney General's Office filed an action in San Mateo County Superior Court and negotiated a settlement on behalf of DTSC.

In November 2014, Sims agreed to pay nearly $2.4 million to settle the civil environmental enforcement action.[98] Under the settlement, Sims was directed to pay $825,000 to DTSC in civil penalties and for reimbursement of DTSC's investigative costs; $125,000 to the Environmental Enforcement and Training Account Program as a Supplemental Environmental Project; and at least $1,443,814 to upgrade the facility. Additionally, Sims was directed to implement facility upgrades including construction of buildings to enclose the metal shredder and the screening unit and associated magnets; improving the air pollution control system; constructing additional perimeter fencing; and conducting regular sweeping of the public roadways outside of the facility. Interim measures outlined in the settlement included logged weekly visual inspections for accumulation of LFM in areas including private properties, public sidewalks, and streets adjacent to and downwind of Sims, immediate removal of any deposits, and proper characterization and management of any deposits.

SA Bakersfield

Fires/Explosions: On February 19, 2008, SA Bakersfield experienced a fire in a scrap metal pile that was about "150 feet, by 300 feet by 50 feet high, firefighters reported."[99] Ultimately, the fire was managed by using a large crane to pull metal pieces from the pile to reach the fire.

CUPA Inspections: Three hazardous waste inspection reports from 2009, 2012, and 2015 were provided to DTSC from the 10-year timeframe requested. During hazardous waste generator inspections conducted by the Kern County Environmental Health Services Department in 2012 and 2015, no violations were found.[100,101] In 2009 and 2012, inspections for three program areas were conducted simultaneously: business plan, hazardous waste generator, and aboveground storage tank.[102]

On April 10, 2009, a routine inspection found three violations under the hazardous waste generator program and two violations under the business plan requirements program. The three minor violations

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[97] See DTSC's Supplemental Statement of Facts in the Investigation of Sims Group USA Corporation, Case No. 14158-48, March 12, 2013.

[98] See People of the State of California, ex rel. Miriam Barcellona, Acting Director of the California Department of Toxic Substances Control v. Sims Group USA Corp., California Superior Court, San Mateo County, case no. CIV531456, Stipulation for Entry of Final Judgment and Order, filed November 24, 2014.

[99] See "Public Safety Digest: Golden State Metals Catches Fire," Bakersfield.com, February 19, 2008.

[100] See Kern County Public Health Services, Hazardous Waste Generator Inspector Report for SA Recycling LLC DBA SA Recycling, May 19, 2015.

[101] See Environmental Health Division, Certified Unified Program Agency (CUPA) Hazardous Material Inspection Form, March 15, 2012.

[102] See Environmental Health Services Department, (CUPA) Hazardous Material Inspection Form, April 10, 2009.

cited under generator requirements were related to improper labeling of hazardous waste storage containers, missing accumulation start dates on spent lead-acid batteries, and failure to dispose of lead-acid batteries within 180 days of generation. Of the two business plan requirements, one Class II violation was cited regarding inaccurate and out-of-date inventory of hazardous waste, and one minor violation related to improperly labeled hazardous waste containers.

DTSC Inspections: In 2014, soil and sludge samples collected by DTSC in areas surrounding the facility showed lead levels that exceeded the STLC. DTSC could not determine the source of the lead, and because the samples did not contain the light fibrous materials often associated with metal shredding facilities, the case was closed without further action. The source of the lead has not been determined. In 2015, SA Bakersfield was issued a letter by DTSC for improper housekeeping on-site including improperly managing shredded materials that escaped the property boundaries as hazardous waste.[103] DTSC warned that failure to prevent metal shredder waste from leaving the site would result in the facility being subject to additional enforcement action.

Ecology Auto Parts

CUPA Inspections: Three hazardous waste inspection reports from 2011, 2012, and 2015 were provided to DTSC from the timeframe requested. On September 25, 2015, the San Bernardino County Fire Department conducted an inspection of the facility and found a violation relating to the failure to update the business plan within 30 days. The facility subsequently submitted updated business plan elements electronically to the California Environmental Reporting System (CERS), and the violation was corrected on October 12, 2015. The facility was previously inspected on June 19, 2012, and November 1, 2011, and no violations were found.[104,105]

DTSC Inspections or Investigations: In 2014, LFM was found in the public access areas outside of the property boundaries, indicating that waste material was migrating from the facility. In 2014 and 2015, it was found that Ecology had "significantly reduced" the amount of LFM that was being generated by the facility based on an observation and on-site inspection conducted by DTSC. Due to the improved management practices employed by the facility, DTSC did not pursue the issue further.

On June 2 and 3, 2015, DTSC conducted an inspection of the Ecology facility.[106] During a walk-through tour of the facility DTSC observed metal processing operations being conducted on bare ground, stained soils collected on paved surfaces, and contaminated soils collected in piles. Inspectors also observed light fibrous material, similar to a heavy dust, that had settled on surfaces and covering piles of other material. DTSC collected samples from each of these locations and found that the collected samples exhibited the following characteristics:

- Soil from the torch cutting area exceeded the STLC for lead.
- Soil from the railroad processing area exceeded the STLC for lead.
- Material from an aggregate pile exceeded the STLCs for cadmium, lead, and zinc.

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[103] See DTSC Letter to Adams, Re Operational Expectations During Implementation of SB 1249, April 13, 2015.
[104] See CUPA San Bernardino Fire Department Hazardous Materials Division, Hazardous Waste Generator and Hazardous Materials Handler Inspection Report, June 19, 2012.
[105] See CUPA San Bernardino Fire Department Hazardous Materials Division, Preliminary Field Inspection Report, November 1, 2011.
[106] See DTSC Report of Investigation on Ecology, Inc., Colton, dba: Pacific Rail Industries, December 16, 2015.

- Material from an aggregate pile exceeded the TTLCs for copper, lead, and zinc.
- Shredder residue on the ground under the conveyors exceeded the STLCs for cadmium and zinc.
- Shredder residue on the ground under the conveyors exceeded the TTLCs for copper, lead, and zinc.
- LFM exceeded the STLC for zinc, and the TTLCs for copper, lead, and zinc.
- Soil collected near the aggregate lines exceeded the STLCs for cadmium, lead, and zinc.
- Soil collected near the aggregate lines exceeded the TTLCs for copper, lead, and zinc

DTSC has shared a copy of the Report of Investigation with Ecology and is evaluating appropriate enforcement.

2.6 Evaluation Findings and Conclusions

Each of the metal shredding facilities is under the jurisdiction of various environmental and health agencies, and their oversight is often specific to particular media or activities. However, even though several agencies have jurisdiction and provide oversight, certain aspects of the operation of the metal shredding facilities appear to be either not regulated adequately or entirely unregulated. DTSC found that the level of regulation clearly differs among local agencies for air pollution control, water pollution programs, and the oversight of hazardous waste management activities. DTSC found that this has resulted in the release of contaminants to the surrounding communities.

Several of the facilities were found to have had storm water runoff exceedances. Two of the four metal shredding facilities had exceedances of the water quality thresholds for specific conductance, chemical oxygen demand, iron, and lead. One metal shredding facility had violations of both its NPDES permit and the Clean Water Act, in which material associated with metal shredding activities was found to have exited the property boundary and contaminated surrounding areas. Subsequent soil and sediment samples from the areas surrounding the property revealed TTLC exceedances of lead, zinc, copper, and cadmium.

Two facilities were required to install an impermeable concrete cap over part of the property due to contamination found in both the soil and groundwater, which was attributed to their metal shredding activities. Three facilities required soil cleanup due to the presence of contaminants associated with metal shredding activities.

Two facilities have had soils collected and analyzed by DTSC in areas where metal processing and storage operations occur, revealing STLC and TTLC exceedances for lead, copper, zinc, and cadmium. During DTSC's 2015 inspection of Schnitzer, soil samples collected from bare ground where scrap metal was stored or being processed, from piles of swept material from paved surfaces, and from areas adjacent to and under the joint products plant where the non-ferrous metals are removed from metal shredder aggregate, were found to exceed regulatory thresholds for metals.

DTSC inspections at Ecology found similar soil contamination. DTSC observed metal processing operations being conducted on bare ground, stained soils accumulating on paved surfaces, and piles of contaminated soils. DTSC collected samples from these areas, and found that the piles often exceeded TTLCs and STLCs for lead, cadmium, copper, and zinc.

Four metal shredding facilities have had fires on their properties, either in the metal shredding machinery or in piles of scrap metal, with a total of six known fires over the past 10 years. Two of the four had more than one fire from 2009 to 2013.

Several of the facilities were found to have had accidents that resulted in releases of hazardous constituents to the air, or to have had ongoing emissions of hazardous constituents resulting from their routine, normal operations. DTSC found that the explosion in the air pollution control system at SA Terminal Island resulted in the release of an estimated 52 pounds per hour of VOCs, and approximately 28.3 tons of particulate matter, over the course of the 120 days that the shredder was in operation after the explosion. DTSC found that the normal, routine operations at Sims had resulted in emissions of light fibrous material from that facility since at least 2009, when the material was found in the ponds at the neighboring Cargill Salt facility. Samples collected of the LFM were found to contain zinc, lead, and copper. The off-site release of this material was found to demonstrate the illegal disposal of hazardous metal shredder residue.

These examples show that while each metal shredding facility is under the jurisdiction of environmental and health agencies, each of those agencies implements a program that is tailored to the priorities that have been established for its district. Notably, the metal shredding facilities in SCAQMD have been required to install and maintain RTO units to control the emissions of VOCs because SCAQMD has identified the emission of VOCs as a priority in its district. BAAQMD does not require the use of RTO, but allows the use of air scrubbers to control the emission of all pollutants, including VOCs. SJVAPCD does not mandate control of VOCs at all.

Given the similarity of the material being shredded, and the common use of a hammer mill to shred the vehicles, appliances and other scrap metals, each metal shredding facility is likely to emit similar pollutants, from its similar processes, to the air, water, and soil surrounding its facilities. These jurisdictional differences indicate that unequal levels of public health or environmental protection may result near the metal shredding facilities.

These jurisdictional differences, coupled with the continued effect of DTSC's "f letters" and OPP 88-6, have resulted in inadequate regulatory oversight of the operations being conducted at the metal shredding facilities.

3 ANALYSIS REQUIRED TO ADOPT REGULATIONS

Pursuant to HSC Sections 25150.82(d)(3)(A) through 25150.82(d)(3)(D), the Metal Shredding Facilities Law requires DTSC to prepare an analysis addressing specific factors relating to activities that would be subject to the alternative management standards, if promulgated, or to existing hazardous waste control law.

DTSC, in its evaluation of the metal shredding facilities and their hazardous waste management activities, has determined that the activities that would most significantly relate to the establishment of alternative management standards or to the requirements of existing hazardous waste control law would be the hazardous waste treatment and storage activities that have been historically “authorized” or otherwise exempted from regulation as a result of OPP 88-6. Therefore, as required by the Metal Shredding Facilities Law, these hazardous waste management activities are the subject of this Analysis.

The following sections present DTSC’s analysis of the factors specified in the Metal Shredding Facilities Law as they pertain to the treatment and storage of metal shredder wastes. All of these wastes are hazardous wastes, and all are activities that would otherwise require a hazardous waste permit or other form of authorization from DTSC to perform. Any alternative management standards proposed would be substituted for the hazardous waste management requirements and permitting standards that apply to these types of hazardous waste management activities under existing statutes and regulations. (Note that the disposal of CTMSR to landfills, which would otherwise require a hazardous waste permit to perform if not for the nonhazardous classifications provided in the “f letters,” is discussed in Section 5.0.)

3.1 Types of Hazardous Waste and Estimated Amounts That Are Managed as Part of the Activity

Health and Safety Code Section 25150.82(d)(3)(A) requires DTSC, if it intends to promulgate alternative management standards, to prepare an analysis of the types of hazardous waste and the estimated amounts of each hazardous waste that are managed as part of the activity. Unless alternative management standards are developed, these activities would be regulated by the hazardous waste management requirements and permitting standards that apply to these types of hazardous waste management activities under existing statutes and regulations.

Metal Shredder Aggregate: The facilities treat the aggregate using physical separation processes to separate ferrous and non-ferrous metals. Except in two instances where the metal shredding facilities claimed the information was confidential business information, each of the facilities provided an estimate of the amount of scrap metal it processed in 2014 (the year prior to the survey responses. According to the surveys, the incoming scrap composition typically consists of end-of-life vehicles (20 to 50 percent), appliances (10 to 70 percent), and other forms of scrap metal (9 to 40 percent).

The total amount of metal shredder aggregate estimated to be processed by all the metal shredding facilities in 2014 was 1.9 million tons. This amount was assumed to be equivalent to the amount of scrap metal received; in other words, the weight of the material before it is shredded in the hammer mill would be the same as the weight of the material after it is shredded. This may overestimate the actual amount of metal shredder aggregate, depending on how much of the scrap metal that is received includes scrap metal that is already “clean” and does not require shredding or separation before being managed as sorted ferrous or non-ferrous metals. However, the estimated amount correlates well with the amount of CTMSR that was reported as alternative daily cover in the same year. To the extent the aggregate contains hazardous wastes, some portion of the estimated amount of aggregate would be a measure of hazardous waste, depending on specific circumstances.

Metal Shredder Residue: After the metal shredder aggregate has been treated to separate the ferrous and non-ferrous metals, the portion that remains is referred to as "metal shredder residue."

The total amount of metal shredder residue estimated to be generated by all of the metal shredding facilities is 536,000 tons. According to the survey responses, the metal shredding facilities provided, the amount of metal shredder residue generated by each facility was reported to range from 29 to 38 percent of the facility's total scrap metal throughput. To approximate the amount of metal shredder residue being generated in 2014, an average of 33.5 percent was applied to the estimated amount of metal shredder aggregate being generated. Again, although it may not provide a precise amount, the calculated estimate correlates well with the amount of CTMSR that was reported as alternative daily cover in the same year.

CTMSR: After the metal shredder waste has been chemically treated, the facilities store it in piles at their facilities. Later, it is loaded onto trucks and transported to solid waste landfills, where it is disposed or used as alternative daily cover. According to information reported to CalRecycle by the solid waste landfills that use CTMSR for alternative daily cover, an estimated 517,000 tons of CTMSR were used as alternative daily cover in 2014. This number does not include the amount of CTMSR sent to H.M. Holloway by SA Bakersfield. CTMSR received by H.M. Holloway is disposed of, and is not used for alternative daily cover. The amount of CTMSR sent to H.M. Holloway by SA Bakersfield in 2014 was approximately 25,000 tons. The total estimated amount of CTMSR generated by metal shredding facilities in 2014 was 542,000 tons.

Quantities of Hazardous Waste Managed at Metal Shredding Facilities: Table 6 summarizes the Quantities of Throughput and Waste Generation from Metal Shredding Facilities reported for 2014. The amount of scrap metal shredded annually was reported by each metal shredding facility in the questionnaires provided to DTSC. The amount of metal shredder aggregate generated is considered to be the same as the amount of scrap metal shredded, because no ferrous or non-ferrous materials have yet been removed. Metal shredder residue remains once the ferrous and non-ferrous metals have been removed. The amount of chemically treated metal shredder residue that was transported offsite for disposal was also reported in the questionnaires from each facility. CalRecycle provides a public record of the amount of CTMSR being used as alternative daily cover. Additional data was provided by the landfills in response to DTSC's survey. The other values in Table 6 were calculated as functions of the known data. Because some facilities claimed that their production and generation volumes were confidential business information, some of the values in Table 6 are estimates based on overall industry averages. Although some of the values are estimated, they provide a reliable approximation of the scale of hazardous waste management activities being conducted at the metal shredding facilities.

Table 6.
Quantities of Throughput and Waste Generation and Management at Metal Shredding Facilities

Facility	Scrap Metal Shredded (Tons)	Metal Shredder Aggregate Generated and Treated (Tons)[b]	Metal Shredder Residue (Approximate Tons)[c]	CTMSR Disposed (Tons)[d]
SA TERMINAL ISLAND	330,000	330,000	110,550	115,172
SCHNITZER STEEL PRODUCTS[a]	582,000[g]	582,000[f]	195,000[f]	195,000[e]
SA ANAHEIM	247,000	247,000	82,745	87,093
SIMS METAL MANAGEMENT[a]	358,000[g]	358,000[f]	120,000[f]	120,000[e]
SA BAKERSFIELD	83,000	83,000	27,805	24,567
ECOLOGY AUTO PARTS	264,000	264,000	N/A	N/A

[a] Some information was claimed as Confidential Business Information. Estimates based on overall industry averages were used to in place of data that was unavailable.
[b] Amount assumed to be the same as the amount of scrap metal processed.
[c] Calculated based on the industry's estimate that the amount of metal shredder residue generated by each facility ranged from 29 to 38 percent of its total throughput. An average of 33.5 percent was applied to approximate the amount generated.
[d] Based on information provided to CalRecycle on the amount of CTMSR that was reported to be used as alternative daily cover.
[e] Estimated from amount of CTMSR used as alternative daily cover reported to CalRecycle.
[f] Calculated using the estimated amount of CTMSR used as alternative daily cover as reported to CalRecycle.
[g] Calculated using the estimated amount of metal shredder residue, using the ratio of metal shredder residue to total throughput of 33.5 percent.

Hazards to Human Health or Safety or to the Environment Posed by Reasonably Foreseeable Mismanagement of Those Hazardous Wastes and Their Constituents

The risks and hazards associated with the management and mismanagement of hazardous wastes are directly related to the hazardous constituents present in the hazardous waste and the characteristics the hazardous waste exhibits. California regulates waste based on the toxicity and hazard to humans and to other biological organisms. The risk posed by hazardous wastes is also a function of the routes of release into the environment and the potential exposure that can take place as a result of that release.

Chemical Hazards of Hazardous Waste Constituents in Metal Shredder Wastes

The primary hazardous waste constituents in metal shredder wastes, shown in previous DTSC sampling and in the treatability study, are lead, copper, and zinc. Each of these contaminants is present at concentrations that exceed their respective STLCs and TTLCs, and the soluble concentrations are only decreased in CTMSR—but even then, not to levels below the STLC. Cadmium has also occasionally been observed in some samples at levels that exceed its STLC. Historically, metal shredder wastes have also contained mercury and PCBs, but these constituents have not recently been found in chemical testing performed.

The primary health and environmental concerns with these hazardous waste constituents are as follows:

Lead: Lead can present health hazards if it is inhaled, ingested, or absorbed as particles.[107] Inhalation presents the greatest risk, because the body absorbs higher levels of lead through this exposure pathway. Lead is absorbed and stored in bones, blood, and tissues. Bones can be demineralized by lead, which replaces other natural elements in the bone structure.

Lead poisoning can happen if a person is exposed to very high levels of lead over a short period of time. This can cause abdominal pain, fatigue, weakness, memory loss, and pain or loss of feeling in the hands and/or feet. Exposure to high levels of lead may cause anemia, weakness, and kidney and brain damage. Prolonged exposure to lead can cause abdominal pain, nausea, and changes in personality, and can increase the risk for high blood pressure, heart disease, kidney disease, and reduced fertility. Very high levels of lead exposure can cause death. The U.S. Department of Health and Human Services, US EPA, and the International Agency for Research on Cancer (IARC) have determined that lead is probably cancer-causing in humans.[108]

Generally, children tend to show signs of severe lead toxicity at lower levels than adults. Lead poisoning has occurred in children whose parents accidentally brought home lead dust on their clothing. Neurological effects and mental retardation have also occurred in children whose parents may have job-related lead exposure. Lead can cross the placental barrier, which means that the fetuses of pregnant women who are exposed to lead are also exposed. Lead can damage a developing baby's nervous system and even low-level lead exposures in developing babies have been found to affect behavior and intelligence. Lead exposure can cause miscarriage, stillbirths, and infertility.

Cadmium: Cadmium has an inhalation hazard that can cause pulmonary irritation.[109] Long-term exposure to cadmium through inhalation or oral ingestion can cause kidney disease due to the build-up of cadmium in the kidneys. Similarly, cadmium is classified by US EPA as a probable human carcinogen, with animal studies concluding increased rates of lung cancer due to chronic exposure.[110]

Cadmium (as an oxide, chloride, or sulfate) will exist in the air as particles or vapors from high-temperature processes. It can be transported long distances in the atmosphere, where it will deposit (wet or dry) onto soils and water surfaces. Cadmium and its compounds may travel through soil, but its mobility depends on several factors such as pH and the amount of organic matter in the soil, which will vary depending on the local environment. Generally, cadmium binds strongly to organic matter, where it will be immobile in soil and be taken up by plant life, eventually entering the food supply.

Copper: Exposure to high doses of copper can cause liver and kidney damage and even death.[111] Long-term exposure to copper dust can irritate the nose, mouth, and eyes, and cause headaches, dizziness,

[107] See Health effects of Lead, The National Institute for Occupational Safety and Health (NIOSH), available at https://www.cdc.gov/niosh/topics/lead/health.html
[108] Toxicological Profile for Lead, U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, 2007.
[109] Toxicological Profile for Cadmium, U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, 2012.
[110] See www.epa.gov/sites/production/files/2016-09/documents/cadmium-compounds.pdf
[111] See Public Health Statement for Copper, U.S. Department of Health and Human Services Agency for Toxic Substances and Disease Registry, 2004.

nausea, and diarrhea. If water that contains higher than normal levels of copper is consumed, it can cause nausea, vomiting, stomach cramps, or diarrhea. It is not known if copper can cause cancer in humans. US EPA does not classify copper as a human carcinogen because there are no adequate human or animal cancer studies.

Elemental copper does not break down in the environment. Copper can be found in plants and animals, and at high concentrations in filter feeders such as mussels and oysters. Copper is also found in a range of concentrations in many foods and beverages that we eat and drink, including drinking water. When copper and copper compounds are released into water, the copper that dissolves can be carried in surface waters either in the form of copper compounds or as free copper or, more likely, copper bound to particles suspended in the water. Even though copper binds strongly to suspended particles and sediments, there is evidence to suggest that some water-soluble copper compounds do enter groundwater. When copper is released into soil, it can become strongly attached to organic material and other soil components (clay, sand, etc.) in the top layers of soil, and may not move very far when it is released. Copper that enters water eventually collects in the sediments of rivers, lakes, and estuaries.

Zinc: Zinc exposure can cause stomach cramps, anemia, and changes in cholesterol levels.[112] Inhaling large amounts of zinc (as dusts or fumes) can cause a specific short-term disease called metal fume fever. However, DHHS and IARC have not classified zinc for carcinogenicity, and US EPA has determined that zinc is not classifiable as to its human carcinogenicity. Zinc is not listed by the State of California as a naturally occurring or synthetic chemical that is known to cause cancer or birth defects or other reproductive harm.

Zinc dust can travel in the air and be deposited by rain and snow. Depending on the type of soil, some zinc compounds can move into the groundwater and into lakes, streams, and rivers. The zinc dissolved in water can build up in fish and other organisms.

Research conducted by US EPA has shown that zinc is a strong aquatic pollutant.[113] Inherent water quality parameters like pH, hardness, and alkalinity change the biological activity of zinc. This is significant because calcium hardness and carbonate alkalinity are both important factors in governing the toxicity of zinc to fish. In the US EPA study, the sensitivity of various fish species to zinc was found to vary by a factor of 2.7 between hard and soft water.

The rulemaking documents that established California's hazardous waste criteria stated that "[z]inc appears to have low toxicity to higher animals, but is highly toxic to fish, especially in soft waters. Moreover, zinc has a synergistic, toxic effect with copper compounds on fish. Zinc is an essential nutrient for plants and animals, but also has an appreciable phytotoxicity which is dependent on soil pH. Liming the soil reduces the phytotoxic effects of zinc. There is a recommended limit of 2.0 milligrams of zinc per liter of water applied to limed soils."[114]

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[112] See Toxic Facts for Zinc, U.S. Department of Health and Human Services, The Agency for Toxic Substances and Disease Registry (ATSDR), U.S. Department of Health and Human Services, available at: https://www.atsdr.cdc.gov
[113] See Holcombe, G.W. and Andrew, R.W., The Acute Toxicity of Zinc to Rainbow and Brook Trout: Comparisons in Hard and Soft Water, Ecological Research Series, Research and Development. US EPA Environmental Research Lab, Duluth, MN. EPA-600/3-78-094PB-289 939, October 1978.
[114] See Final Statement of Reasons, Criteria for Identification of Hazardous and Extremely Hazardous Wastes, Department of Health Services, R-45-78, July 20, 1984, p. 22.

*Hazards from Reasonably Foreseeable Releases of **M**etal Shredder Wastes*

The hazards to human health or safety or to the environment posed by hazardous wastes that exceed any of the TTLCs and STLCs are associated both with the toxic constituents that are present in excess of the TTLC as well as how the hazardous waste is being managed.

Wastes that contain constituents that exceed their respective TTLCs can pose hazards to human health and the environment if managed in ways that do not prevent them from being released into the environment. In addition, wastes that contain constituents that exceed their respective STLCs can pose hazards to human health and the environment if mismanaged in ways that allow the soluble constituents to migrate via surface or groundwater to sensitive aquifer systems such as drinking water supplies or aquatic wildlife environments.

The Department of Health Services (DHS) described potential routes of release of and exposure to particulate toxics, for which TTLCs were developed. The potential routes include:

- Surface run-off and contamination of land and water
- Direct discharge into waterways
- Volatilization of organics
- Airborne dispersal before, during, and after disposal
- Direct on-site land contamination
- Long-term solubilization

As further explained in the rulemaking establishing the hazardous waste criteria, "It was decided to consider the potential impacts on land, resulting from improper disposal of particulate toxic wastes, in establishing TTLC values. The most direct impact of indiscriminate disposal is contamination of the land and the attendant potential impact on organisms which contact the land. These can include persons, animals, or plants."[115]

In its rulemaking documents in which the STLCs were established, DHS explained that "the establishment of the STLC was based upon the potential for soluble substances from improperly disposed wastes to migrate via surface or groundwater to sensitive aquifer systems such as drinking water supplies or aquatic wildlife environments. Several steps can be envisioned in such a process: (a) dissolving of toxic substance from the waste by the leaching action of rain, surface water, ground water, or landfill leachate; (b) movement of the resulting extractant from the disposal area; (c) attenuation (dilution) of toxic substance in the extractant through soil absorption or through mixing with ground or surface waters; and (d) pollution of the aquifer."[116]

The establishment of the STLCs and TTLCs assumed that the "proper" management of hazardous wastes would prevent releases consistent with the potential routes of dissemination and exposure listed above. The primary method of controlling the hazards posed by the hazardous constituents in the waste would be to manage it so that releases cannot occur that could allow it to contaminate land or water, and potentially come into contact with human or biological receptors.

[115] See Final Statement of Reasons, Criteria for Identification of Hazardous and Extremely Hazardous Wastes, Department of Health Services, R-45-78, July 20, 1984, pp. 95 – 98.
[116] See Final Statement of Reasons, Criteria for Identification of Hazardous and Extremely Hazardous Wastes, Department of Health Services, R-45-78, July 20, 1984, pp. 89–91.

The hazardous waste management requirements that would otherwise apply to the metal shredder wastes are all designed to prevent the release of the hazardous waste and hazardous waste constituents into the environment. In all cases, the management of hazardous waste from the point of its generation through its treatment and storage, and ultimately to its transportation to a disposal facility, is required to be performed inside tanks or containers so that the hazardous constituents are controlled and contained. In some cases, these containment standards can be accomplished by performing them inside buildings that meet the standards for containment buildings (see Article 29, Chapter 14, Title 22, California Code of Regulations, Section 66264.1101 et seq.), or in units that meet specific design and operating standards to prevent the release of hazardous wastes into the environment (e.g., waste piles designed and operated in accordance with Article 12, Chapter 14, Title 22, California Code of Regulations, Section 66264.250 et seq.).

The information presented in Section 2.3 demonstrates that metal shredder wastes are not currently managed within tanks or containers, inside containment buildings that meet the Article 29 standards, nor in waste piles that meet the design and operating standards in Article 12. At metal shredding facilities, the metal shredder wastes are not being managed in accordance with existing hazardous waste requirements for transfer, storage, or treatment of hazardous wastes. This has allowed hazardous wastes to be released, causing potential impacts to human health and the environment.

3.2 Complexity of Treatment and Storage Activities at Metal Shredding Facilities

Health and Safety Code Section 25150.82(d)(3)(B) requires DTSC, if it intends to promulgate alternative management standards, to prepare an analysis of the complexity of the activity, and the amount and complexity of operator training, equipment installation and maintenance, and monitoring that are required to ensure that the activity is conducted in a manner that safely and effectively manages each hazardous waste

Complexity of Treatment Activities

Ferrous and Non-ferrous Metal Separation – For ferrous metal separation, the amount of charge placed on the electromagnet and the rate at which the metal shredder aggregate is passed under the magnet affect the efficiency and effectiveness of the retrieval of ferrous metal. For non-ferrous metal separation, the equipment's air flow, timing, and feed rates that account for the density of materials all affect the efficiency and effectiveness of the retrieval and separation. The efficiency or effectiveness of the removal of the ferrous and non-ferrous metals does not affect the amount or toxicity of the hazardous constituents in the metal shredder aggregate or the subsequent metal shredder residue. It may, based on the mass of the metals that are not removed, effectively decrease the concentrations of the hazardous constituents in the remaining wastes.

The most complex aspects of the ferrous and non-ferrous metal separation processes, with regards to containment of hazardous wastes, appear to be controlling releases of hazardous wastes from the processes. Observations by DTSC and other regulatory agencies as noted in Section 2.3 have documented the release of LFM and particulate matter from the separation processes, and have also documented metal shredder aggregate falling outside of the separation process and off of conveyor systems throughout the facilities.

Chemical Stabilization – Chemical stabilization is a common chemical treatment process. It is used to stabilize soluble concentrations of metals in a variety of circumstances and wastes (for site remediation, as well as mandated treatment standards for land disposal restrictions for many hazardous wastes). Stabilization is a common remediation technology employed at state and federal Superfund sites. US EPA estimates that 23 percent of the source control remedies performed at these sites between 1982 and 2005 involved the use of solidification or stabilization, and 94 percent of the solidification/stabilization remediations performed included inorganic binders such as cement, fly ash, lime, phosphate, soluble silicates, or sulfur.

The most complex aspect of the chemical treatment of metal shredder residue is due to its highly heterogeneous composition. Metal shredder residue is a mixture of materials (including plastics, rubber, foam, fabric, carpet, glass, wood, road dirt, and debris, along with a small amount of residual metal). These materials are present in a complex assortment of sizes, shapes, and densities with various physical and chemical properties. Each sample of metal shredder residue can be composed of different ratios and sizes of these materials, making the application of the treatment chemicals and even distribution of them throughout the metal shredder residue more difficult.

The chemical stabilization treatment of the metal shredder residue requires careful control of the application rates of silicate solution and alkaline cement to achieve the needed stabilization of the soluble lead, cadmium, copper, and zinc. The treatment process requires an accurate delivery of the required cement and sodium or potassium silicate mixture to the residue for the treatment to be effective. The effectiveness of the treatment, and the immobilization of the soluble metals, are directly affected by how the treatment process is carried out. Higher concentrations of lead, cadmium, copper, or zinc can result from insufficient application of treatment chemicals.

Hazardous Waste Sampling and Analysis – In addition to the complexity of the application of the treatment chemicals, the methods to verify or validate the effectiveness of the treatment are also complex. Not only is each sample likely to contain different proportions of the material that it is composed of, but the techniques used to take samples must account for the composition of the waste.

Sample preparation and laboratory procedures to measure the concentrations of the chemical constituents are also complex. Because the metal shredder residue is composed of many different materials, it is uniquely heterogeneous, and it is extremely difficult to collect and prepare samples for analysis that are representative of this waste stream. The sample preparation procedures require the sample to be milled to a consistent particle size before mixing with the specified extraction liquid. The varying composition requires special milling equipment to reduce the particle size of the material, and additional time spent by the laboratory staff to ensure the sample can pass through the designated sample sieve. Laboratory staff must also pay close attention to the required procedures to decide whether any of the sample is considered extraneous (not needing to be analyzed) or needs to be retained and processed with the remainder of the sample. Significant variation in analytical results can occur if samples are not collected or prepared for analysis as required to address the unique heterogeneous nature of this waste stream.

Complexity of Storage Activities: Storage of the metal shredder aggregate, the metal shredder residue, and CTMSR at the metal shredding facilities is in piles due to the volume of the waste being managed. Where these piles contain hazardous wastes, they must be managed in compliance with regulations. The requirements for storage of hazardous waste in waste piles are much more complex than what is currently practiced at the metal shredding facilities. To store hazardous waste in a waste pile, the waste pile must be designed and managed in accordance with the Waste Pile standards in Article 12 of Chapter

14, Title 22, California Code of Regulations, Section 66264.250 et seq. These standards include but are not limited to an impermeable liner beneath the pile, a leachate collection system, a leak detection system, and an ongoing monitoring program to detect the migration of contaminants from the waste pile. Storage of hazardous waste in waste piles that are not designed or managed in accordance with the prescribed standards allows for contamination of soils, leakage of contaminants into the subsurface, and the potential for migration of hazardous constituents via surface water runoff and air dispersion throughout the site as well as off-site.

Amount and Complexity of Operator Training Associated with Treatment and Storage of Metal Shredder Wastes

As described above, the operational personnel at the metal shredding facilities must be familiar with, and be trained on, the treatment processes and equipment to ensure they are performing efficiently and effectively.

Improper or inadequate screening of incoming waste scrap metals to confirm they have been adequately de-polluted could result in hazardous materials remaining in the scrap metal that is being fed into the hammer mill. These hazardous materials would further contaminate the metal shredder wastes, potentially exposing operational personnel to unexpected risks and hazards as they operate the equipment used to treat the wastes. There have also been occasions that resulted in catastrophic results. For instance, explosions have occurred within the hammer mill that could have been caused by compressed gas cylinders or explosive ordnance that was not detected in the incoming waste scrap metal being detonated by the hammer mill. These explosions create tremendous risk to the hammer mill operator, potentially causing injury or death, and they could also result in the hammer mill or its pollution control equipment becoming disabled, resulting in process stoppage and release of hazardous constituents into the environment.

Improperly operated ferrous and non-ferrous separation processes could result in ferrous and non-ferrous metals remaining in the metal shredder residue, increasing the amount of metal shredder residue requiring chemical treatment, increasing the amount of CTMSR requiring disposal, and decreasing the profitability of the metal shredding facility's metal recovery operation.

The chemical treatment system is automated to reflect belt scale and speed, but it does not measure the amount of contaminants present to adjust the treatment chemicals accordingly. Therefore, operational personnel must be trained to inspect the metering pump system and associated tank gauges in the chemical treatment system to ensure that the required amount of the sodium or potassium silicate solution and cement is added to metal shredder residue in the pug mill to achieve the required treatment outcomes. Failure to operate the chemical treatment system correctly could result in potential harm. CTMSR that is insufficiently treated could result in contamination at the solid waste landfill and possible harm to the landfill personnel who come in contact with it.

Operational personnel must also be trained on the operation and maintenance of all pollution control equipment, and in the facilities' pollution control best management practices, to ensure that they are functioning properly and are not allowing for discharges that exceed permit standards or allowable limits. Failure to properly operate and maintain pollution control equipment, or to implement pollution control best management practices, could result in releases of hazardous waste or hazardous waste constituents that could expose people to health risks, contaminate the environment, or injure or harm other biological receptors outside the facilities' boundaries.

Required Monitoring to Ensure That Treatment and Storage of Metal Shredder Wastes Are Conducted in a Manner Which Safely and Effectively Manages Each Hazardous Waste

As discussed above, the treatment processes, and the pollution control equipment and pollution control best management practices, must be constantly monitored to ensure they are being operated and implemented effectively. Properly operating pollution control devices reduce emissions from the equipment and the potential for off-site migration and resulting risks due to inhalation, dermal absorption, air deposition, or surface water runoff. Local air districts require periodic analysis of the air emissions to verify that the equipment is operating properly and that emissions are within the allowable limits. Similarly, the RWQCBs require routine monitoring of surface water discharges (if any), and industrial sewer discharges (if any). This monitoring is also intended to verify that wastewater treatment systems are operating properly and that the discharges are within allowable limits. At some metal shredding facilities that have previous cases of soil contamination, the RWQCBs have also required groundwater to be monitored (where subsurface contamination has been confirmed). This monitoring is intended to identify migration of contaminants and potential threats to groundwater or drinking water sources.

3.3 Chemical and Physical Hazards Associated with Treatment and Storage

Health and Safety Code Section 25150.82(d)(3)(C) requires DTSC, if it intends to promulgate alternative management standards, to prepare an analysis of the chemical or physical hazards that are associated with the treatment and storage of metal shredder wastes and the degree to which those hazards are similar to, or different from, the chemical or physical hazards that are associated with the production processes that are carried out in the facilities that produce the hazardous waste that is managed as part of the activity.

The primary chemical hazards associated with the treatment and storage of metal shredder wastes are posed by the elevated soluble and total levels of lead, cadmium, copper, and zinc that are present in the wastes. The waste management practices that are common to the metal shredding facilities do not sufficiently contain or control the metal shredder aggregate, which allows the aggregate and its constituents to be released into the environment (both on and off-site). Metal shredder facility waste management practices have resulted in LFM and particulate containing the contaminants being released onto and outside of the metal shredding facilities. They have also resulted in the dispersion of metal shredder wastes outside of waste treatment equipment, arguably creating circumstances of unintentional disposal when the metal shredder waste is released or becomes separated from the waste treatment equipment or storage areas.

The greatest chemical hazards these hazardous waste constituents pose is when they or the waste they are within are not contained or otherwise controlled, and they are allowed to be released into the environment. This can result in contamination of the metal shredding facilities and potentially the areas near the metal shredding facilities, and may result in both the public and other biological organisms coming into contact with or being exposed to these hazardous constituents, and potentially suffering negative health impacts and harm.

The physical hazards associated with the treatment and storage of metal shredder wastes are hazards that would be common to the operation of large industrial equipment that is managing large amounts of material. The operation of the ferrous and non-ferrous separation processes and equipment must be done in conformance with Cal/OSHA worker safety requirements. DTSC collected reported incidents of worker injury reported to Cal/OSHA but did not find any incidents of accident or injury associated with the operation of the ferrous and non-ferrous separation equipment. DTSC also identified a 2004 fire at Vasco Road Landfill in Livermore in a pile of CTMSR that was being stored for use as alternative daily cover (which is further discussed in Section 5 of this Analysis). Fires in this waste would result in large plumes of dense smoke consistent with the burning of plastics and other synthetic materials that comprise the majority of the metal shredder wastes. The chemical constituents in this smoke can harm those who come in contact with it by, for example, exacerbating existing respiratory problems.

Additional chemical hazards associated with the treatment and storage of metal shredder residue and CTMSR are associated with the sodium or potassium silicate and alkaline cement treatment chemicals. The Material Safety Data Sheet for one brand of silicate solution indicates that it has no fire or explosion hazard, but also indicates that mist or sprays from the solution can cause chest discomfort and coughing; that direct contact can cause eye irritation; that prolonged or repeated contact can remove body oils from skin causing slight irritation; and that swallowing large amounts can cause nausea and vomiting. The Material Safety Data Sheet for cement indicates that it has no fire or explosion hazard but that inhalation of dust should be avoided, and that the cement can cause irritation of the eyes, skin and respiratory tract. Ingestion can also cause irritation of the gastrointestinal tract, which could be introduced to the scrap metal feed as MRSH.

Degree to Which Hazards Are Similar to, or Different From, Chemical or Physical Hazards Associated with Production Processes Carried Out in Facilities That Produce Metal Shredder Wastes

The metal shredder aggregate and metal shredder residue are produced at the same locations where their treatment and storage take place. They are not being produced at a different location, and are not transported to the metal shredding facilities to be treated. Landfill disposal of CTMSR, which occurs at locations other than the metal shredding facilities, is discussed in Section 5 of this Analysis.

3.4 Types of Accidents That Might Reasonably Be Foreseen During Treatment and Storage

Health and Safety Code Section 25150.82(d)(3)(D) requires DTSC, if it intends to promulgate alternative management standards, to prepare an analysis of the types of accidents that might reasonably be foreseen to occur during the management of particular types of hazardous waste streams, the likely consequences of those accidents, and the reasonably available actual accident history associated with the activity. In the context of this Analysis, the focus has been on accidents related to the treatment and storage of metal shredder wastes. As defined in Section 66260.10 of Title 22, California Code of Regulations, an accidental occurrence is an accident, including continuous or repeated exposure to conditions, which results in bodily injury, property damage or environmental degradation neither expected nor intended from the standpoint of the insured.

The types of accidents that might reasonably be foreseen to occur during the treatment and storage of metal shredder wastes include the following:

- Spills or releases of metal shredder wastes outside of conveyor systems and the ferrous and non-ferrous metal separation equipment
- Spills or releases of metal shredder residue and CTMSR outside of conveyor systems and the metal shredder residue treatment equipment
- Spills or releases of sodium or potassium silicate treatment solution outside the containers and tanks it is stored in
- Spills or releases of alkaline cement outside the containers and tanks it is stored in
- Failure of air pollution control equipment
- Fires in piles of the stored metal shredder waste, or in the metal shredder waste treatment equipment
- Meteorological events with high winds causing the wind-borne dispersal of metal shredder wastes outside the boundaries of the metal shredding facilities
- Earthquakes that could result in collapse or damage of buildings or equipment at the metal shredding facilities where metal shredder wastes are managed
- Flooding associated with local or regional events or unanticipated rainfall events

Likely Consequences of Accidents Reasonably Foreseen to Occur During Treatment and Storage of Metal Shredder Wastes

DTSC considered the likely consequences of the accidents reasonably foreseen to occur during the treatment and storage of metal shredder wastes. The waste management practices that are common to the metal shredding facilities do not sufficiently contain or control the metal shredder wastes, which has consistently allowed the metal shredder wastes and their constituents to be released into the environment, both on-site and off-site.

The consequence of any of the accidents listed above related to spills or releases of metal shredder wastes would be a contribution of additional contaminants to areas already impacted by releases of metal shredder wastes and their constituents, as well as to additional areas possibly well outside of the facility or areas in proximity that may already be impacted. The significance of the consequence of some of the more catastrophic events is amplified by the waste management practices being used by the metal shredding facilities. Because the metal shredder wastes are largely not contained at the facility, there is no factor that would limit or inhibit their release to the environment well outside of the facility boundaries, which could potentially result in more widespread impacts of the event.

The consequences of spills or releases of sodium or potassium silicate solution or alkaline cement would be localized in the area of the spill, likely limited to on-site impacts, and could result in both worker health and safety concerns, and could contribute additional chemical contaminants to areas already impacted by releases of metal shredder wastes and their constituents.

Reasonably Available Actual Accident History Associated with Treatment and Storage of Metal Shredder Wastes

In its search for accident history related to the treatment and storage of metal shredder wastes, DTSC could not find any records of accident events specifically related to the subject activities. The only accidents at locations associated with the subject activities were a fire and explosion in 2007 at SA Terminal Island (in the air pollution control equipment used to control emissions from its hammer mill) and a fire in 2004 at Vasco Road Landfill in Livermore (in a pile of CTMSR that was being stored for use as alternative daily cover). All other available accident history at metal shredding facilities was related to either the storage of vehicles, appliances, or other scrap metal prior to its processing in the facilities' hammer mill (2007 and 2012 incidents at Sims Metal Management in Redwood City), or to fires and explosions in a facility's hammer mill (a 2012 incident at Sims Metal Management in Redwood City). None of these accidents occurred in the treatment or storage of metal shredder wastes.

3.5 Demographics of Communities Around Metal Shredders

Health and Safety Code Section 25150.82(d)(3)(E) requires DTSC, if it intends to promulgate alternative management standards, to prepare an analysis of the types of locations where hazardous waste management activities associated with metal shredding and management of treated metal shredder waste may be carried out and the types of hazards or risks that may be posed by proximity to the land uses described in Section 25227 of the Health and Safety Code. The six metal shredding facilities are located in the cities of Anaheim, Bakersfield, Colton, Long Beach, Oakland, and Redwood City. These cities are some of California's most densely populated communities, and together they account for 10 percent of the state's population. According to City-Data.com, the majority of California's industrial workforce is located in the major manufacturing centers of Los Angeles–Long Beach–Orange County and the San Francisco–Oakland–San Jose area. Demographic information related to the areas where each metal shredding facility is located is presented in Table 7.

Table 7.

Demographics of Metal Shredding Facility Locations [a]

	Population [a]	Unemployment Rate [b]	Poverty Rate [c]
Anaheim	351,043	5.4%	16.5%
Bakersfield	376,380	8.4%	19.8%
Colton	54,712	5.8%	22.1%
Oakland	420,005	5.4%	20.4%
Redwood City	84,950	2.9%	9.4%
Long Beach	470,130	5.9%	20.6%

[a] United States Census Bureau, July 1, 2016
[b] California Employment Development Department, Labor Market Information Division, August 2017
[c] United States Census Bureau, 2015 American Community Survey, 5 Year Estimates

<u>Proximity of Treatment and Storage of Metal Shredder Wastes to Land Uses Described in Section 25227 of the Health and Safety Code</u>

Section 25227 of the Health and Safety Code lists the following sensitive land uses:

1) Residences, including mobile homes or factory-built housing constructed or installed for use as permanently occupied human habitation;
2) Hospitals for humans;
3) Schools for persons under 21 years of age;
4) Day care centers for children; and
5) Any permanently occupied human habitation, other than those used for industrial purposes.

A Geographical Information System (GIS) tool was used to evaluate the proximity of sensitive receptors (child care facilities, health care facilities, census housing data, and kindergarten through twelfth-grade schools, as identified in section 25227(c)(1)(B), Health and Safety Code) to metal shredding facilities and landfills that accept CTMSR. The location of each of the identified land uses was marked by geographic coordinates, and the property boundary was used for the metal shredding facilities and landfills. A tool was developed that found the closest sensitive receptor to each of the metal shredding facilities and landfills. In the case of residences, the tool evaluated the distance between the property boundary of the metal shredding facility or landfill and land parcels that are designated as residential, whether an occupied residential structure was on the parcel or not.

The following images of Schnitzer Steel in Oakland and Simi Valley Landfill in Simi Valley show the results of the geographic information system (GIS) mapping for the facilities and landfills. The location and proximity of child care facilities, health care facilities, residential housing, and schools are shown for the two facilities. Images for the additional facilities are included in Appendix C.

GIS mapping of Schnitzer Steel Products, Oakland CA, showing proximity to sensitive receptors.

GIS mapping of Simi Valley Landfill, Simi Valley CA.

Table 8 displays the results of DTSC's analysis, showing the closest distance between the metal shredding facilities and any of the identified land uses.

Table 8.

Distance to Sensitive Receptors

Location	Hospital for Humans	Schools (For Persons Under 21 Years of Age)	Day Care Centers (Children)	Residences
	Closest (in miles)	Closest (in miles)	Closest (in miles)	Closest (in miles)
SA Terminal Island	1.37	1.22	1.22	1.01
SA Anaheim	0.4	1.1	1.1	0.18
SA Bakersfield	1.6	1.4	1.12	0.1
Ecology Auto Parts	0.48	0.5	0.5	0.06
Sims Metal Management	1.58	1.57	1.79	0.73
Schnitzer Steel	0.35	0.12	0.39	0.23
Altamont Landfill	No health care facilities within 5 miles	3.8	No day care facilities within 3 miles	0.79
Holloway Landfill	3.89	3.59	No Day care facilities within 3 miles	3.68
Vasco Road Landfill	No health care facilities within 5 miles	1.37	1.85	0.02
Chiquita Canyon Landfill	0.91	1.2	0.91	0.12
Simi Valley Landfill	1.33	0.34	1.11	0.75

Table 8 shows that some of the metal shredder facilities or landfills where wastes are managed have sensitive land uses located within a mile of the facility. Sensitive land uses that are in close proximity would be especially vulnerable to releases that occur at metal shredding facilities or landfills.

Types of Potential Hazards Posed by Proximity of Metal Shredder Waste Activities to Land Uses Described in Health and Safety Code § 25227

The most likely hazard or risk posed by proximity to residences, hospitals, schools, day care centers, and other human habitation is the risk posed by off-site releases of hazardous waste, hazardous waste constituents, or treatment reagents. Releases of metal shredder waste and metal shredder waste constituents occur either as a result of routine, ongoing treatment or storage activities, or as a result of accidental occurrences. The proximity of these residential land uses to sites where metal shredder waste is being managed increases the risk and likelihood of exposure to those releases.

Regarding the potential impact of releases, it is important to consider the ambient background conditions that exist in communities near the metal shredding facilities evaluated and the landfills that accept CTMSR. To assess ambient conditions, DTSC used the CalEnviroScreen version 3.0 (CES) screening tool, created for CalEPA by the Office of Environmental Health Hazard Assessment (OEHHA). CES is a geospatial screening tool that evaluates a variety of factors, such as unemployment, potential exposures to pollutants, adverse environmental conditions, and the prevalence of certain health conditions, within census-designated tracts in California. Each census tract is assigned a unique CES score that incorporates the pollution and population factors specific to that census tract; a higher CES score indicates a greater burden on the community from activities occurring in the surrounding environment.[117] Vulnerable communities are identified by CalEPA as geographic areas with CES scores between the 75th and 100th percentiles.[118] The percentile indicates how each specific census tract ranks in relation to all of the census tracts throughout California (e.g., if a census tract is in the 80th percentile, it ranked higher than 80 percent of the remaining census tracts in California). Access to the mapping tool and additional information on the mapping tool development and application of indicators can be accessed on OEHHA's Web page.[119]

DTSC used the addresses of the metal shredding facilities and landfills that accept CTMSR to identify the census-designated tracts they are in, allowing the CES score and respective pollution and population information to be extracted. Census tract information for each metal shredding facility and landfill that accepts CTMSR is provided in Tables 9 and 10, respectively.

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[117] See Faust, J., August, L., Bangia, K., Galaviz, V., Leichty, J., Prasad, S., Schmitz, R., Slocombe, A., Welling, R., Wieland, W., and Zeise, L. Update to the California Communities Environmental Health Screening Tool, CalEnviroScreen 3.0. CalEPA OEEHA, January 2017. https://oehha.ca.gov/media/downloads/calenviroscreen/report/ces3report.pdf

[118] See Designation of Disadvantaged Communities Pursuant to Senate Bill 535 (De León), April 2017.

[119] See OHHEA https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-30

Table 9.

CalEnviroScreen 3.0 Population and Pollution Characteristics Near Metal Shredding Facilities

Facility Name & Address	CalEnviroScreen Percentile Range [a]	Population in Census Tract	Pollution Burden Percentile [b]	Population Characteristics Percentile [c]
SA Recycling, Terminal Island 901 New Dock Street Terminal Island, CA 90731	Not evaluated; low population, and health data are unreliable	61	99%	Incomplete evaluation; only asthma and cardiovascular disease contained data
SA Recycling, Anaheim 3200 East Frontera Street Anaheim, CA 92806	96 – 100%	6,488	97%	78%
SA Recycling, Bakersfield 2000 East Brundage Lane Bakersfield, CA 93307	96 – 100%	3,378	86%	99%
Ecology Auto Parts, Inc. DBA Pacific Rail Industries 785 East M Street Colton, CA 92324	96 – 100%	4,268	97%	96%
Sims Metal Management 699 Seaport Boulevard Redwood City, CA 94063	61 – 65%	2,108	86%	42%
Schnitzer Steel Products 1101 Embarcadero West Street Oakland, CA 94607	Not evaluated; low population, and health data are unreliable	71	63%	Incomplete evaluation; only asthma and cardiovascular disease contained data

[a] The CES score for each census tract is the product of multiplying the pollution burden by population characteristics. The CES percentile range displayed allows for a relative ranking of CES scores for all census tracts throughout California.
[b] Pollution burden is the average of the seven exposure indicator percentiles (ozone concentrations, PM 2.5 concentrations, diesel particulate matter emissions, drinking water contaminants, use of certain high-hazard and high-volatility pesticides, toxic releases from facilities, and traffic density) and the average of the five environmental effect indicator percentiles (toxic cleanup sites, groundwater threats from leaking underground storage sites and cleanups, hazardous waste facilities and generators, impaired water bodies, and solid waste sites and facilities). Note that the environmental effect indicator value was given half the weight of the exposure indicator when calculating the pollution burden value.
[c] Population characteristics is the average of the three sensitive population indicator percentiles (asthma emergency department visits, cardiovascular disease as indicated by emergency department visits for heart attacks, and low birth-weight infants) and the average of the five socioeconomic factor indicator percentiles (educational attainment, housing burdened low income households, linguistic isolation, poverty, and unemployment).

Three of the six metal shredding facilities are in census tracts with CES scores that fall between the 96th and 100th percentiles, meaning they are not only located in disadvantaged communities in California but are among those most burdened by pollution and population characteristics (SA Recycling in Anaheim, SA Recycling in Bakersfield, and Ecology Auto Parts; Table 9). Four of the six metal shredding facilities have a calculated pollution burden greater than 86 percent, and three of the six metal shredding facilities have a calculated population characteristic burden greater than 78 percent (Table 9). The location of these metal shredding facilities in disadvantaged communities demonstrates that any release of metal shredder wastes or metal shredder waste constituents would impact populations that are already burdened by other environmental factors, and those populations may exhibit greater sensitivity due to a variety of factors. The population and pollution characteristics near landfills that accept CTMSR are shown in Table 10.

Table 10.
CalEnviroScreen 3.0 Population and Pollution Characteristics Near Landfills That Accept CTMSR

Facility Name & Address	CalEnviroScreen Percentile Range [a]	Population in Census Tract	Pollution Burden Percentile [b]	Population Characteristics Percentile [c]
Altamont Landfill & Resource Recovery 10840 Altamont Pass Livermore, CA 94550	41 – 45%	7,081	93%	16%
H.M. Holloway Surface Mine Landfill 13850 Holloway Road Lost Hills, CA 93249	86 – 90%	3,937	95%	64%
Vasco Road Sanitary Landfill 4001 N. Vasco Road Livermore, CA 94550	41 – 45%	7,081	93%	16%
Chiquita Canyon Sanitary Landfill 29201 Henry Mayo Drive Castaic, CA 91384	66 – 70%	3,110	66%	59%
Simi Valley Landfill & Recycling Center 2801 Madera Road Simi Valley, CA 93065	31 – 35%	8,420	50%	24%
Potrero Hills Landfill 3675 Potrero Hills Lane Suisun City, CA 94585	56 – 60%	6,808	52%	55%

[a] The CES score for each census tract is the product of multiplying the pollution burden by population characteristics. The CES percentile range displayed allows for a relative ranking of CES scores for all census tracts throughout California.
[b] Pollution burden is the average of the seven exposure indicator percentiles (ozone concentrations, PM 2.5 concentrations, diesel particulate matter emissions, drinking water contaminants, use of certain high-hazard and high-volatility pesticides, toxic releases from facilities, and traffic density) and the average of the five environmental effect indicator percentiles (toxic cleanup sites, groundwater threats from leaking underground storage sites and cleanups, hazardous waste facilities and generators, impaired water bodies, and solid waste sites and facilities). Note that the environmental effect indicator value was given half the weight of the exposure indicator when calculating the pollution burden value.
[c] Population characteristics is the average of the three sensitive population indicator percentiles (asthma emergency department visits, cardiovascular disease as indicated by emergency department visits for heart attacks, and low birth-weight infants) and the average of the five socioeconomic factor indicator percentiles (educational attainment, housing burdened low income households, linguistic isolation, poverty, and unemployment).

One of the six landfills that accepts CTMSR is located in a disadvantaged community (H.M. Holloway Surface Mine Landfill). Three of the six landfills have a calculated pollution burden greater than 93 percent, and three of the six landfills have a calculated population characteristic burden between 55 percent and 64 percent, with the remaining three below 24 percent. While the CES scores and respective calculated pollution and population characteristic burdens are lower for landfills, the same conclusion regarding the populations' lowered ability to tolerate additional off-site releases could be made based on population size.

4 DEMONSTRATIONS REQUIRED TO ADOPT REGULATIONS

Pursuant to HSC Sections 25150.82(e)(1) through 25150.82(e)(4), the Legislature directed DTSC to make certain demonstrations in order to be authorized to adopt any alternative management standards. According to the Metal Shredding Facilities Law, DTSC cannot adopt alternative management standards unless it can make one of the following demonstrations:

1. The requirements that the alternative management standards replace are not significant or important in either of the following situations (Health and Safety Code Section 25150.82(e)(1)):
    a. Preventing or mitigating potential hazards to human health or safety or to the environment posed by the activity; or
    b. Ensuring that the activity is conducted in compliance with other applicable requirements of this chapter and the regulations adopted pursuant to this chapter.
2. A requirement is imposed and enforced by another public agency that provides protection of human health and safety and the environment that is as effective as, and equivalent to, the protection provided by the requirement, or requirements, that the alternative management standards replace (Health and Safety Code Section 25150.82(e)(2)).
3. Conditions or limitations imposed as part of the alternative management standards will provide protection of human health and safety and the environment that are equivalent to the requirement, or requirements, that the alternative management standards replace (Health and Safety Code Section 25150.82(e)(3)).
4. Conditions or limitations imposed as part of the alternative management standards accomplish the same regulatory purpose as the requirement, or requirements, that the alternative management standards replace, but at less cost or with greater administrative efficiency, and without increasing potential risks to human health or safety or to the environment (Health and Safety Code Section 25150.82(e)(4)).

DTSC must therefore satisfy one of the above required demonstrations in order to adopt any regulations establishing alternative management standards.

4.1 Hazardous Waste Management Requirements That Any Proposed Alternative Management Standards Would Replace

Each of the demonstrations in Section 25150.82(e) asks DTSC to analyze the requirements that the alternative management standards would replace, which are the existing hazardous waste management requirements. DTSC must therefore identify the existing hazardous waste management requirements that apply to metal shredding facilities. Any person who stores, treats, or disposes of hazardous waste must obtain either a full permit or a standardized permit from DTSC, unless the operation qualifies for coverage under a permit by rule. A full permit is a type of permit that is generally required for hazardous waste facilities that are managing federally regulated hazardous wastes, as well as for certain types of hazardous waste facilities managing California-regulated hazardous wastes (e.g., used oil recycling facilities). A standardized permit is a type of permit that is generally available for California facilities managing hazardous wastes that are not federally regulated. A facility with a standardized permit must comply with most of the operational requirements applicable to a full-permit facility, but the permit application process has been simplified. A permit by rule establishes management standards for covered facilities as a class, rather than on a facility-specific basis. The following is a description of the permit standards that would apply to metal shredding facilities under a full or a standardized permit.

Facility-wide Standards

Article 2. General Facility Standards – The requirements in this article ensure that a metal shredding facility is being operated according to standards that apply to all hazardous waste facilities. It includes operating requirements such as obtaining an identification number and conducting a waste analysis. It also includes inspection requirements, personnel training, location standards (relative to seismic faults and floodplains, e.g.), and construction quality standards (to ensure the constructed units meet or exceed all design criteria and specifications in the permit). Design standards must also be addressed for issues such as foundations, low-permeability soil liners, geomembranes (flexible membrane liners), leachate collection and removal systems and leak detection systems, and final cover systems.

Article 3. Preparedness and Prevention – The requirements in this article ensure that a metal shredding facility is located, designed, constructed, maintained, and operated to minimize the possibility of a fire, explosion, or any unplanned sudden or non-sudden release of metal shredder waste or metal shredder waste constituents to air, soil, or surface water.

Article 4. Contingency Plan and Emergency Procedures – The requirements in this article ensure a metal shredding facility has a plan and procedures in place for responding to emergencies.

Article 5. Manifest System, Recordkeeping, and Reporting – The requirements in this article ensure that a metal shredding facility is keeping accurate and complete records to document the disposition of metal shredder wastes under its management.

Article 7. Closure and Post-closure – The requirements in this article ensure that a metal shredding facility has developed a plan for when the facility eventually will close (and for post-closure if metal shredder wastes will remain), the required elements of that plan, and that the plan satisfies the requirements to certify that closure is complete.

Article 8. Financial Requirements – The requirements in this article ensure that a metal shredding facility has preserved sufficient financial resources to carry out its closure plan and certify closure of the facility, as well as to carry out a post-closure plan if applicable. This article also specifies insurance requirements to ensure a metal shredding facility has resources available to respond to sudden and non-sudden releases.

Article 9. Use and Management of Containers – The requirements in this article ensure that a metal shredding facility manages hazardous wastes in containers safely.

Article 10. Tank Systems – The requirements in this article ensure that a metal shredding facility manages metal shredder wastes in tanks (if used) safely.

Article 17. Environmental Monitoring and Response Programs for Air, Soil, and Soil-pore Gas for Permitted Facilities – The requirements of this article ensure that impacts resulting from metal shredder waste management activities are detected and responded to as quickly as possible.

Waste Pile Standards

As presented in both Section 1 and Section 3, the common way that metal shredder facilities store metal shredder wastes is in waste piles. In addition to the above requirements, "land disposal"[120] of metal shredder waste is subject to additional requirements; some generally apply to all land disposal methods, and some are specific to the method being used. "Land disposal method" is defined in Section 66260.10, Title 22, California Code of Regulations as "disposal of hazardous wastes on or into the land, including, but not limited to, landfill, surface impoundment, *waste piles*, deep-well injection, land spreading and co-burial with municipal garbage" (emphasis added), as well as "storage of hazardous wastes on or in the land, such as *waste piles* and surface impoundments, other than neutralization and evaporation ponds, for longer than one year" (emphasis added). "Pile or waste pile" is defined in that same section of regulations as "any noncontainerized accumulation of solid, nonflowing hazardous waste that is used for treatment or storage and that is not a containment building."

Because metal shredder wastes are stored in waste piles, the following articles in Chapter 14, Title 22, California Code of Regulations would apply to metal shredding facilities:

Article 6. Water Quality Monitoring and Response Programs for Permitted Facilities – The requirements in this article ensure that metal shredder waste constituents are not migrating from the waste pile, and mandate that the metal shredding facility perform corrective action when releases are detected.

Article 12. Waste Piles – The requirements in this article ensure that the metal shredder waste being stored in waste piles does not migrate via wind, surface water, or groundwater, and specify monitoring and leak detection requirements.

Waste Management Unit Specific Standards Applicable to Metal Shredding Facilities

Containment Building Standards: Many of the metal shredder waste management activities at metal shredding facilities are not conducted in containers or tanks or other devices that would prevent the release of metal shredder wastes and metal shredder waste constituents into the environment. One method to contain potential releases is to conduct the metal shredder waste management activities inside a "Containment Building." A "Containment Building" is, according to Section 66264.1100, Title 22, California Code of Regulations, "a completely enclosed, self-supporting structure that is designed and constructed of manmade materials" meeting specified design standards, "has controls sufficient to prevent fugitive dust emissions," and "is designed and operated to ensure containment and prevent the tracking of materials from the unit by personnel or equipment." None of the metal shredding facilities evaluated by DTSC have installed or constructed a building that meets the design standards required by the regulation and would meet the definition of a containment building. If a metal shredding facility chose to use a containment building to demonstrate that it was conducting treatment in a building that was equivalent to a container or tank or other device, it would need to meet the standards applicable to Containment Buildings found in Article 29 in Chapter 14.

[120] According to Section 66260.10, Title 22, California Code of Regulations, "'Land disposal' means placement in or on the land, except in a corrective action management unit, and includes, but is not limited to, placement in a landfill, surface impoundment, waste pile, injection well, land treatment facility, salt dome formation, salt bed formation, underground mine or cave, or placement in a concrete vault or bunker intended for disposal purposes."

Article 16. Miscellaneous Unit Standards: The metal shredding facilities are also using metal shredder waste management methods for which DTSC has not established specific management standards (e.g., conveyor systems used to transport metal shredder wastes between locations where it is being stored and treated). DTSC applies the standards applicable to Miscellaneous Units for any metal shredder waste management activities that are conducted in units for which no specific standards have been developed. The standards applicable to Miscellaneous Units are found in Article 16 in Chapter 14:

The requirements in this article ensure that the unit is located, designed, constructed, operated, maintained, and closed in a manner that ensures protection of human health and the environment. This article establishes performance and operating standards for hazardous waste management units that do not fit into any of the other unit descriptions. The applicable standards include requirements for monitoring, testing, analytical data, inspections, response, and reporting procedures and frequency.

The above hazardous waste permit standards are applied through a review of an application submitted by the facility operator to DTSC, unless the facility is covered by a permit by rule. The review is followed by the development of tailored specific permit conditions that are incorporated into an operations plan, and that detail the requirements applicable to the metal shredder facility, the metal shredder wastes being managed, the equipment and management methods being used, and the operator conducting the metal shredder waste management activities. These elements of the operations plan form the basis of the metal shredding facility's permit, and would provide the grant of authorization for the metal shredding facility to operate.

4.2 Demonstrations Required to Adopt Alternative Management Standard Regulations

The demonstrations in Section 25150.82(e) require DTSC to compare the alternative management standards to the requirements the alternative management standards would replace. In preparing this Analysis and its demonstrations, DTSC contemplated whether the Legislature intended DTSC to compare possible alternative management standards to the requirements currently in place under the "f letters" and OPP 88-6. DTSC dismissed this approach because the legislative intent of the Metal Shredding Facilities Law stated that "[i]t is the intent of the Legislature that the conditional nonhazardous waste classifications, as documented through the historical 'f letters,' be revoked and that metal shredding facilities be thoroughly evaluated and regulated to ensure adequate protection of human health and the environment." Furthermore, the regulation authorizing the "f letters" (subdivision (f) of Section 66260.200, Title 22, California Code of Regulations) merely addresses how waste is classified, not how it is managed. OPP 88-6 does contain such standards, but it is intended as policy for DTSC only, and is not authorized by any law. DTSC therefore must compare any proposed alternative management standards to existing hazardous waste control law.

4.2.1 First Demonstration Required by HSC § 25150.82(e)(1)

Pursuant to HSC Sections 25150.82(e)(1) through 25150.82(e)(4), the Legislature directed DTSC to make certain demonstrations in order to be authorized to adopt any alternative management standards. According to HSC Section 25150.82(e)(1), DTSC cannot adopt alternative management standards under the law's authority unless the requirements which the alternative management standards would replace are not significant or important in either of the following situations:

a. Preventing or mitigating potential hazards to human health or safety or to the environment posed by the activity; or
b. Ensuring that the activity is conducted in compliance with other applicable requirements of this chapter and the regulations adopted pursuant to this chapter.

Under this demonstration, DTSC must first evaluate whether permit requirements for metal shredding facilities are significant or important in 1) preventing or mitigating potential hazards to human health or safety and the environment or 2) ensuring compliance with other hazardous waste requirements.

Risks Addressed by Permit Standards Are Significant

Based on DTSC's analysis, the current treatment and storage practices of metal shredding facilities allow for releases of metal shredder wastes and their constituents into the environment. Releases also occur throughout the facilities' entire operational areas. These releases have resulted in significant soil contamination at each of the sites in areas of the metal shredding facilities where pavement had not been installed. For those metal shredding facilities which are paved, DTSC has not evaluated the construction or integrity of the pavement. The heavy metals stored on pavement and equipment used to transport metals easily degrade most types of pavement over time. The pavement's long-term integrity is therefore unknown.

In addition, as described in the information DTSC received from the RWQCBs (presented in Section 2.3), the pavement at most facilities has not been present for the entire operational history. In some cases, pavement was required in response to releases or enforcement actions. Soil contamination is likely to be present beneath the paved surfaces at all of them because these facilities lacked suitable safeguards to prevent releases of the metal shredder wastes.

DTSC has also identified (as presented in Section 2.3) many documented incidents of the dispersion of metal shredder wastes outside of facility boundaries. These emissions of light fibrous materials have been found to exceed regulatory thresholds when the LFM have been chemically tested.

DTSC has determined that the permitting standards are significant and important in addressing the soil and air releases identified above. Permit requirements are comprehensive, as outlined in Section 4.1. They address every aspect of hazardous waste management and would be tailored to each facility's operations. The installation of pavement would protect against further contamination of soil beneath the facilities, and approved treatment processes and structures would mitigate releases to areas outside of the facility perimeter. DTSC's permit application and review process will correct the potential for releases before they can result in impacts to human health or the environment.

DTSC has also determined that the permitting standards would ensure that metal shredding waste management is conducted in compliance with the Hazardous Waste Control Law and its implementation regulations. The permit mandates the most robust management standards that can govern a metal shredding facility. The permit addresses every aspect of hazardous waste management and ensure comprehensive oversight of the facility, providing the best guarantee that Chapter 6.5 of the Health and Safety Code and Title 22, California Code of Regulations are followed. Storage, treatment, and disposal are all overseen by a permit's authority. No other level of oversight is as equipped to ensure compliance with hazardous waste management as a facility permit issued by DTSC.

Based on these factors, DTSC cannot conclude that the existing hazardous waste management regulations and the hazardous waste facility standards are not significant or important in either:

1) preventing or mitigating potential hazards to human health or safety or to the environment, or

2) ensuring that the activity is conducted in compliance with other applicable requirements of Chapter 6.5 of the Health and Safety Code and Title 22, California Code of Regulations. DTSC was therefore unable to make this demonstration.

4.2.2 Second Demonstration Required by HSC § 25150.82(e)(2)

According to HSC Section 25150.82(e)(2), DTSC cannot adopt alternative management standards under the law's authority unless a requirement is imposed and enforced by another public agency that provides protection of human health and safety and the environment that is as effective as, and equivalent to, the protection provided by the requirement, or requirements, that the alternative management standards replace. In analyzing this second demonstration, DTSC evaluated whether the requirements imposed and enforced by other public agencies are equivalent to, or as effective as, the existing hazardous waste management regulations and the hazardous waste facility standards that are presented in detail in Section 4.1 above. As presented in Section 2.3, there are several environmental regulatory agencies that oversee or exercise jurisdiction over some activities at metal shredding facilities. These other environmental regulatory agencies exercise their jurisdiction and authority over the environmental media they are mandated to protect (e.g., the requirements implemented and enforced by the local air districts are intended to protect air quality, and the requirements implemented and enforced by the RWQCBs are intended to protect water quality). Still other agencies, such as Cal/OSHA, implement and enforce requirements intended to protect worker health and safety. None of these agencies oversee the entirety of the metal shredding facilities' treatment and storage of metal shredder wastes.

DTSC implements and enforces requirements intended to ensure that the treatment and storage of hazardous wastes are performed in a manner that protects the broader spectrum of public health and safety and the environment. The metal shredding facilities' generation and management of metal shredder wastes are all hazardous waste management activities. DTSC is the primary regulatory agency that oversees and regulates the treatment, storage, and disposal of hazardous wastes. No other agency provides oversight as broad as DTSC.

Lastly, DTSC's determination that metal shredder waste is hazardous is relied upon by other agencies. These agencies determine the scope of their respective authorities based on DTSC's classifications. No other agency can therefore regulate metal shredding facilities absent the regulatory involvement of DTSC and its requirements as the first line of defense for risks to human health and the environment.

Based on this, DTSC was not able to conclude that the requirements imposed and enforced by other public agencies are equivalent to, or as effective as, existing hazardous waste management regulations and hazardous waste facility standards.

DTSC was therefore unable to make the demonstration required by HSC Section 25150.82(e)(2).

4.2.3 Third Demonstration Required by HSC § 25150.82(e)(3)

According to HSC Section 25150.82(e)(3), DTSC cannot adopt alternative management standards under the law's authority unless conditions or limitations imposed as part of the alternative management standards will provide protection of human health and safety and the environment equivalent to the requirement, or requirements, that the alternative management standards replace.

DTSC evaluates here whether any alternative management standards could achieve an equivalent level of protection as the existing hazardous waste management regulations and the hazardous waste facility standards described in detail in Section 4.1 above. The highest level of protection is offered by a hazardous waste facility permit. These permits are tailored to ensure that permitted facilities are located, designed, constructed, maintained, and operated to minimize the possibility of a fire, explosion, or any unplanned releases to the environment.

As discussed throughout this Analysis, the current storage and treatment practices of metal shredding facilities have allowed for the release of metal shredder wastes and their constituents into the environment and their dispersal throughout the facilities' entire operational areas. These releases have resulted in significant amounts of soil contamination at each of the sites as well as impacts outside of facility boundaries.

Based on the observations of releases at metal shredding facilities, in addition to operational standards that are intended to prevent releases, alternative management standards must require the use of containment buildings that meet the Chapter 14, Article 29 standards for Containment Buildings, the pavement and liner requirements for Waste Piles in Chapter 14, Article 12, the environmental monitoring requirements for Water Quality Monitoring and Response Programs for Permitted Facilities in Chapter 14, Article 6, and the general requirements for Preparedness and Prevention in Chapter 14, Article 3 facility standards. These detailed requirements are not established within the regulations. Rather, the regulations establish the general objectives that are to be achieved, but the detailed requirements that would be carried out at each site are developed as part of the permitting process.

These permits must also consider the variability between facilities' operations, treatment equipment, pollution control equipment and practices, and environmental setting and proximity to nearby sensitive land uses, such as residences, schools, day care centers, and hospitals. Permits are also the only way to develop and apply standards to waste management units and activities for which specific standards do not exist. The development of a permit, and the application of the general permit standards to the site and the specific operations, equipment, and operator, tailor the hazardous waste management requirements in a way that can account for each facility's unique operations and location. In DTSC's view, this has been and continues to be the most effective method to achieve protection of human health or safety and the environment from risks and hazards posed by the treatment and storage of metal shredder wastes.

Considering the waste management practices that are being implemented by the metal shredding facilities, DTSC cannot envision a set of alternative management standards that could provide the required amount of detail within the regulations to achieve the intended safeguards and protections. The hazardous waste management requirements for permitted facilities are tailored or adapted to the industry-specific circumstances through the administration of the unique permit standards. Absent this tailoring, the safeguards and protections that could be achieved through alternative management standards would not be considered "equivalent" to those provided by the hazardous waste management requirements for permitted facilities.

DTSC was therefore unable to make the demonstration required by HSC Section 25150.82(e)(3).

4.2.4 Fourth Demonstration Required by HSC § 25150.82(e)(4)

According to HSC Section 25150.82(e)(4), DTSC cannot adopt alternative management standards under the law's authority unless conditions or limitations imposed as part of the alternative management standards accomplish the same regulatory purpose as the requirement, or requirements, that the alternative management standards replace, but at less cost or with greater administrative efficiency, and without increasing potential risks to human health or safety or to the environment.

DTSC evaluated whether any conditions or limitations that could be imposed as part of the proposed alternative management standards could accomplish the same regulatory purpose as the existing hazardous waste management regulations and the hazardous waste facility standards, regardless of their cost or administrative efficiency.

As described in the discussion of the Second and Third Demonstrations (see Sections 4.2.2 and 4.2.3 above), metal shredding facilities' treatment and storage of metal shredder wastes has allowed the release of metal shredder wastes and their constituents into the environment and throughout the facilities' operational areas.

DTSC has previously adopted alternative management standards of other hazardous wastes to promote administrative efficiency and lower costs (e.g., the Standards for Universal Waste Management in Chapter 23 of Title 22, California Code of Regulations or the Requirements for Units and Facilities Deemed to Have a Permit by Rule in Chapter 45 of Title 22, California Code of Regulations). In those cases, DTSC could make the required demonstration that reduced compliances costs and added administrative efficiency offered by those regulations did not sacrifice the necessary protections to human health and safety and to the environment. DTSC was able to make the demonstrations because the quantities of hazardous waste being managed under those alternative management standards were much smaller. In addition, the types of waste management activities being used with those wastes were limited, and because of that, detailed operating requirements could be developed and included in the alternative management standards that were adopted.

DTSC evaluated requirements that apply to permitted facilities to assess whether DTSC can propose a less costly or more administratively streamlined option that would not increase potential risks to human health or the environment.

<u>Article 7. Closure and Post-closure</u> – The requirements in this article ensure that metal shredding facilities develop a plan for when the facility eventually will close (and for post-closure, if hazardous wastes will remain). The article specifies the required elements of those plans, and the requirements to certify that closure is complete.

As described in this Analysis, the metal shredding facilities have been designed and operated in a manner that has resulted in significant surface and subsurface contamination. The facilities also manage significant quantities of hazardous wastes. Upon closure, these facilities may require a significant amount of waste disposal and environmental cleanup. In DTSC's experience, a closure plan becomes more complicated, and its contents more critical, when larger volumes of hazardous waste and numbers of hazardous waste units are present at a permitted hazardous waste facility. In addition, a closure plan is increasingly more complicated when the soil beneath waste management units, or beyond waste management units, has been contaminated with hazardous wastes or constituents of the hazardous wastes. As documented in the Analysis, each metal shredding facility manages significant quantities of metal shredder waste. The shredder waste management areas encompass large proportions of their sites. As also documented in the Analysis, there have been significant releases of metal shredder wastes over the facilities' many years of operation, which has contaminated not only those areas where metal shredder wastes have been managed, but also areas well outside the metal shredder waste management areas, including areas outside of their site boundaries. These facts make closure of metal shredding facilities complex and expensive and in need of significant regulatory oversight. The lack of a robust closure plan could result in unaddressed long-term contamination at a site that could impact public health and the environment, with the cost of remediation to be paid for by public funds, if the contamination is remediated at all.

Closure plans for metal shredding facilities will require significant effort to prepare and are likely to require significant review and feedback from DTSC, as well as revisions based on that feedback. DTSC has imposed limited closure requirements in other alternative management standards it has adopted. In those instances, the closure requirements are either overseen by CUPAs or self-implemented and verified afterwards by DTSC. DTSC has included closure requirements in other alternative management standards it has previously adopted, such as its Universal Waste standards and its Permit by Rule standards. In those cases, the volumes of hazardous waste being managed are much more limited. In addition, the types of waste management activities and the types of waste management equipment being used are also more limited, and DTSC was able to tailor the regulations to include sufficient detail for them to be self-implemented, and later verified by either DTSC or a CUPA as being complete.

Because of the volume of metal shredder waste involved, the number of metal shredder waste management units present, and the amount of contamination that exists, DTSC does not believe a self-implementing or post-implementation verification could achieve an equivalent standard of protecting human health and the environment. A permit is necessary.

Article 8. Financial Requirements – The requirements in this article ensure that permitted metal shredding facilities preserve sufficient financial resources to carry out their closure plan and certify closure of the facility, as well as to carry out an approved post-closure plan if applicable. This article also specifies insurance requirements to ensure the facility has resources available to respond to sudden and non-sudden releases.

As described in this Analysis, the historical operation of the metal shredding facilities in their locations has resulted in significant surface and subsurface contamination. Because of this, the cost of closing the facilities, as well as potential post-closure and corrective action costs, are likely to be substantial. If the metal shredding facilities fail to set aside sufficient funds to pay for the costs of closure, post-closure and corrective action, the costs are likely to fall on California taxpayers and fee payers.

DTSC has imposed financial assurance requirements in other alternative management standards it has adopted. In those instances, the financial assurance mechanisms are for far lower values than metal shredding operations, management, and closure would entail because the amounts of hazardous waste are much smaller and the costs of closure much lower.

The metal shredding facilities manage very large amounts of metal shredder waste. They also employ a large number of metal shredder waste management units. Finally, each of the metal shredding facilities reviewed has significant amounts of soil contamination. The costs of closure (and, potentially, corrective action) may be significant. DTSC believes administering financial assurance requirements through alternative management standards would jeopardize California taxpayers and fee payers, increasing their risk of being required to pay the price of closing and cleaning up the metal shredding facilities. The permitting process will go further to ensure accurate financial assurance is implemented under stricter oversight.

Article 6. Water Quality Monitoring and Response Programs for Permitted Facilities; and Article 17. Environmental Monitoring and Response Programs for Air, Soil, and Soil-pore Gas for Permitted Facilities: The requirements in these articles, applicable to surface impoundments, waste piles, land treatment units, or landfills, ensure that metal shredder waste constituents are not migrating from the metal shredder waste management units, and mandate that corrective action be performed when releases are detected.

As described in this Analysis, the metal shredding facilities have caused significant environmental contamination. In addition, the metal shredding facilities' current metal shredder waste management activities (e.g., management of hazardous wastes in piles) continue to contaminate the environment. The environmental monitoring programs described in this article are essential to both define the extent of contamination and to determine whether the releases from the metal shredding facilities are migrating off-site and posing a threat to the public and the environment, including groundwater. DTSC believes the environmental monitoring requirements are essential to protect human health and safety and the environment from the impacts of releases that occur during management of hazardous wastes. DTSC also believes administering the environmental monitoring requirements through alternative management standards would increase potential risks to human health or the environment. Requirements that could be implemented as alternative management standards would need to incorporate all of the detail necessary to ensure that the monitoring to be performed collects sufficient samples of the appropriate environmental media, in the appropriate locations, and to ensure that they are chemically analyzed for the contaminants of concern. Except in very limited cases, these details cannot be generalized or anticipated, but must be developed based on specific information. This is why the environmental monitoring requirements for permitted facilities are developed based on specific information that is gathered and evaluated as part of the permitting process.

Article 12. Waste Piles – The requirements in this article ensure that the metal shredder waste being stored in waste piles does not migrate via wind, surface water, or groundwater. The article specifies design and operating standards for the storage of metal shredder waste in waste piles, and specifies monitoring and leak detection requirements.

As presented in this Analysis, most of the management of metal shredder wastes is taking place in waste piles. This historical practice has resulted in significant environmental contamination and migration of contaminants from the metal shredder wastes, including LFM. DTSC believes the design and operating requirements for waste piles are essential to protect human health and safety and the environment from threats posed by the storage of metal shredder waste in waste piles on ground surfaces. DTSC also believes administering the waste pile requirements through alternative management standards would increase potential risks to human health or the environment.

Article 29. Containment Buildings – The requirements in this article ensure that metal shredder wastes managed in containment buildings are not released into the environment. The article establishes the design and operating standards for containment buildings.

The only management standard that DTSC could envision that would limit the risks and hazards posed by the storage of metal shredder waste in waste piles would be a prohibition on the use of waste piles. Releases from the metal shredder waste treatment and storage activities at the metal shredding facilities could be significantly controlled if they were conducted within containment buildings that met the Article 29 standards.

As described in this Analysis, the metal shredding facilities manage significant quantities of hazardous wastes. The design and construction of containment buildings that meet the Article 29 standards becomes more complicated, and the contents of proposed plans more critical, when larger volumes of hazardous wastes are being managed at the permitted hazardous waste facility. In addition, the shredder waste management areas encompass large proportions of their sites, which would require larger structures to contain the metal shredder waste management operations and releases from those operations.

The design plans for containment buildings at the metal shredding facilities will require significant effort to prepare, and are likely to require significant review and feedback from DTSC, with revisions based on that feedback. DTSC is aware of occasions where generators without permits have been able to install containment structures that meet their secondary containment requirements for container and tank storage. However, those instances involve much smaller quantities of hazardous wastes and far smaller containment buildings.

Because of the large volume of metal shredder waste involved and the large number of metal shredder waste management units that would need to be covered by a containment building, DTSC does not believe a containment building requirement that is self-implementing could control the potential risks to human health and the environment.

Based on these factors, DTSC cannot conclude that any alternative management standard DTSC could propose, or any conditions or limitations that could be imposed as part of those alternative management standards, could accomplish the same regulatory purpose as the existing hazardous waste management regulations and the hazardous waste facility standards, regardless of their cost or administrative efficiency. DTSC is therefore unable to make this demonstration.

4.3 Conclusions of the Required Demonstrations

DTSC evaluated the hazardous waste management activities at metal shredding facilities, and analyzed those activities to determine the hazards and risks that are posed to the surrounding communities. Based on those evaluations and analyses, the Metal Shredding Facilities Law authorizes DTSC to adopt alternative management standards if it can satisfy one of the demonstrations required by HSC Sections 25150.82(e)(1) through 25150.82(e)(4). DTSC has assessed each of the four demonstrations to determine whether alternative management standards would provide adequate safeguards for human health and safety and the environment.

In the first demonstration, DTSC evaluated whether the requirements of existing hazardous waste control law, including the requirement to obtain a permit to conduct hazardous waste treatment and storage activities, are significant or important in preventing or mitigating potential hazards to human health or safety and the environment, or in ensuring compliance with other hazardous waste requirements.

DTSC found that the current practices for treatment and storage of hazardous waste at the facilities have allowed for releases of metal shredder wastes and their constituents into the environment. DTSC documented releases that resulted in soil contamination, contaminated storm water runoff, and emissions of light fibrous materials outside the boundaries of the facility. DTSC found that current practices create potential hazards to human health or safety and the environment.

DTSC determined that the existing permitting standards would ensure that metal shredding waste is managed in compliance with existing hazardous waste control law. The facility permit mandates the most robust management standards that can govern a metal shredding facility. No other level of oversight is as equipped to prevent or mitigate potential hazards to human health or safety and the environment, or to ensure compliance with other hazardous waste requirements, as a facility permit issued by DTSC; however depending on certain factors, a permit by rule may provide adequate protections.

In the second demonstration, DTSC evaluated whether the requirements imposed and enforced by other public agencies are equivalent to, or as effective as, the existing hazardous waste control law. Several public agencies exercise jurisdiction and provide regulatory oversight of metal shredding facilities, including local air districts, the regional water boards, and the CUPAs. However, DTSC found that none of these agencies oversee the entire range of hazardous waste management activities at the metal shredding facilities.

DTSC found that the requirements of hazardous waste control law are the most effective means to ensure that hazardous waste management activities are performed in a manner that protects the broader spectrum of public health and safety and the environment. DTSC is the primary regulatory agency that oversees and regulates the treatment, storage, and disposal of hazardous wastes.

Further, those other agencies rely upon DTSC's determination that metal shredder waste is hazardous waste. The scope of the agencies' respective authorities is then based on DTSC's determination. Therefore, no other agency can regulate metal shredding facilities absent the regulatory involvement of DTSC.

In the third demonstration, DTSC evaluated whether conditions or limitations could be developed that would provide protection of human health and safety and the environment equivalent to the requirement, or requirements, of existing hazardous waste control law. DTSC determined that the highest level of protection of human health and safety and the environment is offered by a hazardous waste facility permit.

These permits are tailored to ensure that facilities are located, designed, constructed, maintained, and operated to minimize the possibility of a fire, explosion, or any unplanned releases to the environment. These detailed requirements are not established within the regulations. Rather, the regulations establish the general objectives that are to be achieved at the facility, but the detailed requirements that would be established at each permitted site are developed as part of the hazardous waste permitting process.

DTSC found that the hazardous waste permit is the most effective method to achieve protection of human health or safety and the environment from risks and hazards posed by the treatment and storage of hazardous wastes. Absent this industry-specific tailoring, any safeguards and protections that could be developed would not be considered “equivalent” to those provided by the hazardous waste management requirements for permitted facilities.

In the fourth demonstration, DTSC evaluated whether conditions or limitations could be imposed that would accomplish the same regulatory purpose as the requirement, or requirements, of existing hazardous waste control law, but at less cost or with greater administrative efficiency, and while preventing potential risks to human health or safety or to the environment.

DTSC evaluated requirements that apply to permitted facilities to assess whether DTSC could propose a less costly or more administratively efficient option that would not increase potential risks to human health or the environment. Requirements on permitted facilities include Closure and Post-closure plans, Financial Assurance, and Environmental Monitoring and Response Programs.

DTSC found that because of the volume of metal shredder waste involved, the number of metal shredder waste management units present, and the amount of contamination that already exists, no self-implementing or post-implementation verification of these requirements could achieve an equivalent standard of protection for human health and safety and the environment, unless key conditions can be addressed to ensure effectiveness of a permit by rule.

Based on these four determinations, DTSC cannot conclude that alternative management standards would provide adequate safeguards for human health and safety and the environment:

- DTSC was not able to conclude that the existing hazardous waste management regulations are not significant or important in preventing or mitigating potential hazards to human health or safety or to the environment, or in ensuring that the activity is conducted in compliance with other applicable requirements.
- DTSC could not conclude that the requirements imposed and enforced by other public agencies are equivalent to, or as effective as, existing hazardous waste management regulations and hazardous waste facility standards.
- DTSC did not find any safeguards and protections that could be achieved through alternative management standards that would be considered “equivalent” to those provided by the hazardous waste management requirements for permitted facilities.
- DTSC found that any alternative management standards, conditions, or limitations that DTSC could propose would not accomplish the same regulatory purpose as existing hazardous waste management regulations and the hazardous waste facility standards, regardless of their cost or administrative efficiency.

DTSC has shown that there is no factual basis to make any of the four demonstrations required by the Metal Shredding Facilities Law. Therefore, DTSC will not adopt regulations to establish alternative management standards under the authority of the Metal Shredding Facilities Law.

5 CLASSIFICATION AND DISPOSAL OF CTMSR

Subdivision (i) of Section 25150.82 of the Health and Safety Code authorizes the alternative management standards adopted by DTSC to allow Chemically Treated Metal Shredder Residue to be classified and managed as nonhazardous waste. In order for this allowance to occur, DTSC's analysis must demonstrate that classification and management as hazardous waste is not necessary to prevent or mitigate potential hazards posed by CTMSR to human health or safety or to the environment.

CTMSR is currently disposed in six landfills (although 22 landfills are authorized to accept the waste for disposal). Altamont Canyon Landfill and Simi Valley Landfill typically receive approximately 60 percent of the state's total CTMSR for disposal.[121] The six California landfills currently accepting CTMSR for disposal or for use as alternative daily cover (ADC) are shown in Table 11.

Table 11.
Landfills Accepting CTMSR

Landfill	Amount Accepted in 2014	Amount Accepted in 2015	Amount Accepted in 2016
Altamont Landfill & Resource Recovery 10840 Altamont Pass Livermore, CA 94550	163,402	146,058	167,179
Simi Valley Landfill & Recycling Center 2801 Madera Road Simi Valley, CA 93065	142,727	141,677	151,633
Vasco Road Sanitary Landfill 4001 Vasco Livermore, CA 94550	94,969	73,137	83,785
Chiquita Canyon Sanitary Landfill 29201 Henry Mayo Drive Castaic, CA 91384	60,351	73,406	85,999
Potrero Hills Landfill 3675 Potrero Hills Lane Suisun City, CA 94585	56,137	43,198	30,612
H.M. Holloway Surface Mine Landfill Lost Hills, CA 93249	24,396	N/A	N/A

The H.M. Holloway Landfill is an industrial landfill that does not accept municipal solid waste and does not use CTMSR as alternative daily cover. At Altamont and Vasco Road landfills, CTMSR is also used to

[121] See Disposal Reporting System, California Solid Waste Statistics, CalRecycle, available at: http://www.calrecycle.ca.gov/lgcentral/Reports/DRS

absorb free liquids from other liquid or semi-solid wastes. Wastes which have free liquids are mixed with CTMSR until the combined material has greater than 50 percent solids by volume. The solidified waste is then transported to the active face of the landfill for use as ADC.

In the surveys they completed, the landfills reported that, except for rare occasions, CTMSR is used almost immediately for ADC and is not stored for periods exceeding two weeks or in amounts exceeding 300 tons at any of the landfills. The information from their surveys also indicated that the handling of CTMSR used as ADC at each of the landfills is similar. Upon arrival, the load of CTMSR is deposited in piles near the active face of the landfill where putrescible municipal wastes are being deposited. The municipal wastes are deposited into cells which contain one day's waste. As the cell is filled, the waste is compacted and then covered with CTMSR. At the end of each working day, the active face is completely covered with CTMSR that acts as a daily cover. ADC is placed over the municipal wastes at the end of each operating day to control vectors, fires, odors, blowing litter, and scavenging. The handling at H.M. Holloway is different, because it does not accept municipal solid waste that requires the use of ADC, but instead disposes CTMSR directly.

5.1 Regulatory Oversight of Disposal of CTMSR

5.1.1 Water Quality: Regulation of Landfills by RWQCBs

According to the Santa Ana RWQCB: "The State Water Resources Control Board (SWRCB) issued two General Permits (General Industrial Activities Storm Water Permit and the General Construction Activity Storm Water Permit) to address most of the industrial facilities and the construction-sites within California. Individual storm water permits were adopted by a number of regional boards, including the Santa Ana Regional Board in Region 8. The regional boards administer the State's General Permits and the regional board's individual permits. The Santa Ana Regional Board adopted a sector-specific General Permit for storm water discharges from certain industrial facilities identified by the Standard Industrial Classification (SIC) Code 5093, specifically identifying metal scrap recyclers (excluding recycling facilities that only receive recyclable materials where no processes are performed on the metal scrap other than sorting, compaction, storage and transport). This sector-specific permit (R8-2012-0012, CAG 618001) was adopted on February 10, 2012."[122] The Industrial General Permit (2014-0057-DWQ) became effective on July 1, 2015.

Per information provided by the SWRCB, facilities are required to obtain permit coverage under the Industrial General Permit (IGP) if they operate under a SIC code that is subject to the permit. Typically, recyclers fall into SIC 5015 or 5093, and landfills fall under SIC 4953, which all generally require permit coverage. These industrial activities are federally defined, and the IGP lists applicable activities in "Attachment A" of the general permit order (2014-0057-DWQ). [123]

A facility covered under the IGP is assigned a Waste Discharge Identification (WDID) number, and a facility with Notice of Intent (NOI) coverage is required to adhere to all requirements in the IGP. Facilities with NOI coverage are generally required to create and implement a storm water pollution prevention plan (SWPPP) and site map, conduct monitoring and reporting, and install best management practices. The facilities would be required to identify monitoring locations in the SWPPP and site map,

[122] https://www.waterboards.ca.gov/santaana/water_issues/programs/stormwater/index.html
[123] Electronic correspondence between DTSC and the SWRCB.

and would be responsible for making those determinations, which are addressed in Section X of the permit.[124]

Sampling and monitoring requirements are outlined in Section XI.B. of the permit. The discharger is required to sample two Qualifying Storm Events (QSEs) from July 1 to December 31, and two QSEs from January 1 to June 30 of the Reporting Year, and report results in the Storm Water Multiple Application and Report Tracking System (SMARTS). A QSE is defined as a storm event that produces a discharge for at least one drainage area and is preceded by 48 hours with no discharge from any drainage area at the industrial facility.[125]

Similarly, the Santa Ana Region 8 sector-specific permit (R8-2012-0012, CAG 618001) addresses the monitoring, reporting and permit requirements in Sections I through X in the “Monitoring and Reporting Program No. R8-2012-0012” section of the permit. The test methods and minimum levels of constituents are provided in a revision of Table 3.[126] A facility would need to maintain all requirements of the permit to stay in compliance.

5.1.2 Solid Waste: Regulation of Landfills by CalRecycle and Local Enforcement Agencies

Municipal solid waste landfills are required to cover the “active face" of the landfill with earthen material at the end of each operating day to control vectors, fires, odors, blowing litter, and scavenging. The active face is the working surface of a landfill where solid wastes are deposited during operation. Vectors include insects, rodents, or other animals capable of transmitting the causative agents of human disease.

CalRecycle has approved 11 types of earthen materials for use as alternative daily cover and established Alternative Daily/Intermediate Cover Guidelines to govern their use. The local enforcement agency must approve the use of any ADC on a site-by-site basis.

Section 41781.3 of the Public Resources Code states that the use of solid waste for beneficial reuse, including use as ADC, constitutes diversion through recycling, and is not considered disposal. In addition to CTMSR, CalRecycle has approved other waste-derived materials for use as ADC including construction and demolition waste, contaminated sediments, municipal waste water treatment plant sludge, and shredded tires. In total, CTMSR accounts for approximately 15 percent of all waste materials diverted for use as ADC statewide.[127]

5.1.3 Air Quality: Regulation of Landfills by Local Air Districts

Local Air Districts also regulate activities at solid waste landfills related to the handling, storage, transportation and disposal of CTMSR. The solid waste landfills are required to employ management practices that minimize the fugitive emissions of dirt and debris from the downstream processes. Each

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[124] Ibid.
[125] Ibid.
[126] https://www.waterboards.ca.gov/santaana/water_issues/programs/stormwater/docs/scrap_metal/REVISED_TABLE_3.pdf
[127] Alternative Daily Cover White Paper, California Integrated Waste Management Board, October 2009.

particulate-emitting operation at a landfill is required to be abated to the extent necessary to ensure compliance with the Ringelmann No. 1 limitation. Controls include use of water sprays and dust suppressants at the active face of the landfill and for stockpiles at the rate and frequency necessary to ensure compliance with limits for visible emissions of particulate matter and to prevent wind erosion from these areas.

5.2 Hazardous Waste Management Activities

Transportation: CTMSR is transported from metal shredding facilities to California solid waste landfills by nonhazardous waste transporters in loads of 20 to 25 tons using standard end-dump trailers. CTMSR continues to exhibit hazardous waste characteristics, even after chemical treatment to stabilize the soluble metals in the waste. If the "f letters" were not in place, transportation of CTMSR would be regulated as a hazardous waste management activity, and a transporter would be required to be registered as a California hazardous waste transporter, to comply with all hazardous waste transportation regulations, and to accompany each shipment with a Uniform Hazardous Waste Manifest.

Landfill Management: CTMSR is managed at solid waste landfill facilities. There are two primary dispositions of the chemically treated metal shredder waste at landfills: disposal and use as alternative daily cover. CTMSR is either disposed along with the other solid wastes shipped to the landfill facility, or it is used as alternative daily cover. As previously discussed, CTMSR continues to exhibit hazardous waste characteristics, even after chemical treatment to stabilize the soluble metals in the waste. If the "f letters" were not in place, its disposal or use as alternative daily cover would be regulated as a hazardous waste management activity, and a metal shredding facility could not send CTMSR to a solid waste landfill. Instead, the waste would need to be sent to a hazardous waste landfill that has a hazardous waste facility permit issued by DTSC to conduct this activity, or to a landfill site that has received a variance from DTSC to accept this waste. Alternately, CTMSR could be transported to a landfill in another state or jurisdiction where it may not be regulated as a hazardous waste. In that case, the receiving facility would need to hold the appropriate authorization from the jurisdiction where it is located.

5.3 Assessment of Hazards Associated with Transportation of CTMSR

The hazards associated with the transportation of CTMSR to landfills include:

- A release of CTMSR to the environment if an accident occurs during transport to the landfill
- A release of CTMSR, or particulate from the waste, if the waste is not appropriately covered during transport

As discussed previously, CTMSR exceeds STLCs for zinc and occasionally for lead, and TTLCs for lead, zinc, and copper. These hazardous constituents can pose risks and hazards to public health and the environment if CTMSR were to be released into the environment.

Reasonably foreseeable releases of CTMSR, or of particulate from CTMSR, could occur if a truck transporting CTMSR is involved in an accident and the contents of its load are spilled, or if CTMSR is not adequately covered or contained during transport, and thus can be carried out of the truck due to wind dispersion.

The concerns of release during transport may be reduced if there is assurance that trucks remain covered during transport, and if CTMSR remains moist. California Vehicle Code Section 23114 requires that the operator of any vehicle on California's roadways must prevent any of the vehicle's contents from dropping, sifting, leaking, blowing, spilling, or otherwise escaping from the vehicle. These requirements apply equally to both hazardous wastes and nonhazardous wastes.

In addition, for trucks transporting CTMSR:

- Drivers must be adequately trained in the risks and hazards associated with CTMSR to ensure that they adequately respond to any transportation incidents.
- Transportation companies must possess adequate insurance coverage to be able to pay for costs associated with any accidents or transportation incidents.
- Shipments of CTMSR need to be adequately tracked from point of generation to disposal location to ensure that they are received and disposed of at the landfill as intended.

The regulatory requirements that would otherwise be applicable to the transportation of CTMSR if it is considered nonhazardous waste may be adequate, on their own, to ensure the prevention of the associated risks to public health and the environment. As was stated previously, most metal shredding facilities use a variety of best management practices to minimize the risks and hazards related to the transportation of CTMSR, and to the extent that they are used they are not adequate.

Although the requirements that govern the transportation of hazardous waste are designed to address all of the identified concerns, DTSC has also determined they are not necessary, specifically because the requirements in the Vehicle Code effectively regulate the release of CTMSR or hazardous constituents of CTMSR from vehicles during transportation. Additionally, based on its assessment, DTSC has not seen evidence of accidents or other transportation incidents that warrant the hazardous waste transportation requirements.

5.4 Assessment of Hazards Associated with CTMSR Use or Disposal at Landfills in California

The hazards associated with the acceptance and use or disposal of CTMSR at landfills include the migration of contaminants via leachate and groundwater, the migration of contaminants via surface water, and the migration of contaminants via the air. Each of these potential pathways is discussed in detail in the following sections.

5.4.1 Migration of Contaminants via Leachate and Groundwater

Contaminants in wastes that have been disposed to landfills have the potential to migrate via leachate and impact the subsurface and, potentially, groundwater and drinking water sources. Leachate is water in the landfill that either emanates from the moisture content of the disposed wastes or enters the landfill through rainfall that percolates through the waste and picks up soluble contaminants from the waste and ADC. If not captured in the landfills' systems designed to capture it, or if the systems are damaged or fail to perform as designed, the leachate can migrate into the environment, seeping to the surface or deep below ground surface to threaten groundwater and drinking water.

STLC is used to identify wastes that are hazardous due to the solubility of its regulated constituents. DTSC's Waste Extraction Test was designed to mimic the conditions a waste would be expected to encounter in a solid waste landfill environment. The test serves as a predictor of the mobilization of hazardous constituents from wastes disposed in a solid waste landfill.

CTMSR has historically exceeded STLCs for zinc and occasionally for lead. It has also, for most of the past 30 years, been disposed or used as ADC in certain solid waste landfills that were authorized to receive it. Because both metal shredder residue and CTMSR have been disposed for a long period of time in some solid waste landfills, DTSC could reasonably assume that the leachate from those landfills would contain elevated levels of lead and zinc.

To validate this assumption, DTSC evaluated a comparative analysis, provided by one of the landfills, which compared leachate from landfills that accepted CTMSR for use as ADC with landfills that did not. Additionally, DTSC assessed leachate and surface water quality results using publicly available leachate and surface water monitoring data from SWRCB.

Geo-Logic Associates Comparative Leachate Study

In response to DTSC's requests for information in preparation for this Analysis, Republic Services, owner and operator of several landfills in California (some of which use CTMSR as ADC), commissioned Geo-Logic Associates (Geo-Logic)[128] in 2014 to prepare a study to compare leachate from landfills that do accept CTMSR to landfills that do not. Geo-Logic concluded that landfills that accepted and used CTMSR as ADC did not have increased metals in leachate when compared to landfills that did not accept any CTMSR. Since Geo-Logic did not provide the raw data they used to draw these conclusions, DTSC was unable to confirm the report's analysis or conclusions.

Geo-Logic compared leachate data from the landfills shown in Table 12 below:

Table 12.
Landfill Data Used by Geo-Logic Comparative Leachate Study

Landfill	Location	Received CTMSR	Number of Years CTMSR in the Landfill
Forward/Austin Landfill	Manteca, CA	Yes	20 years
Vasco Road Landfill	Livermore, CA	Yes	22 years
Ox Mountain Landfill	Half Moon Bay, CA	No	N/A
Keller Canyon Landfill	Pittsburg, CA	No	N/A

The narrative in Geo-Logic's report offered the following data conclusions (excerpted here):

DTSC Comparative Leachate Analysis

Since lead and zinc in CTMSR have historically exceeded STLCs, DTSC conducted a comparative evaluation of the concentrations of lead and zinc in leachate from the landfills that accepted CTMSR to concentrations in leachate from landfills that had never accepted CTMSR. Leachate data for landfills was accessed through SWRCB's GeoTracker system. Quarterly reports from February 2005 to March 2017

[128] Evaluation of Metal Shredding Residue Waste for Alternative Daily Cover, Geo-Logic Associates, January 21, 2014.

were reviewed from Vasco Road Landfill (Vasco Road), which accepts CTMSR. Monitoring reports from February 2005 to October 2016 were reviewed for Ox Mountain Landfill (Ox Mountain), which never accepted CTMSR. Analyte concentrations are shown in Table 13.

For Vasco Road, DTSC also evaluated lead and zinc concentrations in the leachate over time. There was a weak trend of decreasing concentrations of lead and zinc in the leachate during the time period evaluated. The decreasing trend is considered weak because 84 percent of the samples for lead were non-detect (r-squared of -0.35), and 52 percent of the samples for zinc were non-detect (r-squared of -0.34).

ProUCL 5.1 (US EPA) was used to conduct the comparative statistical analysis, using the Kaplan-Meier nonparametric method for the large numbers of non-detect values and the Gehan and Tarone-Ware tests (for non-detects and multiple detection limits) in two-sample hypothesis testing. Comparable hypothesis testing for lead concentrations was not found to be significantly different between Vasco Road and Ox Mountain. However, the zinc concentration was found to be significantly different, with Ox Mountain showing higher average zinc concentrations compared to Vasco Road. These comparisons of the concentrations of soluble metals in the leachate from landfills that accept CTMSR and those that do not accept CTMSR do not indicate that the soluble metals in CTMSR are solubilizing and migrating in the municipal solid waste landfills.

DTSC's assumption that the leachate from the landfills in which CTMSR has been consistently disposed of or used as ADC would show higher soluble lead and zinc results was not confirmed by the leachate data analyzed. DTSC concludes from this analysis that constituents from CTMSR are not migrating from the solid waste landfills.

Table 13.
Landfill Leachate Analyte Concentrations for a Landfill That Accepts CTMSR and a Landfill That Does not accept CTMSR

Analyte	Vasco Road			Ox Mountain		
	Number of Samples	Average Concentration (µg/L)	Number of Non-detects	Number of Samples	Average Concentration (µg/L)	Number of Non-detects
Lead	176	6.9	147	52	3.2	19
Zinc	176	9.8	91	51	19.3	6

5.4.2 Migration of Contaminants via Surface Water

Contaminants in wastes that have been disposed to landfills have the potential to migrate via surface water runoff during periods of rainfall. The surface water runoff, if not captured in the landfills' systems designed to capture it, or if the systems are damaged or fail to perform as designed, can migrate into the environment. Any off-site migration could contaminate the surface water drainages of the solid waste landfills and potentially migrate off-site, where it can come into contact with people or animals, or contaminate the environment. Because CTMSR is currently being disposed in some solid waste landfills, DTSC could reasonably assume that the surface water runoff from the solid waste landfills in which CTMSR is being disposed or used as ADC would contain elevated levels of constituents in CTMSR.

Similar to the leachate data evaluation from landfills that do, and do not, accept CTMSR, DTSC examined storm water sampling data for lead and zinc, since these were known constituents in CTMSR that exceeded STLC values. DTSC evaluated whether the averages of the reported sample results were statistically different from Simi Valley Landfill (Simi Valley), which accepts CTMSR, and from Sunshine Canyon Landfill (Sunshine Canyon), which does not accept CTMSR. Storm water monitoring data is dependent upon rainfall events, which are unpredictable and do not always result in sufficient water volume to sample, which is why the landfills chosen for the storm water evaluation differ from those used for the leachate evaluation. Storm water monitoring data from landfills was accessed from SWRCB's SMARTS database. Data contained in the SMARTS database is self-reported by the holders of the storm water permits. Where available, DTSC corroborates the data in the SMARTS database against respective laboratory reports uploaded by the permit holders. Analyte concentrations from those reports are shown in Table 14.

For Simi Valley, sample results for lead and zinc from 2008 to 2014 were uploaded for five qualifying storm events. In 2014, water samples were collected from two different locations around Simi Valley. Data on lead was available, but zinc was not analyzed in all sampling events. For Sunshine Canyon, sample results for lead and zinc from 2013 to 2017 were uploaded for 17 qualifying storm events. ProUCL 5.1 (US EPA) was used to conduct the comparative statistical analysis.[129] Visual data comparisons were also conducted utilizing box-whisker and quantile-quantile plots. Comparable hypothesis testing results for lead and zinc concentrations were not found to be significantly different between Simi Valley and Sunshine Canyon. These comparisons demonstrate that the concentrations of soluble metals in the surface water runoff from landfills that accept CTMSR and those that do not accept CTMSR are not significantly different.

DTSC's hypothesis that the surface water at solid waste landfills in which CTMSR has been disposed or used as ADC would have higher concentrations of lead and zinc migrating via surface water into the environment was not confirmed by the analysis of surface water data. DTSC concludes from this analysis that constituents from CTMSR do not appear to be migrating from the solid waste landfills via surface water.

For Leachate: For Vasco Road, DTSC also evaluated lead and zinc concentrations in the leachate. A visual inspection of the data indicated that there was weak trend of decreasing concentrations of lead and zinc in the leachate during the time period evaluated. The decreasing trend is considered weak because 84 percent of the samples for lead were non-detect, and 52 percent of the samples for zinc were non-detect.

ProUCL 5.1 (US EPA) was used to conduct the comparative statistical analysis of lead and zinc concentrations in the leachate.[130] Visual data comparisons were also conducted utilizing box-whisker and quantile-quantile plots. Comparable hypothesis testing for lead concentrations was not found to be significantly different between Vasco Road and Ox Mountain. However, the zinc concentration was

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[129] US EPA's ProUCL software used the Kaplan-Meier nonparametric methods for Gehan, Tarone-Ware, and Wilcoxon-Mann-Whitney tests in two-sample hypothesis testing

[130] US EPA's ProUCL software used the Kaplan-Meier nonparametric method for the large numbers of non-detect values and the Gehan and Tarone-Ware tests (for non-detects and multiple detection limits) in two-sample hypothesis testing.

found to be significantly different, with Ox Mountain showing higher average zinc concentrations compared to Vasco Road. These comparisons of the concentrations of soluble metals in the leachate from landfills that accept CTMSR, and those that do not accept CTMSR, do not indicate that the soluble metals in CTMSR are solubilizing and migrating in the municipal solid waste landfills.

Table 14.
Storm Water Monitoring Analyte Concentrations from a Landfill That Accepts CTMSR and a Landfill That Does Not Accept CTMSR

Analyte	Simi Valley Landfill			Sunshine Canyon Landfill		
	Number of Samples	Average Concen-tration (ug/l)	Number of Non-detects	Number of Samples	Average Concen-tration (ug/l)	Number of Non-detects
Lead	6	11.9	0	17	39.1	0
Zinc	4	200	0	17	829	0

5.4.3 Migration of Contaminants from Landfills via Air

Contaminants in wastes that have been disposed to landfills have the potential to migrate through airborne dispersion from wind. Windborne particulate dispersion, if not prevented through the landfills' management practices, can migrate into the environment, contaminating the area surrounding the active face of the landfill, including the surface water drainages of the solid waste landfills. It could also potentially migrate off-site, where it could come into contact with people or animals, or contaminate the environment.

If CTMSR being disposed or used as ADC in solid waste landfills, or particulates from it, were to migrate through the air, DTSC could reasonably assume that measurable concentrations of contaminants commonly found in CTMSR would also be found in samples of air collected at the landfill. DTSC could also reasonably assume that measurable concentrations of the same contaminants would be found in storm water samples, since particulate migrating from a source will come to rest downwind at a distance that varies by particle size, density, wind speed, and topography.

As discussed above, DTSC did not observe a statistical difference between concentrations of contaminants commonly found in CTMSR in surface water samples collected at a landfill that accepted CTMSR and a landfill that did not. The surface water analysis is evidence that DTSC's hypothesis of windborne dispersion is not confirmed, and that chemically treated metal shredder waste, and constituents from the waste, do not appear to be migrating via air from the landfills where it is being placed or disposed.

In addition to the analysis of the surface water data, DTSC contracted to collect air samples at two landfills that receive CTMSR: Vasco Road Landfill and Simi Valley Landfill. The sampling was based on previous air studies conducted at three metal shredding facilities, and was designed to determine the potential for migration of particulate matter from the two landfills.[131] Sampling was conducted at the landfills between August and September of 2017.[132]

The air samples were analyzed for TSP, PM 10, and PM 2.5, and the collected particulate matter samples were further analyzed for metals, including lead. Samples from both landfills frequently exceeded the annual or 24-hour ambient air quality standards for PM10 or PM2.5. Lead is the major metal contaminant of concern which has an established regulatory threshold. However, the sampling results showed that the highest concentration of lead at either landfill was 0.0161 ug/m^3. This value is just over 1/10 of the National Ambient Air Quality Standard for lead of 0.15 ug/m^3 (3-Month Average). Further, DTSC's review of the data indicated that the measured lead concentrations were well below National Institute for Occupational Safety and Health (NIOSH) Recommended Exposure Limits and the OSHA Permissible Exposure Limits of 0.050 mg/m^3.[133]

Based on DTSC's review of the air monitoring data from the shredders and landfills, DTSC does not expect CTMSR or contaminants commonly found in CTMSR to migrate off-site at a landfill via the pathway of windborne particle dispersion. The measured concentrations of hazardous metals in the air monitoring samples collected from the landfills were skewed towards the larger particle sizes (which are not expected to travel long distances before dropping out of the air). Based on these results, DTSC does not expect the CTMSR used as ADC, nor contaminants commonly contained in it, to migrate off-site at a landfill via windborne particulate dispersion. The measured concentrations of hazardous metals in samples collected from the landfills were also skewed toward the larger particle sizes based on the differences between the TSP and smaller sizes, and were in general even lower than the concentrations measured at the shredder facilities. This supports DTSC's assumption, based on the air sampling data collected from the metal shredding facilities, that neither CTMSR used as ADC, nor contaminants commonly contained in it, would be expected to migrate off-site at a landfill via windborne particulate dispersion.

5.5 Evaluation Findings and Conclusions

CTMSR exceeds hazardous waste regulatory threshold levels. The metal shredding industry, through its treatability study, has demonstrated that it can improve the performance of the treatment, but that it still cannot achieve a reduction in soluble levels below STLCs for zinc and, in some instances, lead. It also verified that the chemical treatment cannot affect the total concentrations of lead, copper, or zinc.

In evaluating the potential hazards and possible harm that could be associated with the management of this residue when disposed in solid waste landfills for the past 30 years, DTSC has concluded that its continued disposal as nonhazardous waste, including its use as ADC, has not resulted in harm to human health or safety or to the environment, and that there is no evidence available that demonstrates its ability to contribute to the solubilization and migration of heavy metals from the solid waste landfills into which it has been placed as a nonhazardous waste.

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[131] See Air Monitoring Summary Reports for SA Recycling – Terminal Island, SA Recycling – Bakersfield, and Sims Metal Management, December 2016, available at: http://www.dtsc.ca.gov/HazardousWaste/MetalDocLib.cfm
[132] See Sampling and Analysis Plans for Air Sampling at Vasco Road Landfill and Simi Valley Landfill, August 2017, available at: http://www.dtsc.ca.gov/HazardousWaste/MetalDocLib.cfm
[133] See "NIOSH Pocket Guide to Chemical Hazards"; Department of Health and Human Services, Center for Disease Control and Prevention, National Institute for Occupational Safety and Health, 2010.

However, although CTMSR is identified as a hazardous waste, DTSC believes that the classification and management of it as a hazardous waste is not necessary to prevent or mitigate potential hazards to human health or safety or to the environment posed by it, if appropriate conditions are developed.

DTSC therefore concludes that CTMSR does not need to be classified and managed as a hazardous waste to prevent or mitigate potential hazards to human health or safety or to the environment. As a result, DTSC concludes that it may continue to be classified as a nonhazardous waste, and continue to be disposed of, or used as ADC, in solid waste landfills in California with certain limitations. Because DTSC's conclusions are based on comparative analyses using data from landfills that are currently receiving CTMSR, DTSC's conclusions would continue to be supported only if the solid waste landfills to which CTMSR is sent meet the same general description as those to which it has been sent historically. The landfills that have historically received CTMSR have disposed or used as ADC in a composite-lined portion of their solid waste landfill unit which meet all requirements applicable to disposal of municipal solid waste in California after October 9, 1993, and the landfills are authorized to accept it by the appropriate RWQCB.

6 CONCLUSION

DTSC has prepared this report to evaluate and analyze metal shredding facilities and the wastes they generate, in order to identify the most appropriate level of regulatory oversight necessary to protect public health and safety and the environment. DTSC's purpose in issuing this report is to describe the public health and environmental threats posed by metal shredding facilities and their wastes and to begin the process of ensuring that these facilities comply with existing hazardous waste control law, so that the important public health and environmental protections that existing law provides are afforded to the communities near these facilities.

In conducting the evaluation of metal shredding facilities and their hazardous waste management practices, DTSC found numerous examples of accidents, improper hazardous waste storage, soil contamination, and hazardous waste releases outside the facilities that were found to be contaminating the surrounding community. DTSC noted an explosion in the air pollution control system at the SA Recycling facility in Terminal Island in 2007 that resulted in the release of contaminants to the community; the Los Angeles County District Attorney's Office reached a $2.9 million settlement for those violations. DTSC identified releases of light fibrous material from the Sims facility in Redwood City in 2012, with light fibrous material subsequently found in ponds at the neighboring Cargill Salt facility; DTSC referred the case to the California Attorney General's Office, and Sims agreed to pay $2.4 million to settle the civil environmental enforcement action. DTSC also noted a series of fires at Sims in 2013 that resulted in shelter-in-place orders for nearby residents. At the Schnitzer facility in Oakland in 2015, DTSC inspectors collected samples from areas where scrap metal was stored or being processed and found exceedances for chromium, lead, nickel, zinc, and copper. Also in 2015, DTSC conducted an inspection at the Ecology facility in Colton and found similar releases and contamination. DTSC is evaluating appropriate enforcement actions for these facilities.

DTSC then performed an analysis of the treatment and storage activities at the metal shredding facilities, the chemical and physical hazards that those activities present, the types of accidents that could occur, and the risks those activities pose to nearby communities. DTSC found that the hazardous waste management activities pose substantial risks to nearby communities. DTSC next evaluated whether alternative management standards—alternative regulations to existing hazardous waste control law—could be developed that would provide adequate protection for human health and safety and the environment. DTSC showed through a series of demonstrations that the most appropriate level of regulation for facilities of this size, that are managing hazardous wastes of these types and in these volumes, is a hazardous waste permit. As a result of this analysis, DTSC will not be adopting alternative management standards as authorized by the Metal Shredding Facilities Law.

DTSC also evaluated the longstanding practice of disposal of chemically treated metal shredder waste in municipal landfills to identify threats and risks that would warrant a change in these practices. DTSC found no evidence of migration from landfills that have been accepting this material for over 30 years. DTSC evaluated the potential for migration of the waste through air dispersion, surface water runoff, and leaching into groundwater. DTSC found minimal impacts to air from the standard management practices at the landfills. Comparing surface water and leachate data from landfills that receive the waste with data from landfills that have never accepted the waste, DTSC found no discernable difference in the data from the compared landfills, which indicates that there is no additional risk posed by continued disposal of the waste in municipal landfills under specified conditions. DTSC concluded that classification of CTMSR as a hazardous waste is not necessary to prevent or mitigate potential hazards to human health or safety or to the environment posed by the treated metal shredder waste. DTSC intends to promulgate regulations that exclude CTMSR from classification as a hazardous waste under separate statutory authority.

DTSC's evaluation and analysis of metal shredding facilities and their hazardous waste management practices have demonstrated that, although the Metal Shredding Facilities Law authorized DTSC to adopt management standards as an alternative to the existing hazardous waste management requirements, the risks and hazards posed by the hazardous waste management activities conducted at metal shredding facilities require the protections that can only be provided by the existing hazardous waste management requirements. This report is intended to serve as a basis for establishing enforceable requirements for metal shredding facilities through a hazardous waste permit. Through the formal permitting process, DTSC will ensure that these facilities come into compliance with existing law, and that adequate protections are developed and implemented for human health and safety and the environment. DTSC intends to work with the metal shredding industry and other stakeholders during a transition period to develop and implement the new permitting requirements.

DTSC looks forward to working in an open and cooperative way with the public, the regulated community, and other stakeholders in the permitting process and when the department announces its proposed rulemaking. DTSC is committed to work transparently to implement safeguards for public health and safety and the environment. DTSC anticipates conducting public workshops on the proposed regulatory action in early 2018, and DTSC welcomes input from all stakeholders.

APPENDIX A: DTSC QUESTIONNAIRE RESPONSES FROM ALL SHREDDERS (REDACTED)

SIMS METAL MANAGEMENT REDWOOD CITY RESPONSE 7/17/15

DTSC METAL SHREDDING QUESTIONNAIRE 5/8/15

1. **Describe your facility's scrap metal acceptance policy and describe all materials you bring into your facility for shredding, metals recovery or both**

   The Redwood City Facility of Sims Metal Management (Sims) purchases mainly shreddable ferrous scrap that is managed in the Shredder. The Facility's scrap metal acceptance policy is described as follows: The Facility maintains a Prohibited Materials List (see attached) that clearly identifies items prohibited from purchase with inbound material. Regular suppliers are informed of Prohibited Materials through their Account Managers. They are required to sign a Scrap Acceptance Agreement (see attached) through which they certify that they will not send the facility Prohibited Materials. Suppliers such as peddlers who do not execute a Scrap Acceptance Agreement warrant that their inbound materials do not contain Prohibited Materials. The scale operator also provides peddlers and other suppliers the list of Prohibited Materials in both English and Spanish. In addition, for all suppliers: The Facility has prohibited materials signage located at the entrance to the Facility. Loads are inspected at the scale and by inspectors in the unloading areas. Material handlers also assist in the inspection process. If prohibited materials are identified in inbound materials during the inspection process the prohibited materials and/or the entire load are rejected.

2. **How much material by weight did your facility shred from January 1, 2015 through January 1, 2015. Include the percentage of total materials shredded annually for each of the following: vehicles, appliances, and other forms of scrap metal.**

   CONFIDENTIAL BUSINESS INFORMATION (CBI) – The information provided in response to Question #2 is considered Proprietary Confidential Business Information by Sims.

   [redacted]

3. **What type of shredder (e.g., the model, brand, and its horse power) is used by your facility?**

   CONFIDENTIAL BUSINESS INFORMATION (CBI) – The information provided in response to Question #3 is considered Proprietary Confidential Business Information by Sims.

[redacted]

4. **Is your facility's shredder equipped with an Air Pollution Control Device (APCD)? How else does our facility control any particulate emissions throughout the facility?**

   The Shredder at the Redwood City Facility has an Air Pollution Control Device (APCD) which is a permitted source with the BAAQMD. The APCD collects emissions from the Shredder from the Undermill Oscillator (UOM) and directs the air through a cyclone and then a wet scrubber system. This system is more fully described in response to Question 6.

   The Facility utilizes multiple BMPs for fugitive dust control including buildings and other structures, coverings or containment around conveyor systems, fabric covered fencing with candy cane tops, sprinklers, dust bosses, sweepers, and manual sweeping/portable vacuum units. Sims is currently working with the BAAQMD on the finalization of the Redwood City Facility Emissions Minimization Plan (EMP) which addresses fugitive emissions in accordance with the BAAQMD Regulation 6. Rule 4: Metal Recycling and Shredder Operations (see attached Draft EMP).

5. **Provide a copy of all permits and other forms of authorization issued to your facility by any governmental entity related to metal shredding activities.**

   Sims Metal Management Redwood City Permits

   - BAAQMD - Air Permit – Shredder - attached
   - DTSC - Certified Appliance Recycler Permit - attached
   - RWQCB - Industrial Storm Water Permit – Notice of Intent(NOI) attached
   - San Mateo County Environmental Health - CUPA Permit - attached
   - State of CA DOSH – Air Pressure Tanks/LPG Gas Permits attached
   -

6. **Describe the ferrous metals separation process, including how shredded material is sent to the ferrous metals separation process, the type of magnet used, if any and under what circumstances would materials exiting the ferrous metals separation process be reintroduced. Also indicate if your facility recovers ferrous metals from any material that is not shredded at your facility. If so, please describe that process. Please include representative pictures of the ferrous recovery process and a site map of where activities occur when applicable.**

   CONFIDENTIAL BUSINESS INFORMATION (CBI) – The information provided in response to Question #6 is considered Proprietary Confidential Business Information by Sims.

[redacted]

[redacted]

[redacted]

7. **Is the shredded material ever stored onsite before ferrous metal recovery occurs? Is so, on average how much and for how long is it stored, how is it stored (e.g., on a paved surface), and where in the facility is it stored?**

   The magnets are in line with the Shredder and thus ferrous metal recovery occurs immediately following shredding. There is some ferrous metal recovery in the Non-Ferrous Separation process including an over-band ferrous metal magnet on the final aggregate conveyor after treatment.

8. **If ferrous metals recovery does not occur onsite, please respond to the following questions:**
    - **How much shredded material is stored onsite?**
    - **How long is shredded material stored onsite?**
    - **How is the shredded material stored (e.g. on paved ground)"?**
    - **Where in the facility is the shredded material stored?**
    - **Where is the shredded material sent (please include addresses)?**

    Not Applicable to the Redwood City Facility

9. **Describe the nonferrous metals separation process at your facility, it any. Describe how aggregate (i.e. the shredded material remaining after ferrous metals separation) is introduced into that process, the type of system (s) used, where in your facility it occurs, and under what circumstances would materials exiting nonferrous metals separation processes be reintroduced. Also indicate if your facility recoveries nonferrous metals from any material that is not shredded at your facility. Please provide a site map of where activities occur.**

    CONFIDENTIAL BUSINESS INFORMATION (CBI) – The information provided in response to Question #9 is considered Proprietary Confidential Business Information by Sims.

    [redacted]

    [redacted]

    [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

10. **Is aggregate ever stored onsite prior to or during the nonferrous metals separation process, if so, how much is stored and for how long? Identify where in your facility it is stored.**

    Aggregate is stored in Building E at the MRP. Approximately 2100 tons of aggregate could potentially be stored in the building but the Facility makes an effort to process the aggregate "to the ground" every day. Daily processing can range from 200 to 500 tons of aggregate. On average, there is no more than 300 tons present in the building each day.

11. **If nonferrous metals recovered does not occur onsite, please respond to the following questions:**
    - **How much aggregate is store onsite?**
    - **How long is aggregate stored onsite:**
    - **How is the aggregate stored (e.g., on pave ground)?**
    - **Where in the facility is the aggregate stored? Where is the aggregate sent (please include addresses)?**
    - **Describe the offsite transportation and if any Department of Transportation (DOT) requirements are followed.**

This question is not applicable to the Redwood City Facility.

12. **Describe how your facility chemically treats metal shredder waste. For the purposes of this document only, “metal shredder waste” shall mean the material remaining after metal recovery is complete. Include how metal shredder waste not chemically treated is sent to the treatment process, how screening is conducted, the type of equipment used to perform the chemical treatment, chemical formulas and doses, and the sampling and analysis performed on the chemically treated metal shredder waste to ensure adequate treatment.**

    CONFIDENTIAL BUSINESS INFORMATION (CBI) – The information provided in response to Question #12 is considered Proprietary Confidential Business Information by Sims.

    [redacted]

13. **Do landfills, regional water quality control boards, or other regulating authority impose any requirement on treated metal shredder waste sent for disposal or use as Alternative Daily Cover (ADC)? If so, what are the requirements?**

    The Redwood City Facility complies with all the requirements from the landfills for the management of treated metal shredder waste (treated auto shredder waste or TASW). Each landfill received approval from the Regional Water Quality Control Board to utilize this material as ADC at their landfill and to our knowledge follows the Waste Disposal Requirements (WDRs) under those approvals.

14. **Is untreated metal shredder waste stored onsite prior to treatment? Is so, how much and for how long is it stored, how is it stored and where on the facility is it stored?**

No - All aggregate exiting the non-ferrous separation area immediately goes through treatment, so no untreated metal shredder waste is stored at the Facility.

15. **Is treated metal shredder waste stored on site before disposal? If so, how much and for how long is it stored, how is it stored and where on the facility is it stored?**

CONFIDENTIAL BUSINESS INFORMATION (CBI) – The information provided in response to Question #15 is considered Proprietary Confidential Business Information by Sims.

[redacted]

16. **How much treated metal shredder waste, if any, was transported offsite in the calendar year January 1, 2014, through January 1, 2015? List all destinations with addresses.**

CONFIDENTIAL BUSINESS INFORMATION (CBI) – The information provided in response to Question #16 is considered Proprietary Confidential Business Information by Sims.

[redacted]

[redacted]

17. **Describe the offsite transportation of metal shredder wastes. Are there any DOT requirements followed during transportation?**

Treated metal shredder waste or TASW is shipped to the landfills by subcontracted trucks hauling end dumps. The empty trucks drive into an enclosed structure specifically designed and constructed to load TASW into the trailers. The doors of the structure are closed while the end dumps are loaded inside, in order to minimize fugitive emissions. Once loaded the trucks are tarped before they travel on-road to the landfills. The subcontracted trucks are required to comply with those California DOT requirements pertaining to vehicles hauling non-hazardous waste materials.

Schnitzer Steel Products Company
1101 Embarcadero West
Oakland, CA 94607

Metal Shredding Facility Questionnaire- Schnitzer Steel

1. Describe your facility's scrap metal acceptance policy and describe all materials you bring into your facility for shredding, metals recovery or both.

   Schnitzer Steel recycles the following types of metal at our facility:

   <u>Ferrous Metals to Be Shredded</u>

   - Ferrous (Iron containing scrap) Metals of light gauges, grades and sizes.
      a. End of life vehicles-depolluted only.
      b. End of life appliances-depolluted only.
      c. Ferrous demolition scrap.

   <u>Ferrous Metals to Be Sheared and/or Torch Cut (Not Shredded)</u>

   - Ferrous (Iron containing scrap) metals of heavy grades, gauges, and sizes.

   <u>Non-Ferrous Metals to Be Collected, Packaged, and Shipped to End Users (Not Shredded):</u>

   - Copper scrap metal
   - Aluminum scrap metal
   - Stainless steel scrap metal
   - Some limited electronic scrap (Schnitzer Steel is an authorized E-waste collector)
   - Lead acid batteries (purchased and resold as commodities; not shredded)

   Schnitzer Steel has a robust written scrap acceptance policy which prohibits acceptance of hazardous materials and/or waste in our incoming scrap metal streams. This policy is designed to keep prohibited material out of Ferrous scrap streams and especially shredder feedstock. This policy includes, but is not limited to prohibitions on materials such as:

   - Items with elemental Mercury.
   - Batteries such as NiCad, Li Ion, Alkaline, etc.
   - E-waste (Schnitzer Steel will purchase some electronic scrap for recycling as a separate commodity)
   - Scrap with free-flowing liquids (i.e. used oil, etc.)
   - Scrap with CFC's (i.e. Refrigerants)

- Scrap with PCBs (i.e. capacitors, ballasts, transformer oil, etc.)
- Military Munitions and other explosives.
- Scrap metal with asbestos
- Radioactive scrap metal
- Materials which contained hazardous materials or waste not meeting the definition of empty (22 CCR 66261.7)

See attached Schnitzer Steel's attached Scrap Acceptance Policy and attached ISRI material specification document.

2. How much material by weight did your facility shred from January 1, 2014 to January 1, 2015? Include the percentage of total materials shredded annually for each of the following: vehicles, appliances, and other forms of scrap metal.

   Schnitzer considers the amount of metal shredded at our facility to be Confidential Business Information/Proprietary.

   [redacted]

   [redacted]

3. What type of shredder (e.g., the model, brand, and its horsepower) is used by your facility?

   Riverside Engineering Model 122 x 102 which is 9000hp.

4. Is your facility's shredder equipped with an Air Pollution Control Device (APCD)? How else does your facility control any particulate matter emissions throughout the facility?

   Yes, our shredder emissions are abated by a water spray system, irrigated cyclone scrubber (venturi scrubber), mist eliminator, moving dry belt filter, and simple cyclone (This simple cyclone is downstream of the magnets and is used to further remove non-metallic material from the shred prior to the conveyor that sends shred to the pile. By minimizing non-metallic in the shred, emissions are minimized when discharging shred to the stockpile.), and regulated by the BAAQMD under a Permit to Operate (PTO) for plant # 208.

   Additionally, Schnitzer Steel Oakland is regulated by BAAQMD Regulation 6, Particulate Matter, Rule 4 Metal Recycling and Shredding Operations which is designed to minimize particulate fugitive emissions from our operations. We have developed an Emissions Minimization Plan (EMP) in compliance with this rule. (Attached) BMP's to minimize fugitive emissions at our Oakland facility include but are not limited to the following:

- Frequent sweeping of paved traffic surfaces with a mobile sweeper to minimize dust from equipment traffic.
- Frequent application of water to all traffic surfaces and stockpiles.
- Use of Dust Boss mist turbines at key material handling areas to minimize fugitive emissions.
- Enclosure of many material conveyance systems to minimize exposure to ambient wind and minimize generation of fugitive emissions.
- Use of an industrial wheel wash at facility exit to minimize tracking of soil/sediment offsite.
- Enforcement of a facility speed limit of no more than 5 miles per hour.
- Maintaining a high moisture content in our Aggregate and Treated Auto Shredder Residue. (Typically 15 to 20% by weight)
- Daily facility housekeeping in areas prone to fugitive emissions.

5. Provide a copy of all permits and other forms of authorization issued to your facility by any governmental entity related to metal shredding activities.

   Copies of the following permits are attached:

   a) Notice of Intent Receipt Letter from the CA State Water Resources Control Board (Storm water permit)
   b) EPA Generator Identification Number Verification (Hazardous Waste Generator)
   c) Business License, City of Oakland
   d) Bay Area Air Quality Management District (BAAQMD) Permit to Operate (PTO)
   e) East Bay Municipal Utility District (EBMUD) Waste Water Discharge Permit
   f) DTSC Certified Appliance Recycler Certificate
   g) DTSC/CAL Recycle Electronic Waste Collector Registration

6. Describe the ferrous metals separation process, including how shredded material is sent to the ferrous metals separation process, the type of magnet used, if any, and under what circumstances would materials exiting the ferrous metals separation process be reintroduced. Also indicated if your facility recovers ferrous metals from any material not shredded at your facility. If so, please describe that process. Please include representative pictures of the ferrous recovery process and a site map of where activities occur when applicable.

The shredding process at Schnitzer is a continuous, in-line process from the infeed belt of the shredder hammermill to the outputs of ferrous shred and aggregate material. After shredder feed stock is processed through the hammermill, the resulting material is conveyed downstream for ferrous separation on a conveyor belt. Large, rotating drum electromagnets are used to separate most of the ferrous metal (e.g., steel and iron) from the nonferrous metals (e.g., copper, aluminum and stainless steel) and other non-metallic materials contained in the shredder output. The aggregate (the mixture of non-ferrous metal and non-metallic material remaining after removal of ferrous metal) is conveyed under the magnet drums to the aggregate output conveyor, while the ferrous metal is conveyed to the ferrous line conveyor. The ferrous material is then further cleaned of incidental, remaining rag and fiber via a closed loop air aspiration system which uses material density to further separate residual non-metallics from the ferrous shred. This enclosed system returns the separated material (which contains some nonferrous metals) to the aggregate output conveyor for further processing. A final quality assurance step involves a hand picking operation to remove copper and other nonferrous materials that may have been carried through the ferrous line prior to the radial conveyor stacker which stages the final shred product for export. Schnitzer Steel Oakland does not recover ferrous metal from any material that is not shredded onsite. See attached site map for location of shredder activities.

7. Is the shredded material ever stored onsite before ferrous metal recovery occurs? If so, on average how much and for how long is it stored, how is it stored (e.g. on a paved surface), and where in the facility is it stored?

   No, see response to question number 6.

8. If ferrous metal recovery does not occur onsite, please respond to the following questions:
   - How much shredded material is stored onsite?
   - How long is the shredded material stored onsite?
   - How is the shredded material stored?
   - Where in the facility is the shredded material stored?
   - Where is the shredded material sent (please include addresses)?

   This question and sub questions are not applicable as Schnitzer Steel Oakland shreds and recovers ferrous onsite.

9. Describe the nonferrous metals separation process at your facility, if any. Describe how aggregate (i.e. the shredded material remaining after ferrous materials separation) is introduced into the process, the type of system(s) used, where in your facility it occurs, and under what circumstances would materials exiting nonferrous metals separation processes be

reintroduced. Also indicate if your facility recovers nonferrous metals from any material that is not shredded at your facility. Please provide a map of where activities occur.

Once the ferrous metal (or “shred”) has been separated from the shredder output, the remaining material (aggregate or “Nonferrous Raw”) moves through a series of trommels, screens and other “downstream” sizing equipment to separate and size the remaining materials into different fractions so that they can be further processed to optimize removal of nonferrous metals. These fractions are based on size. The sizing equipment separates the aggregate into 3/8” minus, 3/8” to 3/4”, 2.5”, and 2.5” to 5” fractions. The nonferrous metal is typically separated from the non-metallic material by eddy current separators (which create a means for magnetic separation of the nonferrous metals) and advanced mechanical separation methods (e.g., inductive or optical sensor sorting systems). An inductive sorter uses metal sensing technology to detect and target metals from nonmetals. An optical sensor uses infrared or visual light spectrum to detect and target shapes or specific nonmetallic metals from metals. Manual hand picking is also used at various points in the process to maintain quality and collect specific high value materials that cannot be recovered via mechanical means. After the majority of non-ferrous metals separation has occurred, the remaining material is sent through the shredder residue treatment process. Prior to exiting the treatment process a belt magnet is used to recover any remaining ferrous metals that were not removed in the ferrous metal recovery operations.

In-process material (i.e., material that has not yet reached the residue treatment process and that still contains recoverable nonferrous metals) may fall off moving conveyors and is periodically collected and placed back into the aggregate pile for reprocessing to further extract valuable metal.

Schnitzer Steel Oakland does not accept aggregate from other metal shredding facilities. On rare occasions, the facility accepts coarse screenings with recoverable metal from other Schnitzer feeder yards to recover economically valuable metal.

The majority of the conveyors in the non-ferrous recovery system have been covered to minimize the generation and/or escape of fugitive emissions. Additionally, an elevated, oscillating Dust Boss mister turbine has been installed to blanket the area in a mist of atomized water further minimizing fugitive emissions.

See attached facility map which indicates location of the non-ferrous recovery operations.

10. Is aggregate ever stored onsite prior to or during the nonferrous metals separation process? If so, how much is stored and for how long? Identify where in your facility it is stored.

    Yes, aggregate processing is a more complex process than shredding metal. To ensure efficient recovery of non-ferrous metals and adequate treatment of the resulting residue (by maximizing metals recovery prior to treatment), the nonferrous metals separation process is necessarily slower than the shredding process. As a consequence, there is generally a stockpile of aggregate onsite awaiting non-ferrous metal separation and processing. On average, there may be 300 to 500 tons of aggregate stockpiled near the shredder and the non-ferrous separation plant. Aggregate is moved from the shredder output area to the non-ferrous separation plant via front end loader and rock trucks. The aggregate has a high moisture content due to the water added during the shredding process. Typically, the moisture content is 15 to 20% by weight. This high residual moisture content helps to minimize the amount of potential fugitive emissions from stockpiles and material handling. Additionally, the aggregate stockpile near the non-ferrous separation plant is wetted during plant operation by a Dust Boss turbine mister further reducing fugitive emissions.

    See attached facility map which indicates the location of the aggregate storage stockpiles.

11. If non-ferrous metals recovery does not occur onsite, please respond to the following questions:
    - How much aggregate is stored onsite?
    - How long is aggregate stored onsite?
    - How is the aggregate stored (e.g. on paved ground)?
    - Where in the facility is the aggregate stored?
    - Where is the aggregate sent (please include addresses)?
    - Describe the offsite transportation and if any Department of Transportation (DOT) requirements are followed.

    This question is not applicable as Schnitzer Steel conducts non-ferrous metals recovery onsite.

12. Describe how your facility chemically treats metal shredder waste. For the purposes of this document only, “shredder metal waste” shall mean the material remaining after metal recovery is complete. Include how metal shredder waste not chemically treated is sent to the treatment process, how screening is conducted, the types of equipment used to perform the chemical treatment, chemical formulas and doses, and the sampling and analysis performed on the chemically treated metal shredder waste to ensure adequate treatment.

    Schnitzer Oakland treats its metal shredder residue prior to the final metal separation step. After all non-ferrous metal recovery is complete; the material is conveyed via covered belt to the treatment process. Shredder residue passes through an enclosure where a metered water and silicate mixture is sprayed onto the material as it passes through. Next, the material passes through a second enclosure where the alkaline cement activator is applied along with additional water spray to aid in mixing and minimize the cement dust. Schnitzer currently uses a chemical dose of 0.3 lbs. of Metabond MCX 90 (silicate compound) chemical per ton of residue. Schnitzer then applies Portland cement at a rate 6 percent (120 pounds) by weight per ton of residue. The material then enters a pug mill with two large metal screws that mix the treatment chemicals and shredder residue. After exiting the pug mill, the material is transported via conveyor belt for final ferrous metal recovery by a belt magnet and is then added to the treated shredder residue stockpile for transport offsite.

As discussed in the DTSC requested May 2012 report “Treatment of Auto Shredder Residue” written by Dr. George Trezek et al., the process for treatment of auto shredder residue is similar to “Stabilization Treatment” as described by the EPA. According to EPA, “Stabilization has been shown to be effective for a wide range of constituents including lead, arsenic, and chromium” (USEPA, 2009).[1] Stabilization is a process that chemically renders metals less soluble, thereby reducing their leachability in a landfill situation. It should be noted that the Metal Recycling industry, in cooperation with the DTSC, is performing a concurrent treatability study of Metal Shredder Residue to demonstrate the effectiveness of the industry treatment process, determine optimum treatment chemical ratios, and identify appropriate treatment standards. The treatment process, chemistry, and efficacy will be discussed in detail in the forthcoming treatability study report. Additionally, DTSC staff is involved and will continue to be involved with this ongoing process.

Schnitzer collects daily samples of treated shredder residue which are composited into samples for various types of analysis. These analyses include total PCBs for every 1000 tons of shredder residue, quarterly metals leachability analysis using landfill leachate, and occasional total metals analysis as requested by the landfills.

13. Do landfills, regional water quality control boards, or other regulating authority impose any requirements on treated metal shredder waste sent for disposal or use as Alternative Daily Cover (ADC)? If so, what are the requirements?

Yes, both Waste Management’s Altamont landfill and Republic’s Vasco Road landfill require Schnitzer to perform periodic analysis related to their material acceptance policies and their respective WDRs.

Republic Service’s Vasco Road Landfill requires Schnitzer to conduct a quarterly landfill leachate extraction test for Lead, Zinc, Cadmium, Chromium, Nickel, and Copper. This process utilizes landfill supplied leachate (From Vasco Road) to provide a realistic simulation of the landfill conditions that the material will be subject to. In addition, Schnitzer performs total PCB analysis for every 1000 tons of treated shredder residue on an ongoing basis.

Waste Management's Altamont landfill requires total metal analysis for Cadmium, Chromium, Lead, Copper, and Mercury for profile renewal every three years. Waste Management also requires total PCB analysis for every 1000 tons of treated shredder residue on an ongoing basis.

14. Is untreated metal shredder waste stored onsite before disposal? If so, how much and for how long is it stored, how is it stored, and where on the facility is it stored?

    Schnitzer Steel does not store untreated metal shredder waste onsite, nor does Schnitzer Steel dispose of untreated shredder waste. All treated shredder residue is transported offsite for beneficial reuse as alternative daily cover (ADC).

15. Is treated metal shredder waste stored onsite before disposal? If so, how much and for how long is it stored, how is it stored and where on the facility is it stored?

    Although shredder residue is typically shipped offsite Monday through Friday, there is always some amount of material onsite. Typically, there is anywhere from 250 to 500 tons of treated shredder residue onsite awaiting transport to the landfill for use as alternative daily cover. Typically, 20 loads per day are transported offsite to the landfill. This material is accumulated in a stockpile near the treated shredder residue output belt of the treatment system and is indicated on the attached facility site map.

16. How much treated metal shredder waste, if any, was transported offsite in the calendar year January 1, 2014 through January 1, 2015? List destinations with addresses.

    1) Republic Services, Vasco Road Landfill
       4001 N. Vasco Rd.
       Livermore, CA 94550

       Schnitzer considers the amount of treated metal shredder waste to be Confidential Business Information/Proprietary.

    2) Waste Management, Altamont Landfill
       10840 Altamont Pass Road
       Livermore, CA 94551

       Schnitzer considers the amount of treated metal shredder waste to be Confidential Business Information/Proprietary.

17. Describe the offsite transportation of metal shredder wastes. Are there any DOT requirements followed during transportation?

    Treated Metal Shredder Residue is loaded into end dump trailers for transport to the above-mentioned landfills for beneficial reuse as alternative daily cover (ADC). The high residual moisture content of this material helps to minimize generation of fugitive emissions (typically 15 to 20%). All trucks exiting the facility must pass through an industrial wheel wash to minimize tracking of material offsite. These trailers are tarped prior to leaving the site to contain material during transport to the landfill.

    Standard DOT requirements related to the movement of goods, safe operation of tractor and trailer, proper license/endorsements of drivers apply. Auto Shredder Residue is not a RCRA hazardous waste; therefore, no DOT Hazardous Materials Rules apply. All Shredder Waste transported is documented with a standard Bill of Lading (BOL).

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[1] USEPA, (2009) *Technology Performance Review: Selecting and Using Solidification/ Stabilization Treatment for Site Remediation*, document EPA/600/R-09/148.

DTSC QUESTIONNAIRE
METAL SHREDDING FACILITIES
SA RECYCLING TERMINAL ISLAND FACILITY
901 New Dock Street, Terminal Island, CA 90731

1. *Describe your facility's scrap metal acceptance policy, and describe all materials you bring into your facility for shredding, metals recovery, or both.*

   The SA Recycling material acceptance policy is contained in the attached document titled "Supplier Source Control Procedure" (revised 3/27/15). (See Attachment 1)

   The facility receives every type of scrap metal material including Automobiles, consumer and industrial appliances, manufacturing scrap, curbside collection scrap, demolition scrap, consumer/homeowner scrap, industrial scrap. The facility receives scrap from industrial accounts, including materials from other scrap metal recycling facilities. All materials received meet the definition of "scrap metal" under title 22, CCR, section 66260.10.

   The "Supplier Source Control Procedure" document contains a Prohibited Materials List which details the types of materials that are not accepted at the shredder. Automobiles must have all fluids drained to the extent practical, and batteries and mercury switches removed. Appliances such as refrigerators must be properly depolluted prior to being sent to the shredder infeed area. In some circumstances, appliances and vehicles will be de-polluted on site, pursuant to applicable law, in a specially designated area, prior to being sent to the shredder.

   Items removed/recovered from the de-polluting process including waste oil, diesel/gasoline fuel, batteries, capacitors etc. are all managed under separate programs per State regulations.

2. *How much material by weight did your facility shred from January 1, 2014, through January 1, 2015? Include the percentage of total materials shredded annually for each of the following: vehicles, appliances, and other forms of scrap metal.*

   A total weight of approximately 300,000 MT of material was shredded for the year 2014.

   Annual percentages of material are as follows:

Vehicles:	42.16%
Appliances/Tin:	43.63%
Other/Misc:	14.21%

3. What type of shredder (e.g., the model, brand and its horsepower) is used by your facility?

   Shredder is manufactured by Riverside Engineering. Model RIV 122X112 Mega Shredder.
   9,000 horse power.

4. *Is your facility's shredder equipped with an Air Pollution Control Device(APCD)?*

Yes. The shredder is controlled by a four-stage air pollution control system (APCS), which has a Permit to Operate (R-G27566, attached) issued by the South Coast Air Quality Management District.

APCS Stage One

Shredder overhead exhaust system hood designed to capture at least 90% of all particulate matter (PM) and volatile organic compounds (VOC's), and send those emissions through to the second stage.

APCS Stage Two

Dust/Mist Collector – Custom designed and manufactured, Model No. TAME-40K-2008, dual parallel compartments designed to capture oils, PM and moisture present in the exhaust stream.

- Mist Eliminating Wall manufactured by UDC and poly pad (coarse PM, moisture and oils control)
- Drop Safe Rigid Pocket Bag Filters (Microscopic water molecules filtration)
- DP-40 Synthetic PM Filters (additional PM filtration at MERV 8)
- Legacy PM Filters (additional PM filtration at MERV 11)
- HydroVee, High Efficiency PM Filters (additional PM filtration at MERV 15)

APCS Stage Three

40K SCFM Regenerative Thermal Oxidizer (RTO) - The 40K SCFM RTO, Model No. RETOX 40.0 RTO095 was manufactured by CECO-ADWEST Technologies.

APCS Stage Four

HEE Environmental Chemical Scrubber - The vertical, counter-current chemical scrubber neutralizes the exhaust from the RTO.

How else does your facility control any particulate emissions throughout the facility?

Terminal Island employs a number of measures to control particulate matter emissions, as follows:

The entire shredding chamber is enclosed and connected to the air pollution control system. Many of the conveyors and magnet systems are all covered or enclosed. All shredded material (Aggregate) that is processed following ferrous metal removal, including Treated Auto Shredder Residue (TASR), is staged within covered containment buildings.

Material stacking areas are swept periodically throughout the day, as necessary. The sweeping is performed with a mechanical broom. During operations, the mechanical broom is used to maintain the outer boundary of the intake piles of feedstock material by pushing material on the edge of the piles back toward the center of the pile.

A TYMCO sweeper is used to clean-up the entrances and driveways in the yard on a regular basis, as necessary throughout the day. There are track-out devices (to minimize dirt track-out) for all of the trucks that exit the facility.

Water is applied extensively to the yard haul roads and piles of materials throughout the day with a water truck, as necessary. The entire facility is concrete paved, and is designed to collect all of the water and direct it to an industrial waste water facility where the water is recycled for re-use onsite.

Most incoming trucks that are self-dumping are doused with water before unloading scrap metal to minimize airborne emissions during the unloading process

The Metals Recovery Plant (MRP) is equipped with dust collectors to control particulate matter emissions during the non-ferrous metals recovery process. The MRP utilizes a series of pulse-jet type dust collectors on all of its cyclones to control particulate emissions. Many of the process areas are enclosed as well as the aggregate and TASR staging areas.

5. *Provide a copy of all permits and other forms of authorization issued to your facility by any governmental entity related to metal shredding activities.*

Terminal Island holds SCAQMD Permits to Operate for the shredder (R-G27565), the MRP (R-G18947), and the shredder APCS (R-G27566). The facility also holds a CAR Permit and an NOI issued by the State Water Resources Control Board. Copies of permits are provided. (See Attachment 2)

6. *Describe the ferrous metals separation process, including how shredded material is sent to the ferrous metals separation process, the type of magnet used, if any.*

The shredder feed materials, including automobiles and appliances, are loaded onto the conveyor and conveyed into the enclosed shredding chamber (vented to the Air Pollution Control System). The shredder shreds the cars and scrap metal materials into fist sized pieces. (Everything exits the shredder chamber through eight-inch square openings.) This stream of material collectively is called “Aggregate”.

All shredded Aggregate exits the shredder onto a shaker table, which then transfers the materials to a single conveyor belt. That single flow of Aggregate is split into two equal streams of material and continues through two parallel processing lines. Each stream is run over a first drum magnet (Steinert Drum Magnet, 60-inch diameter by 96-inch wide). The magnetic fraction, which primarily consists of steel and iron materials, is conveyed via a short length shaker table to a second identical Steinert drum magnet, which further separates the magnetic fraction from the non-magnetic fraction. The two non-magnetic fractions are combined and run through a similar but smaller magnetic recovery system consisting of two 24-inch diameter by 48-inch-wide drum magnets. The non-magnetic Aggregate contains non-magnetic metals such as aluminum, copper, zinc and stainless steel. After the magnetic separation process, the aggregate is conveyed to a trommel where the oversized fraction (pieces typically lager than 4-5 inches) is screened out. The oversized materials are re-shredded on a daily basis. The screened aggregate is conveyed to the Interim Aggregate Staging Building.

…and under what circumstances would materials exiting the ferrous metals separation process be reintroduced?

The non-magnetic aggregate fraction is screened through a trommel, and all materials over 4- 5 inches are returned to the shredder in-feed for re-shredding.

Materials that have accumulated on and under the conveyor belts and picking stations and related equipment described above are returned to the shredder in-feed for re-shredding.

Also, indicate if your facility recovers ferrous metals from any material that is not shredded at your facility. If so, please describe that process and a site map of where activities occur when applicable.

The Terminal Island facility receives all types of scrap metal, including prepared and unprepared materials that are not shredded at the facility. The prepared materials, including HMS (Heavy Melt Steel) and P&S (Plate and Structural) are received and stockpiled for future shipment via bulk vessels. The unprepared materials are sheared or cut in the areas designated for those activities on the site map. The facility operates a 2,000 ton guillotine type shear which is used to size longer pieces of steel into lengths typically under 5 feet. Scrap materials that are too big to fit into the shear or contain metal that is too thick to cut with the shear, are sent to a designated torch cutting area.

After processing to reduce the size and length of the scrap metal, the material is transferred to the “prepared” stockpiles to await shipment via bulk vessels.

Please include representative pictures of the ferrous recovery process and a site map of where activities occur when applicable.

- Site Map (See Attachment 3)
- Magnet Photos (See Attachment 4)

7. *Is the shredded material ever stored onsite before ferrous metal recovery occurs? If so, on average how much and for how long is it stored, how is it stored (e.g., on a paved surface), and where in the facility is it stored?*

   No, shredder output is always processed in-line after it leaves the shredder. Material may temporarily be located on a conveyance system in the event of an emergency shut-down; however, it is not stored in the system.

8. *If ferrous metals recovery does not occur onsite, please respond to the following questions:*

   How much shredded material is stored onsite?
   How long is shredded material stored onsite?
   How is the shredded material stored (e.g., on paved ground)?
   Where in the facility is the shredded material stored?
   Where is the shredded material sent (please include addresses)?

   Not-applicable

9. *Describe the nonferrous metals separation process at your facility, if any. Describe how aggregate (i.e., the shredded material remaining after ferrous metals separation) is introduced into that process, the type of system(s) used, where in your facility it occurs,*

   Aggregate materials exiting the shredder go through the ferrous recovery stage described above in question #6 and then are conveyed by an enclosed conveyor to the first aggregate staging building (enclosed, covered, concrete floor). At the Interim Aggregate Staging Building, aggregate materials are loaded onto a 45 ton Terex dump truck via a front-end wheel loader. The Terex truck transfers the material to the enclosed, covered Primary Aggregate Staging Area in the non-ferrous metal recovery plant (MRP) building. From the covered Primary Aggregate Staging Area, the aggregate material is loaded onto a track feeder that meters the flow of the aggregate into the MRP.

   In the first step of the non-ferrous recovery process, aggregate is separated into three size fractions through the use of screens and trommels.
   Each of these three size fractions continues through the MRP, which utilizes three types of technology to separate and recover non-ferrous materials, as well conventional magnets for residual ferrous material recovery.

   The three technologies used for non-ferrous metal recovery include:

   1. Eddy- current magnetic separators for most aluminum, zinc and copper materials
   2. Sensors (air actuated) for stainless and copper wire
   3. Density separators for fine copper materials

   ……and under what circumstances would materials exiting nonferrous metals separation processes be reintroduced.

   Materials that accumulate under or on the equipment are in-progress materials and are routinely returned to the MRP infeed area using front-end loaders and skid-steer type tractors. Any recovered product that does not meet a quality standard is returned to the aggregate in-feed area for re-processing. There are several product streams that require a second pass through the MRP.

Also indicate if your facility recovers nonferrous metals from any material that is not shredded at your facility. Please provide a site map of where activities occur.

The facility does not typically receive or handle any non-ferrous material other than what is generated from the shredding activity. The facility does not receive any previously shredded material from another location for non-ferrous recovery through the MRP.

10. *Is aggregate ever stored onsite prior to or during the nonferrous metals separation process? If so, how much is stored and for how long? Identify where in your facility it is stored.*

    Yes, aggregate is staged in two locations on site: The Interim Aggregate Staging Building and the Primary Aggregate Staging Area (as designated on the site map).

    The amount of aggregate on site ranges from 1,000 to 4,000 tons. Aggregate is typically processed through the MRP within 7 to 10 days of production.

11. *If nonferrous metals recovery does not occur onsite, please respond to the following questions:*

    Not Applicable

    - *How much aggregate is stored onsite?*
    - *How long is aggregate store onsite?*
    - *How is the aggregate stored (e.g., on paved ground)?*
    - *Where in the facility is the aggregate stored?*
    - *Where is the aggregate sent (please include addresses)?*
    - *Describe the offsite transportation and if any Department of Transportation (DOT) requirements are followed.*

12. *Describe how your facility chemically treats metal shredder waste. For the purposes of this document only, "metal shredder waste" shall mean the material remaining after metal recovery is complete. Include how metal shredder waste not chemically treated is sent to the treatment process, how screening is conducted, the types of equipment used to perform the chemical treatment, chemical formulas and doses, and the sampling and analysis performed on the chemically treated metal shredder waste to ensure adequate treatment.*

    Treatment of aggregate that has been fully processed for recovery of non-ferrous metal occurs in-line at the end of the non-ferrous metals recovery process. Residual materials from all of the various non-ferrous recovery steps as previously described are combined on a single, scaled (weigh belt) conveyor which delivers material to the treatment auger. A proprietary silicate-phosphate liquid is applied first. Silicate-phosphate is drawn from a tote into a foamer/tank where it is blended with a 9 – 13x volume of water. This solution is pumped from the foamer tank and is combined with the metal shredder waste in the auger chamber. The auger blends and pushes the treated material toward the cement feeds. The proprietary, non-hydraulic cement is formulated to reduce the leachability of metals. The incoming weigh belt scale is used to control the by-weight cement allocation, 9.0 – 10.0%, at the treatment auger. Cement is fed into the auger chamber from adjacent silos and applied to the material in the remaining length of the auger chamber, approximately five (5) meters, before being deposited onto the outgoing conveyor. The auger mixes and blends the material with the cement and silicate phosphate solution. The total residence time in the auger is approximately 60 seconds. Fully treated material is then passed under a magnet for final ferrous metal recovery and then conveyed to the enclosed, paved TASR staging area before loading and transport to the receiving landfill.

Sampling of the treated metal shredder waste occurs approximately six (6) meters from the exit of the treatment auger chamber. Samples are taken manually from the conveyor and added to a composite, shift sample, each half-hour. Samples from a given week are combined - mixed, coned and quartered – before being submitted to the receiving laboratory for analysis of volatile organic compounds (VOCs) via EPA method 8260B, poly-chlorinated biphenyls (PCBs) via EPA method 8082, and soluble cadmium, chromium, copper, lead, mercury, nickel and zinc via the Waste Extraction Test (WET). One such weekly composite sample is analyzed per month.

The Terminal Island facility is participating in an ongoing MSR Treatability Study that is evaluating the effectiveness of the treatment process and will serve as a basis for uniform, statewide treatment standards appropriate to TASR.

13. *Do landfills, regional water quality control boards, or other regulating authority impose any requirements on treated metal shredder waste sent for disposal or use as Alternative Daily Cover (ADC)? If so, what are the requirements?*

TASR is shipped to two landfills: Chiquita Canyon Landfill in Castaic CA, and Simi Valley Landfill in Simi CA. Both landfills operate under the jurisdiction of the Los Angeles Regional Water Quality Control Board. There are sampling and analysis and reporting requirements specified by the Waste Discharge Requirements (WDRs) of the receiving landfills for treated auto shredder waste (TASR) regardless of whether it is employed as alternative daily cover (ADC) or disposed of as waste. SA's understanding is that essentially all of the TASR received at both of these landfills is used as ADC.

The landfill is required to record the quantity of TASR deposited each month and the number of loads deposited from each generator. The landfill must report the TASR laboratory analysis results provided by the generator, in addition to those from the landfill's own monitoring per the WDR's.

Per the WDR's the analysis of TASR samples include analysis of volatile organic compounds via EPA method 8260B, polychlorinated biphenyls via EPA method 8082, and soluble cadmium, chromium, copper, lead, mercury, nickel and zinc via the Waste Extraction Test (WET).

The WDRs for Simi Valley Landfill also specify the sampling procedure and SA has adopted this procedure, as described above. Composite samples of TASR are collected daily; one (1)-pound sample each half-hour per shift. Samples from a given week are combined – mixed, coned and quartered – before being submitted to the receiving laboratory. One weekly composite sample, prepared as described, is submitted per month for the above-mentioned analyses.

Additionally, Simi Valley Landfill requires that one such sample, per quarter, be analyzed for the solubility of the full suite of "CAM-17" metals using the Synthetic Precipitation Leaching Procedure (EPA method 1312).

14. *Is untreated metal shredder waste stored onsite before disposal? If so, how much and for how long is it stored, how is it stored and where on the facility is it stored?*

    There is no untreated shredder waste stored on-site. At the conclusion of the non-ferrous recovery process, fully processed aggregate is conveyed directly to the treatment process and treated in-line as discussed above.

15. *Is treated metal shredder waste stored onsite before disposal? If so, how much and for how long is it stored, how is it stored and where on the facility is it stored?*

    TASR is staged for shipment in the MRP building under a roof on a concrete floor. There is typically 1,500 - 2,000 tons of TASR on site at any one time, which is approximately one week's worth of production. TASR is typically transported off-site within 5 to 7 days of production.

16. *How much treated metal shredder waste, if any, was transported offsite in the calendar year January 1, 2014, through January 1, 2015? List all destinations with addresses.*

    From January 1st, 2014 to January 1st, 2015, the facility shipped 115,172 tons of treated metal shredder waste to two (2) landfills:

    - Simi Valley Landfill
      2801 Madera Rd
      Simi Valley, CA 93065

    - Chiquita Canyon Landfill
      29201 Henry Mayo Drive
      Castaic, CA 91384

    37,662 tons of treated metal shredder waste shipped to Chiquita Canyon Landfill.

    77,510 tons of treated metal shredder waste shipped to Simi Valley Landfill.

17. *Describe the offsite transportation of metal shredder wastes. Are there any DOT requirements followed during transportation?*

    Treated metal shredder waste is transported on a non-hazardous waste manifest. Material is loaded into end dumps and a tarpaulin placed over the exposed surface. The transportation activity is conducted in compliance with the US Department of Transportation regulations and the Federal Motor Carrier Safety Administration (49 CFR Parts 300-399).

DTSC QUESTIONNAIRE
METAL SHREDDING FACILITIES
SA RECYCLING BAKERSFIELD FACILITY
2000 East Brundage Lane, Bakersfield CA 93387

1. *Describe your facility's scrap metal acceptance policy, and describe all materials you bring into your facility for shredding, metals recovery, or both.*

   The SA Recycling material acceptance policy is contained in the attached document titled "Supplier Source Control Procedure" (revised 3/27/15). (See Attachment 1)

   The facility receives every type of scrap metal material including:

   Automobiles, consumer and industrial appliances, manufacturing scrap, curbside collection scrap, demolition scrap, consumer/homeowner scrap, industrial scrap. The facility receives scrap from industrial accounts, including materials from other scrap metal recycling facilities. All materials received meet the definition of "scrap metal" under title 22, CCR, section 66260.10.

   The "Supplier Source Control Procedure" document contains a Prohibited Materials List which details the types of materials that are not accepted at the shredder.
   Automobiles must have all fluids drained to the extent practical, and batteries and mercury switches removed.

   Appliances such as refrigerators must be properly depolluted prior to being sent to the shredder infeed area. In some circumstances, appliances and vehicles will be de-polluted on site, pursuant to applicable law, in a specially designated area, prior to being sent to the shredder.
   Items removed/recovered from the de-polluting process including waste oil, diesel/gasoline fuel, batteries, capacitors, etc. are all managed under separate programs per State regulations.

2. *How much material by weight did your facility shred from January 1, 2014, through January 1, 2015? Include the percentage of total materials shredded annually for each of the following: vehicles, appliances, and other forms of scrap metal.*

   A total weight of approximately 75,000 MT of material was shredded for the year 2014.

   Annual percentages of material are as follows:

Vehicles:	52.34%
Appliances/Tin:	30.10%
Other/Misc:	17.56%

3. *What type of shredder (e.g., the model, brand and its horsepower) is used by your facility?*

   Shredder is manufactured by The Shredder Company. Model #124-SXS Mega Shredder
   6,000 Horse Power

4. *Is your facility's shredder equipped with an Air Pollution Control Device (APCD)?*

Yes. The shredder is controlled by a two-stage air pollution control system (APCS). Both the shredder and the APCS are included in permits to operate (S-1256-7-2 and S-1256-3-10) issued by the San Joaquin Valley Air Pollution Control District.

<u>APCS Stage One</u>

Shredder overhead, multi-hood exhaust system that captures particulate matter (PM) and volatile organic compounds (VOC's) and sends those emissions through the next stage.

<u>APCS Stage Two</u>

Dust/Mist Collector - Custom made, Model No. TAME-40K-2008, dual parallel compartments designed to capture oils, PM and moisture present in the gas stream.

Two-inch thick poly pad (coarse PM, and oils control)
HS Aluminum Filters (additional moisture control)
Moisture Separator Cell (PM and microscopic water molecules filtration)
DP-40 Synthetic PM Filters (additional PM filtration at MERV 8)
Very Plus (Total Filtration Solutions) High Efficiency PM Filters (additional PM filtration at MERV 15)

How else does your facility control any particulate emissions throughout the facility?

Bakersfield employs a number of measures to control particulate matter emissions, as follows:

Material stacking areas are swept periodically throughout the day, as necessary. The sweeping is performed with a mechanical broom. During operations, the mechanical broom is used to maintain the outer boundary of the intake piles by pushing material on the edge of the piles back toward the center of the pile.

A TYMCO PM-10 compliant sweeper is used to clean-up the entrances and driveways in the yard on a regular basis, as necessary throughout the day Water is applied to the yard haul roads and piles of materials throughout the day with a water truck, as necessary.

Track out is monitored and managed in accordance to the San Joaquin Valley Air Pollution Control District Regulation VIII.

District's guidance for relevant source category is followed, as applicable.

The Metals Recovery Plant (MRP) is equipped with dust collectors to control particulate matter emissions during the non-ferrous metals recovery process, as necessary.

5. *Provide a copy of all permits and other forms of authorization issued to your facility by any governmental entity related to metal shredding activities.*

   Bakersfield holds San Joaquin Valley Air Pollution Control District permits to operate the shredder and air pollution control system (1256-7-2) and the MRP (1256-3-10).

   The facility also holds a CAR permit and an NOI issued by the State Water Resources Control Board. Copies of permits are provided in attachment 2.

6. *Describe the ferrous metals separation process, including how shredded material is sent to the ferrous metals separation process, the type of magnet used, if any*

   The shredder feed materials, including automobiles and appliances, are loaded onto the conveyor using grapple cranes and front-end loaders and are conveyed into the hooded shredding chamber (vented to the Air Pollution Control System).

   The shredder shreds the cars and scrap metal materials into fist sized pieces. (Everything exits the shredder chamber through eight-inch square grate openings.) This stream of material collectively is called “Aggregate”. All shredded Aggregate exits the shredder onto a shaker table, which then transfers the materials to a single conveyor belt. That single flow of Aggregate is split into two equal streams of material and continues through two parallel processing lines. Each stream is run over a first drum magnet (SGM Drum Magnet, Model TMR-60”/98” 60 inch diameter by 98 inch wide). The magnetic fraction, which primarily consists of steel and iron materials, is conveyed via a short length shaker table to a second identical SGM drum magnet, which further separates the magnetic fraction from the non-magnetic fraction. The two non-magnetic fractions are combined onto a conveyer which runs under a 36 inch diameter by 48 inch wide magnetic tail pulley to recover residual magnetic steel and returns that steel to the larger SGM drum magnets via a conveyer.

   The non-magnetic aggregate contains non-magnetic metals such as aluminum, copper, zinc and stainless steel. After the magnetic separation process, the Aggregate is conveyed to the concrete paved Aggregate staging area prior to being fed into the MRP.

   …..and under what circumstances would materials exiting the ferrous metals separation process be reintroduced.

   The MRP process screens out oversized Aggregate material (+ 5 inches), which is then returned to the shredder in-feed area for re-shredding.

   Materials that have accumulated on and under the conveyor belts and picking stations and related equipment described above are returned to the shredder in-feed for re-shredding.

Also, indicate if your facility recovers ferrous metals from any material that is not shredded at your facility. If so, please describe that process and a site map of where activities occur when applicable.

The Bakersfield facility receives all types of scrap metal, including prepared and unprepared materials that are not shredded at the facility. The prepared materials, including HMS (Heavy Melt Steel) and P&S (Plate and Structural) are received and stockpiled for shipment to the SA Terminal Island facility or directly loaded into overseas shipping containers or shipped to domestic markets. The unprepared materials are sheared or cut in the areas designated for those activities on the site map. The facility operates a portable hydraulic "alligator" type shear mounted on a back-hoe type tractor which is used to shear longer pieces of steel into lengths typically under 5 feet.
Scrap materials that are too heavy to be cut by the shear are directed to a designated torch cutting area. After processing to reduce the size and length of the scrap metal, the material is loaded into trucks using an electro-magnet attached to a crane.

Please include representative pictures of the ferrous recovery process and a site map of where activities occur when applicable.

- Site Map (See Attachment 3)
- Magnet Photos (See Attachment 4)

7. *Is the shredded material ever stored onsite before ferrous metal recovery occurs? If so, on average how much and for how long is it stored, how is it stored (e.g., on a paved surface), and where in the facility is it stored?*

   No, shredder output is always processed in-line after it leaves the shredder. Material may temporarily be located on a conveyance system in the event of an emergency shut-down; however, it is not stored in the system.

8. *If ferrous metals recovery does not occur onsite, please respond to the following questions:*

   How much shredded material is stored onsite?
   How long is shredded material stored onsite?
   How is the shredded material stored (e.g., on paved ground)?
   Where in the facility is the shredded material stored?
   Where is the shredded material sent (please include addresses)?

   Not Applicable.

9. *Describe the nonferrous metals separation process at your facility, if any. Describe how aggregate (i.e., the shredded material remaining after ferrous metals separation) is introduced into that process, the type of system(s) used, where in your facility it occurs, and under what circumstances would materials exiting nonferrous metals separation processes be reintroduced.*

Aggregate materials exiting the shredder go through the ferrous recovery stage, described above in question #6, and then are transferred by a conveyor directly to the aggregate staging area. From this staging area, the aggregate material is loaded onto a track feeder that meters the flow of the aggregate into the MRP plant.

The MRP uses a series of trommels and shaker screens to initially separate the aggregate into three different fractions based on size.

Each of these size fractions continues through the MRP, which utilizes three primary types of technology to separate and recover non-ferrous materials, as well as conventional magnets for the recovery of residual ferrous materials.

The three primary technologies used for the recovery of non-ferrous metals include:

1. Eddy- current magnetic separators for most aluminum, zinc and copper materials
2. Sensors (air actuated) for stainless and copper wire
3. Density separators for fine copper materials

……and under what circumstances would materials exiting nonferrous metals separation processes be reintroduced.

Materials that accumulate under or on the equipment are in-progress materials and are routinely returned to the infeed area using front-end loaders and skid-steer type tractors. Any recovered product that does not meet a quality standard is returned to the aggregate in-feed area for re-processing. There are several product streams that require a second pass through the MRP.

Also indicate if your facility recovers nonferrous metals from any material that is not shredded at your facility. Please provide a site map of where activities occur.

The facility receives typical non-ferrous materials like aluminum and copper that is sorted and segregated into salable products, not associated with the shredder or MRP. The facility does not receive any previously shredded material from another location for non-ferrous recovery through the MRP.

10. *Is aggregate ever stored onsite prior to or during the nonferrous metals separation process? If so, how much is stored and for how long? Identify where in your facility it is stored.*

Yes, aggregate is staged on a concrete paved area. (As designated on the site map)

The amount of aggregate on site ranges from 300 to 800 tons, which equates to 3 to 10 days of production.

11. *If nonferrous metals recovery does not occur onsite, please respond to the following questions:*

Not Applicable.

- How much aggregate is stored onsite?
- How long is aggregate store onsite?
- How is the aggregate stored (e.g., on paved ground)?
- Where in the facility is the aggregate stored?
- Where is the aggregate sent (please include addresses)?
- Describe the offsite transportation and if any Department of Transportation (DOT) requirements are followed.

12. *Describe how your facility chemically treats metal shredder waste. For the purposes of this document only, "metal shredder waste" shall mean the material remaining after metal recovery is complete. Include how metal shredder waste not chemically treated is sent to the treatment process, how screening is conducted, the types of equipment used to perform the chemical treatment, chemical formulas and doses, and the sampling and analysis performed on the chemically treated metal shredder waste to ensure adequate treatment.*

Treatment of aggregate that has been fully processed for non-ferrous metals occurs in-line at the end of the non-ferrous metals recovery process. Residual materials from all of the various non-ferrous recovery steps as previously described are combined on a single, scaled (weigh belt) conveyor which delivers material to the treatment auger. A proprietary silicate-phosphate liquid is applied first. Silicate-phosphate is drawn from a tote into a foamer/tank where it is blended with a 9 – 13x volume of water. This solution is pumped from the foamer tank and is combined with the metal shredder waste in the auger chamber. The auger blends and pushes the treated material toward the cement feeds. The proprietary, non-hydraulic cement is formulated to reduce the leachability of metals. The incoming weigh belt scale is used to control the by-weight cement allocation, 9.0 – 10.0%, at the treatment auger. Cement is fed into the auger chamber from adjacent silos and applied to the material in the remaining length of the auger chamber, approximately five (5) meters, before being deposited onto the outgoing conveyor. The auger mixes and blends the material with the cement and silicate phosphate solution. The resident time in the auger is approximately sixty seconds. Fully treated material is then passed under a magnet for final ferrous metal recovery and then conveyed to a stacking conveyor. The treated aggregate (TASR) is then loaded into end dumps and then transported to the receiving landfill.

Treated metal shredder waste is sampled from the TASR staging area. Multiple grab samples, of 200 – 500 grams/each, are taken from random locations from the surface and accessible depths of the stored treated waste, per shift. These are added to a one (1)-gallon plastic bag during or following each shift of a production run; defined as consecutive or near-consecutive days during which the non-ferrous recovery plant is operated and metal shredder waste is treated. The resulting composite sample is coned and quartered before being submitted to the receiving laboratory. Analysis of this composite sample includes analysis of volatile organic compounds (VOCs) via EPA method 8260B, poly-chlorinated biphenyls (PCBs) via EPA method 8082, and soluble cadmium, chromium, copper, lead, mercury, nickel and zinc via the Waste Extraction Test (WET). One such composite sample is analyzed per month.

The Bakersfield facility is participating in an ongoing MSR Treatability Study that is evaluating the effectiveness of the treatment process and will serve as a basis for uniform, statewide treatment standards appropriate to TASR.

13. *Do landfills, regional water quality control boards, or other regulating authority impose any requirements on treated metal shredder waste sent for disposal or use as Alternative Daily Cover (ADC)? If so, what are the requirements?*

There are reporting and sampling and analysis requirements specified by the Waste Discharge Requirements (WDRs) of receiving landfills. These WDRs apply to all treated auto shredder residue (TASR) deposited at the landfill, regardless of whether or not it is put to beneficial reuse.

The landfill is required to record the quantity of TASR deposited each month and the number of loads deposited from each generator. The landfill must also report the TASR laboratory analysis results provided by the generator, in addition to those from the landfill's own monitoring.

Analysis of TASR samples include analysis of volatile organic compounds via EPA method 8260B, polychlorinated biphenyls via EPA method 8082, and soluble cadmium, chromium, copper, lead, mercury, nickel and zinc via the Waste Extraction Test (WET). Results are reported to the receiving landfill quarterly and upon request.

14. *Is untreated metal shredder waste stored onsite before disposal? If so, how much and for how long is it stored, how is it stored and where on the facility is it stored?*

There is no untreated shredder waste stored on-site. At the conclusion of the non-ferrous recovery process, processed aggregate is conveyed directly to the treatment process and treated in-line as discussed above.

15. *Is treated metal shredder waste stored onsite before disposal? If so, how much and for how long is it stored, how is it stored and where on the facility is it stored?*

TASR is staged for shipment near the MRP plant on a concrete floor. There is typically 100-300 tons of TASR on site at any one time, which is approximately three days' worth of production.

16. *How much treated metal shredder waste, if any, was transported offsite in the calendar year January 1, 2014, through January 1, 2015? List all destinations with addresses.*

From January 1st, 2014 to January 1st, 2015, the facility shipped 24,567 tons of treated metal shredder waste to:

H.M. Holloway, Inc.
Office address:
2019 Westwind Drive, STE B
Bakersfield, CA 93301-3030

Landfill Facility address:
13850 Holloway Rd, Lost Hills, CA 93249

17. *Describe the offsite transportation of metal shredder wastes. Are there any DOT requirements followed during transportation?*

Treated metal shredder waste is transported on a non-hazardous waste manifest. Material is loaded into end dumps and a tarpaulin is placed over the exposed surface. The transportation activity is conducted in compliance with the US Department of Transportation regulations and the Federal Motor Carrier Safety Administration (49 CFR Parts 300-399).

DTSC QUESTIONNAIRE
METAL SHREDDING FACILITIES
SA RECYCLING ANAHEIM FACILITY
3200 E. Frontera Street, Anaheim, CA 92806

1. *Describe your facility's scrap metal acceptance policy, and describe all materials you bring into your facility for shredding, metals recovery, or both.*

   The SA Recycling material acceptance policy is contained in the attached document titled "Supplier Source Control Procedure" (revised 3/27/15). (See Attachment 1)

   The facility receives every type of metal material including:

   Automobiles, consumer and industrial appliances, manufacturing scrap, curbside collection scrap, demolition scrap, consumer/homeowner scrap, industrial scrap. The facility receives scrap from industrial accounts, including materials from other scrap metal recycling facilities. All materials received meet the definition of "scrap metal" under title 22, CCR, section 66260.10.

   The "Supplier Source Control Procedure" document contains a Prohibited Materials List which details the types of materials that are not accepted at the shredder. Automobiles must have all fluids drained to the extent practical, and batteries and mercury switches removed. Appliances such as refrigerators must be properly depolluted prior to being sent to the shredder infeed area. In some circumstances, appliances and vehicles will be de-polluted on site, pursuant to applicable law, in a specially designated area, prior to being sent to the shredder. Items removed/recovered from the de-polluting process including waste oil, diesel/gasoline fuel, batteries, capacitors etc. are all managed under separate programs per State regulations.

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2. *How much material by weight did your facility shred from January 1, 2014, through January 1, 2015? Include the percentage of total materials shredded annually for each of the following: vehicles, appliances, and other forms of scrap metal.*

   A total weight of approximately 225,000 MT of material was shredded for the year 2014.

   Annual percentages of material are as follows:

Vehicles:	39.25%
Appliances/Tin:	34.63%
Other/Misc:	26.11%

3. *What type of shredder (e.g., the model, brand and its horsepower) is used by your facility?*

   Shredder is manufactured by The Shredder Company. Model #124-SXS Mega Shredder
   7,000 Horse Power

4. *Is your facility's shredder equipped with an Air Pollution Control Device (APCD)?*

Yes. The shredder is controlled by a five-stage air pollution control system (APCS), which has a permit to construct (A/N 495678, attached) issued by the South Coast Air Quality Management District. The permit to operate is pending until a final compliance source test approval is granted by the SCAQMD.

<u>APCS Stage One</u>

Shredder overhead, multi-hood exhaust system that captures 90% of all particulate matter (PM) and volatile organic compounds (VOC's) and send those emissions through the second stage.

<u>APCS Stage Two</u>

Dust/Mist Collector - Custom designed and manufactured, Model No. TAME-40K-2008, dual parallel compartments designed to capture oils, PM and moisture present in the gas stream. VOC's are not controlled at this stage and are carried into stage three and four, and are abated in stage five, in the RTO.

- Mist Eliminating Wall manufactured by AAF International (initial moisture control)
- Two –inch thick poly pad (coarse PM, and oils control)
- HS Aluminum Filters (additional moisture control)
- Drop Safe Rigid Pocket Bag Filters (PM and microscopic water molecules filtration)*
- DP-40 Synthetic PM Filters (additional PM filtration at MERV 8)*
- HydroVee, High Efficiency PM Filters (additional PM filtration at MERV 15)*

*All PM filters in the TAME Unit indicated by an asterisk above will be removed if the Donaldson Baghouse listed below is in operation. The SCAQMD has directed additional PM testing of the Donaldson Baghouse, without PM filters in the TAME Unit. Additional PM testing will be completed by August 2015.

<u>APCS Stage Three</u>

This stage is a PM control stage that uses a 484-RF Donaldson Baghouse. This unit is a continuous duty dust collector with 484 oleophobic, bag-style filters designed to handle upwards of 100,000 SCFM applications with heavy dust loads.

<u>APCS Stage Four</u>

40K SCFM Regenerative Thermal Oxidizer (RTO). The 40K SCFM RTO, Model No. RETOX 40.0 RTO095, was manufactured by CECO-ADWEST Technologies.

<u>APCS Stage Five</u>

HEE Environmental Chemical Scrubber – The vertical, counter-current chemical scrubber neutralizes the exhaust from the RTO.

How else does your facility control any particulate emissions throughout the facility?

Anaheim employs a number of measures to control particulate matter emissions as follows:

- The shredding chamber is enclosed by a large hood.
- The ferrous magnet system is enclosed within a building.
- The entire Metals Recovery Plant (MRP) operation, from receipt of aggregate via conveyer through non-ferrous and ferrous recovery operations to loading out TASR in trucks, is conducted within an enclosed structure.

Material stacking areas are swept periodically throughout the day, as necessary. The sweeping is performed with a mechanical broom. During operations, the mechanical broom is used to maintain the outer boundary of the intake piles of feedstock material by pushing material on the edge of the piles back toward the center of the pile.

A TYMCO sweeper is used to clean-up the entrances and driveways on a regular basis, as necessary throughout the day. Water is applied to the yard haul roads and piles of materials throughout the day with a water truck, as necessary.

The entire facility is concrete paved and is designed to collect/divert all residual process water to an on-site waste water treatment facility, where the water is recycled for re-use on-site.

In addition to being completely enclosed in a building, the MRP is equipped with dust collectors to control particulate matter during the non-ferrous metals recovery process. The MRP uses a series of pulse-jet type dust collectors on all of its cyclones to control particulate emissions.

5. *Provide a copy of all permits and other forms of authorization issued to your facility by any governmental entity related to metal shredding activities.*

   Anaheim holds SCAQMD permits to construct/operate the shredder (Permit to Construct/Modify No. 502884), the MRP (G16984), and the shredder APCS (Permit to Construct No. 495678). The facility also holds a CAR permit and an NOI issued by the State Water Resources Control Board. Copies of permits are provided in attachment 2.

6. *Describe the ferrous metals separation process, including how shredded material is sent to the ferrous metals separation process, the type of magnet used, if any,*

   The shredder feed materials, including automobiles and appliances, are loaded onto the conveyor using grapple cranes and front-end loaders and are conveyed into the hooded shredding chamber (vented to the Air Pollution Control System).

   The shredder shreds the cars and scrap metal materials into fist sized pieces. (All shredded material must exit the shredder chamber through eight inch square grate openings). This stream of material collectively is called “Aggregate”.

All shredded Aggregate exits the shredder onto a shaker table, which then transfers the materials to a single conveyor belt. That single flow of Aggregate is split into two equal streams of material and continues through two parallel processing lines. Each stream is run over a first drum magnet (SGM Drum Magnet, Model TMR-60"/98" 60 inch diameter by 98 inch wide). The magnetic fraction, which primarily consists of steel and iron materials, is conveyed via a short length shaker table to a second identical SGM drum magnet, which further separates the magnetic fraction from the non-magnetic fraction. The two non-magnetic fractions are combined onto a conveyer which runs under a 36 inch diameter by 48 inch wide magnetic tail pulley to recover residual magnetic steel and returns that steel to the larger SGM drum magnets via a conveyer.

The non-magnetic Aggregate contains non-magnetic metals such as aluminum, copper, zinc and stainless steel. After the magnetic separation process, the Aggregate is conveyed to the enclosed MRP building where it is staged prior to being fed into the MRP.

…and under what circumstances would materials exiting the ferrous metals separation process be reintroduced?

The MRP process screens out oversized material (+ 5 inches) which can be returned to the shredder in-feed area for re-shredding.

Materials that have accumulated on and under the conveyor belts and picking stations and related equipment described above are returned to the shredder in-feed for re-shredding.

Also, indicate if your facility recovers ferrous metals from any material that is not shredded at your facility. If so, please describe that process and a site map of where activities occur when applicable.

The Anaheim facility receives all types of scrap metal, including prepared and unprepared materials that are not shredded at the facility. The prepared materials, including HMS (Heavy Melt Steel) and P&S (Plate and Structural) are received and stockpiled for shipment to the SA Terminal Island facility or loaded directly into overseas shipping containers or shipped to other domestic markets. The unprepared materials are sheared or cut in the areas designated for those activities on the site map. The facility operates a portable hydraulic "alligator" type shear mounted on a back-hoe type tractor which is used to size longer pieces of steel into lengths typically under 5 feet.

Scrap materials that are too heavy to be cut by the shear are directed to a designated torch cutting area. After processing to reduce the size and length of the scrap metal, the material is loaded into trucks using an electro-magnet attached to a crane.

Please include representative pictures of the ferrous recovery process and a site map of where activities occur when applicable.

- Site Map (See Attachment 3)
- Magnet Photos (See Attachment 4)

7. *Is the shredded material ever stored onsite before ferrous metal recovery occurs? If so, on average how much and for how long is it stored, how is it stored (e.g., on a paved surface), and where in the facility is it stored?*

   No, shredder output is always processed in-line after it leaves the shredder. Material may temporarily be located on a conveyance system in the event of an emergency shut-down; however, it is not stored in the system.

8. *If ferrous metals recovery does not occur onsite, please respond to the following questions:*

   How much shredded material is stored onsite?
   How long is shredded material stored onsite?
   How is the shredded material stored (e.g., on paved ground)?
   Where in the facility is the shredded material stored?
   Where is the shredded material sent (please include addresses)?

   Not-applicable

9. *Describe the nonferrous metals separation process at your facility, if any. Describe how aggregate (i.e., the shredded material remaining after ferrous metals separation) is introduced into that process, the type of system(s) used, where in your facility it occurs,*

   Aggregate materials exiting the shredder go through the ferrous recovery stage, described above in question #6, and then are transferred by a conveyor directly to the aggregate staging area within the 85,000 square foot MRP building (enclosed, covered, concrete floor). From this staging area, the aggregate material is loaded onto a track feeder that meters the flow of the aggregate into the MRP.

   The MRP uses a series of trommels, shaker screens, and water tanks to initially separate the aggregate into different fractions based on size and density.

   Each of these fractions continues through the MRP, which utilizes three primary types of technology to separate and recover non-ferrous materials, as well as conventional magnets to recover residual ferrous materials.

   The three primary technologies used for non-ferrous metal recovery include:

   1. Eddy- current magnetic separators for most aluminum, zinc and copper materials
   2. Sensors (air actuated) for stainless and copper wire
   3. Density separators for fine copper materials

   ……and under what circumstances would materials exiting nonferrous metals separation processes be reintroduced.

   Materials that accumulate under or on the equipment are in-progress materials and are routinely returned to the infeed area using front-end loaders and skid-steer type tractors.

Any recovered product that does not meet a quality standard is returned to the aggregate in-feed area for re-processing. There are several product streams that require a second pass through the MRP.

Also indicate if your facility recovers nonferrous metals from any material that is not shredded at your facility. Please provide a site map of where activities occur.

The facility receives typical non-ferrous materials like aluminum and copper that is sorted and segregated into salable products, not associated with the shredder or MRP. The facility does not receive any previously shredded material from another location for non-ferrous recovery through the MRP.

10. *Is aggregate ever stored onsite prior to or during the nonferrous metals separation process? If so, how much is stored and for how long? Identify where in your facility it is stored.*

    Yes, aggregate is staged within the MRP Building. (As designated on the site map)

    The amount of aggregate on site ranges from 500 to 1,500 tons, which equates to 3 to 5 days of production.

11. *If nonferrous metals recovery does not occur onsite, please respond to the following questions:*

    Not Applicable

    - *How much aggregate is stored onsite?*
    - *How long is aggregate store onsite?*
    - *How is the aggregate stored (e.g., on paved ground)?*
    - *Where in the facility is the aggregate stored?*
    - *Where is the aggregate sent (please include addresses)?*
    - *Describe the offsite transportation and if any Department of Transportation (DOT) requirements are followed.*

12. *Describe how your facility chemically treats metal shredder waste. For the purposes of this document only, "metal shredder waste" shall mean the material remaining after metal recovery is complete. Include how metal shredder waste not chemically treated is sent to the treatment process, how screening is conducted, the types of equipment used to perform the chemical treatment, chemical formulas and doses, and the sampling and analysis performed on the chemically treated metal shredder waste to ensure adequate treatment.*

    Treatment of aggregate that has been fully processed for recovery of non-ferrous metals occurs in-line at the end of the non-ferrous metals recovery process. Residual materials from all of the various non-ferrous recovery steps as previously described are combined on a single, scaled (weigh belt) conveyor which delivers material to the treatment auger. A proprietary silicate-phosphate liquid is applied first. Silicate-phosphate is drawn from a tote into a foamer/tank where it is blended with a 9 – 13x volume of water. This solution is pumped from the foamer tank and is combined with the metal shredder waste in the auger chamber. The auger blends and pushes the treated material toward the cement feeds. The proprietary, non-hydraulic cement is formulated to reduce the leachability of metals. The incoming weigh belt scale is used to control the by-weight cement allocation, 9.0 – 10.0%, at the treatment auger. Cement is fed into the auger chamber from adjacent silos and applied to the material in the remaining length of the auger chamber, approximately five (5) meters, before being deposited onto the outgoing conveyor. The auger mixes and blends the material along with the cement and silicate phosphate solution. The residence time in the auger is approximately sixty seconds. Fully treated material is then passed under a magnet for final ferrous metal recovery and then conveyed to a stacking conveyor, all within the enclosed MRP building. The treated aggregate (TASR) is then loaded into end dumps (all within the MRP building) and then transported to the receiving landfill.

Sampling of the treated metal shredder waste occurs approximately six (6) meters from the exit of the treatment auger chamber. Samples are taken manually from the conveyor and added to a composite, shift sample, each half-hour. Samples from a given week are combined - mixed, coned and quartered – before being submitted to the receiving laboratory for analysis of volatile organic compounds (VOCs) via EPA method 8260B, poly-chlorinated biphenyls (PCBs) via EPA method 8082, and soluble cadmium, chromium, copper, lead, mercury, nickel and zinc via the Waste Extraction Test (WET). One such weekly composite sample is analyzed per month.

The Anaheim facility is participating in an ongoing MSR Treatability Study that is evaluating the effectiveness of the treatment process and will serve as a basis for uniform, statewide treatment standards appropriate to TASR.

13. *Do landfills, regional water quality control boards, or other regulating authority impose any requirements on treated metal shredder waste sent for disposal or use as Alternative Daily Cover (ADC)? If so, what are the requirements?*

TASR is shipped to two landfills: Chiquita Canyon Landfill in Castaic CA, and Simi Valley Landfill in Simi CA. Both landfills operate under the jurisdiction of the Los Angeles Regional Quality Control Board. There are sampling and analysis and reporting requirements specified by the Waste Discharge Requirements (WDRs) of the receiving landfills for treated auto shredder residue (TASR) regardless of whether it is employed as alternative daily cover (ADC) or disposed of as waste. SA's understanding is that essentially all of the TASR received at both of these landfills is used as ADC.

The landfill is required to record the quantity of TASR deposited each month and the number of loads deposited from each generator. The landfill must report the TASR laboratory analysis results provided by the generator, in addition to those from the landfill's own monitoring per the WDR's.

Per the WDR's the analysis of TASR samples include analysis of volatile organic compounds via EPA method 8260B, polychlorinated biphenyls via EPA method 8082, and soluble cadmium, chromium, copper, lead, mercury, nickel and zinc via the Waste Extraction Test (WET).

The WDR's for Simi Valley Landfill also specify the sampling procedure and SA has adopted this procedure, as described above. Composite samples of TASR are collected daily; one (1)-pound sample each half-hour per shift. Samples from a given week are combined – mixed, coned and quartered – before being submitted to the receiving laboratory. One weekly composite sample, prepared as described, is submitted per month for the above-mentioned analysis.

Additionally, Simi Valley Landfill requires that one such sample, per quarter, be analyzed for the solubility of the full suite of "CAM-17" metals using the Synthetic Precipitation Leaching Procedure (EPA method 1312).

14. *Is untreated metal shredder waste stored onsite before disposal? If so, how much and for how long is it stored, how is it stored and where on the facility is it stored?*

    There is no untreated shredder waste stored on-site. At the conclusion of the non-ferrous recovery process, fully processed aggregate is conveyed directly to the treatment process and treated in-line as discussed above.

15. *Is treated metal shredder waste stored onsite before disposal? If so, how much and for how long is it stored, how is it stored and where on the facility is it stored?*

    TASR is staged for shipment in the MRP building under a roof on a concrete floor. There is typically 500-1,000 tons of TASR on site at any one time, which is approximately three or four days' worth of production.

16. *How much treated metal shredder waste, if any, was transported offsite in the calendar year January 1, 2014, through January 1, 2015? List all destinations with addresses.*

    From January 1st, 2014 to January 1st, 2015, the facility shipped 87,093 tons of treated metal shredder waste to two (2) landfills:

    - Simi Valley Landfill
2801 Madera Rd
Simi Valley, CA 93065

    - Chiquita Canyon Landfill
29201 Henry Mayo Drive
Castaic, CA 91384

    21,988 tons of treated metal shredder waste shipped to Chiquita Canyon Landfill.

    65,105 tons of treated metal shredder waste shipped to Simi Valley Landfill.

17. *Describe the offsite transportation of metal shredder wastes. Are there any DOT requirements followed during transportation?*

    Treated metal shredder waste is transported on a non-hazardous waste manifest. Material is loaded into end dumps and a tarpaulin placed over the exposed surface. The transportation activity is conducted in compliance with the US Department of Transportation regulations and the Federal Motor Carrier Safety Administration (49 CFR Parts 300-399).

Ecology Auto Parts, Inc.'s Responses to DTSC's
Questionnaire to Metal Shredding Facilities
Dated May 8, 2015

Question 1. Describe your facility's scrap metal acceptance policy and describe all materials you bring into your facility for shredding, metals recovery, or both.

Answer 1. Ecology Auto Parts, Inc. ("Ecology") accepts various types of materials for shredding, including vehicles, appliances and tin, and other forms of scrap metal. However, Ecology does *not* accept the following materials at its shredder facility:

- dross, slag, or dust containing lead;
- electrical transformers;
- unattached oil filters or oil-contaminated products;
- asbestos;
- sealed or crushed drums, or pails with lids (unless thoroughly cleaned and opened on one end);
- compressed gas cylinders;
- magnesium borings, turnings, grindings, or fines;
- steel, zirconium, or non-ferrous turnings or borings that contain oil;
- radioactive substances or wastes;
- munitions scrap of any kind;
- mercury or mercury switches;
- wood, concrete, unattached tires, paint, cathode ray tubes in equipment, or other non-metallic waste debris;
- infectious waste;
- storage tanks or batteries;
- railcars with fiberglass insulation.

In most instances, un-screened automobile bodies (i.e., auto bodies that have not been de-polluted) are *not* accepted directly at Ecology's shredder facility; that is, they have been pre-screened (de-polluted) at a scrap vehicle yard before delivery to the shredder facility and had the following items removed beforehand (or otherwise, such items will be removed by Ecology):

- automotive fluids drained, including gasoline, oil, and antifreeze;
- refrigerants collected for recycling;
- all mercury-containing materials, such as light switches, anti-lock braking system (ABS) components, and televisions.

Other sources of scrap metal material are screened in the scale area of the facility in the customers' presence. All rejected materials are retained by the customers.

Question 2. How much material by weight did your facility shred from January 1, 2014, through January 1,2015? Include the percentage of total materials shredded annually for each of the following: vehicles, appliances, and other forms of scrap metal.

Answer 2. During the fourth quarter of 2014, Ecology averaged approximately 22,000 tons of shredded materials per month. During that same period, the percentage breakdown per month of materials shredded averaged as follows:

- Vehicles - 35%
- Appliances and tin _, 56%
- Other forms of metal --, 9%

These percentages tend to be consistent from quarter to quarter.

Question 3. What type of shredder (e.g., the model, brand, and its horse power) is used by your facility?

Answer 3. Ecology uses the following type of shredder:

- Model: Hammer Mill (dimensions: 96 in. x 104 in.)
- Brand: Metso
- Horse Power: 6000

Question 4. Is your facility's shredder equipped with an Air Pollution Control Device (APCD)? How else does your facility control any particulate emissions throughout the facility?

Answer 4. Yes, Ecology's shredder is equipped with multiple Air Pollution Control Devices, including a HEPA-equipped mechanical filtration system for ultra-fine particulate control, as well as a regenerative thermal oxidizer (RTO) for volatile organic compound (VOC)-control. Ecology also uses spray nozzles inside of the mill-box during the shredding process.

Ecology has implemented multiple dust-control and fugitive emissions-control measures throughout the facility. The entire shredding area, including the receiving and stockpile areas, is completely paved, and all incoming and outgoing trucks are tarped. Ecology employs a full-time mechanical street sweeper for continuous cleaning throughout the day, and the shredder area is swept again at night once operations are completed for that day. Ecology uses a 40-foot high overhead, remote-controlled water cannon and a Dust Boss to spray down the shredder area and stockpile. Ecology also uses a water truck to wash down specific areas when needed.

Question 5. Provide a copy of all permits and other forms of authorization issued to your facility by any governmental entity related to metal shredding activities.

Answer 5. Ecology is attaching copies of the following permits and authorizations as they relate to its metal shredding activities:

- South Coast Air Quality Management District "Permit to Operate" for the shredder system;
- South Coast Air Quality Management District "Permit" for the regenerative thermal oxidiz.er and auto body shredding (among other listed permitted activities, e.g. storage and dispensing of gasoline);
- *San Bernardino County CUPA "Annual Permit";
- *State Water Resources Control Board "Notice of Intent" listing the waste discharge identification number (WDID) under the General Industrial Storm Water Permit;

- Cal. EPA Department of Toxic Substances Control "Appliance Recycler Certification" listing the Cal. EPA identification number;
- Department of Toxic Substances Control letter dated August I, 2005 giving confirmation of non-hazardous waste classification;
- Department of Toxic Substances Control Declassification letter dated September 24, 1987 (originally issued to Clean Steel);
- **Colton Fire Department Permit.

* **Pacific Rail Industries is a dba of Ecology Auto Parts, Inc.**

** **Pacific Rail Dismantling Services, Inc. is a wholly owned subsidiary of Ecology Auto Parts, Inc.**

Question 6. Describe the ferrous metals separation process, including how shredded material is sent to the ferrous metals separation process, the type of magnet used, if any, and under what circumstances would materials exiting the ferrous metals separation process be reintroduced. Also indicate if your facility recovers ferrous metals from any material that is not shredded at your facility. If so, please describe that process. Please include representative pictures of the ferrous recovery process and a site map of where activities occur when applicable.

Answer 6. After materials are shredded, they are sent by conveyor to a pan feeder that delivers the materials to a Steinert (brand) drum magnet. At that point, the shredder output falls onto a second conveyor, which delivers the steel to a second feeder, which in turn transfers the steel to a second drum magnet for more cleaning. A third conveyor brings the steel underneath a "Z-box" cyclone, which functions as a large vacuum to pull out the light non-metallic material. Thereafter, the steel travels to a picking station where employees, by hand, pull out the rubber and any other remaining debris. A fourth conveyor then brings the steel to a finished stockpile. Photos of the shredder box, the drum magnets, and "Z-box" cyclone are included.

Ecology does not recover any ferrous metals from other shredder facilities. Occasionally, Ecology will receive a heavy piece of steel that cannot be shredded due to its size. In those instances, the steel is processed in a separate area of the facility by using a hydraulic shear.

Question 7. Is the shredded material ever stored onsite before ferrous metal recovery occurs? If so, on average how much and for how long is it stored, how is it stored (e.g., on a paved surface), -and where in the facility is it stored?

Answer 7. No, the shredded material is not stored onsite before performing ferrous metal recovery.

Question 8. If ferrous metals recovery does not occur onsite, please respond to the following questions:

- How much shredded material is stored onsite?
- How long is shredded material stored onsite?
- How is the shredded material stored (e.g., on paved ground)?
- Where in the facility is the shredded material stored?
- Where is the shredded material sent (please include addresses)?

Answer 8. Not applicable, because ferrous metal recovery *does* occur onsite.

Question 9. Describe the nonferrous metals separation process at your facility, if any. Describe how aggregate (i.e., the shredded material remaining after ferrous metals separation) is introduced into that process, the type of system(s) used, where in your facility it occurs, and under what circumstances would materials exiting nonferrous metals separation processes be reintroduced. Also indicate if your facility recovers nonferrous metals from any material that is not shredded at your facility. Please provide a site map of where activities occur.

Answer 9. Not applicable, because nonferrous metals separation does *not* occur at this facility. See Answer 11 below.

Question 10. Is aggregate ever stored onsite prior to or during the nonferrous metals separation process? If so, how much is stored and for how long? Identify where in your facility it is stored.

Answer 10. See Answer 11 below, although nonferrous metals separation does *not* occur at this facility.

Question 11. If nonferrous metals recovery does not occur onsite, please respond to the following questions:

- How much aggregate is stored onsite?
- How long is aggregate stored onsite?
- How is the aggregate stored (e.g., on paved ground)?
- Where in the facility is the aggregate stored?
- Where is the aggregate sent (please include addresses)?
- Describe the offsite transportation and if any Department of Transportation (DOT) requirements are.followed.

Answer 11. Ecology does not perform nonferrous metals recovery onsite.

- Ecology temporarily stages anywhere from zero tons up to approximately 800 tons of aggregate onsite.
- The aggregate may be staged onsite for up to approximately two days.
- The aggregate is staged underneath a three-sided steel building (receiving bay). The building has a 12-inch thick concrete floor, with a half-inch, solid steel plate above it. Any water that may drain from the aggregate travels to a floor drain, where it is pumped to a one-million gallon tank for reuse in the shredding process.
- The receiving bay is located approximately 150-feet north of the drum magnets.
- The aggregate is sent to Ecology's Arizona facility for nonferrous recovery, which is located at 59260 Highway 72, Salome, Arizona, 85348.
- The aggregate is trucked by Ecology employees in Ecology-owned trailers. Ecology hauls the aggregate primarily in end-dump trailers, which are tarped and have rubber seals on their back doors. The aggregate is *not* handled or held at any interim location during transit. Ecology complies with all applicable DOT requirements.

Question 12. Describe how your facility chemically treats metal shredder waste. For the purposes of this document only, "metal shredder waste" shall mean the material remaining after metal recovery is complete. Include how metal shredder waste not chemically treated is sent to the treatment process, how screening is conducted, the types of equipment used to perform the chemical treatment, chemical formulas and doses, and the sampling and analysis performed on the chemically treated metal shredder waste to ensure adequate treatment.

Answer 12. Not applicable. See Answer 11 above.

Question 13. Do landfills, regional water quality control boards, or other regulating authority impose any requirements on treated metal shredder waste sent for disposal or use as Alternative Daily Cover (ADC)? If so, what are the requirements?

Answer 13. Not applicable. See Answer 11 above.

Question 14. Is untreated metal shredder waste stored onsite prior to treatment? If so, how much and for how long is it stored, how is it stored and where on the facility is it stored?

Answer 14. Not applicable. See Answer 11 above.

Question 15. Is treated metal shredder waste stored onsite before disposal? If so, how much and for how long is it stored, how is it stored and where on the facility is it stored?

Answer 15. Not applicable. See Answer 11 above.

Question 16. How much treated metal shredder waste, if any, was transported offsite in the calendar year January 1,2014, through January 1,2015? List all destinations with addresses.

Answer 16. Not applicable. See Answer 11 above.

Question 17. Describe the offsite transportation of metal shredder wastes. Are there any DOT requirements followed during transportation?

Answer 17. Not applicable. See Answer 11 above.

APPENDIX B: COMBINED LANDFILL QUESTIONNAIRES

RECEIVED AUG 03 2015

WASTE MANAGEMENT

Altamont Landfill & Resource Recovery Facility
10840 Altamont Pass Road, Livermore, CA 94551

July 27, 2015

Mr. Rick Brausch
Policy and Program Support Division
Hazardous Waste Management Program
Department of Toxic Substances Control
1001 I Street, 23rd Floor
P.O. Box 8006
Sacramento, California 95812-0806

Re: Information Request for Implementation of Senate Bill (SB) 1249 (Hill, Chapter 756, Statutes of 2014)

Dear Mr. Brausch:

This letter is in response to your letter dated May 20, 2015 regarding the management of metal shredder waste that occurs at Waste Management of Alameda County, Inc.'s (WMAC) Altamont Landfill & Resource Recovery Facility (ALRRF) in Livermore, California.

The following questions are those that you requested be answered in the questionnaire attached to your original letter.

1. *Please provide the policy that applies to the acceptance of metal shredder waste.*

   WMAC Response: Metal shredder waste is allowed through ALRRF's Waste Discharge Requirements (WDR). The language that addresses metal shredder waste in the WDR (Findings 16 and 17) is attached.

2. *How much metal shredder waste by weight did your facility accept from January 1, 2014, through January 1, 2015? Please include the name and address of each metal shredding facility that sent the metal shredder waste and how much they sent during the calendar year.*

   WMAC Response: ALRRF accepts metal shredder waste from two companies:

   Sims Metal Management
   699 Seaport Ave.

Redwood City, CA, 94063
63,505.78 tons accepted 1/1/14-1/1/15

Schnitzer Steel
1101 Embarcadero West
Oakland, CA, 94607
99,897.19 tons accepted 1/1/14-1/1/15

3. *What percentage of metal shredder waste was used as Alternative Daily Cover (ADC)?*

   WMAC Response: 100% of metal shredder waste was used as ADC.

4. a. *How much metal shredder waste is stored onsite prior to its use as ADC?*

   WMAC Response: ALRRF tries to minimize the amount of stockpiled metal shredder waste by using it as it is received. The amount that is stored onsite varies based on the amount coming in, placement availability, and the classification of the area currently being filled (i.e., Class II or Class III). At times, the stockpile size may grow to up to 300 tons, but this is not the norm.

   b. *How long is it stored?*

   WMAC Response: ALRRF tries to use metal shredder waste as it is received. It is normally used within two weeks of receipt but may be stored longer based on operational needs.

   c. *How is it stored?*

   WMAC Response: It is stored in the Class II unit (Fill Area 1, Unit 2).

   d. *Where in the facility is it stored? Please provide a site map of the location.*

   WMAC Response: Metal shredder waste is stored in the landfill footprint, in the Class II unit. Stockpiles move based on the location of the active fill area. See attached map. The Class II unit is Fill Area 1, Unit 2.

5. *Please answer the following questions (5.A.—5.D.) pertaining to metal shredder waste accepted at your facility but not used as ADC:*

   a. How much metal shredder waste is stored onsite prior to its use as ADC?

   b. How long is it stored?

   c. How is it stored (e.g., on a paved surface)?

d. Where in the facility is it stored? Please provide a site map of the location

WMAC Response: N/A. All metal shredder waste at ALRRF is used as ADC.

6. *Do the regional water quality control boards or other regulating authorities impose any requirements on your facility concerning metal shredder wastes? If so, what are those requirements?*

   WMAC Response: The WDR referenced in question #1 above is attached. Findings 16 and 17 address metal shredder waste.

7. *Provide a copy of all permits and other forms of documented authorization issued to your facility by any governmental entity related to metal shredder waste management activities, and a copy of any data your facility may have regarding the toxicity characteristics of metal shredder waste.*

   WMAC Response: The WDR referenced in questions #1 and #6 above is attached. ALRRF's Solid Waste Facility Permit (SWFP) is attached. Section 7, page 15, of ALRRF's Joint Technical Document (JTD) addressing metal shredder waste is attached. Metal shredder waste generators provide PCB data for every 1000 tons of metal shredder waste disposed of.

8. *Are other management requirements followed by your facility for metal shredder waste when accepting, handling, storing and ultimately disposing of or using metal shredder waste as ADC? If so, please describe those requirements.*

   WMAC Response: Metal shredder waste is generally placed on semi-flat surfaces and interior slopes. It is applied with a minimum compacted thickness layer of six inches and average compacted thickness of less than 24 inches. A D6 dozer performs application as needed. To maximize efficiency and facilitate its timely use in cover operations, metal shredder waste is initially unloaded near the active disposal area.

   Metal shredder waste is also used as an extender for solidification of liquid or semi-solid waste (i.e., waste containing less than 50% solids) and dewatered sewage or water treatment sludge prior. The liquid/semi-solid waste is mixed with the metal shredder waste in a clay-lined pit or solidification basin in the Class II unit until the combined material is greater than 50% solids by volume. The solidified waste is then loaded by the excavator into a dump truck and transported to the active face. At the active face, the ADC material is spread using bulldozers.

If you have any questions regarding the content of this report, please contact me at (925) 455-7305.

Sincerely,

Sarah Fockler
Environmental Protection Specialist

Altamont Landfill and Resource Recovery Facility

Attachments:
Attachment A – ALRRF WDR
Attachment B – Site Map
Attachment C –ALRRF SWFP
Attachment D – ALRRF JTD

Attachment A

ALRRF WDR

15. The Discharger accepts for disposal and discharges wastes containing greater than one percent (>1%) friable asbestos to the landfill units. These wastes are classified as 'hazardous' under CCR title 22. However, these wastes do not pose a threat to groundwater quality and Section 25143.7 of California's Health and Safety Code permits their disposal in any landfill that has WDRs that specifically permit the discharge, provided that the wastes are handled and disposed of in accordance with applicable statutes and regulations.

16. The State Water Resources Control Board adopted Resolution No. 87-22 on 19 March 1987. This Resolution allows the discharge of shredder wastes to Class III landfills where WDRs allow such disposal.

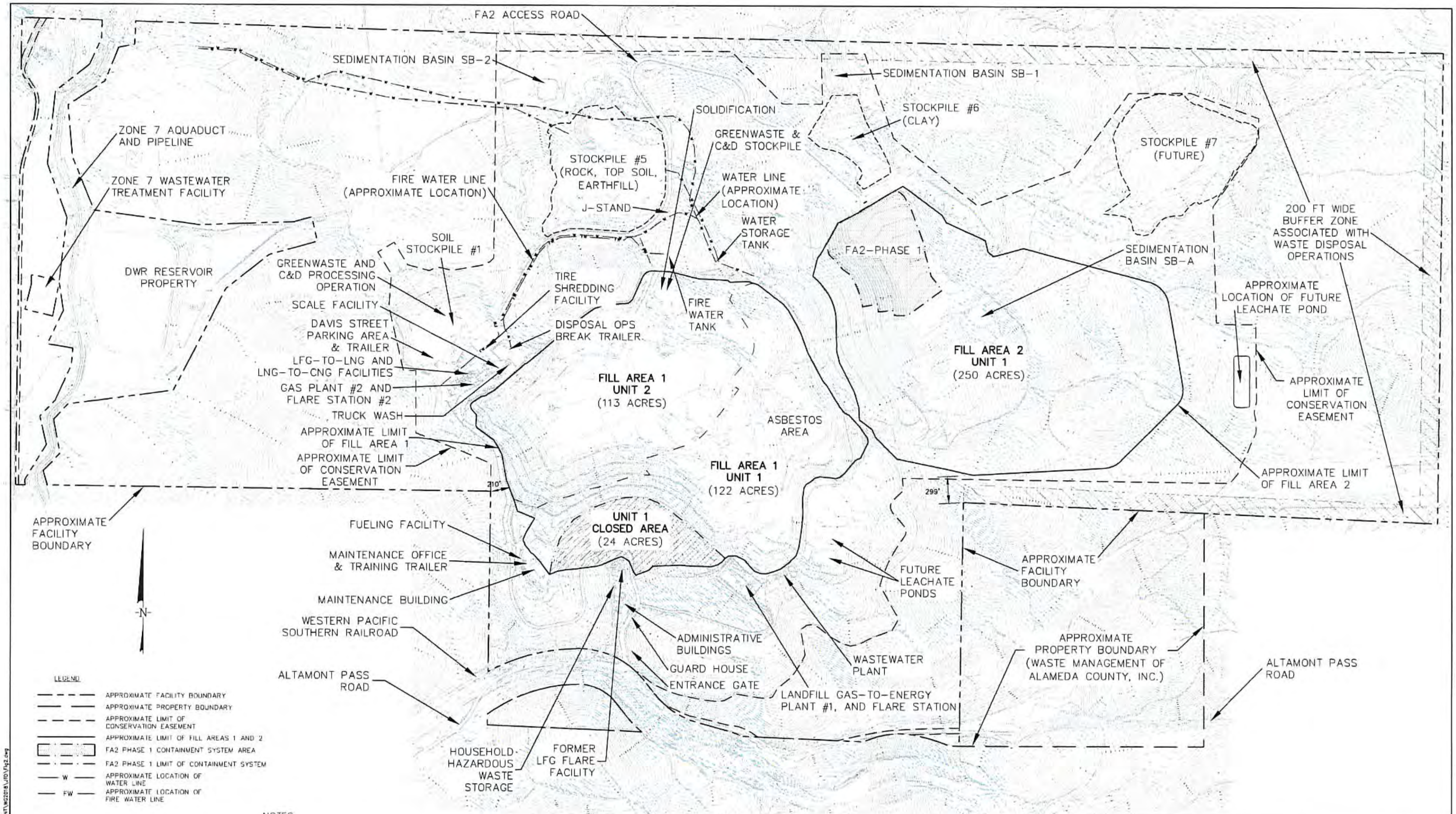
17. Treated (stabilized) auto shredder waste (TASW) is any non-recyclable waste from the shredding of automobile bodies (from which batteries, mufflers, mercury switches, and exhaust pipes have been removed), household appliances, and sheet metal. The Discharger proposed to continue to discharge TASW in the top lift of Fill Area 1, Unit 1 where it will not be exposed to acidic leachate. The Discharger also proposes to continue to use TASW as alternative daily cover, beneficial reuse material, or to dispose of it in all the applicable Class II landfill areas. In the past, TASW has been discharged at the landfill under a waiver from the Department of Toxic Substances Control (DTSC), and at the Class III unit, pursuant to Resolution No. 87-22. DTSC's waiver is currently under review and may be rescinded due to new data and information indicating it should be managed as a hazardous waste due to increasingly high concentrations of toxic metals, and concerns about the long-term effectiveness of the stabilization treatment process. If DTSC makes the determination that TASW is a special hazardous waste and requires management at a Class I facility, this Order prohibits the discharge of auto shredder waste (treated or untreated) at the Altamont Landfill.

18. The Discharger proposes to discharge treated wood waste at the landfill. CCR title 22 defines "Treated wood" to mean wood that has been treated with a chemical preservative for purposes of protecting the wood against attacks from insects, microorganisms, fungi, and other environmental conditions that can lead to decay of the wood and the chemical preservative is registered pursuant to the Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. Sec. 136 and following). This may include but is not limited to waste wood that has been treated with chromated copper arsenate (CCA), pentachlorophenol, creosote, acid copper chromate (ACC), ammoniacal copper arsenate (ACA), ammoniacal copper zinc arsenate (ACZA), or chromated zinc chloride (CZC).

19. Findings and specifications in these WDRs apply only to treated wood waste that is a hazardous waste, solely due to the presence of a preservative in the wood, and is not subject to regulation as a hazardous waste under the federal act. Treated wood that is not a hazardous waste can be handled as C&D debris or

Attachment B

Site Map



NOTES:

1. SITE TOPOGRAPHY PROVIDED BY MILLER CREEK AERIAL MAPPING, LLC. AERIAL PHOTO DATED 31 DECEMBER 2014. AS THE SITE IS AN ACTIVE LANDFILL, TOPOGRAPHY MAY HAVE CHANGED SINCE THE SURVEY DATE SHOWN.

2. THE HORIZONTAL COORDINATES ARE BASED ON CALIFORNIA STATE PLANE COORDINATE SYSTEM ZONE 3, NAD27. THE VERTICAL DATUM IS BASED ON NAVD 1929.

SITE PLAN AND 2014 TOPOGRAPHY ALTAMONT LANDFILL & RESOURCE RECOVERY FACILITY ALAMEDA COUNTY, CALIFORNIA	Geosyntec consultants	
	FIGURE NO.	2
	PROJECT NO.	WG2018
	DATE:	JULY 2015

P:\CADD\CIVIL 3D\WM\ALTAMONT\WG2018\FIG\Fig2.dwg

Attachment C

ALRRF SWFP

SOLID WASTE FACILITY PERMIT

1. Facility/Permit Number:

01-AA-0009

2. Name and Street Address of Facility:

Altamont Landfill and Resource Recovery Facility
10840 Altamont Pass Road, Livermore CA 94551

3. Name and Mailing Address of Operator:

Waste Management of Alameda County
172 98th Avenue
Oakland, CA 94503

4. Name and Mailing Address of Owner:

Waste Management of Alameda County
172 98th Avenue
Oakland, CA 94503

5. Specifications:

a. Permitted Operations:

- ☐ Composting Facility (mixed wastes)
- ☐ Composting Facility (yard waste)
- ☒ Landfill Disposal Site
- ☐ Material Recovery Facility
- ☐ Processing Facility
- ☐ Transfer Station
- ☐ Transformation Facility
- ☐ Other:

b. Permitted Hours of Operation: (Receipt of Refuse/Waste) **24 hours**
(Ancillary Operations/Facility Operation Hours) **24 hours**
(Public Hours) **Monday through Friday 6 a.m. to 6 p.m.**

c. Permitted Tons per Operating Day: **11,150** Tons per Day for Disposal

d. Permitted Traffic Volume: **557** Refuse Vehicles per Day

e. Key Design Parameters (Detailed parameters are shown on site plans bearing LEA and CIWMB validations):

	Total	Disposal	Transfer	MRF	Composting	Transformation
Permitted Area (in acres)	2,170	472	N/A	N/A	N/A	N/A
Design Capacity		87.1 million tons 124.4 million cubic yard	N/A	N/A	N/A	N/A
Max. Elevation (Ft. MSL)		1200 feet				
Max. Depth (Ft BGS)		540 feet				
Estimated Closure Date		2025				

Upon a significant change in design or operation from that described herein, this permit is subject to revocation or suspension. The stipulated permit findings and conditions are integral parts of this permit & supersede the conditions of any previously issued permit.

6. Approval:

Ariu Levi
Director, Environmental Health

Approving Officer Signature

7. Enforcement Agency Name and Address:

Alameda County Environmental Health
Office of Solid/Medical Waste Management

1131 Harbor Bay Parkway
Alameda, CA 94502

8. Received by CIWMB: 07/18/2005

9. CIWMB Concurrence Date: 08/16/2005

10. Permit Issued Date: 08/22/2005

11A. Next Permit Review Due Date: 08/22/2015

11B. Permit Transfer Date:

11C. Permit Review Date: 08/20/2010

SOLID WASTE FACILITY PERMIT

Facility Number:

01-AA-0009

12. Legal Description of Facility:

The legal description of this facility is contained in page 2-4 of the Joint Technical Document dated September 15, 2004, Revised on 1 April 7, 2005.

13. Findings:

a. This permit is consistent with the Alameda County Integrated Waste Management Plan, which was approved by the CIWMB on December 12, 2000. The location of the facility is identified in the Countywide Siting Element, pursuant to Public Resources Code (PRC), Section 50001(a).

b. This permit is consistent with the standards adopted by the CIWMB, pursuant to PRC 44010.

c. The design and operation of the facility is consistent with the State Minimum Standards for Solid Waste Handling and Disposal as determined by the enforcement agency, pursuant to PRC 44009.

d. The Alameda County Fire Department has determined that the facility is in conformance with applicable fire standards, pursuant to PRC, 44151.

e. An EIR was filed with the State Clearinghouse (SCH #1992083047) and certified by the Board of Supervisors on March 9, 2000. The EIR describes and supports the design and operation, which will be authorized by the issuance of this permit. A Notice of Determination was filed with the State Clearinghouse on March 9, 2000.

f. The EIR consists of the EIR dated September 29,1995, the Response to Comments Addendum dated March 29, 1996 and the Revised Final EIR dated January 2000.

g. The Alameda County Planning Department has determined that the facility expansion is compatible with surrounding land use through the approval of Conditional Use Permit C-5512.

14. Prohibitions:

The permittee is prohibited from accepting the following wastes:

Hazardous, radioactive, medical (as defined in Chapter 6.1, Division 20 of the Health and Safety Code), liquid, designated, or other wastes requiring special treatment or handling, except as identified in the Report of Facility Information and approved amendments thereto and as approved by the enforcement agency and other federal, state, and local agencies.

15. The following documents describe and/or restrict the operation of this facility:

	Date		Date
Report of Disposal Site Information Revised	Sept. 15,2004 April 7 2005	Preliminary Closure and Postclosure Maintenance Plan	pending
Waste Discharge Requirements Order No. R5-2002-0119	June 7,2002	Closure Financial Assurance Documentation	pending
BAAQMD Permit to Operate #A2066	Feb. 1, 2005	Operating Liability Certification	pending
EIR (SCH #1992083047)	March 9, 2000	Land Use and/or Conditional Use Permit	March 9, 2000
EPA Major Facility Review Permit Administered by BAAQMD pursuant to Federal Title V	Dec. 1, 2003	NPDES No. 0083763	June 7, 2002
Alameda County Waste Management Authority Resolution No. 2000-10	May 24, 2000		

SOLID WASTE FACILITY PERMIT	Facility Number: 01-AA-0009

16. Self Monitoring

The owner/operator shall submit all self monitoring programs to the Enforcement Agency within 30 days of the end of the reporting period .

	Program	Reporting Frequency
a.	The types and quantities (in tons) of waste, including separated or commingled recyclables, entering the facility per day.	Monthly*
b.	The number of refuse vehicles using the facility per day.	Monthly*
c.	Results of the hazardous waste load checking program, including the quantities and types of hazardous wastes, medical wastes or otherwise prohibited wastes found in the waste stream and the disposition of these materials.	Available on site
d.	Copies of all written complaints regarding this facility and the operator's actions taken to resolve these complaints.	Quarterly*
e.	Results of the perimeter landfill gas migration monitoring program.	Quarterly*
f.	Remaining site capacity with aerial surveys.	Annual by June 30
g.	Annual mitigation monitoring program report.	Annually
h.	Type, source and quantity of alternative daily cover materials received.	Available on site

*All reports with monthly or quarterly frequency shall be due on the last day of the month following the reporting period.

17. Enforcement Agency (EA) Conditions:

a. The operator shall comply with all State Minimum Standards for solid waste handling and disposal as specified in Title 27, California Code of Regulations.

b. The operator shall maintain a log of special/unusual occurrences. This log shall include, but is not limited to, fires, explosions, the discharge and disposition of hazardous or unpermitted wastes, and significant injuries, accidents or property damage. Each log entry shall be accompanied by a summary of any actions taken by the operator to mitigate the occurrence. The log shall be available to site personnel and the EA at all times.

c. Additional information concerning the design and operation of the facility shall be furnished upon request and within the time frame specified by the EA.

d. The maximum permitted daily tonnage for this facility is 11,150 disposal tons per day, and the facility shall not receive more than this amount without a revision of this permit.

e. This permit is subject to review by the EA and may be suspended, revoked, or revised at any time for sufficient cause.

f. The EA reserves the right to suspend or modify waste receiving and handling operations when deemed necessary due to an emergency, a potential health hazard, or the creation of a public nuisance.

g. Any change that would cause the design or operation of the facility not to conform to the terms and conditions of this permit is prohibited. Such a change may be considered a significant change, requiring a permit revision. In no case shall the operator implement any change without first submitting a written notice of the proposed change, in the form of an RFI amendment, to the EA at least 150 days in advance of the change.

h. A copy of this permit shall be maintained at the facility.

i. Daily cover will be applied in an ongoing process during the "working day" which is up to 6.5 days long. No area of waste is to be exposed that will not be receiving waste or cover within 24 hours. At the end of the working day, the entire site is to be covered with at least 6 inches of soil or approved ADC.

j. Covering of friable asbestos containing waste must begin within one hour of receipt of the final load of the day pursuant to the Asbestos Management Plan for the facility in the JTD.

k. Operator shall implement all components of the litter control program as described in the JTD. The EA may require revisions to the program and implementation of additional control mechanisms if the facility is continuously in violation of State Minimum Standards for litter control.

Attachment D

ALRRF JTD

the working face, processed green material shall comply with a grain size specification by volume of 95% less than 6 inches. Alternative processing and grain size specification requirements may be approved by the EA if the EA determines that the alternative meets the performance requirements of ¶(a)(2) and (a)(3) of this section and the CIWMB concurs."

Section 20690(b)(3)(C) restricts the use of processed green material "*... to a minimum compacted thickness of 6 inches and average compacted thickness of less than or equal to 12 inches...*" Section 20690(b)(3)(D) requires that "*... processed green material placed as cover shall not be exposed for more than 21 days.*"

In accordance with Alameda County Ordinance 2008-01, the ALRRF no longer uses processed green waste materials as ADC.

Green waste material may be used as erosion protection in accordance with Alameda County Ordinance 2008-01.

<u>Processed C&D Wastes</u>

Section 20690(b)(9) of Title 27 allows for use of processed C&D waste, as well as the fines derived from processing of such materials, as ADC. The ALRRF accepts for use as ADC material screened from the C&D processing line at the Davis Street Transfer Station Material Recovery Facility. This screened material is less than 6 in. in diameter with average grain size around 1 in. It consists mainly of ground plant material that is commingled with the C&D wastes from construction work as well as soil, sand, and small amounts of wood products.

This material is typically used as ADC as an extender in solidification. This material is thought to work well in this process and compacts well to form a good cover material free of voids. The ALRRF may use this material by itself as ADC at some point but would be cognizant of potentially dusty conditions and would implement control mechanisms to ensure safety and compliance.

<u>Treated Auto Shredder Waste (TASW)</u>

Section 20690(b)(6)(B) of Title 27 states that "*... treated auto shredder waste used for alternative daily cover shall be restricted to a minimum compacted thickness of 6 inches and average compacted thickness of less than 24 inches.*"

TASW at the ALRRF is utilized in accordance with these requirements. The material is unloaded near the active disposal area to facilitate its use in cover operations in Class II areas.

CHIQUITA CANYON
A Waste Connections Company

July 17, 2015

Mr. Rick Brauson, Chief
Policy and Program Support Division
Hazardous Waste Program

Dear Mr. Brauson:

In response to you letter titled; RE: INFORMATION FOR INPLEMENTATION OF SENATE BILL (SB) 1249 (Hill, Chapter 756, Statutes of 2014), I would like to offer these responses to question 1-8 below for Chiquita Canyon Landfill.

1. Please provide the policy that applies to the acceptance of shredder waste. If no such policy exists, describe any practices and procedures used by your facility to accept such waste.
   See attachment #1
2. How much metal shredder waste by weight did your facility accept from January 1, 2014 through January 1, 2015? Please include the name and address of each metal shredding facility that sent the metal shredder waste and how much they sent during the calendar year.
   60,350.68 tons total.
   - SA Recycling LLC. 901 New Dock, San Pedro, CA 93731. 38,225.74 tons
   - SA Recycling LLC. 3200 E. Frontera St. Anaheim, CA. 92806. 22,124.94 tons
3. What percentage of metal shredder waste was used as Alternative Daily Cover (ADC)?
   100%
4. Please answer the following questions (4.A. – 4.D.) pertaining to metal shredder waste accepted at your facility <u>and used as ADC</u>:
   a. How much metal shredder waste is stored onsite prior to its use as ADC?
      We generally do not store this material because the daily amount we get is usually less than or equal to our daily cover need. If we do store some it is typically only 1 or 2 days worth.

   b. How long is it stored?
      About one or two days.

   c. How is it stored (e.g., on a paved surface)?
      Near the working face of the landfill to facilitate its use the next day. The

material is placed on an already filled portion of the landfill which is underlain by a composite liner and leachate collection and removal system.

d. Where in the facility is it stored? Please provide a site map of the location. The working face moves around the landfill as the fill sequence progresses so the material is not ever really stored in the same location, therefore no map is provided.

5. Please answer the following questions (5.A. – 5.D.) pertaining to metal shredder waste accepted at your facility but not used as ADC: N/A see answer on number 3.
   a. How much metal shredder waste is stored onsite prior to its use as ADC?
   b. How long is it stored?
   c. How is it stored (e.g., on a paved surface)?
   d. Where in the facility is it stored? Please provide a site map of the location.

6. Do the regional water quality control board or other regulating authorization impose any requirement on your facility concerning metal shredder waste? If so, what are those requirements? You may exclude any permits or other forms of documented authorizations answered in question 7, below.
   Cal Recycle has requirements governing the thickness of ADC in Title 27.The Los Angeles Regional Water Quality Control Board specified the testing requirements for acceptance of metal shredder waste in the landfills Waste Discharge Requirements.

7. Provide a copy of all permits and other forms of documented authorization issued to your facility by any governmental entity related to metal shredder waste management activities, and a copy of any data your facility may have regarding the toxicity characteristics of metal shredder waste. See attachment 2

8. Are other management requirements followed by your facility for metal shredder waste when accepting, handling, storing and ultimately disposing of or using metal shredder waste as ADC? If so, please describe those requirements. N/A

Please call me with any question at 661-371-9214 or email at steveca@wasteconnections.com

Sincerely

Steve Cassulo
District Manager
Chiquita Canyon Landfill

Cc:

Mr. Christopher Cho
Staff Attorney
Office of Legal Affairs
DTSC
1001 I Street, 23rd Floor
PO Box 806
Sacramento, CA. 95812-0806

Ms. Valetti Lang, Chief
Research and Policy Development Branch
Policy and Program Support Division
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DTSC
1001 I Street, 11rd Floor
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Mr. Kevin Sanchez
Senior Environmental Scientist (Specialist)
Research and Policy Development Branch
Policy and Program Support Division
Hazardous Waste Program
DTSC
1001 I Street, 11rd Floor
PO Box 806
Sacramento, CA. 95812-0806

Attachment 1

10.0 COVER AND BENEFICIAL USE

10.1 Cover Materials

27 CCR 21600(b)(6)(A)

Soil cover, consisting of excavated on-site soil and soil delivered to the landfill, is placed and compacted as required by 27 CCR 21600(b)(6), 20680, and 20700. Standards for cover are followed as described in 27 CCR 20705. This requires 6 inches of compacted daily soil cover and 1 foot of compacted intermediate soil cover to be placed on the working face, and the top and sideslopes, respectively, of each advancing lift. Cover materials are graded and compacted to: (1) prevent ponding of surface water over wastes, (2) direct runoff from the active waste area, and (3) minimize potential erosion.

On-site cover soil will be excavated from one of the excavation cells or borrow areas (Drawing B-2, Appendix B).

The Saugus Formation accounts for 80 percent of bedrock exposure and is as much as 1,800 feet thick above the Pico Formation within the site boundaries. It is composed mainly of fine- to medium-grain sandstone with 10 to 50 percent fines. Lenticular discontinuous beds of conglomerate lie within the sandstone. Highly plastic mudstone lenses have also been identified.

The Pico Formation, exposed at the extreme northern portion of the site, consists of cemented sandstone with interbedded conglomerate and siltstone. This formation, which is generally more resistant to weathering than the Saugus Formation, accounts for the steep cliffs to the north. The upper 200 to 300 feet of this formation may also contain soft siltstone and mudstone.

Excavation will take place as described in Section 6.3. Table 5 provides the estimated soil required for daily and intermediate cover.

10.2 Alternative Daily Cover

27 CCR 21600(b)(6)(B), 21600(b)(6)(C)

Waste is delivered to CCL in transfer trucks, collection trucks, and various other vehicles by commercial haulers, contract haulers, and the general public. The landfill is constructed using the area fill method. In general, waste is placed in 10- to 30-foot-thick lifts, and compacted in 2-foot-thick layers with typical working face slopes of 4:1 and maximum working face slopes of about 3:1. The size and shape of the working face varies daily depending on the specific geometry of where on the site the active filling is taking place. During the day, the size of the working face also varies. To control odors and blowing litter, the working face is kept as small as practical by placing ADC during the operating day. For example, in order to safely accommodate the truck traffic during the busiest time of day, the working face is at its largest. During slower periods of the day, daily cover may be placed on the working face to minimize the size of the active face and to efficiently use the landfill's equipment and operator resources. Over the course of a typical day the total area requiring daily cover is about 60,000 sf (200 feet by 300 feet).

Daily cover is placed at the end of the operating day. However, as described above, daily cover may be placed over portions of the active area at various times during the operating day. At a time when the facility operates 24-hours per day, Monday through Saturday, daily cover is placed and compacted at least once during the 24-hour period and on Saturday at the end of the operating day.

ADC may be utilized consistent with 27 CCR 20690. ADC includes any material pre-approved in 27 CCR 20690: geosynthetic materials, foam, processed green material, ash and cement kiln dust materials, treated auto shredder waste, contaminated sediment, dredge spoils, foundry sands, energy resource exploration and production waste, compost materials, construction and demolition wastes, shredded tires, and spray applied cementitious products. Other materials may be approved as ADC by the EA based on a successful demonstration project consistent with 27 CCR 20690 .

ADC is used consistent with the requirements contained in 27 CCR 20690. Currently, CCL uses treated auto shredder waste as the primary material for ADC. Depending on the daily flow of materials, CCL also uses ground green waste, processed construction and demolition wastes, and energy resource exploration and production wastes as ADC. Should a change in the type of ADC be needed, CCL will notify the EA. If the quantity of ADC materials received exceeds the daily requirements, the excess ADC materials are stockpiled for future use.

10.3 Intermediate Cover
27 CCR 21600(b)(6)(D)

Consistent with 27 CCR 21600(b)(6)(C), 20680, and 20700, a minimum 1 foot of compacted intermediate soil cover is placed on the top and sideslopes of each advancing lift. At all times, intermediate cover is placed and compacted as landfilling progresses to minimize areas exposed to precipitation and to reduce blowing litter. Intermediate soil cover is usually placed and compacted on areas where additional waste disposal cells are not to be constructed for extended periods of time, and therefore must resist erosion for a longer period of time than daily cover. Waste disposal areas not receiving wastes for more than 180 days will also be covered with 1 foot of soil. Soil for intermediate cover is obtained from on-site excavations or soil stockpiles. Clean import soil received at CCL may also be used for intermediate cover. Soil is transported to the area to receive intermediate cover by scrapers. The scrapers will unload the soil while traversing across the area to receive intermediate cover. Compactors or dozers will then spread and compact the soil to a minimum thickness of 1 foot.

In addition, landfill operations include compacting and covering the waste with these soils, thereby significantly reducing the potential escape of odors, emergence of flies, and progress of fires. Combined

LACFCD-owned Sediment Placement Sites (SPSs), but some is also taken to landfills for disposal or beneficial on-site use.

The LACFCD completed a report analyzing soil samples at seven of the most active SPSs, located across the County of Los Angeles. The soil in these SPSs is representative of the sediment removed from the County's dams and debris basins. The analysis indicates that constituents in the soil samples are well below threshold levels for all contaminants specified in Order No. R4-2011-0052. Therefore, this material or similar material from other sediment and debris basins will not be profiled at CCL.

Acceptable wastes are defined in WDR Order No. 98-086 (A. Acceptable Materials) as follows:

> *2… certain nonhazardous solid wastes and inert solid wastes, as described in Section 20220(a) and Section 20230 of Title 27.*
> *3… all putrescible and nonputrescible solid, semi-solid and liquid wastes, demolition and construction wastes, abandoned vehicles and parts thereof, discarded home and industrial appliances, manure, vegetable or animal solid and semi-solid wastes, and other discarded waste (whether of solid and semi-solid consistency); provided that such wastes do not contain wastes which must be managed as hazardous wastes, or wastes which contain soluble pollutants in concentrations which exceed applicable water quality objectives, or could cause degradation to waters of the State (i.e., designated waste).*

1.4.2 Wastes That Require Profiling

CCL is authorized to accept various types of Special Wastes. Special Wastes are defined in Title 22, CCR as a hazardous waste which meets all of the following criteria and requirements:

> It is a solid, a water-based sludge or a water-based slurry of which the solid constituents are substantially insoluble in water;
> It is a hazardous waste only because it contains a persistent or bioaccumulative substance at a solubilized and extractable concentration exceeding its Soluble Threshold Limit Concentration (STLC), or at a total concentration exceeding its Total Threshold Limit Concentration (TTLC), except that:
> - It shall contain no persistent or bioaccumulative listed substances at a solubilized and extractable concentration in milligrams per kilogram of waste exceeding the TTLC value for the substance; and
> - It shall contain no persistent or bioaccumulative inorganic substance at a concentration equal to or exceeding the TTLC value of the substance.

For purposes of this WAP, Special Wastes are wastes that require analysis and testing (profiling) prior to acceptance due to their component make-up. Special Waste acceptance procedures, documentation, and reporting are discussed in sections 2.0 and 3.0.

Acceptable wastes that require profiling or that can only be accepted through special Orders from the RWQCB are defined in WDR Order No. 98-086 (A. Acceptable Materials) as follows:

> *4. Treated auto shredder waste may be disposed provided that it is nonhazardous pursuant to Title 22, California Code of Regulations.*
> *5. The landfill will accept waste for disposal as deemed acceptable at this class of facility by the Regional Board through Orders or regulations.*

Examples of materials that fall under the special Order category are Treated Wood Waste (Order No. R4-2006-0007) and Contaminated Soil (Order No. R4-2011-0052).

1.5 Prohibited Wastes

CCL is a Class III waste disposal facility that operates under the requirements of WDRs (Order No. 98-086) and Conditional Use Permit No. 89-081(5). In accordance with the provisions of these two permits, CCL does not accept:

1) Hazardous wastes which are wastes that fall into the hazardous category based on criteria contained in the Title 22, CCR;
2) Designated wastes as defined in Section 13173 of the California Water Code as either:
   a) Hazardous waste that has been granted a variance from hazardous waste management requirements pursuant to §25143 of the Health and Safety Code; or
   b) Non-hazardous waste that consists of, or contains, pollutants that, under ambient environmental conditions at a waste management unit, could be released in concentrations exceeding applicable water quality objectives or that could reasonably be expected to affect beneficial uses of the waters of the state as contained in the appropriate state water quality control plan.

There are no quantitative values or concentrations associated with the definition of Designated Waste. To address this issue, CCL conducted site-specific modeling to determine the acceptable threshold concentrations for specific chemicals below which the water quality objectives for the site would be met. The methodology is provided in Appendix B and further discussed in Section 2.2.2.

The WDRs Order No. 98-086 (B. Unacceptable Materials) states the following regarding unacceptable materials:

> *1. No hazardous wastes, designated wastes, or special wastes, such as liquids, oils, waxes, tars, soaps, solvents, or readily water-soluble solids, such as salts, borax, lye, caustic, or acids shall be disposed of at this waste management facility.*
> *2. No semi-solid wastes shall be disposed of at this waste management facility, except as noted above. Semi-solid waste means waste containing less than 50 percent solids, as described in Section 20200 of Title 27.*
> *3. No materials which are of a toxic nature, such as insecticides, poisons, or radioactive materials, shall be disposed of at this waste management facility.*

4. No infectious materials or hospital or laboratory wastes, except those authorized for disposal to land by official agencies charged with control of plant, animal, and human disease, shall be disposed of at this waste management facility.
5. No pesticide containers shall be disposed of at this waste management facility, unless they are rendered nonhazardous by triple rinsing. Otherwise, they must be hauled off site to a legal point of disposal.
6. No septic tank or chemical toilet wastes shall be disposed of at this waste management facility.

The Conditional Use Permit No. 89-081(5) (Conditions of Approval Item 9.a) states the following:

Liquid or hazardous waste or radioactive waste/material shall not be accepted. Should such prohibited waste be nevertheless received at the landfill, it shall be handled and disposed of as provided in Condition 26. The term "liquid waste" as used herein includes non-hazardous sludges meeting the requirements contained in Title 23, Chapter 15 of the California Code of Regulations for disposal in a Class III landfill. The landfill shall not accept sludge or sludge components at any time.

1.6 Load-Checking Program

A load-checking program was developed to screen incoming loads for the presence of prohibited wastes. The load-checking program includes signs to notify landfill customers of acceptable and unacceptable materials, visual inspections at the scale house, inspection at the landfill working face, and physical inspections of random loads.

During inspections, observations are made for prohibited wastes. Designated, trained personnel identify the nature of materials received in a load, and whether they are regulated wastes. Visual inspections are performed daily by trained personnel stationed at the scale house and at the working face of the landfill during waste disposal hours to observe for the disposal of prohibited wastes. The load-checking program (Appendix C of the Joint Technical Document [JTD]) also includes requirements for record keeping, personnel training and monitoring, and for notifying the appropriate regulatory agencies if a regulated or hazardous waste is discovered in a waste load.

The load-checking program also includes a prequalification check for Special Wastes that is conducted at the waste source, before transport to the disposal facility. In general, the prequalification program is directed at industrial waste streams.

2.0 SPECIAL WASTE ACCEPTANCE PROCEDURES

The following describes the procedures for acceptance of wastes that require prequalification and profiling.

Attachment 2

V. MONITORING OF ONSITE USE OF WATER

A. If water purged from the wells and leachate removed from the site's leachate collection and removal systems were used onsite in accordance with Provision F of this Regional Board's Order No. 98-086, the discharger shall analyze constituents listed in Provision F.6 and Provision F.7 of Order No. 98-086 and submit the data in the semi-annual monitoring report.

VI. MONITORING OF TREATED AUTO SHREDDER WASTE

A. Treated auto shredder waste (TASW) samples from Hugo Neu-Proler Company or future TASW generators shall be sampled and analyzed according to the Waste Extraction Test procedure described in Title 22, California Code of Regulations, Section 66261.126, Appendix II (Metals) and Appendix II-Table 4 (PCBs), for the following constituents:

Constituent	Unit	Analysis
STLC		
Cadmium and/or cadmium compounds	mg/L	Monthly
Chromium and/or chromium compounds	mg/L	Monthly
Copper and/or copper compounds	mg/L	Monthly
Lead and/or lead compounds	mg/L	Monthly
Mercury and/or mercury compounds	mg/L	Monthly
Nickel and/or nickel compounds	mg/L	Monthly
Zinc and/or zinc compounds	mg/L	Monthly
TTLC		
Polychlorinated biphenyls (PCBs)	mg/Kg	Monthly

B. Shredder waste samples from each source shall also be analyzed once per month for volatile organic compounds using EPA Method 8240. A grab sample shall be randomly obtained from the sampler for this analysis and immediately sealed in an appropriate container.

C. Composite samples of the waste stream from each shredder source shall be collected daily according to the following procedure: The waste stream will be cut every half-hour and approximately a one pound sample obtained. At the end of eight hours the sample will be coned, quartered and two samples obtained. The combined samples for one week will be mixed, coned and quartered prior to submission to the laboratory. One weekly composite shall be subjected to the monthly testing. The shredder waste producers may present an alternate procedure for compositing samples for Executive Officer approval.

D. The discharger shall submit copies of all analytical results of TASW deposited with the semi-annual monitoring report.

Ordered By: Dennis A. Dickerson
DENNIS A. DICKERSON
Executive Officer

Date: November 2, 1998

Date: May 1, 2015

Mr. Todd F. Peterson
SA Recycling Of Anaheim
3200 E. Frontera Street
Anaheim, CA 92806
Tel(714)688-4940 Email:TPeterson@sarecycling.com

Project: **Anaheim HP Weekly 04.13-18.15**
Lab I.D.: **150427-28**

Dear Mr. Peterson:

The **analytical results** for the solid sample, received by our lab on April 27, 2015, are attached. The sample was received intact, accompanying chain of custody.

Enviro-Chem appreciates the opportunity to provide you and your company this and other services. Please do not hesitate to call us if you have any questions.

Sincerely,

Curtis Desilets
Vice President/Program Manager

Andy Wang
Laboratory Manager

[illegible]
1214 E. Lexington Avenue, Pomona, CA [illegible] Tel (909) 590-[illegible] Fax (909) 590-[illegible]

Laboratory Report

CUSTOMER: SA Recycling Of Anaheim
3200 E. Frontera Street, Anaheim, CA 92806
Tel(714)688-4940 Email:TPeterson@sarecycling.com

PROJECT: **Anaheim HP Weekly 04.13-18.15**
MATRIX: SOLID
DATE COLLECTED: 04/13-18/15
REPORT TO: MR. TODD F. PETERSON

DATE RECEIVED: 04/27/15
DATE EXTRACTED: 04/27/15
DATE ANALYZED: 04/27/15
DATE REPORTED: 05/01/15

SAMPLE I.D.: **Anaheim HP Weekly 04.13-18.15** LAB I.D.: 150427-28

PCBs ANALYSIS, EPA 8082
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL	DF
PCB-1016	ND	2.00	1
PCB-1221	ND	2.00	1
PCB-1232	ND	2.00	1
PCB-1242	ND	2.00	1
PCB-1248	ND	2.00	1
PCB-1254	ND	2.00	1
PCB-1260	ND	2.00	1
TOTAL PCBs IN THE SAMPLE*	ND	2.00	1

COMMENTS
DF = Dilution Factor
PQL = Practical Quantitation Limit
Actual Detection Limit = PQL X DF
ND = Non-Detected or Below the Actual Detection Limit
* = Sum of the PCB 1016, 1221, 1232, 1242, 1248, 1254 and 1260
*** = The concentration exceeds the TTLC Limit of 50, and the sample is defined as hazardous waste as per CCR-TITLE 22 (if marked)

DATA REVIEWED AND APPROVED BY: ______
CAL-DHS ELAP CERTIFICATE No.: 1555

Laboratory Report

CUSTOMER: **SA Recycling Of Anaheim**
3200 E. Frontera Street, Anaheim, CA 92806
Tel(714)688-4940 Email:TPeterson@sarecycling.com

PROJECT: **Anaheim HP Weekly 04.13-18.15**
MATRIX: SOLID
DATE COLLECTED: 04/13-18/15
REPORT TO: MR. TODD F. PETERSON

DATE RECEIVED: 04/27/15
DATE ANALYZED: 04/28-30/15
DATE REPORTED: 05/01/15

SAMPLE I.D.: **Anaheim HP Weekly 04.13-18.15** LAB I.D.: 150427-28

SOLUBLE THRESHOLD LIMIT CONCENTRATION (STLC) ANALYSIS
UNIT: mg/L IN THE STLC LEACHATE

ELEMENT ANALYZED	SAMPLE RESULT	PQL	DF	TTLC LIMIT	STLC LIMIT	EPA METHOD USED
Cadmium (Cd)	ND	0.05	10	100	1.0	6010B
Chromium Total(Cr)	0.777	0.05	10	2,500	560/5.0@	6010B
Copper (Cu)	13.7	0.1	10	2,500	25	6010B
Lead (Pb)	4.27	0.05	10	1,000	50.0*	6010B
Mercury (Hg)	ND	0.02	1	20	0.2	7470A
Nickel (Ni)	ND	0.25	10	2,000	20	6010B
Zinc (Zn)	28.3	0.05	10	5,000	250	6010B

COMMENTS:
mg/L = Milligram per Liter = PPM
DF = Dilution Factor
PQL = Practical Quantitation Limit
Actual Detection Limit = PQL X DF
ND = Below Actual Detection Limit or non-detected
TTLC = Total Threshold Limit Concentration
STLC = Soluble Threshold Limit Concentration
@ = Must meet the TCLP limit/chromium (5.0 mg/L in TCLP leachate)
* = The STLC-Lead Limit for SA Recycling is 50 mg/L instead of 5 mg/L
** = TCLP Chromium required (if marked)
*** = The concentration exceeds the STLC Limit, and the sample is defined as hazardous waste as per CAL-TITLE 22 (if marked)

Data Reviewed and Approved by: ____________
CAL-DHS ELAP CERTIFICATE No.: 1555

Enviro - Chem, Inc
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

Laboratory Report

CUSTOMER: **SA Recycling Of Anaheim**
3200 E. Frontera Street, Anaheim, CA 92806
Tel(714)688-4940 Email:TPeterson@sarecycling.com

PROJECT: **Anaheim HP Weekly 04.13-18.15**
MATRIX:SOLID
DATE COLLECTED:04/13-18/15
REPORT TO:MR. TODD F. PETERSON

DATE RECEIVED:04/27/15
DATE ANALYZED:04/27/15
DATE REPORTED:05/01/15

SAMPLE I.D.: **Anaheim HP Weekly 04.13-18.15** LAB I.D.: 150427-28

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5030B/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X500
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: ____________

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

Laboratory Report

CUSTOMER: **SA Recycling Of Anaheim**
3200 E. Frontera Street, Anaheim, CA 92806
Tel(714)688-4940 Email:TPeterson@sarecycling.com

PROJECT: **Anaheim HP Weekly 04.13-18.15**
MATRIX: SOLID — DATE RECEIVED: 04/27/15
DATE COLLECTED: 04/13-18/15 — DATE ANALYZED: 04/27/15
REPORT TO: MR. TODD F. PETERSON — DATE REPORTED: 05/01/15

SAMPLE I.D.: **Anaheim HP Weekly 04.13-18.15** — LAB I.D.: 150427-28

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5030B/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X500
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	9.28	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE PQL
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

Enviro-Chem, Inc. Laboratories
1214 E. Lexington Avenue,
Pomona, CA 91766
Tel: (909) 590-5905 Fax: (909) 590-5907
CA-DHS ELAP CERTIFICATE #1555

Turnaround Time
0 Same Day
0 24 Hours
0 48 Hours
0 72 Hours
0 1 Week (Standard)
Other:

Misc./PO#
PO# 4057409

SAMPLE ID	LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	No. OF CONTAINERS	TEMPERATURE	PRESERVATION	PCBs	VOCs	TTLC: Cd, Cr, Cu, Pb, Ni, Zn							COMMENTS
Anaheim UP weekly 04.13-18.15	150427-28	04-13-18.15		SOLID	1			x	x	x							

Company Name: SA, Anaheim

Address:

City/State/Zip:

Project Contact: T. T. Peterson

Tel: 714.764.2241

Fax/Email: tpeterson@sarecycling.com

Sampler's Signature:

Project Name/ID: Anaheim UP weekly 04.13-18.15

Relinquished by:	Received by:	Date & Time: 4/27/15 9:50
Relinquished by:	Received by:	Date & Time:
Relinquished by:	Received by:	Date & Time:

Instructions for Sample Storage After Analysis:
O Dispose of O Return to Client X Store (30 Days)
O Other:

CHAIN OF CUSTODY RECORD

WHITE WITH SAMPLE • YELLOW TO CLIENT

Date: 4/27/15

Enviro-Chem, Inc. Laboratories
1214 E. Lexington Avenue,
Pomona, CA 91766
Tel: (909) 590-5905 Fax: (909) 590-5907
CA-DHS ELAP CERTIFICATE #1555

Turnaround Time
0 Same Day
0 24 Hours
0 48 Hours
0 72 Hours
X 1 Week (Standard)
Other:

Misc./PO#
PO# 4057909

SAMPLE ID	LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	No. OF CONTAINERS	TEMPERATURE	PRESERVATION	PCBs	VOCs	[illegible]							COMMENTS
Anaheim HP weekly 04.13-18.15	150427-28	4/13-18/15		Solid	1 bag		None	x	x	x							

Analysis Required

Company Name: SA, Anaheim
Address:
City/State/Zip:

Project Contact: T.T. Peterson
Tel: 714.764.2241
Fax/Email: tjpeterson@s[illegible].com

Sampler's Signature:
Project Name/ID: Anaheim HP weekly 04.13-18.15

Relinquished by:	Received by:	Date & Time: 4/27/15 950	
Relinquished by:	Received by:	Date & Time:	
Relinquished by:	Received by:	Date & Time:	

Instructions for Sample Storage After Analysis:
O Dispose of O Return to Client X Store (30 Days)
O Other:

CHAIN OF CUSTODY RECORD

WHITE WITH SAMPLE • YELLOW TO CLIENT

Date: 4/27/15

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

Date: May 28, 2015

Mr. Todd F. Peterson
SA Recycling Of Anaheim
3200 E. Frontera Street
Anaheim, CA 92806
Tel(714)688-4940
E-mail: TPeterson@sarecycling.com

Project: **Anaheim HP Weekly 05.04-09.15**
Lab I.D.: **150522-16**

Dear Mr. Peterson:

The **Analysis results** for the solid sample, received by our lab on May 22, 2015, are attached. The sample was received intact, accompanying chain of custody.

Enviro-Chem appreciates the opportunity to provide you and your company this and other services. Please do not hesitate to call us if you have any questions.

Sincerely,

Curtis Desilets
Vice President/Program Manager

Andy Wang
Laboratory Manager

Enviro - Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

Laboratory Report

CUSTOMER: **SA Recycling Of Anaheim**
3200 E. Frontera Street,
Anaheim, CA 92806
Tel(714)688-4940 **E-mail: TPeterson@sarecycling.com**
PROJECT: **Anaheim HP Weekly 05.04-09.15**

MATRIX: SOLID
DATE COLLECTED: 05/04-09/15
REPORT TO: MR. TODD F. PETERSON

DATE RECEIVED: 05/22/15
DATE EXTRACTED: 05/26/15
DATE ANALYZED: 05/26/15
DATE REPORTED: 05/28/15

SAMPLE I.D.: **Anaheim HP Weekly 05.04-09.15**
LAB I.D.: 150522-16

PCBs ANALYSIS, EPA 8082
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL	DF
PCB-1016	ND	2.00	1
PCB-1221	ND	2.00	1
PCB-1232	ND	2.00	1
PCB-1242	8.16	2.00	1
PCB-1248	ND	2.00	1
PCB-1254	ND	2.00	1
PCB-1260	ND	2.00	1
TOTAL PCBs IN THE SAMPLE*	8.16	2.00	1

COMMENTS
DF = Dilution Factor
PQL = Practical Quantitation Limit
Actual Detection Limit = PQL X DF
ND = Non-Detected or Below the Actual Detection Limit
* = Sum of the PCB 1016, 1221, 1232, 1242, 1248, 1254 and 1260
*** = The concentration exceeds the TTLC Limit of 50, and the sample is defined as hazardous waste as per CCR-TITLE 22 (if marked)

DATA REVIEWED AND APPROVED BY:
CAL-DHS ELAP CERTIFICATE No.: 1555

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

Laboratory Report

CUSTOMER: SA Recycling Of Anaheim
3200 E. Frontera Street
Anaheim, CA 92806
Tel(714)688-4940 E-mail: TPeterson@sarecycling.com

PROJECT: Anaheim HP Weekly 05.04-09.15
MATRIX: SOLID
DATE COLLECTED: 05/04-09/15
REPORT TO: MR. TODD F. PETERSON

DATE RECEIVED: 05/22/15
DATE ANALYZED: 05/22/15
DATE REPORTED: 05/28/15

SAMPLE I.D.: Anaheim HP Weekly 05.04-09.15
LAB I.D.: 150522-16

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5030B/8260B, PAGE 1 OF 2
UNIT: MG/KG = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X250
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: ______

Enviro - Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

Laboratory Report

CUSTOMER: **SA Recycling Of Anaheim**
3200 E. Frontera Street
Anaheim, CA 92806
Tel(714)688-4940 **E-mail: TPeterson@sarecycling.com**

PROJECT: **Anaheim HP Weekly 05.04-09.15**
MATRIX: SOLID
DATE COLLECTED: 05/04-09/15
REPORT TO: MR. TODD F. PETERSON

DATE RECEIVED: 05/22/15
DATE ANALYZED: 05/22/15
DATE REPORTED: 05/28/15

SAMPLE I.D.: **Anaheim HP Weekly 05.04-09.15**
LAB I.D.: 150522-16

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5030B/8260B, PAGE 2 OF 2
UNIT: MG/KG = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X250
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	24.1	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE PQL
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

Laboratory Report

CUSTOMER: **SA Recycling Of Anaheim**
3200 E. Frontera Street
Anaheim, CA 92806
Tel(714)688-4940 **E-mail: TPeterson@sarecycling.com**

PROJECT: **Anaheim HP Weekly 05.04-09.15**
MATRIX: SOLID
DATE COLLECTED: 05/04-09/15
REPORT TO: MR. TODD F. PETERSON

DATE RECEIVED: 05/22/15
DATE ANALYZED: 05/24-26/15
DATE REPORTED: 05/28/15

SAMPLE I.D.: **Anaheim HP Weekly 05.04-09.15**
LAB I.D.: 150522-16

SOLUBLE THRESHOLD LIMIT CONCENTRATION (STLC) ANALYSIS
UNIT: mg/L IN THE STLC LEACHATE

ELEMENT ANALYZED	SAMPLE RESULT	PQL	DF	TTLC LIMIT	STLC LIMIT	EPA METHOD USED
Cadmium (Cd)	ND	0.05	10	100	1.0	6010B
Chromium Total(Cr)	0.697	0.05	10	2,500	560/5.0@	6010B
Copper (Cu)	11.7	0.1	10	2,500	25	6010B
Lead (Pb)	5.39	0.05	10	1,000	50.0*	6010B
Mercury (Hg)	ND	0.02	1	20	0.2	7470A
Nickel (Ni)	ND	0.25	10	2,000	20	6010B
Zinc (Zn)	47.2	0.05	10	5,000	250	6010B

COMMENTS:
MG/L = Milligram per Liter = PPM
DF = Dilution Factor
PQL = Practical Quantitation Limit
Actual Detection Limit = PQL X DF
ND = Below Actual Detection Limit or non-detected
TTLC = Total Threshold Limit Concentration
STLC = Soluble Threshold Limit Concentration
@ = Must meet the TCLP limit/chromium (5.0 mg/L in TCLP leachate)
* = The STLC-Lead Limit for SA Recycling is 50 mg/L instead of 5 mg/L
** = TCLP Chromium required (if marked)
*** = The concentration exceeds the STLC Limit, and the sample is defined as hazardous waste as per CAL-TITLE 22 (if marked)

Data Reviewed and Approved by: ______
CAL-DHS ELAP CERTIFICATE No.: 1555

Enviro-Chem, Inc. Laboratories
1214 E. Lexington Avenue,
Pomona, CA 91766
Tel: (909) 590-5905 Fax: (909) 590-5907
CA-DHS ELAP CERTIFICATE #1555

Turnaround Time
0 Same Day
0 24 Hours
0 48 Hours
X 72 Hours
0 1 Week (Standard)
Other:

RUSH

Misc./PO#: PO # 4057409

SAMPLE ID	LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	No. OF CONTAINERS	TEMPERATURE	PRESERVATION	PCBs	VOCs	STLC Cr, Cu, Ni, Pb, Hg, Ni, Zn							COMMENTS
Anaheim WP weekly 05.04-09.15	150522-16	05-04-09.15		Solid	1			x	x	x							
					1 x bag												

Analysis Required

Company Name: SA, Anaheim
Address:
City/State/Zip:

Project Contact: T.F. Peterson
Tel: 714.764.2241
Fax/Email: tpeterson@sareycling.com

Sampler's Signature:
Project Name/ID: Anaheim WP weekly 05.04-09.15

Relinquished by:	Received by:	Date & Time: 5/22/15 1113	
Relinquished by:	Received by:	Date & Time:	
Relinquished by:	Received by:	Date & Time:	

Instructions for Sample Storage After Analysis:
O Dispose of O Return to Client O Store (30 Days)
O Other:

CHAIN OF CUSTODY RECORD

WHITE WITH SAMPLE • YELLOW TO CLIENT

Date: ____

Page ___ of ___

Date: April 23, 2015

Mr. Todd F. Peterson
SA Recycling Of Los Angeles
901 New Dock Street
San Pedro, CA 90731
Tel(714)688-4940 Email:TPeterson@sarecycling.com

Project: **TI HP Weekly 04.05-11.15**
Lab I.D.: **150421-20**

Dear Mr. Peterson:

The **analytical results** for the solid sample, received by our lab on April 21, 2015, are attached. The sample was received intact, accompanying chain of custody.

Enviro-Chem appreciates the opportunity to provide you and your company this and other services. Please do not hesitate to call us if you have any questions.

Sincerely,

Curtis Desilets
Vice President/Program Manager

Andy Wang
Laboratory Manager

[illegible] Inc
214 E. Lexington Avenue, Pomona, CA [illegible] Tel (909) 590-5905 Fax (909) 590-5907

Laboratory Report

CUSTOMER: **SA Recycling Of Los Angeles**
901 New Dock Street, San Pedro, CA 90731
Tel(714)688-4940 Email:TPeterson@sarecycling.com

PROJECT: **TI HP Weekly 04.05-11.15** — DATE RECEIVED: 04/21/15
MATRIX: SOLID — DATE EXTRACTED: 04/21/15
DATE COLLECTED: 04/05-11/15 — DATE ANALYZED: 04/21/15
REPORT TO: MR. TODD F. PETERSON — DATE REPORTED: 04/23/15

SAMPLE I.D.: **TI HP Weekly 04.05-11.15** — LAB I.D.: 150421-20

PCBs ANALYSIS, EPA 8082
UNIT: **mg/Kg = MILLIGRAM PER KILOGRAM = PPM**

PARAMETER	SAMPLE RESULT	PQL	DF
PCB-1016	ND	2.00	1
PCB-1221	ND	2.00	1
PCB-1232	ND	2.00	1
PCB-1242	4.92	2.00	1
PCB-1248	ND	2.00	1
PCB-1254	ND	2.00	1
PCB-1260	ND	2.00	1
TOTAL PCBs IN THE SAMPLE*	4.92	2.00	1

COMMENTS
DF = Dilution Factor
PQL = Practical Quantitation Limit
Actual Detection Limit = PQL X DF
ND = Non-Detected or Below the PQL
* = Sum of the PCB 1016, 1221, 1232, 1242, 1248, 1254 and 1260
*** = The concentration exceeds the TTLC Limit of 50, and the sample is defined as hazardous waste as per CCR-TITLE 22 (if marked)

DATA REVIEWED AND APPROVED BY: ______
CAL-DHS ELAP CERTIFICATE No.: 1555

Laboratory Report

CUSTOMER: SA Recycling Of Los Angeles
901 New Dock Street, San Pedro, CA 90731
Tel(714)688-4940 Email:TPeterson@sarecycling.com

PROJECT: TI HP Weekly 04.05-11.15
MATRIX: SOLID
DATE COLLECTED: 04/05-11/15
REPORT TO: MR. TODD F. PETERSON

DATE RECEIVED: 04/21/15
DATE ANALYZED: 04/21-23/15
DATE REPORTED: 04/23/15

SAMPLE I.D.: TI HP Weekly 04.05-11.15 LAB I.D.: 150421-20

SOLUBLE THRESHOLD LIMIT CONCENTRATION (STLC) ANALYSIS
UNIT: mg/L IN THE STLC LEACHATE

ELEMENT ANALYZED	SAMPLE RESULT	PQL	DF	TTLC LIMIT	STLC LIMIT	EPA METHOD USED
Cadmium (Cd)	ND	0.05	10	100	1.0	6010B
Chromium Total(Cr)	1.52	0.05	10	2,500	560/5.0@	6010B
Copper (Cu)	12.8	0.1	10	2,500	25	6010B
Lead (Pb)	2.09	0.05	10	1,000	50.0*	6010B
Mercury (Hg)	ND	0.01	1	20	0.2	7470A
Nickel (Ni)	ND	0.25	10	2,000	20	6010B
Zinc (Zn)	19.3	0.05	10	5,000	250	6010B

COMMENTS:
mg/L = Milligram per Liter = PPM
DF = Dilution Factor
PQL = Practical Quantitation Limit
Actual Detection Limit = PQL X DF
ND = Below Actual Detection Limit or non-detected
TTLC = Total Threshold Limit Concentration
STLC = Soluble Threshold Limit Concentration
@ = Must meet the TCLP limit/chromium (5.0 Mg/L in TCLP leachate)
* = The STLC-Lead Limit for SA Recycling is 50 Mg/L instead of 5 Mg/L
** = TCLP Chromium required (if marked)
*** = The concentration exceeds the STLC Limit, and the sample is defined as hazardous waste as per CAL-TITLE 22 (if marked)

Data Reviewed and Approved by: ______
CAL-DHS ELAP CERTIFICATE No.: 1555

Enviro - Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

Laboratory Report

CUSTOMER: SA Recycling Of Los Angeles
901 New Dock Street, San Pedro, CA 90731
Tel(714)688-4940 Email:TPeterson@sarecycling.com

PROJECT: TI HP Weekly 04.05-11.15
MATRIX: SOLID
DATE COLLECTED: 04/05-11/15
REPORT TO: MR. TODD F. PETERSON

DATE RECEIVED: 04/21/15
DATE ANALYZED: 04/21/15
DATE REPORTED: 04/23/15

SAMPLE I.D.: TI HP Weekly 04.05-11.15 LAB I.D.: 150421-20

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5030B/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1000
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _______________

Enviro - Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

Laboratory Report

CUSTOMER: **SA Recycling Of Los Angeles**
901 New Dock Street, San Pedro, CA 90731
Tel(714)688-4940 Email:TPeterson@sarecycling.com

PROJECT: **TI HP Weekly 04.05-11.15**
MATRIX: SOLID
DATE COLLECTED: 04/05-11/15
REPORT TO: MR. TODD F. PETERSON
DATE RECEIVED: 04/21/15
DATE ANALYZED: 04/21/15
DATE REPORTED: 04/23/15

SAMPLE I.D.: **TI HP Weekly 04.05-11.15** LAB I.D.: 150421-20

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5030B/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1000
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	180	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE PQL
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

Enviro-Chem, Inc. Laboratories
1214 E. Lexington Avenue,
Pomona, CA 91766
Tel: (909) 590-5905 Fax: (909) 590-5907
CA-DHS ELAP CERTIFICATE #1555

Turnaround Time
0 Same Day
0 24 Hours
0 48 Hours
0 72 Hours
0 1 Week (Standard)
Other: THURSDAY

RUSH

Misc./PO#
PO# 4053199

SAMPLE ID	LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	No. OF CONTAINERS	TEMPERATURE	PRESERVATION	PCBs	VOCs	STLC: Cd, Cr, Co, Pb, Hg, Ni, Zn								COMMENTS
TI HP weekly 04.05-11.15	1504121-20	04.05-11.15		SOLID	1 bag			x	x	x								

Analysis Required

Company Name: SA, TI
Address:
City/State/Zip:
Project Contact: T.F. Peterson
Tel: 714.764.2241
Fax/Email: tpeterson@sarecycling.com
Sampler's Signature:
Project Name/ID: TI HP weekly 04.05-11.15

Relinquished by:	Received by:	Date & Time:	Instructions for Sample Storage After Analysis:
Relinquished by:	Received by:	Date & Time:	O Dispose of O Return to Client O Store (30 Days)
Relinquished by:	Received by:	Date & Time:	O Other:

CHAIN OF CUSTODY RECORD

WHITE WITH SAMPLE • YELLOW TO CLIENT

Date: 4/21/11

Page 1 of 1

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

Date: June 5, 2015

Mr. Todd F. Peterson
SA Recycling Of Los Angeles
901 New Dock Street
San Pedro, CA 90731
Tel(714)688-4940
E-mail: TPeterson@sarecycling.com

Project: **TI HP Weekly 05.17-23.15**
Lab I.D.: **150602-22**

Dear Mr. Peterson:

The **Analysis results** for the solid sample, received by our lab on June 2, 2015 are attached. The sample was received intact, accompanying chain of custody.

Enviro-Chem appreciates the opportunity to provide you and your company this and other services. Please do not hesitate to call us if you have any questions.

Sincerely,

Curtis Desilets
Vice President/Program Manager

Andy Wang
Laboratory Manager

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

Laboratory Report

CUSTOMER: **SA Recycling Of Los Angeles**
901 New Dock Street, San Pedro, CA 90731
Tel(714)688-4940
E-mail: TPeterson@sarecycling.com

PROJECT: **TI HP Weekly 05.17-23.15**

MATRIX: SOLID
DATE COLLECTED: 05/17-23/15
REPORT TO: MR. TODD F. PETERSON

DATE RECEIVED: 06/02/15
DATE EXTRACTED: 06/03/15
DATE ANALYZED: 06/03/15
DATE REPORTED: 06/05/15

SAMPLE I.D.: **TI HP Weekly 05.17-23.15** LAB I.D.: 150602-22

PCBs ANALYSIS, EPA 8082
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL	DF
PCB-1016	ND	2.00	1
PCB-1221	ND	2.00	1
PCB-1232	ND	2.00	1
PCB-1242	11.6	2.00	1
PCB-1248	ND	2.00	1
PCB-1254	ND	2.00	1
PCB-1260	ND	2.00	1
TOTAL PCBs IN THE SAMPLE*	11.6	2.00	1

COMMENTS
DF = Dilution Factor
PQL = Practical Quantitation Limit
Actual Detection Limit = PQL X DF
ND = Non-Detected or Below the PQL
* = Sum of the PCB 1016, 1221, 1232, 1242, 1248, 1254 and 1260
*** = The concentration exceeds the TTLC Limit of 50, and the sample is defined as hazardous waste as per CCR-TITLE 22 (if marked)

DATA REVIEWED AND APPROVED BY: ____
CAL-DHS ELAP CERTIFICATE No.: 1555

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1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

Laboratory Report

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Tel(714)688-4940
E-mail: TPeterson@sarecycling.com

PROJECT: TI HP Weekly 05.17-23.15
MATRIX: SOLID — DATE RECEIVED: 06/02/15
DATE COLLECTED: 05/17-23/15 — DATE ANALYZED: 06/02-04/15
REPORT TO: MR. TODD F. PETERSON — DATE REPORTED: 06/05/15

SAMPLE I.D.: TI HP Weekly 05.17-23.15 LAB I.D.: 150602-22

SOLUBLE THRESHOLD LIMIT CONCENTRATION (STLC) ANALYSIS
UNIT: MG/L IN THE STLC LEACHATE

ELEMENT ANALYZED	SAMPLE RESULT	PQL	DF	TTLC LIMIT	STLC LIMIT	EPA METHOD USED
Cadmium (Cd)	ND	0.05	1	100	1.0	6010B
Chromium Total(Cr)	0.992	0.05	1	2,500	560/5.0@	6010B
Copper (Cu)	14.0	0.1	1	2,500	25	6010B
Lead (Pb)	2.62	0.05	1	1,000	50.0*	6010B
Mercury (Hg)	ND	0.02	1	20	0.2	7470A
Nickel (Ni)	ND	0.25	1	2,000	20	6010B
Zinc (Zn)	23.0	0.05	1	5,000	250	6010B

COMMENTS:
MG/L = Milligram per Liter = PPM
DF = Dilution Factor
PQL = Practical Quantitation Limit
Actual Detection Limit = PQL X DF
ND = Below Actual Detection Limit or non-detected
TTLC = Total Threshold Limit Concentration
STLC = Soluble Threshold Limit Concentration
@ = Must meet the TCLP limit/chromium (5.0 Mg/L in TCLP leachate)
* = The STLC-Lead Limit for SA Recycling is 50 Mg/L instead of 5 Mg/L
** = TCLP Chromium required (if marked)
*** = The concentration exceeds the STLC Limit, and the sample is defined as hazardous waste as per CAL-TITLE 22 (if marked)

Data Reviewed and Approved by: ______
CAL-DHS ELAP CERTIFICATE No.: 1555

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Laboratory Report

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PROJECT: TI HP Weekly 05.17-23.15
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DATE REPORTED: 06/05/15

SAMPLE I.D.: TI HP Weekly 05.17-23.15 LAB I.D.: 150602-22

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5030B/8260B, PAGE 1 OF 2
UNIT: MG/KG = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X250
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: ______________

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ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5030B/8260B, PAGE 2 OF 2
UNIT: MG/KG = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X250
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	2.50	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	24.0	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE PQL
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

Enviro-Chem, Inc. Laboratories

1214 E. Lexington Avenue,
Pomona, CA 91766
Tel: (909) 590-5905 Fax: (909) 590-5907
CA-DHS ELAP CERTIFICATE #1555

Turnaround Time
0 Same Day
0 24 Hours
0 48 Hours
X 72 Hours
0 1 Week (Standard)
Other:

Misc./PO#
PO# 4053199

RUSH

SAMPLE ID	LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	No. OF CONTAINERS	TEMPERATURE	PRESERVATION	PCBs	VOCs	STLC Cr, Cu, Co, Pb, Hg, Zn						COMMENTS
TI UP weekly 05.17-23.15	150602-22	05.17-23.15		Solid	1 bag			x	x	x						

Analysis Required

Company Name: SA, TI
Address:
City/State/Zip:

Project Contact: T.F. Peterson
Tel: 714.964.2241
Fax/Email: tpeterson@sarecycling.com

Sampler's Signature:
Project Name/ID: TI UP weekly 05.17-23.15

Relinquished by:	Received by:	Date & Time: 6/2/15 1227	Instructions for Sample Storage After Analysis:
Relinquished by:	Received by:	Date & Time:	O Dispose of O Return to Client O Store (30 Days)
Relinquished by:	Received by:	Date & Time:	O Other:

CHAIN OF CUSTODY RECORD

WHITE WITH SAMPLE • YELLOW TO CLIENT

Date: ____

Page ____ of ____

Dear Mr. Sanchez,

In accordance with the Department of Toxic Substances Control's letter and questionnaire dated 20 May 2015, responses to the questions are as follows:

1. Please provide the policy that applies to the acceptance of metal shredder waste. If no such policy exists, describe any practices and procedures used by your facility to accept such waste.
   Forward is permitted to accept treated auto shredder waste in accordance with requirements set forth in the Solid Waste Facility Permit 39-AA-0015, Waste Discharge Requirements Order No. R5-2014-0006, and Joint Technical Document (April 2014 – Amended June 2014).
2. How much metal shredder waste by weight did your facility accept from January 1, 2014, through January 1, 2015? Please include the name and address of each metal shredding facility that sent the metal shredder waste and how much they sent during the calendar year.
   There was no treated auto shredder waste accepted between 1 January 2014 and 1 January 2015.
3. What percentage of metal shredder waste was used as Alternative Daily Cover (ADC)?
   N/A
4. Please answer the following questions (4.A. – 4.D.) pertaining to metal shredder waste accepted at your facility and used as ADC:
   A. How much metal shredder waste is stored onsite prior to its use as ADC?
   B. How long is it stored?
   C. How is it stored (e.g., on a paved surface)?
   D. Where in the facility is it stored? Please provide a site map of the location.

   N/A
5. Please answer the following questions (5.A. – 5.D.) pertaining to metal shredder waste accepted at your facility but not used as ADC:
   A. How much metal shredder waste is stored onsite prior to its use as ADC?
   B. How long is it stored?
   C. How is it stored (e.g., on a paved surface)?
   D. Where in the facility is it stored? Please provide a site map of the location.

   N/A
6. Do the regional water quality control boards or other regulating authorities impose any requirements on your facility concerning metal shredder waste? If so, what are those requirements? You may exclude any permits or other forms of documented authorizations answered in question 7, below.
   The Regional Water Quality Control Board does not have any requirements other than auto shredder waste must be placed in a Subtitle D cell.
7. Provide a copy of all permits and other forms of documented authorization issued to your facility by any governmental entity related to metal shredder waste management activities, and a copy of any data your facility may have regarding the toxicity characteristics of metal shredder waste.
   See attached Solid Waste Facility Permit 39-AA-0015, Waste Discharge Requirements Order No. R5-2014-0006, and excerpt from Joint Technical Document (April 2014 – Amended June 2014) describing use of treated auto shredder waste as ADC.
8. Are other management requirements followed by your facility for metal shredder waste when accepting, handling, storing and ultimately disposing of or using metal shredder waste as ADC? If so, please describe those requirements.
   N/A

Thank you very much for your time, and please do not hesitate to contact me with any questions.

Kindest regards,

Erin

We'll handle it from here.™

Erin Fanning Environmental Manager

9999 South Austin Road, Manteca, CA 95336
e efanning@republicservices.com
o 209-982-4298
f 209-982-1009
w republicservices.com

QUESTIONNAIRE
SOLID WASTE DISPOSAL FACILITIES MANAGING METAL SHREDDER WASTE
May 20, 2015

1. Please provide the policy that applies to the acceptance of metal shredder waste. If no such policy exists, describe any practices and procedures used by your facility to accept such waste.

   (A) Holloway receives treated auto shredder waste (predominately non-metallic solid material including plastic, broken glass, rubber, foam, soil, and fabric). All trucks delivering approved waste streams are weighed loaded and unloaded, at the mine headquarters compound. Each truck load is accompanied with a weigh ticket and material manifest from the generator. All records or copies are available for inspection at the Holloway office, at 2019 Westwind Drive Suite B, Bakersfield, California 93310 with copies being kept at the Landfill headquarters office, adjacent to the Landfill. Tonnage by material type and generator are and will be tabulated each month, at the Landfill headquarters office.

   The waste material is spread in rows in designated areas of the disposal pit floor for processing. The waste is then either blended with stockpiled soil overburden in a minimum 1:1 ratio by volume of soil to waste, and spread and compacted into 1-2 foot thick lifts, or is spread in a monolayer lift of 6 inches to 1 foot thick, and then covered with an equivalent thickness of stockpiled soil overburden and compacted, or is spread in monolayer lifts of 1-2 foot thick and covered with an equivalent thickness of stockpiled soil overburden and compacted. All waste stream blending, spreading and initial compaction is accomplished by Michigan 210 self-loaders. Michigan 380B bulldozers are also used for compaction.

   Note that prior to the acceptance of Treated Automobile Shredder Waste (TAS) to any approved Pit, representative samples of waste from sources are analyzed by the generator and then by Holloway for Inorganic Persistent, Bioaccumulative Toxic Substances, Polychlorinated Biphenyls (PCBs) and Volatile Organic Compounds (VOCs). Generators that have received a letter from the Department of Toxic Substances Control in accordance with Section 66260.200(f) of Title 22 CCR, can manage TAS as a nonhazardous waste. This characterization of nonhazardous waste is further classified as "designated" waste in accordance with Section 2522(a)(2) of Title 23, CCR.

2. How much metal shredder waste by weight did your facility accept from January 1, 2014, through January 1, 2015? Please include the name and address of each metal shredding facility that sent the metal shredder waste and how much they sent during the calendar year.

   (A) 24,396.48 tons delivered from SA Recycling, 2411 North Glassell St. Orange, CA. 92865

3. What percentage of metal shredder waste was used as Alternative Daily Cover (ADC)?

   (A) All auto shedder waste delivered was buried in Holloway landfill, zero tonnage delivered was used for daily cover.

   The only cover material used that has been and will be used in the Holloway Landfill operation is on-site native soils that have been stockpiled during the mining operations. At present, Holloway does not intend to use any Alternate Daily Cover (ADC) material.

4. Please answer the following questions (4.A.–4.D.) pertaining to metal shredder waste accepted at your facility and used as ADC:

   A. How much metal shredder waste is stored onsite prior to its use as ADC?

      (A) None

   B. How long is it stored?

      (A) N/A

   C. How is it stored (e.g., on a paved surface)?

      (A) N/A

   D. Where in the facility is it stored? Please provide a site map of the location.

      (A) N/A

5. Please answer the following questions (5.A. –5.D.) pertaining to metal shredder waste accepted at your facility <u>but not used as A</u>DC:

   A. How much metal shredder waste is stored onsite prior to its use as ADC?

      (A) N/A, see process description question No. 1

   B. How long is it stored?

      (A) N/A see process description question No. 1

   C. How is it stored (e.g., on a paved surface)?

      (A) N/A see process description question No. 1

   D. Where in the facility is it stored? Please provide a site map of the location.

      (A) N/A see process description question No. 1

6. Do the regional water quality control boards or other regulating authorities impose any requirements on your facility concerning metal shredder waste? If so, what are those requirements? You may exclude any permits or other forms of documented authorizations answered in question 7, below.

   (A) Please see permits provides for question No. 7

7. Provide a copy of all permits and other forms of documented authorization issued to your facility by any governmental entity related to metal shredder waste management activities, and a copy of any data your facility may have regarding the toxicity characteristics of metal shredder waste.

   (A) Please see attached permits for the Holloway landfill facility.

8. Are other management requirements followed by your facility for metal shredder waste when accepting, handling, storing and ultimately disposing of or using metal shredder waste as ADC? If so, please describe those requirements. (A) None that I am aware.

From	[illegible]
To	[illegible]
Cc	[illegible]
Subject	Questionnaire SWD Managing Metal Shredder Waste (Treated Auto [illegible]
Date	Monday June 01 2015 3 28:25 PM
Attachments	[illegible]

Hi Kevin

Per our conversation on Friday May 29 2015 regarding the Metal Shredder Waste which we call (Treated Auto Shredder Waste) TASW.

Vasco Road Landfill Practice and Procedures.

1) Treated auto shredder waste is mixed with Bio-Solid sludge and used for alternative daily cover. Vasco LF has to cover the active face daily per SWFP.

2) /1/14-1/1/2015 total received from only one Customer – Schnitzer Steel 94 969.92 tons

3) 00% is used for daily cover. It is our primary material source of covering out our daily active working face area.

4) A.) We stockpile the TASW near the active face
   B.) Normally within a week the stockpile is depleted
   C.) On soil/concrete deck
   D.) TASW is only stockpiled near the active working face; which moves da ly.

5) A.) TASW not stored on site. (Only used for ADC)\
   B.) NA
   C.) NA
   D.) NA

6) Regional Water Quality Control Board does not have special requirements other than (Auto-shredder waste must be in a Sub-Title D cell)

7) SWFP/JTD Attached

8) None (See attached Permit)

Should you have any further questions please feel free to contact me.

Thank you

Diana Ratto Operations Manager

001 North Vasco Road Livermore CA 9 551
e [illegible]
o 925- 53-3620
c 925-260-2091
w [illegible]

APPENDIX C: GIS IMAGES OF METAL SHREDDING FACILITIES AND LANDFILLS

SA Anaheim

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SA Bakersfield

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SA Terminal Island

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Schnitzer


Legend
Facility Boundary
Schools
Residential Parcels
Childcare
Healthcare
Oakland
0 0.25 0.5 1 1.5 2
Miles
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Sims

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Ecology

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Altamont Landfill

Chiquita Canyon Landfill

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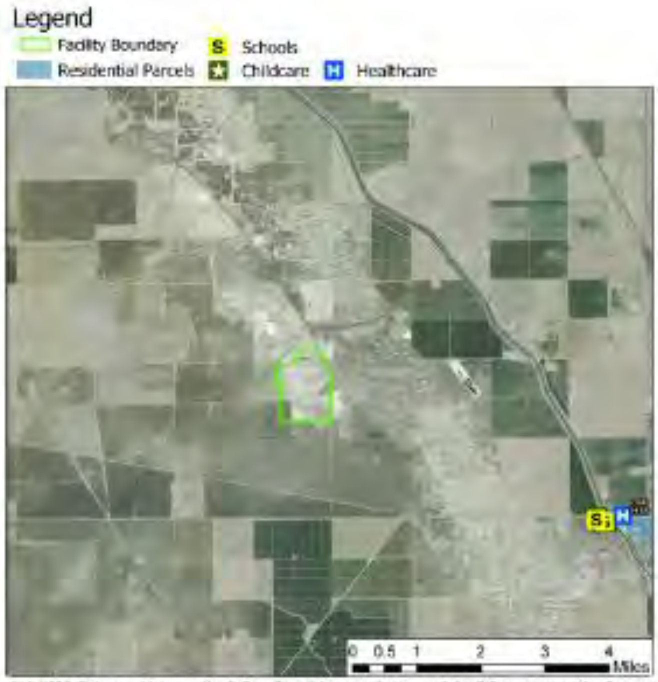
HM Holloway Surface Mine and Landfill



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Potrero Hills Landfill

Simi Valley Landfill

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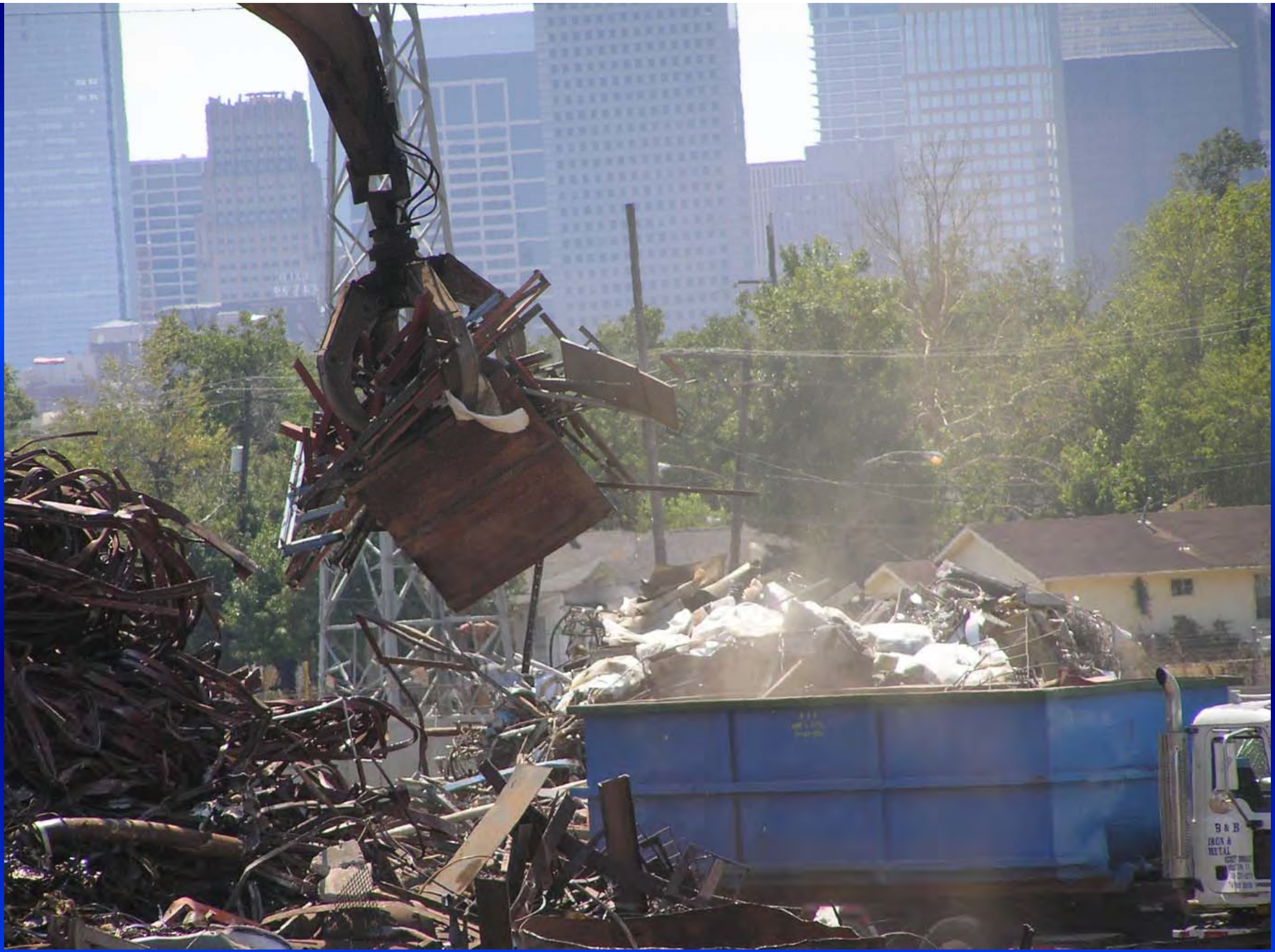
Vasco Road Landfill

Exhibit 3.

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

Arturo J. Blanco
Loren Raun, PhD*
Don Richner, CIH

Houston Department of Health and Human Services
Bureau of Pollution Control and Prevention

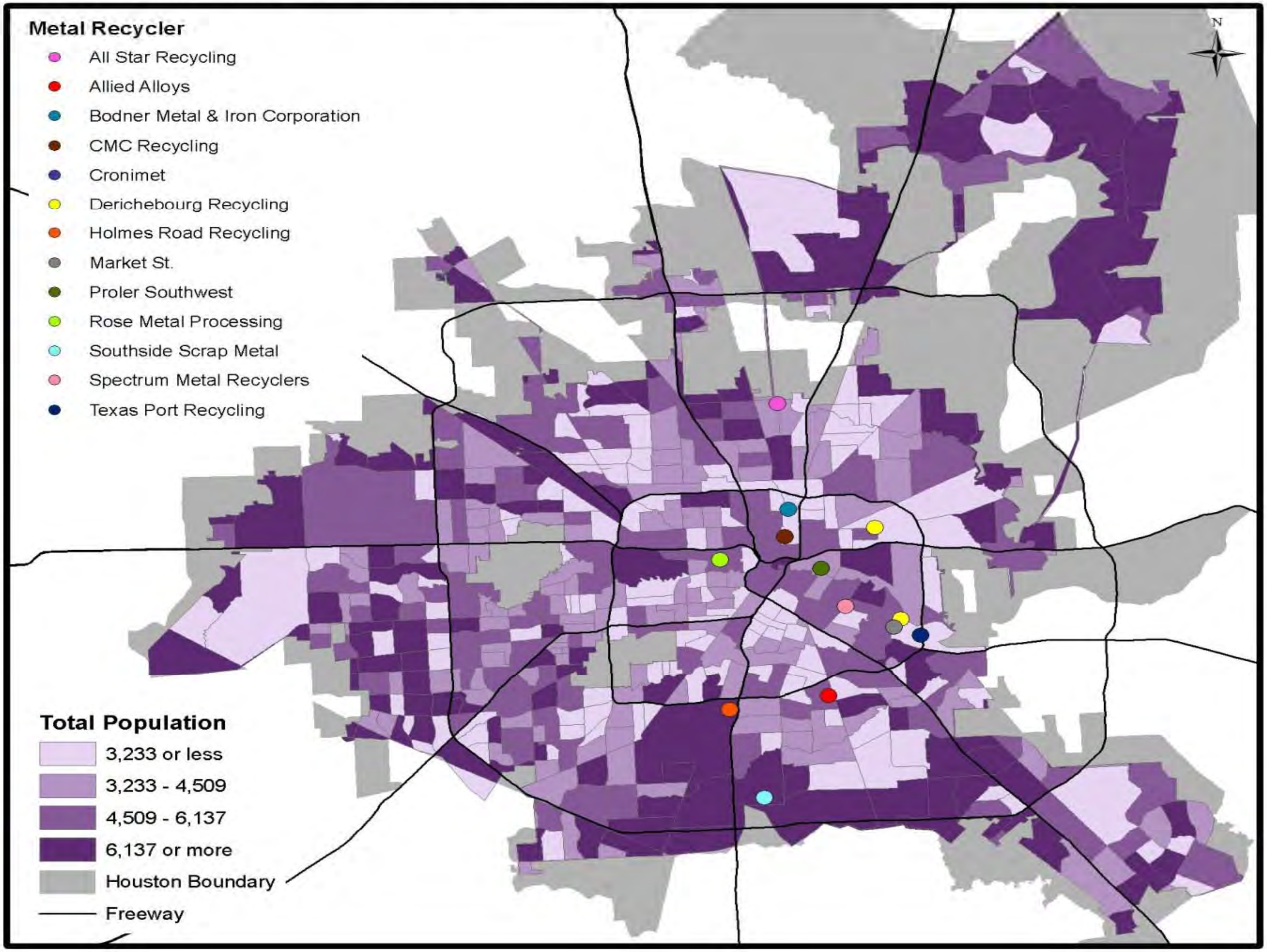


Houston Air Facts:
**“A plethora of toxic pollutants are
emitted into Houston's air by more than 400 chemical manufacturing facilities, including 2 of the 4 largest refineries in the U.S.”**

What are they?

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

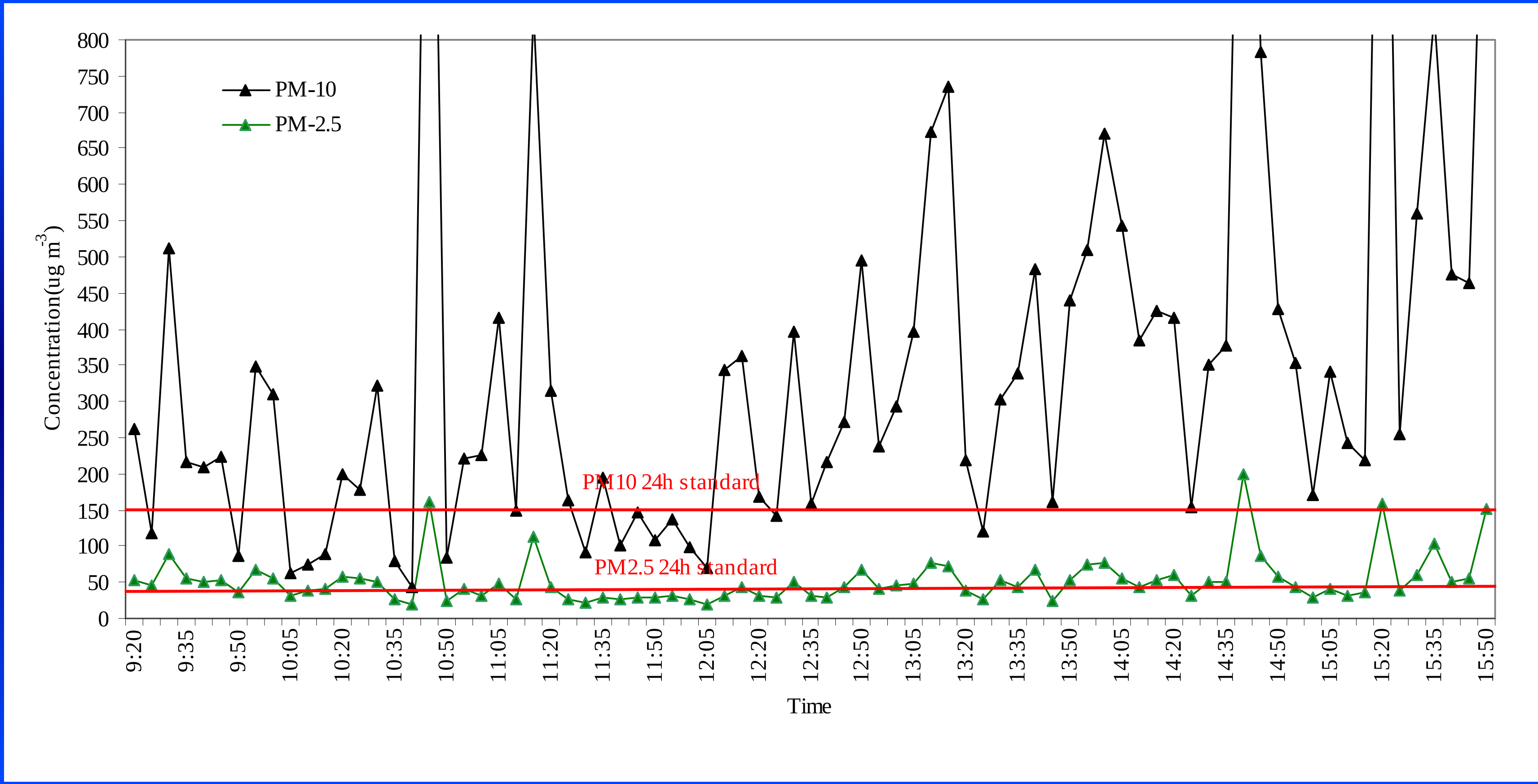
Metal Recycling Sites and Houston Population




CMC Metals


304 ALL
Allied Alloys

PM10 and PM2.5 1/5/2012



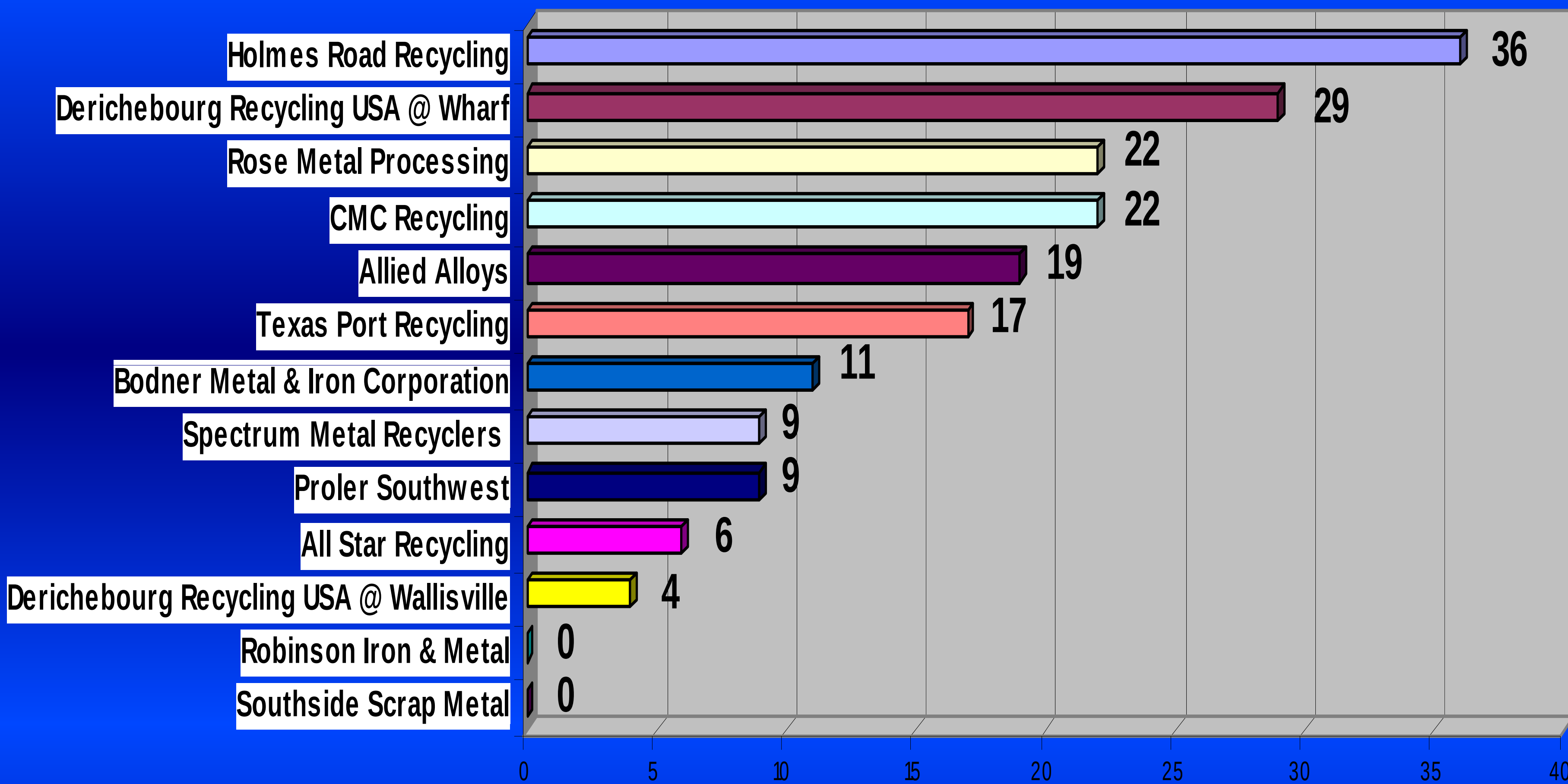
Priority Ranking System for Emission Sources

Priority Assigned is total of points

	Points
Death or serious injury onsite	4
Explosion or fire affecting offsite	3
Explosions onsite	2
Fires onsite	1
Adjacent Schools, Hospitals etc.	4
Adjacent Residential	3
Commercial	2
Industrial Area	1
Isolated Site	0
Large number of complaint <1 yr	3
Large number of complaint <5 yr	2
Few complaints in 5 yrs	1
No complaints	0
HAP metal > ESL	4
One or more metals > ST ESL	3
One or more metals > LT ESL	2
Many metals detected	1

	Points
Iron above LT ESL (not authorized)	1
HAP VOC > ESL	4
VOCs > ST ESL	3
VOCs > LT ESL	2
Many VOCs detected	1
Nuisance Odor	1
Freon compounds found	1
PM exceeds ST ESL	3
PM exceeds LT ESL	2
Many PM spikes above ST ESL	1
MS4 threatened by toxics	2
MS4 threatened by nontoxics	1
No MS4 issues identified	0
City NOVs or Citations	1
Opacity limit exceeded	1
Other agency NOV or Citation	1

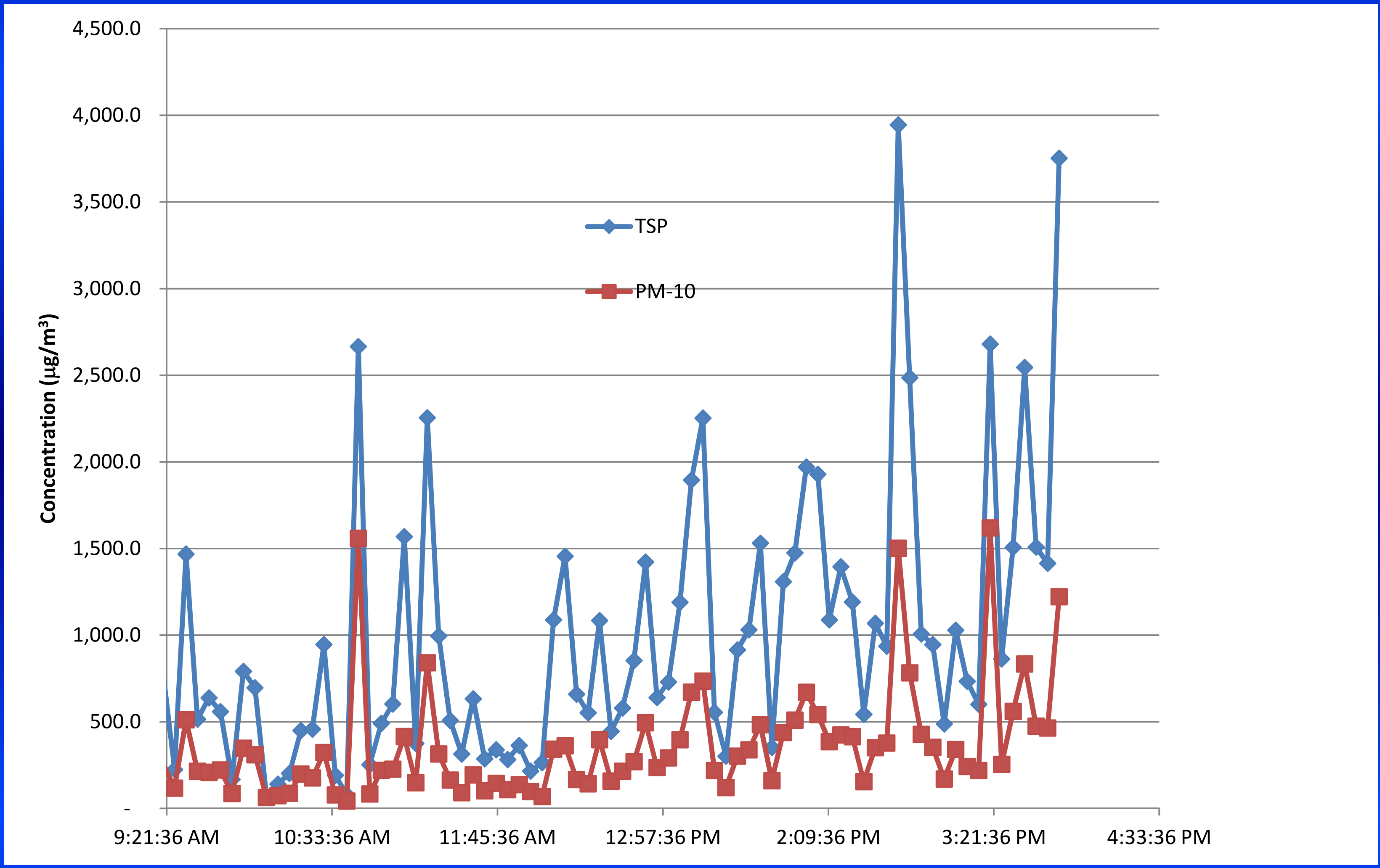
Metal Recyclers Priority Ranking - November 2011



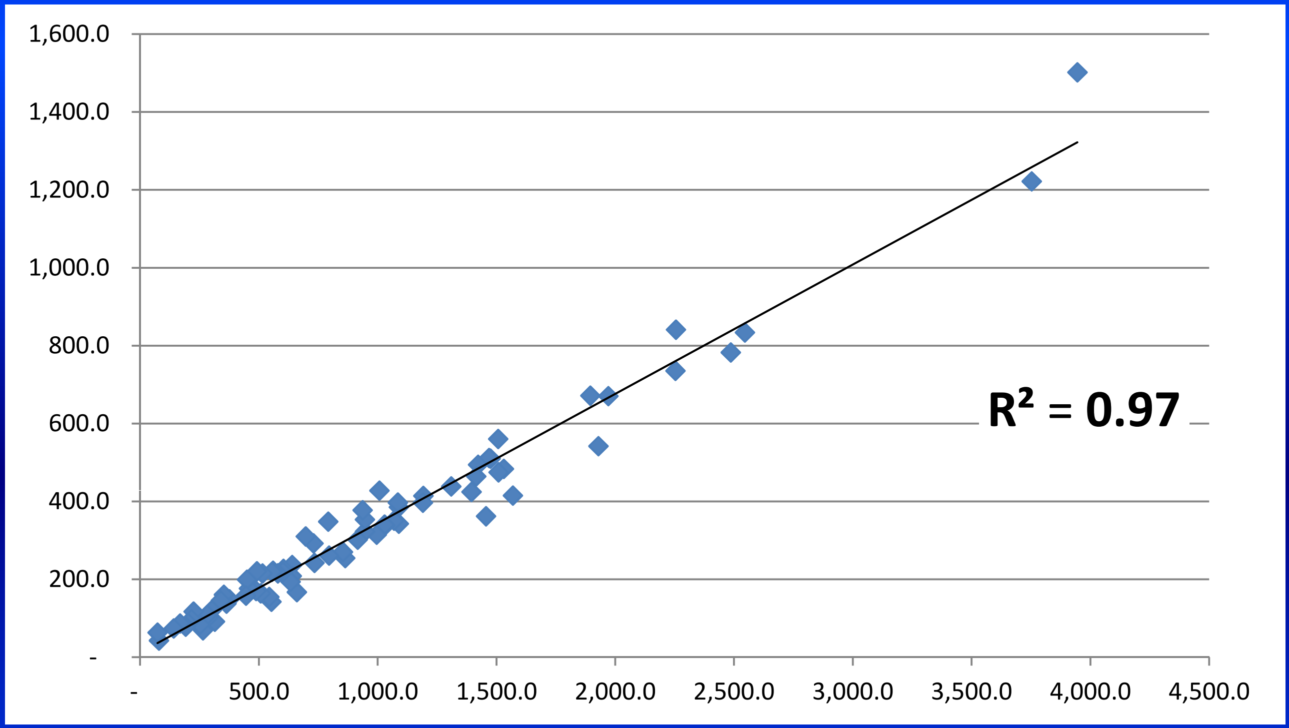
Sampling and Analysis

- 11 Metals and 75 VOCs:
  - Ag Cd Cr Cu Mn Ni Pb Zn Fe Co Hg
  - Zn eliminated
  - Cr (VI)

TSP and PM10 1/5/2012



Holmes Road 1/5/2012: PM10 from TSP



	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	12.24	8.17	1.49	0.13
TSP	0.331	0.006734	49.3	6.61E-59

Summary Statistics of Metals ($\mu g/m^3$)

Variable	N	Min	Max	Mean	Median	SD	% NDs
Cr (total)	72	0.013	1.641	0.155	0.0575	0.237	15.28%
Cu	72	0.02	2.63	0.372	0.202	0.45	5.56%
Mn	72	0.02	2.02	0.303	0.196	0.399	5.56%
Ni	65	0.038	2.07	0.28	0.116	0.394	29.23%
Pb	69	0.06	6.22	0.354	0.15	0.79	37.68%
Fe	65	0.375	354.00	25.95	10.95	50.45	3.08%
Cd	12	0.014	0.09	0.0274	0.0195	0.0228	66.67%
Co	16	0.013	0.34	0.0583	0.018	0.0982	43.75%
Ag	5	0.022	0.15	0.0722	0.065	0.05	20.00%

Risk Methodology

RAGS Part F

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

- Exposure concentration measured then assessed using EPA ProUCL

Toxicity IUR

Default

Resident Risk-Based Screening Levels (RSL) for Air

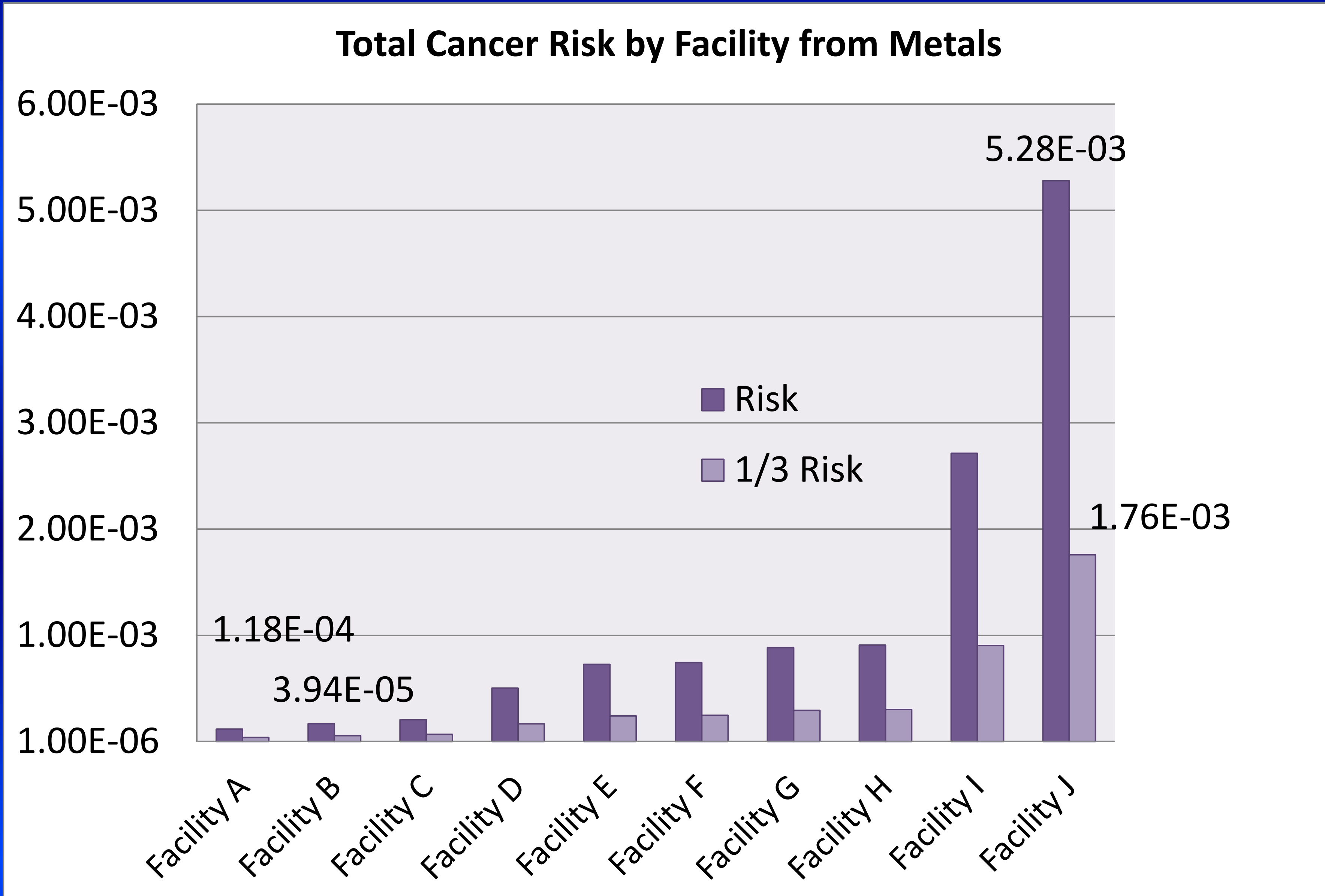
ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL),

ca** (Where nc SL < 10 x ca SL),

max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat

Chemical	**Inhalation Unit Risk (ug/m³)⁻¹**	**IUR Ref**	**Chronic RfC (mg/m³)**	**RfC Ref**	Carcinogenic SL TR=1.0E-6 (ug/m³)	Noncarcinogenic SL HI=1 (ug/m³)	Screening Level (ug/m³)
Cadmium	1.80E-03	I	2.00E-05	C	1.35E-03	2.09E-02	1.35E-03 ca*
Chromium(VI)	8.40E-02	S	1.00E-04	I	1.14E-05	1.04E-01	1.14E-05 ca
Cobalt	9.00E-03	P	6.00E-06	P	2.70E-04	6.26E-03	2.70E-04 ca*
Manganese	-		5.00E-05	I	-	5.21E-02	5.21E-02 nc
Nickel Refinery Dust	2.40E-04	I	5.00E-05	C	1.01E-02	5.21E-02	1.01E-02 ca**

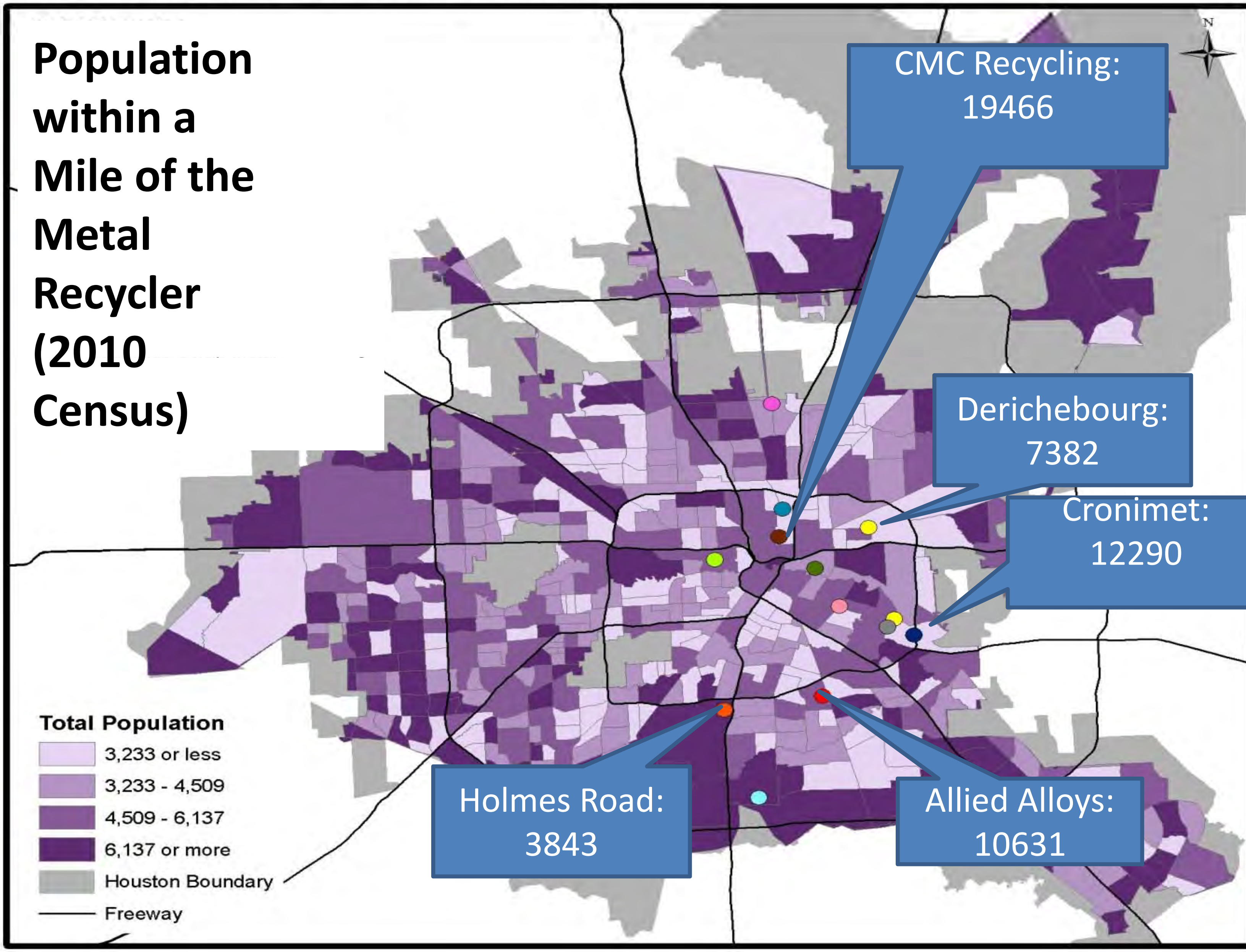
Output generated 30APR2012:19:32:34


Total Cancer Risk by Facility from Metals
6.00E-03
5.00E-03
4.00E-03
3.00E-03
2.00E-03
1.00E-03
1.00E-06
5.28E-03
1.76E-03
1.18E-04
3.94E-05
Risk
1/3 Risk
Facility A
Facility B
Facility C
Facility D
Facility E
Facility F
Facility G
Facility H
Facility I
Facility J

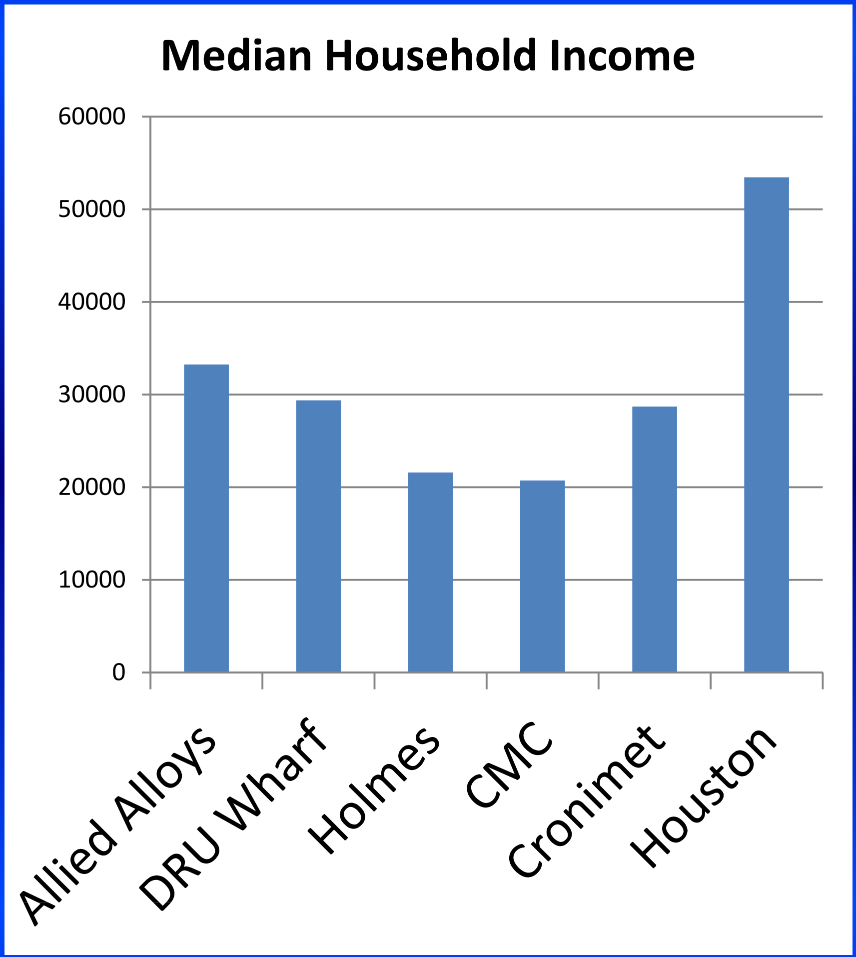
Site Specific Total Risk Estimate

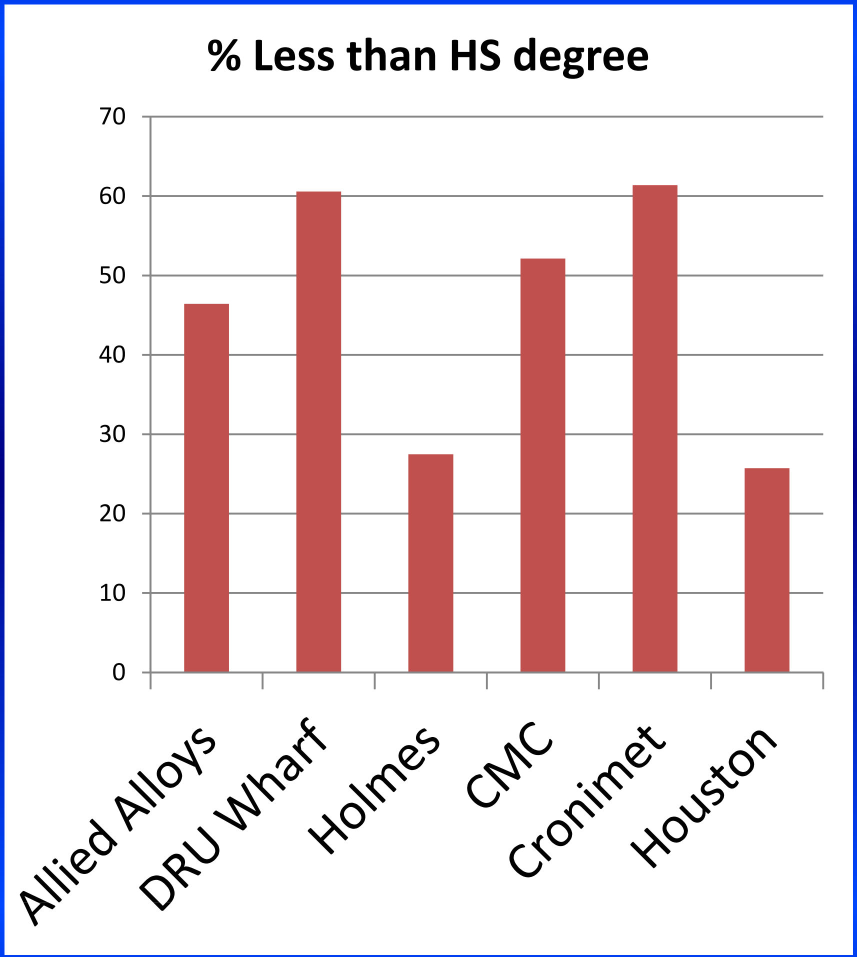
COC	IUR $(ug/m^3)^{-1}$	Conc ug/m^3	Cancer Risk
1,4-Dichlorobenzene	1.10E-05	1.82E+00	2.00E-05
Benzene	7.80E-06	3.07E+00	2.39E-05
1,3 Butadiene	3.00E-05	6.15E-01	1.85E-05
Ethylbenzene	2.50E-06	4.10E+00	1.02E-05
MethyleneChloride	1.00E-08	9.14E-01	9.14E-09
Tetrachloroethylene	2.60E-07	7.85E-01	2.04E-07
VinylChloride	4.40E-06	2.31E-01	1.01E-06
Cr VI	8.40E-02	0.008	6.72E-04
Ni	2.40E-04	0.234	5.62E-05
Total VOC Risk			**7.38E-05**
Total Metal Risk			**7.28E-04**
Total Risk			**8.02E-04**
Total Metal Risk by 1/3			**2.43E-04**

Metal Recycling Sites and Houston Population



Demographics Near Recyclers: Disadvantaged Population





NATA *Under* Estimates

Recycler	Facility X	Facility Y		
Metal	Cr(VI)	Cr(VI)	Ni	Co
Risk City of Houston	1.26E-02	3.18E-02	2.74E-04	1.17E-03
NATA Risk	2.61E-06	1.19E-05	3.72E-07	0.00E+00

Recycler	Facility Z		Facility AA		
Metal	Cr(VI)	Ni	Cr(VI)	Ni	Co
Risk City of Houston	1.71E-02	6.29E-05	1.25E-01	1.28E-04	1.49E-04
NATA Risk	1.99E-06	3.02E-07	3.93E-06	5.29E-07	0.00E+00

Strengthes and Weaknesses

Strengths:

- Measured data
- Negotiation leverage
- Verifiable improvements

Weaknesses:

- Relying on PM10 to TSP ratio
- Total Chromium to Hexavalent ratio

In Summary

Based on the current data and assumptions, we see a need to:

- Validate our findings
- Continue to work with companies to reduce exposure
- Work with the state to refine PBR
- Work with the impacted communities

Exhibit 4.

Do I Have a Special Waste?

Information presented in this publication is intended to provide a general understanding of the statutory and regulatory requirements governing special waste. This information is not intended to replace, limit or expand upon the complete statutory and regulatory requirements found in the Illinois Environmental Protection Act and Title 35 of the Illinois Administrative Code of Regulations.

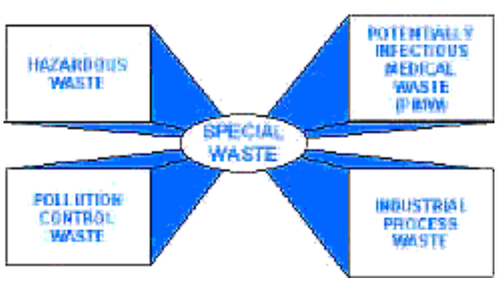
Illinois regulates many different types of waste, including special waste. Because you generate waste, it is your responsibility to figure out what type of waste you generate. This can be a confusing process! This fact sheet will help you understand what special waste is and help you determine whether you generate a special waste. Special waste needs to be managed and disposed of properly to protect our environment. To understand what kind of special wastes you may generate, ask yourself the following questions in the order presented below, then follow the flowchart below to figure out if you generate a special waste. If you have additional questions, please call the Office of Small Business at 1-888-EPA-1996.

What is a Special Waste?

Special waste includes hazardous waste, potentially infectious medical waste (PIMW), industrial process waste, and pollution control waste.

What is a Hazardous Waste?

A hazardous waste is (1) listed on the Illinois Environmental Protection Agency hazardous waste list which can be obtained from the Office of Small Business or (2) has the characteristic of ignitability, corrosivity, reactivity, or toxicity (determined by generator knowledge or analytical testing in a laboratory).



Generator knowledge and analytical testing of the waste are used to determine if your waste is a hazardous waste. Generator knowledge means the business that generates the waste has sufficient information to determine if the waste is hazardous based on its understanding of the waste generating process and the raw materials used in the process. Analytical testing of a sample of your waste is done by a laboratory.

What is a PIMW?

PIMW is generated in connection with the diagnosis, treatment, or immunization of human beings or animals; medical research; and biological testing. The businesses that typically generate PIMW are hospitals, nursing homes, medical or veterinary clinics, dental offices, clinical or pharmaceutical laboratories, university or research facilities, and other such facilities.

What is an Industrial Process Waste?

An industrial process waste is any liquid, solid, semisolid, or gaseous waste generated when manufacturing a product or performing a service. Examples include cutting oils, paint sludges, equipment cleanings, metallic dust sweepings, used solvents from parts cleaners, and off-specification, contaminated, or recalled wholesale or retail products. The following wastes are not industrial process wastes:

- Uncontaminated packaging materials
- Uncontaminated machinery components
- General household waste
- Landscape waste
- Construction or demolition debris

Where Can I Find Information?

A material safety data sheet (MSDS) is a document available for most commercial products and chemicals that presents information on the materials such as hazard classification and proper disposal.

What is a Pollution Control Waste?

A pollution control waste is generated directly or indirectly when businesses remove contaminants from air, soil, or water. Examples include baghouse dust, landfill waste, scrubber sludge, and chemical spill cleaning material.

If your industrial process waste or pollution control waste is any one of the following, it is a special waste:

- *A liquid waste*
- *An asbestos waste regulated under the Clean Air Act*
- *A regulated polychlorinated biphenyl (PCB) waste*
- *A delisted hazardous waste*
- *A characteristic hazardous waste treated or stabilized to be nonhazardous*
- *A waste material generated by shredding recyclable metals*

The following questions will help you understand each of these industrial process or pollution control wastes.

What is Used Oil?

Because used oil is often recycled or reused, used oil has its own management requirements. For more information on how to manage your used oil, see the "Managing Your Used Oil!" factsheet or call the Office of Small Business.

What is a Liquid Waste?

Liquid waste is any waste material that is determined to contain "free liquids." Used cutting oil is a typical liquid waste. For sludges or other wastes that you cannot easily determine is liquid, you can use the paint filter test. The test requires pouring the waste through a specific filter to determine if the waste contains "free liquids." For further information about this test, please call the Office of Small Business.

What is an Asbestos Waste Regulated Under the Clean Air Act?

Asbestos waste regulated under the Clean Air Act is (1) any waste that contains commercial asbestos and (2) any asbestos waste generated during demolition or renovation. Examples include insulation, fireproofing materials, and packaging contaminated with commercial asbestos.

What is a Regulated PCB Waste?

PCBs are typically found in old transformers and other electrical equipment. A PCB waste is a waste that contains any monochlorinated or polychlorinated biphenyl or any mixture that contains one or more of them. This includes equipment, solids (including empty containers) and contaminated liquids.

Tip

To protect the environment and reduce your regulatory requirements, minimize the amount of waste you generate. For more information, call the Office of Small Business.

What is a Delisted Hazardous Waste?

A delisted hazardous waste is excluded from the list of hazardous wastes when the Illinois Pollution Control Board grants a petition filed by a business.

What is a Decharacterized Hazardous Waste?

A decharacterized hazardous waste is a hazardous waste that has been treated to make it nonhazardous or the hazardous characteristic, ignitability, corrosivity, reactivity, or toxicity, has been removed.

What is an Example of a Waste Generated by Shredding Recyclable Metals?

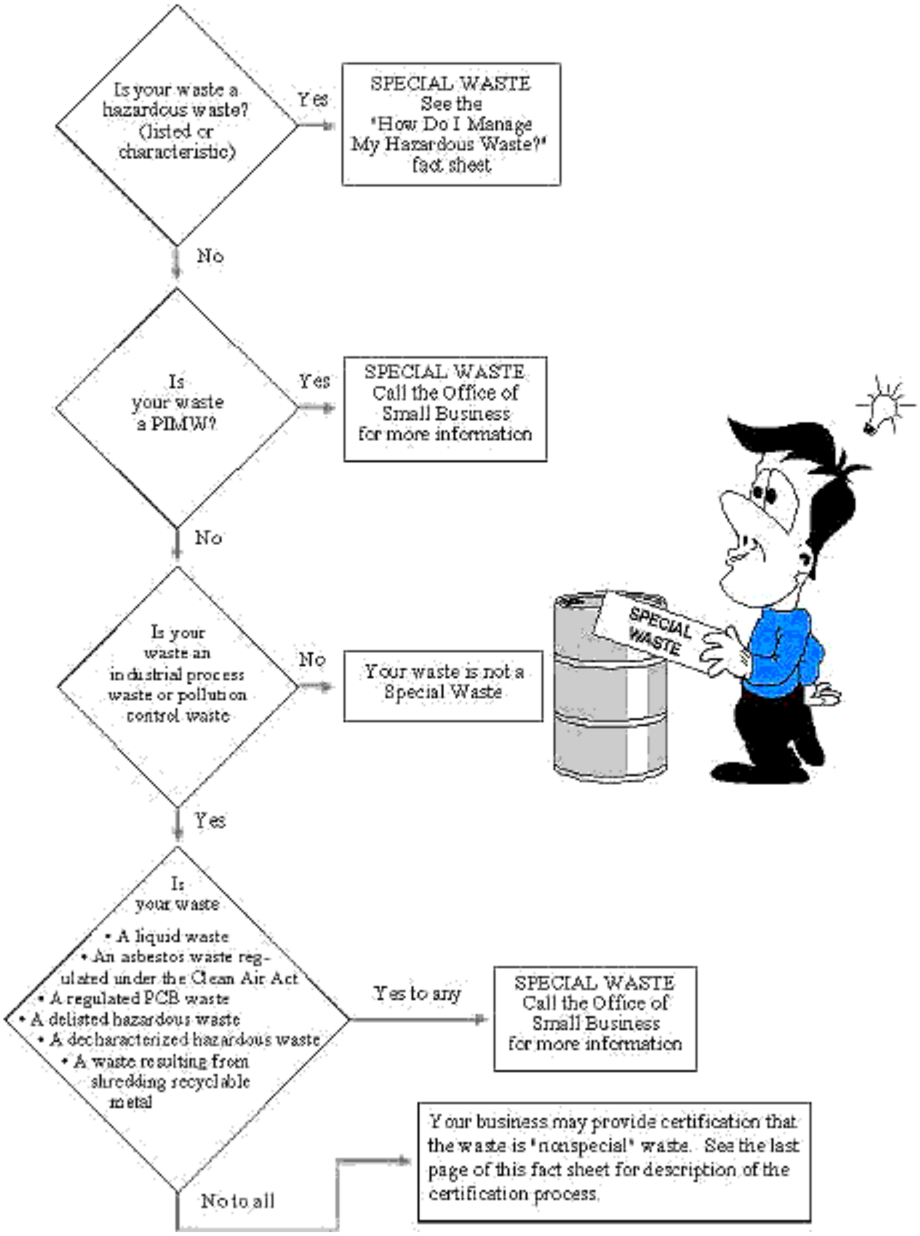
When autos and trucks are shredded to reclaim metals, a significant amount of other materials are generated such as upholstery and plastics (auto fluff). This material is often contaminated during the recycling process and must be managed as a special waste.

Are There Industrial Process Wastes and Pollution Control Wastes that are not Special Waste?

Yes, in some instances you may certify that your waste is not a special waste by following the procedures on page 4.

Special Waste Determination Process

This flow chart can assist you in determining if you generate a special waste.



Nonspecial Waste Certification

Any industrial process wastes and pollution control wastes that are not hazardous and not liquid may be certified as nonspecial waste in Illinois and may be disposed of with your general refuse. In addition to these wastes, the containers that once held them may also be excluded from the definition of special waste if:

- The container no longer contains a liquid
- All wastes have been removed
- Any residue is less than 1 inch thick
- Any inner liner has been removed and disposed of as special waste

If you determine that the industrial process or pollution control waste that you generate is a " **nonspecial waste**", you may prepare a nonspecial waste certification. This certification must be made in writing and must be provided when requested by Illinois EPA, the waste transporter, the disposal site, and any one else involved in managing the waste. If you do not make this written certification, the waste is still considered a special waste and must be managed as a special waste.

The information contained in this certification must include (as applicable):

- A description of the process that generated the waste
- **How** you determined the waste is not hazardous
- **How** you determined the waste is not a liquid, does not contain PCBs, asbestos, is not formerly hazardous waste rendered nonhazardous, and is not redded recyclable metals
- Any analytical results, or relevant MSDS
- An explanation as to why any analysis was not performed or required

If the process that generates the waste changes or the raw materials change, you must complete a new certification. Certifications must be signed, dated, and kept for at least 3 years after you stop operating the process that generates the certified nonspecial waste. The law provides stiff penalties for false certification.

Examples of Nonspecial Waste Certifications

No specific form is required for nonspecial waste certifications. Some example certifications are provided below.

John's Auto Body

123 Main Street

Roscoe, IL 61073

I certify that masking materials used when spray painting vehicles in my shop, including 9-29-97
paper, plastic, and masking tape with paint overspray are not hazardous, not liquid, do not contain PCBs or asbestos, are not formerly hazardous , are not shredded recyclable metals, and are not special wastes. I determined that my wastes are not special wastes by looking at my MSDS. I also certify that discarded paint cans are empty and no longer contain any liquids. MSDS for paints are attached.

John R. Karr

[signature]

Owner

Mike's Machine Shop

2616 N.E. Adams St.

Peoria, IL 61611

I certify that grit from grinding and metal grindings, shavings, turnings, and scrap resulting from machining various components are nonhazardous and nonliquid; do not contain asbestos or PCBs; are not formerly hazardous waste rendered nonhazardous; are not generated by shredding recyclable metals. Therefore, these are not special waste. 6 Nov. 1997

Michael W. Thomas

[signature]

Owner/Manager

(Analytical results attached)

What Do I Do Next?

Now that you have determined whether you generate a special waste, if you need additional assistance, please call the Office of Small Business at 1-888-EPA-1996 for more information about requirements that may apply to you.

Exhibit 5.

Occupational
Safety and Health
Administration

www.osha.gov

Guidance for the Identification and Control of Safety and Health Hazards in Metal Scrap Recycling

OSHA 3348-05 2008

adds value to business, work and life.

Employers are responsible for providing a safe and healthy workplace for their employees. OSHA's role is to promote the safety and health of America's working men and women by setting and enforcing standards; providing training, outreach and education; establishing partnerships; and encouraging continual improvement in workplace safety and health.

This publication provides a general overview of a particular standards-related topic. This publication does not alter or determine compliance responsibilities which are set forth in OSHA standards, and the *Occupational Safety and Health Act*. Moreover, because interpretations and enforcement policy may change over time, for additional guidance on OSHA compliance requirements, the reader should consult current administrative interpretations and decisions by the Occupational Safety and Health Review Commission and the courts.

This information will be made available to sensory impaired individuals upon request. Voice phone: (202) 693-1999; teletypewriter (TTY) number: 1-877-889-5627.

Edwin G. Foulke, Jr.
Assistant Secretary of Labor for
Occupational Safety and Health

Guidance for the Identification and Control of Safety and Health Hazards in Metal Scrap Recycling

Occupational Safety and Health Administration
U.S. Department of Labor

OSHA 3348-05
2008

Contents

Introduction

The Audience for This Guide

Anyone who works in the metal scrap recycling industry—employers, employees, safety professionals, and industrial hygienists—should read this publication. This guide can help you identify and manage the hazards associated with exposure to various metals and processing chemicals and with related processes and equipment used in metal scrap recycling operations.

Why This Guide Is Important

Metal scrap recycling, also called secondary metal processing, is a large industry that processes, in the U.S. alone, 56 million tons of scrap iron and steel (including 10 million tons of scrap automobiles), 1.5 million tons of scrap copper, 2.5 million tons of scrap aluminum, 1.3 million tons of scrap lead, 300,000 tons of scrap zinc and 800,000 tons of scrap stainless steel, and smaller quantities of other metals, on a yearly basis. (ISRI NDa)

Scrap metals, in general, are divided into two basic categories: ferrous and nonferrous. Ferrous scrap is metal that contains iron, while nonferrous metals are metals that do not contain iron. These two basic categories of metals are described in further detail in the section, "Types of Metals Most Commonly Recycled" in the "Commonly Recycled Metals and Their Sources" chapter of this guide.

Many employees are employed by scrap metal recycling industries. Private, nonferrous recycling industries in the U.S. employed approximately 16,000 employees in 2001.[1] (Figures were not available for ferrous recycling industries.) In 2001, those nonferrous recycling industries reported approximately 3,000 injuries and illnesses. The most common causes of illness were poisoning (e.g., lead or cadmium poisoning), disorders associated with repeated trauma, skin diseases or disorders, and respiratory conditions due to inhalation of, or other contact with, toxic agents. Of those injuries and illnesses, 701 cases involved days away from work. The most common events or exposures leading to these cases were contact with an object or piece of equipment; overextension; and exposure to a harmful substance. The most common types of these injuries were sprains and strains; heat burns; and cuts, lacerations, and punctures. (BLS, 2003)

[1]After 2001, the data for private nonferrous recycling industries were no longer available due to a change in industry codes. However, the nonfatal injury incident rates in 2005 for codes that encompass the nonferrous recycling industry range from 7.8 to 11.2 per 100 employees (BLS, 2005).

How This Guide Can Help

As an employer, this guide will help you protect your employees by helping you and your employees recognize, manage, and control the potential hazards associated with common metal scrap recycling processes. This guide will also assist safety professionals and industrial hygienists in their efforts to identify, evaluate, and develop appropriate controls for hazards related to metal scrap recycling processes.

What This Guide Covers

This document will assist employers and employees in recognizing and controlling typical health and safety hazards associated with various metal scrap recycling operations and in selecting appropriate control methods. This document does not provide an in-depth evaluation of every recycled material, or of every associated process-related hazard; rather it gives an overview of processes and related hazards common to a wide range of metal scrap recycling operations.

Employers must evaluate their own operations, processes, and equipment to ensure that all hazards in their operations are identified and appropriately controlled. There are many relevant guidance documents and standards related to exposure to hazardous substances (including metals), working in industrial environments, and working with specific types of material handling and processing equipment that may be associated with recycling processes. This guidance document includes references to these documents throughout the text, along with short summaries where appropriate.

Specific Standards and Requirements Addressing Chemical and Physical Hazards in Metal Recycling Operations

Although this guide recommends work practices and engineering controls to decrease hazards to employees, there are legal requirements in OSHA standards that you need to know about and comply with. These include, for example, OSHA General Industry Standards, *Title 29 of the Code of Federal Regulations (CFR), Part 1910* and the Construction Industry Standards in *29 CFR* 1926. Consult these standards directly to ensure full compliance with the provisions. States with OSHA-approved plans have standards which are at least as effective as, but may differ from, the Federal OSHA standards. These and other OSHA standards and documents are available online at www.osha.gov.

Other federal agencies, including the Department of Transportation (DOT), the Mine Safety and Health Administration (MSHA) within the Department of Labor, the Environmental Protection Agency (EPA), the Nuclear Regulatory Commission (NRC), and the Department of Energy (DOE) may each have applicable standards regulating specific types of scrap metals or specific aspects of related recycling processes. Employers should refer to these agencies for specific information regarding standards that may affect their recycling operations.

Other Relevant Guidelines

The American National Standards Institute (ANSI) publishes voluntary consensus standards on the safe care and use of specific machinery. ANSI standards also may give you guidance on complying with OSHA performance-based standards, such as 29 CFR 1910.212, *General Requirements for All Machines*. ANSI standards are sometimes incorporated into OSHA regulations, and in these cases, employers are accountable for complying with the specific versions of the ANSI standard referenced. OSHA generally recommends, however, that employers use the most recent versions of ANSI standards.

Types of Hazards in Metal Scrap Recycling

Employees in facilities that recycle metal scrap are exposed to a range of safety hazards associated with material handling methods, hazards associated with the metals themselves (as dust or fumes), and with the hazardous substances used to process or recover these metals. These hazards, the processes and operations that present the hazards and the related control measures are covered in this guide.

Commonly Recycled Metals and Their Sources

Types of Metals Most Commonly Recycled

The scrap metal recycling industry encompasses a wide range of metals. Some of the most commonly-recycled metals (by volume) are iron and scrap steel (ISS), copper, aluminum, lead, zinc, and stainless steel. (ISRI NDa)

Scrap metals, in general, are divided into two basic categories: ferrous and nonferrous. Ferrous scrap is metal that contains iron. Iron and steel (which contains iron) can be processed and remelted repeatedly to form new objects. (ISRI NDb)

Common nonferrous metals are copper, brass, aluminum, zinc, magnesium, tin, nickel, and lead. Nonferrous metals also include precious and exotic metals. Precious metals are metals with a high market value in any form, such as gold, silver, and platinum. Exotic metals contain rare elements such as cobalt, mercury, titanium, tungsten, arsenic, beryllium, bismuth, cerium, cadmium, niobium, indium, gallium, germanium, lithium, selenium, tantalum, tellurium, vanadium, and zirconium.

Some types of metals are radioactive. These may be "naturally-occurring" or may be formed as by-products of nuclear reactions. Metals that have been exposed to radioactive sources may also become radioactive in settings such as medical environments, research laboratories, or nuclear power plants.

Common Sources of Recycled Metals

Ferrous scrap comes from sources such as:

- Mill scrap (from primary processing).
- Used construction beams, plates, pipes, tubes, wiring, and shot.
- Old automobiles and other automotive scraps.
- Boat scrap, railroad scrap, and railcar scrap.
- Miscellaneous scrap metal.

Ferrous metals are magnetic and are often collected in scrap yards by a large electromagnet attached to a crane, sweeping across piles of scrap to grab magnetic objects.

Aluminum is the most widely-recycled nonferrous metal. (ISRI NDc) The major sources of nonferrous scrap are industrial or new scrap, and obsolete scrap. Industrial or new scrap may include:

- Aluminum left over when can lids are punched out of sheets.
- Brass from lock manufacturing.
- Copper from tubing manufacturing.

Obsolete scrap, the other major source, may include:

- Copper cables.
- Copper household products.
- Copper and zinc pipes and radiators.
- Zinc from die-cast alloys in cars.
- Aluminum from used beverage cans.
- Aluminum from building siding.
- Platinum from automobile catalytic converters.
- Gold from electronic applications.
- Silver from used photographic film.
- Nickel from stainless steel.
- Lead from battery plates. (ISRI NDc; OECD 1995)

Nonferrous metals can also be recycled from captured particle emissions from metal primary or secondary production facilities.

Other exotic and precious metals come from a variety of sources, such as:

- Gallium from gallium arsenide (GaAs) used in electronics.
- Gold from precious metals manufacturing plants and from discarded electronics and jewelry.
- Platinum-group metals from catalysts (including catalytic converters, which automobile recyclers systematically collect).
- Used catalysts from industrial processes (mostly from the chemical and pharmaceutical industries).
- Old electronics equipment.
- Other jewelry. (USGS 2001)

Radioactive metal scrap may come from military applications (such as depleted uranium), discarded medical equipment, building or storage material from nuclear power plants (particularly nickel scrap) or trace amounts found elsewhere, such as Americium (Am-241), found in smoke detectors.

Additional information on sources of various metals is provided in the "What You Need to Know about Exposure to Other Metals" section at page 24.

What You Need to Know about Scrap Quality and Contaminants

The worldwide scrap metal recycling industry has developed sets of specifications and grading systems to ensure consistent quality of source scrap material for a given grade of metal scrap. The three most widely-used specifications are the Scrap Specifications Circular (U.S. Institute of Scrap Recycling Industries, Inc.), the European Classification for Non-Ferrous Scrap Metals, and the Standard Classification for Non-Ferrous Scrap Metals (U.S. National Association of Secondary Materials Industries, Inc.). These specifications generally set minimum and maximum content of certain metal impurities, and restrict levels of certain hazardous metals and other hazardous substances.

Employers should be aware that these criteria are designed to protect the end-user, or are for product quality purposes, and are not designed to protect employees performing metal scrap recycling processes. As a result, concentrations of certain metals that are below these quality specification requirements, either as incoming raw scrap or as processed scrap (to be sent elsewhere), may still pose hazards to employees handling metal scrap.

Employers should be aware of the potential impurities in their source scrap, and should be prepared to monitor for hazardous levels of those metals and other chemicals in their work environments (OECD 1995). Employers should also ensure that they receive their scrap supply from reliable sources that follow the established guidelines and should obtain material data safety sheets (MSDSs) and labels for the scrap materials where available. If an MSDS is not provided, the employer must request one from their supplier. See the discussion on "What You Need to Know about Hazard Communication" at page 32 in the "Recognizing and Controlling Hazards" section of this guide for more information on employer obligations to obtain MSDSs and labels for scrap materials.

Common Recycling Processes, Hazards and Related Controls

Processes Commonly Used to Recycle Metal Scrap and Their Hazards

Metal scrap recycling is a large and complex industry. The variety of metals involved and the wide range of sources of metal scrap require many processing techniques. These processing techniques pose a range of safety and health hazards to employees in the industry. This section discusses a selection of those processes, the types of hazards that these processes may pose to employees, and control measures employers and operators can implement to control or eliminate these hazards. This document does not go into detail on every process or every hazard associated with every process, but rather it discusses the most common processes and provides examples of hazards related to those processes.

Recycling is a multi-step process, starting with collection and transport of raw scrap, pretreatment, melting, refining, forming and finishing. The recycling processes discussed in this document fall into these basic categories:

- Loading and unloading.
- Breaking and separating.
- Gas torch cutting.
- Non-gas torch cutting and other cutting.
- Baling, compacting, and shredding.
- Melting and baking in furnaces and ovens.
- Applying chemical processes to recycle metals.

Each category is an individual component of the recycling process and may pose a wide range of safety hazards that are common to many industrial and material handling processes. Such hazards may include flying pieces of material, exposed moving parts, fire hazards, and noise hazards.

Hazardous chemical exposures to employees are most likely to result from hot processes that produce fumes (such as torching and welding or melting in furnaces) or processes that produce dust (such as breaking, shredding, and cutting). Each of these processes is discussed in detail on the following pages.

Applicable Standards

29 CFR 1910 General Industry - many standards for occupational safety and health may apply to metal scrap recycling, including (but not limited to) the following standards

- 29 CFR 1910.1000, *Air Contaminants*
- 29 CFR 1910.212, *General requirements for all machines*
- 29 CFR 1910.219, *Mechanical power-transmission apparatus*
- 29 CFR 1910.147, *The control of hazardous energy (lockout/tagout)*

Sources of Additional Information

- OSHA 3170, *Safeguarding Equipment and Protecting Employees from Amputations*
- OSHA 2254, *Training Requirements in OSHA Standards and Training Guidelines*
- OSHA Health and Safety Topics: Machine Guarding, http://www.osha.gov/SLTC/machine guarding/index.html
- OSHA Lockout/Tagout eTool http://www.osha.gov/dts/osta/loto training/index.htm
- National Electrical Code 250-112

Loading and Unloading

The first step in any metal scrap recycling operation is getting the metal scrap to the recycling operation and collecting or sorting materials to be processed in groups. This may involve light or heavy trucks, stationary or mobile cranes, conveyor belts, and other large and potentially hazardous equipment. Working with this equipment poses hazards typical for material handling equipment.

Employers must ensure that employees use the appropriate combination of personal protective equipment (PPE) such as hard hats, sturdy boots, gloves, thick clothing, and respirators (if the operation generates hazardous dust) to be adequately protected from safety and health hazards.

OSHA's Personal Protective Equipment standards (29 CFR 1910 Subpart I) establish requirements for employers to evaluate the workplace and identify PPE needs based on actual workplace hazards (29 CFR 1910.132). These standards also establish criteria for proper selection and use of specific types of PPE such as foot, eye, or head protection. See the "Applicable Standards" box on the next page for a list of OSHA PPE standards (not necessarily all-inclusive) that may apply to recycling operations.

Forklift and crane operators must be properly trained in the use of such equipment. Operators must conduct pre- or post-shift vehicle inspections depending on vehicle use. Employers must consider equipping vehicles with guarding to protect any vulnerable brake lines from incidental damage during operation (NIOSH FACE; 29 CFR 1910.178). Of course, any alterations/additions to powered industrial trucks would require written approval from the manufacturer.

Case History #1
A 46-year-old laborer died from injuries sustained when his left arm became caught between the belt and pulley of a conveyor system at a Massachusetts scrapyard and recycling plant. The victim was working alone removing fallen debris from the conveyor frame at the time of the incident. (NIOSH FACE, 94MA021)

Preventive/corrective measures: Material handling equipment must be equipped with proper machine guards to prevent employees from coming in contact with moving parts. Emergency stop devices should be provided within easy reach of all conveyor operator stations to allow operators to immediately stop conveyors in the event of an emergency. Machines must be locked or tagged out during cleaning, servicing or maintenance. Employees must be properly trained in all safety devices.

Case History #2
A 41-year-old tow truck operator was run over by his tow truck while unloading a car at a scrapyard. The tow truck operator jerked the truck back and forth to release a car, and backed over the victim, who was working behind the truck. He then ran over him again as he moved forward, with the truck coming to rest with the victim pinned under the rear wheel. Scrapyard employees tried to rescue the victim by lifting the truck with a grapple crane but the grapple slipped and the truck fell back on him. (NIOSH FACE, 99NJ09101)

Preventive/corrective measures: Operators should disengage the transmission of the towing vehicle when hooking or unhooking vehicles from a tow. In addition, employees should never work behind the towed vehicle or between the vehicle and the tow truck during this process.

Case History #3
A 31-year-old male recycling plant foreman died when he was run over and crushed by a front-end loader. The victim was struck by the loader when its brakes failed as it backed down an incline after depositing cans into a hopper for processing. (NIOSH FACE, 95MA026)

Preventive/corrective measures: Operators must examine all powered material handling equipment at the beginning of each shift. All failing equipment must be tagged out of service and not used until repaired.

Case History #4
A 24-year-old forklift truck operator died after the lift truck he was operating overturned. The victim was operating the equipment in the storage yard of a wire mill. A length of wire became wrapped around the front drive trans-axle, severing the hydraulic brake line. As he was returning to the plant with two empty wire spools, the brakes failed on the truck. He was traveling down an incline and turned abruptly to avoid striking stored material. The sharp turn caused the truck to overturn. The victim tried to jump free but was struck by the Roll Over Protective Structure (ROPS) of the truck. (NIOSH FACE, 96MO054)

Preventive/corrective measures: Employers must keep aisles and passages used by material handling vehicles clear of obstructions. Operators must inspect all powered material handling equipment at the beginning of each shift. All failing equipment must be tagged out of service and not used until repaired. Operators of sit-down trucks need to be trained to remain in the operator's position in a tipover accident and to lean away from the direction of fall to minimize the potential for injury. When seat belts are installed on forklifts, employees are required to wear them.

Applicable Standards
- 29 CFR 1910.132, *General requirements*
- 29 CFR 1910.132(h), *Employer Payment for Personal Protective Equipment*
- 29 CFR 1910.133, *Eye and face protection*
- 29 CFR 1910.134, *Respiratory protection*

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- 29 CFR 1910.135, *Head protection*
- 29 CFR 1910.136, *Occupational foot protection*
- 29 CFR 1910.137, *Electrical protective devices*
- 29 CFR 1910.138, *Hand protection*
- 29 CFR 1910.147, *The control of hazardous energy (lockout/tagout)*
- 29 CFR 1910.176, *Handling materials - general*
- 29 CFR 1910.178, *Powered industrial trucks*
- 29 CFR 1910.179, *Overhead and gantry cranes*
- 29 CFR 1910.180, *Crawler locomotive and truck cranes*
- 29 CFR 1910.181, *Derricks*
- 29 CFR 1910.184, *Slings*
- 29 CFR 1910.212, *General requirements for all machines*
- 29 CFR 1910.219, *Mechanical power-transmission apparatus*

Breaking and Separating Processes

Size-reduction of metal scrap is a necessary component of some operations. Basic metal breaking processes often involve heavy manual labor to break up large or complex assemblies of scrap metal, or to cut or break the pieces into sizes that can be fed into a furnace. Employees involved in activities of this type may be exposed to metal fumes, smoke, hot environments, and hot material when working near furnaces, and may come in contact with metals that present hazards through both skin contact and inhalation.

Some recycling industries use drop-ball breaking (or 'tupping') to break apart the largest solid pieces of scrap metal, or to initiate breaking up large assemblies. This process may create flying object hazards as the material breaks apart from the impact of the ball. Employers must ensure that employees are protected from these hazards by either performing the task remotely; placing a barrier or protective shield around the task; or using PPE such as face and body protection. Breaking may also create a noise hazard, requiring the employer to implement feasible engineering or administrative controls. If these controls do not sufficiently reduce the noise hazard, employers must provide appropriate hearing protection such as earplugs, canal plugs, earmuffs, or other protective devices as required by OSHA's Occupational Noise Exposure standard, 29 CFR 1910.95.

Sorting of scrap is now commonly done by automated processes, though some metals must still be sorted by hand. When sorting metal scrap by hand, employees must wear personal protective equipment such as gloves if there is a possibility of encountering any metal or other substance for which skin contact could result in adverse health effects.

Even for metals that do not irritate the skin, handling sharp or pointed pieces of scrap metal poses cut or abrasion hazards to hands or bodies. Employers are required to ensure that employees wear proper personal protective equipment such as gloves and durable clothing to guard against cuts and scrapes. Employees also need to be aware of the proper first aid, medical, and reporting procedures if they receive a cut or scrape. Similar concerns apply to other scenarios where employees work with scrap by hand.

Once an employee has started feeding material into a furnace, there is a risk of hazardous fumes from certain metals. Where exposures exceed OSHA Permissible Exposure Limits (PELs), employers are required to implement feasible engineering controls (e.g., furnace feeding operations can be set-up with local exhaust which can circulate and vent the air near the furnaces to remove toxic fumes from the workplace). If the exposures still exceed the PELs, employees will need to wear respiratory protection to prevent inhalation of toxic fumes and dusts. Refer to the section on Personal Protective Equipment in the "Recognizing and Controlling Hazards" section of this guide for further information on this topic.

Applicable Standards

- 29 CFR 1910.95, *Occupational Noise Exposure*
- 29 CFR 1910.132, *General requirements*
- 29 CFR 1910.133, *Eye and face protection*
- 29 CFR 1910.134, *Respiratory protection*
- 29 CFR 1910.135, *Head protection*
- 29 CFR 1910.136, *Occupational foot protection*
- 29 CFR 1910.137, *Electrical protective devices*
- 29 CFR 1910.138, *Hand protection*
- 29 CFR 1910.147, *The control of hazardous energy (lockout/tagout)*
- 29 CFR 1910.212, *General requirements for all machines*
- 29 CFR 1910.219, *Mechanical power-transmission apparatus*
- 29 CFR 1910.1000, *Air Contaminants*

Gas Torch Cutting

One of the most common tools used to break apart large metal pieces is the gas cutting torch, often used for cutting steel scrap. Classic cutting torches use gas, while other torches use plasma or powder, or even water (although water torches are rarely used for metal scrap). Thermal (gas) torches expose employees to sprays of sparks and metal dust particles, to high temperatures, to bright light that could damage eyes (light both inside and outside of the visible spectrum), and to various gases. Old cutting torches used pure hydrogen and oxygen, while newer torches often use acetylene, propane, carbide, gasoline-oxygen or other mixtures. (Nijkerk 2001)

Compressed gases may be flammable and/or explosive or may present toxic or asphyxiant hazards if leaks occur. Compressed gas cylinders can also present explosion or missile hazards if exposed to excessive heat or physical damage. OSHA standards at 29 CFR 1910, Subpart H establish general and selected substance-specific requirements for proper storage, handling, and use of compressed gasses. Additional requirements for compressed gasses used in certain types of welding and cutting operations are provided in 29 CFR 1910, Subpart Q.

The use of torches presents an obvious fire hazard. This hazard is of particular concern when working on materials that have combustible or explosive components such as motor vehicles with plastics and fuel tanks, or objects with wooden interiors (Nijkerk 2001). Disc-cutting is sometimes used to cut scrap metal objects, particularly where the heat and high temperatures of a gas torch would pose increased fire safety hazards.

Gas torches also involve storage of flammable and explosive gases on site. Employers must store these gases in safe locations and ensure that all equipment is in good working condition (i.e., detached or punctured hoses can create a safety hazard for nearby employees) (Nijkerk 2001). Employers must ensure that gas tanks are inspected, tested, and appropriately labeled while in storage and prior to movement and use. (NIOSH FACE; 29 CFR 1910.253)

Employers must ensure that employees use appropriate eye and face protection such as a welder's helmet and heatproof and or aluminum lined clothing to protect their bodies from the output of these cutting operations, which have similar hazards to welding.

OSHA has established PELs for many hazardous substances. OSHA requires employers to provide engineering controls or work practices to the extent feasible when employee exposure exceeds these PELs for any metal or other hazardous substances. Appropriate engineering controls such as ventilation may include a local exhaust hood or booth or portable local exhaust, such as a "snorkel" exhaust system. Where ventilation or other engineering solutions are not completely effective or are not feasible, employees must wear PPE (e.g., respiratory protection) to reduce their exposures to below the PEL.

Eye protection, such as safety goggles or a welder's mask with appropriate shaded lenses must also be worn by employees that perform welding or cutting activities (see 29 CFR 1910.133 for a list of appropriate shade numbers for welding and cutting tasks). Employers should ensure that a competent person inspects all work areas where hot work will be done and should also ensure that employees are capable of recognizing and avoiding hazardous situations. Note, a competent person is an individual who through training or experience is capable of recognizing hazards in the surroundings or working conditions and of identifying appropriate controls.

Case History #5
A 29-year-old scrap metal cutter died from injuries sustained in an explosion. At the time of the incident, the victim had been cutting a vehicle frame for salvage with a torch. He was working 8-to-10 feet from a 1,500-gallon storage tank. Escaping vapors from the tank were ignited by spatter from the cutting activities, causing the tank to explode. The victim was engulfed in flames, igniting his clothing and causing burns over 45% of his body. The coworker extinguished the victim's burning clothing and helped him walk to the company's shop building. (NIOSH FACE, 98AK021)

Preventive/corrective measures: A competent person should inspect all work areas where hot work will be performed prior to the start of the operations. All flammable and combustible materials should be removed from the area. If flammable or combustible materials cannot be removed from the area, employers must ensure that proper steps are taken to isolate the flammable or combustible material from the heat generated by the torch.

Applicable Standards

- 29 CFR 1910.106, *Flammable and combustible liquids*
- 29 CFR 1910.132, *General requirements*
- 29 CFR 1910.133, *Eye and face protection*
- 29 CFR 1910.134, *Respiratory protection*
- 29 CFR 1910.135, *Head protection*
- 29 CFR 1910.136, *Occupational foot protection*
- 29 CFR 1910.137, *Electrical protective devices*
- 29 CFR 1910.138, *Hand protection*
- 29 CFR 1910.147, *The control of hazardous energy (lockout/tagout)*
- 29 CFR 1910.212, *General requirements for all machines*
- 29 CFR 1910.219, *Mechanical power-transmission apparatus*
- 29 CFR 1910.242, *Hand and portable powered tools and equipment (general)*
- 29 CFR 1910.243, *Guarding of portable powered tools*
- 29 CFR 1910.244, *Other portable tools and equipment*
- 29 CFR 1910.252, *General requirements (Welding, Cutting, and Brazing)*
- 29 CFR 1910.253, *Oxygen-fuel gas welding and cutting*
- 29 CFR 1910.1000, *Air Contaminants*
- 29 CFR 1910.1018, *Arsenic*
- 29 CFR 1910.1025, *Lead*
- 29 CFR 1910.1026 *Hexavalent Chromium*
- 29 CFR 1910.1027, *Cadmium*

Sources of Additional Information

- OSHA Safety and Health Topics: Welding, Cutting, and Brazing, http://www.osha.gov/SLTC/weldingcuttingbrazing/index.html
- OSHA Construction Safety and Health Outreach Program: Safety and Welding, http://www.osha.gov/doc/outreachtraining/htmlfiles/welding.html

Non-Gas Torch and Other Cutting

Materials that require higher temperatures to cut, such as pig iron and heat-resistant alloyed scrap, or materials that conduct heat too well to be cut with thermal torches, such as copper and bronze, may be cut with non-thermal methods such as plasma torches or powder cutting torches. These tools may also be used where a gas torch could pose a safety hazard, as discussed in the previous section. Plasma torches are often used for superconductors of heat or heat-resistant metals, such as alloy steels containing nickel and/or chromium (Nijkerk 2001). Plasma torches generate a large amount of smoke and noise, as well as ultraviolet (UV) and infrared (IR) light. Depending on the metal, this smoke could contain toxic fumes or dusts. A discussion on the potential chemical hazards and controls to reduce exposures to these hazards can be found in the "Recognizing and Controlling Hazards" chapter at page 16. However, where exposures exceed OSHA PELs, employers must install feasible engineering controls or work practices to reduce employee exposures such as providing well-ventilated areas for such operations. In addition, the employer should place appropriate barriers around the process to protect other nearby employees from exposure to the UV and IR light. Employees performing these tasks must use appropriate PPE such as respirators, goggles or face shields with appropriate shaded lenses, and hearing protection, to prevent exposure to smoke, fumes, light, and noise. See 29 CFR 1910.134 for OSHA's standard on Respiratory Protection, 29 CFR 1910.95 for OSHA's standard on Occupational Noise Exposure, and 29 CFR 1910.133 for OSHA's standard on Eye and Face Protection. Note, a list of appropriate lens shade numbers for welding and cutting tasks is also provided in 29 CFR 1910.133.

Employees using torches often spend long periods of time in awkward or hunched postures, which may increase the risk of bodily injuries such as strains and sprains. Other hazards common to cutting operations (as well as to welding and brazing) include burns, fires, explosions, electric shock, and heat stress. Even chemicals that are generally not flammable may burn readily when vaporized. Larger scrap metal objects are often broken apart using stationary shears, such as alligator shears used to cut apart short steel for foundries or to cut nonferrous metals. These machines can send small pieces of metal flying. Such flying object hazards may be controlled through the use of shields set up around the machines to protect employees. Eye protection and other body protection such as metal lined abrasion-resistant protective clothing may also be needed in some cases.

A larger concern than flying objects, however, is that the operator often works quite close to the machine and is subject to amputation or crushing hazards. In the early days of using shears, it was not uncommon for an employee to lose a finger or a hand to the shears, or to have a hand trapped between pieces of scrap that were fed into the shears. (Nijkerk 2001)

Hydraulic shears can be stopped instantly to prevent damage to the machine or operator, whereas mechanical shears transmit force from a flywheel to the shears and cannot be stopped quickly in an emergency. Hydraulic shears are, therefore, safer for the operator. Both types of shears, however, are still used in a variety of operations.

Modern alligator shears are often operated by a foot pedal that stops the shear immediately if released (Nijkerk 2001). Employers can also use controls such as wrist straps (attached to cables) to keep employees' limbs a safe distance from moving parts. One way to distance shears from the operator is to attach the shears to a crane. In this setup, the operator sits inside the cab of the crane and demolishes objects or cuts pieces of scrap metal from a safe location. If the metal scrap is being cut from a building or other object high off the ground, remote operation also eliminates the safety hazards associated with working at heights.

Hydraulic guillotine shears work similarly to alligator shears and pose similar hazards: employees must remain at a safe distance from the point of operation so that no limbs or other body parts could contact the cutting mechanism. Employers must install shields around stationary cutting areas to protect employees from flying objects.

When a tough or complex piece of scrap damages a machine, that machine may be more likely to malfunction and to pose a hazard to the operator and to other nearby employees. As a result, machines should have periodic inspections and should be maintained in proper working order. For all types of shears, employees must follow the company's established procedures for de-energizing energy sources and for lockout/tagout when performing servicing or maintenance tasks (see the OSHA Lockout/Tagout standard at 29 CFR 1910.147).

Case History #6

A 52-year-old welder was crushed to death by a hydraulic door on a scrap metal shredder. The victim was attempting to remove a jammed piece of metal from the hydraulic door when the incident occurred. Prior to removing the jam the victim did not lockout or de-energize the system. When the piece of metal was cut away, the hydraulic door, which was still under pressure, closed upward on the victim. (NIOSH FACE, 02CA004)

Preventive/corrective measures: Employees must follow lockout/tagout procedures to de-energize all equipment prior to cleaning or performing maintenance.

Applicable Standards

- 29 CFR 1910.147, *The control of hazardous energy (lockout/tagout)*
- 29 CFR 1910.212, *General requirements for all machines*
- 29 CFR 1910.218, *Forging*
- 29 CFR 1910.219, *Mechanical power-transmission apparatus*
- 29 CFR 1910.242, *Hand and portable powered tools and equipment (general)*
- 29 CFR 1910.243, *Guarding of portable powered tools*
- 29 CFR 1910.244, *Other portable tools and equipment*
- 29 CFR 1910.252, *General requirements (Welding, Cutting, and Brazing)*
- 29 CFR 1910.1000, *Air Contaminants*

Sources of Additional Information

- OSHA Safety and Health Topics: Welding, Cutting, and Brazing, http://www.osha.gov/SLTC/weldingcuttingbrazing/index.html
- OSHA Construction Safety and Health Outreach Program: Safety and Welding, http://www.osha.gov/doc/outreachtraining/htmlfiles/welding.html
- OSHA 3170, Safeguarding Equipment and Protecting Employees from Amputations

Baling, Compacting and Shredding

Scrap metal is often compacted using balers to promote efficient melting by allowing more metal into a furnace than would be possible for a random assortment of sheeting and other scrap objects. Balers use powerful hydraulic systems to compact scrap metal. Moving parts of balers must be shielded to prevent body parts from coming in contact with the machine. Car flatteners work on many of the same principles as balers and present similar hazards.

Balers are typically automated machines. This allows operators to stay a safe distance from the machinery, however, employees must still exercise caution when feeding raw material into a baler using a hopper or conveyor belt. Again, some sort of physical restraint such as railings may be appropriate to keep employees from falling onto these machines.

Some paper balers and shredders have sensors or heat detectors installed that react to human body heat and automatically stop all machine operations. For others, employees may wear magnetic or other devices on their belts that are linked to a safety interlock system (Nijkerk 2001). Systems such as these could be applied to some metal balers and shredders to provide additional protection to employees (both from metal and from contaminants in the scrap). Employees must be trained to understand the functioning and safety procedures of their equipment, and must follow procedures for adequate control of hazardous energy, particularly when performing maintenance procedures on equipment. (NIOSH FACE; 29 CFR 1910.147)

Case History #7
A 34-year-old laborer died after falling into an operating paper baler. The victim and a coworker were loading scrap paper into an automatically operated paper baler via a belt conveyor. The victim ascended to a platform located between the conveyor discharge and the feed chute of the paper baler to clear jammed material. Before ascending, the victim had asked the coworker to shut down the conveyor so that he could clear the jam. After shutting down the conveyor, the coworker turned away to get more paper. The victim fell into the baling chamber and the baler ram automatically activated. (NIOSH FACE, 9715)

Preventive/corrective measures: Employees must follow lockout/tagout procedures to de-energize all equipment prior to cleaning or performing maintenance. Employers must install guards on machinery to prevent any employees from contacting moving parts. Where access to process machinery is necessary, employers should consider installing standard railings using gates interlocked with the machine's control system. When the gates are opened, the machine will shut down.

For all equipment where pieces of scrap metal are fed into a machine directly, or using a hopper, or even via conveyor belt, employees must be trained in the proper use of the equipment. In addition, appropriate guards must be installed to prevent employees from coming into contact with hazardous moving parts of the machinery. This applies to the alligator and guillotine shears discussed above, and also to other similar machines such as rotary shears and rotary shredders. For such equipment, employees need to stay a safe distance away from working machinery and take adequate safety precautions to minimize risks. Employers must install shields to block stray pieces of metal scraps from flying out from these machines and employees must be trained to know what materials can or cannot be fed into the machine to prevent malfunctioning.

In addition to the physical hazards associated with baling, compacting and shredding, these processes also produce significant amounts of dusts. These dusts, if not controlled, can present both explosion hazards and inhalation hazards. Some ways to control these hazards include:

- Installing proper air cleaning systems on shredding machines.
- Installing explosion sensors where appropriate to inject water to suppress explosions.
- Operating machinery at lower speeds to reduce dust generation.
- Introducing an inert gas to rotary shears to reduce the risk of explosion. (Nijkerk 2001)
- Providing supplemental ventilation where needed and perhaps respiratory protection to protect employees from exposure to hazardous dusts.
- Using wet or semi-wet shredding processes.

Some scrap materials such as scrap vehicles or refrigerators may contain fuels or other materials that introduce additional hazards to the process. Operators must be sure to remove these materials before introducing the scrap to process machinery. For example, gasoline must be removed from the gas tank of scrap automobiles before compacting or shredding the automobile. In addition, chloroflourocarbons (CFCs) and ammonia must be removed from air conditioning systems to prevent employee exposure to these irritants and to prevent the release of these gases to the atmosphere. Removal of CFCs also applies to shredding of refrigerators.

Many of the processes above use large amounts of electricity to operate. Employees must be aware of the hazards of working in high-voltage environments and should take appropriate precautions. All equipment power systems must be covered with non-conducting covers that require a tool to remove. High-voltage areas must be protected to prevent access to unauthorized individuals. Employers must create a lockout/tagout program and train employees on proper implementation of these procedures.

Applicable Standards

- 29 CFR 1910.147, The control of hazardous energy (lockout/tagout)
- 29 CFR 1910.212, General requirements for all machines
- 29 CFR 1910.219, Mechanical power-transmission apparatus
- 29 CFR 1910.1000, Air Contaminants

Melting and Baking in Furnaces and Ovens

Many scrap metal recycling operations heat scrap pieces to high temperatures to separate different metal components, increase the purity of scrap, bake out non-metal substances, burn off contaminants, remove insulation from wire, or otherwise process the metal scrap (EPA 2001). This may be done using furnaces or ovens that use fuel or electrical heating sources.

Employees near operational furnaces are exposed to hazards even if they do not work directly with the furnace. Heating scrap will generate metal fumes if the furnace temperature is above the melting point of any of the metals in the furnace. In addition, hot pieces of metal could jump from the furnace, creating fire or burn hazards to nearby locations or people.

Similar to many of the processes already discussed, electrical furnaces use large amounts of electricity at high voltages to melt the metal scrap. Employees near these furnaces could face an electrocution hazard if they come into contact with a furnace in an unsafe manner. Employers must ensure that furnace refractories are kept in good condition and that employees follow electrical safety guidelines. Employers should ensure that there is sufficient room for employees to work safely in the vicinity of energized furnaces. For example, an employer may establish a maximum scrap metal size and weight for each type (and size) of furnace that they operate. (NIOSH FACE)

Furnaces generate smoke, dust, and metal fumes, depending on temperature and content. Combustion by-products may include sulfur and nitrogen oxides, and carbon monoxide and carbon dioxide. Organic compounds may be emitted as heating vaporizes oil and grease on scraps (EPA 2001). In addition, heating or burning of certain plastics (such as plastic-coated wiring) may release phosgene or other hazardous substances. Emissions from fluxing typically include chlorides and fluorides. The highest concentrations of ‘fugitive’ emissions (i.e., gases and vapors that escape from equipment) occur when the lids and doors of a furnace are opened during charging, alloying, and other operations (EPA 2001). Employers should ensure that workplaces are well-ventilated, consider the use of local exhaust ventilation during these operations, and that emissions from furnaces are filtered before the air is released outside the facility.

Afterburners can be used to control organic compounds, carbon monoxide, chlorides, fluorides, and hydrochloric acid; fabric filters can be used to control metal oxide dust, chlorides, fluorides, and hydrochloric acid; wet scrubbers can be used to control metal oxide dust, sulfur oxides and sulfuric acid mist; and electrostatic precipitators or fabric filters can be used to control particulate or other matter. These are used in different setups depending on the specific recycling industry. EPA (2001) discusses control methods for some recycling industries. For a full listing of hazardous air pollutants associated with some metal recycling processes, such as aluminum production, lead smelting, iron foundries and steel foundries, see EPA’s Emission Inventory Improvement Program (EIIP), Vol. II, Table 9.2-1. (EPA 2001)

For information on ventilation, refer to the “Examples of Engineering and Work Practice Control Techniques to Reduce Emissions” section at page 29.

Case History #8

A 22-year-old male foundry laborer was electrocuted when a piece of scrap metal he was loading into a damaged electric induction furnace became energized. The refractory had developed an unusual degree of cracking, and molten metal seeped out of the refractory and solidified. This material was in contact with the frame, but not the coil. Two employees lowered the scrap into the furnace, which already contained molten steel. The victim was resting his thighs on the top edge of the frame. The furnace was jarred, and presumably more molten metal was released through the cracks, completing the circuit between the coil and the contents of the refractory. Current passed through the piece of scrap, the victim's body, and to ground through the frame. (NIOSH FACE, 89OH43)

Preventive/corrective measures: Employers should institute a regular inspection and maintenance program for all of their equipment. When problems with equipment arise, the equipment should be tagged and removed from service until it is repaired.

Applicable Standards

- 29 CFR 1910.147, *The control of hazardous energy (lockout/tagout)*
- 29 CFR 1910.212, *General requirements for all machines*
- 29 CFR 1910.219, *Mechanical power-transmission apparatus*
- 29 CFR 1910.1000, *Air Contaminants*
- 29 CFR 1910.1018, *Inorganic Arsenic*
- 29 CFR 1910.1025, *Lead*
- 29 CFR 1910.1026, *Hexavalent Chromium*
- 29 CFR 1910.1027, *Cadmium*

Sources of Additional Information

- OSHA Construction Safety and Health Outreach Program: Safety and Welding, http://www.osha.gov/doc/outreachtraining/htmlfiles/welding.html
- EPA (2001) Emission Inventory Improvement Program (EIIP), Vol. II, Table 9.2-1.

Applying Chemical Processes to Recycle Metals

Chemical processes are also used in a wide range of metal scrap recycling industries as a means to separate scrap into its component metals, to clean scrap metal prior to using physical processes, to remove contaminants (such as paint) from scrap material, or to extract selected metals from a batch of scrap containing many metal types. Chemical processes may include high-temperature chlorination, electrorefining, plating, leaching, chemical separation, dissolution, reduction, or galvanizing. Each of these processes may present specific safety and health hazards associated with how the process is carried out, as well as specific material hazards associated with:

- The starting reagents for the process.
- The resulting forms of these materials following any reaction.
- By-products.
- Special cleaning agents.
- The equipment used for the process.

As with every hazardous chemical introduced into the workplace, all employees who are potentially exposed must be trained in the hazards associated with that chemical category. This requirement and other provisions of OSHA's Hazard Communication standard (29 CFR 1910.1200) are discussed in the "What You Need to Know about Hazard Communication" section of the "Recognizing and Controlling Hazards" chapter of this guide.

The most probable emissions from these processes include metal fumes and vapors, organic vapors, and acid gases. Other potential hazards may include high amounts of heat, splashing of caustic or otherwise hazardous chemicals, or combustion hazards. Employers should be knowledgeable about the processes that are used in their recycling operations and should refer to MSDSs to obtain specific information regarding potential exposure to any other substances used in recycling processes. Employers must comply with OSHA PELs. They may also want to consider other recommended exposure limits (such as National Institute for Occupational Safety and Health (NIOSH) Recommended Exposure Limits (RELs)) for the chemicals used or produced in these processes.

One common process involves the use of aqua regia solution to remove gold from gold-plated objects. Aqua regia is a mixture of two corrosive acids. This process emits acid fumes that are dangerous to inhale. Employers using aqua regia or similar solutions (cyanide may also be used) must implement feasible engineering controls, such as a fume hood to remove fumes from the workspace. Employers must also ensure that employees wear gloves and an apron to prevent skin or eye contact with the aqua regia solution. Not all glove and apron materials protect from all corrosive substances, so employers need to pay special attention to the capabilities of the PPE used. For additional information on PPE, refer to the "Personal Protective Equipment" section in the "Recognizing and Controlling Hazards" chapter of this guide.

After smelting or separation, metal may be refined in an electrolytic process in which anodes from the smelting process are placed in an electrolytic cell that contains a cathode and an electrolyte such as sulfuric acid; the metal is deposited on the cathode. In such operations, employees must be aware not only of the hazards posed by the acid used as the electrolyte and the metal involved but also of the hazards posed by the electrical system.

Applicable Standards

- 29 CFR 1910.147, *The control of hazardous energy (lockout/tagout)*
- 29 CFR 1910.212, *General requirements for all machines*
- 29 CFR 1910.219, *Mechanical power-transmission apparatus*
- 29 CFR 1910.1000, *Air Contaminants*
- 29 CFR 1910.1200, *Hazard Communication*

Recognizing and Controlling Hazards

How to Determine the Hazard Levels of Various Processes

Metal scrap recycling operations present a wide variety of hazards, including health hazards associated with chemical exposures and safety hazards associated with material processing operations and the equipment used in these tasks. This section discusses the metals that may present hazards to employees in recycling operations, the exposure routes through which employees may be exposed to that metal and the potential health effects from that exposure. This section also addresses other chemical hazards of special note (e.g., metalworking fluids and radioactive material), and discusses ways that employers and employees can identify and control these hazards. Finally, the section discusses some ways that employers and employees can decrease the risks of employee exposure to these hazards. There is little data available to describe the level of air contaminants associated with specific metal scrap recycling operations. Employers and managers need to analyze the levels of various hazardous substances directly, using personal and area monitoring devices to assess employee exposures. After doing this, employers must comply with all OSHA standards. Employers may also want to consider recommendations by NIOSH (i.e., RELs) to determine the need for additional controls (e.g., engineering controls, PPE).

Sources of Additional Information

- OSHA Safety and Health Topics: Sampling and Analysis, http://www.osha.gov/SLTC/samplinganalysis/index.html
- EPA Emission Inventory Improvement Program, Volume II, Chapter 9: Preferred and Alternative Methods for Estimating Air Emissions from Secondary Metal Processing. (EPA 2001)

Metals that OSHA Regulates

OSHA regulates the workplace exposure to many toxic metals and their oxides. These metals are listed in 29 CFR 1910.1000 along with employee exposure limits and include the following:

Table 1. OSHA-Regulated Toxic Metals

Aluminum	Hafnium	Silver
Antimony	Iron	Tantalum
Arsenic	Lead	Tellurium
Barium	Magnesium	Thallium
Beryllium	Manganese	Tin
Bismuth	Mercury	Titanium
Boron	Molybdenum	Uranium
Cadmium	Nickel	Vanadium
Calcium	Osmium	Yttrium
Chromium	Platinum	Zinc
Cobalt	Rhodium	Zirconium
Copper	Selenium	

OSHA also has comprehensive substance-specific standards for hexavalent chromium (29 CFR 1910.1026), arsenic (29 CFR 1910.1018), cadmium (29 CFR 1910.1027), and lead (29 CFR 1910.1025). Each of these standards establishes workplace PELs as well as specific requirements for personal monitoring, medical surveillance, engineering controls, respiratory protection, and training.

Many of these metals do not pose any hazard to people who handle objects containing the metal in everyday use. In fact, low levels of many of these elements are needed for the human body to function. However, hazards exist when these metals are ground, blasted, roasted, or melted and fumes or metal dusts are produced and distributed in the air. Each of these metals may create health hazards to employees recycling scrap that contains even trace amounts of that metal.

Employers can typically determine the level at which a metal (or other hazardous chemical) poses a hazard to employees by referring to the OSHA PELs listed in 29 CFR 1910, Subpart Z, Toxic and Hazardous Substances. Employers can obtain additional information on chemical hazards by referring to the NIOSH RELs listed in the NIOSH Pocket Guide to Chemical Hazards. Information on exposures associated with specific health effects of the OSHA-regulated toxic metals can be found in the references cited in this guidance document.

In cases where employees could be exposed to multiple hazardous metals or other hazardous substances at the same time or during the same workday, employers must consider the combined effects of the exposure in determining safe exposure levels. In such cases, employers must consult OSHA's standard, 29 CFR 1910.1000(d)(2), to determine how to apply exposure limits to exposure situations involving multiple hazardous substances.

Chemicals evaluated and found to be a suspected, anticipated, or known human carcinogen by authoritative scientific organizations, such as the National Toxicology Program (NTP) or the International Agency for Research on Cancer (IARC) may warrant special consideration at any level of exposure.

Employers must also rely on chemical manufacturers' data (such as MSDSs) when determining the hazards of workplace chemicals.

The remainder of this section discusses the health effects of selected commonly recycled metals that may be encountered during recycling operations. It also discusses where employees may encounter these metals. This discussion begins with a detailed description of six metals for which OSHA has provided comprehensive standards and/or guidance.

Applicable Standards

- 29 CFR 1910.19, *Special provisions for air contaminants*
- 29 CFR 1910.1000, *Air Contaminants*
- 29 CFR 1910.1018, *Inorganic Arsenic*
- 29 CFR 1910.1025, *Lead*
- 29 CFR 1910.1026, *Hexavalent Chromium*
- 29 CFR 1910.1027, *Cadmium*
- 29 CFR 1910.1200, *Hazard Communication*

Sources of Additional Information

- OSHA Safety and Health Topics: Toxic Metals, http://www.osha.gov/SLTC/metalsheavy
- OSHA Hazard Communication Web Page http://www.osha.gov/SLTC/hazardcommunications/index.html

What You Need to Know about Arsenic Exposure

The United States has not produced primary arsenic since 1985. All arsenic for domestic needs is imported, primarily from China (arsenic trioxide and arsenic metal) and Japan (arsenic metal). Historically, approximately 90% of the domestic use of arsenic was for chromated copper arsenate (CCA), a wood preservative that is now being phased out for residential uses due to concerns over toxicity. Some coal is rich in arsenic and arsenic is sometimes found in coal pollution. Arsenic compounds and arsenic metal are also used in electronics, pigments, and metal alloys, and are sometimes used in glassmaking. There is also limited demand for arsenic metal to be alloyed with lead and antimony for ammunition, solders, and other applications. (USGS 2001)

Arsenic may be found in contaminated workplace air resulting from smelting operations, in recycling facilities that deal with various nonferrous metal alloys, or with electronic semiconductors. Arsenic exposure can occur in the workplace through inhalation, ingestion, or dermal contact.

Exposure to high concentrations of arsenic can cause sore throats or irritated lungs. Breathing inorganic arsenic over long periods of time can cause damage to blood vessels and nerves in the hands and feet. Redness or swelling may result from skin contact with inorganic arsenic (ATSDR 2000a). Occupational studies have found increased risk of lung cancer among employees exposed to inorganic arsenic for many years. IARC and NTP classify inorganic arsenic as a known human carcinogen. (IARC 2006a; NTP 2004)

OSHA has a substance-specific standard regarding exposure to inorganic arsenic in general industry, 29 CFR 1910.1018. This standard sets a PEL of 10 $\mu g/m^3$ and outlines workplace requirements for the protection of employees from arsenic exposure including provisions for exposure monitoring, preferred methods for exposure control, written exposure control program, respiratory protection, protective work clothing and equipment, medical surveillance, and employee information and training.

Applicable Standards

- 29 CFR 1910.19, *Special provisions for air contaminants*
- 29 CFR 1910.1018, *Inorganic Arsenic*

Sources of Additional Information

- OSHA Safety and Health Topics: Toxic Metals, http://www.osha.gov/SLTC/metalsheavy/index.html
- ATSDR Toxicology Frequently Asked Questions (ToxFAQs), http://www.atsdr.cdc.gov/toxfaq.html

What You Need to Know about Beryllium Exposure

Beryllium is used in alloy forms, as a metal, and as beryllium oxide. Beryllium is mined from two minerals, beryl and bertrandite. The United States is one of three countries that process beryllium ores. Most of the beryllium is sold to the domestic market, in sectors such as communications and computers, automotive electronics, industrial components, and optical media. (USGS 2001)

The most likely place for employees to encounter beryllium is the processing of alloy metals containing beryllium (http://www.osha.gov/SLTC/metals heavy; http://www.osha.gov/SLTC/beryllium/index.html). Beryllium is often used as a metal in aerospace and defense applications, or as beryllium oxide in high-density electronics circuits (USGS 2001). Both of these sources may be recycled at some recycling plants. Beryllium is also used in copper and aluminum alloys and in sporting equipment such as golf clubs. Beryllium copper (a type of scrap metal that may contain high levels of beryllium) is processed by melting it in a furnace. Employees located near those furnaces may be exposed to beryllium fumes. Beryllium copper scrap is sometimes processed by other methods, such as chemical and electrolytic separation; thermal reduction and burning; melting and pyro-metallurgical separation; and milling (IPMI 2001). The melting process used for some other scrap metals may also generate fumes that can contain beryllium. (IPMI 2001)

Employees who breathe relatively low levels of beryllium dust and fumes may develop the lung ailment, chronic beryllium disease (CBD). CBD can develop over a few months or can take many years to develop. The disease occurs as a result of a person's immune system attacking beryllium present in the lung. These immune system cells attack the beryllium particles, leading to damage that can result in scar tissue in the lungs. This prevents the affected portion of the lung from functioning properly (Hathaway, Proctor, et al. 1991). There is no known cure for CBD (OSHA 1999b). Symptoms of CBD include persistent coughing, difficulty breathing upon physical exertion, fatigue, chest and joint pain, weight loss, and fevers. CBD only develops in employees sensitized to beryllium. A sensitized employee is an employee who has developed an allergic reaction to beryllium. Exposure to beryllium, possibly even below OSHA's PEL, may sensitize an employee to beryllium, placing that employee at elevated risk of CBD. (Bechtel 2001)

Many years ago, employees who breathed very high levels (>100 $\mu g/m^3$) of beryllium dust and fumes, even for a short period of time, developed acute beryllium disease (ABD). This disease rarely occurs in modern industry due to improved industrial protective measures designed to reduce exposure levels. ABD is caused directly by inflammation of the respiratory tract from irritation due to tissue exposure to beryllium itself. Symptoms associated with ABD include difficulty breathing, cough, and chest pain and occur much more rapidly than CBD symptoms. (Lang 1994) ABD may lead to death or respiratory illness similar to pneumonia.

Beryllium has been classified as a known human carcinogen by NTP and IARC (NTP 2004; IARC 2006a). Occupational studies reported excess lung cancer mortality among employees engaged in beryllium production and processing during the 1930s to 1960s. Exposure to large amounts of beryllium metal and beryllium compounds in the lungs of experimental animals has led to increased lung cancer. (ATSDR 2002)

As noted in the 1999 OSHA Hazard Information Bulletin, the current eight-hour time-weighted average (TWA) permissible exposure limit (PEL) of 2 $\mu g/m^3$ may not adequately prevent CBD among exposed employees (OSHA 1999c). Control of dusts or fumes is the main preventative measure. Industries that work with beryllium should consider their ventilation systems, employee PPE, and workplace monitoring for hazardous levels of beryllium. For additional control information, refer to the "How to Control Hazards" section of this guide.

Beryllium sensitization can be detected through the use of a blood test called the BeLPT, which stands for beryllium lymphocyte proliferation test. This test measures how specific white blood cells called lymphocytes react to beryllium. A confirmed positive test result means that an employee is sensitized (OSHA l999c). While it is not known whether everyone who is sensitized will develop CBD, many exposed employees who were confirmed positive with the BeLPT already had CBD or were diagnosed with the disease at a later time.

All employees who could potentially be exposed to beryllium in the workplace should be taught to recognize the following symptoms as possible signs of CBD: unexplained cough; shortness of breath; fatigue; weight loss or loss of appetite; fevers; and/or skin rash. These employees should also be encouraged to talk to their doctor or other health professional about CBD and getting a BeLPT blood test regardless of symptoms. (OSHA 1999c)

Applicable Standards

- 29 CFR 1910.1000, *Air Contaminants*
- 29 CFR 1910.134, *Respiratory Protection*

Sources of Additional Information

- OSHA Safety and Health Topics: Toxic Metals: Beryllium http://www.osha.gov/SLTC/beryllium/index.html
- 10 CFR Part 850, Chronic Beryllium Disease Prevention Program, Final Rule. (Department of Energy, 9 Feb. 2006)
- OSHA. Preventing Adverse Health Effects from Exposure to Beryllium, http://www.osha.gov/dts/hib/hib_data/hib19990902.html.
- IARC 1997, Beryllium and beryllium compounds, http://www.inchem.org/documents/iarc/vol58/mono58-1.html
- EPA 1998, Beryllium and compounds, http://www.epa.gov/iris/subst/0012.htm

What You Need to Know about Cadmium Exposure

The worldwide production of cadmium was approximately 19,400 tons/year in 2005. In the U.S., only three companies produced cadmium in 2006: one produced cadmium as a by-product of the smelting and refining of zinc while the other produced cadmium from scrap, primarily nickel-cadmium (NiCd) batteries. (USGS 2007)

Cadmium is a toxic metal commonly found in smelting operations. Cadmium hazards exist for recycling employees cutting apart pieces of metal scrap with gas torches, and employees near furnaces that melt such alloys. Overexposure to cadmium may occur even in situations where only trace quantities of cadmium are found in the raw material or in smelter dust or fumes.

Nickel-cadmium (NiCad) batteries are one of the main sources of scrap cadmium (USGS 2003). Recycling of large NiCad batteries, usually weighing over 2 kg, typically involves emptying the electrolytes from the battery and dismantling the battery (cutting off the tops). The cadmium plates are detached, washed, dried and then sent to a recycling facility where the cadmium would be loaded into the furnace. Cadmium in smaller batteries is typically recovered by burning off the castings and separators in a furnace. Exposures to cadmium in NiCad recycling operations typically are associated with work near the recycling furnaces.

Historically, cadmium was also used as a pigment in industrial paints and may present a hazard to employees when welding, cutting, or shredding scrap coated with cadmium-containing paints.

Cadmium emits a characteristic brown fume (CdO) upon heating, which is relatively non-irritating. Several deaths from acute exposure occurred in welders who welded on cadmium-containing alloys or worked with silver solder.

Short-term exposure to high concentrations of airborne cadmium may lead to metal fume fever with flu-like symptoms such as weakness, fever, headache, chills, sweating and muscle pain. Acute pulmonary edema (excess fluid in the lungs) usually develops within 24 hours, reaching a maximum in three days: if death due to asphyxiation does not occur, then symptoms may resolve within a week (http://www.osha.gov/SLTC/metals heavy; http://www.osha.gov/SLTC/cadmium/index.html).

Longer-term exposure to lower levels of cadmium may cause lung or prostate cancer, kidney damage, and hypertension. Cadmium is also believed to cause pulmonary emphysema, bone disease, and possibly anemia, teeth discoloration and loss of smell (http://www.osha.gov/SLTC/metalsheavy; ATSDR, 1999a). Cadmium is classified as a known human carcinogen by IARC and NTP (IARC 2006a;

NTP 2004). Additional information is available in Cadmium, OSHA Publication 3136.

OSHA has a substance-specific standard regarding exposure to cadmium in general industry, 29 CFR 1910.1027, that establishes a PEL of 5 μg/m^3. This standard also contains additional requirements for the protection of employees from cadmium exposure such as provisions for exposure monitoring, preferred methods for exposure control (including the use of separate engineering control limits (or SECALS) in selected operations), written exposure control plans, respiratory protection, protective work clothing and equipment, medical surveillance, and employee information and training. OSHA Publication 3136 provides additional details on these requirements.

Case History #9
A 36-year-old man was poisoned with cadmium fumes after smelting lead. Cadmium exposures can occur during lead processing since lead concentrates contain small amounts of cadmium which exist naturally in the environment. The patient developed pulmonary edema and died on the fifth day after exposure. (PIM 1990)

Preventive/corrective measures: All employers who use cadmium must monitor employees for exposure. In cases where employees are exposed above the PEL, employers must implement a full cadmium compliance program including provisions for engineering controls, warning signs, emergency plans, and PPE, among others.

Case History #10
An employee used an oxyacetylene torch to perform demolition work on a bridge which spanned a creek. He was assigned to salvage guardrails on the bridge and to also salvage a gauge shelter which was mounted on a platform next to the bridge. While wearing no respiratory protection, he spent the morning cutting anchor posts and bolts to remove the bridge rails; these were later found to be cadmium-coated. After lunch, he worked to remove the gauge shelter which was anchored to the platform on both an exterior and interior flange. Wearing no respirator, the employee entered the shelter and cut the bolts with the torch; these were galvanized. The employee felt ill after coming out of the shelter.

His condition continued to worsen; he was hospitalized two days later and died three weeks later. (OSHA IMIS)

Preventive/corrective measures: Employers are required to monitor employees' exposure to cadmium in all situations where employees may be exposed. If the monitoring indicates exposure to cadmium above the PEL, employers must implement a full cadmium compliance program including provisions for engineering controls, warning signs, emergency plans, and PPE, among others.

For additional details on control measures, refer to the "How to Control Hazards" section of this guide, at page 28 or to the OSHA website section on Toxic Metals.

Applicable Standards
- 29 CFR 1910.1027, *Cadmium*
- 29 CFR 1910.19, *Special provisions for air contaminants*

Sources of Additional Information
- OSHA 3136, Cadmium http://www.osha.gov/Publications/osha 3136.pdf
- OSHA Safety and Health Topics: Toxic Metals, http://www.osha.gov/SLTC/metalsheavy/index.html

What You Need to Know about Hexavalent Chromium Exposure

Chromium exists in several physical states; the most common states are chromium metal (Cr0), trivalent chromium (CrIII) and hexavalent chromium (CrVI). Chromium (in its various states) has a wide range of uses in metals, chemicals, and refractories. Chromium metal is principally used to produce stainless steel, alloy steels, and other nonferrous alloys to improve structural and anticorrosive properties. (USGS 2005)

Hexavalent chromium and trivalent chromium compounds are often used in electroplating of metals and plastic substrates to improve corrosion resistance. Chromates (CrVI) are also used as pigments in paints, plastics, dyes and inks to impart corrosion resistance, heat stability, color and other qualities. Other major industrial uses of hexavalent chromium containing compounds are in catalysts, as a wood preservative, and as a chemical intermediate to produce chemicals for leather tanning. (OSHA 2006)

Employees in the metal recycling industry can be exposed to hexavalent chromium when chromium-containing materials are heated such as during melting or welding of chromium alloys such as stainless steel or a substrate with chromium protective coating.

The major illnesses associated with occupational exposure to hexavalent chromium are lung cancer, nasal septum ulcerations and perforations, asthma, skin ulcerations and allergic and irritant contact dermatitis (OSHA 2006). Hexavalent chromium is classified as a known human carcinogen by IARC and NTP. (IARC, 2006a; NTP 2004)

OSHA has a substance-specific standard regarding exposure to hexavalent chromium in general industry, 29 CFR 1910.1026, that establishes a PEL of 5 μg/m^3. The standard also includes provisions for employee protection such as preferred methods for exposure control, respiratory protection, protective work clothing and equipment, housekeeping, medical surveillance and communication of hazards.

Applicable Standards
- 29 CFR 1910.1026, *Hexavalent Chromium*

Sources of Additional Information
- OSHA Safety and Health Topics: Hexavalent Chromium http://www.osha.gov/SLTC/hexavalent chromium/index.html
- OSHA 3320, Small Entity Compliance Guide for the Hexavalent Chromium Standards http://www.osha.gov/Publications/OSHA_small_entity_comp.pdf
- ATSDR Toxicology Frequently Asked Questions (ToxFAQs), http://www.atsdr.cdc.gov/toxfaq.html

What You Need to Know about Lead Exposure

The United States is the world's third-largest primary producer of lead. Eighty percent of the lead ore mined domestically comes from Missouri. In 1993, the lead industry employed 600 employees in primary smelting and 1,700 employees in secondary smelting and refining.

Lead is used primarily in batteries. Other uses include ammunition, sheathing on electrical cables, and for corrosion resistance and color characteristics (as pigments) in paints.

Lead is the most recycled metal, when compared to percentage output (ISRI NDc) with the U.S. as the world's largest recycler of lead scrap. Most recycled lead comes from batteries where the primary process involves breaking and smelting used batteries. (EPA 1995)

The lead in used batteries is often in the form of lead oxide, which easily forms inhalable particles. When working with old batteries, employees should also be aware of the corrosive acid contaminated with lead (Washington 2002). Lead-acid batteries are processed by:
- Draining the acid.
- Dismantling the battery using hammer mill and grinding.
- Washing and tumbling.
- Treating individual components by desulfurization.
- Feeding this to a blast furnace or electric reduction furnace to recover raw lead. (USGS 1999)

OSHA has developed the Secondary Lead Smelter eTool (http://www.osha.gov/SLTC/etools/leadsmelter) to describe ways to reduce lead exposure to employees in lead smelting plants, with sections that focus on Raw Materials Processing, Smelting, Refining and Casting, Environmental Controls, and Maintenance. Many of the discussions that this eTool provides on smelting and processing of lead should give insights into hazards that may be encountered by employees that deal with lead scrap recycling.

Secondary processing of lead battery scrap and other materials recycled with that scrap typically produce air emissions containing other hazards including sulfur dioxide and particulate matter containing lead and cadmium (EPA 1995). For further information on the potential hazards from exposure to cadmium, refer to the "What You Need to Know about Cadmium Exposure" section of this guide.

Recyclers may also encounter lead when working with scraps coated with paints containing lead (especially scraps originating from bridge dismantling and rehabilitation and shipyards). Lead dust can be created by grinding, cutting, drilling, sanding, scraping or blasting surfaces coated with lead paints. Lead fumes can be created by using heat guns or other heating techniques to remove paint from surfaces, or by using heated cutting tools to cut through painted metal. (NYSDOH 2001)

Lead is also recycled from solder, cable covering, building construction materials, and residues and drosses from smelter-refinery operations (USGS 2001). Employees may be exposed to lead during any of these processes.

Overexposure to lead is one of the most commonplace overexposures in industry. OSHA has established the reduction of lead exposure as a high strategic priority. Lead is a systemic poison and overexposure to lead can damage blood-forming, nervous, urinary, cardiovascular and reproductive systems and may cause cancer (ATSDR 1999b, Navas-Acien 2007). Lead accumulates in the body over time and remains in the blood for a month, in organs for several months, and in bones for years (NYSDOH 2001). Lead affects:

- the brain and nervous systems
- reproductive capabilities
- kidneys
- cardiovascular system
- the digestive system
- the ability to make blood

Inorganic lead is classified as a reasonably anticipated human carcinogen by NTP and as a probable human carcinogen by IARC. (NTP 2004; IARC 2006b)

Early signs of lead poisoning include:

- tiredness
- headache
- metallic taste in the mouth
- poor appetite

Later signs include aches or pains in the stomach, constipation, muscle and joint pains, and memory problems. (NYSDOH 2001)

Employees who may have been exposed to lead should talk to a doctor or other health professional. Your doctor may order a blood lead test which will measure the body's lead levels.

OSHA has a substance-specific standard regarding exposure to lead in general industry, 29 CFR 1910.1025. This standard establishes a PEL of 50 $\mu g/m^3$ and includes additional employee protection provisions such as preferred methods of control, protective work clothing and equipment, housekeeping, hygiene facilities and practices, medical surveillance and employee training.

Lead poisoning is a topic of extreme concern in the medical community. Employees that encounter lead at work must take precautions so that they do not accidentally take lead dust into their homes through contaminated workplace shoes or clothes. For example, employees must not be allowed to leave the facility wearing the clothes that they wore during their work shift, which may be contaminated with lead dust.

Applicable Standards

- 29 CFR 1910.1025, *Lead*
- 29 CFR 1910.19, *Special provisions for air contaminants*

Sources of Additional Information

- OSHA, Lead: Secondary Smelter eTool, http://www.osha.gov/SLTC/etools/leadsmelter/index.html
- OSHA Safety and Health Topics: Toxic Metals, http://www.osha.gov/SLTC/metalsheavy/index.html

What You Need to Know about Mercury Exposure

The United States relies on recycled material and imports to meet its mercury needs; no U.S. mine has recovered mercury as its main product in over a decade. Some domestic companies recover mercury as a by-product of other metals. Several companies recover and refine mercury; the largest end uses for this mercury are the production of chlorine and of caustic soda. (USGS 2002)

Mercury is typically used in electrical applications such as thermometers and other gauges, valves, switches, batteries, and high-intensity discharge lights; it is used in amalgams for dentistry, in preservatives, in pigments, catalysts, and lubricating oils, and in heat transfer technology. The most common environments where exposure is likely to occur are during production and transportation of mercury, and mining and refining of gold and silver ores (http://www.osha.gov/SLTC/metalsheavy/index.html). Mercury and its compounds exist in three general forms; elemental (metallic) mercury, inorganic mercury, and organic mercury.

Mercury may be present in any industry that works with mercury or with materials that contain trace amounts of mercury. Recycling of mercury lamps is one industry that is at risk for exposure to mercury. Emissions testing in 1999 showed that facilities that process steel scrap could be a large source of mercury emissions (Sastry et al. ND). Other sources include electronic devices such as rectifiers, switches, thermostats, relays; thermometers; dental amalgams; and catalysts used in the production of chlorine and caustic soda (USGS 2001). Employees may be exposed to mercury when smelting metals that contain trace levels of mercury, or when smelting involving processes that use mercury. Employees could also be exposed to mercury when collecting or otherwise processing gauges containing mercury.

Exposure to high levels of metallic, inorganic, or organic mercury can permanently damage the brain, kidneys, and developing fetus. Mercury's effects on brain functionality may result in changes in mood or personality (such as irritability or shyness), tremors, changes in vision or hearing, and memory problems. Short-term exposure to high levels of metallic mercury vapor may cause adverse effects including lung damage, nausea, vomiting, diarrhea, increases in blood pressure or heart rate, skin rashes, and eye irritation. (ATSDR 1999d)

In addition to the OSHA PEL for mercury (29 CFR 1910.1000, Table Z-2), OSHA has published guidelines in CPL 02-02-006, Inorganic Mercury and its Compounds, for protecting employees from occupational exposure to inorganic mercury. These guidelines provide suggestions for exposure monitoring, medical surveillance, training, PPE, housekeeping, and personal hygiene facilities and practices. (OSHA 1978, 1985)

Case History #11

A college chemistry professor spilled a few drops of dimethyl-mercury on the back of her gloved hand while the chemical was being transferred between containers. She promptly cleaned up and did not think any more about it. This was the only time the material was handled outside of a closed container.

The first symptoms did not occur until two months later, and they were ascribed to gastroenteritis. Neurological symptoms appeared after an additional two months, and she died five months later of organic mercury poisoning.

A lapse time between exposure and the appearance of symptoms is characteristic of alkyl mercury poisoning. The amount of the chemical that was absorbed into the professor's body was estimated to be less than one-tenth of a milliliter (approximately 300 mg), or the equivalent of a single small droplet.

Dimethyl-mercury is absorbed through the skin and is potentially lethal in small doses. Exposure appeared to have occurred through the employee's gloves. This death by organic mercury poisoning was directly attributable to use of the wrong type of glove material for the chemical involved. (OSHA IMIS)

Preventive/corrective measures: Employees must be trained in proper selection and use of PPE (in this case, the correct type of gloves) and must be required to use this PPE when handling hazardous substances. Employees that believe they have been exposed to any level of hazardous materials should report the suspected exposure to their employer and seek medical attention promptly.

Case History #12

An employee was told to clean up some mercury that had spilled out of a device. Three days later he went to an emergency room for neurological problems. After two more days, he was moved to another medical facility for further treatment. (OSHA IMIS)

Preventive/corrective measures: Employees must be trained in proper spill cleanup procedures, including proper selection and use of PPE when handling hazardous substances. If regular employees are unable to effectively and safely manage potential spills, the employer must either evacuate the area or have an emergency response plan in place to manage uncontrolled spills or other releases. Employees who believe that they have been exposed to hazardous substances should inform their employer and promptly seek medical attention.

Applicable Standards

- 29 CFR 1910.132, *Personal Protective Equipment, General Requirements*
- 29 CFR 1910.134, *Respiratory Protection*
- 29 CFR 1910.1000, *Air Contaminants*

Sources of Additional Information

- OSHA Safety and Health Topics: Toxic Metals, http://www.osha.gov/SLTC/metalsheavy/index.html
- OSHA Safety and Health Topics: Emergency Preparedness and Response, http://www.osha.gov/SLTC/emergency preparedness/index.html
- ATSDR Toxicology Frequently Asked Questions (ToxFAQs), http://www.atsdr.cdc.gov/toxfaq.html
- OSHA (1978) CPL 02-02-006 Inorganic Mercury and its Compounds
- OSHA (1985) CPL 02-02-006 CH-1 Removal of Obsolete Sections

What You Need to Know about Exposure to Other Metals

OSHA has published extensive information on arsenic, beryllium, cadmium, hexavalent chromium, lead, and mercury. In addition to these metals, employers should also limit employee exposure to all other hazardous metals handled or processed in metal scrap recycling operations. This section of the guide discusses additional metals for which OSHA and other agencies have collected health information. The section also notes some of the common processing techniques for those metals, where information was available.

The current PELs for each of the metals discussed in this section can be found in 29 CFR 1910.1000, Table Z-1 or Z-2. NIOSH has recommended exposure limits for a number of these metals. The NIOSH RELs can be found in the NIOSH Pocket Guide available online at http://www.cdc.gov/niosh/npg/default.html. These exposure limits are summarized in Appendix A of this guide.

Aluminum is one of the most commonly recycled metals and can be hazardous to employees in recycling operations. Scrap aluminum mostly comes from recycled used beverage cans (UBCs), which account for over half of the recycled aluminum supply. The other main source is diecasts, which are mostly from the automobile industry (USGS 2001). Employees who process aluminum scrap might be exposed to high levels of aluminum dust in workplace air during pre-processing steps that involve crushing and/or shredding and drying. Aluminum may cause respiratory problems, including coughing and possibly asthma from breathing dust, and it may also cause skeletal problems in those with poor kidney function. High levels of aluminum were found in people with Alzheimer's disease, but it is not known whether the aluminum is a cause of this disease. (ATSDR 1999c)

Antimony is derived primarily from the recycling of lead-acid batteries (USGS 2002). It may be found in the air near industries that process or release it, including smelters, coal-fired power plants, and refuse incinerators. Occupational overexposure to antimony has been reported to result in eye and respiratory tract irritation, chronic lung disease, and possibly cardiovascular and gastrointestinal effects. (ATSDR 1992a)

Cobalt exposure may be a problem for employees who make or use grinding or cutting tools, or that refine or process cobalt metals, or that use cobalt or produce cobalt alloys. Cobalt is typically processed in an electric arc furnace operating under reducing conditions to adjust cobalt's chemical composition, or by roasting of spent catalysts, chlorination or leach milling, or by other chemical processes (USGS 1999; Jones 1998). Most recycled cobalt comes from used catalysts from the petroleum and chemical industries, cemented carbides used in cutting and wear-resistant applications, rechargeable batteries, superalloys, magnetic- and wear-resistant alloys, and tool steel (USGS 2001). Occupational overexposure to cobalt can result in respiratory irritation, chronic lung inflammation and pulmonary fibrosis. Possible cardiac and neurological effects have also been reported. Skin contact can cause an allergic contact dermatitis (ATSDR 2004a). IARC has classified metallic cobalt containing tungsten carbide as probably carcinogenic to humans and other cobaolt compounds as possibly carcinogenic to humans. (IARC 2006c)

Copper may be present in dust in industries that grind or weld copper metal. Direct metal scrap (primarily alloy scrap) is the main source of copper scrap, with other copper scrap coming from copper smelters and refiners, brass mills, brass and bronze ingot makers, aluminum and steel alloy producers, foundries, and chemical plants (USGS 2001). Employees might breathe, or have skin contact with this dust. Occupational overexposure to copper dust can irritate the eyes, nose and lungs and possibly lead to gastrointestinal disturbance. (ATSDR 2004b)

Iron and steel are used in construction and industrial uses including vehicles, bridges, machinery, tools, buildings, containers, highways, and appliances. The primary source of obsolete steel is automobiles (USGS 2001). Steel is often coated with aluminum, chromium, lead-tin alloy, tin, or zinc (refer to the sections on those metals for information on their hazards). Steel mills melt scrap in electric arc furnaces or basic oxygen furnaces, or in blast furnaces (USGS 1999). Iron oxide is a red-brown fume with a metallic taste that can affect the respiratory system and damage the lungs after breathing high concentrations over many years. (http://www.osha.gov/SLTC/metalsheavy). Exposure to iron pentacarbonyl is acutely toxic and can cause acute lung damage (http://www.osha.gov/dts/chemicalsampling/data/CH_247500.html), however, this form of iron may not be commonly encountered in recycling operations since it is used as a chemical intermediate or catalyst and, therefore, is not in the final products. (ISP, ND)

Manganese is ubiquitous throughout the various grades of steel (averaging 0.7% manganese), and can also be found as a component in certain aluminum alloys. The main material recycled for its manganese content is high-manganese (Hadfield) steel, otherwise manganese is mostly recycled incidentally when recycling steel and aluminum (USGS 2001). Manganese exposures can occur during operations at steel and aluminum recycling facilities which consist of segregating scrap by content and cutting up bulky pieces as well as the melt and refining processes (USGS 1999). Short-term exposure to high levels of manganese can result in respiratory tract irritation and inflammation of the lungs. Manganese exposure, at high levels over a longer period of time, can cause manganism, a set of Parkinson-like symptoms that include mental and emotional disturbances, difficulty walking, and slow and clumsy body movements. Long-term exposure to manganese at lower levels may cause deterioration of certain motor skills (such as holding hands steady or performing fast movements) and balance. (ATSDR 2000c)

Molybdenum is mostly recycled from catalysts. Molybdenum is also found in alloy iron and steel scrap, where it is recycled to produce steel products (USGS 2001). Employees can be exposed to molybdenum dust during the processing of scrap which involves cutting, cleaning, and baling, and possibly calcining, drying, leaching, precipitation, and separation. Roasting, crushing, and abrading may be used in preparation for melting (USGS 1999) (http://www.osha.gov/SLTC/metalsheavy).

Nickel may be present as fumes or as dust in industries that process nickel scrap. Nickel is used in stainless steel, copper-nickel alloys, aluminum alloys, and nickel-based alloy, and is used in electroplating and welding products. Employees may be exposed to nickel by breathing fumes, by ingesting dust, or via skin contact. Other sources include emission control dusts, swarf, grindings, mill waste, and waste from the stainless steel industry (USGS 2001). Skin exposure to nickel dust can cause an allergic contact dermatitis, often at the skin site where the contact occurred. Some occupational studies of employees exposed to nickel compounds have found increased risk of lung and nasal cancer among employees (ATSDR 2005a). Most nickel compounds are classified as known human carcinogens by IARC and NTP (IARC 2006a; NTP 2004). Employees who inhale large amounts of nickel may suffer from inflammation of the respiratory tract, chronic bronchitis or reduced lung function. (ATSDR 2005a)

Selenium may be present in the air at some metal processing facilities typically as elemental selenium or selenium dioxide. Selenium uses are: as a substitute for lead in plumbing when alloyed with bismuth and in electronics including rectifier and photoelectric applications (USGS 2001). Occupational overexposure to selenium may lead to eye, skin, respiratory tract irritation, bronchitis, and breathing difficulties. (ATSDR 2003)

Silver is used in solder, which may be found with many types of scrap metal. Silver is found in photographic plates and solutions, and in silver recovery cartridges (VADEQ 2001). Other large sources of scrap silver include jewelers' sweepings, catalysts, electronic scrap, and other metal materials (USGS 2001). Exposure to high levels of silver for a long period of time may result in argyria, which is a blue-gray discoloration of skin and other body tissue. Argyria is permanent but it does not have any known health effects. Lower levels of silver exposure can also cause silver deposition in areas of the body. A study found that 21% and 25% of silver reclamation employees exhibited conjunctival and corneal argyrosis, respectively, and that 74% of the subjects exhibited some degree of internal nasal-septal pigmentation. The route of exposure may have been direct absorption by the eyes. No association was observed between these depositions and decreased visual ability (ATSDR 1990). Exposure to high levels of silver can also cause breathing problems, lung and throat irritation, and stomach pain. In some people, skin contact with silver can cause allergic reactions such as rashes, swelling, and inflammation.

Tin is recycled from can-making facilities, brass and bronze plants, and soldering operations (USGS 2001). De-tinning involves removal of tin from new or old tinplate scrap by immersion in a heated sodium hydroxide solution, a batch process that reverses the tin electroplating process (USGS 1999). Employees could potentially have airborne exposures from fumes and dermal exposures from material handling. Inorganic tin compounds typically enter and leave the body rapidly and they do not usually cause harmful effects. Overexposure to organic tin compounds can cause respiratory, eye, and skin irritation and interfere with the normal operation of the nervous, endocrine, and reproductive systems. (ATSDR 2005b)

Vanadium may be present as a vapor or particulate in air at facilities that work with scrap metal containing vanadium. Vanadium is primarily an alloying element generally less than 1%; the main supply of vanadium scrap for recycling comes from used catalysts (USGS 2001). Overexposure to vanadium can cause harmful health effects to the respiratory tract (such as lung irritation, inflammation, and bronchitis), and can irritate the eyes (ATSDR 1992b). Vanadium pentoxide is classified as a possible human carcinogen by IARC. (IARC 2006c)

Zinc is found as dust or fumes in air at manufacturing sites, and at recycling sites. The chief sources of zinc scrap are brass, die casting scrap, flue dust, zinc sheet, galvanizing residues, and zinc die casts (USGS 2001). Zinc is processed by boiling secondary zinc alloys and then capturing the purified zinc in a distillation column, or by casting galvanized residues into slabs, melting the slabs in furnaces and then condensing the zinc fumes. A more recent process involves dissolving the zinc coating from scrap in a hot caustic solution and then recovering the zinc from the solution using an electrolyte process (USGS 1999). Some zinc is needed for proper body function, but high levels may be hazardous. Breathing large amounts of zinc can cause metal fume fever, which is thought to be an immune response that affects the lungs and body temperature. (ATSDR 2005c)

Applicable Standards

- 29 CFR 1910.1000, *Air Contaminants*

Sources of Additional Information

- OSHA Safety and Health Topics: Toxic Metals, http://www.osha.gov/SLTC/metalsheavy/index.html
- ATSDR Toxicology Frequently Asked Questions (ToxFAQs), http://www.atsdr.cdc.gov/toxfaq.html

What You Need to Know about Radioactive Scrap

Scrap recycling industries may encounter radioactive metal scrap (Nijkerk 2001). This scrap could consist of scrap from decommissioned nuclear power plants (steel, galvanized iron, copper, Inconel, lead, bronze, aluminum, brass, nickel, precious metals), industrial and research irradiator activities, teletherapy, industrial radiography, medical equipment, gauges, logging, and pipes from the potash industry (Legare ND), or from other sources.

Radioactive materials may pose adverse health effects to employees, including cancer. Employees could be exposed to radioactive material or dust when contaminated materials are crushed or ground. If radioactive materials or objects are smelted, sealed sources of radioactivity may rupture and release their radioactive contents. Radioactive scrap in an uncontrolled setting in a processing facility may cause problems with the machinery, and require an extensive cleanup effort and possible temporary shutdown of the facility.

To detect radioactive material when it enters the recycling facility, employers can install a radiation monitoring system to detect gamma radiation emitting from source materials. These systems are expensive to purchase and expensive to calibrate and maintain. It is also possible to monitor incoming material with hand-held radiation detection devices which can monitor for alpha, beta, and gamma radiation, but these devices may be less sensitive and they require more operator skill. (Smith ND)

Fixed radiation-monitoring systems are generally installed at the loading area of a scrap facility, typically at the weigh bridge. Factors such as the type of radiation emitted, the distance from monitors, shielding, and background radiation may affect the ability of the monitoring systems to register all radioactivity. It may be necessary to install multiple fixed radiation-monitoring systems to monitor the same batch of scrap metal; common locations to install such systems are at the shredder or furnace entry, or at a conveyor or sorting station. (Legare ND)

Employers should work with their suppliers to ensure that no radioactive materials are delivered and should also install radiation detectors as appropriate. Working with radioactive materials can cause various types of cancer. There are no early warning signs for cancer. Exposure to large doses of radiation could also lead to acute radiation syndrome which includes nausea, vomiting, diarrhea, bleeding, coma, and even death. Employers must communicate the hazards of radioactive materials to employees and should set clear instructions on how to remove any radioactive materials that are discovered.

Applicable Standards
- 29 CFR 1910.1096, *Ionizing radiation*

What You Need to Know about Metalworking Fluids

Metalworking fluids (MWFs), or sometimes called machining fluids, are "fluids used during machining and grinding to prolong the life of the tool, carry away debris, and protect the surfaces of workpieces. These fluids reduce friction between the cutting tool and the work surface, reduce wear and galling, protect surface characteristics, reduce surface adhesion or welding and carry away generated heat." (NIOSH 98-116). Employees are unlikely to encounter MWF in conjunction with the scrap metal they process, however, they may encounter MWF in the course of using various heavy machinery (such as hydraulic shears) to cut apart pieces of scrap metal. MWFs may contain toxic substances; skin exposure to MWF in liquid forms, or breathing in vapors/mists from MWF, can cause dermatitis, acute and chronic respiratory disease, skin cancer and other cancers (OSHA 1999a). Precautions for working with MWF include ventilation, PPE, and training for relevant procedures. Similar precautions apply to solvents used for cleaning metal scrap prior to processing.

Applicable Standards
- 29 CFR 1910.1000, *Air Contaminants*

Sources of Additional Information
- OSHA Safety and Health Topics: Metalworking Fluids, http://www.osha.gov/SLTC/metalworking fluids/
- NIOSH 98-116, What You Need to Know About Occupational Exposure to Metalworking Fluids

What Other Hazards You Should Know About

In addition to the toxicological hazards discussed in the preceding sections, employees may face hazards from trace metals mixed into the scrap, or from materials and chemicals associated with the scrap such as gasoline in old cars, flammable and hazardous plastics surrounding cables, paint on used beverage cans, or from metalworking fluids used to process metals. Some metals are processed by oxidation/reduction or other chemical processes which may release harmful gases or harmful gaseous forms of the metal being processed.

The equipment used to process scrap metal may include physical processes that cut, slice, compact, shred, or perform other operations. These pose hazards to machine operators and those who work in close proximity to machine points of operation.

In addition, employers must also consider:
- Fire hazards from flammable metals or other substances.
- Explosion hazards from gas canisters, tanks, or cylinders, or from particles in the air.
- Injury from falling objects.
- Burns and scalding from hot air or hot materials.
- Other process-specific safety hazards such as amputation, acid burns, electrical hazards, confined spaces, etc.

Employers need to evaluate their metal scrap recycling operations to identify hazards present in their processes and to develop control measures. Employers should evaluate each piece of equipment to identify related hazards and to determine the best ways to control or eliminate hazards.

OSHA has guidance documents to assist you in considering many of these hazards.

Case History #13

An employee mixed sodium nitrate and aluminum out of sequence in a secondary lead smelter factory. As a result, the pot of lead exploded, burning and scalding 12 employees with molten lead. Five employees were hospitalized for more than one week. One employee died approximately 35 days after the accident as a result of the injuries he sustained. (OSHA IMIS)

Preventive/corrective measures: Employees should pay close attention to sequence when *mixing certain groups of chemicals. Employers should provide written procedures for conducting hazardous processes. Where possible, these processes should be conducted in isolated areas of the facility.*

Applicable Standards
- 29 CFR Subpart L, *Fire protection*
- 29 CFR 1910.106, *Flammable and combustible liquids*

How to Control Hazards

There are many ways to reduce the hazards the metal scrap recycling industry poses to employees. Engineering controls (for example, adding machine guards or barriers or installing ventilation, etc.) or work practice controls (such as establishing standard operating procedures or requiring the use of PPE) can place a safer distance between an employee and a potentially dangerous material or process. Employees must be protected (using engineering and work practice controls) from potentially harmful materials, and from the dust and fumes generated by these materials and the recycling processes. Workplaces should be well ventilated to remove dust and fumes from the air employees breathe. Employers must fully communicate the hazards of their operations to employees in such a way as to reduce those hazards.

Additionally, employers may need to conduct medical testing or medical surveillance to determine whether the exposure levels of certain metals and other substances have placed employees at risk. Medical surveillance is an important hazard prevention tool that can help employers detect and eliminate hazardous exposures that may be affecting employee health. Periodic medical testing is also important to help ensure prompt diagnosis and treatment of employees suffering adverse health affects related to exposures (http://www.osha.gov/SLTC/medicalsurveillance). Further information on medical screening and medical surveillance is available in OSHA 3162, Screening and Surveillance: A Guide to OSHA Standards.

The following sections outline some safety recommendations that are specific to certain operations, but many recommendations are common to a range of physical operations. Employers should become familiar with available resources on safety standards and safe work practices.

In all cases, employers must ensure that operators are fully trained to use their industrial equipment or vehicle and use caution during operation. Employers must ensure that defective equipment is removed from service until it has been repaired. Only trained employees should operate industrial equipment and vehicles.

Employers may need to design, develop and implement a comprehensive safety plan that includes, but is not limited to, analysis and control of vehicle- and machine-related hazards through use of a daily checklist. Equipment must be de-energized when employees are attempting to clean out fallen or jammed material. Employers must make sure that all electrically powered equipment complies with applicable electrical standards (29 CFR 1910 Subpart S).

Applicable Standards
- 29 CFR 1910 Subpart S *Electrical*
- 29 CFR 1910.1000 *Air Contaminants*

Sources of Additional Information
- OSHA 3162, Screening and Surveillance: A Guide to OSHA Standards
- OSHA 3170, Safeguarding Equipment and Protecting Employees from Amputations
- OSHA 2254, Training Requirements in OSHA Standards and Training Guidelines
- OSHA Safety and Health Topics: Machine Guarding, http://www.osha.gov/SLTC/machineguarding/index.html
- OSHA Lockout/Tagout eTool, http://www.osha.gov/dts/osta/lototraining/index.htm

Engineering Controls and Work Practice Controls

Engineering controls and work practice controls are the primary means by which an employer can attempt to reduce employee exposure to the hazards of toxic metal scraps and the equipment used to process those scraps.

Examples of engineering and work practice controls include:
- Enclosing processes where employees do not constantly need direct access to the machinery.
- Using product substitution to eliminate harmful substances.
- Installing an exhaust system to capture the airborne hazardous metal at the source.

- Installing guard devices at nip points where employees could come into contact with moving parts of machinery.
- Equipping all machinery with prominently-displayed and properly-functioning stop buttons, or a stop cable running the length of a conveyor belt or other equipment.
- Using explosion-proof electrical systems to reduce hazards associated with flammable materials or other combustibles.

Employers should also consider the use of alternate processes as a way to reduce hazards. For example, in some situations, employees can use other methods to cut scrap such as shears or power saws that may lower employee exposure to some toxic metals (e.g., hexavalent chromium) when compared to torch cutting. However, alternative methods such as saws and shears can still produce dust and noise and create certain safety hazards.

Work practice controls involve changing employee procedures and practices to reduce exposure to some substances. For example, employers may not allow employees to eat, drink, smoke, chew tobacco or gum in areas where hazardous chemicals are used or present. Both the lead and cadmium standards forbid eating or storage of food, consumption of tobacco products and application of cosmetics in regulated areas or areas where exposures have been measured above the PEL.

In addition to engineering and work practice controls, employers can implement administrative controls. For example, to reduce the number of employees at risk during a hazardous operation, an employer may consider performing the hazardous task during times when fewer individuals are present in the work area.

OSHA substance-specific standards for arsenic, cadmium, hexavalent chromium and lead contain provisions for change rooms and hygiene facilities such as showers and handwashing and luncheon facilities. Employers must also follow other requirements regarding clean surfaces; cleanup of spills and releases; and cleaning methods that minimize the risk of dispersing hazardous dust into the air. Refer to the specific OSHA standards for these metals for further information on these topics. Employers can also apply these controls for recycling operations that involve other metals to help minimize the possibility of spreading contamination beyond work areas.

Examples of Engineering and Work Practice Control Techniques to Reduce Emissions

Some common engineering control techniques to reduce emissions to the atmosphere include:

- Wet scrubbers for dust (particulate matter) and acid gases. Scrubbers work by passing the material through a liquid that absorbs the dust. Liquids are selected based on their ability to maximize pollutant removal.
- Thermal and catalytic incineration for organic compounds. Incineration uses burners and chambers to ignite fuel and to allow oxidation to occur.
- Cyclones, electrostatic precipitators (ESPs), and fabric filters, for filterable dust (EPA 2001). Cyclones work like centrifuges, spiraling incoming gases to cause heavier particulate matter to drop out of the air to a surface to be collected. Electrostatic precipitators use electrical static forces to collect particles out of a gas stream and onto collection plates. Fabric filters (baghouses) pass a gas stream through a porous fabric: the particles form a layer of dust that can be removed.

Other examples of common engineering controls:

- Adding machine guards or barriers.
- Local exhaust ventilation, which includes both portable ventilation systems and stationary hoods, is generally the preferred method to control emissions in the workplace. For example, cutters with local exhaust ventilation.

Employers should ensure that employees avoid prolonged skin contact with hazardous metals and other hazardous substances either through controlling fugitive emissions or providing appropriate PPE. In most cases, employers must not use compressed air to clean working surfaces or body parts. Ventilation is one of the main engineering controls used to control exposure to chemical hazards in the workplace. There are two basic types of ventilation systems used for this purpose: general exhaust ventilation which provides ventilation for an entire room or area and local exhaust ventilation which provides local exhaust at a specific work area or process.

General exhaust ventilation (i.e., dilution, ventilation) allows materials to be released into the general atmosphere of the workplace and then introduces uncontaminated air to reduce concentrations of dust or vapor to acceptable levels. General exhaust ventilation may be appropriate where:

- The contaminants released into the air constitute a low hazard.
- The contaminants are unlikely to settle.
- Emission is widely dispersed or uniform.

Local exhaust ventilation is designed to capture and remove hazardous dusts, vapors, or fumes at their source before they can enter the general work space. Local exhaust ventilation (such as chemical hoods) may be appropriate where the materials released pose a high hazard or are highly localized; where air does not already circulate adequately to eliminate the hazard; or where employees work in close proximity to the emission source.

Applicable Standards
- 29 CFR 1910.94, *Ventilation*
- 29 CFR 1910.1000, *Air Contaminants*
- 29 CFR 1910.1018, *Arsenic*
- 29 CFR 1910.1026, *Hexavalent Chromium*
- 29 CFR 1910.1025, *Lead*
- 29 CFR 1910.1027, *Cadmium*

Sources of Additional Information
- OSHA Safety and Health Topics: Ventilation, http://www.osha.gov/SLTC/ventilation/

Personal Protective Equipment

While engineering controls and work practice controls are the primary means of reducing exposure to hazardous chemicals and processes, they are not always completely effective. In such cases, PPE may be used to reduce employee exposure. OSHA requires the use of PPE to reduce employees' exposures to hazards when engineering and administrative controls are not feasible or effective in reducing these exposures to acceptable levels (29 CFR 1910, Subpart I). PPE may include respirators, coveralls or other full-body clothing, gloves, head coverings, boots, face shields, earplugs and vented goggles.

Employers are required to determine all exposures to hazards in their workplace, and to determine if PPE should be used to protect employees. Employers must provide PPE for their employees if the work environment or processes present a hazard or are likely to present a hazard to any part of an employee's body; or if an employee might come into contact with hazardous chemicals, radiation, or mechanical irritants; and potential exposure to these hazards cannot be eliminated through the use of engineering, work practice, or administrative controls.

A PPE program must identify and evaluate potential hazards in the workplace and indicate whether the use of PPE is an appropriate control measure. If PPE is required, the program must address selection, use, and maintenance procedures, as well as employee training and periodic reviews to evaluate its effectiveness in preventing employee injury or illness.

OSHA Publication 3151, *Personal Protective Equipment*, discusses PPE and the ways that employers and employees can identify hazards requiring PPE. For example, employees exposed to various safety hazards from operating heavy equipment may require adequate body protection including head and foot protection, gloves, durable clothing, hearing protection and safety glasses. Hazards from skin contact with materials can be addressed through the use of gloves and other protective clothing. A wide variety of chemical protective suits are available, and if such protection is needed employers must ensure that the suits used are appropriate for the materials of concern.

Some of the most significant hazards are associated with employee exposure to metal dust or fumes, so respiratory protection is a very important consideration. Respirators are required when exposures exceed the PEL and engineering and work practice controls are infeasible or insufficient. They may also be required in an emergency or in a designated regulated area.

Employers must provide respirators at no cost to employees, and ensure that respirators are used in compliance with applicable standards (29 CFR 1910.134). Respirators can be broken down into two general types, air purifying and supplied air. Air purifying respirators are typically tight fitting respirators that use replaceable filters to clean the air locally before the person breathes that air. They can have a facepiece that covers the whole face or one that just covers the mouth and nose. Supplied air respirators can be broken down into two categories, air-line respirators and self-contained breathing apparatus (SCBA). Air-line respirators connect the wearer's facepiece to a remote source of air either in a bottle or an air compressor. SCBA units supply air to users through an air tank worn on the user's back. Additional information on respirators is available in OSHA's Small Entity Compliance Guide for the Revised Respiratory Protection Standard, Publication 9071, available online at http://www.osha. gov/Publications/SECG_ RPS/secg_rps.html or http://www.osha.gov/Publications/secgrev-current.pdf

Employees using metalworking fluids or chemical baths to dissolve or clean metal scrap may be at added risk of hazardous chemicals spraying onto their bodies or heads and would need appropriate protection. Employees that use high-temperature gas torches need eye protection for flying pieces of scrap and for different types and intensities of light and possibly full-body protection from the extreme heat generated by some gas torches. Employees who weld or torchcut stainless steel must be informed of the hazards of hexavalent chromium that is generated in the process and can be inhaled with the fumes.

Employers must dispose of and/or properly clean, launder, repair, and replace PPE. Employees should not be allowed to take work clothing or equipment home or off the work site, and are prohibited from doing so under OSHA's Cadmium standard, 29 CFR 1910.1027, and Hexavalent Chromium standard, 29 CFR 1910.1026. Employers subject to OSHA's Arsenic and Lead standards (29 CFR 1910.1018 and 1910.1025, respectively) must train their employees on the hazards related to exposure to contaminated clothing. Employers should provide clearly-marked containers for PPE and maintain separate storage areas for work clothes and street clothes. Further PPE suggestions are discussed along with each process, earlier in this document.

Applicable Standards
- 29 CFR 1910.132, *General requirements*
- 29 CFR 1910.133, *Eye and face protection*
- 29 CFR 1910.134, *Respiratory protection*
- 29 CFR 1910.135, *Head protection*
- 29 CFR 1910.136, *Occupational foot protection*
- 29 CFR 1910.137, *Electrical protective devices*
- 29 CFR 1910.138, *Hand protection*
- 29 CFR 1910.1018, *Arsenic*
- 29 CFR 1910.1025, *Lead*
- 29 CFR 1910.1026, *Hexavalent Chromium*
- 29 CFR 1910.1027, *Cadmium*

Sources of Additional Information
- OSHA Safety and Health Topics: Ventilation, http://www.osha.gov/SLTC/ventilation/

The Need to Provide Hearing Protection

Noise is a pervasive occupational health problem. According to NIOSH, 30 million employees are occupationally exposed to hazardous noise, and about one-third of these people have noise-induced hearing loss, nearly all caused by occupational exposure to hazardous noise levels. (NSC 2000)

OSHA requires employers to make hearing protectors and audiometric testing available to all employees exposed to 8-hour TWA noise levels of 85 dB or above. Employees must wear hearing protection if exposures to noise levels are 90 dB or above (8-hour TWA) or above 85 dB (8-hr. TWA) for employees who have experienced a standard threshold shift. These requirements are set to ensure that employees have access to protectors before they experience significant hearing loss. (29 CFR 1910.95)

Employees that work with or near heavy machinery including melting furnaces, or material handling equipment may need hearing protection for protection from noise hazards. The incidence of noise-induced hearing loss can be reduced, or often eliminated, through the successful application of engineering controls and hearing conservation programs. For example, employers can install soundproofing to enclose loud processes or equipment to stop loud noises from traveling to all work areas. If engineering controls are not adequate to eliminate problematic workplace noise, employees can use hearing protection devices such as earplugs, canal caps, or earmuffs.

For additional information regarding OSHA requirements and guidance on hearing protection, refer to OSHA 3074, *Hearing Conservation*. To ensure compliance, employers should also refer directly to the OSHA standards in 29 CFR 1910.95.

Applicable Standards
- 29 CFR 1910.95, *Occupational Noise Exposure*

Sources of Additional Information
- OSHA 3074, Hearing Conservation
- OSHA Safety and Health Topics: Noise and Hearing Conservation, http://www.osha.gov/SLTC/noisehearing conservation/
- National Safety Council, Safeworker, http://www.nsc.org/pubs/sw.htm

What You Need to Know about Hazard Communication

Employees in the recycling industry may come in contact with a wide range of hazardous materials in their workplace. These materials may include the metals and scrap materials themselves as well as any chemicals used or produced in the recycling processes. Employers must ensure that employees are trained on the hazards of the metals and other substances that are in their recycling plants. In addition, employers must ensure that employees are trained on emergency procedures and that employees can obtain the required information immediately in the event of an emergency. Employees must be trained to wear appropriate PPE and to recognize situations where PPE is needed.

OSHA's Hazard Communication standard (HCS) (29 CFR 1910.1200) describes how employers are to identify and convey information about various workplace chemical hazards. The HCS requires chemical manufacturers and importers to evaluate the hazards of the chemicals they produce or import and provide information about these hazards and associated protective measures to downstream users through container labels and material safety data sheets (MSDSs). All employers with hazardous chemicals in their workplaces must develop and implement a written hazard communication program that includes provisions for container labeling, employee access to MSDSs and training for all potentially exposed employees.

Manufacturers and importers are required to provide information on the scrap metal they sell to recyclers. Manufacturers are also required to pass on any information they have regarding known contaminants of the scrap, as would be the case if cutting fluids were present. This information must, in turn, be given to the downstream users by the scrap recycler. However, the HCS does not require employers to create labels and MSDSs when they scrap manufactured articles, such as equipment, piping, radiators and furniture, when the employer scrapping the item did not manufacture it and does not, in fact, possess an MSDS for the item. Regardless, employers should check with their scrap supplier to determine if MSDSs and labels or other hazard information are available. If a scrap supplier obtains an MSDS from a manufacturer or distributor, the scrap supplier must make that MSDS available to any downstream user upon request.

The HCS provides employees the right to know the hazards and identities of the chemicals they are exposed to in the workplace. When employees have this information, they can effectively participate in their employers' programs and take steps to protect themselves.

Specifically, employees need to know about:

- The requirements of the HCS.
- Any operation in their work area where hazardous chemicals are present and the nature of the operations that could result in exposure to these substances.
- The physical and health hazards of chemicals in the work area.
- Work practices and other measures employees can take to protect themselves from potential hazards such as emergency procedures and personal protective equipment needed.
- The location and availability of the written hazard communication program.
- The content of applicable OSHA standards.

OSHA Publication 3111, Hazard Communication Guidelines for Compliance, and OSHA Publication 3084, Chemical Hazard Communication, discuss the requirements of the HCS in more detail. These documents discuss labeling, MSDS procedures, and other hazard communication requirements. Employers must consider special communication needs to ensure comprehension of the contents of the training program.

The substance-specific standards for Arsenic (29 CFR 1910.1018), Lead (29 CFR 1910.1025), Hexavalent Chromium (29 CFR 1910.1026), and Cadmium (29 CFR 1910.1027) also establish requirements (e.g., employee training, labeling, and posting of warning signs) for communicating the hazards associated with these metals to potentially exposed employees. Employers must refer to these standards for specific information on related hazard communication requirements.

Applicable Standards

- 29 CFR 1910.1200, *Hazard Communication*
- 29 CFR 1910.1018, *Arsenic*
- 29 CFR 1910.1025, *Lead*
- 29 CFR 1910.1026, *Hexavalent Chromium*
- 29 CFR 1910.1027, *Cadmium*

Sources of Additional Information

- OSHA 2254, Training Requirements in OSHA Standards and Training Guidelines
- OSHA 3084, Chemical Hazard Communication
- OSHA 3111, Hazard Communication Guidelines for Compliance
- OSHA Hazard Communication http://www.osha.gov/SLTC/hazard communications/index.html

References

American National Standards Institute (ANSI)

- ANSI Z87.1-2003, *Occupational and Educational Eye and Face Protection Devices*
- BSR Z89.1-1997, *Industrial Head Protection*
- ANSI Z9.1, *Open Surface Tanks Operation*
- ANSI Z9.2, *Fundamentals Covering the Design and Operation of Local Exhaust Systems*
- ANSI Z9.3, *Design, Construction, and Ventilation of Spray Finishing Operations*
- ANSI Z9.4, *Ventilation and Safe Practice of Abrasive Blasting Operations*
- ANSI Z9.5, *Laboratory Ventilation*

Agency for Toxic Substances and Disease Registry (ATSDR)

- ATSDR. 1990. *Toxicological Profile for Silver.*
- ATSDR. 1992a. *Toxicological Profile for Antimony.*
- ATSDR. 1992b. *Toxicological Profile for Vanadium.*
- ATSDR. 1999a. *Toxicological Profile for Cadmium.*
- ATSDR. 1999b. *Toxicological Profile for Lead. (Update).*
- ATSDR. 1999c. *Toxicological Profile for Aluminum. (Update).*
- ATSDR. 1999d. *Toxicological Profile for Mercury. (Update).*
- ATSDR. 2000a. *Toxicological Profile for Arsenic (Update).*
- ATSDR. 2000b. *Toxicological Profile for Chromium (Update).*
- ATSDR. 2000c. *Toxicological Profile for Manganese.*
- ATSDR. 2002. *Toxicological Profile for Beryllium. (Update).*
- ATSDR. 2003. *Toxicological Profile for Selenium. (Update).*
- ATSDR. 2004a. *Toxicological Profile for Cobalt. (Update).*
- ATSDR. 2004b. *Toxicological Profile for Copper. (Update).*
- ATSDR. 2005a. *Toxicological Profile for Nickel. (Update).*
- ATSDR. 2005b. *Toxicological Profile for Tin.*
- ATSDR. 2005c. *Toxicological Profile for Zinc. (Update).*
- ATSDR. ND *Toxicology Frequently Asked Questions (ToxFAQs),* http://www.atsdr.cdc. gov/toxfaq.html

National Institute for Occupational Safety and Health (NIOSH)

- NIOSH. FACE. NIOSH Fatality Assessment and Control Evaluation (FACE) Program. Online database. http://www.cdc.gov/ niosh/face
- NIOSH 98-116. What You Need to Know About Occupational Exposure to Metalworking Fluids.
- NIOSH, 2005 NIOSH Pocket Guide to Chemical Hazards.

Occupational Safety and Health Administration (OSHA) Standards

- 29 CFR 1910.19 – *Special provisions for air contaminants*
- 29 CFR 1910.94 – *Ventilation*
- 29 CFR 1910.95 – *Occupational Noise Exposure*
- 29 CFR 1910.106 – *Flammable and combustible liquids*
- 29 CFR 1910.119 – *Process safety management of highly hazardous chemicals*
- 29 CFR 1910.132 – *General requirements*
- 29 CFR 1910.133 – *Eye and face protection*
- 29 CFR 1910.134 – *Respiratory protection*
- 29 CFR 1910.135 – *Head protection*
- 29 CFR 1910.136 – *Occupational foot protection*
- 29 CFR 1910.137 – *Electrical protective devices*
- 29 CFR 1910.138 – *Hand protection*
- 29 CFR 1910.147 – *The control of hazardous energy (lockout/tagout)*
- 29 CFR 1910.176 – *Handling materials – general.*
- 29 CFR 1910.178 – *Powered industrial trucks*
- 29 CFR 1910.179 – *Overhead and gantry cranes*
- 29 CFR 1910.180 – *Crawler locomotive and truck cranes*
- 29 CFR 1910.181 – *Derricks*
- 29 CFR 1910.184 – *Slings*
- 29 CFR 1910.212 – *General requirements for all machines*
- 29 CFR 1910.219 – *Mechanical power-transmission apparatus.*
- 29 CFR 1910.242 – *Hand and portable powered tools and equipment (general)*
- 29 CFR 1910.243 – *Guarding of portable powered tools*
- 29 CFR 1910.244 – *Other portable tools and equipment*
- 29 CFR 1910.252 – *General requirements (Welding, Cutting, and Brazing)*
- 29 CFR 1910.253 – *Oxygen-fuel gas welding and cutting*
- 29 CFR 1910.1000 – *Air Contaminants*
- 29 CFR 1910.1000, Table Z-1 – *Limits for Air Contaminants*

- 29 CFR 1910.1000, Table Z-2
- 29 CFR 1910.1018 – *Arsenic*
- 29 CFR 1910.1025 – *Lead*
- 29 CFR 1910.1026 – *Hexavalent Chromium*
- 29 CFR 1910.1027 – *Cadmium*
- 29 CFR 1910.1096 – *Ionizing radiation*
- 29 CFR 1910.1200 – *Hazard Communication*
- 29 CFR 1910 Subpart H – *Hazardous Materials*
- 29 CFR 1910 Subpart I – *Personal Protective Equipment*
- 29 CFR 1910 Subpart L – *Fire protection*
- 29 CFR 1910 Subpart Q – *Welding, Cutting and Brazing*
- 29 CFR 1910 Subpart S – *Electrical*
- 29 CFR 1926.62 – *Lead in Construction*
- 29 CFR 1926.55 – App. A, *Gases, fumes, vapors, dusts, and musts*

Occupational Safety and Health Administration (OSHA) Databases and Web Pages

- OSHA IMIS. OSHA Form 170 Reports, *Integrated Management Information System (IMIS).*
- OSHA eTool. OSHA, Lead Secondary Smelter eTool, http://www.osha.gov/SLTC/etools/leadsmelter/
- OSHA eTool. Lockout/Tagout eTool http://www.osha.gov/dts/osta/lototraining/index.htm
- OSHA Safety and Health Topics: Main Page http://www.osha.gov/SLTC/index.html
- OSHA Construction Safety and Health Outreach Program: Safety and Welding, http://www.osha.gov/doc/outreachtraining/htmlfiles/welding.html
- OSHA Hazard Communication Web Page: Foundation of Workplace Chemical Safety Programs, http://www.osha.gov/SLTC/hazardcommunications/index.html

Occupational Safety and Health Administration (OSHA) Publications

- OSHA 1620, Occupational Exposure to Beryllium (not yet released)
- OSHA 2254, Training Requirements in OSHA Standards and Training Guidelines
- OSHA 3074, Hearing Conservation
- OSHA 3084, Chemical Hazard Communication
- OSHA 3111, Hazard Communication Guidelines for Compliance
- OSHA 3136, Cadmium
- OSHA 3139, Occupational Exposure to Cadmium in the Construction Industry
- OSHA 3151, Personal Protective Equipment
- OSHA 3162, Screening and Surveillance: A Guide to OSHA Standards
- OSHA 3170, Safeguarding Equipment and Protecting Employees from Amputations
- OSHA 3320, Small Entity Compliance Guide for the Hexavalent Chromium Standards

Occupational Safety and Health Administration (OSHA) Releases

- OSHA. 1999a. Summary of Final Report of the OSHA Metalworking Fluids Standards Advisory Committee. July 1999. http://www.osha.gov/dhs/reports/metalworking/MWFSAC-FinalReportSummary.html
- OSHA. 1999b. OSHA Alerts Workers to Beryllium Exposure, Trade News Release, 9/17/99. http://www.osha.gov/pls/oshaweb. show_document?p_table=New_Release& p-id=283
- OSHA. 1999c. Preventing Adverse Health Effects from Exposure to Beryllium. http://www.osha.gov/dts/hib/hib_data/hib19990902.html
- OSHA 2001. OSHA Launches National Emphasis Program to Reduce Lead Exposure, OSHA Trade News Release, July 20, 2001.
- OSHA. 1978. Directive 02-02-006 Inorganic Mercury and its Compounds.
- OSHA. 1985. Directive 02-02-006 CH-1 Removal of Obsolete Sections

Other References

ACGIH. 2004. Industrial Ventilation: A Manual of Recommended Practice, 25th Edition. 2004.

Bechtel. 2001. Hanford Site Contractor Chronic Beryllium Disease Prevention Program, Bechtel Hanford, Inc., Hanford Environmental Health Foundation, Fluor Hanford, Pacific Northwest National Laboratory, CH2M Hill Hanford Group, Inc. Rev. 2, April 26, 2001.

BLS. 2003. Occupational Injuries and Illnesses in the United States, Profiles Data 1992-2001, Version 9.0. Bureau of Labor Statistics. Department of Labor.

DOE. 2006. 10 CFR part 850, Chronic Beryllium Disease Program, Final Rule (Department of Energy, 9 Feb. 2006).

EPA. 1995. EPA Office of Compliance Sector Notebook Project. Profile of the Nonferrous Metals Industry. Sept. 1995. http://www.epa.gov/Compliance/resources/publications/assistance/sectors/notebooks/nfmetlsn.pdf

EPA. 1998. Beryllium and Beryllium Compounds. http://www.epa.gov/IRIS/subst/0012.htm

EPA. 2001. Emission Inventory Improvement Program. U.S. Environmental Protection Program. 2001. http://www.epa.gov/ttn/chief/eiip/

Hathaway GJ, Proctor NH, Hughes JP, and Fischman ML [1991]. Proctor and Hughes' chemical hazards of the workplace. 3rd edition. New York, NY: Van Nostrand Reinhold.

IARC 1997. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. Volume 58, Beryllium, Cadmium, Mercury, and Exposures in the Glass Manufacturing Industry.

IARC 2006a. List of Agents Evaluated and Their Classifications as Evaluated in IARC Monographs Volumes 1-85. http://monographs.iarc.fr/ENG/Classification/index.php

IARC 2006b. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. Volume 87, Inorganic and Organic Lead Compounds.

IARC 2006c. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. Volume 86, Cobalt in Hard Metals and Cobalt Sulfate, Gallium Arsenide, Indium Phosphide, and Vanadium Pentoxide.

IPCS. 2000. International Chemical Safety Card, Beryllium. NIOSH, CEC, and IPCS. http://www.cdc.gov/niosh/ipcsneng/neng 0226.html.

IPMI. 2001. Environmental and Regulatory Affairs Committee. Guidance to Members on Beryllium Management. International Precious Metals Institute. October 15, 2001.

ISP ND International Specialty Products Industrial Reference Guide Performance-Enhancing Products for Industrial Markets. No date. Online at: http://www.ispcorp.com/products/biocides/content/brochure/ind_ref.html

ISRI. NDa. Scrap Recycling: Where Tomorrow Begins. Institute of Scrap Recycling Industries (ISRI). No date. Online at http://www.isri.org/isridown loads/scrap2.pdf.

ISRI. NDb. Recycling Scrap Iron and Steel. No date. Online at http://www.isri.org/isri downloads/ironq.pdf.

ISRI. NDc. Recycling Nonferrous Scrap Metals. No date. Online at http://www.isri.org/isri-downloads/nonferq.pdf.

Jones, R.T., 1998 Using a Direct-Current Arc Furnace to Recover Cobalt from Slags. JOM, 57 1998 October.

Lang, 1994. Beryllium: a chronic problem. Leslie Lang. Environmental Health Perspectives, 102(6-7), June-July 1994.

Legare, J-M, PhD, ND. Detection of Radioactive Sources in Scrap Metal. Commercial Radiation Protection Services. No date. Online at http://www.sftext.com/radioprotection/ cuba_detection_radio.html.

Navas-Acien, A., Guallar, E., Silbergeld, E.K., and Rothenberg, S.J. 2007. Lead Exposure and Cardiovascular Disease – a Systematic Review. Environmental Health Perspectives, 115(3), March 2007.

Nijkerk, A.A. and Dalmijn, W.L. 2001. Handbook of Recycling Techniques. The Hague: Nijkerk Consultancy. Fifth, revised and expanded edition, February 2001.

NSC. ND. Accident Prevention Manual for Industrial Operations: Engineering and Technology. 10th Ed. Itasca, IL: National Safety Council. No date.

NSC. 2000. National Safety Council Safeworker program. February 2000. http://www.nsc.org/pubs/sw.htm.

NTP. 2004. Eleventh Report on Carcinogens, National Toxicology Program.

NYSDOH. 2001. Lead on the Job: A Guide for Workers, New York State Department of Health, January 2001. http://www.health.state.ny.us/nysdoh/lead/worker.htm.

OECD. 1995. Recycling of Copper, Lead, and Zinc-Bearing Wastes. Environmental Monographs No. 109. Organization for Economic Cooperation and Development (OECD), Paris, 1995. http://www.cpplatform.ch/technology/pdf_ docs/1114b.pdf.

OSHA. 2006. Final Economic and Regulatory Flexibility Analysis for OSHA's Final Standard for Occupational Exposure to Hexavalent Chromium. http://dockets.osha.gov/search/browseExhibits.asp

PIM. 1990. Cadmium. PIM 089. http://www.inchem.org/documents/pims/chemical/cadmium.htm.

Smith, DM. Radioactive Material in Scrap Metal - The UK Approach. Health & Safety Executive, Midlands Region Specialist Group, McLaren Building, 35 Dale End, Birmingham B4 7NP UK. No date.

Sastry et al. ND. Sastry R, Orlemann J, Koval P. Mercury Contamination from Metal Scrap Processing Facilities: A Study by Ohio EPA, Paper 947. No date.

USGS. 1999. U.S. Geological Survey Minerals Yearbook.

USGS. 2001. U.S. Geological Survey Minerals Yearbook.

USGS. 2002. U.S. Geological Survey Minerals Yearbook.

USGS, 2003 Cadmium Recycling in the United States in 2000.

USGS. 2006. U.S. Geological Survey Minerals Yearbook.

VADEQ. 2001. Precious Metal Recovery: Photographic Silver. Virginia Department of Environmental Quality, Waste Management. Revision 6/12/01. http://www.deq.state.va.us/waste/hazardous3.html.

Washington. 2002. Preventing Lead Poisoning in Scrap Metal Recycling, Safety & Health Assessment & Research for Prevention (SHARP), University of Washington, Seattle, WA. May 2002.

Appendix: Exposure Limits for Selected Metals

SUBSTANCE	NIOSH	OSHA
	REL	PEL
Aluminum Metal (as Al)	10 mg/m^3 (total dust) 5 mg/m^3 (resp)	15 mg/m^3 as Al (total) 5 mg/m^3 (resp)
pyro powders and welding fumes	5 mg/m^3	
soluble salts and alkyls	2 mg/m^3	
Antimony and compounds except Stibine (as Sb)	0.5 mg/m^3	0.5 mg/m^3
Arsenic, inorganic compounds (as As);	Ca C 0.002 mg/m^3 [15-minute]	0.010 mg/m^3 see 1910.1018
Arsenic, organic compounds (as As)	none	0.5 mg/m^3
Arsine	Ca C 0.002 mg/m^3 [15-minute]	0.05 ppm (0.2 mg/m^3)
Barium, soluble compounds, except Barium Sulfate (as Ba)	0.5 mg/m^3	0.5 mg/m^3
Barium sulfate	10 mg/m^3 (total dust) 5 mg/m^3 (resp)	15 mg/m^3 (total) 5 mg/m^3 (resp)
Beryllium and compounds (as Be)	Ca Not to exceed 0.0005 mg/m^3	0.002 mg/m^3 C 0.005 mg/m^3 0.025 mg/m^3 [30-minute maximum peak]
Bismuth telluride, Undoped	10 mg/m^3 (total) 5 mg/m^3 (resp)	15 mg/m^3 (total) 5 mg/m^3 (resp)
Bismuth telluride, Se-doped	5 mg/m^3	
Cadmium and compounds (as Cd)	Ca	0.005 mg/m^3 see 1910.1027
Chromium (VI) compounds Chromic acid and chromates	(as Cr) Ca 0.001 mg/m^3	(as Cr) C 0.005 mg/m^3 see 1910.1026
Chromium (II) compounds (as Cr)	0.5 mg/m^3	0.5 mg/m^3
Chromium (III) compounds (as Cr)	0.5 mg/m^3	0.5 mg/m^3
Chromium metal (as Cr)	0.5 mg/m^3	1 mg/m^3
Chromium insoluble salts (as Cr)	0.5 mg/m^3	1 mg/m^3
Cobalt metal, dust, and fume (as Co)	0.05 mg/m^3	0.1 mg/m^3
Cobalt carbonyl	0.1 mg/m^3	
Cobalt hydrocarbonyl	0.1 mg/m^3	
Copper, fume (as Cu)	0.1 mg/m^3	0.1 mg/m^3
Copper, dust and mist (as Cu)	1 mg/m^3	1 mg/m^3
Hafnium and compounds (as Hf)	0.5 mg/m^3	0.5 mg/m^3
Hydrogen selenide (as Se)	0.05 ppm (0.2 mg/m^3)	0.05 ppm (0.2 mg/m^3)
Iron oxide	5 mg/m^3 dust and fume	10 mg/m^3 fume
Iron salts, soluble as Fe	1 mg/m^3	
Lead inorganic (as Pb)	0.050 mg/m^3	0.050 mg/m^3 see 1910.1025
Lead Chromate	See "Lead inorganic" and "Chromic acid & chromates"	See "Lead inorganic" and "Chromic acid & chromates"
Magnesium oxide fume		15 mg/m^3

SUBSTANCE	NIOSH	OSHA
	REL	PEL
Manganese compounds (as Mn)	1 mg/m^3 ST 3 mg/m^3	C 5 mg/m^3
Manganese fume (as Mn)	1 mg/m^3 ST 3 mg/m^3	C 5 mg/m^3
Mercury (organo) alkyl compounds (as Hg)	0.01 mg/m^3 ST 0.03 mg/m^3 [skin]	0.01 mg/m^3 C 0.04 mg/m^3
Mercury (Elemental and Inorganic form)	C 0.1 mg/m^3 [skin]	C 0.1 mg/m^3
Mercury vapor	0.05 mg/m^3 [skin]	C 0.1 mg/m^3
Molybdenum insoluble compounds (as Mo)		15 mg/m^3
Molybdenum soluble compounds		5 mg/m^3
Nickel carbonyl (as Ni)	Ca 0.001 ppm (0.007 mg/m^3)	0.001 ppm (0.007 mg/m^3)
Nickel, metal (as Ni)	Ca 0.015 mg/m^3	1 mg/m^3
Nickel, insoluble compounds (as Ni)	Ca 0.015 mg/m^3	1 mg/m^3
Nickel, soluble compounds (as Ni)	Ca 0.015 mg/m^3	1 mg/m^3
Osmium tetroxide (as Os)	0.002 mg/m^3 (0.0002 ppm) ST 0.006 mg/m^3 (0.0006 ppm)	0.002 mg/m^3
Platinum, metal	1 mg/m^3	none
Platinum, soluble salts (as Pt)	0.002 mg/m^3	0.002 mg/m^3
Rhodium (as Rh), metal fume and insoluble compounds	0.1 mg/m^3	0.1 mg/m^3
Rhodium (as Rh), soluble compounds	0.001 mg/m^3	0.001 mg/m^3
Selenium and compounds (as Se)	0.2 mg/m^3	0.2 mg/m^3
Selenium hexafluoride (as Se)	0.05 ppm	0.05 ppm (0.4 mg/m^3)
Silver, metal (as Ag)	0.01 mg/m^3	0.01 mg/m^3
Silver, soluble compounds (as Ag)	0.01 mg/m^3	0.01 mg/m^3
Stibine (Antimony hydride)	0.1 ppm (0.5 mg/m^3)	0.1 ppm (0.5 mg/m^3)
Tantalum, metal and oxide dust	5 mg/m^3 ST 10 mg/m^3	5 mg/m^3
Tellurium and compounds (as Te)	0.1 mg/m^3	0.1 mg/m^3
Tellurium hexafluoride (as Te)	0.02 ppm (0.2 mg/m^3)	0.02 ppm (0.2 mg/m^3)
Tetraethyl lead (as Pb)	0.075 mg/m^3 [skin]	0.075 mg/m^3 [skin]
Tetramethyl lead (as Pb)	0.075 mg/m^3 [skin]	0.075 mg/m^3 [skin]
Thallium, soluble compounds (as Tl)	0.1 mg/m^3 [skin]	0.1 mg/m^3 [skin]
Tin, inorganic compounds (except oxides) (as Sn)	2 mg/m^3	2 mg/m^3
Tin, organic compounds (as Sn)	0.1 mg/m^3 [skin]	0.1 mg/m^3
Tin(II) oxide	2 mg/m^3	
Tin(IV) oxide	2 mg/m^3	
Titanium dioxide	Ca	15 mg/m^3
Uranium, soluble compounds	Ca 0.05 mg/m^3	0.05 mg/m^3

SUBSTANCE	NIOSH	OSHA
	REL	PEL
Uranium, insoluble compounds	Ca 0.2 mg/m^3 ST 0.6 mg/m^3	0.25 mg/m^3
Vanadium, dust	C 0.05 mg/m^3 [15-minute] (as V)	C 0.05 mg/m^3 (as V2O5) (resp)
Vanadium, fumes	C 0.05 mg/m^3 [15-minute] (as V)	C 0.1 mg/m^3 (as V2O5)
Yttrium and compounds (as Y)	1 mg/m^3	1 mg/m^3
Zinc chloride fume	1 mg/m^3 ST 2 mg/m^3	1 mg/m^3
Zinc oxide fume	5 mg/m^3 ST 10 mg/m^3	5 mg/m^3
Zinc oxide dust	5 mg/m^3 C 15 mg/m^3	15 mg/m^3 (total) 5 mg/m^3 (resp)
Zinc stearate	10 mg/m^3 (total) 5 mg/m^3 (resp)	
Zirconium compounds (as Zr)	5 mg/m^3 ST 10 mg/m^3 (as Zr) (except Zirconium tetrachloride.)	5 mg/m^3

Sources: 29 CFR 1910.1000 Table Z-1; 29 CFR 1910.1000 Table Z-2; National Institute for Occupational Safety and Health (NIOSH) Pocket Guide, Publication 97-140, February 2004.

Legend of Acronyms and Notations for Appendix A

General		**Substances**			
mg/m^3	milligrams per cubic meter	A	Aluminum	Ni	Nickel
ppm	parts per million	Ag	Silver	Os	Osmium
resp	respirable fraction of the airborne particulate	As	Arsenic	Pb	Lead
skin	indicates the potential for dermal absorption	Ba	Barium	$Pb_3(AsO_4)_2$	Lead Arsenate
total	total airborne particulate	Be	Beryllium	Pt	Platinum
C	ceiling	Cd	Cadmium	Rh	Rhodium
		Co	Cobalt	Sb	Antimony
NIOSH		Cr	Chromium	Se	Selenium
Ca	carcinogen	CrO_3	Chromium Oxide	Sn	Tin
REL	recommended exposure limit	Cu	Copper	Te	Tellurium
ST	Short term exposure limit	Fe	Iron	Tl	Thallium
		Hf	Hafnium	V	Vanadium
OSHA		Hg	Mercury	V_2O_5	Vanadium Pentoxide
PEL	permissible exposure limit	Mn	Manganese	Y	Yttrium
skin	indicates the potential for dermal absorption	Mo	Molybdenum	Zr	Zirconium

OSHA Assistance

OSHA can provide extensive help through a variety of programs, including technical assistance about effective safety and health programs, state plans, workplace consultations, voluntary protection programs, strategic partnerships, training and education, and more. An overall commitment to workplace safety and health can add value to your business, to your workplace, and to your life.

Safety and Health Program Management Guidelines

Effective management of employee safety and health protection is a decisive factor in reducing the extent and severity of work-related injuries and illnesses and their related costs. In fact, an effective safety and health program forms the basis of good employee protection and can save time and money (about $4 for every dollar spent) and increase productivity and reduce employee injuries, illnesses, and related workers' compensation costs.

To assist employers and employees in developing effective safety and health programs, OSHA published recommended Safety and Health Program Management Guidelines (54 *Federal Register* (16): 3904-3916, January 26, 1989). These voluntary guidelines can be applied to all places of employment covered by OSHA.

The guidelines identify four general elements critical to the development of a successful safety and health management system:

- Management leadership and employee involvement,
- Worksite analysis,
- Hazard prevention and control, and
- Safety and health training.

The guidelines recommend specific actions, under each of these general elements, to achieve an effective safety and health program. The Federal Register notice is available online at www.osha.gov.

State Programs

The Occupational Safety and Health Act of 1970 (OSH Act) encourages states to develop and operate their own job safety and health plans. OSHA approves and monitors these plans. Twenty-four states, Puerto Rico, and the Virgin Islands currently operate approved state plans: 22 cover both private and public (state and local government) employment; Connecticut, New Jersey, New York, and the Virgin Islands cover the public sector only. States and territories with their own OSHA-approved occupational safety and health plans must adopt standards identical to, or at least as effective as, the Federal OSHA standards.

Consultation Services

Consultation assistance is available on request to employers who want help in establishing and maintaining a safe and healthful workplace. Largely funded by OSHA, the service is provided at no cost to the employer. Primarily developed for smaller employers with more hazardous operations, the consultation service is delivered by state governments employing professional safety and health consultants. Comprehensive assistance includes an appraisal of all mechanical systems, work practices, and occupational safety and health hazards of the workplace and all aspects of the employer's present job safety and health program. In addition, the service offers assistance to employers in developing and implementing an effective safety and health program. No penalties are proposed or citations issued for hazards identified by the consultant. OSHA provides consultation assistance to the employer with the assurance that his or her name and firm and any information about the workplace will not be routinely reported to OSHA enforcement staff.

Under the consultation program, certain exemplary employers may request participation in OSHA's Safety and Health Achievement Recognition Program (SHARP). Eligibility for participation in SHARP includes receiving a comprehensive consultation visit, demonstrating exemplary achievements in workplace safety and health by abating all identified hazards, and developing an excellent safety and health program.

Employers accepted into SHARP may receive an exemption from programmed inspections (not complaint or accident investigation inspections) for a period of 1 year. For more information concerning consultation assistance, see OSHA's website at www.osha.gov.

Voluntary Protection Programs (VPP)

Voluntary Protection Programs and on-site consultation services, when coupled with an effective enforcement program, expand employee protection to help meet the goals of the OSH Act. The VPPs motivate others to achieve excellent safety and health results in the same outstanding way as they establish a cooperative relationship between employers, employees, and OSHA.

For additional information on VPP and how to apply, contact the OSHA regional offices listed at the end of this publication.

Strategic Partnership Program

OSHA's Strategic Partnership Program, the newest member of OSHA's cooperative programs, helps encourage, assist, and recognize the efforts of partners to eliminate serious workplace hazards and achieve a high level of employee safety and health. Whereas OSHA's Consultation Program and VPP entail one-on-one relationships between OSHA and individual worksites, most strategic partnerships seek to have a broader impact by building cooperative relationships with groups of employers and employees. These partnerships are voluntary, cooperative relationships between OSHA, employers, employee representatives, and others (e.g., trade unions, trade and professional associations, universities, and other government agencies).

For more information on this and other cooperative programs, contact your nearest OSHA office, or visit OSHA's website at www.osha.gov.

Alliance Program

Through the Alliance Program, OSHA works with groups committed to safety and health, including businesses, trade or professional organizations, unions and educational institutions, to leverage resources and expertise to develop compliance assistance tools and resources and share information with employers and employees to help prevent injuries, illnesses and fatalities in the workplace.

Alliance program agreements have been established with a wide variety of industries including meat, apparel, poultry, steel, plastics, maritime, printing, chemical, construction, paper and telecommunications. These agreements are addressing many safety and health hazards and at-risk audiences, including silica, fall protection, amputations, immigrant workers, youth and small businesses. By meeting the goals of the Alliance Program agreements (training and education, outreach and communication, and promoting the national dialogue on workplace safety and health), OSHA and the Alliance Program participants are developing and disseminating compliance assistance information and resources for employers and employees such as electronic assistance tools, fact sheets, toolbox talks, and training programs.

OSHA Training and Education

OSHA area offices offer a variety of information services, such as compliance assistance, technical advice, publications, audiovisual aids, and speakers for special engagements. OSHA's Training Institute in Arlington Heights, IL, provides basic and advanced courses in safety and health for Federal and state compliance officers, state consultants, Federal agency personnel, and private sector employers, employees, and their representatives.

The OSHA Training Institute also has established OSHA Training Institute Education Centers to address the increased demand for its courses from the private sector and from other federal agencies. These centers include colleges, universities, and nonprofit training organizations that have been selected after a competition for participation in the program.

OSHA also provides funds to nonprofit organizations, through grants, to conduct workplace training and education in subjects where OSHA believes there is a lack of workplace training. Grants are awarded annually. Grant recipients are expected to contribute 20 percent of the total grant cost.

For more information on training and education, contact the OSHA Training Institute, Directorate of Training and Education, 2020 South Arlington Heights Road, Arlington Heights, IL, 60005, (847) 297-4810, or see Training on OSHA's website at www.osha.gov. For further information on any OSHA program, contact your nearest OSHA regional office listed at the end of this publication.

Information Available Electronically

OSHA has a variety of materials and tools available on its website at www.osha.gov. These include electronic compliance assistance tools, such as *Safety and Health Topics Pages, eTools, Expert Advisors;* regulations, directives, publications and videos; and other information for employers and employees. OSHA's software programs and compliance assistance tools walk you through challenging safety and health issues and common problems to find the best solutions for your workplace.

A wide variety of OSHA materials, including standards, interpretations, directives, and more can be purchased on CD-ROM from the U.S. Government Printing Office, Superintendent of Documents, toll-free phone (866) 512-1800.

OSHA Publications

OSHA has an extensive publications program. For a listing of free or sales items, visit OSHA's website at www.osha.gov or contact the OSHA Publications Office, U.S. Department of Labor, 200 Constitution Avenue, NW, N-3101, Washington, DC 20210: Telephone (202) 693-1888 or fax to (202) 693-2498.

Contacting OSHA

To report an emergency, file a complaint, or seek OSHA advice, assistance, or products, call (800) 321-OSHA or contact your nearest OSHA Regional office listed at the end of this publication. The teletypewriter (TTY) number is (877) 889-5627.

Written correspondence can be mailed to the nearest OSHA Regional or Area Office listed at the end of this publication or to OSHA's national office at: U.S. Department of Labor, Occupational Safety and Health Administration, 200 Constitution Avenue, N.W., Washington, DC 20210.

By visiting OSHA's website at www.osha.gov, you can also:

- File a complaint online,
- Submit general inquiries about workplace safety and health electronically, and
- Find more information about OSHA and occupational safety and health.

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Exhibit 6.

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

RECEIVED
JUN 20 1994
STATE OF ILLINOIS
POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
	)	
CATEGORIES OF INSIGNIFICANT	)	R94-14
ACTIVITIES OR EMISSION	)	(Rulemaking)
LEVELS AT A CAAPP SOURCE,	)	
AMENDMENTS TO 35 ILL. ADM.	)	
CODE PARTS 201 AND 211.	)	

Testimony of Christopher Romaine
Illinois Environmental Protection Agency

June 1994

I. INTRODUCTION

My name is Christopher Romaine. I am testifying for the Illinois Environmental Protection Agency ("Agency"). I am employed as Manager of the New Source Review Unit of the Permit Section in the Division of Air Pollution Control.

I have a Bachelor of Science Degree in Engineering from Brown University and have completed course work toward a Masters Degree in Environmental Engineering from Southern Illinois University. I am a Professional Engineer. I have worked for the Agency since June 1976.

As manager of the New Source Review Unit, I have programmatic responsibility for permitting activities related to certain federal or federally derived rules for new or modified sources. These rules include New Source Performance Standards (40 CFR Part 60), Prevention of Significant Deterioration of Air Quality (40 CFR 52.21), and Major Stationary Sources Construction and Modification (35 Ill. Adm. Code Part 203). I assist permit analysts in the Division of Air Pollution Control in their review of permit applications and examine their work. I am also responsible for coordination of Permit Section activities with respect to these programs with the United States Environmental Protection Agency ("USEPA") and the Agency's program development.

As part of my duties at the Agency, I assist in certain aspects of program development for the Division of Air Pollution Control. One of these is the development of regulations. I have been the Agency's technical expert in Board proceedings regarding New Source Review rules: R81-16, R85-20, and R92-21. I have also participated in numerous regulatory proceedings dealing with the control of Volatile Organic Material emissions, including R86-18, R91-8, and R93-9.

I was a member of the Agency workgroup chaired by Donald Sutton, Manager of the Air Permit Section, that developed this proposal. My testimony provides the technical support for the Agency's proposal. The purpose of this rulemaking is to amend Parts 201 and 211 to define insignificant activities or emission levels for purposes of Illinois' Clean Air Act Permit Program. The testimony includes an overview of the Clean Air Act Permit Program, an explanation of the Agency's proposed approach to insignificant activities and emission levels, and a detailed discussion of the proposed amendments.

II. OVERVIEW

A. Historical Background

Section 502(d) of the Clean Air Act, as amended in 1990, required Illinois to develop and submit to USEPA a permit program that meets the requirements of Title V of the Clean Air Act and the federal regulations promulgated thereunder (40 CFR Part 70). Illinois adopted new Section 39.5 of the Environmental Protection Act ("Act") establishing Illinois' program known as the Clean Air Act Permit Program or "CAAPP." This program is intended to meet all federal requirements. Draft application forms and other necessary documentation and supporting procedures have also been generally developed by the Agency. On November 15, 1993, the Agency submitted Illinois' CAAPP program to USEPA for approval. Implementation of the CAAPP by the Agency will begin when the program is approved by USEPA. All

CAAPP applications for existing major sources are to be submitted in the year following approval of the program by USEPA. The Agency is to complete issuance of permits for these sources within three years of program approval by USEPA.

Although the federal regulations allow for States to designate insignificant activities and emission levels for State Title V programs, States are not required to do so. The CAAPP currently submitted to USEPA does not specifically identify such activities or emission levels. However, the Agency is required, pursuant to Section 39.5(5)(w) of the Act, to propose regulations to the Board defining insignificant activities or emission levels for purposes of CAAPP permitting. These regulations must be consistent with the federal regulations for Title V permit programs. The federal regulations provide that 1) the Administrator may approve as part of a State program a list of insignificant activities and emission levels which need not be included in permit applications, 2) for insignificant activities which are exempted because of size or production rate, a list of such insignificant activities must be included in the permit, and 3) an application may not omit information needed to determine the applicability of, or to impose, any applicable requirement (See 40 CFR 70.5(c)).

The Agency has submitted the proposed amendments to 35 Ill. Adm. Code Part 201 to the Pollution Control Board to comply with the mandate of Section 39.5(5)(w) of the Act. The Agency is also proposing amendments to 35 Ill. Adm. Code Part 211 to add definitions for certain terms used in the proposed amendments to Part 201. Upon adoption by the Board, the Agency will be submitting these amendments to Parts 201 and 211 to USEPA for review as an additional aspect of Illinois' CAAPP.

Accordingly, the scope of insignificant activities and emission levels is a potential concern for all sources required to have CAAPP permits. These sources include any "major source" as defined in Section 39.5(2)(c) of the Act.

The proposed amendments to Part 201, Subpart F, would establish insignificant activities and emission levels at a CAAPP source. Classification of an activity or emission level as insignificant is relevant primarily for purposes of preparing a CAAPP application. It is also relevant for the subsequent content of the CAAPP permit. It is also important for the ongoing operation of a source because it is expected that an owner or operator of a CAAPP source will not be required to address insignificant activities in anywhere near the same level of detail as other activities at the CAAPP source.

The classification of an activity as insignificant, so that detailed emission data would not have to be provided, would also effectively exclude the activity from consideration for purposes of fees. This impact should be minimal, for both sources and the Agency, if insignificant activities and emission levels are established appropriately. Moreover, the Clean Air Act requires the CAAPP to be self-sustaining, irrespective of the treatment of insignificant activities and emission levels.

It must be stressed that classification of activities as insignificant cannot be relied upon for purposes of applicability, that is, to show that a source is not a major source. For purposes of applicability, insignificant activities can count, and a source cannot rely on them as the difference between being a major and non-major source. In this respect, a source that is required to submit a CAAPP application, but is seeking a Federally Enforceable State Operating Permit ("FESOP"), may have to provide additional information about insignificant activities. This additional information will have to show that the restrictions in a FESOP will ensure that the source is not a major source, even after accounting for all emissions from insignificant activities.

D. Coordination with Current State Operating Permit Program

35 Ill. Adm. Code Part 201 contains Illinois' regulations requiring state operating permits for sources of air pollution. In addition to addressing insignificant activities and emission levels for CAAPP permitting, proposed Subpart F also provides that the existing state operating permit requirement and associated permitting procedures do not apply for purpose of the CAAPP. This is intended to avoid confusion between the existing state operating permit program and the new federal CAAPP operating permit program.

III. EXPLANATION OF AGENCY PROPOSAL FOR INSIGNIFICANT ACTIVITIES

The Agency's proposal represents a multi-layered approach to insignificant activities, with four layers or classes of insignificant activities. The first layer identifies various "non-traditional" activities at sources, such as cafeterias, office equipment, groundskeeping, vehicle maintenance, building maintenance, etc., that are considered insignificant. These activities are not routinely permitted now and the Agency proposes to formalize this practice for purposes of the CAAPP. In conjunction with these provisions, the proposal also clarifies that certain emission units, such as leaking components, should be addressed as a group rather than individually in a CAAPP application. The second layer identifies a number of specific categories of equipment and operations, such as "small" boilers, "small" tanks and "small" printing operations, below certain sizes or activity levels that can be considered insignificant. In the third layer, the proposal establishes emission levels that are considered insignificant. These levels are set for those regulated air pollutants that are not listed as hazardous air pollutants. The proposed insignificant emission levels for these pollutants are 0.1 pound/hour and 0.44 ton/year, expressed as emissions prior to any control device. The final layer of the Agency's approach to insignificant activities is a case-to-case process whereby a source may propose that an activity with emissions of up to 1.0 pound/hour be considered insignificant, subject to acceptance or rejection by the Agency.

The four classes of activities proposed by the Agency to be insignificant are further differentiated based on whether an activity must be individually listed in an application. All of the "non-traditional" activities and some of the specific "traditional" activities need not be individually listed in the application. These activities do not include size or throughput restrictions and these activities are expected to be present at most if not all sources. (See proposed 35 Ill. Adm. Code 201.210(b)). All of the other insignificant activities, including the other traditional emission units, the emissions criteria activities, and the case-by-case activities must be individually listed. (See proposed 35 Ill. Adm. Code 201.210(a)). Based on the list of insignificant activities submitted in a CAAPP application, the Agency or USEPA may find during the course of permitting that an activity should not qualify as insignificant. Such a finding might be based on the amount of emissions from an emission unit or applicable air pollution control requirements. In such circumstances, the owner or operator of a source would be required to supplement the application to address the activity and allow the Agency to prepare a CAAPP permit which appropriately addresses such activity. During a field inspection, Agency personnel may also verify whether the activities listed in an application were properly identified as insignificant by the owner or operator of the CAAPP source.

This multi-layered approach to insignificant activities was developed to provide simplicity and certainty for CAAPP permitting generally, while still allowing flexibility on a case-by-case basis. It is intended to assure that the environmental goals of Title V of the Clean Air Act are achieved, while minimizing the procedural and administrative burden on CAAPP applicants and the Agency.

The first class of insignificant activities, the "nontraditional" activities, is the one that I find most interesting. In day to day practice, the current state air pollution control permit program has been focused on individual equipment and operations, using what I can only describe as administrative common sense. The Agency has not required permits for cafeterias where cooking may release smoke and volatile organic material or maintenance of buildings which may involve painting, blasting, or welding. For purposes of the CAAPP, which is Illinois' version of the federal Title V permit program, it is appropriate to better define the activities of routine interest at a stationary source. It is apparent that there are a variety of activities at stationary sources that will not fit into a CAAPP permit, at least on an individual basis, because of limited impact on the environment, transitory nature, uncertainty of emissions, unpredictability of occurrence, or coincidental relationship to the source. To avoid any uncertainty in CAAPP permitting, the Agency is proposing to identify such activities as "insignificant".

In this respect, it is important to note that there may be requirements and obligations with respect to air pollution control that exist outside the CAAPP permit. For example, it is wholly inappropriate to address in a CAAPP permit individual asbestos removal activities, each use of architectural coating, each application of fertilizer to lawns, smoking by employees, or each job performed by refrigeration repair workers. The owner or operator of CAAPP sources will still be required to comply with control requirements for such activities, if such control requirements apply to the owner or operator of a source.

The Agency has also realized that even for equipment that is of interest for air pollution control, the Agency has used administrative common sense in implementing the State permit programs. The Agency has focused on stationary equipment and assemblages of components, termed "emission sources" under the existing State permit programs. The Agency also proposes to use the provisions for insignificant activities to formally continue this practice. The Agency is proposing to identify certain activities individually to be insignificant, e.g., an individual valve or pipeline flange in a chemical process or a particular engine being run on an engine test stand. In the absence of this clarification, these activities might inappropriately be treated as individual emission units. These activities, which will be referred to as emission points, are, however, to be addressed in the aggregate, as the group of components

The insignificant activities addressed in this subsection are required to b individually listed in a CAAPP application and generally contain eligibility criteria terms of emissions, capacity, size, materials being handled, and so forth. The listin of an activity in an application provides general notice to the Agency, USEPA, and th public that specific activities that are deemed insignificant are occurring at a source

i. Section 201.210(a)(1)

This subsection makes reference to the case-by-case process fo insignificant activities in proposed Section 201.211, which allows an emissio unit with up to 1.0 pound/hour emissions to be considered insignificant.

ii. Section 201.210(a)(2) and (a)(3)

These subsections establish the emission levels at and below which unit's emission of regulated pollutants other than hazardous air pollutants, e.g. particulate matter and volatile organic material, may be considered insignificant These cut-offs are 0.1 pound/hour or less and 0.44 ton/year, in the absence o air pollution control equipment.

iii. Section 201.210(a)(4) through (a)(18)

These subsections identify specific activities, that is, categories of equipment, which are proposed to be insignificant and for which individual listing in an application would be required. This portion of the Agency's proposal is generally self-explanatory and one should refer to the proposed rule for the specific equipment that the Agency is proposing for this treatment.

b. Section 201.210(b)(1) through (b)(29)

The insignificant activities proposed in this subsection are both traditional and nontraditional activities that the Agency would propose to not have individually listed in a CAAPP application. Rather, the applicant would denote in its CAAPP application whether any of the listed activities are present at the source. The Agency intends to provide a space on the CAAPP application form for insignificant activities whereby the applicant can indicate whether one or more of these activities are present.

Many of these provisions are self explanatory, and one is again referred to the Agency's proposal. A discussion of selected provisions follows, for which additional explanation is provided.

i. Section 201.210(b)(9)

This subsection addresses housekeeping activities, but does not include the use of cleaning materials that contain organic solvent. This Section is intended to address both portable vacuum cleaning equipment and centrally located vacuum cleaning systems used to collect dust as part of housekeeping activity. As such, it would not extend to continuously operated aspiration systems to control dust emissions. This section has also been written to accommodate immediate cleanup of solids or liquids following a spill or accidental release. In certain situations, reporting requirements or liability may apply to such a cleanup, pursuant to provisions for emergency releases. However, it is not appropriate to address or delay the remedial cleanup activity by CAAPP permitting.

ii. Section 201.210(b)(10)

criteria is specified at 68°F, (0.1 psi, measured at 68°F) as solvent vapor pressure data may be more readily available for a temperature of 68°F.

vi. Section 201.210(b)(20)

This subsection addresses a variety of manually operated equipment used for buffing, polishing, carving, cutting, drilling, machining, routing, sanding, sawing, scarfing, surface grinding, or turning. This subsection is supported by a proposed definition of "manually operated equipment" in Section 211.3620. The term manually operated equipment does not extend to central dust collection systems serving more than one machine or tool. The emissions from such central dust collection systems will be affected by the number and type of manually operated equipment being served, and therefore, it is not appropriate to extend this category to include such systems.

vii. Section 201.210(b)(21)

This subsection addresses the use of consumer products where the product is used at a source in a manner similar to the use the general public would make of a product. This use of consumer products extends to hazardous substances used in the same manner as normal consumer use.

viii. Section 201.210(b)(23)

This subsection addresses firefighting and firefighting training activities; provided, however, as specifically stated in a note, that state open burning permits may be required for certain firefighting training activity pursuant to 35 Ill. Adm. Code Part 237.

Exhibit 7.

May 25, 2016

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

Mr. Jason Roughton
RJ Industrial Recycling
5061 Energy Drive
Flint, MI 48505

Kotz Sangster Wysocki P.C
Mr. George F. Curran, III
400 Renaissance Center, Suite 3400
Detroit, MI 48243-1618

SRN: N7885, Genesee County

Dear Mr. Roughton and Mr. Curran:

VIOLATION NOTICE

On May 24, 2016, the Department of Environmental Quality (DEQ), Air Quality Division (AQD) conducted visible emission (VE) readings of your facility located at G5167 North Dort Highway, Flint. The purpose of this inspection was to determine compliance with the requirements of the federal Clean Air Act; Part 55, Air Pollution Control, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (Act 451); and Administrative Consent Order EPA number 5-15-113(a)-MI-02.

As a result of the evaluation on May 24, 2016, the following air pollution violations were identified:

Process Description	Rule/Permit Condition Violated	Comments
Torch cutting of scrap metal	Rule 301	Smoke from torch cutting operations exceeded 20% opacity
Torch cutting of scrap metal	Administrative Consent Order EPA 5-15-113(a)-MI-02, paragraph 23	Opacity exceedances show lack of or insufficient training of employees
Torch cutting of scrap metal	Administrative Consent Order EPA 5-15-113(a)-MI-02, Appendix A paragraph 8	Operators torching materials giving high emissions
Torch cutting of scrap metal	Administrative Consent Order EPA 5-15-113(a)-MI-02, Appendix A paragraph 10	SPARCS unit was not being used or was not operating, or was not effective
Torch cutting of scrap metal	Administrative Consent Order EPA 5-15-113(a)-MI-02, Appendix A paragraph 19	SPARCS unit was not being used or was not operating, or was not effective

During this inspection it was noted that your company's torch cutting processes were emitting opacity in excess of emissions allowed by Act 451, Rule 301.

Enclosed are copies of the instantaneous and six minute average readings taken on May 24, 2016, from 9:08 am to 9:53 am. It should be noted that this timeframe is not the only times in which opacity was witnessed on this date, but rather the times it was read and documented using Method 9 analysis.

In addition, opacity was observed on the dates of May 17, 18, and 19, 2016, by DEQ, AQD staff. Though Method 9 readings were not conducted during these days, it is the professional judgement of the AQD staff that the visible emissions observed were in excess of Rule 301.

The cited is enforceable per DEQ, AQD Rule 301 (R336.1301) and Administrative Consent Order EPA 5-15-113(a)-MI-02 paragraph 23, Appendix A paragraphs 8, 10, and 19 in the following manner:

Rule 301(1)(a) states: a person shall not cause or permit to be discharged into the outer air from a process or process equipment a visible emission of a density greater than the most stringent of the following: (a) A 6-minute average of 20% opacity, except for 1 6-minute average per hour of not more than 27% opacity. During the visible emissions readings, the maximum six minute opacity reading was 51.0%.

Paragraph 23 of the consent order requires "a training program and shall require all of its employees who conduct torch cutting, in addition to the appropriate supervisors and managers, to complete training on all aspects of the best management practices for torch cutting as described in Appendix A". Based on my observations, the individuals conducting torch cutting operations are not properly trained, or they are ignoring the training content and the site manager is not enforcing the standards.

Appendix A paragraph 8 states: "RJ shall ensure that its employees are aware of what materials are likely to produce higher VEs when torch cut and shall develop protocols to manage VEs when cutting those materials." Based on my observations, awareness of materials that produce higher VEs was either ignored or unknown to the torch operator.

Appendix A paragraph 10 states: "RJ shall utilize the SPARCS units, which are designed to reduce opacity from torch-cutting operations." Observations of the torch cutting operations were made without the use of the SPARCS equipment.

Appendix A paragraph 19 states: "RJ shall conduct torch cutting in a SPARCS unit at any time when, due to the scraps metallurgical properties and size, emissions are expected to exceed the VE limit in R336.1301(1)(a) of the Michigan SIP. Observations of torch cutting operations were made without the use of SPARCS.

Please initiate actions necessary to correct the cited violations and submit a written response to this Violation Notice by June 15, 2016. The written response should include: the dates the violations occurred; an explanation of the causes and duration of the violations; whether the violations are ongoing; a summary of the actions that have been taken and are proposed to be taken to correct the violations and the dates by which these actions will take place; and what steps are being taken to prevent a reoccurrence.

If RJ Industrial Recycling believes the above observations or statements are inaccurate or do not constitute violations of the applicable legal requirements cited, please provide appropriate factual information to explain your position.

Thank you for your attention to resolving the violations cited above. If you have any questions regarding the violations or the actions necessary to bring this facility into compliance, please contact me at the telephone number listed below.

Sincerely,

Nathan Hude
Environmental Quality Analyst
Air Quality Division
517-284-6779

NNH:TG

Enclosures

cc/via e-mail: Ms. Sarah Marshall, EPA
Mr. Raymond Cullen, EPA
Ms. Lynn Fiedler, DEQ
Ms. Teresa Seidel, DEQ
Ms. Heidi Hollenbach, DEQ
Mr. Thomas Hess, DEQ
Mr. Brad Myott, DEQ

Exhibit 8.

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Unanticipated potential cancer risk near metal recycling facilities

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ABSTRACT

Metal recycling is an important growing industry. Prior to this study, area sources consisting of metal recycling facilities fell in a category of limited regulatory scrutiny because of assumed low levels of annual emissions. Initiating with community complaints of nuisance from smoke, dust and odor, the Houston Department of Health and Human Services (HDHHS) began a monitoring program outside metal recycler facilities and found metal particulates in outdoor ambient air at levels which could pose a carcinogenic human health risk. In a study of five similar metal recycler facilities which used a torch cutting process, air downwind and outside the facility was sampled for eight hours between 6 and 10 times each over 18 months using a mobile laboratory. Ten background locations were also sampled. Iron, manganese, copper, chromium, nickel, lead, cobalt, cadmium and mercury were detected downwind of the metal recyclers at frequencies ranging from 100% of the time for iron to 2% of the time for mercury. Of these metals, chromium, nickel, lead, cobalt, cadmium and mercury were not detected in any sample in the background. Two pairs of samples were analyzed for total chromium and hexavalent chromium to establish a ratio of the fraction of hexavalent chromium in total chromium. This fraction was used to estimate hexavalent chromium at all locations. The carcinogenic risk posed to a residential receptor from metal particulate matter concentrations in the ambient air attributed to the metal recyclers was estimated from each of the five facilities in an effort to rank the importance of this source and inform the need for further investigation. The total risk from these area sources ranged from an increased cancer risk of 1 in 1,000,000 to 6 in 10,000 using the 95th upper confidence limit of the mean of the carcinogenic metal particulate matter concentration, assuming the point of the exposure is the sample location for a residential receptor after accounting for wind direction and the number of shifts that could operate a year. Further study is warranted to better understand the metal air pollution levels in the community and if necessary, to evaluate the feasibility of emission controls and identify operational improvements and best management practices for this industry.

This research adds two new aspects to the literature: identification of types and magnitude of metal particulate matter air pollutants associated with a previously unrecognized area source, metal recyclers and their potential risk to health.

1. Introduction

The aim of this study was to investigate metal particulate matter concentrations at an area source concerning air pollution previously not considered significant and use carcinogenic risk assessment to rank the severity of the human health threat. The particular area source category we investigate, metal recyclers, was first recognized as a possible hazard by the residents of nearby neighborhoods. Communities in Houston, Texas, the fourth largest city in the United States, complained to the Houston Department of Health and Human Services (HDHHS) repeatedly between 2004 and 2012 regarding odor, smoke, and dust from metal recycler facilities in their neighborhood. Motivated by public health concerns, and not just by violation of any state or federal regulation, the City of Houston responded to the community complaints with initiation of air monitoring off-site of local metal recycler facilities. What the communities recognized as a smoke, dust and odor

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nuisance has ultimately been found to pose a potential health concern due to the chemical composition of the emissions.

Metal particulate matter emissions are generated from cutting metal to be recycled on an industrial scale. The term metal cutting encompasses a broad range of metal recycler destruction from shredding to torch cutting. Torch cutting is the destruction process of most concern because the process generates fine particulate matter air pollution. Evidence that short term exposure to particulate matter air pollution is associated with morbidity and mortality is increasingly found in the literature, especially with respect to fine particulate matter of aerodynamic diameter smaller than 2.5 μm (PM2.5) (Pope and Dockery, 2006). There is growing evidence that the chemical composition of particulate matter is another important consideration when studying the health impact (De Hartog et al., 2009; Franklin et al., 2008). Though not previously specifically studied, the particulate matter from metal recyclers is likely composed of metals often seen in surface coatings (e.g., arsenic, cadmium, chromium, mercury, lead and selenium), and the alloys themselves which are being recycled (e.g., iron, chromium, copper, cobalt, manganese and nickel), some of which are toxic.

Section 112 of the United States Clean Air Act addresses emissions of hazardous air pollutants (HAPs). This section divides stationary sources, or groups of stationary sources, into two categories: major sources and area sources. A major source is defined as a stationary source that either emits or has the potential to emit 10 tons per year (tpy) of a HAP or 25 tpy or more of a combination of HAPs. An area source is defined as any stationary source that is not a major source, thus emits less than 10 tpy of a single HAP and less than 25 tpy of a combination of HAPs. The metal recyclers in Houston analyzed in this study fall in the area source category. Metal HAP emissions, from certain types of area sources including metal recyclers are not required to be controlled, measured, inventoried or modeled, while other types of area sources are required to be controlled and measured. As a result there is large uncertainty in regulatory estimates of emissions from area sources generally, and especially from the area sources without effective control requirements, like metal recyclers.

2. Materials and methods

2.1. Facility selection

The U.S. Census Bureau statistics of U.S. Businesses (Census.gov) indicates that there are over 100 metal recycler facilities in Houston. We conducted particulate matter ambient air monitoring using a mobile ambient air monitoring laboratory for a collective total of 48 days at five of the medium sized metal recyclers in four different communities. While we did not measure the emissions, the concentrations in the ambient air reflect emissions from the facilities because continuous weather data (wind direction and speed) were recorded during the sampling period. Only days when air monitoring data were collected entirely downwind of the facility, according to weather monitoring and back trajectory analysis, were included in this analysis.

These metal recycler facilities are similar in size, processing an estimated 200 to 500 tons per day of steel and various other recyclable metals, use metal torch cutting, have similar regulatory authorizations and are located in mixed industrial-residential areas. Each metal torch cutting facility is authorized under Title 30 of the Texas Administrative Code (30 TAC) §106.265 Handheld and Manually Operated Equipment, which provides no limitations regarding management practices, distances to offsite receptors or emissions from the metal torch cutting operations, provided the total emissions do not exceed Title V Air permit threshold limits per (30 TAC) §106.4.

An often used rationale for inaction regarding smaller industrial type area emission sources is that the potential risk is mitigated because of an assumed lack of human receptors. This is not a valid assumption for this particular type of area source, especially in Houston where a lack of zoning restrictions results in residences and industry frequently being located in close proximity with each other, and in some cases, sharing a fence line. The metal recyclers studied are in populated communities with a diversity of ethnicity, income and education. Table 1 lists the community name, the metal recyclers in that community and a description of the community (FILES: Census, 2010 Summary File 1; FILES: 2006–2010 American Community Survey).

Within one mile of each of the facilities studied are numerous neighborhood features which serve as indicators that these area sources are not located in predominantly industrial areas (Table 2).

For control and comparison purposes, we also sampled at ten other locations across the city to assess background metal particulate matter concentrations. All locations where background sampling was conducted were upwind of any nearby metal recyclers during sampling. The ten comparison locations consisted of industrial facilities as well as parks and neighborhood centers. The locations of the known metal recyclers in Houston, the five facilities studied, and the comparison/control points are shown in Fig. 1. Filter blank samples were also collected for quality assurance. The number of blank samples equal 20% of the total samples collected.

2.2. Sampling and analysis

Total suspended particulate matter (TSP) samples were collected downwind from these facilities using high volume samplers operating at a flow rate of 85 l/m for a collective total of 48 days at locations 50 to 100 ft outside the facility fence. The high volume sample model, HiQ Hi-Vol Model #: CF-1002BRL-DGTL, was purchased from Hi-Q Environmental Products located in California. While future research will consider particulate matter broken down by size fraction, in this study, we restrict analysis to TSP because the City of Houston sampling and analysis capacity was more limited with other size fractions.

The sample durations lasted approximately 8 h per deployment. The location of the mobile lab outside of the facility was selected based on wind direction to ensure that the concentrations in the ambient air were downwind of the facility.

Each facility was sampled several times over a span of 18 months (6 to 13 times). Samples were collected on 47 mm binderless quartz fiber filters. The metals in the particulate matter samples were analyzed by inductively coupled plasma using the United States Environmental Protection Agency (EPA) method 6010 (EPA, 2007) at the City of Houston laboratory. The laboratory is accredited through the National Environmental Laboratory Accreditation Program for all the metals analyzed in this study.

In addition to the high volume samplers, HAZ-DUST EPAM-5000 samplers were used to collect TSP and PM10 data for hexavalent chromium (CrVI) speciation. The HAZ-DUST EPAM-5000 was purchased

Table 1
Characteristics of the communities in vicinity of metal recyclers studied.

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	3979	25–34	$61,910	16
Magnolia Park/Harrisburg	Facility 2/Facility 3	Hispanic	4188	25–34	$28,257	57
South Park	Facility 4	African American	4545	34–54	$32,635	46
Sunnyside	Facility 5	African American	937	25–34	$48,694	10

Table 2
Neighborhood features within a mile from metal recycling facility.

	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	–

from Environmental Devices Corporation. The unit uses an infra red detector to estimate particle concentrations μg/m^3, has a calibrated flow of 4.0 lpm and collects samples on a 47 mm filter for laboratory analysis. The HAZ-DUST EPAM-5000 was used because the flow rate is lower (4 lpm) than the high volume rate and the currently acceptable methodologies (National Institute for Occupational Safety and Health et al., 1985) all require a lower flow rate and smaller sample volume than the TSP method to prevent sample loss or conversion of CrVI. The samples for CrVI were prepared and analyzed by ion chromatography as referenced in OSHA ID 215 and our sample collection was consistent with the method (Occupational Safety and Health Administration, 1998).

3. Results

3.1. Ambient air metal particulate matter results

TSP samples were collected for 48 days at the metal recycler locations and 10 days at the comparison (background) locations. 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), cobalt (Co) and mercury (Hg). At the five study locations, Ag was not detected and Hg was detected once at one location. Zn was detected in all samples including significant concentrations in the blank filter samples and at the ten comparison and control locations used for background; therefore, the Zn results are not considered accurate. Hg, Ag and Zn were eliminated from further assessment.

The number of sample days, arithmetic mean, standard deviation, percent of sample days with concentrations above the detection limit, the assumed distributional shape and 95th upper confidence limit of the mean based on the assumed distribution shape (Singh and Singh, 2003; Singh et al., 2006) are summarized for each metal by facility in Table 3. Calculations were performed in SAS and ProUCL statistical software (SAS, 2010; ProUCL, 2011).

The statistical assessment indicates that the most commonly detected metals across the five locations were Fe, Mn, Cu, and Cr, with an average detection rate of 100%, 98%, 96% and 92% respectively. In contrast, Cd was detected at only one location and in only 31% of the samples at that location and Co was detected at only two of the locations, in 14 and 75% of the samples at those locations (Table 3). The distributions of the Fe, Mn, Cu, and Cr across the five sites were found to be variable with the largest difference in relative range associated with Cr (Fig. 2 a,b,c,d).

In comparison, only three metals, Fe, Mn and Cu, were detected at the locations used to represent background (Table 4). The background concentrations of the detected metals were significantly lower than the concentrations at the metal recyclers (Table 3 and Fig. 2).

As expected, the time series of certain metal concentrations at the five study locations were found to be linearly correlated according to Pearson correlation coefficients. For example, Fe and Mn were linearly correlated at four of the five locations: facility 1 0.96, facility 2 0.92, facility 4 0.86 and facility 5 0.64. Each facility had at least two pairs of metals with statistically significant correlations greater than 0.80.

While Cr (total) was routinely collected with the other metals, as noted above, two CrVI samples were collected simultaneously with Cr total, one TSP and one PM10. The results of the simultaneous sampling were used to develop a ratio of total Cr that is CrVI, which could be used to estimate the CrVI fraction when only Cr total was measured. Note, EPA assumes 34% of the reported chromium is CrVI when other data are not available (EPA, 2010). Our results indicate the percentage of total Cr that is CrVI in ambient air downwind from metal recyclers to

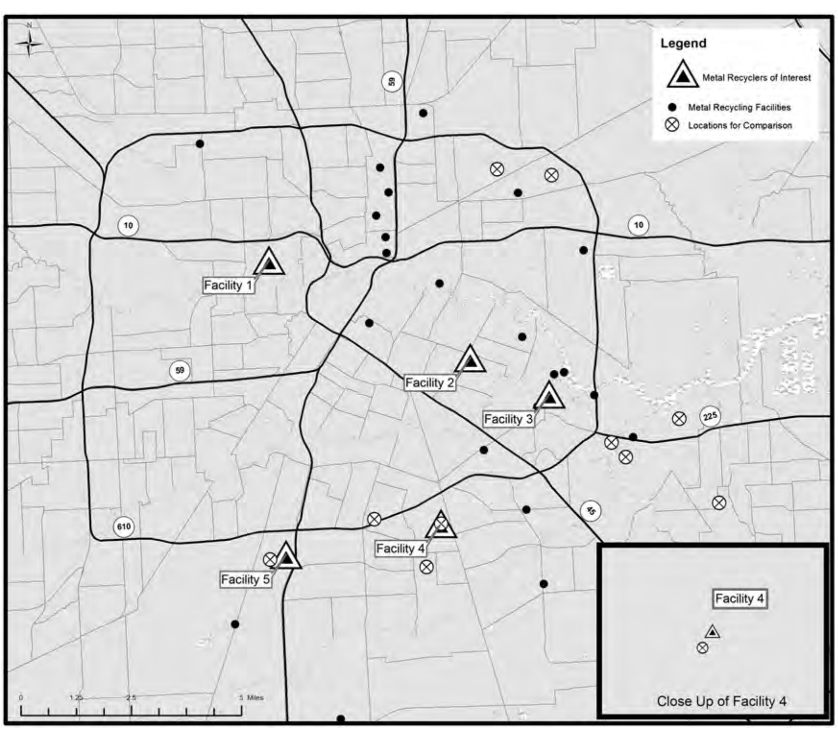

Fig. 1. Metal recycler facilities in Houston, facilities in study, and comparison/control locations.

Table 3
Descriptive statistics of metal concentrations.

Metal	Statistic	Facility 1	Facility 2	Facility 3	Facility 4	Facility 5	Background
		n = 10	n = 6	n = 7	n = 12	n = 13	n = 10
		μg/m^3					
Cd	Mean (SD)	NA	NA	NA	NA	0.026 (0.022)	NA
	% detected	0	0	0	0	31	0
	Distribution	NA	NA	NA	NA	None discernible	NA
	95th UCL	NA	NA	NA	NA	0.0532	NA
Co	Mean (SD)	NA	NA	0.016 (0.002)	0.048 (0.072)	NA	NA
	% detected	0	0	14	75	0	0
	Distribution	NA	NA	None discernible	None discernible	NA	NA
	95th UCL	NA	NA	0.0169	0.138	NA	NA
Cu	Mean (SD)	0.11 (0.08)	1.317 (0.718)	0.139 (0.057)	0.471 (0.523)	0.296 (0.186)	0.0341 (0.0386)
	% detected	90	100	100	92	100	71
	Distribution	Normal	Normal	Normal	Gamma	Normal	None discernible
	95th UCL	0.156	1.907	0.181	0.911	0.388	0.079
Cr	Mean (SD)	0.036 (0.015)	0.095 (0.109)	0.751 (0.665)	0.312 (0.28)	0.129 (0.121)	NA
	% detected	60	100	100	100	100	0
	Distribution	Normal	Gamma	Normal	Gamma	Gamma	NA
	95th UCL	0.044	0.288	1.239	0.532	0.208	NA
Fe	Mean (SD)	12.47 (9.45)	4.3 (1.748)	8.377 (5.64)	14.28 (8.857)	18.21 (16.94)	1.731 (1.419)
	% detected	100	100	100	100	100	100
	Distribution	Normal	Normal	Normal	Normal	Gamma	Gamma
	95th UCL	17.95	5.738	12.52	18.87	31.59	2.595
Pb	Mean (SD)	0.21 (0.282)	0.44 (0.313)	0.93 (0.04)	0.096 (0.05)	0.249 (0.242)	NA
	% detected	40	100	14	100	92	0
	Distribution	Gamma	Normal	None discernible	None discernible	Gamma	NA
	95th UCL	0.383	0.697	0.123	0.121	0.385	NA
Mn	Mean (SD)	0.147 (0.103)	0.096 (0.056)	0.21 (0.079)	0.24 (0.132)	0.22 (0.129)	0.0344 (0.0285)
	% detected	90	100	100	100	100	64
	Distribution	Normal	Normal	Normal	Normal	Gamma	Gamma
	95th UCL	0.206	0.142	0.269	0.309	0.313	0.049
Ni	Mean (SD)	0.064 (0.32)	0.149 (0.142)	0.423 (0.18)	0.766 (0.618)	0.157 (0.129)	NA
	% detected	30	50	100	100	85	0
	Distribution	None discernible	Gamma	Normal	Normal	Gamma	NA
	95th UCL	0.082	0.382	0.555	1.087	0.243	NA

SD, standard deviation. 95th UCL refers to the 95th upper confidence limit of the mean based on the distributional shape. If there was no discernible distribution, the 95th upper confidence limit of the mean for the t distribution was used.

be approximately 10% (0.042 μg/m^3/0.396 μg/m^3). This same percentage of total Cr that is CrVI found in the TSP sample was also found in the simultaneously collected PM10 sample.

3.2. Ambient air metal particulate matter risk

Of the metals detected in the ambient air downwind of the metal recyclers, Ni, Cd, CrVI, and Co are carcinogenic. None of these metals were detected in the ambient air at the background locations. In order to determine if the metal concentrations detected in the ambient air offsite of the metal recyclers were potentially posing an increased cancer risk above acceptable levels, the concentrations were first compared with screening level concentrations. The screening levels were calculated using EPA methodology for assessing inhalation human health risk (EPA, 2009), assuming a residential exposure, a risk of one in a million as the acceptable risk level, and toxicity values obtained from EPA's Integrated Risk Information System (IRIS) with the exception of cobalt (IRIS, 2012a,b). The toxicity value for cobalt is from the Provisional Peer Reviewed Toxicity Values for Superfund (EPA, 2003).

The residential carcinogenic screening level (SL) is calculated as follows:

$$\mathrm{SL} = (TR \times AT)/(EF \times ED \times ET \times IUR)$$

TR Target risk (1×10^{-6});
AT Average time (70 years lifetime × 365 days/year × 24 h/day);
EF Exposure frequency (350 days/year);
ED Exposure duration (30 years);
ET Exposure time (24 h/day);
IUR Inhalation unit risk ($(\mu g/m^3)^{-1}$)

The metal concentrations measured 50 to 100 ft downwind of the site fence line represent the concentration detected in an 8 hour period. This concentration reflects emissions resulting directly from the industrial operations because the monitoring sites were selected based on current and forecasted wind direction data. In order to approximate an annual concentration, the 8 hour concentration was adjusted for the hours and days a facility operates in a year.

Facilities may operate continuously or fewer shifts a day (i.e., one, two or three 8 hour shifts a day). Most facilities are closed on Sundays. For a facility working three 8 hour shifts a day and closed on Sunday, a reasonable approximation of the annual potential exposure concentration would be the 95th upper confidence limit of the mean of the measured 8 hour concentration adjusted for zero emissions on Sunday (i.e., 8 hour concentrations multiplied by 6/7). If the facility worked less than three 8 hour shifts a day while operating, the concentration is adjusted down accordingly. For example, the annual concentration is derived as follows:

$$C_{Annual} = C(8\,h) \times (6/7) \times n/3$$

C_{Annual} Annual concentration, $\mu g/m^3$
C_{8h} 95th upper confidence limit of measured 8 hour mean concentration, $\mu g/m^3$
n Number of 8 hour shifts per day.

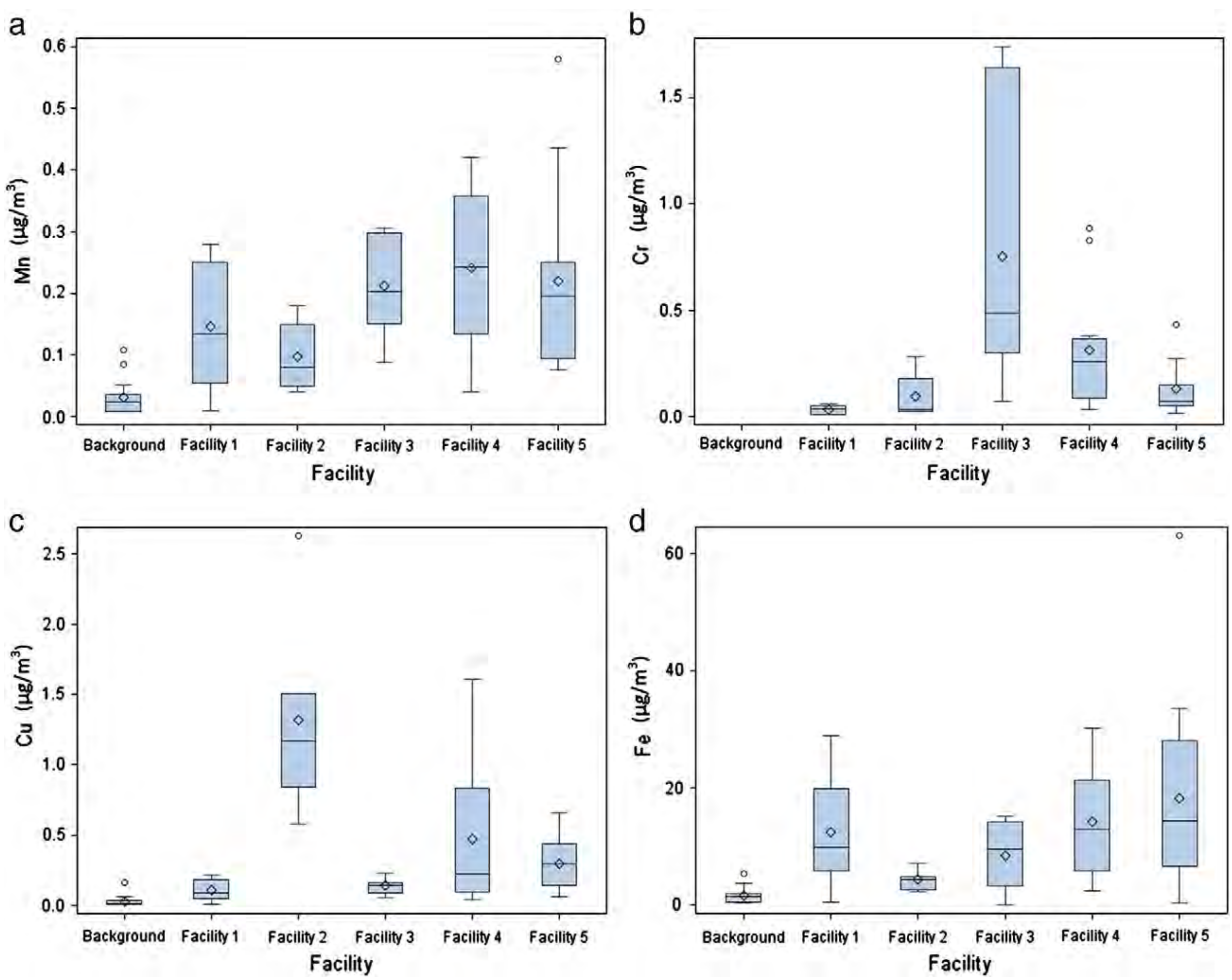

Fig. 2. Distribution plots of most commonly detected metals by location μg/m^3. a) Upper left: Mn b) upper right: Cr c) lower left: Cu d) lower right: Fe.
Circle are outliers defined as 1.5x interquartile range below the 25th percentile and above the 75th percentile.
The length of the box represents the interquartile range (the distance between the 25th and 75th percentiles).
The symbol (diamond) in the box interior represents the group mean.
The horizontal line in the box interior represents the group median.
The vertical lines (whiskers) issuing from the box extend to the group minimum and maximum values that are not outliers.

Table 5 lists each carcinogenic metal found at the facility and not in the background, the inhalation unit risk toxicity value, (IRIS, 2012a,b) the 95th upper confidence limit of the 8 hour mean metal concentrations measured during sampling and the estimate of the annual concentration adjusted based on a range of number of facility operating shifts per workday. The table also lists the corresponding residential inhalation carcinogenic screening level per metal. The number of checks in the table indicates the number of shift schedule weighted concentrations which exceed the screening level (e.g., three checks indicate that the concentration exceeded the screening level for the three shift scenarios presented). Every facility in the study with detectable metals exceeded the screening level for at least one metal over all shift scenarios.

Table 4
Average frequency of detection of metals downwind of metal recycler area sources and background.

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

As a second step, the total risk from the carcinogenic metals emitted at each facility was calculated by summing over the risk each metal at a facility poses (Table 6). This risk value provides a measure of the potential magnitude resulting from exposure to more than one metal, for populations near metal recyclers in Houston.

The risk was calculated as follows:

$$Risk = C_{Annual} \times (EF \times ED \times ET \times IUR)/AT.$$

The concentrations used to calculate the risks above assume a constant wind direction throughout the year. Because wind direction is not constant and the concentrations of these metals were not detected in the background, the actual annual concentrations will be lower when the concentrations from the metal recyclers are averaged with the background. While future research should address longer term monitoring

Table 5
Facility concentrations compared with residential carcinogenic screening levels.

Facility	Metal	Inhalation unit risk (per μg/m^3)	Measured concentration (μg/m^3)	Annual concentration (μg/m^3)[a]			Residential carcinogenic screening level (μg/m^3)	Exceeded
			8 h[b]	1 shift/day	2 shifts/day	3 shifts/day		
1	CrVI[b]	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[b]	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[b]	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[b]	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[b]	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	√√√

[a] Assume 6 day work week.
[b] Concentration estimated from CrVI/Cr total ratio.

to better estimate the annual concentration, in the absence of more precise information a simplistic approach is used.

The wind direction history indicates that the prevailing wind direction in Houston is southeasterly, with southeasterly winds occurring approximately 12% of the time (TCEQ, 2012). To approximate the long term metal concentration northwest of a metal recycler, we assumed that the measured metal concentrations downwind from a metal recycling operation occurs 12% of the time and that the background concentrations (0 metal concentration) occurs the remaining 88% of the time. Taking 12% of total risk in Table 7 provides a range spanning risk posed from constant downwind to 12% of the year downwind.

These risk estimates, are used to frame the potential risk to residents, and do not represent personal exposure. While there are limitations to this comparison, the results provide a means of informing regulators regarding the relative rank of potential health threat of sources in the city. The estimated increased cancer risks range from 1 case in 1,000,000 to 8 cases in 10,000 depending upon the facility, the operating schedule and the wind direction.

4. Discussion and conclusions

In response to community complaints regarding smoke and dust nuisance, we detected metals in ambient air off-site of metal recyclers at concentration levels of potential concern for increased carcinogenic risk. These metals were not detected at background locations. After accounting for wind direction and the number of shifts that could operate a year, the total risk from these area sources ranged from an increased cancer risk 1 case in 1,000,000 to 8 cases in 10,000 depending upon the facility.

Table 6
Human health risk for residential exposure to facility concentrations.

	Metal	Carcinogenic risk from metal concentrations			
			1 shift/day	2 shifts/day	3 shifts/day
Facility 1	CrVI[a]		6.25E−06	1.25E−05	1.87E−05
	Ni		2.33E−06	4.65E−06	6.98E−06
		Total	8.57E−06	1.71E−05	2.57E−05
Facility 2	CrVI[a]		4.05E−05	8.11E−05	1.22E−04
	Ni		1.08E−05	2.16E−05	3.24E−05
		Total	5.13E−05	1.03E−04	1.54E−04
Facility 3	CrVI[a]		1.75E−04	3.49E−04	5.24E−04
	Ni		1.57E−05	3.14E−05	4.71E−05
	Co		1.79E−05	3.58E−05	5.37E−05
		Total	2.08E−04	4.16E−04	6.24E−04
Facility 4	CrVI[a]		7.49E−05	1.50E−04	2.25E−04
	Ni		3.08E−05	6.17E−05	9.25E−05
	Co		1.46E−04	2.92E−04	4.38E−04
		Total	2.52E−04	5.03E−04	7.55E−04
Facility 5	CrVI[a]		2.93E−05	5.86E−05	8.78E−05
	Ni		6.87E−06	1.37E−05	2.06E−05
	Cd		1.13E−05	2.25E−05	3.38E−05
		Total	4.74E−05	9.48E−05	1.42E−04

[a] Concentration estimated from CrVI/Cr total ratio.

4.1. National Air Toxic Assessment

The EPA uses the National Air Toxic Assessment (NATA) (Technology Transfer Network, 2012a) as a screening tool that state, local, and tribal agencies may use to prioritize pollutants, identify areas of concern, and develop a better understanding of the risks posed from air pollution to residents at the census tract level (Pechan and Associates Inc., 2006; Technology Transfer Network, 2012b). NATA is developed using the National Emission Inventory (NEI). Area source emissions like metal recyclers that are not reported for the NEI at the source level are referred to in NEI and NATA as non-point sources. A review of the non-point source categories used by NATA and the NEI indicates that metal recycler emissions were not included in the NEI and therefore not reflected in NATA.

4.2. Plausibility of findings

Are these findings plausible given the physical process? *Yes.* Little information on emissions from torch metal cutting exists in the literature but emissions from metal welding have been well studied. The processes are physically similar enough to glean some understanding of what types of emissions may be expected from metal cutting from what is known about metal welding. Generally, gas welding torches have two tubes of oxygen and fuel and cutting torches have three tubes of oxygen, fuel, and another oxygen tube controlled by a blast

Table 7
Total risk ranges by facility for prevailing downwind locations.

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

trigger. The oxygen blast trigger is used to increase the torch flame to cut through thick metals (Finch, 2007). The body of the torch and the nozzle direction is at an obtuse angle for welding and a 90° angle for cutting. The former is designed for precision and the latter for power.

From research on emissions from welding, we can expect torch metal cutting to generate particulate matter of Cr, CrVI, Mn, Ni and Pb in at least two size modes (Serageldin and Reeves, 2009). Our study detected these metals in addition to Co.

A strong time series correlation between two air contaminants indicates there is a common source. The strong time series correlations for Fe and Mn concentrations were expected because we expect the metal recyclers to conduct a significant amount of torch cutting of steel. We know that the primary constituent of steel is Fe, while Mn is one of the more common constituents found in steel alloys.

Of special interest is information regarding CrVI because it is highly toxic, reflects the highest risk in our preliminary findings and limited concentration information exists compared with other metals (EPA, 1994), perhaps because it requires special sampling and analysis techniques. Depending upon the welding method, the ratio of CrVI/Cr generated in air varies: 55% for shielded metal arc welding, 5% for gas metal arc welding, 10% for flux core arc welding and 0.05% for submerged arc welding (In The Chromium File, 2002). Our preliminary findings indicate the percentage of Cr that is CrVI in ambient air is 10% ($0.042\ \mu g/m^3/0.396\ \mu g/m^3$). The ratios we are seeing from metal cutting are consistent with those found in arc welding.

Although not previously studied, given the similarity in the welding and torch metal cutting processes and what is known about emissions from welding, the concentrations we are seeing from metal recyclers are quite plausible.

4.3. Implications

This is the first evidence that an important and growing industry necessary for sustainable development, metal recyclers, may pose a significant human health risk. Citizen complaints about smoke and dust from metal recycling facilities led to a monitoring study by the City of Houston. Carcinogenic metal concentrations downwind of these facilities proved to be at levels which may potentially impact the health of the local community. Further study is warranted to better understand the metal air pollution levels in the community and if necessary, to evaluate the feasibility of emission controls and identify operational improvements and best management practices for this industry. As is likely true in other big cities with industrial operations, the local government focus in Houston has been largely committed to monitoring control of major source emissions and, although not within the local government jurisdiction, mobile source emissions are continually tracked because together mobile and major source emissions account for the vast majority of ambient air contamination in the city. In light of this study, while we continue to acknowledge that the majority of emissions stem from major and mobile sources, we now better recognize the need to examine area sources posing a neighborhood level, but significant risk.

4.4. Limitations

The data used in this study collected by the City of Houston in response to citizen complaints of smoke and dust are not the product of funded research. Consequently, the data collection and sampling analysis were limited to the City's capabilities. The data were limited to TSP samples collected outside the fence at one physical location per facility for 8 hour duration at between 6 and 13 different sampling periods per facility. Future research should include sampling at more locations throughout the neighborhood, more frequently throughout the year, for longer durations and smaller particulate matter size fractions. In addition, CrVI should be collected at each facility.

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References

Census.gov, [Internet] Census Bureau Economic Statistics. Washington, DC: U.S. Census Bureau. [updated 2012 Oct 31; cited 2012 Sep]. Available from: http://www.census.gov/econ/

De Hartog JJ, Lanki T, Timonen KL, Hoek G, Janssen NA, Ibald-Mulli A, et al. Associations between PM2.5 and heart rate variability are modified by particle composition and beta-blocker use in patients with coronary heart disease. Environ Health Perspect 2009;117:105–11.

EPA. Compilation of air pollutant emission factors: development of particulate and hazardous emission factors for electric arc welding; AP-42, section 12–19. Revised final report. Research Triangle Park, NC: EPA; 1994. [[cited 2012 Aug]. Available from: http://www.epa.gov/ttn/chief/ap42/ch12].

EPA. Provisional peer reviewed toxicity values for Superfund (PPRTV). [Internet]. [updated Jan 2012; cited 2013 Feb]Washington, DC 20460: Office of Superfund Remediation and Technology Innovation U.S. Environmental Protection Agency; 2003 [Available from http://hhpprtv.ornl.gov/index.html].

EPA. Hazardous waste test methods [Internet]. [cited 2013 Jan]; [1 pp.]. Available from: http://www.epa.gov/osw/hazard/testmethods/sw846/online/6_series.htm 2007.

EPA. Waste and cleanup risk assessment. Risk assessment guidance for Superfund (RAGS), volume 1: human health evaluation manual (part f, supplemental guidance for inhalation risk assessment. Office of Superfund Remediation and Technology Innovation Environment Protection Agency; 2009 [EPA-540-R-070-002;OSWER 9285.7-82].

EPA. List of air toxics in the 2005 NATA assessment. [Internet]Environmental Protection Agency; 2010 [[cited 2012 Aug]; [1 pp.]. Available from: http://www.epa.gov/ttn/atw/nata2005/05pdf/2005polls.pdf].

FILES: 2006–2010 American Community Survey [Houston, Texas]/prepared by Social Explorer. [Internet]. Cary: Oxford University Press [updated 2012 Sep; cited 2012 Sep]. Available from: http://www.socialexplorer.com

FILES: Census 2010 Summary File 1-[Houston, Texas]/prepared by Social Explorer. [Internet]. Cary: Oxford University Press [updated 2012 Sep; cited 2012 Sep]. Available from: http://www.socialexplorer.com

Finch R. Welder's handbook: a guide to plasma cutting, oxyacetylene, ARC, MIG, and TIG welding. New York: Penguin Group; 2007 [Print].

Franklin M, Koutrakis P, Schwartz P. The role of particle composition on the association between PM2.5 and mortality. Epidemiology 2008;19:680–9.

In The Chromium File. Chromium in stainless steel welding fumes. Paris, France: International Chromium Development Association; 2002. p. 9.

Integrated Risk Information. Chromium (VI) (CASRN 18540-29-9). [Internet]. Washington, DC: Environmental Protection Agency; 2012 [[updated 2012 Aug 9; cited 2012 Aug]. Available from: http://www.epa.gov/iris/subst/0144.htm].

Integrated Risk Information (IRIS). Internet. Washington, DC: Environmental Protection Agency; 2012 [[updated 2012 Oct 10; cited 2012 Aug]. Available from: http://www.epa.gov/iris/].

National Institute for Occupational Safety and Health, Occupational Safety and Health Administration, U.S. Coast Guard, U.S. Environmental Protection Agency. Final report. Occupational safety and health guidance manual for hazardous waste site activities; October 19851-198 [Available from: http://www.osha.gov/Publications/complinks/OSHG-HazWaste/all-in-one.pdf].

Occupational Safety and Health Administration. Final report. Hexavalent chromium in workplace atmospheres ID-215; 1998. p. 1-31. [Available from: http://www.osha.gov/dts/sltc/methods/inorganic/id215/id215.html].

Pechan EH, Associates Inc. Final report. [Internet] Documentation for the final 2002 nonpoint sector (final version) national emission inventory for criteria and hazardous air pollutants. 3622 Lyckan Parkway, Suite 2002 Durham, NC 27707: E.H. Pechan & Associates, Inc.; 2006. [[cited 2013 Feb]. Available from: ftp://ftp.epa.gov/EmisInventory/2002finalnei/documentation/nonpoint/2002nei_final_nonpoint_documentation0206version.pdf].

Pope III CA, Dockery DW. Health effects of fine particulate air pollution: lines that connect. J Air Waste Manag Assoc 2006;56:709–42.

ProUCL 4.1.00. Statistical software. [Internet]. Las Vegas Nevada: National Exposure Research Lab, EPA; 2011 [[updated 2012 Sep 13; cited 2013 Jan]. Available from: http://www.epa.gov/osp/hstl/tsc/software.htm#about].

SAS/STAT software, Version [9.3] of the SAS System for [Unix]. Statistical Software [Internet]. Copyright © [2010] SAS Institute Inc. SAS and all other SAS Institute Inc. product or service names are registered trademarks or trademarks of SAS Institute Inc., Cary, NC, USA. [cited 2012 Aug]. Available from: http://www.sas.com/presscenter/guidelines.html.

Serageldin M, Reeves DW. Development of welding emission factors for Cr and Cr(VI) with a confidence level. J Air Waste Manage Assoc 2009;59:619–26. http://dx.doi.org/10.3155/1047-3289.59.5.619.

Singh A, Singh AK. Estimation of the exposure point concentration term (95% UCL) using bias-corrected accelerated (BCA) bootstrap method and several other methods for normal, lognormal, and gamma distributions. Draft EPA Internal Report. Las Vegas, NV: Office of Research and Development. National Exposure Research Laboratory. Environmental Sciences Division; 2003.

Singh A, Maichle R, Lee S. On the computation of a 95% upper confidence limit for the unknown population mean based upon data sets with below detection limit observations. EPA/600/R-06/22. Available from: http://www.epa.gov/osp/hstl/tsc/softwaredocs.htm 2006.
TCEQ. [Internet] IAH Annual 1984–92. Austin: Texas Commission on Environmental Quality; 2012 [[cited 2012 Oct]. Available from: http://www.tceq.texas.gov/assets/public/compliance/monops/air/windroses/iahall.gif].
Technology Transfer Network, Air Toxics Web Site [Internet]. Area source standards. Washington, DC: Environmental Protection Agency; 2012a [[updated 2012a Sep 20; cited 2012 Aug]. Available from: http://www.epa.gov/ttn/atw/area/arearules.html].
Technology Transfer Network, Air Toxics Web Site [Internet]. Assessment methods. Washington, DC: Environmental Protection Agency; 2012b [[updated 2012b May 21; cited 2013 Feb]. Available from: http://www.epa.gov/ttn/atw/nata2005/methods.html].

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Exhibit 9.

World Health Organization
REGIONAL OFFICE FOR Europe

HEALTH EFFECTS OF PARTICULATE MATTER

Policy implications for countries in eastern Europe, Caucasus and central Asia

Abstract

This paper summarizes the evidence about the health effects of air pollution from particulate matter and their implications for policy-makers, with the aim of stimulating the development of more effective strategies to reduce air pollution and its health effects in the countries of eastern Europe, the Caucasus and central Asia.

Keywords
AIR POLLUTION - adverse effects
ENVIRONMENT AND PUBLIC HEALTH
ENVIRONMENTAL POLLUTANTS
HEALTH POLICY
PARTICULATE MATTER - analysis
POLICY MAKING

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Convention on Long-Range Transboundary Air Pollution

Abbreviations

AQG	air quality guidelines
EECCA	eastern Europe, the Caucasus and central Asia
PAH	polycyclic aromatic hydrocarbon
PM	particulate matter
UNECE	United Nations Economic Commission for Europe

Introduction and context

In most countries in the region covered by the United Nations Economic Commission for Europe (UNECE), ambient air quality has improved considerably in the last few decades. This has been achieved by a range of measures to reduce harmful air emissions, including those stipulated by the various protocols under the Convention on Long-range Transboundary Air Pollution *(1)*. There is, however, convincing evidence that current levels of air pollution still pose a considerable risk to the environment and to human health.

Recently, the Executive Body of the Convention has adopted amendments to the Convention's 1999 Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-level Ozone. Following years of negotiations, the approved revised text of the Protocol now specifies national emission reduction commitments for main air pollutants to be achieved by the UNECE Parties by 2020 and beyond. The revised Protocol includes, for the first time, commitments to reduce the emission of fine particulate matter ($PM_{2.5}$). Furthermore, black carbon or soot is now included in the revision as an important component of $PM_{2.5}$. Black carbon is an air pollutant which both affects health and contributes to climate change *(2)*.

What is particulate matter?

PM is a widespread air pollutant, consisting of a mixture of solid and liquid particles suspended in the air.

Commonly used indicators describing PM that are relevant to health refer to the mass concentration of particles with a diameter of less than 10 µm (PM_{10}) and of particles with a diameter of less than 2.5 µm ($PM_{2.5}$). $PM_{2.5}$, often called fine PM, also comprises ultrafine particles having a diameter of less than 0.1 µm. In most locations in Europe, $PM_{2.5}$ constitutes 50–70% of PM_{10}.

PM between 0.1 µm and 1 µm in diameter can remain in the atmosphere for days or weeks and thus be subject to long-range transboundary transport in the air.

PM is a mixture with physical and chemical characteristics varying by location. Common chemical constituents of PM include sulfates, nitrates, ammonium, other inorganic ions such as ions of sodium, potassium, calcium, magnesium and chloride, organic and elemental carbon, crustal material, particle-bound water, metals (including cadmium, copper, nickel, vanadium and zinc) and polycyclic aromatic hydrocarbons (PAH). In addition, biological components such as allergens and microbial compounds are found in PM.

Where does PM come from?

Particles can either be directly emitted into the air (primary PM) or be formed in the atmosphere from gaseous precursors such as sulfur dioxide, oxides of nitrogen, ammonia and non-methane volatile organic compounds (secondary particles).

Primary PM and the precursor gases can have both man-made (anthropogenic) and natural (non-anthropogenic) sources.

Anthropogenic sources include combustion engines (both diesel and petrol), solid-fuel (coal, lignite, heavy oil and biomass) combustion for energy production in households and industry, other industrial activities (building, mining, manufacture of cement, ceramic and bricks, and smelting), and erosion of the pavement by road traffic and abrasion of brakes and tyres. Agriculture is the main source of ammonium.

Secondary particles are formed in the air through chemical reactions of gaseous pollutants. They are products of atmospheric transformation of nitrogen oxides (mainly emitted by traffic and some industrial processes) and sulfur dioxide resulting from the combustion of sulfur-containing fuels. Secondary particles are mostly found in fine PM.

Soil and dust re-suspension is also a contributing source of PM, particularly in arid areas or during episodes of long-range transport of dust, for example from the Sahara to southern Europe.

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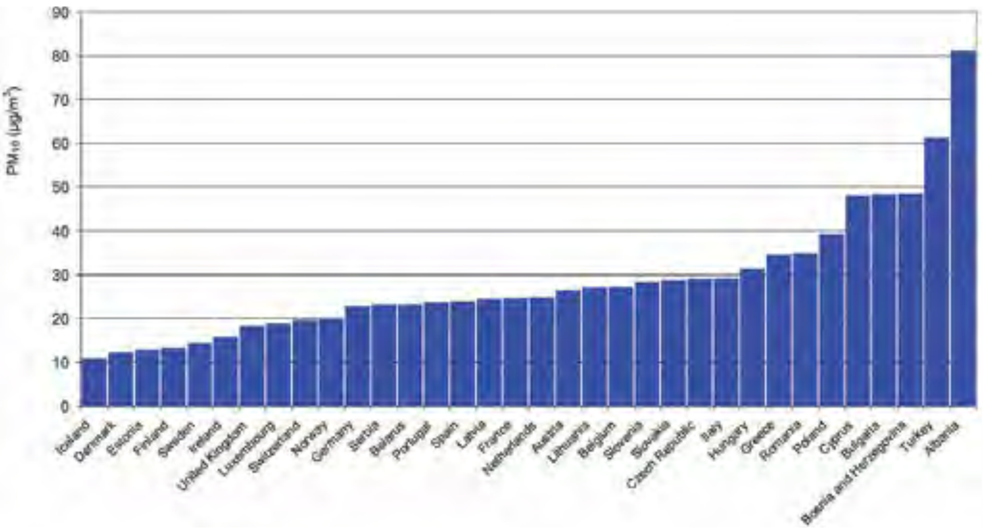
What are the levels of and trends in PM in the WHO European Region[1] ?

The WHO Environment and Health Information System (ENHIS), which is based to a large extent on data submitted by European Union (EU) member states to the European Environment Agency AirBase *(3)*, includes PM_{10} monitoring data from urban and suburban background locations. Fig. 1 presents the population exposure, expressed as annual mean concentration of PM_{10}, weighted by the population in cities with data, in 403 cities in 34 WHO European Member States for 2010. In only 9 of these 34 Member States, PM_{10} levels in at least some cities are below the annual WHO air quality guideline (AQG) level of 20 μg/m^3. Almost 83% of the population of the cities for which PM data exist is exposed to, PM_{10} levels exceeding the AQG levels. Although this proportion remains high, it is an improvement compared to previous years, with average PM_{10} levels slowly decreasing in most countries in the last decade.

Fig. 1.
Population-weighted annual mean PM_{10} in cities by WHO European Member State, 2010



Source: WHO Regional Office for Europe *(4)*.

On the other hand, monitoring of PM_{10} and $PM_{2.5}$ is very limited in countries in eastern Europe, the Caucasus and central Asia (EECCA), with only a small number of monitoring

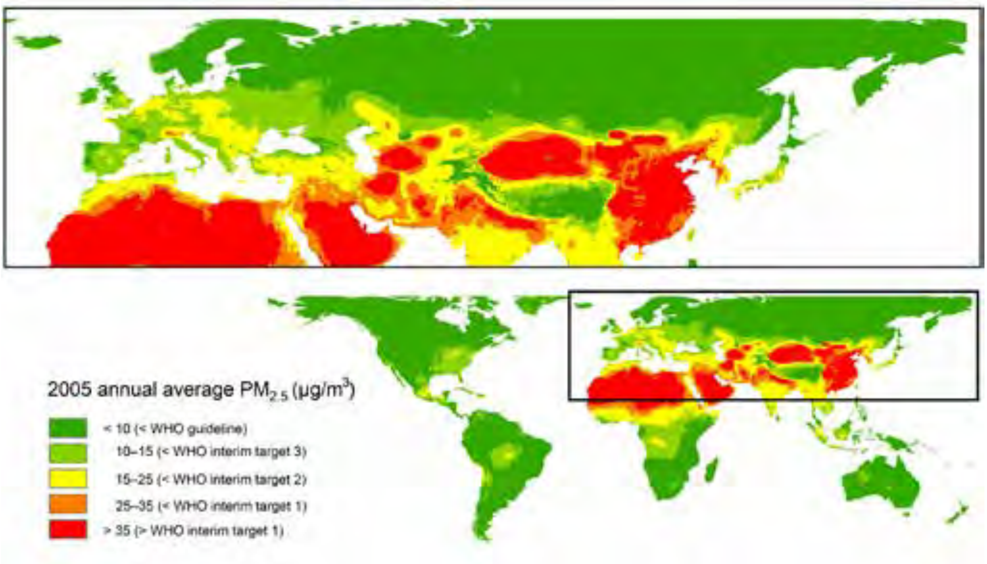
1 The WHO European Region includes 53 countries stretching from the Atlantic Ocean to the Pacific Ocean, with a population of almost 900 million people.

stations in Belarus, the Russian Federation (Moscow) and Uzbekistan (one in Tashkent and one in Nukus). Initial data from the two Uzbek cities indicate that PM_{10} and $PM_{2.5}$ levels are high in comparison with most of the other cities with PM monitoring in the Region. While the levels in Nukus may be affected by dust storms (which are frequent in that area), various combustion sources may be predominant in Tashkent.

The proper assessment of levels of and trends in PM in EECCA countries requires PM_{10} and/or $PM_{2.5}$ monitoring in more locations in those countries. The assessment of PM concentrations requires continuous monitoring conducted for 24 hours daily for 365 days a year, with standardized methods or methods equivalent to the standard. Quantitative knowledge about sources and levels of and trends in emissions of primary particles and precursor gases plays an important role in finding the best control strategy for reducing risks.

In view of the scarcity of ground-level data for PM, remote (satellite) sensing combined with modelling and existing surface measurements has recently been used for the assessment of population exposure at country level. Recent estimates have been published for $PM_{2.5}$ concentrations using this technology as part of the Global Burden of Diseases, Injuries and Risk Factors Project *(5)* (see Fig. 2). Further development of these methods and their precision depends to a large extent on the availability of surface measurements in all regions of the world.

Fig. 2.
Estimated 2005 annual average $PM_{2.5}$ concentrations (μg/m^3), presented according to the WHO AQG and interim target values



Source: Michael Brauer, personal communication based on *(5)*.

What are the health effects of PM?

PM_{10} and $PM_{2.5}$ include inhalable particles that are small enough to penetrate the thoracic region of the respiratory system. The health effects of inhalable PM are well documented. They are due to exposure over both the short term (hours, days) and long term (months, years) and include:

- respiratory and cardiovascular morbidity, such as aggravation of asthma, respiratory symptoms and an increase in hospital admissions;
- mortality from cardiovascular and respiratory diseases and from lung cancer.

There is good evidence of the effects of short-term exposure to PM_{10} on respiratory health, but for mortality, and especially as a consequence of long-term exposure, $PM_{2.5}$ is a stronger risk factor than the coarse part of PM_{10} (particles in the 2.5–10 μm range). All-cause daily mortality is estimated to increase by 0.2–0.6% per 10 $\mu g/m^3$ of PM_{10} *(6,7)*. Long-term exposure to $PM_{2.5}$ is associated with an increase in the long-term risk of cardiopulmonary mortality by 6–13% per 10 $\mu g/m^3$ of $PM_{2.5}$ *(8–10)*.

Susceptible groups with pre-existing lung or heart disease, as well as elderly people and children, are particularly vulnerable. For example, exposure to PM affects lung development in children, including reversible deficits in lung function as well as chronically reduced lung growth rate and a deficit in long-term lung function *(4)*. There is no evidence of a safe level of exposure or a threshold below which no adverse health effects occur. The exposure is ubiquitous and involuntary, increasing the significance of this determinant of health.

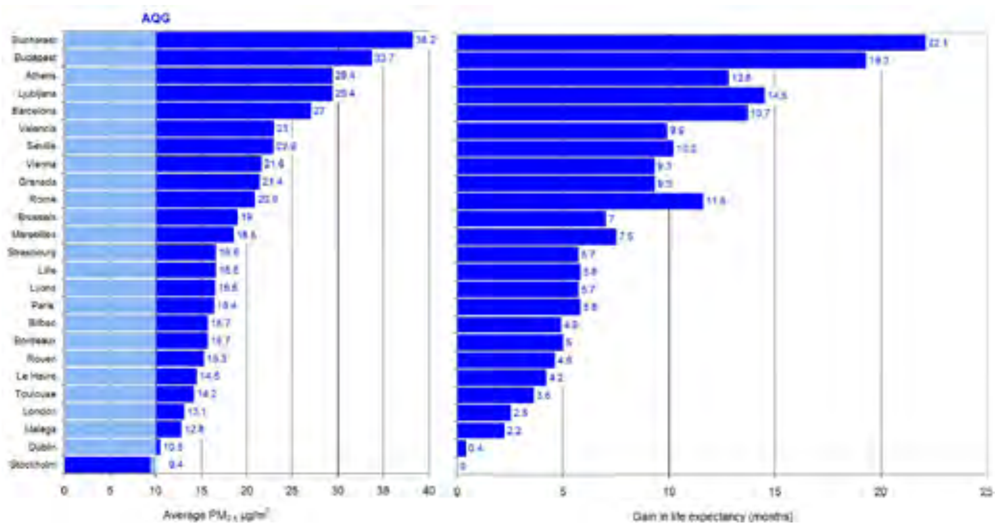
At present, at the population level, there is not enough evidence to identify differences in the effects of particles with different chemical compositions or emanating from various sources *(11)*. It should be noted, however, that the evidence for the hazardous nature of combustion-related PM (from both mobile and stationary sources) is more consistent than that for PM from other sources *(12)*. The black carbon part of $PM_{2.5}$, which results from incomplete combustion, has attracted the attention of the air quality community owing to the evidence for its contribution to detrimental effects on health as well as on climate. Many components of PM attached to black carbon are currently seen as responsible for health effects, for instance organics such as PAHs that are known carcinogens and directly toxic to the cells, as well as metals and inorganic salts. Recently, the exhaust from diesel engines (consisting mostly of particles) was classified by the International Agency for Research on Cancer as carcinogenic (Group 1) to humans *(13)*. This list also includes some PAHs and related exposures, as well as the household use of solid fuels *(14,15)*.

What is the burden of disease related to exposure to PM?

It is estimated that approximately 3% of cardiopulmonary and 5% of lung cancer deaths are attributable to PM globally. In the European Region, this proportion is 1–3% and 2–5%, respectively, in various subregions *(16)*. Results emerging from a recent study indicate that the burden of disease related to ambient air pollution may be even higher. This study estimates that in 2010, ambient air pollution, as annual $PM_{2.5}$, accounted for 3.1 million deaths and around 3.1% of global disability-adjusted life years *(17)*.

Exposure to $PM_{2.5}$ reduces the life expectancy of the population of the Region by about 8.6 months on average. Results from the scientific project Improving Knowledge and Communication for Decision-making on Air Pollution and Health in Europe (Aphekom), which uses traditional health impact assessment methods, indicate that average life expectancy in the most polluted cities could be increased by approximately 20 months if the long-term $PM_{2.5}$ concentration was reduced to the WHO (AQG) annual level (Fig. 3).

Fig. 3.
Predicted average gain in life expectancy (months) for people aged 30 years for a reduction in average annual levels of $PM_{2.5}$ down to the WHO AQG annual mean level of 10µg/m^3 in 25 European cities participating in the Aphekom project



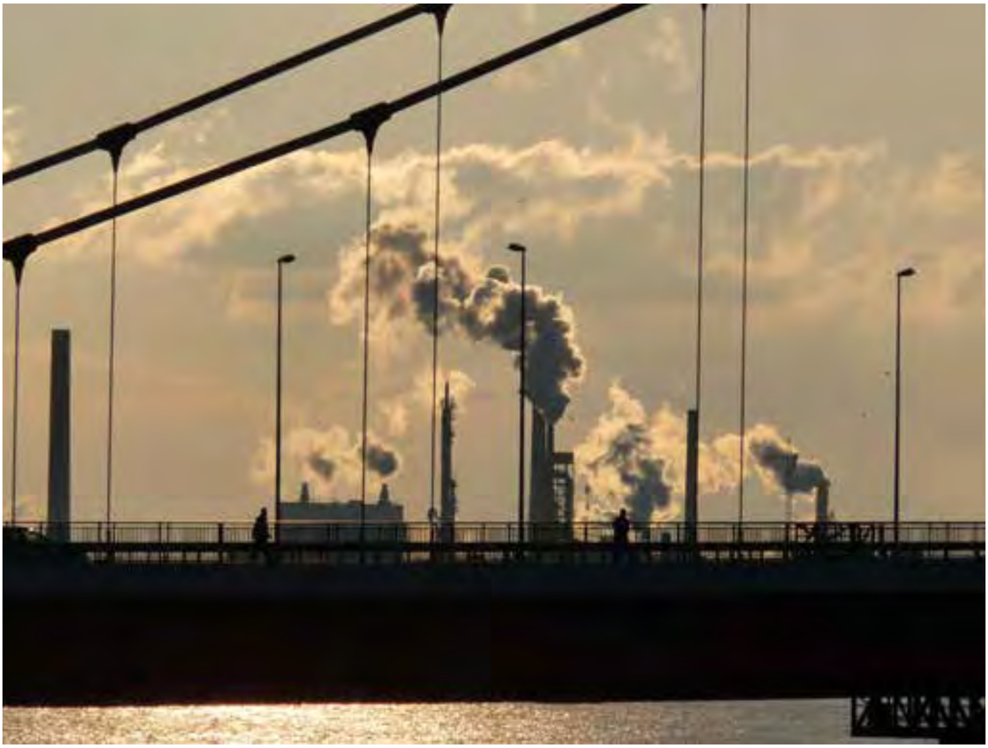
Source: based on Medina *(18)*.

WHO AQGs

WHO last revised its AQG values for PM in 2005, as follows:
- for $PM_{2.5}$: 10 µg/m^3 for the annual average and 25 µg/m^3 for the 24-hour mean (not to be exceeded for more than 3 days/year);
- for PM_{10}: 20 µg/m^3 for the annual average and 50 µg/m^3 for the 24-hour mean.

In addition to these guideline values, the AQGs provide interim targets for each air pollutant, aimed at promoting a gradual shift to lower concentrations in highly polluted locations. If these targets were to be achieved, significant reductions in risks for acute and chronic health effects from air pollution could be expected. Progress towards the guideline values should, however, be the ultimate objective. As no threshold for PM has been identified below which no damage to health is observed, the recommended values should be regarded as representing acceptable and achievable objectives to minimize health effects in the context of local constraints, capabilities and public health priorities.

WHO is currently developing indoor air guidelines for household combustion of fuels for cooking, heating and lighting. These will provide recommendations for household fuels and technologies that will enable progress towards the AQGs.



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Evidence on effects of air quality improvements

There is consistent evidence that lower air pollution levels following a sustained, long-term intervention result in health benefits for the population, with improvements in population health occurring soon (a few years) after the reduction in pollution. Several successful interventions and accountability studies have been evaluated *(19,20)*. A few examples are summarized below.

Follow-up to the Harvard Six Cities Study, United States

A group of adults living in six cities in the United States was followed from 1974 to 2009 in order to estimate the effects of air pollution on mortality. Overall, $PM_{2.5}$ concentrations had decreased to below 15 µg/m^3 by 2000 (except in one city where levels were below 18 µg/m^3). The main finding was that a 2.5 µg/m^3 decrease in the annual average level of $PM_{2.5}$ was associated with a 3.5% reduction in all-cause mortality *(21–23)*. Results show associations between chronic exposure to $PM_{2.5}$ and all-cause, cardiovascular and lung cancer mortality, with health effects seen at any PM concentration. Results suggest that the critical period of exposure to $PM_{2.5}$ for the associated health effects is one year for all-cause mortality, implying that health improvements can be expected to start almost immediately after a reduction in air pollution. In a related study, but using different data, it was demonstrated that the reduction in fine particulate air pollution in the United States in the 1980s and 1990s accounted for as much as 15% of the 2.7-year overall increase in life expectancy that had occurred in that period *(24)*.

Short-term decrease in industrial emissions, United States

A copper smelter strike in 1967–1968 in four states, and the closure and reopening of a steel mill in Utah Valley in 1986–1987, are two examples of unplanned events which had a positive impact on health by decreasing air pollution concentrations in specific areas. The copper smelter strike led to a 60% drop in regional sulfur dioxide concentrations over eight months and was associated with a 2.5% decrease in mortality *(25)*. In the Utah Valley, the closure of the steel mill, which was the primary source of PM_{10} in the area, lasted for 13 months and led to a decrease in PM_{10} levels of approximately 50% during the closure in winter compared to the previous winter when the mill was operating. Hospital admissions for children were approximately three times lower and bronchitis and asthma admissions were halved when the mill was closed *(26)*. Furthermore, the reported 3.2% drop in daily numbers of deaths was associated with a simultaneous fall in PM_{10} levels of approximately 15 µg/m^3 while the steel mill was closed, the strongest association being with respiratory deaths *(27)*.

Respiratory health studies and air pollution abatement measures, Switzerland

The Swiss Study on Air Pollution and Lung Diseases in Adults assessed lung diseases in adults from eight Swiss communities in 1991 and again in 2002. Overall exposure to outdoor PM_{10} estimated at each individual's residence fell by an average of 6.2 µg/m^3 over the study period, to reach a range of approximately 5 µg/m^3 to 35 µg/m^3 in 2002, depending on the community. This reduction in particle levels was associated with attenuated age-related annual declines in various lung function parameters. The falling PM_{10} levels were also associated with fewer reports of respiratory symptoms such as regular cough, chronic cough or phlegm, and wheezing and breathlessness *(28,29)*. As part of a separate investigation, children from nine Swiss communities were followed between 1992 and 2001 as part of the Swiss Study on Childhood Allergy and Respiratory Symptoms with respect to Air Pollution, Climate and Pollen. Falling levels of regional PM_{10} were associated with a declining prevalence of various respiratory symptoms, including chronic cough, bronchitis, common cold, nocturnal dry cough and conjunctivitis symptoms *(30)*. These findings suggest that modest as well as drastic improvements in ambient air quality are beneficial for respiratory health in both children and adults.

These examples of successful interventions show that decreased levels of particulate air pollution can substantially diminish total, respiratory and cardiovascular death rates. Benefits can be expected at almost any reduction in levels of air pollution, which suggests that further policy efforts that reduce fine PM air pollution are likely to have continuing favourable effects on public health.

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Air quality management and policy

Up to 80% of particulate air pollution in EECCA countries can be reduced with currently available technologies *(31)*. The reduction of outdoor air pollutants in general, and PM in particular, requires concerted action by public authorities, industry and individuals at national, regional and even international levels. Responsible authorities with a vested interest in air pollution management include the environment, transport, land planning, public health, housing and energy sectors. Since the burden of air pollution on health is significant at even relatively low concentrations, the effective management of air quality is necessary to reduce health risks to a minimum.

The development and exchange of information on policies, strategies and technical measures to reduce emissions are part of the fundamental principles of the Convention on Long-range Transboundary Air Pollution. The Working Group on Strategies and Reviews of the Convention, and in particular its Expert Group on Techno-economic Issues *(32)*, maintains the database of information on control technologies for air pollution abatement and their costs. An example of its work is provided by the Group's 2010 report summarizing progress in work to reduce dust emissions from small combustion installations *(33)*.

There are co-benefits to addressing particulate air pollution that go beyond just the positive impact on health. For example, reductions in black carbon emissions from the strategic mitigation of combustion sources will also simultaneously reduce global warming *(34)*.

Finally, integrated policies on urban planning and transport can encourage the use of cleaner modes of transport and lead to changes in individual behaviour by promoting walking, cycling and increased commuting by public transport. These policies contribute to cleaner air while promoting physical activity and largely benefiting public health.

Conclusions

PM is a widespread air pollutant, present wherever people live.

The health effects of PM_{10} and $PM_{2.5}$ are well documented. There is no evidence of a safe level of exposure or a threshold below which no adverse health effects occur.

Since even at relatively low concentrations the burden of air pollution on health is significant, effective management of air quality aiming to achieve WHO AQG levels is necessary to reduce health risks to a minimum.

Monitoring of PM_{10} and/or $PM_{2.5}$ needs to be improved in many countries to assess population exposure and to assist local authorities in establishing plans for improving air quality.

There is evidence that decreased levels of particulate air pollution following a sustained intervention result in health benefits for the population assessed. These benefits can be seen with almost any decrease in level of PM. The health and economic impacts of inaction should be assessed.

Particulate air pollution can be reduced using current technologies.

Interventions resulting in a reduction in the health effects of air pollution range from regulatory measures (stricter air quality standards, limits for emissions from various sources), structural changes (such as reducing energy consumption, especially that based on combustion sources, changing modes of transport, land use planning) as well as behavioural changes by individuals by, for example, using cleaner modes of transport or household energy sources.

There are important potential co-benefits of integrating climate change and air pollution management strategies, as evidenced by the importance of the PM indicator and climate change contributor black carbon.

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References

1. Convention on Long-range Transboundary Air Pollution [web site]. Geneva, United Nations Economic Commission for Europe, 2012 (http://www.unece.org/env/lrtap/, accessed 27 October 2012).
2. Janssen NAH et al. *Health effects of black carbon*. Copenhagen, WHO Regional Office for Europe, 2012 (http://www.euro.who.int/en/what-we-do/health-topics/environment-and-health/air-quality/publications/2012/health-effects-of-black-carbon, accessed 28 October 2012).
3. AirBase: public air quality database [online database]. Copenhagen, European Environment Agency, 2012 (http://www.eea.europa.eu/themes/air/airbase, accessed 27 October 2012).
4. *Exposure to air pollution (particulate matter) in outdoor air.* Copenhagen, WHO Regional Office for Europe, 2011 (ENHIS Factsheet 3.3) (http://www.euro.who.int/__data/assets/pdf_file/0018/97002/ENHIS_Factsheet_3.3_July_2011.pdf, accessed 28 October 2012).
5. Brauer M et al. Exposure assessment for estimation of the global burden of disease attributable to outdoor air pollution. *Environmental Science and Technology*, 2012, 46: 652–660.
6. *Air quality guidelines: global update 2005. Particulate matter, ozone, nitrogen dioxide and sulfur dioxide.* Copenhagen, WHO Regional Office for Europe, 2006 (http://www.euro.who.int/en/what-we-do/health-topics/environment-and-health/air-quality/publications/ pre2009/air-quality-guidelines.-global-update-2005.-particulate-matter,-ozone,-nitrogen-dioxide-and-sulfur-dioxide, accessed 28 October 2012).
7. Samoli E et al. Acute effects of ambient particulate matter on mortality in Europe and North America: results from the APHENA Study. *Environmental Health Perspectives*, 2008, 116(11):1480–1486.
8. Beelen R et al. Long-term effects of traffic-related air pollution on mortality in a Dutch cohort (NLCS-AIR Study). *Environmental Health Perspectives*, 2008, 116(2):196–202.
9. Krewski D et al. *Extended follow-up and spatial analysis of the American Cancer Society linking particulate air pollution and mortality*. Boston, MA, Health Effects Institute, 2009 (HEI Research Report 140).
10. Pope CA III et al. Lung cancer, cardiopulmonary mortality, and long-term exposure to fine particulate air pollution. *Journal of the American Medical Association*, 2002, 287(9): 1132–1141.
11. Stanek LW et al. Attributing health effects to apportioned components and sources of particulate matter: an evaluation of collective results. *Atmospheric Environment*, 2011, 45:5655–5663.
12. *Health relevance of particulate matter from various sources*. Report of a WHO Workshop. Copenhagen, WHO Regional Office for Europe, 2007 (www.euro.who.int/document/E90672.pdf, accessed 28 October 2012).
13. *IARC: diesel engine exhaust carcinogenic*. Lyons, International Agency for Research on Cancer, 2012 (Press release No. 213) (http://www.iarc.fr/en/media-centre/iarcnews/2012/mono105-info.php, accessed 28 October 2012).

14. *Some non-heterocyclic polycyclic aromatic hydrocarbons and some related exposures.* Lyons, International Agency for Research on Cancer, 2010 (IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, Vol. 92) (http://monographs.iarc.fr/ENG/Monographs/vol92/mono92.pdf, accessed 27 October 2012).
15. *Household use of solid fuels and high-temperature frying*. Lyons, International Agency for Research on Cancer, 2010 (IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, Vol. 95) (http://monographs.iarc.fr/ENG/Monographs/vol95/mono95.pdf, accessed 28 October 2012).
16. Cohen AJ et al. Urban air pollution. In: Ezzati M et al., eds. *Comparative quantification of health risks. Global and regional burden of disease attributable to selected major factors.* Geneva, World Health Organization, 2004, 2(17):1354–1433 (http://www.who.int/healthinfo/global_burden_disease/cra/en/index.html, accessed 28 October 2012).
17. Lim SS et al. A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet*, 2012, 380: 2224-2260.
18. Medina S. *Summary report of the APHEKOM project 2008–2011*. Saint-Maurice Cedex, Institut de Veille Sanitaire, 2012 (www.endseurope.com/docs/110302b.pdf, accessed 28 October 2012).
19. Henschel S et al. Air pollution interventions and their impact on public health. *International Journal of Public Health*, 2012, 57(5):757–768 (DOI 10.1007/s00038-012-0369-6, accessed 28 October 2012).
20. Van Erp AM et al. Progress in research to assess the effectiveness of air quality interventions towards improving public health. *Air Quality and Atmospheric Health*, 2012, 5:217–230.
21. Dockery DW et al. An association between air pollution and mortality in six U.S. cities. *The New England Journal of Medicine*, 1993, 329(24):1753–1759.
22. Laden F et al. Reduction in fine particulate air pollution and mortality: extended follow-up of the Harvard Six Cities Study. *American Journal for Respiratory Critical Care Medicine*, 2006, 173(6):667–672.
23. Lepeule J et al. Chronic exposure to fine particles and mortality: an extended follow-up of the Harvard Six Cities Study from 1974 to 2009. *Environmental Health Perspectives*, 2012, 120:965–970.
24. Pope CA III et al. Fine-particulate air pollution and life expectancy in the United States. *The New England Journal of Medicine*, 2009, 360:376–386.
25. Pope CA III et al. Mortality effects of a copper smelter strike and reduced ambient sulfate particulate matter air pollution. *Environmental Health Perspectives*, 2007, 115(5):679–683.
26. Pope CA III. Respiratory disease associated with community air pollution and a steel mill, Utah Valley. *American Journal of Public Health*, 1989, 79(5):623–628.
27. Pope CA III et al. Daily mortality and PM_{10} pollution in Utah Valley. *Archives of Environmental Health*, 1992, 47(3):211–217.
28. Downs SH et al. Reduced exposure to PM_{10} and attenuated age-related decline in lung function. *The New England Journal of Medicine*, 2007, 357:2338–2347.
29. Schindler C et al. Improvements in PM_{10} exposure and reduced rates of respiratory symptoms in a cohort of Swiss adults (SAPALDIA). *American Journal for Respiratory and Critical Care Medicine*, 2009, 179:1–9.

30. Bayer-Oglesby L et al. Decline of ambient air pollution levels and improved respiratory health in Swiss children. *Environmental Health Perspectives*, 2005, 113:1632–1637.
31. *Health risks of particulate matter from long-range transboundary air pollution.* Copenhagen, WHO Regional Office for Europe, 2006 (www.euro.who.int/document/ e88189.pdf, accessed 28 October 2012).
32. EGTEI Expert Group on Techno-Economic Issues [web site]. Geneva, United Nations Economic Commission for Europe, 2012 (http://citepaax.alias.domicile.fr/forums/egtei/egtei_index.htm, accessed 28 October 2012).
33. Economic and Social Council. *Techno-Economic issues. Report by the Co-Chairs of the Expert Group on Techno-economic Issues.* Geneva, United Nations Economic Commission for Europe, 2010 (ECE/EB.AIR/WG.5/2010/15) (http://www.unece.org/fileadmin/DAM/ env/documents/2010/eb/wg5/wg47/ECE.EB.AIR.WG.5.2010.15_e.pdf, accessed 27 October 2012).
34. Schindell D et al. Simultaneously mitigating near-term climate change and improving human health and food security. *Science*, 2012, 335(6065):183–189.

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Exhibit 10.

Metal Recycling Industry Project

- Metal Recycling Industry Project (PDF, 577KB, 33pg.)
- Preventing Lead Exposure During Metal Recycling

Executive Summary

Significant Findings

- Significant lead exposure occurred when torch cutting not only painted metals, but also unpainted metals and new steel;
- Lead contamination was found in bathrooms and lunchrooms, and on workers' hands prior to eating;
- Metal recycling companies did not recognize potential sources of lead exposure (such as new steel) and underestimated the degree of exposure; and
- Metal recycling companies that we visited made substantial improvements to their lead protection programs after receiving information and technical guidance.

Background and Methods

Metal recycling workers can be exposed to lead, a known industrial hazard, while performing typical metal recycling tasks. The New York State Department of Health's (NYSDOH) Bureau of Occupational Health (BOH) launched a Metal Recycling Industry Project (MRIP) in June 2000. The goals of the project were to 1) collect information on metal recycling operations and processes from a representative survey population, 2) identify and evaluate metal recycling workers' exposures to lead and other hazardous metals and 3) propose feasible and effective measures to reduce the exposures if needed. The information collected and the preventive measures formulated during the survey are currently being used to develop worker educational and training materials that will be disseminated to the industry and to other stakeholders.

The project had two components: a mail survey and on-site industrial hygiene (IH) evaluations. The mail survey portion was completed at the end of September 2000 and the on-site evaluations completed in February 2001. We additionally conducted a telephone survey in 2005 to collect updated information from the companies that received our on-site evaluations. The follow-up telephone survey was completed in June 2005.

During the mail survey, questionnaires were sent to 224 metal recycling facilities in New York State and 101 (45%) completed responses were received. BOH industrial hygienists conducted on-site industrial hygiene (IH) evaluations at eight facilities that responded to the mail survey and indicated an interest in the evaluation. Each on-site evaluation included a walk-through survey, safety and health program review, personal air monitoring and collection of surface dust samples. A written evaluation report was provided to each facility. Seven of the eight facilities that received the IH evaluations completed the telephone follow-up survey in 2005 (one company was no longer in business).

Results and Discussion

At the time of our survey, companies reported recycling assorted metals such as aluminum, iron, copper, brass, steel, stainless steel, and tin. Workers reportedly performed tasks included sorting, shearing, baling, saw cutting and torch cutting of metal. Among the surveyed companies, 60 (59%) reported performing torch cutting, an operation expected to generate excessive quantities of airborne lead particulates that pose a high health risk to the workers. Despite this, when the companies were asked to assess the likelihood of employee lead exposures at their facilities, 72 (71%) stated that their employees were unlikely or definitely not exposed to lead at work.

Two of the eight companies that received an on-site evaluation required workers to use respiratory protection only when cutting galvanized or painted metals. The companies' decisions were based on the assumption that lead only existed in painted or galvanized steels. However, our personal air monitoring results demonstrated otherwise: workers may be exposed to sufficiently high concentrations of lead when cutting unpainted metal, steel without galvanized coating and even new steel. Three of the six personal air samples that were collected from the workers who performed torch cutting had average lead concentrations over sample time exceeding the Occupational Safety and Health Administration (OSHA)'s Permissible Exposure Limit (PEL) for lead. Two samples were obtained when the workers were torch cutting unpainted steel. In fact, one of the workers was cutting new steel from a local fabrication shop.

Lead is one of the elemental metals that are commonly used as an additive in the steel making process to improve the machinability of the steel. Although the quantity of lead contained in these steels is small - typically ranging from 0.15 to 0.35%, torch cutting can release substantial amount of lead fume as demonstrated by our air monitoring results.

We also found personal air lead levels during sample time in excess of the OSHA PEL during auto radiator disassembly at one facility.

Only 10% of the 101 companies that responded to the survey reported performing personal air monitoring to assess employee lead exposures. Of the 101 companies, forty-five (45%) companies did not provide their workers with any respiratory protection; twenty-eight (28%) provided only disposable dust masks. Of the 60 companies that performed torch cutting, twenty-four (40%) companies provided their workers with half-face or full-face air purifying respirators (APR). Sixty percent (60%) of the companies that had torch cutting operations did not provide workers with any respiratory protection or provided only disposable dust masks.

Fifteen (15%) companies reported that they provided blood lead testing for their employees at least once. This was slightly higher (18%) among the companies that reported torch cutting. With regard to frequency of biological monitoring, four (4%) of the companies reported that they offered blood lead testing annually, six (6%) semiannually, and two (2%) quarterly.

More than 70% of the wipe samples collected in lunchrooms and bathrooms at the eight metal recycling sites had lead dust concentrations exceeding the Environmental Protection Agency (EPA) clearance threshold for homes following lead remediation projects. Lead was also found in wipe samples collected from the hands of workers who held different job titles, including a yard supervisor, a torch cutter, a driver, a sorter, and a laborer in a facility's new steel shop. These samples were collected after the workers washed their hands to eat lunch.

The telephone follow up survey found that the facilities have made improvements in providing workers with personal protective equipment (PPE) and hygiene facilities. The survey also found that owners of metal recycling companies did not understand the prevalence of occupational lead exposures associated with metal recycling activities.

Recommendations

We recommend that the governmental agencies, metal recycling trade organizations, safety and health professionals, workers' compensation carriers and other stakeholders work together to educate employers of the metal recycling industry and raise their awareness of occupational lead exposure in the trade.

We also encourage employers within the metal recycling industry to adopt the following to reduce workers' lead exposures:

- Institute a biological monitoring program for all employees potentially exposed to lead;
- Implement engineering controls such as replacing torch cutting with shearing to reduce workers' lead exposures;
- Implement employee lead training programs;

- Conduct personal air monitoring to assess workers' airborne lead exposures and the adequacy of respiratory protection;
- Provide appropriate respiratory protection to all workers who perform torch cutting, radiator disassembly or other tasks associated with high airborne lead exposures;
- Require employees to thoroughly clean their respirators daily;
- Provide hygiene facilities, such as a clean lunch room, a locker room with separate "clean" and "dirty" lockers and a shower facility;
- Prohibit eating, drinking, and smoking in work areas where lead contamination may occur; and
- Perform routine housekeeping to reduce surface lead dust accumulation throughout the facility.

Introduction

A typical metal recycling facility recycles a variety of materials, including ferrous and nonferrous scrap metals, vehicles and parts, communication cables, radiators, and batteries. The recycling process includes receiving, sorting, processing, packaging, storing and shipping the materials or metals to other facilities where they can be reused or reprocessed. Sorting is either done manually or by machines such as shaker beds, cranes, or magnets. Large scrap metal parts are cut with shears or torches into smaller pieces. The scrap metal is then compressed and packaged, commonly by balers for storage and transportation.

Lead is a ubiquitous metal, and a known environmental and industrial hazard *(1)*. Many of the materials being recycled, such as batteries, radiators, and metals contain lead. It may be in the coatings on the scrap metal (lead-based paint or galvanized coatings) *(2)*. It may also be present in the metal as an additive, alloy element or contaminant *(3, 4, 5, 6)*. When metal recycling workers cut, shear, bale or sort scrap metals, they can be exposed to lead dust and fume.

Lead can be absorbed into the body by inhalation (breathing) and ingestion (eating) *(7)*. Once lead gets into the body, it travels in the blood to the "soft tissues" such as the liver, kidneys, lungs, brain, spleen, muscles, and heart before it moves to the bones and teeth where it may stay for decades *(8)*. Elevated blood lead levels in adults can damage the cardiovascular, central nervous, reproductive, hematologic, and renal systems *(7)*. The mean blood lead level (BLL) of adults in the United States is less than three micrograms of lead per deciliter of whole blood (μg/dL) *(9)*. The U.S. Department of Health and Human Services recommends that BLLs among all adults be less than 25 μg/dL *(9)*. According to the U.S. Occupational Safety and Health Administration's (OSHA) lead standard for general industry, a worker must be removed from further lead exposure when the worker's BLL is at or above 60 μg/dL or the average of the worker's last three BLLs is at or above 50 μg/dL[1] *(7)*. The worker cannot return to work unless his or her BLL is reduced to below 40 μg/dL[1].

The Bureau of Occupational Health (BOH) of the New York State Department of Health (NYSDOH) maintains a Heavy Metals Registry (HMR) to identify adults who have elevated biological indicators (blood or urine) of lead and other heavy metals. BOH staff work with the individuals reported to the HMR to determine the source of exposure and to prevent or reduce further intake of the metals. If the source of exposure is work related or in a work environment, the BOH industrial hygienists may work with the employers to develop and implement controls to reduce the workers' occupational exposures.

According to Census data, there were approximately 6,300 workers in the metal recycling industry in New York State in 2000. From 1990 to 2000, the HMR received reports of elevated BLLs for 65 individuals working in metal recycling companies. Of those reported, 25 had blood lead levels above 40 μg/dL, and three had blood lead levels above 100 μg/dL. Given the reports of elevated BLLs in metal recycling workers and these reports likely underrepresented the extent of the problem (since many scrap metal workers may not be tested), a Metal Recycling Industry Project (MRIP) was initiated in June 2000.

The goals of the project were to collect information on metal recycling operations and processes from a representative survey population, to identify and evaluate workers' exposures to lead and selected other hazardous metals during metal recycling processes and to propose feasible and effective measures to reduce the exposures. BOH staff worked with the Institute of Scrap Recycling Industries, Inc. (ISRI), a metal recycling industry trade association in Washington DC, in developing the project. The project had two components: a mail survey and on-site industrial hygiene (IH) evaluations. The mail survey portion was completed at the end of September 2000 and the on-site evaluations were completed in February 2001. Additionally, we conducted a telephone survey in June 2005 to collect updated information on the companies that received our IH on-site evaluations.

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[1] OSHA used the unit if micrograms of lead per 100 grams of blood (μg/100g) for blood lead level in its lead standard for general industry (29CFR1910.1025). According to OSHA, the units of μg/dL and μg/100g are essentially the same (see 29CFR1910.1025: Appendix A, II, B (3)).

Methods

Mail Survey

A survey questionnaire was designed to gather information on company operations, potential employee lead exposures, biological monitoring programs, control measures e.g. engineering controls, personal protective equipment (PPE), employee training, and housekeeping. ISRI provided valuable input in formulating the questionnaire. In an effort to maximize the response rate, we kept the survey brief, limiting it to 19 multiple choice or short answer questions.

The yellow pages provided by several internet websites were used to compile a list of potential survey participants, including all listings from the following categories: "Scrap Metals", "Process & Recycle", "Scrap Metals & Iron (wholesale)", and "Steel-used". A total of 355 companies were identified. A cover letter explaining the nature and objectives of the survey was sent with the questionnaire to each of the 355 companies in June 2000. Companies that did not respond within three weeks after the initial mailing were contacted via telephone to attempt to complete the survey. Of the 355 companies, 131 were removed from the survey for one or more of the following reasons: (1) not having a valid mailing address or phone number; (2) not in business; or (3) not in the metal recycling business. The final survey population was thus reduced to 224 companies that were active and in the metal recycling business. A total of 101 companies completed the survey either by mail or by phone, resulting in a response rate of 45%. The remaining (123) declined to participate.

On-site Industrial Hygiene Evaluations

Ten (10%) of the facilities that answered the mail survey also requested on-site evaluations from the BOH industrial hygiene group. One of these companies only agreed to a preliminary walk-through; another was in the electronics recycling business (not a typical metal recycling operation). The results of the on-site IH evaluations of the eight remaining facilities are presented in this report.

During each on-site evaluation, BOH industrial hygienists conducted a walk-through survey to observe recycling processes and employees' work activities, reviewed company lead safety programs, performed personal air monitoring, and collected surface dust samples. We also performed a thorough review of the eight companies' biological monitoring activities and their blood lead monitoring data that had been reported to the HMR. The focus of these site visits was to identify and evaluate occupational exposure to lead and other metals. Other safety and health hazards were not within the scope of the site visits. Therefore, the on-site assessments should not be viewed as a complete hazard evaluation for a specific facility or for the industry.

Personal breathing zone (PBZ) air samples were collected to measure employees' exposures to lead and other selected metals, such as cadmium, cobalt and nickel. These samples were collected during the performance of the various job tasks, such as sorting metal, driving forklifts, operating shears and balers, torch-cutting metal, and crushing cars. Sampling was task-specific (collected only during the performance of a single task) and generally lasted the duration of the task. For tasks performed all day, sample duration was limited to half of the shift.

The sampling train consisted of a personal sampling pump (Ametek Model 2500 Constant Flow Sampler), Tygon tubing and a close-faced 37 millimeter (mm) filter cassette containing a 0.8 micron (m) mixed cellulose ester filter (MCEF) with a backup pad. The cassette was clipped onto a worker's lapel. If a worker wore a face shield, the MCEF cassette was placed outside the face shield. The pump was calibrated before and after sampling with a primary flow meter (Gilibrator) at a flow rate of two liters per minute (LPM). Pump start and stop times were recorded to the nearest minute. One to two field blanks were submitted for each batch of PBZ air samples.

Surface dust samples were also collected to assess the extent of surface contamination by lead dust in non-production areas throughout each facility. Areas sampled included surfaces in lunchrooms, bathrooms, and locker rooms. The samples were collected by wiping an area of 100 square centimeters (cm^2) with an individual "baby wipe". At one facility, we collected wipes from workers' hands. This was done by thoroughly wiping the palm and fingers of one hand with an individual "baby wipe".

All of the personal air samples and wipe samples were analyzed by the Wadsworth Laboratory of the NYSDOH. National Institute for Occupational Safety and Health (NIOSH) Method 7082, flame atomic absorption spectrophotometry (FAAS) *(10)*, was used for analyzing all lead samples. NIOSH Method 7300, Inductively Coupled Argon Plasma-Atomic Emission Spectroscopy (ICP-AES) *(10)*, was used to analyze samples for other metals.

An individualized report including a survey summary and recommendations on reducing and controlling workers' lead exposures was sent to each of the eight facilities that received site visits.

In May 2005, five years after completion of the IH on-site evaluations, BOH conducted a follow-up telephone survey to collect updated information from the eight facilities. The questionnaire was designed to collect information on current company production status and preventive measures adopted by the companies to control and reduce workers lead exposures. One company was no longer in business; the remaining seven facilities completed the telephone survey.

Results

Mail Survey

The geographical distribution of the metal recycling companies identified in New York State by the survey is illustrated in Figure 1. The companies that received survey questionnaires and those that participated in the survey are indicated with different symbols in the figure. The participation rate was not consistent throughout the state. While the overall participation rate was 45%, the rate downstate (New York City plus Long Island) was only 26%, and the rate for the rest of state was 57%.

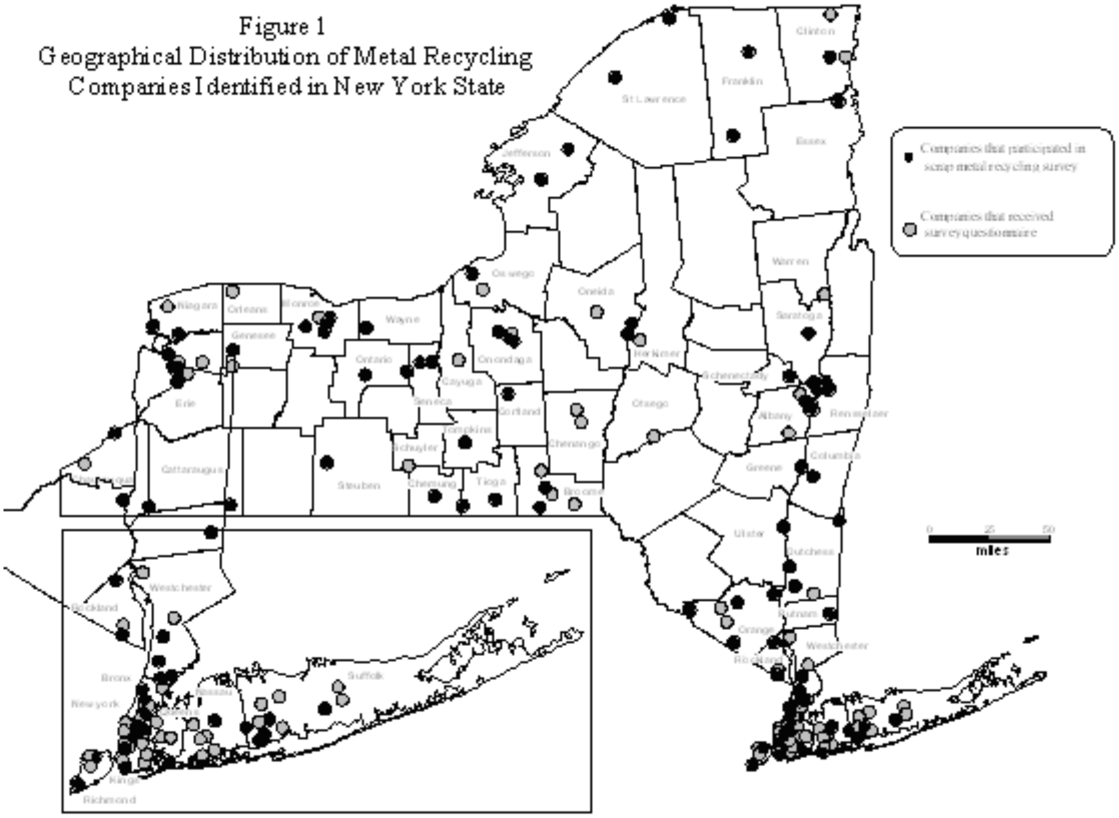
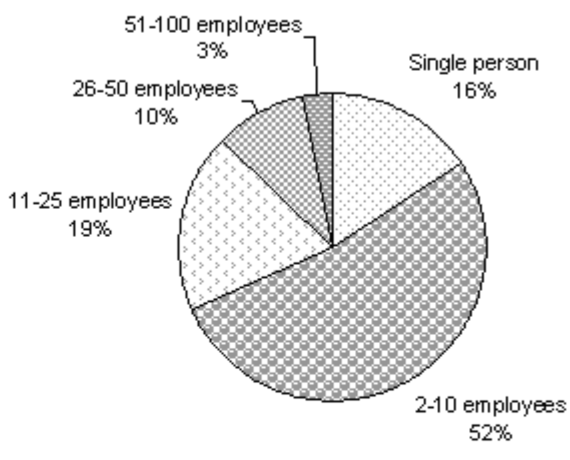


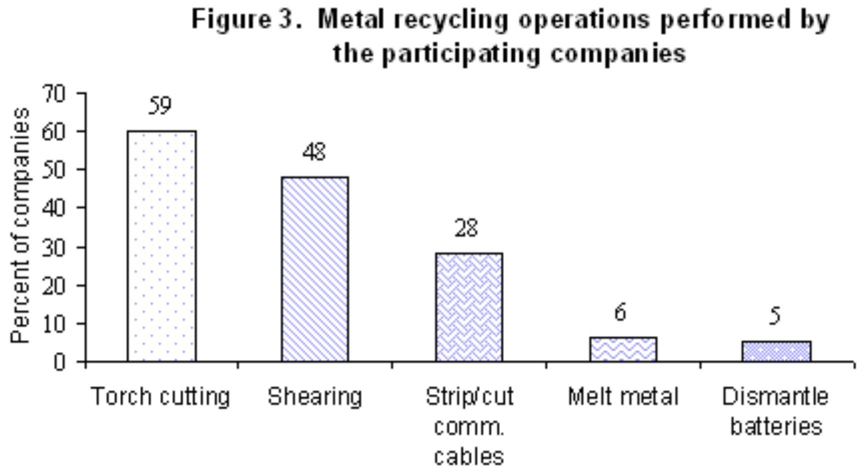
Figure 1
Geographical Distribution of Metal Recycling Companies Identified in New York State

Among the 101 companies that responded to the survey, most were small facilities; 16 (16%) reported that they were a single person operation and 53 (52%) reported that they had 2-10 employees (see Figure 2). Only 3 (3%) had more than 50 employees. The surveyed companies reported that they recycled aluminum, iron, copper, brass, steel, stainless steel, and tin.

Figure 2. Number of employees in participating companies



Forty-eight (48%) companies belonged to one or more statewide or national trade associations, such as ISRI, New York Recyclers, Empire Metal Merchants or Auto Recyclers' Association of New York.



Sixty (59%) survey respondents reported performing torch cutting, a task that has the potential for significant lead dust or fume exposure (Figure 3) *(11)*. The companies also reported shearing metal, stripping or cutting communication cables, melting metal and dismantling batteries. These tasks are also likely to carry a potential for lead exposure. When asked to assess the likelihood of employee lead exposures at their facility, however, 72 (71%) of the companies responded that their employees were unlikely or definitely not exposed to lead at work (Figure 4).

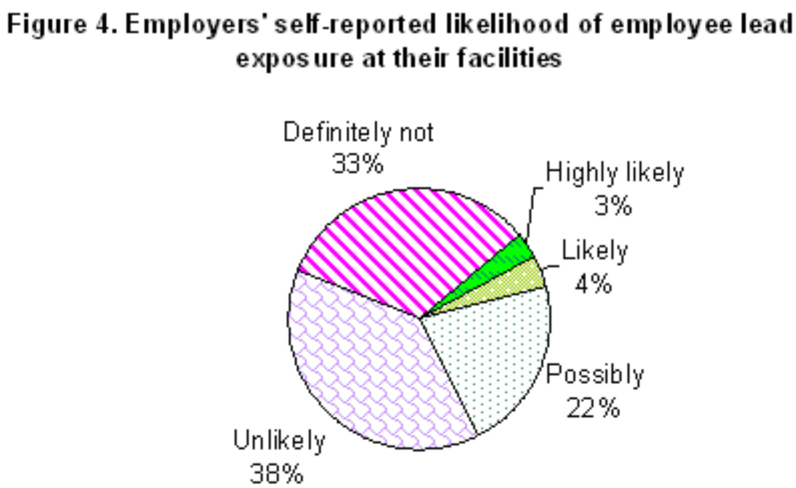


Table 1 presents the lead hazard awareness level (likelihood of employee lead exposures as reported by the company owner) in relation to the percentage of these companies that reportedly conducted personal air monitoring. Only 10% of the surveyed companies reported performing personal air monitoring to assess employee lead exposures. Of the 60 companies that performed torch cutting, only eight (13%) reported conducting personal air monitoring. Of the 72 companies that considered the likelihood of their employee lead exposure as "unlikely" or "definitely not", only one company reported performing personal air monitoring.

Table 1. Number of companies that reported conducting personal air monitoring in relation to their lead hazard awareness levels

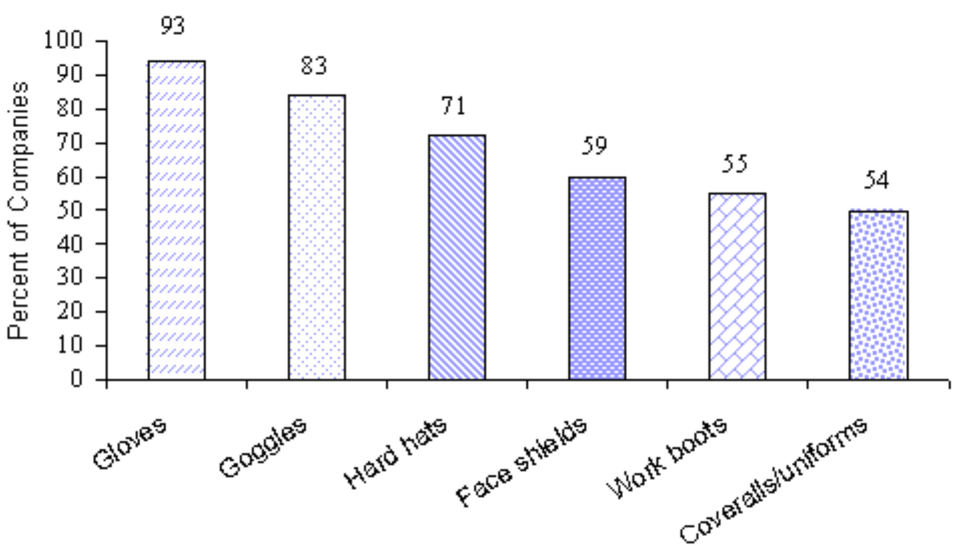
Reported likelihood of employee lead exposure	Number of companies	Number of companies reporting conducting personal air monitoring	Percentage (%)
Highly likely	3	3	100
Likely	4	2	50
Possible	22	4	18

Unlikely	39	0	0
Definitely not	33	1	3

Of the 101 companies that responded to the survey, forty-five (45%) companies did not provide their workers with any respiratory protection and twenty-eight (28%) provided only disposable dust masks. Of the 60 companies that performed torch cutting, twenty-four (40%) companies provided their workers with half-face or full-face air purifying respirators (APR). Sixty percent (60%) of the companies that had torch cutting operations did not provide workers with any respiratory protection or provided only disposable dust masks.

With regard to other personal protective equipment, 94 (93%) of the 101 survey respondents provided their employees with gloves, 84 (83%) provided goggles, 72 (71%) hard hats, 60 (59%) face shields, 55 (54%) work shoes/boots, and 50 (50%) uniforms (Figure 5).

Figure 5. Personal protective equipment provided by the surveyed companies



With regard to hygiene facilities, 68 (67%) of the 101 survey respondents reported that they had lunchrooms, 81 (80%) had wash stations, 21 (21%) had showers, and 49 (49%) had lockers available.

We inquired about whether the companies had a biomonitoring program for lead. Of the 101 respondents, 15 (15%) reported that they provided blood lead testing for their employees at least once (Table 2). Eleven (18%) of the sixty companies that performed torch cutting reported having provided workers with blood lead monitoring at least once. With regard to frequency of biomonitoring, four (4%) of the companies reported that they offered blood lead testing annually, six (6%) semiannually, and 2 (2%) quarterly. The likelihood of having a biological monitoring program in place increased with the self-reported likelihood of employee lead exposure (Table 3).

Table 2. Biological monitoring reported by participating companies

	Total Number	Companies Offered Biomonitoring	Percentage (%)
Total survey population	101	15	15
Companies that torch cut	60	11	18

Table 3. Number of companies that reported providing biological monitoring in relation to their self-reported likelihood of lead exposure

Reported Likelihood of Lead Exposure	Number of companies	Reported providing biomonitoring

Highly likely	3	3 (100%)
Likely	4	2 (50%)
Possibly	22	5 (23%)
Unlikely	39	4 (10%)
Definitely not	33	1 (3%)

On-Site Industrial Hygiene Evaluations

Of the eight facilities that received IH on-site evaluations, employment ranged from four to sixty workers. Seven facilities belonged to trade associations. Six were ISRI members and one was a member of the Automotive Recyclers' Association of New York.

Two facilities recycled automobiles in addition to other scrap metals. Seven sites had torch cutting operations, seven sheared metal, four stripped communication cables, and one disassembled radiators. Overall, the eight facilities appeared representative of the mail surveyed population in terms of the types of metal recycling tasks performed by the workers.

Table 4 summarizes the employers' assessment of the likelihood of lead exposure in the workplace, whether torch cutting was conducted, and the availability of the key elements of a lead safety program at each facility. All but two companies reported that occupational lead exposures were at least possible while recycling scrap metals. Seven facilities reported performing torch cutting either weekly or monthly. One of the seven companies did not provide any respiratory protection to the torch cutters, three provided only disposable dust masks, and the remaining three provided half-face or full-face air purifying respirators (APR) with P100 (high efficiency particulate air-HEPA) filters to the workers. Two of the three companies that provided APR also provided qualitative respirator fit testing for the employees.

Table 4. Summary of employers' assessment of the likelihood of occupational lead exposures, torch cutting activity and the availability of key elements of a lead safety program

Facility	Reported Likelihood of Lead Exposure	Perform Torch Cutting	Respirator Protection	Respirator fit testing	Bio-monitoring	Showers	Require Change Clothing
G	Highly likely	No	No[1]		Yes	Yes	Yes
C	Likely	Yes	Dust mask	No	No	No	No
D	Likely	Yes	½ APR + P100, dust mask	Yes	Yes	Yes	No
A	Possibly	Yes	No		No	No	No
B	Possibly	Yes	Full APR + P100	Yes	Yes	No	Yes
E	Possibly	Yes	½ APR + P100, sup. air	No	Yes	No	No
F	Unlikely	Yes	Dust mask	No	No	No	No
H	Unlikely	Yes	Dust mask	No	No	No	Yes

[1] *Respiratory protection was not needed at site G based on the personal air monitoring results.*

Of the eight facilities visited, two (D and G) had showers available. Three (B, G and H) required their employees to change into their work clothes before the beginning of the work shift and to change back to their street clothes after work.

Air Sampling Results

A total of 27 personal air samples were collected during the eight industrial hygiene site visits. Eighteen samples were analyzed for lead only, eight were analyzed for cadmium and lead and one sample was analyzed for cadmium, cobalt, lead and nickel. The monitoring was done to evaluate workers' exposures as they performed typical metal recycling tasks. Neither cadmium nor cobalt was detected in the samples. Nickel was detected in Sample No. 5 when the worker was cutting new plate steel and the concentration during sample time was 8.1 micrograms of nickel per cubic meter of air ($\mu g/m^3$). This level is well below the OSHA's Permissible Exposure Limit (PEL) of 1000 $\mu g/m^3$, that is based on an 8-hour time weighted average (TWA) exposure (12). NIOSH recommends that workers' 8-hour TWA exposure to nickel should not exceed 15 $\mu g/m^3$ (13). The American Conference of Governmental Industrial Hygienists (ACGIH) has established a TWA threshold limit value (TLV) for nickel as 1500 $\mu g/m^3$ (14).

The results of the personal air monitoring for lead are presented in Table 5. OSHA requires an employer to comply with the General Industry Lead Standard (29CFR1910.1025). The OSHA action level (AL) is defined as an airborne concentration of lead of 30 $\mu g/m^3$ averaged over an 8-hour period. If the OSHA AL is exceeded, employee personal air monitoring, medical surveillance and employee training are mandated. OSHA also established a PEL of 50 $\mu g/m^3$ based on an 8-hour TWA exposure. Employers are required by OSHA to keep workers' airborne lead exposures below the PEL through implementing engineering controls and providing personal protective equipment. Both NIOSH and ACGIH have recommended 50 $\mu g/m^3$ as a TWA lead exposure limit (13, 14).

Personal air samples were collected on six torch cutters (Samples 1-6) at five facilities. Five of the six torch cutters used oxy-propane torches and one used an oxy-acetylene torch. The materials that were cut during the monitoring included painted machine parts, unpainted highway guard rails, unpainted new plate steel, aluminum and copper. Sample times ranged from 89 to 172 minutes. The time-weighted average of lead concentrations during the sample time (Sample Time TWA) ranged from below the laboratory's limit of detection (LOD) to 320 $\mu g/m^3$. If these workers performed essentially the same tasks as being monitored during their entire eight-hour work shift, the Sample Time TWA would be equivalent to the workers' 8-hour TWA exposures and would be compared with the OSHA PEL.

The lead concentrations for the torch cutters (Samples 4 and 5) at facility B and H were the highest: 250 $\mu g/m^3$ and 320 $\mu g/m^3$ respectively. Both workers' exposures during their sample time (166 minutes and 124 minutes respectively) exceeded the OSHA PEL. If these workers had no additional lead exposure during the duration of their 8-hour shift, the 8-hour TWAs for the torch cutters at facility B and facility H would be 86 $\mu g/m^3$ and 83 $\mu g/m^3$, respectively. At facility H, the workers were reported to perform torch cutting usually up to six hours a day; the 8-hour TWA for such a worker with the sampled concentration would be 240 $\mu g/m^3$ or 4.8 times the OSHA PEL.

Table 5. Personal air sampling results

Sample ID Number	Site ID	Job Description	Materials being Cut	Sample Time (min.)	Lead[1] Concentration ($\mu g/m^3$)	Respiratory Protection	Compare TWA exposure in sample time with PEL
1	F	Torch cutting	Unpainted new plate metal	133	2	No	<PEL
2	D	Torch cutting	Assorted scrap metal	145	29	No	<PEL
<3				<89	<110		
<4				<166	<250		
<5				<124	<320		
6	D	Torch	Nonferrous	172	<11 [2]	No	<PEL

		cutting	metal				
7	C	Operating a baler		192	16	No	<PEL
8	D	Operating a baler		191	<11 [2]	No	<PEL
9	B	Operating a crane		169	<1 [2]	No	<PEL
10	F	Operating a crane		135	<1 [2]	No	<PEL
11	D	Operating a forklift		167	<11 [2]	No	<PEL
<12				<119	<67		
<13				<32	<210		
14	H	Sorting copper		164	13	No	<PEL
15	H	Sorting brass		146	<1 [2]	No	<PEL
16	C	Operating a shear		203	13	No	<PEL
17	C	Operating a shear		202	18	No	<PEL
18	E	Manual sorting scrap		150	3	No	<PEL
19	F	Sorting in warehouse		141	3	No	<PEL
20	G	Sorting in yard		121	5	No	<PEL
21	G	Sorting in yard		121	6	No	<PEL
22	A	Sorting nonferrous		136	7	No	<PEL
23	D	Sorting scrap		192	<11 [2]	No	<PEL
24	E	Welding		250	4.9	No	<PEL
<25				<41	<578		
26	C	Dumping wheel weights		22	<20 [2]	No	<PEL
27	C	Repairing a saw		56	<9 [2]	No	<PEL

[1] *For each set of personal air samples, a minimum of one blank field blank samples was collected and all lead concentrations reported were blank corrected.*

[2] *The concentration of lead in this sample was below the laboratory's limit of detection (LOD).*

Although six facilities indicated that the workers were provided with some kind of respiratory device (see Table 4), only one (Facility B) provided its torch cutter with respiratory protection (a full-face APR with dual P100

HEPA cartridges) at the time of the monitoring. The other torch cutters, including the one at Facility H whose exposure exceeded the OSHA PEL, were not wearing any respiratory protection during sample time.

Table 5 also presents the personal air sample results collected from 21 workers who performed metal recycling tasks other than torch cutting. While the lead concentrations measured during most of the tasks were low or even below the LOD, two samples taken during radiator disassembly and the one obtained during sandblasting exceeded the OSHA PEL during the sample time.

At facility H, two workers (Samples 12 and 13) were monitored while they disassembled auto radiators. Their tasks involved separating steel support pieces from the radiators using a hatchet and a pneumatic chisel. The air lead concentrations for the two workers were 67 $\mu g/m^3$ (worker 012) and 210 $\mu g/m^3$ (worker 013) during the sampling periods of 119 minutes and 32 minutes respectively. Neither of the workers wore respiratory protection.

Facility E had a maintenance/welding shop where workers repaired and refinished vehicles and equipment. The abrasive blaster was reported sandblasting an average of four to six hours a day. Based on the air monitoring results, the blaster's 8-hour TWA would be 289 $\mu g/m^3$ if he blasted four hours a day, assuming that he had no additional lead exposure during the other four hours of his shift. The blaster wore a supplied air blasting hood with continuous flow while he was being monitored.

Wipe Sampling Results

A total of 40 wipe samples were collected to evaluate surface contamination in non-production areas at the eight facilities. The sample results for lunchrooms, bathrooms and miscellaneous surfaces are reported in Tables 6, 7 and 8 respectively.

Sixteen wipe samples taken from lunchrooms in six metal recycling facilities had lead dust concentrations ranging from below the LOD (<45 $\mu g/ft^2$) up to 1,710 micrograms of lead per square foot ($\mu g/ft^2$) (see Table 6). The mean lead dust concentration on the surfaces in lunchrooms was 221 $\mu g/ft^2$ and the median was 89.1 $\mu g/ft^2$.

Table 6. Lunchroom surface sample results for lead

Sample ID	Site ID	Surfaces	Concentration [1] ($\mu g/ft^2$)
1	D	Coffee counter	88.2
2	F	Coffee pot	108
3	H	Locker	<45 [2]
4	B	Lunch table	<45 [2]
5	D	Lunch table	162
6	E	Lunch table	810
7	F	Lunch table	1710
8	G	Lunch table	<45 [2]
9	F	Microwave oven	135
10	G	Microwave oven	<45 [2]
11	D	Microwave oven dial	189
12	B	Microwave oven front panel	<45 [2]
13	H	Microwave oven top	189
14	D	Refrigerator handle	56.7
15	B	Table	90
16	G	Window ledge	<45 [2]

[1] For each set of wipe samples collected at a facility, a minimum of one blank field blank samples was collected and all lead concentrations reported were blank corrected.

[2]The concentration of lead in this sample was below the laboratory's limit of detection (LOD).

The lead dust concentrations of the fourteen wipe samples from bathrooms in six facilities ranged from below LOD to 2070 μg/ft^2 on a paper towel dispenser (Table 7). The mean concentration was 465 μg/ft^2 and median 189 μg/ft^2.

Table 7. Bathroom surfaces' sample results for lead

Sample ID	**Site ID**	**Surfaces**	**Concentration (μg/ft^2)[1]**
17	F	First aid kit box	162
18	E	Paper towel dispenser front	<45 [2]
19	B	Paper towel dispenser, handle	71
20	F	Shelf	324
21	A	Sink	216
22	E	Sink	351
23	A	Storage shelf	162
24	C	Toilet tank	1260
25	F	Toilet tank	<45 [2]
26	H	Toilet top	45.9
27	H	Towel dispenser (in non ferrous area)	153
28	H	Towel dispenser (in ferrous area)	2070
29	E	Urinal top	990
30	E	Washing machine	702

[1] For each set of wipe samples collected at a facility, a minimum of one blank field blank samples was collected and all lead concentrations reported were blank corrected.

[2] The concentration of lead in this sample was below the laboratory's limit of detection (LOD).

Table 8 presents the results of the ten wipe samples collected from surfaces in a variety of locations other than bathrooms and lunchrooms. The highest level found was

23,400 μg/ft^2 on a microwave oven in an aluminum room where workers processed scrap aluminum and stored and ate their lunches.

Table 8. Miscellaneous surface sample results for lead

Sample ID	**Site ID**	**Surfaces**	**Location**	**Concentration [1] (μg/ft^2)**
31	H	Microwave oven	Aluminum room	23400
32	D	Locker door	Clean locker room	126
33	D	Locker top	Clean locker room	4500
34	D	Cubby	Locker room	135
35	H	Microwave oven	Locker room	<45 [2]
36	G	Refrigerator top	Locker room	144
37	C	Desk	Office	1080
38	C	Locker	Office	<45 [2]
39	A	Vending machine	Outdoor	243

40	G	Shelf	Shower room	216

[1]*For each set of wipe samples collected at a facility, a minimum of one blank field blank samples was collected and all lead concentrations reported were blank corrected.*

[2]*The concentration of lead in this sample was below the laboratory's limit of detection (LOD).*

During one of the site visits (Site B), we also collected wipe samples from workers' hands. Five wipe samples were collected after the workers washed their hands just before their lunch break. These workers performed different job duties with varied airborne lead exposures. The results are reported as micrograms of lead per hand (μg/hand) in Table 9. Lead was positively identified from all five workers' hands. The hand wipe samples were to demonstrate that workers may be exposed to lead through hand to mouth contamination regardless of their assigned jobs and the extent of airborne lead exposures, and they could ingest lead if they did not wash their hands well.

Table 9. Hand wipe results collected at site B for lead

Sample ID	Job title	Lead Concentration [1] (μg/ hand)
W1	Yard supervisor	12
W2	Crane operator	15
W3	Torch cutter	140
W4	Sorting, non-ferrous metal shop	34
W5	Worker, new steel shop	19

[1]*For each set of wipe samples collected at a facility, a minimum of one blank field blank samples was collected and all lead concentrations reported were blank corrected.*

Workers' Blood Lead Monitoring Data

At the time of our site visits, there were approximately 100 workers at the eight sites sorting, shearing, baling and cutting scrap metals. HMR data indicated that 20 (20%) of these workers received a total of 55 blood lead tests in 2000. Some of the tests were administered by workers' private physicians rather than through company biological monitoring programs. Table 10 summarizes the eight facilities' biological monitoring status at the time of our site visits. Four sites A, C, F and H did not provide workers with blood lead tests. According to our personal air monitoring results, the torch cutters of companies A and H were exposed to airborne lead fume and dust exceeding the OSHA PEL during sample time.

Table 10. Summary of blood lead monitoring status in 2000 of the eight companies for the metal recycling yard workers

Site ID	Number of yard workers	Number of workers tested	Job titles of workers tested	Number of tests	BLL range (μg/dL)	BLL Mean (μg/dL)	BLL Median (μg/dL)	Frequency of testing
A	7	0	NA[1]	0	NA	NA	NA	NA
B	15	2	Torch cutter	12	27-161	64	49	Followed doctor's recommendations
C	7	0	NA	0	NA	NA	NA	NA
D	23	13	Torch cutter, ferrous and nonferrous yard labor	29	10-41	16	14	Baseline and semi-annual testing
E	12	1	Maintenance mechanic	1	17	17	17	No company set frequency

F	5	0	NA	0	NA	NA	NA	NA
G	4	4	Metal recycling labor	13	18-40	29	28	Semi-annual testing
H	27	0	NA	0	NA	NA		NA

[1] *Not applicable.*

Four facilities (B, D, E and G) provided blood lead monitoring for some of their yard workers during the year of 2000. Company B had two torch cutters and one of them became ill after cutting bridge steel for a few months. The worker went to see his personal physician who tested the worker's blood lead level. His initial BLL was 121 μg/dL, which is severely elevated. The company had neither performed personal air monitoring to assess the worker's airborne lead exposure, nor provided any lead awareness training to the torch cutters prior to assigning them the torch cutting job. The worker had been provided with a full-face air-purifying respirator with P100 cartridges, although he was not fit tested and the respirator did not fit well. After consulting with the BOH industrial hygiene staff, Company B began providing blood lead testing for its two torch cutters in 2000. A total of 12 tests were provided that year; the torch cutters' BLL ranged from 27 to 161 μg/dL and the mean BLL was 64 μg/dL.

In responding to a torch cutter's elevated blood lead level of 41 μg/dL, Site D offered its thirteen yard workers with baseline and semiannual blood lead tests in 2000. A total of 29 blood lead tests were administered and the mean BLL was 16 μg/dL.

Facility G did not have a torch cutting operation; four workers sorted, sheared, and baled scrap metals. The facility did not have a biological monitoring program until 1996 when two workers found out that their children had elevated blood lead levels. Of the workers' children, a 23 month-old had a BLL of 25 μg/dL and a 13 month-old had a BLL of 27 μg/dL. The Centers for Disease Control and Prevention (CDC) defines an elevated BLL as 10 μg/dL for children younger than six years-old *(15)*. The two workers subsequently requested blood lead tests through their personal physicians; their initial blood lead levels were 26 μg/dL and 53 μg/dL, respectively. Based on the information gathered through the employee interviews and from the company, the BOH determined that the likely cause of the children's elevated blood lead was take-home lead from the fathers' metal recycling work. Following BOH's recommendations, Facility G started providing routine blood lead monitoring for all four employees in 1997.

At Facility G, the workers' main routes of lead intake was ingestion according to the results of the personal air monitoring. To reduce workers' exposures to lead dust through hand to mouth contamination, the BOH industrial hygiene staff recommended that the facility provide workers with a locker room with separate "dirty" and "clean" lockers, a lunchroom that was separated from the work area, and a shower room. Facility G completed the construction and the workers started using the hygiene facilities in April 2000. The workers changed into work clothes at the beginning of their work shift, showered at the end of a workday and changed into their street clothes before leaving for home. During their lunch break, the workers removed the outer layer of their work uniforms and boots, put on clean slippers, washed their hands and then entered the lunchroom for lunch in their under shirts and pants. These measures effectively reduced the employees' lead exposures as reflected in the reduction of the workers' blood lead levels. One worker whose blood lead level had been above 40 μg/dL since 1997 had a BLL below 30 μg/dL for the first time in 2000. The workers' mean BLL in 1997 was 42 μg/dL; it declined to 29 μg/dL in 2000. The workers' mean BLL was 25 μg/dL in 2005.

During the five years (from 2001 to 2005) after our site visits, facilities B, D and G continued monitoring their yard workers blood lead levels. The number of workers being monitored, and the number of tests administered at each facility varied every year, and the testing frequencies at each facility were not consistent over the time. Among the three facilities, the number of people being tested every year ranged from one to six and the number of annual tests administered ranged from two to sixteen. There were no clear statistical trends demonstrated by the BLL data among the three facilities.

Although both Sites E and F had on-going torch cutting operations, neither provided regular blood lead testing to the workers who had lead exposures. Site E had one worker tested twice while Site F provided three workers with a total of five blood lead tests during the five years following our site visits.

Follow-up Telephone Survey

The follow-up survey found that the seven facilities still recycled the same types of materials and metals as reported during the initial survey. However, three of the seven companies reported that they increased shearing operations as a substitute for torch cutting to reduce workers' lead exposures.

Two facility representatives stated that they provided torch cutters with better respiratory protection. One of the two companies upgraded the torch cutters' respirators from half-face APR to full-face APR with P100 filters. The other facility replaced the torch cutter's disposable dust mask with a half-face APR with P100 filters and provided respirator fit testing.

According to the follow-up telephone survey, the surveyed facilities reported across the board improvements in providing employees with personal protective equipment and hygiene facilities such as lunchrooms, lockers and showers. The number of facilities that provided employee lunchrooms increased from two to four. Two more companies provided workers with lockers and showers. The reported improvement could not be verified since no on-site evaluations were conducted.

When asked whether workers would be exposed to lead while cutting new steel, six facility representatives answered no. When asked whether workers would be exposed to lead while cutting unpainted scrap, four company representatives answered no.

Discussion

Employee Airborne Lead Exposures

It is important to recognize when reviewing the personal air sample results that monitoring occurred on only one day at each facility. The work conditions and contaminant concentrations could vary significantly from day-to-day or even during a work shift. Some factors that can influence workers' airborne lead exposures in the various scrap yard operations include: the types of metal (composition and coating) being processed, the amounts of those metals, the condition of the equipment and the machinery involved, the skills and techniques of the persons who conducted the tasks, and the weather. The air sampling results are representative only to the extent that the conditions on the day of monitoring were "typical" of that job.

For workers who do more than one job during a typical 8-hour shift, one needs to monitor the exposure they receive while performing each task to determine their total exposure for the work shift. The formula for calculating an 8-hour TWA that involves different tasks with varied exposures is "$C_1T_1+C_2T_2+C_3T_3+\ldots)/480$" *(12)* . "$C_1$" represents the lead concentration for the first task performed, "C_2" the concentration for the second task, etc. "T_1" represents the time (in minutes) that the first task is performed, "T_2" is the time for the second task, etc.

Among all the typical metal recycling tasks, torch cutting showed the greatest potential for serious lead exposure (see Table 5). When asked to assess lead hazards associated with torch cutting different scrap metals during the survey, the majority of the companies considered that unpainted metal presented less lead hazards and new steel presented none. The survey found that some companies only require workers to use respirators when cutting galvanized steel (lead is a common impurity in zinc that is used for galvanizing steel) or painted metals (lead-based paint). The companies' decision was based on the assumption that lead only existed in painted or galvanized coatings.

However, lead is one of the elemental metals that are commonly used as an additive by steelmakers to enhance the steel's machinability *(16)*. For example, Grade 12L14, a free-machining steel widely used throughout the world, contains up to 0.35 percent (%) lead by weight *(4,5,16)*. Lead is used in the manufacturing of other ferrous and non-ferrous metals or alloys for its unique characteristics *(5)*. Torch cutting these metals can release substantial amounts of lead fume and dust as demonstrated by our air monitoring results. Two of the samples (ID #004 and #005) had sufficiently high lead concentrations that, even if the workers were exposed to no lead for the remainder of their work shift, their 8-hour TWA would still exceed the OSHA PEL. Both workers were cutting unpainted steel; the worker (#005) at facility H was cutting new steel from a local fabrication shop.

Scrap comes to recycling facilities from a variety of sources and the exact content or composition of the materials being processed by metal recycling workers are usually unknown. Given the difficulty in predicting the specific and precise lead and other toxic metal contents in any metal, a good industrial hygiene practice is for workers to wear respiratory protection during torch cutting of any scrap metal.

Besides torch cutting, radiator disassembly is also a relatively high-risk operation and workers can be potentially exposed to lead levels exceeding the OSHA PEL.

The workers who performed sorting, shearing, baling and moving metal with vehicles were exposed to relatively low airborne concentrations (from below LOD up to 18 $\mu g/m^3$). Although the air lead concentrations during these operations may be influenced by the factors that were discussed in the first paragraph of the Discussion section, the monitoring results in this study did not exceed the OSHA action level (AL) of 30 $\mu g/m^3$ for general industry *(7)*. For the workers who performed these operations, the employers should focus on minimizing ingestion of lead through hand to mouth contamination.

Surface Lead Contamination and Workers Exposures Through Ingestion

During metal recycling processes, lead dust can be generated and dispersed through the air, eventually settling on surfaces both inside and outside the work area, and on workers' exposed hair, skin, clothes and shoes. Lead can accumulate on surfaces over time if the facility is not kept clean of lead dust. When surfaces have lead dust on them, a worker may touch those surfaces, and then may pick up food, a cigarette, or touch his mouth with his hand. This can result in the accidental ingestion (eating) of lead, which is then absorbed into the body.

The OSHA General Industry Lead Standard *(7)* contains housekeeping provisions that address the issue of surface contamination, but there are currently no threshold levels of surface contamination included in the OSHA standards. The United States Environmental Protection Agency (EPA) has defined dangerous levels of lead dust in deteriorated paint, settled dust on floors and window sills, and soil *(17)*. Although the EPA standard is often used as a reference when evaluating surface dust accumulation and the effectiveness of housekeeping, it should be noted that the EPA levels are principally intended to protect young children in the home, and may not be directly applicable to an industrial setting. Under the EPA's recent (2000) standard, the threshold concentration for floors is 40 $\mu g/ft^2$, for interior window sills is 250 $\mu g/ft^2$ and for window troughs is 400 $\mu g/ft^2$.

Many of the wipe samples that were collected on lunchroom surfaces during the site visits had measurable levels of lead dust. Given that food and beverages are consumed in those areas, this represents a risk of lead ingestion. Some of the samples obtained in the restrooms indicate similar concern. For example, finding a concentration of 2070 $\mu g/ft^2$ on a towel dispenser is problematic, given that a worker may touch his mouth or face after obtaining a towel.

In one of the facilities, some workers took their lunch break in the "aluminum room", where aluminum was sorted, sheared and baled. A microwave oven placed in the aluminum room was used by the workers to heat their lunches. The lead dust concentration on top of the microwave was very elevated at 23,400 $\mu g/ft^2$. It was recommended to the company that eating, drinking, and smoking in that area (and other lead work areas) be prohibited.

It is critical that workers wash their hands thoroughly before eating, drinking or smoking in order to minimize their risk of ingesting lead. Practicing good personal hygiene requires involvement of both management and workers. At the facility where the hand wipes were collected, certain work areas were considered by both management and employees as "clean" and "lead free", such as the "new steel" shop where only new steel was processed and handled. Hand washing was not required by management for the workers who worked in those areas or who did not perform torch cutting. All the hand wipe samples were collected after workers washed their hands and were ready to eat their lunches. The highest lead dust accumulation (140 μg) was found on a torch cutter's hand. The worker in the "new steel" shop had 19 μg of lead dust on his hand. The supervisor who did not do yard work had 12 μg of lead dust on his hand. The hand wipe sample results demonstrated that there was no such area as "clean" and "lead free" in a metal recycling facility, and that all metal recycling tasks present a potential hazard for lead ingestion. Practicing correct hand washing technique is one way to reduce ingestion of lead.

The lead dust that settled on workers' clothes and shoes can also pose a hazard. Even if a lunchroom is completely separate from all production areas, workers can track lead into the room if they don't clean the lead dust off their work clothes before entering the lunchroom. The dust should be removed with a high efficiency particulate air (HEPA) vacuum (not with compressed air) to avoid dispersing lead dust into the air.

In addition to regular cleaning, one facility (Site G) required all of its employees to remove the outer layer of their work uniforms and boots, put on clean slippers, wash their hands and then enter the lunchroom to eat in their under shirts and pants. By doing that, they were able to keep the concentration of lead dust on their lunchroom surfaces below the analytical detection limit (Table 6).

Workers can also inadvertently bring lead dust home on their clothes and in their hair, potentially exposing family members to lead. Most vulnerable are young children less than two years of age. Such take-home exposures can and should be minimized. A shower facility with separate "clean" and "dirty" lockers can help prevent cross contamination between the workplace and workers' homes. With this system, a worker leaves the production area, enters the "dirty" locker room, removes his clothes, showers, and goes directly into the "clean" locker room before donning clean clothes, getting into his vehicle and traveling home after work.

Biological Monitoring for Lead

Our mail survey found that 85% of the metal recycling companies did not provide workers with biological monitoring for lead. Since the survey question did not differentiate between routine, on-going biological monitoring for lead that was part of a company lead safety program and sporadic or one-time blood lead testing, the percentage of the companies without regular biological monitoring for lead could be even higher.

Among the companies that provided blood lead testing, few initiated the biological monitoring for lead proactively. Some companies provided minimum testing in responding to OSHA citations, while others only started monitoring their workers' blood lead levels after a worker or workers' family members (including children) were diagnosed with lead poisoning by the workers' private physicians.

Most companies that offered blood lead testing only had their torch cutters tested. Very few companies provided blood lead testing to the workers who performed metal recycling tasks other than torch cutting such as sorting, baling and shearing. The HMR data showed that workers could have lead poisoning through ingestion while handling scrap metals by hand. Workers can also inadvertently bring lead dust home and poison their family members, including children who are more susceptible to lead poisoning (as it happened at Facility G).

The BLL data of Facilities B, D and E that mainly monitored torch cutters' blood lead levels did not demonstrate clear statistical trends during the five years following the BOH on-site consultations. This may be due to the limited numbers of workers being tested, limited number of tests administered on each worker annually and inconsistent testing frequencies. Overall, the metal recycling industry as a whole has not integrated biological monitoring for lead into its routine safety and health programs.

Air monitoring can only determine workers' airborne lead exposures. Biological monitoring can assess workers' exposures to lead through both inhalation and ingestion. Symptoms of lead poisoning may be subtle and non-specific at early stages of lead poisoning; timely blood lead monitoring can offer early detection. Workers elevated blood lead levels may indicate problems in engineering controls, personal protective equipment, personal hygiene or housekeeping. Early detection of workers' elevated blood lead levels can lead to prompt industrial hygiene intervention that can prevent further exposures and protect workers from suffering irreversible health effects.

Worker Exposures to Other Metals

In addition to lead, metal recycling workers may be exposed to other metals. A NIOSH study found that besides lead, torch cutters were also exposed to elevated levels of arsenic, cadmium, copper, iron and nickel fumes and dusts *(18)*. Our personal air samples did not find significant airborne exposures to cobalt and cadmium. One worker was exposed to nickel at a concentration of 8.1 $\mu g/m^3$ while torch cutting new steel that came from a local fabricating shop. Although this level is well below the OSHA PEL of 1000 $\mu g/m^3$ and ACGIH TWA of 1500 $\mu g/m^3$, it is more than half of the Threshold Limit Value (TLV) of 15 $\mu g/m^3$ recommended by NIOSH. Nickel is often combined with other metals to form alloys. The U.S. Department of Health and Human Services (DHHS) has determined that nickel metal may reasonably be anticipated to be a carcinogen *(19)*. The general control measures for occupational lead exposures discussed above would also be used to control exposures to nickel and other metals during metal recycling processes.

Employer Awareness of Workplace Lead Exposures

Our survey found that the greater the employer's awareness of workplace lead exposures, the greater the likelihood that the employer will conduct personal air monitoring (Table 1) and implement a biological monitoring program (Table 3).

Based on our survey results, metal recycling workers are exposed to lead on a daily bases from both inhalation and ingestion. However, of the 101 companies that completed our survey, 72 (71%) of them considered that occupational lead exposure was unlikely to or definitely did not occur at their facilities. These survey results demonstrate that efforts should be made to increase the awareness on the part of scrap yard owners as to the prevalence, extent and magnitude of occupational lead exposures in the metal recycling trade.

Conclusions

Metal recycling workers can be exposed to lead through both inhalation and ingestion while performing typical metal recycling tasks. Torch cutting and radiator disassembly may generate lead dust and fume concentrations exceeding the OSHA PEL. New or unpainted steel is not "clean" or "lead free". Torch cutters' airborne lead exposures can exceed the OSHA PEL even while cutting steel that may mistakenly be assumed to be lead-free.

Ingestion is a significant potential route of lead exposure for all workers at a metal recycling facility. It is prudent to assume that all of the scrap metal handling areas and adjacent support areas, such as lunchrooms, bathrooms, and offices have lead surface contamination. Workers' hands can be contaminated with lead dust even when they work in so called "non-lead" areas, such as a new steel shop. Personal air monitoring cannot assess the extent of the workers' lead exposure through ingestion. The only method that can assess exposure in this situation is biological monitoring (conducting regular blood lead testing).

Owners of metal recycling companies did not understand the widespread nature of occupational lead exposures in their facilities and the importance of biological monitoring. The majority of the metal recycling companies in New York State are either single person operations or have less than 10 employees (see Figure 2). Educating this population presents a special challenge, since these small companies may have limited occupational safety and health resources.

Recommendations

1. Governmental agencies, metal recycling industry trade organizations, safety and health professionals, workers' compensation carriers and other stakeholders should work together to help educate the employers of the metal recycling industry and raise their awareness of occupational lead exposure in the trade. The effort should be focused on developing effective educational materials and intervention strategies, disseminating the materials to the target population, and evaluating the effectiveness of the education materials through follow up surveys.

2. The first and best strategy is to control the hazard at its source, and engineering controls are generally recommended to achieve that goal *(20)*. Employers should eliminate workplace hazards or reduce exposure to hazards by implementing engineering controls to the extent feasible. The following engineering controls may be adopted to reduce workers' exposures to metals while performing typical metal recycling tasks:

    - Replace torch cutting with other cutting methods that generate less lead fume and dust, such as shearing; and
    - Provide local exhaust ventilation to the workers who disassemble radiators. Employers may want to refer to the ACGIH Industrial Ventilation manual for examples of local exhaust hood designs *(21)*.
3. Employers should provide employees with lead training on a regular basis, preferably annually. Workers should be informed of the hazards of lead exposure, correct methods for using respiratory protection, good personal hygiene, the benefits of biological monitoring, and the dangers of contaminating their homes with lead from work. The workers should also learn the proper techniques and practices to minimize lead exposure for each job assignment.

4. Employers should institute a biological monitoring program for all employees potentially exposed to lead. The metal recycling companies are encouraged to follow the guidelines developed by the New York State Occupational Health Clinic Network (OHCN) *(22)*. These guidelines, originally developed for the construction industry exceed OSHA biological monitoring requirement for the general industry and offer an early detection of blood lead poisoning:

    - Initial blood lead test before beginning work involving lead;
    - Blood lead test every month in the following circumstances:
        - For the first three months of work; or
        - If the previous blood lead level was greater than 25 μg/dL; or
        - If the previous blood lead level was at least 50 μg/dL (*a follow-up test within two weeks and medical removal is strongly recommended);* or
        - If an increase of at least 10 μg/dL from the previous test is observed;
    - Blood lead test every two months in the following circumstances:
        - When the blood lead level remains below 25 μg/dL for three months; and
        - If an increase less than 10 μg/dL from the previous test is observed;
    - Blood lead test every six months in the following circumstances:
        - When the blood lead levels remain below 25 μg/dL for six months; and
        - If an increase less than 10 μg/dL from the previous test is observed.

    The employee blood lead test results may be charted and recorded in a graph or a spreadsheet format that is easily understood and can offer a historical perspective to the worker and the company. The companies could utilize the spreadsheet to look for trends and to perform hazard evaluation for specific jobs.

5. Engineering controls should be implemented first to reduce workers' airborne lead exposures to the lowest feasible. Torch cutters should be wearing respirators whenever they cut, since their exposures vary significantly.

Each facility should develop and implement a written respiratory protection program. The employees who perform torch cutting, radiator disassembly, and any other tasks that could subject them to significant lead exposures should be placed in the program. The workers should wear at least half-face respirators with dual P100 (HEPA) cartridges whenever they torch cut, or disassemble radiators. An employee who is required to use a respirator should receive a medical evaluation, a respirator fit test, and training on respirator usage and maintenance, as per the OSHA Respirator Standard (29CFR1910.134) and OSHA lead standard (29CFR1910.1025)

6. The interior and exterior surfaces of workers' respirators and other personal protective equipment should be cleaned daily to prevent lead dust contamination and subsequent lead ingestion by the workers who use the PPE. A sink with cleaning supplies should be available for this purpose.

7. Employers should provide clean lunchrooms separate from the production areas. Workers should store food and drink in the lunchrooms. A locker room with separate "clean" and "dirty" areas should be available to allow workers to store their work and street clothes and shoes separately to avoid cross contamination. Showers should be available for the workers who perform tasks that emit high levels of lead dust and fume. Workers should shower and change to their clean clothing and shoes after their work shift to prevent "take-home" lead.

8. Workers should not eat, drink, or smoke in any work area where there is potential contamination with lead dust. Signs clearly prohibiting such activities should be posted prominently in those areas. Employees should clean the dust off their clothes with a HEPA vacuum (and ideally remove their outer clothing) before taking a lunch break. All the production employees should be instructed to wash their faces and hands before eating, drinking, smoking, or taking breaks.

   Employers should provide a brush and hand soap for hand washing. Workers should learn and practice good hand washing techniques, such as rubbing and scrubbing with a brush vigorously, and rinsing with a copious quantity of water.

   Employees who perform certain tasks with significant lead exposures, such as torch cutting and radiator disassembling, should shower at the end of their shift. All employees with lead exposures should change into work clothes and shoes at the beginning of their work shift and back into street clothes and shoes afterwards to avoid exposing their family members to "take home" lead. Work clothes should be stored and laundered separately to avoid cross contamination.

9. The lunchrooms and bathrooms should be cleaned daily to reduce lead dust accumulation. A HEPA filter vacuum should be used to clean floors. Wet methods can prevent surface dusts from becoming airborne. Dry sweeping should be prohibited. Cleaning should be done with detergent and water.

References

1. Castellino N, Castellino P and Sannolo N. Inorganic Lead Exposure: Metabolism and Intoxication. CRC Press, Inc. 1995.
2. The Spangle on Hot-Dip Galvanized Steel Sheet. GalvInfo Center. The International Zinc Association. January 2007. Last retrieved on June 1, 2007
3. Koepfer C. Anatomy of Free Machining Steel. Production Machining Magazine. March/April 2002. Last retrieved on June 1, 2007.
4. Walsh R. Machining and Metalworking Handbook. McGraw-Hill. 1993.
5. Davis J. R. and Associates. Carbon and Alloy Steels. ASM International. 1996.
6. Briant C. Impurities in Engineering Materials. Marcel Dekker, Inc. 1999.
7. US Department of Labor (DOL), Occupational Safety and Health Administration (OSHA). Regulations (Standards 29-CFR). Lead. – 1910.1025. Last retrieved June 1, 2007.
8. Agency for Toxic Substances and Disease Registry (ATSDR). Toxicological Profile for Lead. November 2, 2006. Last retrieved on June 1, 2007

9. Center for Disease Control and Prevention (CDC). Adult Blood Lead Epidemiology and Surveillance-United States, 1998-2001. CDC MMWR. December 13, 2002. Last retrieved on June 1, 2007.
10. National Institute for Occupational Safety and Health (NIOSH). NIOSH Manual of Analytical Methods (NMAM). August 1994. Last retrieved on June 1, 2007.
11. National Institute for Occupational Safety and Health (NIOSH). Health and Safety Guide for Scrap Processors. DHEW Publication No. NIOSH 76-125. 1976.
12. US Department of Labor (DOL), Occupational Safety and Health Administration (OSHA). Regulations (Standards 29-CFR). Air Contaminants. – 1910.1000. Last retrieved on June 1, 2007.
13. National Institute for Occupational Safety and Health (NIOSH). NIOSH Pocket Guide for Chemical Hazards (NPG). February 2004.
14. American Conference of Governmental Industrial Hygienists (ACGIH). 2005 TLVs and BEIs. ACGIH. 2005.
15. Center for Disease Control and Prevention (CDC). Surveillance for Elevated Blood Lead Levels Among Children --- United States, 1997--2001. MMWR. September 12, 2003. Last retrieved on June 1, 2007.
16. Takashi I, Toshiyuki M. Bar and Wire Steels for Gears and Valves of Automobiles – Eco-friendly Free Cutting Steel without Lead Addition. JFE Technical Report. No. 4. November 2004. Last retrieved on June 1, 2007.
17. Environmental Protection Agency. 40 CFR Part 745. Identification of dangerous Levels of Lead; Final Rule. January 5, 2001.
18. National Institute for Occupational Safety and Health (NIOSH). NIOSH Health Hazard Evaluation Report. HETA #2003-0367-2973. July 2005. Last retrieved on June 1, 2007.
19. Agency for Toxic Substances and Disease Registry (ATSDR). Toxicological Profile for Nickel. August 2005. Last retrieved on June 1, 2007.
20. US Department of Labor (DOL), Occupational Safety and Health Administration (OSHA). Safety and Health Management System e-tool: Hazard Prevention and Control. Last retrieved on June 1, 2007.
21. American Conference of Governmental Industrial Hygienists (ACGIH). Industrial Ventilation, 25th ed., a manual of recommended practice. 2005. Cincinnati, OH. ACGIH.
22. Levin S, Goldberg M. 2000. Clinical Evaluation and Management of Lead-Exposed Construction Workers. American Journal of Industrial Medicine 37:23-43.