Evaluation and Analysis of Metal Shredding Facilities and Metal Shredder Wastes

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DTSC
Department of Toxic Substances Control

CalEPA
California Environmental Protection Agency

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ACRONYMS

AB	Assembly Bill
ADC	Alternative Daily Cover
APCD	Air Pollution Control District
AQMD	Air Quality Management District
ARB	Air Resources Board
ATSDR	Agency for Toxic Substances and Disease Registry
BAAQMD	Bay Area Air Quality Management District
BMP	Best Management Practice
CAAQS	California Ambient Air Quality Standards
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
CES	CalEnviroScreen
CFC	chlorofluorocarbon
COD	chemical oxygen demand
CTMSR	Chemically Treated Metal Shredder Residue
CUPA	Certified Unified Program Agency
DBA	doing business as
DHHS	Department of Health and Human Services
DHS	Department of Health Services
DTSC	Department of Toxic Substances Control
EBMUD	East Bay Municipal Utility District
EMP	Emissions Minimization Plan
GIS	Geographic Information System
HVAC	Heating, Ventilation, and Air Conditioning
HWTS	Hazardous Waste Tracking System
IARC	International Agency for Research on Cancer
IGP	Industrial General Permit
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
MSR	metal shredder residue
n	number of samples analyzed
NAAQS	National Ambient Air Quality Standards
NAICS	North American Industry Classification System
NAL	numeric action level
NIOSH	National Institute for Occupational Safety and Health
NPDES	National Pollutant Discharge Elimination System
OCI	Office of Criminal Investigations
OEHHA	Office of Environmental Health Hazard Assessment
OPP	Official Policy and Procedure
PCB	polychlorinated biphenyls
PM	particulate matter
QSE	Qualifying Storm Event
RCRA	Resource Conservation and Recovery Act
RTO	Regenerative Thermal Oxidizer
RWQCB	Regional Water Quality Control Board
SB	Senate Bill
SCAQMD	South Coast Air Quality Management District
SIC	Standard Industrial Classification
SIP	State Implementation Plan
SJVAPCD	San Joaquin Valley Air Pollution Control District
SMARTS	Storm Water Multiple Application and Report Tracking System
STLC	Soluble Threshold Limit Concentration
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TSCD	Toxic Substances Control Division
TSCP	Toxic Substances Control Program
TMSR	Treated Metal Shredder Residue
TSP	total suspended particulates
TTLC	Total Threshold Limit Concentration
UCL	Upper Confidence Limit
$\mu g/m^3$	micrograms per cubic meter
U.S. EPA	United States Environmental Protection Agency
VOC	volatile organic compounds
WDID	Waste Discharger Identification
XRF	X-ray Fluorescence

EXECUTIVE SUMMARY

The Department of Toxic Substances Control (DTSC) is pleased to present this Evaluation and Analysis of Metal Shredding Facilities and Metal Shredder Wastes (Final Report). This Final Report incorporates feedback received after initial posting of the Draft Report in 2018, summarizes recent enforcement actions taken since 2018, provides an analysis of the DTSC-directed treatability study, incorporates information learned by DTSC during the course of its community workshops and stakeholder consultation group meetings, and revises terminology where appropriate.

DTSC reviewed hazardous waste management activities, current regulatory environmental oversight, and the history of releases, contamination, and enforcement actions at metal shredding facilities in California. Additionally, DTSC coordinated with metal shredding facilities on a treatability study to identify the highest level of treatment that could be achieved to stabilize metals of concern on metal shredder waste with current technology. DTSC also reviewed the current disposal practices of chemically treated metal shredder waste at municipal solid waste landfills to identify the potential for migration of contaminants to groundwater, surface water, and the air.

The study team found numerous examples of accidents, improper storage of hazardous wastes, soil contamination, and releases of hazardous wastes that impacted the environment and surrounding communities at metal shredding facilities. DTSC and other agencies have taken several enforcement actions against metal shredding facilities in response to these types of incidents.

DTSC’s efforts have allowed for it to gain a more thorough understanding of metal shredder operations, as well as of the ambiguities within the existing regulatory framework under which metal recyclers, including shredding facilities, have historically operated. Based on this evaluation, DTSC has determined that the point of generation of hazardous waste is at the shredder itself, meaning that various downstream activities performed at the facilities would be subject to the Hazardous Waste Control Law. Under the Hazardous Waste Control Law, entities who conduct hazardous waste treatment, storage, or disposal are required to apply for and receive a form of authorization from DTSC in order to operate. Based on the results of its evaluation and DTSC's updated understanding of these activities, metal shredding facilities would require a form of authorization from DTSC to continue to operate in the same manner.

DTSC’s analysis demonstrates that the disposal of chemically treated metal shredder residue as nonhazardous waste in municipal solid waste landfills, including its use as alternative daily cover, has not resulted in harm to human health or safety or to the environment, based on the limited data available to DTSC. Additionally, the analysis demonstrates that chemically treated metal shredder residue has not contributed to the solubilization and migration of heavy metals from solid waste landfills via leaching into soil or groundwater, surface water contamination, or windborne dispersion. Thus, while various protections and requirements related to the management of chemically treated metal shredder residue (CTMSR) during its transportation to landfills may need to be developed to ensure the safety of human health and the environment, DTSC has concluded that it is not necessary that metal shredder residue that has been appropriately chemically treated, managed, and transported, to be disposed of as a hazardous waste to prevent or mitigate potential hazards to human health or safety or to the environment.

1 Introduction and Overview

The Department of Toxic Substances Control (DTSC) prepared this Evaluation and Analysis of Metal Shredding Facilities and Metal Shredder Wastes (Final Report) as part of its ongoing efforts to better understand the metal shredding industry in California, and the existing regulatory framework within which it operates. During the research for and preparation of this Final Report, DTSC consulted with other state and local governmental regulatory agencies including the California Air Resources Board (ARB), the State Water Resources Control Board (SWRCB), the California Department of Recycling and Resource Recovery (CalRecycle), the California Department of Industrial Relations, the Division of Occupational Safety and Health (Cal/OSHA), numerous Regional Water Quality Control Boards (RWQCBs), local Air Quality Management Districts and Air Pollution Control Districts, and the Certified Unified Program Agencies (CUPAs). Additionally, DTSC engaged with metal shredding facilities and landfill owners and operators in conducting this evaluation. DTSC would like to express its appreciation for the cooperation and assistance of the regulated community, members of the public, and other stakeholders in the evaluation and development of this Final Report. DTSC welcomes the continued participation from industry[1] and other stakeholders in the development of a lawful, equitable, and balanced approach to the regulation of metal shredding facilities and the management of metal shredder wastes in California.

1.1 Document Scope

This Final Report was prepared to evaluate metal shredding processes and wastes as they are currently operating. DTSC's goal is to ensure that these processes are managed and regulated in a manner that protects public health and the environment. The Final Report specifically considers the applicability of hazardous waste management regulations and determines whether additional requirements are needed or appropriate.

This Final Report is divided into five sections. The first section provides an introduction and overview of metal shredding operations in California. The second section describes the evaluations that DTSC conducted as part of its research into metal shredding facilities and metal shredder wastes. The third section presents the analyses that DTSC performed based on the evaluations in Section 2. The fourth section discusses the current classification and disposal mechanisms of CTMSR. The fifth and final section presents DTSC's conclusions and recommendations.

1.2 Terminology

To ensure a clear and common understanding of the concepts discussed in this Final Report, DTSC provides the following definitions of terms associated with the metal shredding industry and the wastes that it generates:

[1] Industry is used here to refer to all metal shredding facilities in California that currently possess a nonhazardous waste variance under Title 22, California Code of Regulations, section 66260.200(f). The California Metal Shredder Coalition is composed of Schnitzer Steel Industries, Inc., Sims Metal Management, SA Recycling LLC, and Ecology Recycling (formerly known as Ecology Auto Parts, Inc.).

Chemically Treated Metal Shredder Residue (CTMSR): Metal shredder residue that has been subject to a chemical stabilization treatment process consisting of the addition of sodium or potassium silicate and an alkaline cement powder to reduce to the solubility of metals in the residue.

Department of Toxic Substances Control (DTSC): DTSC originated as the Toxic Substances Control Division (TSCD) within the Department of Health Services (DHS), and was later expanded as 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 Final Report under the umbrella term of “DTSC” for ease of reference.

Disposal: 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.” (Sec. 66260.10, div. 4.5, tit. 22, Cal. Code Regs; see also sec. 25113, Health & Saf. Code.)

Emissions Minimization Plan (EMP): An EMP details the management practices, measures, equipment, and procedures that are used to minimize fugitive emissions at individual metal shredding facilities. Operations subject to an EMP include roadways and traffic areas, metal management, metal shredder waste management, and de-pollution operations. EMPs are required for “metal facilities” in the Bay Area Air Quality Management District (BAAQMD); specific EMP requirements for metal shredding facilities located within the BAAQMD are found in the BAAQMD’s Regulation 6, Rule 4.

Ferrous Metal: Pursuant to section 18720 of division 7 of title 14 of the California Code of Regulations, ferrous metal means any iron or steel scrap that has an iron content sufficient for magnetic separation.

Light Fibrous Material (LFM): Material produced during the metal shredding process that does not fall under the categories of recoverable ferrous or non-ferrous metal, but rather metal shredder residue, and which can be inappropriately dispersed offsite due to wind or rain if not adequately managed. LFM typically consists of residues from metal shredding operations such as glass, rubber, automobile fluids, dirt, and plastics from shredded dashboards, car seats, and other non-metallic car parts and household appliances. Samples of LFM have been shown to meet the criteria for hazardous waste in California due to exceedances of regulatory thresholds for zinc, lead, and copper.

Metal Shredder Aggregate: The mixture of shredded material produced by the metal shredding hammer mill that is typically comprised of recoverable ferrous and non-ferrous metals and metal shredder residue.

Metal Shredder Residue (MSR): The portion of the metal shredder aggregate mixture, comprised of plastics, rubber, glass, foam, fabrics, carpet, wood, residual amounts of fluids such as fuels, oils, and grease, dirt, and/or other debris, that remains after ferrous metals and non-ferrous metals have been separated and removed, and before chemical stabilization/treatment occurs.

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 CTMSR.

Metal Shredding Facility: A metal shredding facility is an operation that uses a shredding technique, such as a hammer mill, to process end-of-life vehicles, appliances, and other forms of metallic discard in order to facilitate the separation and sorting of recoverable ferrous and non-ferrous metals from nonrecyclable materials. 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. (Sec. 25150.82(b), Health & Saf. Code.)

Metallic Discard: Metallic discard means any large metal article or product, or any part thereof, including, but not limited to, metal furniture, machinery, major appliances, electronic products, and wood-burning stoves. (Sec. 42161, Public Res. Code.)

Non-ferrous Metal: Pursuant to section 18720 of division 7 of title 14 of the California Code of Regulations, non-ferrous metal means any metal scraps that have value, and that are derived from metals other than iron and its alloys in steel, such as aluminum, copper, brass, bronze, lead, zinc and other metals, and to which a magnet will not adhere.

Storage: 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." (Sec. 66260.10, div. 4.5, tit. 22, Cal. Code Regs.; see also sec. 25123, Health & Saf. Code.)

Treatment: 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." (Sec. 66260.10, div. 4.5, tit. 22, Cal. Code Regs.; see also sec. 25123.5, Health & Saf. Code.)

Unprocessed Obsolete Scrap Metal: For purposes of this Final Report, the term "unprocessed obsolete scrap metal" will be used to describe the material received by metal shredding facilities prior to "de-pollution" and processing. This material includes, but is not limited to, waste metallic discards, waste vehicles, and other forms of waste metal. The term "feedstock," in the context of metal shredding activities described in this Final Report, refers to "unprocessed obsolete scrap metal" which has undergone the "de-pollution" process.

Vehicle: Vehicle means any device used for transportation. "Vehicle" includes bicycles, airplanes, and other transportation devices not used on highways, and automobiles and other vehicles, as defined in Section 670 of the Vehicle Code. (Sec. 42165, Public Res. Code.)

1.3 Metal Shredding Operations

It is estimated that there are approximately 2,500 metal recycling facilities in California, which, in 2019, collected and processed for export an estimated 6.4 million tons of metal worth $3.3 billion.[2] The majority of this metal was exported to countries in Asia. Metal recycling facilities include feeder yards that collect metallic discard from the public and businesses, automobile dismantlers that process end-of-life vehicles, and metal shredding facilities, which represent a small and unique subset of metal recycling facilities, which shred and separate recoverable scrap metal[3] for export. To DTSC's knowledge, there are currently six metal shredding facilities in California that were the recipients of hazardous

[2] See State of Disposal and Recycling in California for Calendar Year 2019, California Department of Resources Recycling and Recovery, Publication # DRRR-2020-1697, February 2021.

[3] See Sec. 66260.10, div. 4.5, tit. 22, Cal. Code Regs., for definition of "scrap metal."

waste declassifications for CTMSR issued by DTSC between 1986 and 1992, and three other facilities that do not currently operate under a similar declassification from DTSC.

Metal shredding operations all follow the same basic process, as illustrated in Figure 1. The metal shredding facility receives unprocessed obsolete scrap metal, such as crushed vehicles and large appliances, either from feeder yards or directly from the public. Before feeder yards transfer this unprocessed obsolete scrap metal to the shredding facility, they must remove hazardous materials that are often present in unprocessed obsolete scrap metal in a process referred to as “de-pollution.” Waste metal that is received directly by shredding facilities must be de-polluted onsite prior to processing. The de-polluted feedstock is processed through a shredder (also called a hammer mill) to physically alter the feedstock and facilitate its separation into distinct materials to enhance its economic value, resulting in metal shredder aggregate. The aggregate that is generated via this process is a mixed wastestream consisting of ferrous and non-ferrous metals, plastic, rubber, glass and other components that comprise the unprocessed obsolete scrap metal. Ferrous metal is separated out and the remaining metal shredder

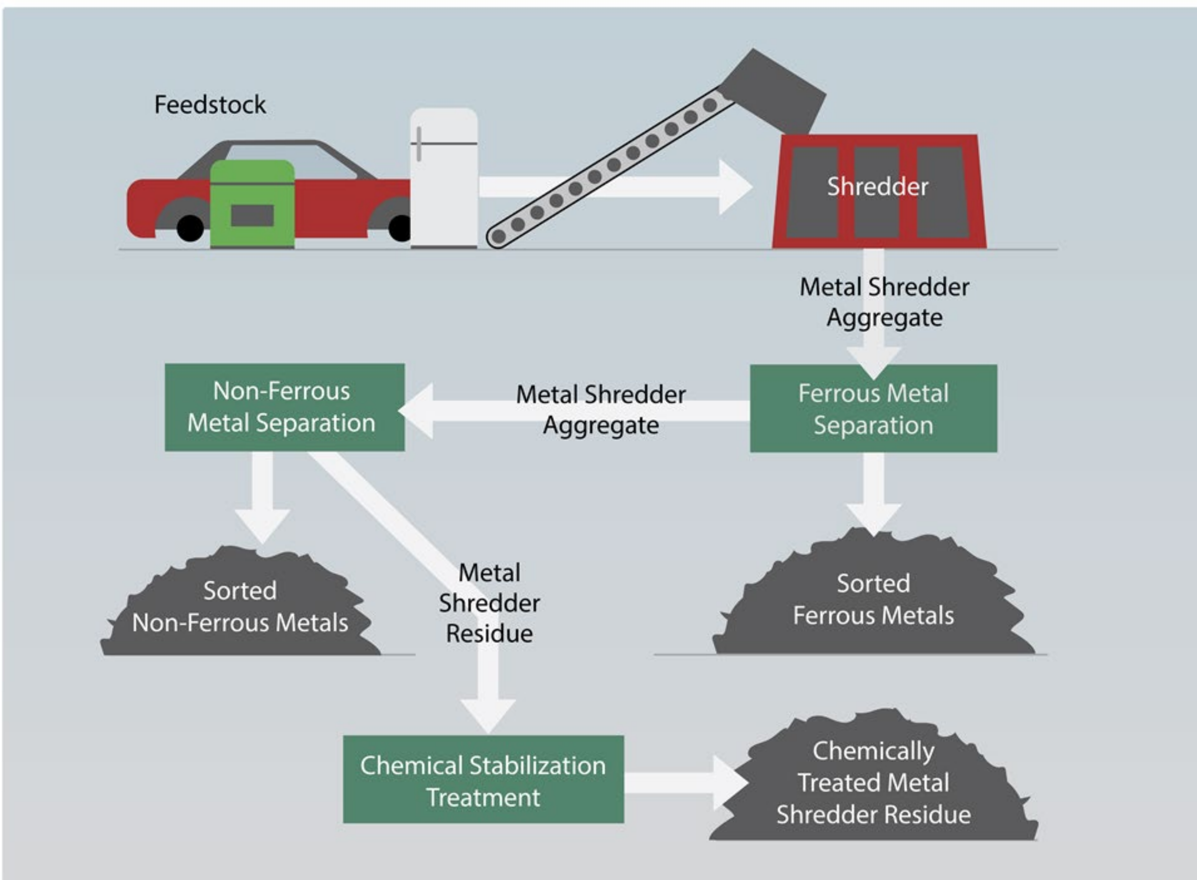

Figure 1. Diagram of a typical metal shredding operation

aggregate is further processed to separate 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 municipal solid waste landfills if the generating facility has applied for an received a nonhazardous waste classification for CTMSR from DTSC. Each of these steps is discussed further below.

Feedstock/Unprocessed Obsolete Scrap Metal

The unprocessed obsolete scrap metal that is sent to metal shredding facilities includes end-of-life products that are primarily composed of metal, such as vehicles, appliances, construction and demolition materials, and manufacturing scrap. Much of the material that arrives at metal shredding facilities comes from feeder yards which sort, bale, and shear the metal to compress it for ease of transport. This material arrives at the metal shredding facility in a variety of ways, most commonly by truck or rail. Because consumers have discarded the unprocessed obsolete scrap metal before it has arrived at the metal shredding facilities, the material is defined as a waste.

When the unprocessed obsolete scrap metal arrives at the metal shredding facility, it is unloaded by large machinery and piled on the ground for ease of handling. Because deliveries can be a mixture of metals and other materials, additional separation and processing steps such as further sorting, de-pollution, and shearing may occur before the feedstock is ready to be shredded.

De-Pollution

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, must be managed as a hazardous waste pursuant to chapter 6.5 (commencing with sec. 25100) of division 20 of the Health and Safety Code. Much of the unprocessed obsolete scrap metal that metal shredding facilities receive for shredding has the potential to contain MRSH. MRSH must be removed before metal feedstock can enter the shredder. The facilities must conduct de-pollution activities onsite for any material received from the public. Typical hazardous components that can be found in unprocessed obsolete 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, capacitors containing polychlorinated biphenyls (PCBs), light ballasts, transformers, and items containing elemental mercury (e.g., tilt-switches or thermostats), among others.

Metal shredding facilities that generate or otherwise manage hazardous waste onsite, including conducting de-pollution operations, are subject to hazardous waste generator requirements as the facility becomes the point of hazardous waste generation. As hazardous waste generators, metal shredding facilities are subject to certain requirements including those that relate to containerization, labeling, storage, accumulation time limits, and disposal or other means of hazardous waste management.

Hammer Mill

The de-polluted feedstock is fed into a shredder (also called a hammer mill) to reduce it into pieces less than four inches in diameter and thus facilitate downstream sorting processes. This shredded material is called metal shredder aggregate. Metal shredder aggregate is a mixture of recoverable ferrous and non-ferrous metals, as well as unrecoverable metal shredder residue.

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 traveling 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.

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 in the remaining metal shredder aggregate, as illustrated in Figure 2 and Figure 3.

Figure 2. Magnets (pre-enclosure) used for ferrous metal recovery

Figure 3. Pile of sorted ferrous metal following shredding of feedstock

Non-Ferrous Metal Recovery

Non-ferrous metals are recovered from metal shredder aggregate based on differences in physical properties such as size, magnetism, or density. 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 through: (1) eddy-current separators that use induced magnetic currents to separate most of the aluminum, zinc, and copper materials, (2) air-actuated sensors to remove stainless steel and copper wire, and (3) density separators to remove fine copper materials. Additionally, at some metal shredding facilities, 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 undergoes chemical stabilization treatment. The sorted and separated metals are stored (see Figure 4) and then sold in bulk to metal refiners for further purification, ultimately to be used in the manufacture of new metal products.

Figure 4. 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 amounts of fluids (e.g., fuels, oils, and grease), 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.[4]

Chemical Stabilization

Each of the facilities that conducts non-ferrous metal separation onsite treats the resulting metal shredder residue using a chemical stabilization process. 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, an alkaline activator, such as cement powder, is added, and the material is mixed in a pug mill, yielding CTMSR. This CTMSR is passed under a final magnet for additional recovery of ferrous metals before it is transported offsite for disposal.

1.4 Regulatory History of Metal Shredding Facilities and Metal Shredder Waste

Metal shredding facilities generally do not produce waste that exceeds the federal regulatory levels established by the United States Environmental Protection Agency (U.S. EPA) under the Resource Conservation and Recovery Act (RCRA), and thus are not federally regulated as a hazardous waste. Metal shredding facilities do, however, generate waste that exceeds California's regulatory thresholds for the characteristic of toxicity, and is recognized by DTSC to be a non-RCRA 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.[5] Metal shredder residue was found to have levels of lead, copper, and zinc which exceeded regulatory thresholds and 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 in California and must be managed in accordance with hazardous waste regulations.[6] The requirement that metal shredder residue be managed (and disposed of) as a hazardous waste 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 RWQCBs[7] to prepare a list of Class III nonhazardous waste landfills that would be authorized to accept and dispose of metal shredder residue.[8] 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

[4] See industry presentation, "Regulation of Auto Shredder Residue in California," Oakland Public Workshop, January 23, 2014.
[5] See Appendix II ("Waste Extraction Test (WET) Procedures"), chapter 11, division 4.5, title 22, California Code of Regulations.
[6] See DHS Letter to Dr. Kenneth Hekimian RE: Disposal of Automobile Shredder Wastes from Hugo Neu-Proler and Clean Steel, Inc., March 9, 1984.
[7] RWQCBs in the San Francisco, Central Valley, Los Angeles, Santa Ana, and San Diego regions.
[8] 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).

residue was designated as 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, although doing so was financially prohibitive for most of the landfills. By its own operation, SB 976 expired on January 1, 1988.

In 1986, DTSC began working with Hugo Neu-Proler (later to become SA Terminal Island) to determine if metal shredder residue 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 the evaluation of test results of the treated waste provided by Hugo Neu-Proler, 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.[9] DTSC cited as its legal authority section 66305(e) of title 22 of the California Administrative Code. This authority was later renumbered to section 66260.200(f) of title 22 of the California Code of Regulations. DTSC’s approval of a facility’s application made pursuant to section 66260.200(f) to classify and manage as nonhazardous a waste what would otherwise be a non-RCRA hazardous waste, is referred to as an “f letter.”

In 1987, as DTSC continued to work with the metal shredding industry to consult on development of an effective chemical stabilization for metal shredder residue, the 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.[10] Resolution 87-22 stated that metal shredder residue that was determined by DTSC to be hazardous, but was granted a variance by DTSC for the purposes of disposal, was suitable for disposal as nonhazardous waste at designated Class III landfills.

In 1987, Assembly Bill (AB) 1542 (Bradley and Peace, Chapter 1483, Statutes of 1987) was enacted, which exempted untreated metal shredder residue that was disposed of in an appropriate Class III landfill from hazardous waste disposal fees and taxes. The AB 1542 conditional exemption was applicable only if the generator 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 notified the metal shredding facilities that the existing disposal variances for metal shredder residue would be rescinded, and that DTSC would need to make a new determination that the metal shredder residue would not pose a threat to human health or water quality.[11] 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.

[9] See letter from Dr. David J. Leu, Department of Health Services, Toxic Substances Control Division, to Mr. Jim Wothorspoon, Hugo Neu-Proler Company, February 21, 1986.
[10] See State Water Resources Control Board, Resolution No. 87-22, Policy on the Disposal of Shredder Waste.
[11] See DHS Letter to Mr. George Adams, Orange County Steel Salvage, et al., November 30, 1987.

Of the eight metal shredding facilities in California at that time, only Levin Metal Corp. (later to become Sims Metal Management)[12] and Schnitzer Steel Products, used the AB 1542 nonhazardous disposal provision. Over the next several years, DTSC reviewed testing data from several facilities demonstrating their use of the silicate and cement treatment to reduce the solubility of metals. Based on the demonstrated reduction in the solubility of metals in their applications, DTSC granted nonhazardous waste classifications to Clean Steel (later Ecology Auto Parts),[13] Ferromet (later SA Rancho Cucamonga; no longer in operation),[14] Schnitzer Steel Products,[15] Orange County Steel Salvage (later SA Anaheim),[16] Levin Metal Corp.,[17] and Golden State Metal (later SA Bakersfield).[18] Pacific Steel (National City; no longer in operation) also submitted testing data, but their application for nonhazardous waste classification was denied.[19] AB 1542 expired on January 1, 1989.

In 1988, DTSC 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.[20] OPP 88-6 was designed to assist DHS/DTSC staff in regulating generators and provided clarification regarding the appropriate regulatory actions 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 facility 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.

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.[21] 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.[22]

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 fires in his district, and his concern that the 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

[12] See letter from Mr. Robert Lewon, LMC Metals, to Dr. David J. Leu, Department of Health Services, Toxic Substances Control Division, dated December 15, 1987.
[13] See DHS Letter to Mr. Harry Favorsham, Clean Steel, Inc., dated September 24, 1987.
[14] See DHS Letter to Mr. Leo Frankel, Ferromet, Inc., December 8, 1987.
[15] See DHS Letter to Mr. Nick Andrusyshyn, Schnitzer Steel Products Company, dated June 13, 1988.
[16] See DHS letter to Mr. George Adams, Jr., Orange County Steel Salvage, Inc. December 19, 1988.
[17] See DHS Letter to Mr. Robert Lewon, LMC Metals, dated May 31, 1989.
[18] See DTSC Letter to Mr. Takehisa Miyake, Golden State Metals, Inc., dated February 25, 1992.
[19] See DHS Letter to Mr. Danny Ayala, Pacific Steel, Inc., dated September 22, 1988.
[20] See DHS Official Policy and Procedure Number 88-6 Auto Shredder Waste Policy and Procedure, 1988 (OPP 88-6).
[21] 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.
[22] 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.

found to have contaminated air and water surrounding their facilities.[23] 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 authorized DTSC to adopt, if appropriate, regulations establishing alternative management standards for metal shredding facilities for hazardous waste management activities within DTSC's jurisdiction. These regulations would serve as an alternative to the requirements of existing hazardous waste control law and would be 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 chemically treated metal shredder residue. This authority to establish alternative management standards sunset on January 1, 2018.

Under the hazardous waste control law, all facilities that store, treat, or dispose of hazardous waste in California must obtain a grant of authorization from DTSC if not expressly exempt or excluded.[24] 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.

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

[24] See Health & Saf. Code sec. 25200.

2 EVALUATION

This section presents the information that DTSC gathered in performing the following:

- The operative environmental and public health regulatory oversight of metal shredding facilities; and
- The hazardous waste management activities being conducted by metal shredding facilities or at landfills that handle metal shredder waste.

2.1 Identification of Metal Shredding Facilities

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

Table 1. Databases Searched for the Identification of 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 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 material merchant wholesalers
Institute of Scrap Recycling Industries	241 California businesses
2014 North American Scrap Metals Directory	8 facilities

The data review identified approximately 2,000 businesses in California that managed unprocessed obsolete 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 offsite for disposal. DTSC examined satellite images of the 400 facilities in Google Earth[25] and identified 101

[25] Gorelick, N., Hancher, M., Dixon, M., Ilyushchenko, S., Thau, D., & Moore, R. (2017). Google Earth Engine: Planetary-scale geospatial analysis for everyone. Remote Sensing of Environment.

Table 2. Metal Shredding Facilities Operating with a Nonhazardous Waste Variance ("f letter")

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. DBA Pacific Rail Industries 785 East M Street Colton, CA 92324-0000	Transferred from Clean Steel, Inc. August 1, 2005	April 8, 1988

locations where metal processing equipment and piles of material indicating 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.[26] 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 names and locations of the California metal shredding facilities which hold an "f letter" are shown in Table 2. In addition to the facilities identified in Table 2, an SA Recycling facility in Rancho Cucamonga holds an "f letter," but it was not operating as a metal shredding facility as of 2017.[27] DTSC also identified three additional metal shredding facilities that do not hold an "f letter": Pacific Auto Recycling Center in Lancaster, Universal Recycling Services in Stockton, and Kramar's Iron and Metal in Sun Valley. Due to the stated scope of SB 1249, namely the evaluation of facilities holding and operating under "f letters," these additional

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

facilities were not included in the evaluation. Additional facilities that had previously been in operation but are no longer operating as of October 2019 were also not included in this evaluation.[28] Similarly, no mobile shredding facilities were included in this evaluation due to logistical concerns related to their locations.

The locations of the six metal shredding facilities identified in Table 2 are shown in Figure 5. Additionally, the locations of the six solid waste landfills that accepted CTMSR, based on questionnaire responses from all six metal shredding facilities in 2015, are also presented in Figure 5.

Figure 5. Metal shredding facilities currently operating with "f letters", and landfills accepting CTMSR as of 2015

[28] See People of the State of California, ex rel. Barbara A. Lee, Director of the Department of Toxic Substances Control v. NorthState Recycling, California Superior Court, County of Sacramento, case no. 24-2016-00199059, Notice of Entry of Final Judgment Pursuant to Stipulation, filed on March 15, 2017.

2.2 Survey of Metal Shredding Facilities

In 2015, DTSC sent questionnaires to the metal shredding facilities with “f letters” and to the landfills then 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.

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 Final Report.

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.[29] Bair Island State Marine Park and Ecological Reserve is located on the opposite side of Redwood Creek, and extensive commercial salt evaporation ponds are located on the opposite side of Seaport Boulevard, as photographed in Figure 6. Residential areas are located approximately two miles south of the facility.

Figure 6. Sims, Redwood City, CA

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

The facility reported that approximately 78 percent of the site is either paved or beneath structures.[30] There are no storm drain connections from the facility to any offsite storm water drainage system. Run-off and onsite precipitation from storm events is collected in two storage ponds designed to hold the precipitation from a 100-year storm event. One pond is concrete-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. Groundwater is reported to occur at approximately five feet below ground surface at the facility, based on proximity to Redwood Creek.[31] In addition to the collected storm water, shallow groundwater may also be present in the unlined pond. Water collected in the ponds

[29] See Storm Water Pollution Prevention Plan for Sims Metal Management, Redwood City, June 30, 2015.
[30] See Storm Water Pollution Prevention Plan, Sims Metal Management – Redwood City, WDID: 2 41I005107, dated January 5, 2018.
[31] Ibid., page 14.

is used for dust control in the yard, and for cooling and dust control in the shredder.

In 2012, Sims increased the height of fencing on the Seaport Boulevard part of the east boundary to 34 feet, on the south boundary to 20 feet, and on the south part of the west property line to 25 feet.[32] The fencing height is standard 8-foot along the north property line and the north part of the west line. The fence height is 22 feet high on the east side of the shredder stockpile. The fencing is covered in narrow-mesh netting to provide additional dust control and capture of LFM. In 2013, Sims installed a "candy cane" top on the eastern boundary fence intended to capture fugitive emissions of LFM.

Schnitzer Steel Products

Schnitzer Steel Products (Schnitzer) is located on 26.5 acres in southern Oakland in the industrialized Port of Oakland area, as photographed in Figure 7. 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. 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.[33]

All storm water that falls on the facility is contained onsite 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 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. After heavy rainfall events, ponding occurs in the drainage areas, with water depths ranging from a few inches in some areas up to three or four feet in other areas of the facility.[34] Facility personnel use portable submersible or gas-powered transfer pumps and hoses to convey the storm water to a 1.2 million-gallon storage tank.

Figure 7. Schnitzer Steel Products, Oakland, CA

Schnitzer operates a storm water treatment system and reuses some of the treated storm water for cooling in the shredder, but discharges the majority of its treated storm water to the city of Oakland's separate municipal storm

[32] Ibid, page 41.
[33] See Industrial Activities Storm Water Pollution Prevention Plan, prepared for Schnitzer Steel Products Company, Inc., Oakland, CA, WDID number 2 01I003365, June 2015.
[34] Ibid, page 36.

sewer system. The Industrial General Permit (IGP) identifies the following contaminants as potential pollutants in storm water from the scrap recycling facilities: pH (below 6.0 or above 9.0), total suspended solids, oil and grease, iron, lead, aluminum, zinc, and chemical oxygen demand (COD).[35] Schnitzer's treatment system passes the collected storm water through weir boxes, screens, and a clarifier for removal of solids and oil and grease before reuse in the shredder or discharge to the sewer.

In 2017, Schnitzer received an individual National Pollutant Discharge Elimination System (NPDES) permit that rescinded the facility's coverage under the IGP.[36] Schnitzer's individual NPDES permit requires the facility to discharge to Oakland's separate storm sewer system under a permit from the East Bay Municipal Utility District (EBMUD).[37] In 2017, Schnitzer filed a Notice of Termination of coverage under the IGP because its storm water discharge is specifically regulated by the NPDES permit for EBMUD's wastewater treatment plant.[38]

Schnitzer processes ferrous 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; any metals contaminated with free-flowing liquids (e.g., used oil); scrap with refrigerants; scrap with capacitors, ballasts, and transformers; munitions and other explosives; asbestos; radioactive scrap; and any wastes that contain hazardous materials.

Schnitzer reported that the unprocessed obsolete scrap metal shredded 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 uses a 9,000-horsepower mega shredder manufactured by Riverside Engineering.

Schnitzer reported that between 70,000 and 80,000 tons of sorted metal feedstock awaiting shredding are stored outdoors at any given time. Additionally, on average there may be 300 to 500 tons of metal shredder aggregate that 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 offsite for disposal in a landfill. Each load weighs between 20 and 25 tons.

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[35] See California Industrial General Permit (IGP) for Storm Water Discharges Associated with Industrial Activates, IGP Order 2014-0057-DWQ, National Pollutant Discharge Elimination System (NPDES) No. CAS000001, effective on July 1, 2015.
[36] See San Francisco Regional Water Quality Control Board Order No. R2-2016-0045, NPDES No. CA0030228, effective January 1, 2017.
[37] See East Bay Municipal Utility District Wastewater Discharge Permit No. 02300331, effective December 20, 2014.
[38] See Notice of Termination ID 536360, Schnitzer Steel Industries, Inc., California Water Boards, dated April 3, 2017.

SA Terminal Island

SA Terminal Island is located on 27 acres in the Terminal Island area of the Port of Long Beach, as photographed in Figure 8. The surrounding area is entirely industrial. More than 95 percent of the facility site is covered with pavement or by structures.[39] Storm water discharges from the facility are regulated by the General Permit for Storm Water Discharges Associated with Industrial Activities.[40] All storm water, including that used for dust control and as wash waters from the yard, are captured and pumped to a wastewater treatment plant for storage or treatment prior to reuse onsite or discharge to a receiving water body. The facility identified total suspended solids, oil and grease, aluminum, iron, lead, zinc, and COD as pollutants likely to be present in its storm water.[41] The facility treats the wastewater by using hydrogen peroxide, and then adds metal precipitant, coagulant, and polymer flocculent before clarification in an inclined-plate clarifier. Storm waters are further treated using zeolite media to provide a final polishing filtration prior to discharge. Wastewater that is not reused onsite is discharged through a single outfall leading to two storm drains that flow to the Cerritos Channel, which then flows to the Pacific Ocean.

Figure 8. SA metal recycling facility, 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 onsite prior to being sent to the shredder. The facility reported that a total weight of approximately 300,000 metric tons of feedstock was shredded for the year 2014. The feedstock consisted of approximately 42 percent automobiles, 44 percent appliances, and 14 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 metals were stored onsite at any given time. The facility reported that it typically stores 1,000 to 4,000 tons of metal shredder aggregate with its ferrous metals removed, prior to the removal of non-ferrous metals. SA

[39] See Storm Water Pollution Prevention Plan, SA Recycling LLC dba SA Recycling, WDID: 419I021125, revision dated June 20, 2015.
[40] Industrial General Permit Order 2014-0057-DWQ, National Pollutant Discharge Elimination System (NPDES), General Permit for Storm Water Discharges Associated with Industrial Activities, Order NPDES No. CAS000001, effective on July 1, 2015.
[41] See SA Terminal Island Storm Water Pollution Prevention Plan, op. cit., page 23.

Terminal Island reported that it typically stores 1,500 to 2,000 tons of CTMSR onsite at any given time, but that up to 10,000 tons could potentially be present at the site.

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.[42] More than 95 percent of the facility is paved or beneath structures, as photographed in Figure 9.

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 metal recycling facilities, and materials from the public. The facility reported that it processed approximately 75,000 metric tons of material in 2014. The feedstock was composed of approximately 52 percent end-of-life vehicles, 30 percent appliances, and 18 percent miscellaneous. The facility uses a 6,000-horsepower mega shredder manufactured by The Shredder Company.

Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community. Source:
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Figure 9. SA metal recycling facility, Bakersfield, CA 016

The facility reported that less than 6,000 tons at any given time of ferrous and non-ferrous scrap is stored in bins and boxes, and in piles in bermed areas that also serve as surface impoundments. The facility reported that 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 onsite at any one time.

SA Bakersfield reported that their onsite storm water management includes settling/sedimentation, oil-water separation, filtration, and reuse.

SA Anaheim

SA Anaheim is located on approximately 20 acres of a 40-acre site in Anaheim, near retail centers, warehouses, and residential neighborhoods. Metal shredding operations are conducted on the 20-acre portion, as photographed in Figure 10. The remainder of the site is used as a railyard.[43] The facility is completely paved and is designed to collect storm water for recycling and onsite 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.

[42] See Storm Water Pollution Prevention Plan, SA Recycling LLC dba SA Recycling, June 17, 2015.
[43] See Storm Water Pollution Prevention Plan, SA Recycling LLC dba SA Recycling, WDID: 8 30MR000004, revision dated June 6, 2011.

SA Anaheim reported that end-of-life vehicles, consumer and industrial appliances, manufacturing scrap, curbside collection scrap, demolition scrap, miscellaneous scrap from consumers and homeowners, and industrial scrap are all processed at the facility. The facility receives scrap from industrial accounts, from other metal recycling facilities, and from the public. Some materials are received with the fluids, batteries, mercury switches, and other pollutants are 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.

SA Anaheim reported that approximately 225,000 metric tons of metal feedstock were shredded in 2014. The shredded material was composed of approximately 39 percent end-of-life vehicles, 35 percent appliances, and 26 percent miscellaneous. The facility uses a 7,000-horsepower mega shredder manufactured by The Shredder Company.

Figure 10. SA metal recycling facility, Anaheim, CA

The facility reported that it stores more than 20,000 tons of separated ferrous and non-ferrous scrap metal onsite 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 that has had the ferrous metal removed stored in the metals recovery plant. The facility reported storing less than 150 tons of CTMSR onsite 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 collected water is stored in a 135,000-gallon aboveground tank. Water exiting the treatment system that is not reused onsite is discharged to the municipal storm drain that discharges to the Santa Ana River, which eventually discharges to the Pacific Ocean.

Ecology Auto Parts

Ecology Auto Parts (Ecology) is located on approximately 22 acres in an industrial area of Colton (but with residential properties nearby), as photographed in Figure 11. Ecology accepts various types of materials for shredding, including end-of-life vehicles, appliances, tin, and other forms of waste metal. In most instances, auto bodies that have not been de-polluted 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 metal feedstock 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 Corp.

Figure 11. Ecology Auto Parts metal recycling facility, 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 for further processing to recover the non-ferrous metals at its facility in Arizona. In 2005, DTSC transferred the nonhazardous waste reclassification that had been issued to the predecessor of the Colton facility, Clean Steel, Inc. of Long Beach, to Pacific Rail Industries.[44] However, because Ecology Auto Parts, Inc., doing business as (dba) Pacific Rail Industries, does not recover the non-ferrous metals at the Colton facility, the facility does not operate a chemical stabilization treatment system.

Ecology reported that approximately 98 percent of the site is surfaced in impervious materials, and that structures account for approximately 10 percent of the site.[45] The site is graded so that all storm water runoff is captured in either a 1 million-gallon storage tank or a half million-gallon lined detention basin.[46] There are no discharge locations because the facility is designed with a capacity to accommodate the precipitation from a 100-year, 24-hour storm event. The collected storm water is stored and reused in the shredder.

2.3 Operative Environmental and Public Health Regulatory Oversight

This section presents the information that DTSC gathered to evaluate the operative environmental and public health regulatory oversight of metal shredding facilities.

[44] See DTSC Letter to Ms. Lynn Delzell, August 1, 2005.
[45] See Storm Water Pollution Prevention Plan and Monitoring Implementation Plan, Ecology Auto Colton Scrap Yard, WDID No. 8 36I012903, revision dated June 22, 2015.
[46] Ibid, page 5.

Table 3 identifies the local environmental regulatory agencies that exercise jurisdiction over the metal shredding facilities.

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

Metal Shredding Facility and County	Air District	RWQCB	CUPA
Sims Metal Management 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
Schnitzer Steel Products 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, Terminal Island 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
SA Recycling, Bakersfield 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
SA Recycling, Anaheim 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
Ecology Auto Parts, Inc. DBA Pacific Rail Industries 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

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 U.S. EPA as containing sufficient measures to attain NAAQS. California law makes ARB the lead agency for developing and implementing the SIP. ARB has established California Ambient Air Quality Standards (CAAQS), which are often more stringent than national standards. Local air districts and certain other agencies prepare SIP elements and submit them to ARB for review and approval. ARB forwards SIP revisions to U.S. 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. A summary of the regulatory oversight of the metal shredding facilities by local air districts is shown in Table 4.

Metal shredding facilities and landfills that accept metal shredder waste are required by California’s Air Toxics “Hot Spots” program to report the types and quantities of certain substances routinely released into the air.[47] The goals of the program 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.[48]

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.[49] It is widely used by law enforcement or compliance officers in jurisdictions that have adopted standards based on visible emissions.

[47] See Air Toxics "Hot Spots" Information and Assessment Act (AB 2588, 1987, Connelly), as amended (SB 1731 1992, Calderon).
[48] Annual emissions data is available on the ARB website at: https://www.arb.ca.gov/app/emsinv/facinfo/facinfo.php
[49] 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 Management	Schnitzer Steel Products	SA Terminal Island	SA Bakersfield	SA Anaheim	Ecology
District	BAAQMD	BAAQMD	SCAQMD	SJVAPCD	SCAQMD	SCAQMD[50]
Permit Number	Permit for Plant #5152	Permit for Plant #A0208	Permit No. R-G27565	Permit Number(s): S-1256-7-2	Permit No. G 16984	Permit No. G32848
Facility ID	5152	208	152952	1256	153095	134600
Point Source	Hood, H2O, Cyclone	Hood, H2O, Cyclone	Hood, H2O	Hood, H2O	Hood, H2O	Hood, H2O
VOC Control Technology	Scrubber	Scrubber	RTO,[51] Scrubber	No RTO or Scrubber	RTO, 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	5% max opacity, PM10 limit	Must be kept moist	Must be kept moist
Maximum Throughput Authorized	200 tons/hr max	720,000 tons/yr	108,333 tons/mo max	2,300 tons/day max	56,160 tons/mo	40,000 tons/mo max
Particulate Matter Emissions in 2016 (tons/yr)[52]	8.6	0.4	2.0	0.5	1.4	0
PM 10 Emissions in 2016 (tons/yr)	5.4	0.2	0.4	0.3	0.3	0
PM 2.5 Emissions in 2016 (tons/yr)	4.1	0.2	0.3	0.2	0.2	0
Lead Emissions in 2016 (lbs/yr)	N/A	N/A	2.5	N/A	1.1	N/A

[50] BAAQMD refers to Bay Area Air Quality Management District; SCAQMD refers to South Coast Air Quality Management District; SJVAPCD refers to San Joaquin Valley Air Pollution Control District.

[51] RTO refers to a Regenerative Thermal Oxidizer, which removes VOCs from exhaust air.

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

The following details provide specific information regarding the air pollution control permits, compliance activities, and a summary of the measures to control offsite migration of contaminants at each of the facilities. In some cases, the information was provided by the facilities in their responses to the questionnaires in 2015, and in other cases, updated information was obtained from subsequent comments provided by the individual facilities in 2018.

Evaluation of Air Quality Impacts from Metal Shredding Facilities

DTSC contracted to conduct air monitoring at three metal shredding facilities to identify the potential for negative air quality impacts on neighboring communities and the environment from metal shredding operations. Air samples were collected in October 2016 at SA Bakersfield,[53] SA Terminal Island,[54] and Sims.[55] Air samples were collected using four sampling stations placed just inside the perimeter at each facility, so that readings from each station would provide an indication of the potential for contaminants to escape the facility property boundaries and potentially contribute negatively to local air quality. Samples were collected at each station over three days during normal business operations at the facilities. The samples were analyzed for total suspended particulates (TSP), PM10, PM2.5, asbestos, PCBs, and formaldehyde. The particulate matter collected in the three size fractions (TSP, PM10, PM2.5) was further analyzed for the presence of metals such as lead and zinc. The presence of these metals in the samples could indicate that hazardous waste or hazardous waste constituents had the potential to be released from the facilities. The particulate matter collected was also analyzed for the presence of iron, which is not a regulated metal but could be used to indicate whether the measured emissions were coming from the adjacent metal shredding operations.

Table 5. Summary of PM10 and PM2.5 Values Measured at Three Shredding Facilities

		SA Bakersfield	SA Terminal Island	Sims	NAAQS[a]	CAAQS[a]
PM10 ($\mu g/m^3$)	**Maximum**	115	51	89.8	**150**	**50**
	Minimum	13	19.9	19.4		
	Average	94.8	32.2	43.8		
PM2.5 ($\mu g/m^3$)	**Maximum**	96.6	18.8	20.6	**35**	**None**
	Minimum	12.5	6.5	6		
	Average	24.0	10.7	10.9		

[a] Represents 24-hour standard average thresholds; https://www.arb.ca.gov/research/aaqs/common-pollutants/pm/pm.htm

Table 5 shows the maximum, minimum, and average readings for PM10 and PM2.5, in units of micrograms per cubic meter ($\mu g/m^3$), as measured at the metal shredding facilities over the three days of sampling, which were compared to 24-hour standard average thresholds for NAAQS and CAAQS. The

[53] See Air Monitoring Summary Report, SA-Bakersfield, Geocon Consultants, Inc., Geocon project No. S9850-03-21, December 20, 2016, and Air Monitoring Summary Report- Addendum, SA-Bakersfield, August 18, 2017.
[54] See Air Monitoring Summary Report, SA-Terminal Island, Geocon Consultants, Inc., Geocon project No. S9850-03-21, December 23, 2016.
[55] See Air Monitoring Summary Report, Sims Metal Management, Geocon Consultants, Inc., Geocon project No. S9850-03-21, December 30, 2016.

PM10 data shows that the highest readings measured at each facility exceeded CAAQS thresholds but had no exceedances for NAAQS thresholds over the three-day monitoring period. SA Bakersfield was the only facility to exceed NAAQS thresholds for PM10, with the highest readings exceeding NAAQS for PM2.5. From this data, a reasonable conclusion can be made that metal shredding operations may release particulate matter to neighboring communities and the environment, and potentially contribute to the degradation of existing ambient air quality.

Figure 12. Air sampling stations at Sims, Redwood City

Table 6 shows the summary of data for TSP measured at metal shredding facilities and associated metal concentrations. The particulate matter collected was analyzed for metals by x-ray fluorescence (XRF). The principal metals of concern were iron, lead, and zinc. Lead and zinc were analyzed due to their consistent presence in metal shredder residue, while iron was analyzed as a proxy for metal shredding facility activities. Iron was the most significant constituent of the particulate matter. On a per facility basis, the TSP measured at the perimeter boundaries of the metal shredding facilities was as much as 3 to 11 percent iron, which provides an indication that there is a correlation between the measured particulate matter and the adjacent metal shredding operations.

Overall, the analysis of TSP samples indicates that the potential exists for hazardous wastes or hazardous waste constituents to migrate offsite via air from the facilities into neighboring communities and the environment.

Table 6. Summary of Total Suspended Particulates and Associated Metal Concentrations Measured at Three Metal Shredding Facilities

		SA Bakersfield	SA Terminal Island	Sims
TSP Net (µg/m³)	**Maximum**	304	100	202
	Minimum	160	42.5	31.6
	Average	215.4	64.48	88.63
Iron (µg/m³)	**Maximum**	10.18	8.05	7.46
	Minimum	5.90	1.97	1.17
	Average	7.84	3.71	3.64
Lead (µg/m³)	**Maximum**	0.077	0.06	0.10
	Minimum	0.02	0.01	0.01
	Average	0.04	0.03	0.04
Zinc (µg/m³)	**Maximum**	0.45	0.48	1.45
	Minimum	0.20	0.17	0.10
	Average	0.29	0.31	0.47

Sims Metal Management

Sims is under the jurisdiction of the Bay Area Air Quality Management District (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 offsite contamination:

- Enclosure of shredder mill structure, material recovery plant buildings, and MSR building;
- Englo air recirculation system inside the shredder enclosure;
- Water and foam injection system to control temperature and reduce dust generation in the shredder mill;
- An exhaust collection system for the shredder using a cyclone dust collection system and a wet scrubber system;
- Enclosed chutes to place non-ferrous commodities into collection bins;
- Enclosure of non-ferrous commodity shipping container loader with built-in water sprayer;
- Enclosure of screening unit and associated magnets into a structure;
- Enclosure of ship-loading conveyor;
- Enclosure of certain aggregate handling systems such as conveyors;
- Enclosure of non-ferrous bays with misting system;
- Fabric-covered windscreen fencing with rolled top to reduce offsite emissions of LFM;
- Use of Tymco Regenerative Sweeper and water truck for dust control;
- Use of DustBosses and misting turbine to control fugitive emissions; and
- Use of oscillating sprinklers at infeed and shred stockpiles.

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. 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 address dust on the ground.

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.

Schnitzer Steel Products

Schnitzer is under the jurisdiction of the 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 intended to prevent offsite contamination:

- Shredder emissions abatement by a water spray system and shredder emission control system;
- Irrigated cyclone scrubber (Venturi scrubber), mist eliminator, moving dry belt filter;
- A cyclone downstream of the magnets;
- Installed cover and drip pan for ship-loading conveyor;
- Enclosure of conveyance systems to minimize fugitive emissions;

- Sweeping of paved traffic surfaces with a mobile sweeper;
- Application of water to all traffic surfaces and stockpiles; and
- Use of DustBoss misting turbines at key material handling areas to address fugitive emissions.

The facility made various improvements between 2012 and 2013 to contain storm water run-off from the facility. Industrial wheel washes are used for trucks entering the dock and at the facility exit to minimize tracking offsite. BAAQMD Regulation 6, Rule 4 for Metal Recycling and Shredding Operations requires metal recycling facilities to develop an EMP to minimize the fugitive emissions of particulate matter from the facilities operating in the district. Schnitzer submitted its EMP to BAAQMD on October 27, 2014.

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).

The SCAQMD sets the most stringent air quality standards of any local air district in the state. SA Terminal Island and the other two facilities within the SCAQMD are required to have RTOs 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 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 is intended to yield 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 gases when heated in the oxidizer, which are then 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 offsite migration of contaminants:

- Enclosure of the shredder chamber to control and capture potential emissions;
- Shredder emissions controls including particulate filters for reduction of PM, an RTO for removal of VOCs, and a scrubber for removal of acid gases;
- Enclosure of non-ferrous metals recovery operations to prevent PM emissions;
- Covered non-ferrous product storage;
- Enclosure of aggregate storage, MSR, and CTMSR storage areas;
- Covered conveyor belts to prevent PM emissions;
- An industrial vacuum sweeper and water trucks providing sweeping and watering throughout the yard to prevent PM emissions due to traffic;
- Sprinklers installed throughout the facility for dust control; and
- Application of water to the yard, haul roads, and material piles to reduce dust generation.

The scales are equipped with radiation gate monitors for screening inbound material and outbound containers. The facility is concrete-paved and is designed to allow collection of the wash water for recycling and subsequent reuse onsite. The facility claims it is able to reuse much of the water for housekeeping and operations. Rumble strips are used to prevent tracking out materials onto public roadways.

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 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 offsite migration:

- Overhead exhaust hood to collect PM and VOCs generated from shredding;
- Water spray used inside the shredder chamber to control temperature and reduce dust generation;
- Dust/mist collector to capture oils, particulate matter, and moisture from shredder exhaust;
- PM controls on the shredder designed for control efficiency of 95 percent or greater;
- Coverage of storage areas for non-ferrous metals;
- Partially enclosed non-ferrous metal recovery process;
- Installed dust control units in the non-ferrous metal recovery process;
- Covered belt conveyors to prevent PM emissions;
- Various moisture-coalescing filters and high-efficiency dust filters;
- Sweeping of material stacking areas throughout the day;
- Acquisition of an industrial vacuum sweeper and water truck;
- Sweeping and watering throughout the yard to prevent PM emissions due to traffic; and
- Watering of materials offloaded by the tin pile.

The SA Bakersfield facility is graded and paved to capture storm water and deliver it to tank storage. Limited volumes of storm water may be infiltrated onsite, but the facility claims it is able to reuse much of the water for housekeeping and operations. Scales at the facility are equipped with radiation gate monitors for screening inbound material and outbound containers. A sweeper truck is used to clean the entrances and driveways in the yard. Track-out devices (rumble strips) are used to prevent dust emissions and to prevent tracking out materials on the public roadways.

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 a variety of measures to control offsite migration:

- Enclosed shredder with collection hood and water spray to control temperature and reduce dust generation;
- Use of a baghouse filter for reduction of PM, an RTO for reduction of VOCs, and a chemical scrubber to neutralize and remove acid gases from the shredder exhaust for shredder emission controls;
- Enclosure of metal recovery operations in a building;

- Aggregate handling operations conducted underneath a roof, including truck loading operations;
- Non-ferrous metals recovery process, MSR treatment, and storage of CTMSR conducted under a canopy;
- Covered non-ferrous material storage;
- Covered belt conveyors to prevent particulate matter emissions;
- Installed dust control units in the non-ferrous metal recovery process;
- Sweeping and watering using an industrial vacuum sweeper and water truck throughout the yard to prevent particulate matter emissions due to traffic;
- Sweeping of material stacking areas throughout the day;
- Use of a sweeper truck to clean the entrances and driveways in the yard; and
- Application of water to the yard haul roads and piles of materials to reduce dust generation.

The facility claims it has been paved and graded, storm water is captured, and spills are contained onsite. The facility reuses captured water onsite for housekeeping and operations. Inbound materials are screened at the scales with radiation gate monitors, as are outbound containers. Rumble strips are used to prevent tracking out of materials onto public roadways.

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 offsite contamination:

- Overhead exhaust hood to collect PM and VOCs generated from shredding on shredder mill;
- Water spray to control temperatures, prevent fires and explosions, and reduce dust generation inside the shredder chamber;
- A particulate air filter and a regenerative thermal exhaust system to address VOC emissions at the shredder mill;
- Lo-NOx combustion burners on the RTO;
- Cyclones for dust control over post-shredding material conveyors in the mill process equipment;
- Material recovery bins maintained underneath conveyors for return to the process;
- Enclosure of the aggregate storage area to avoid wind dispersal and rainwater mixing with materials;
- The aggregate storage area equipped with steel plate flooring, berms, and siding;
- Enclosure of the mill, aggregate, ferrous metals, and material loading areas by a concrete wall to provide wind protection;
- Overhead, remote-controlled water cannon and mist turbines to spray down the shredder area;
- Moistening of roads and scrap storage piles to avoid dust generation;
- Rumble strips at the main entrance and exit to avoid track-out onto exterior roadways; and
- A mechanical street sweeper and water truck to wash down specific areas.

At Ecology, the shredding area, including the receiving and stockpile areas, is paved. The facility is enclosed by a 12-inch berm to capture and direct storm water to a storage tank or detention basin. Collected storm water is used in the mill to cool the process equipment during the shredding process and to eliminate sparking. The collected storm water is used for onsite dust control, the maintenance of moisture levels in the scrap, and for fire control at the facility.

2.3.2 Water Quality

SWRCB implements federal requirements for storm water quality for industrial facilities using the IGP (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 at the facility using SIC 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, it is assigned a waste discharge identification (WDID) number and must submit a Notice of Intent for coverage under the permit, explaining how it will adhere to all the requirements of the General Permit. A facility covered under the General Permit is required to create and implement a Storm Water Pollution Prevention Plan (SWPPP), including development of a site map, conduction of water quality monitoring and reporting, and implementation of best management practices (BMPs). These requirements include sampling 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 the results in the Stormwater Multiple Application and Report Tracking System (SMARTS) database. 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.[56]

Sims Metal Management

Sims is under the jurisdiction of the San Francisco Bay RWQCB. Storm water discharges from Sims are permitted under the SWRCB General Permit to Discharge Storm Water Associated with Industrial Activity. The WDID number is 2 41I005107.

Schnitzer Steel Products

Schnitzer is under the jurisdiction of the San Francisco Bay RWQCB. The facility is subject to requirements of an individual NPDES Permit No. CA0030228 (San Francisco Bay RWQCB Order No. R2-2016-0045). Storm water discharges from the Schnitzer facility are permitted by EBMUD under Wastewater Discharge Permit No. 02300311. The WDID number for the facility is 2 01I003365.

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.

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.

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

[56] SWRCB Industrial General Permit 2014-0057-DWQ, Attachment C – Glossary, Effective July 1, 2015.

Industrial Activities from Scrap Metal Recycling Facilities within the Santa Ana Region. The WDID number is 8 30MR000004.

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. As of November 2020, there are 102 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 generators, transporters, and treatment, storage, 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.

2.3.4 Hazardous Waste and Hazardous Materials: Regulation by Local CUPAs

CalEPA oversees the statewide implementation of the Unified Program and its 81 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 Onsite Hazardous Waste Treatment (tiered permitting) Programs; and the
- Underground Storage Tank Program.

Certain hazardous waste activities captured by the above listed programs and conducted by the metal shredding facilities are under the jurisdiction of the CUPA in their geographic area. CUPAs are responsible for inspections of hazardous waste generators and are responsible for ensuring compliance with the lower-tiered permitting programs, namely Permit by Rule, Conditional Authorization, and Conditionally Exempt. None of the metal shredding facilities is currently operating under one of the lower-tiered permitting programs for which the CUPAs would have primary jurisdiction. Table 3 identifies the CUPAs that have jurisdiction in the localities of each metal shredding facility.

2.4 Hazardous Waste Management Activities

This section provides a summary of the hazardous waste management activities at the facilities.

2.4.1 Hazardous Wastes Generated and Managed at Metal Shredding Facilities

Feedstock/Unprocessed Obsolete Scrap Metal

The unprocessed obsolete scrap metal that arrives at metal shredding facilities is a waste because it has already been discarded by the consumer.[57] At this point, even though the waste may be considered to be a recyclable material, it is still subject to the Hazardous Waste Control Law.[58]

Metal Shredder Aggregate

Figure 13. A pile of aggregate awaiting further processing

After vehicles, appliances, and other forms of feedstock are shredded in the hammer mill, a mixture of ferrous metals, non-ferrous metals, and waste residue is generated. This mixture is referred to in this Final Report as metal shredder aggregate. Figure 13 shows piles of metal shredder aggregate.

Due to challenges in sampling methodology at the precise point of shredding in the hammer mill, there is limited empirical data available on the characteristics of metal shredder aggregate at this point. Sampling data from later stages of processing, specifically after removal of nonferrous metal, demonstrates that the metal shredder residue exhibits the hazardous waste characteristic of toxicity. Based on the nature of the metal shredding and recovery process, the concentration of metals in the aggregate before the removal of nonferrous metals is likely higher than the stage at which the waste was sampled.

Historically, metal shredder aggregate has contained levels of cadmium and PCBs in excess of their respective Soluble Threshold Limit Concentrations (STLCs) or Total Threshold Limit Concentrations (TTLCs)[59], although the presence of these constituents appears to have decreased in recent years.[60] The

[57] See section 66261.2(b), chapter 11, title 22, California Code of Regulations.

[58] See section 25143.2, Health & Safety Code.

[59] See section 66261.24(a), chapter 11, title 22, California Code of Regulations for STLC and TTLC values.
[60] Metal Shredder Residue Treatability Study, prepared for the Institute of Scrap Recycling Industries, California Chapter, by Terraphase Engineering, Inc., April 26, 2017.

STLC and TTLC are regulatory levels that determine whether a waste is considered hazardous because it exhibits the hazardous waste characteristic of toxicity.

Based on sampling of metal shredder residue conducted at the California metal shredding facilities, DTSC has concluded that metal shredder aggregate exiting the hammer mill includes hazardous waste (including, but not limited to, fine powders of lead, copper, and zinc). Thus, DTSC has determined that metal shredder aggregate does not meet the definition of scrap metal (see Sec. 66260.10, div. 4.5, tit. 22, Cal. Code Regs.) and is not exempt from regulation as a hazardous waste.

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 Final Report as metal shredder residue, as photographed in Figure 14. As with the metal shredder aggregate, the metal shredder residue also contains levels of lead, copper, cadmium, and zinc that exceed their respective STLCs or TTLCs, and historically contained levels of cadmium and PCBs in excess of their respective STLCs and TTLCs.

Figure 14. Metal shredder residue exiting the joint products plant following removal of non-ferrous metals

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. In this Final Report, after this chemical treatment, the metal shredder residue is referred to 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 on the effects of chemical stabilization on soluble concentrations of lead and zinc that was performed by the metal shredding industry and from sampling efforts related to enforcement activities. Thus, although the solubility of metals in the waste is reduced by the treatment, CTMSR continues to exhibit the hazardous waste characteristic of toxicity and is a hazardous waste.

Treatability Study for Metal Shredder Residue and CTMSR

In 2016, the metal shredding facilities conducted a study to demonstrate the effectiveness of their treatment methods. The treatability study was designed to demonstrate 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 soluble concentrations consistently below STLCs for all constituents.[61] The treatability study confirmed the treatment process used by metal shredding facilities can reduce the solubility of regulated metals contained in CTMSR, including lead.

[61] See DTSC Letter to Ms. Margaret Rosegay, dated May 12, 2016.

However, the treatability study confirmed that CTMSR remains a California-regulated hazardous waste even after treatment.

Data collected under the bench-scale testing in preparation for the treatability study showed that metal shredder residue prior to chemical treatment contains hazardous constituents but is nonhazardous waste under RCRA because U.S. EPA thresholds for regulated hazardous constituents were not met or exceeded. For instance, U.S. 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.[62] In addition, the highest result found for PCBs was 33 milligrams per kilogram (mg/kg).[63] The federal toxicity characteristic regulatory threshold for PCBs is 50 mg/kg.

As a result of the bench-scale testing in the treatability study, three treatment reagent combinations were selected by the metal shredding facilities for evaluation during the subsequent demonstration of the treatment at the full-scale (see Table 7). 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 rate still exceeded regulatory thresholds for both total and soluble metals.

Table 7. Three Reagent Combinations Used for Treatability Study

Treatment Level	Silicate (gal/ton)	Cement (%)
High	0.7	12
Medium	0.7	8.5
Low	0.5	5

The treatability study was conducted at each of the five metal shredding facilities that performs the chemical stabilization treatment. All five facilities demonstrated treatment at the highest dosage. SA Anaheim, Schnitzer, and Sims also demonstrated both lower dosages. Both Terraphase, the consultant conducting the study on behalf of the five metal shredding facilities, and DTSC analyzed splits of each sample collected, so that independent sets of analytical data would be produced. DTSC's samples were analyzed by DTSC's Environmental Chemistry Laboratories located in Berkeley and Pasadena.

Both Terraphase and DTSC found that the treatability study showed that CTMSR remains a non-RCRA hazardous waste. The stabilization treatment does not lower the total metal concentrations, and the TTLC test results showed that CTMSR exceeded regulatory thresholds for copper, lead, and zinc. However, the stabilization treatment was able to lower soluble metal concentrations to below STLCs occasionally (see Table 8 and Table 9).

DTSC and Terraphase data is compared in Table 8 and Table 9 using U.S. EPA's ProUCL 5.1 statistical software. Maximum, minimum, and average constituent values are shown, along with the number of samples (n) analyzed at each dosage, the standard deviation of samples, and the 95% UCL values. The results of the treatability study, as demonstrated by the 95% UCL values from both DTSC and

[62] 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.
[63] 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.

Terraphase's results, demonstrate that none of the treatment application rates was sufficient to reduce STLCs of lead or zinc such that CTMSR would no longer be considered non-RCRA hazardous waste.

Table 8. TTLC Lead and Zinc Levels After Different Treatment Dosages

		DTSC		Terraphase (ISRI)	
		Lead[a] (mg/kg)	Zinc[b] (mg/kg)	Lead[a] (mg/kg)	Zinc[b] (mg/kg)
High Dosage (n = 120)	95% UCL	845.6	7,327*	1,566*	6,834*
	Maximum	5460	17,600	11,300	15,500
	Minimum	136	1,250	317	2,810
	Average	776.87	5,961.25	1,040.86	6,468.08
	Standard Deviation	793.64	3,418.09	1,314.46	2,404.99
Medium Dosage (n = 48)	95% UCL	829.8	9,103*	1,815*	7,436*
	Maximum	2630	18,300	9,620	13,400
	Minimum	225	2,760	358	3,170
	Average	728.7	7,628.54	976.83	6,766.04
	Standard Deviation	433.49	4,771.12	1,318.52	2,736.98
Low Dosage (n = 80)	95% UCL	1,107*	11,926*	1,060*	6,905*
	Maximum	6,520	23,700	7,160	14,200
	Minimum	257	1,960	301	2,310
	Average	987.7	9,172.25	900.67	6,468.75
	Standard Deviation	884.87	5,615.91	806.77	2,169.05

[a] TTLC for Lead = 1,000 mg/kg
[b] TTLC for Zinc = 5,000 mg/kg
* 95% UCLs that exceeded TTLC regulatory limits as defined in section 66261.24, chapter 11, title 22, California Code of Regulations are presented with an asterisk.

During the demonstration of the treatment at the higher application rate for CTMSR, the Terraphase data showed the average TTLC concentration of lead to be 1,041 mg/kg, and of zinc to be 6,468 mg/kg.[64,65] However, the maximum lead concentration observed by Terraphase in 120 samples collected during treatment at the higher application rate was 11,300 mg/kg.[66] Similarly, the maximum zinc concentration observed in the Terraphase data was 15,500 mg/kg, which further indicates that

[64] Ibid.
[65] 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.
[66] 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.

significant concentration spikes are a possibility for individual sampling events.[67] Samples analyzed by DTSC's Environmental Chemistry Laboratories showed similar results.

Table 9. STLC Lead and Zinc Levels After Different Treatment Dosages

		DTSC		Terraphase (ISRI)	
		Lead[a] (mg/L)	Zinc[b] (mg/L)	Lead[a] (mg/L)	Zinc[b] (mg/L)
High Dosage (n = 120)	95% UCL	5.08*	331.9*	16.14*	239.2 or 249.6
	Maximum	48	1,210	91.3	434
	Minimum	0.4	0.4	0.44	2.53
	Average	4.2	236.35	13.43	180.81
	Standard Deviation	6.16	239.08	16.48	135.99
Medium Dosage (n = 48)	95% UCL	5.53*	534.1*	23.84*	447.9* or 347.9*
	Maximum	9.57	1140	46.8	524
	Minimum	0.4	1	0.23	4.5
	Average	3.789	361.45	18.26	337.01
	Standard Deviation	2.75	271.48	13.81	141.6
Low Dosage (n = 80)	95% UCL	34.03*	982*	38.16*	372.5* or 364.9*
	Maximum	94.5	2220	106	700
	Minimum	1	14.6	6.21	36.3
	Average	22.94	876.83	34.99	347.69
	Standard Deviation	22.63	495.85	16.03	117.82

[a] STLC for Lead = 5 mg/L
[b] STLC for Zinc = 250 mg/L
* 95% UCLs that exceeded STLC regulatory limits as defined in section 66261.24, chapter 11, title 22, California Code of Regulations are presented with an asterisk.

The treatability study also demonstrated that the treatment process used by metal shredding facilities could not consistently reduce soluble concentrations for lead to below the STLC limit. The STLC limit for lead is 5 mg/L and the average concentration was found to be 13.4 mg/L by Terraphase and 4.2 mg/L by DTSC.[68] The average concentration of zinc in CTMSR was 180 mg/L as reported by Terraphase and 236 mg/L as reported by DTSC,[69] which did not exceed the zinc STLC of 250 mg/L. The maximum observed

[67] 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 1,629 of Part 4.
[68] Metal Shredder Residue Treatability Study, April 26, 2017, Individual Sample Results for the high dosages found in Table B1, Pilot Study.
[69] 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 as reported by Terraphase, and 48 mg/L as reported by DTSC.[70] The maximum observed concentrations for zinc and lead, as noted previously, are an indication that significant concentration spikes are possible in individual samples.[71]

The treatability study showed that soluble concentrations of cadmium, lead, and zinc usually decreased when application rates were increased. In most cases, the greatest percentage reduction achieved during the full-scale demonstration was with the high-dosage treatment rate (0.7 gallon per ton silicate and 12 percent cement).[72] However, even though the treatment reduces the solubility of regulated metals, CTMSR still consistently exceeds total thresholds for lead and zinc, and soluble thresholds for lead. 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.[73] The treatment results also reflected the high degree of variability in the metal shredder residue wastestream, 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.[74]

Hazardous Materials Removed from Received Unprocessed Obsolete Scrap Metals

Figure 15. Compressors removed from refrigerators and other appliances

Figure 16. Storage area for materials requiring special handling

Unprocessed obsolete scrap metal can contain 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

[70] 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.

[71] 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.

[72] Ibid., page 68 of Part 5.

[73] Ibid., page 71 of Part 5.

[74] 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.

shredding facility will remove the hazardous materials rather than reject the load. Typical hazardous materials that can be found in unprocessed obsolete 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). Figure 15, Figure 16, and Figure 17 are photographs of hazardous materials removed from received unprocessed obsolete scrap metal.

Air Pollution Control Equipment Dust and Filters

Figure 17. Waste mercury switches pulled from appliances

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. Generators are responsible for characterizing such wastes and managing them properly if they are determined to be hazardous. The steps set forth to make such a determination are found in section 66262.11, chapter 12, title 22, California Code of Regulations. No residues from air pollution control equipment were analyzed as part of this Final Report. 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 manifest information contained in 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.[75] Generators are responsible for characterizing this waste and managing it as hazardous if it exhibits hazardous waste characteristics. The characteristics of this type of waste were not quantified by DTSC, and DTSC has been unable to verify through manifest information contained in HWTS whether this material is being managed as a hazardous waste. No samples from this waste stream were analyzed as part of this Final Report.

Storm Water Collection System Tank Bottoms

[75] In the event that hazardous waste is introduced into the wastewater treatment system, the system would need a permit or other form of authorization from DTSC to treat a hazardous waste.

Most of the metal shredding facilities have no surface water discharge, meaning they capture and store all surface water runoff in lined or unlined ponds or surface impoundments, and recycle and reuse it directly either as hammer mill quench water or 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 thus also expected to be hazardous wastes. The characteristics of this type of waste were not quantified by DTSC. No samples from this waste stream were analyzed as part of this Final Report, 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 of 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. The amount and characteristics of this type of waste were not quantified by DTSC. No samples from this waste stream were analyzed as part of this Final Report, 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 various activities conducted at the facility. Most of the metal shredding facilities collect this dirt and debris using sweepers and vacuums. The wastes produced by these activities 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 and characteristics of this type of waste were not quantified by DTSC. No samples from this waste stream were analyzed as part of this Final Report, and DTSC was not able to identify this waste stream in HWTS.

Summary of Hazardous Wastes Shipped Offsite 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. Hazardous waste manifests used to ship hazardous wastes from the metal shredding facilities to offsite hazardous waste facilities must list hazardous waste types and a correlating California Waste Code. These waste codes often do not correlate directly to the hazardous wastes that may be generated, as discussed above. All hazardous waste shipments must be accompanied by a hazardous waste manifest from the site where they are generated to the site where they are disposed of. Table 10 provides the approximate quantities of certain hazardous wastes manifested by the metal shredding facilities in 2019.

Table 10. Hazardous Wastes Manifested From Metal Shredding Facilities in 2019					
Facility	**Soils and Other Solids (tons)**	**Asbestos (tons)**	**Oils (tons)**	**PCBs (tons)**	**Solvents (tons)**
Sims	253.8	0	2.09	0	0
Schnitzer Steel Products	50.76	2.3	2.31	0.23	0
SA Terminal Island	28.86	0	20.02	0.17	0.20
SA Bakersfield	311.19	0	0.1	3.29	3.9
SA Anaheim	0	0.1	62.01	0	0
Ecology Auto Parts	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. Unless specifically excluded or exempted from regulation, the treatment, storage, and disposal of hazardous wastes can only be performed at a facility that has a hazardous waste facility 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”, none of the metal shredding facilities have been granted authorization for the treatment, storage, or disposal of hazardous waste. Hazardous waste generated and accumulated onsite is subject to accumulation time limits based on the type and amount of hazardous waste generated. The hazardous waste generated and accumulated onsite within the appropriate time limits would not require a permit if it is stored in appropriate containers, and the metal shredding facilities comply with other applicable generator requirements.

Treatment Processes

Generally, a facility that conducts activities that meet the definition of treatment and storage as defined in California Code of regulations, title 22, section 66260.10 requires authorization from DTSC to conduct these activities. There are many treatment processes that can occur at a metal shredding facility, as described below.

Metal Shredding Unit or Hammer Mill: Appropriately screened feedstock is generally not considered hazardous waste under California law. Therefore, as long as hazardous waste is not introduced into the hammer mill, operation of the hammer mill would not be considered a hazardous waste treatment activity.

Physical Separation of Ferrous Metals from Metal Shredder Aggregate: Because metal shredder aggregate is a mixture of recoverable scrap metal and metal shredder residue which exhibits the hazardous characteristic of toxicity, the removal of ferrous metals from metal shredder aggregate using magnets is recognized to be a hazardous waste treatment activity.

Physical Separation of Non-Ferrous Metals from Metal Shredder Aggregate: Similarly, the removal of non-ferrous metals from metal shredder aggregate based on density and other physical properties is recognized to be a hazardous waste treatment activity because it is performed on a waste, specifically metal shredder aggregate, which does not meet the definition of scrap metal.

Figure 18. Tube for feeding cement into the pug mill for chemical treatment of metal shredder residue

Chemical Stabilization of Metal Shredder Residue: 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. Based on the definition of treatment, this chemical stabilization step is a hazardous waste treatment activity because metal shredder residue is recognized as a waste which exhibits the hazardous characteristic of toxicity. Figure 18 shows the manner in which cement is fed into the pug mill.

Storage Processes

The metal shredder aggregate stored in piles exhibits the hazardous waste characteristic of toxicity. California's hazardous waste laws generally allow for large quantity generators to accumulate 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, containers, drip pads, or containment buildings).[76] 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 in piles for varying periods of time at various stages of its processing due to the quantities being managed. At most of the metal shredding facilities, these piles are outside of buildings, and at some facilities they are on bare ground, as shown in Figure 19. Metal shredder aggregate contains metal shredder residue, which exhibits the hazardous waste characteristic of toxicity. The storage of hazardous waste in piles is regulated as a hazardous waste management activity, and a metal shredding facility would need a form of authorization from DTSC to conduct this activity.

Figure 19. Stockpiled aggregate

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

[76] See Sec. 66262.34, div. 4.5, tit. 22, Cal. Code Regs.

homogeneous, and are not processed further at the metal shredding facilities but are stored prior to shipment. Because of their quantities, they are typically stored in large outdoor piles. As long as the sorted ferrous and non-ferrous metals are managed in an appropriate manner so as to prevent potential releases of hazardous constituents into the environment and are legitimately recycled, they are considered to be an excluded scrap metal. Metal shredding facilities must ensure that the storage and management of the ferrous and non-ferrous metals is conducted in a manner that minimizes the possibility of release of hazardous waste or hazardous waste constituents to air, soil, or surface water, and also that the ferrous and non-ferrous metals be legitimately recycled.[77] Assuming that the contents of the pile(s) qualify as excluded scrap metal, 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 authorization from DTSC to conduct this activity, unless residual amounts of hazardous constituents remain in the segregated metals.

Storage of CTMSR: CTMSR is stored in piles (sometimes outside of buildings) for varying periods of time after treatment, as illustrated in Figure 20.

The accumulation of hazardous waste in piles is not available to generators (see Sec. 66262.34, div. 4.5, tit. 22, Cal. Code Regs.). A generator may accumulate hazardous waste onsite for up to 90 days without a permit only if the waste is appropriately contained. CTMSR continues to exhibit the hazardous waste characteristic of toxicity, even after chemical treatment to stabilize the soluble metals in the waste. Because of this, the storage of CTMSR would be regulated as a hazardous waste management activity, and a metal shredding facility would need a form of authorization from DTSC to conduct this activity.

Transfer and Transportation Processes

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

Figure 20. Piled stored CTMSR

Transfer of Metal Shredder Aggregate 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, as shown in Figures 21 and 22.

Facilities are required to conduct operations such as the transfer of metal shredder aggregate within the facility in a manner that minimizes the possibility of release of hazardous waste or hazardous waste constituents to air, soil, or surface water.[78]

[77] See section 66265.31, chapter 15, title 22, California Code of Regulations, via Cal. Code of Regs., tit. 22, section 66262.34.

[78] See section 66265.31, Title 22, California Code of Regulations.

Figure 21. Front loader used to feed stockpiled aggregate into the joint products plant

Figure 22. Conveyor belt lines used to transport material through the joint products plant and to the chemical treatment system

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, as illustrated in Figure 23. For those facilities which are not located close to a port, ferrous metal is primarily transported by rail before being loaded onto said ocean-going vessels.

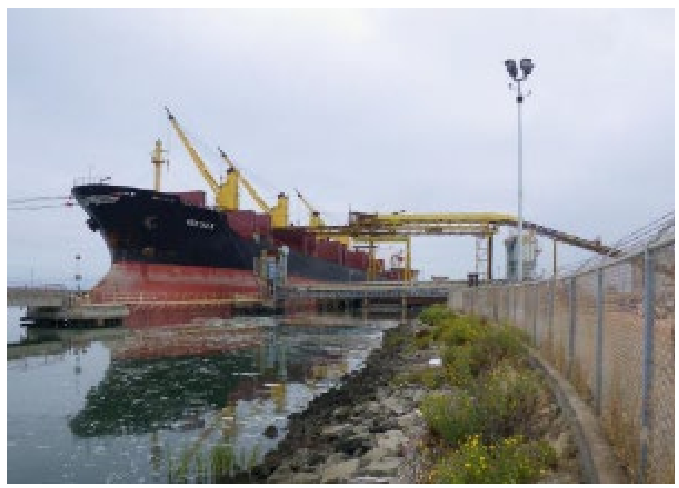

Figure 23. Loading sorted and shredded ferrous metals onto ship via conveyor system

Transportation of CTMSR from the Metal Shredding Facility: CTMSR is transferred from the metal shredding facilities to the landfills where it is either being directly disposed, or used as ADC, as shown in Figure 24.

Even after chemical treatment to stabilize the soluble metals in the waste, CTMSR continues to exhibit the hazardous waste characteristic of toxicity, and would therefore meet the definition of a hazardous waste in California if not granted a nonhazardous waste classification under 66260.200(f). The transportation of a hazardous waste is a regulated hazardous waste management activity and requires the use of a registered hazardous waste transporter.

Figure 24. Truck being loaded with CTMSR for transportation

Transportation of Treated Metal Shredder Aggregate from a Metal Shredding Facility: 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 does not transport the aggregate as hazardous waste. Additionally, 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.

Disposal Processes

Figure 25. Vasco Road Landfill, Livermore, CA, with municipal solid waste in the foreground (lighter material) and stockpiled CTMSR in the distance (darker colored material)

Land Disposal: 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 vehicular traffic, but not to prevent migration of hazardous waste or hazardous waste constituents. Particulate matter (e.g., suspended metal particles) and LFM have been shown to be emitted from the metal shredding facilities and to deposit on the ground outside the facility boundaries. Metal shredder aggregate or residue that falls from conveyors or outside of waste management units, and that is not retrieved or cleaned up, results in those operational areas of the metal shredding facilities being contaminated with the hazardous constituents that are originally present in the metal shredder wastes.

Solid Waste Landfill Disposal: CTMSR which has been generated at a metal shredding facility that has applied for and received a nonhazardous waste classification under 66260.200(f) may be disposed of at certain solid waste landfill facilities, as identified by SWRCB. The disposal processes will be discussed further in Section 4 of this Final Report. Figure 25 captures an example of a municipal solid waste landfill with CTMSR.

2.5 Enforcement History

DTSC reviewed the compliance and enforcement histories from the CUPAs, the SWRCB, and DTSC's own investigations to identify past violations at metal shredding facilities. The enforcement history was requested from each respective authority for a 10-year time span, starting in 2007 and ending in 2016, with additional information from 2016 through 2019. Although some of the violations referred to in this section were minor or administrative in nature, all of the violations required a correction. The following databases and resources were used to obtain information on violations:

Storm Water Requirements

SWRCB's SMARTS is a public database that provides access to storm water permits and all supporting documentation, including storm water pollution prevention plans, annual reports and sampling results, and enforcement actions.[79] 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.

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

Two of the four metal shredding facilities that operate under an industrial general permit had exceedances of the water quality thresholds known as numeric action levels (NALs). The NAL exceedances were for specific conductance, COD, iron, and lead. The NALs are pollutant concentration levels that are used to evaluate if a facility's best management practices are effective and if additional measures are necessary to control pollutants. NALs are not effluent limits, and the exceedance of an NAL is not a permit violation.[80] Dischargers self-report NAL exceedances through the SMARTS system and are then required to conduct an evaluation to identify any additional BMPs or revisions to the SWPPP that are necessary to prevent future NAL exceedances. The RWQCB then requires proof of implementation of best management practices to mitigate any future exceedances of the NALs.

One metal shredding facility had violations for both its NPDES permit and the Clean Water Act, enforced by U.S. 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

SWRCB's GeoTracker database is used to track facilities with groundwater contamination.[81] Additionally, DTSC's EnviroStor was consulted to see if any of the facilities had undergone cleanup activities.[82]

All six metal shredding facilities have been cited by either the CUPAs, SWRCB, DTSC, or U.S. EPA for soil contamination or offsite migration of contaminants. As a result of enforcement actions by the RWQCBs, three facilities required soil cleanup due to the presence of petroleum hydrocarbons, metals, PCBs, and other contaminants associated with metal shredding activities, and two of the facilities were required to install an impermeable concrete cap over part of their properties to prevent further releases to the soil and groundwater, which was attributed to 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. Three facilities had offsite migration of LFM, which lands on soil and can cause contamination of the surrounding properties.

Fire/Explosions

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

Four metal shredding facilities have had fires on their properties, either in the metal shredding machinery or in the piles of metal feedstock, with a total of seven known fires between 2007 and 2020.[83] One of the incidents resulted in substantial damage to the air pollution control device on the

[80] See California Industrial General Permit (IGP) for Storm Water Discharges Associated with Industrial Activates, IGP Order 2014-0057-DWQ, National Pollutant Discharge Elimination System (NPDES) No. CAS000001, effective on July 1, 2015.
[81] See https://geotracker.waterboards.ca.gov/
[82] See https://www.envirostor.dtsc.ca.gov/public/
[83] Note that a fire occurred (June 2, 2018) at a metal shredding facility subsequent to DTSC's release of the draft Analysis in January 2018, and as such was not evaluated for purposes of this final Analysis.

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

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.

Typically, facilities are inspected by CUPAs for hazardous waste and materials management every three years. The most common violations citated 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, not keeping containers closed when not in use, and failure to dispose of wastes within appropriate storage time limits.

Violations also included improper storage and inadequate hazardous waste plans for hazardous waste ammunition, unknown fluids being stored, and inaccurate and out-of-date hazardous waste inventory.

DTSC Inspections or Investigations

DTSC reviewed all investigations from 2007 to 2020 for the six metal shredding facilities that were included in the Final Report, including complaints received.

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 offsite migration of contaminants associated with metal shredding facilities.

2.5.1 Enforcement History at Metal Shredding Facilities

Sims Metal Management

Storm water Requirements: On March 4, 2011, while conducting an NPDES storm water inspection at the Port of Redwood City adjacent to the Sims Metal Management facility, U.S. EPA observed material outside the Sims property boundary, including "shredding residue, scrap metal, and other debris associated with industrial activities."[84] On August 25, 2011, U.S. 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.[85] U.S. EPA determined that Sims had been operating that way since at least the early 1990s. On December 16, 2011, U.S. 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.[86] In 2014, U.S. EPA fined Sims $189,500 for polluting Redwood Creek and San Francisco Bay.[87]

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[84] See DTSC Statement of Facts in the Investigation of Sims Group USA Corporation, Case No. 14158-48.
[85] See U.S. EPA Region IX Clean Water Act Compliance Office Inspection Report, Port of Redwood City adjacent to Sims Metal Management, Redwood City, CA, Inspection date August 25, 2011.
[86] See U.S. EPA Letter to Mr. Steven Shinn, Sims Metal Management, Findings of Violation and Order for Compliance, December 16, 2011.
[87] See "EPA fines Sims Metal plant in Redwood City $189,500 for polluting the Bay," The Mercury News, September 19, 2014.

Fires/Explosions: On November 10, 2013, a two-alarm fire originated from "crushed cars and scrap metal [sic] that were in a large pile about 30 feet high."[88,89] The fire sent a plume of smoke into the area that 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."[90] DTSC 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 time frame requested. In 2009 and 2010, no violations were cited, and in 2011, one violation regarding an unlabeled drip pan was found but corrected onsite.[91,92,93] 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.[94] On April 18, 2016, two minor violations and one Class II violation were cited.[95] 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 U.S. 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.[96] Results of the soil/sediment samples collected by U.S. EPA revealed exceedances of DTSC's TTLCs for cadmium, copper, lead, and zinc. Prior to DTSC visiting the facility with U.S. 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."[97] Release of LFM has been an issue at the Sims facility since at least 2009, when discoloration, subsequently identified as LFM, was found in the ponds at the neighboring Cargill Salt facility. Beginning on March 13, 2012, samples from various locations in and around the

[88] See Bay Area Air Quality Management District, "Incident Report, Sims Metal Management (A5152), Redwood City, CA," Compliance and Enforcement Division, November 10, 2013.
[89] See "Redwood City requires Sims Metal to take more than a dozen steps to prevent future fires," The Mercury News, February 21, 2014.
[90] See "Redwood City Officials Meet with Recycling Plant After Second Blaze in Two Months," San Francisco Examiner, December 20, 2013.
[91] See San Mateo County Environmental Health Division, Hazardous Waste Generator Inspection Report for Sims, February 25, 2009.
[92] See San Mateo County Environmental Health Division, Hazardous Waste Generator Inspection Report for Sims Metal, November 18, 2010.
[93] See San Mateo County Environmental Health Division, Hazardous Waste Generator Inspection Report for Sims Metal, December 9, 2011.
[94] See San Mateo County Environmental Health Division, Hazardous Waste Generator Inspection Report for Sims Metal Management, March 18, 2014.
[95] See San Mateo County Environmental Health Division, Hazardous Waste Generator Inspection Report for Sims Metal Management, April 18, 2016.
[96] See DTSC Statement of Facts in the Investigation of Sims Group USA Corporation, Case No. 14158-48.
[97] Ibid.

vicinity were collected, including treated shredder waste, fluff, soil, soil/fluff combination, and heating, ventilation, and air conditioning (HVAC) air filters. Of the samples collected, exceedances were noted for zinc, lead, and copper, demonstrating the illegal disposal of hazardous shredder residue.[98]

DTSC referred the case to the California Attorney General's Office, alleging that Sims's metal shredding operations released LFM, 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.[99] 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.

In September 2018, DTSC issued a Summary of Violations (SOV) to Sims after DTSC again observed patches of LFM located on the sidewalk along Seaport Blvd parallel to Sims' yard and across the street in the parking lot of the neighboring commercial complex. LFM is generated by Sims from the metal shredding and metal processing equipment it uses on-site. Six samples were collected by DTSC. The sample results showed five out of the six samples collected contained soluble lead concentrations above the hazardous waste STLC regulatory limit. Three samples also contained soluble zinc, commonly found in wastes from scrap metal operations, at a concentration that did not exceed the regulatory hazardous waste threshold.

In March 2019, DTSC staff issued another SOV to Sims after a joint inspection by DTSC and San Mateo County Environmental Health identified a repeat hazardous waste violation due to LFM migration. Additionally, three other hazardous waste violations, including unauthorized storage and disposal of hazardous waste, and failure to minimize the release of hazardous wastes to air and soil that may threaten human health and the environment, were also identified by DTSC staff.

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

[98] See DTSC's Supplemental Statement of Facts in the Investigation of Sims Group USA Corporation, Case No. 14158-48, March 12, 2013.
[99] 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.

cap to part of the property and to conduct semiannual groundwater monitoring as part of the remediation plans.[100] 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 in 2013 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.[101] The San Francisco 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 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. The results of the soil, groundwater, standing water, and sludge sampling demonstrate that groundwater containing petroleum hydrocarbons as diesel and/or petroleum hydrocarbons as motor oil, and dissolved metals (arsenic, copper, lead, and nickel) was discharged from the Schnitzer site into the San Francisco Bay at concentrations harmful to the environment. Soil samples also demonstrated concentrations of arsenic, copper, lead, nickel, and total petroleum hydrocarbons exceeding the San Francisco Bay RWQCB's construction worker environmental screening levels.[102]

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[100] 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.
[101] 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.
[102] See San Francisco Bay Regional Water Quality Control Board Letter to Bruce Rieser, Schnitzer Steel Industries, Inc., Comments – Multi-Media Investigation Report and Water Code Section 13267 Technical Report Requirement Order – Site Investigations Work Plan and Report – Schnitzer Steel Products, 1101 Embarcadero West, Oakland, Alameda County, File No. 01S0067 (MS), February 24, 2017.

Fire/Explosions: On April 8, 2009, a fire occurred at Schnitzer in a pile of debris at the site.[103] The smoke reportedly created air quality concerns for the local neighborhoods. On September 29, 2011, another fire occurred in a pile of metal feedstock, which was reported to have sent a plume of smoke into the sky that was visible for miles.[104] On June 2, 2018, a large fire broke out in a pile of metal shredder aggregate stored at the Oakland facility following the metal shredding and ferrous removal processes.[105] Four engines, two fire trucks, and the city of Alameda's fire boat were used to battle the fire, and black smoke could be seen as far as Fremont.[106] Another fire occurred at Schnitzer on June 17, 2020, which required six engines and two trucks to contain.[107]

CUPA Inspections: Two hazardous waste inspection reports were provided to DTSC from the 10-year time frame 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.[108] The CUPA found six violations. Schnitzer had violated two recordkeeping and documentation requirements related to eyewash and shower station installation, lack of exit 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.[109] During the previous inspection on February 13, 2007, no violations had been found.[110]

DTSC Inspections or Investigations: On March 17, 18, and 19, 2015, DTSC conducted a Compliance Investigation Inspection of Schnitzer.[111] During the inspection, DTSC collected soil samples from bare ground where metal feedstock 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 STLC exceedances for chromium, lead, nickel, and zinc. Additionally, samples collected had TTLC exceedances for copper, lead, nickel, and zinc.

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[103] See Don Sanchez of ABC 7 News, "Fire Breaks Out at Steel Plant in Oakland," April 8, 2009, http://abc7news.com/archive/6751956/

[104] 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/

[105] See NBC Bay Area, "Air Quality Concern in Oakland Following Recycling Plant Fire," June 2, 2018.

[106] See Peter Hegarty of East Bay Times, "Fire breaks out at Schnitzer Steel in Oakland," June 2, 2018, https://www.eastbaytimes.com/2018/06/02/fire-breaks-out-at-schnitzer-steel-in-oakland/.

[107] See Lauren Hernández San Francisco Chronicle, "Blaze at metals recycling facility under control, Oakland fire says," June 17, 2020, https://www.sfchronicle.com/bayarea/article/Oakland-firefighters-battle-blaze-at-metals-15347901.php.

[108] See Alameda County Department of Environmental Health Inspection Report for Schnitzer Oakland, September 14, 2015.

[109] Ibid.

[110] See Alameda County Department of Environmental Health, Hazardous Waste Generator Inspection Report for Schnitzer Steel, February 13, 2007.

[111] See DTSC Letter to Mr. Chris Orsolini, Re Report of Investigation on Schnitzer Steel Industries, Inc. Oakland Facility, August 18, 2015.

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

On Saturday, June 2, 2018, a fire originated at a pile of nonferrous metals stored onsite, which had been separated via magnet from ferrous materials. Both samples taken by DTSC staff from the remnant of the pile on June 5, 2018, exceeded the TTLC for zinc, lead, and/or copper and thus were classified as non-RCRA, California only hazardous wastes due to exhibiting the hazardous waste characteristic of toxicity. On June 12, 2018, DTSC sent a Notice of Violations (NOV) to Schnitzer for having "failed to maintain and/or operate their facility to minimize the possibility of a fire,"[112] due to the outbreak of the fire at the facility on June 2, 2018. The NOV alleged that Schnitzer failed to maintain and/or operate its facility to minimize the possibility of a fire, in violation of California Code of Regulations, title 22, sections 66262.10(h), 66262.34(a)(4), and 66265.31. Schnitzer is currently contesting the NOV and its contents.[113]

SA Terminal Island

Storm water Requirements: In 2009, the facility reported that its storm water discharges exceeded water quality benchmark standards for specific conductance, COD, and copper.[114] In 2011, the facility exceeded water quality standards for specific conductance, COD, and zinc.[115] 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 the BMPs identified in its SWPPP or has described which additional BMPs will be implemented, and updated its SWPPP to include the additional BMPs.[116] A response from SA Terminal Island indicated that 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.[117] In 2013, the facility was cited by the Los Angeles RWQCB for inadequately updating the SWPPP, 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.[118] 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 treatment system

[112] See Notice of Violations, Department of Toxic Substances Control to Schnitzer Steel, June 5, 2018.

[113] See Schnitzer Steel Industries, Inc. Letter to Mr. Dylan Clark, Re: Notice of Violations: Schnitzer Steel Industries, Inc. – Oakland, June 20, 2018.

[114] See 2008-2009 Annual Report for Storm Water Discharges Associated with Industrial Activities, SA Recycling, 901 New Dock St, San Pedro, CA, WDID No. 4 19I021125TI, dated June 29, 2009.

[115] See 2010-2011 Annual Report for Storm Water Discharges Associated with Industrial Activities, SA Recycling, 901 New Dock St, San Pedro, CA, WDID No. 4 19I021125TI, dated June 30, 2011.

[116] 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, dated July 5, 2012.

[117] 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.

[118] See Los Angeles Regional Water Quality Control Board Notice to Comply for SA Recycling, WDID# 4 19I021125, Order No. 97-03, February 25, 2013.

to resolve discrepancies in the plan.[119] 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.[120] In 2016, the facility was notified that it must complete certain response actions due to exceedances of COD. The facility was required to conduct an evaluation of the BMPs in their SWPPP and identify any additional BMPs and revisions to the SWPPP necessary to prevent future exceedances.[121]

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 semiannual groundwater monitoring as part of remediation plans associated with contamination found in both the soil and groundwater.[122] 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, when the facility was operated by the Hugo Neu-Proler Company,[123] to assess the environmental impact from long-term metal recycling activities at the facility. Soils were found to have been impacted by petroleum hydrocarbons, metals, polychlorinated biphenyls, and polycyclic aromatic hydrocarbons. Cleanup involved removing contaminated soil, backfilling the excavation, and placing a concrete cap over the affected area to prevent further contamination. Low-level measurements of methyl tert-butyl ether and tert-butyl alcohol were detected, but they were attributed to an offsite source.

Fire/Explosions: On May 21, 2007, there was an explosion at the Terminal Island facility, then operated by Sims Hugo Neu West, a subsidiary of Sims Group Limited,[124] that damaged the air pollution control system that was used to control emissions of particulate matter and VOCs.[125] 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.[126]

CUPA Inspections: One hazardous waste inspection report from 2015 was provided to DTSC from the 10-year time frame requested. Records for the most recent inspection, conducted on August 27, 2015,

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[119] See California Regional Water Quality Control Board – Los Angeles Region, Industrial Storm Water Inspection Report for SA Recycling, WDID# 4 19I021125, April 19, 2013.
[120] Ibid.
[121] See Los Angeles Regional Water Quality Control Board Letter to SA Recycling LLC, Notification of Level 1 Status: SA Recycling LLC 901 New Dock Street San Pedro, CA 90731; WDID NO. 4 191021125, dated December 8, 2016.
[122] 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.
[123] See DHS Letter to Mr. Philip Disney, Hugo Neu-Proler Company, dated April 24, 1991.
[124] See DTSC New Release T-16-11 Amended, dated September 22, 2011.
[125] See Statement of Facts in the Investigation of SA Recycling LLC. Case No. 13450-19-078, April 22, 2009.
[126] See 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.

were provided, in addition to the dates of additional inspections conducted between September 1999 and September 2016. SA Terminal Island was visited by the CUPA 18 times during that time, in 1999, 2003, 2011, 2015, and 2016.[127] On August 27, 2015, the Los Angeles Fire Department conducted a routine inspection and noted three minor violations.[128] The inspectors observed hazardous waste solids stored in an open metal container without the required labeling. They observed five open 12-foot roll-off 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.[129] These findings were included in the case brought by the Los Angeles County District Attorney's Office against SA Recycling.[130]

SA Bakersfield

Fires/Explosions: On February 19, 2008, SA Bakersfield experienced a fire in a pile of crushed unprocessed obsolete scrap metal that was about "150 feet, by 300 feet by 50 feet high, firefighters reported."[131] 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 time frame requested. During hazardous waste generator inspections conducted by the Kern County Environmental Health Services Department in 2012 and 2015, no violations were found.[132,133] In 2009 and 2012, inspections for three program areas were conducted simultaneously: business plan, hazardous waste generator, and aboveground storage tank.[134]

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 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

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[127] See LA County Fire Department, Facility Information Report for SA Recycling, retrieved on October 4, 2016.
[128] See Los Angeles County Fire Department – Health Hazardous Materials Division, Inspection Report for SA Recycling LLC on August 27, 2015.
[129] See Statement of Facts in the Investigation of SA Recycling LLC. Case No. 13450-19-078, April 22, 2009.
[130] 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.
[131] See "Public Safety Digest: Golden State Metals Catches Fire," Bakersfield.com, February 19, 2008.
[132] See Kern County Public Health Services, Hazardous Waste Generator Inspector Report for SA Recycling LLC DBA SA Recycling, May 19, 2015.
[133] See Environmental Health Division, Certified Unified Program Agency (CUPA) Hazardous Material Inspection Form, March 15, 2012.
[134] See Environmental Health Services Department, (CUPA) Hazardous Material Inspection Form, April 10, 2009.

violation was cited regarding inaccurate and out-of-date inventory of hazardous waste, and one minor violation related to improperly labeled hazardous waste containers.

On March 21, 29, and April 10, 2001, the Kern County Environmental Health Services Department conducted inspections at the facility, then operated as Golden State Metals. The CUPA consulted with DTSC[135] regarding its findings, and in 2002 the facility agreed to a consent order that stipulated that the facility had violated section 25189.5(a) of Health and Safety Code by allowing hazardous waste to impact the ground, thereby constituting disposal.[136] The facility agreed to prevent future discharge of auto shredder waste, referred to as metal shredder waste in this report, to the soil.

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 LFM 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 improperly managing shredded materials that escaped the property boundaries as hazardous waste.[137] DTSC warned that failure to prevent metal shredder waste from leaving the site would result in the facility being subject to additional enforcement action.

SA Anaheim

Storm water Requirements: SA Anaheim holds a sector-specific general permit for storm water runoff associated with industrial activities from scrap metal recycling facilities administered by the Santa Ana RWQCB. In 2014, a notice of violation was issued by the RWQCB following the facility's reporting of their sample results for the year 2012-2013. Those sample results showed the facility exceeded numeric action levels, for either single sample events or for the annual averages, for specific conductance, COD, and iron.[138] In response to the exceedances, 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, the facility received another notice of violation following the analysis of storm water discharge samples collected during the 2014-2015 reporting year.[139] Those samples showed exceedances of the numeric action levels for COD and lead after implementing the corrective action plan resulting from the 2014 notice of violation. SA Anaheim was then required to develop an additional corrective action plan that included an evaluation of the best available technology treatment method used at the facility. The RWQCB conducted an inspection in 2016 and found that no corrective actions

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[135] See DTSC Letter to Kern County Environmental Health Services Department, dated August 10, 2001.

[136] See Kern County Environmental Health Services Department Letter to Mr. George Adams, re Consent Order, Compliance of Golden State Metals, Docket Nos. WN0001/03-01 and WN0003/02-03, dated March 23, 2004.

[137] See DTSC Letter to Adams, Re Operational Expectations During Implementation of SB 1249, April 13, 2015.

[138] 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.

[139] 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.

were needed and all documentation required as part of the storm water permit was present.[140]

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 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.[141] 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 time frame requested, with two of the six being reinspections. On 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.[142] 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 sumps.[143] 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.[144]

On February 12, 2016, the CUPA conducted a routine inspection and cited one Class II violation for containers with unknown fluids, requiring a hazardous waste determination for the wastes.[145] One minor violation related to aisle space and waste management practices was also cited. On March 22, 2016, the CUPA determined that all violations from the February 12, 2016, inspection had been corrected.[146]

Ecology Auto Parts

CUPA Inspections: Three hazardous waste inspection reports from 2011, 2012, and 2015 were provided to DTSC from the time frame 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

[140] See Santa Ana Regional Water Quality Control Board Inspection Report for SA Recycling LLC (WDID: 8 30MR000004), September 1, 2016.
[141] See DTSC Letter to Mr. George Adams, Jr., October 30, 2002.
[142] See Anaheim Fire Department Hazardous Materials Section, Hazardous Waste Generator Inspection Report for SA Recycling LLC, March 13, 2008.
[143] See Anaheim Fire Department Hazardous Materials Section, Hazardous Waste Generator Inspection Report for SA Recycling LLC, March 4, 2010.
[144] See Anaheim Fire & Rescue Hazardous Materials Section, Hazardous Waste Generator Inspection Report for SA Recycling LLC, February 20, 2013.
[145] See Anaheim Fire & Rescue Hazardous Materials Section, Hazardous Waste Generator Inspection Report for SA Recycling LLC, February 12, 2016.
[146] See Anaheim Fire & Rescue Hazardous Materials Section, Hazardous Waste Generator Inspection Report for SA Recycling LLC, March 22, 2016.

update the business plan within 30 days. The facility subsequently submitted updated business plan elements electronically to the California Environmental Reporting System, 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.[147,148]

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 released by the facility based on an observation and onsite inspection conducted by DTSC.

On June 2 and 3, 2015, DTSC conducted an inspection of the Ecology facility.[149] 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 LFM, similar to a heavy dust, that had settled on surfaces and was covering piles of other material. DTSC cited the facility for failure to minimize the release of hazardous waste or hazardous waste constituents to the air, soil, or surface water, which could threaten human health or the environment. DTSC collected samples from each of these locations, which demonstrated that the soil, aggregate material, shredder residue, and LFM all met the criteria for classification as non-RCRA hazardous waste. DTSC has shared a copy of the Report of Investigation with Ecology and is evaluating an appropriate enforcement response.[150]

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, DTSC found that local agencies differ in their implementation of water pollution programs and oversight of hazardous waste management activities.

While each metal shredding facility is under the jurisdiction of environmental and health agencies, each of those agencies implements a program 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 specific methods of control of VOC emissions.

[147] See CUPA San Bernardino Fire Department Hazardous Materials Division, Hazardous Waste Generator and Hazardous Materials Handler Inspection Report, June 19, 2012.
[148] See CUPA San Bernardino Fire Department Hazardous Materials Division, Preliminary Field Inspection Report, November 1, 2011.
[149] See DTSC Summary of Violations, Ecology Auto Parts, Inc., Colton, EPA ID Number: CAL000177441, June 4, 2015.
[150] See DTSC Report of Investigation on Ecology, Inc., Colton, dba: Pacific Rail Industries, December 16, 2015.

3 ANALYSIS

The following subsections present DTSC's analysis of the generation, treatment, and storage of metal shredder wastes. All of the wastes described in these subsections are hazardous wastes generated by metal shredding facilities, and all activities described are those which would otherwise require a form of authorization from DTSC to perform. The disposal of CTMSR to solid waste landfills is discussed in Section 4.

3.1 Types of Hazardous Waste and Estimated Amounts Managed

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 unprocessed obsolete scrap metal it processed in 2014 (the year prior to the survey responses). According to the surveys, the incoming unprocessed obsolete scrap metal 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 unprocessed obsolete 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; however, the estimated amount correlates with the amount of CTMSR that was reported to CalRecycle as ADC in the same year.

Metal Shredder Residue

The total amount of metal shredder residue estimated to have been generated by all of the metal shredding facilities in 2014 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 metal feedstock 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 with the amount of CTMSR that was reported to CalRecycle as ADC 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 ADC. According to information reported to CalRecycle by the solid waste landfills that use CTMSR for ADC, an estimated 517,000 tons of CTMSR were used as ADC 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 ADC. 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 11 summarizes the quantities of throughput and waste generation from metal shredding facilities reported for 2014. Because some facilities claimed that their production and generation volumes were confidential business information, some of the values in Table 11 are estimates based on overall industry averages or were calculated as functions of the known data. 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 10. Quantities of Throughput and Waste Generation and Management at Metal Shredding Facilities

Facility	Metal Shredded/Aggregate Generated (Tons) [b]	CTMSR Disposed (Tons) [c]
Sims [a]	358,000[a]	120,000 [d]
Schnitzer Steel Products [a]	582,000[a]	195,000 [d]
SA Terminal Island	330,000	115,172
SA Bakersfield	83,000	24,567
SA Anaheim	247,000	87,093
Ecology Auto Parts	264,000	N/A

[a] Some information was claimed as confidential business information. Estimates based on overall industry averages were used in place of data that was unavailable.
[b] Amount assumed to be the same as the amount of 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 ADC.

3.1.2 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 exhibiting the characteristic of toxicity, ignitability, corrosivity, and/or reactivity, along with potential hazard to humans and to other biological organisms, as well as risk of environmental contamination. 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 TTLC and/or STLC regulatory limits, and the soluble concentrations are only decreased in CTMSR—but even then, not to levels below the STLC regulatory limit. Cadmium has also occasionally been observed in some samples at levels that exceed its STLC regulatory limit. Historically, metal shredder waste was frequently contaminated with mercury and PCBs. However, because of product bans on mercury[151] and PCBs,[152] these contaminants are now found with reduced frequency and in reduced concentrations, as they have have been minimized from the metal feedstocks.

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.[153] 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 (DHHS), U.S. EPA, and the International Agency for Research on Cancer (IARC) have determined that lead is probably cancer-causing in humans.[154]

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 intellectual disability 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.

Copper: Exposure to high doses of copper can cause liver and kidney damage and even death.[155] Long-term exposure to copper dust can irritate the nose, mouth, and eyes, and cause headaches, dizziness,

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[151] See California's Mercury Reduction Act of 2001 (Sher, Chapter 656, Statutes of 2001).

[152] In 1979 the U.S. EPA issued regulations banning the manufacture, processing, and distribution in commerce of PCBs, thus phasing out most PCB uses. See Part 761 of Title 40 of the Code of Federal Regulations.

[153] 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

[154] Toxicological Profile for Lead, U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, 2007.

[155] 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. U.S. 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; it is toxic to aquatic organisms at high concentrations. 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.[156] 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 U.S. 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 U.S. EPA has shown that zinc is a strong aquatic pollutant.[157] 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 governing the toxicity of zinc to fish. In the U.S. 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.

[156] 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
[157] 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. U.S. EPA Environmental Research Lab, Duluth, MN. EPA-600/3-78-094PB-289 939, October 1978.

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."[158]

Cadmium: Cadmium is an inhalation hazard that can cause pulmonary irritation.[159] Long-term exposure to cadmium through inhalation or oral ingestion can cause kidney disease due to the buildup of cadmium in the kidneys. Similarly, cadmium is classified by U.S. EPA as a probable human carcinogen, with animal studies concluding increased rates of lung cancer due to chronic exposure.[160]

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.

Hazards from Reasonably Foreseeable Releases of Metal 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 and how the hazardous waste is being managed.

Wastes that contain constituents that exceed their respective TTLC regulatory limits 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 STLC regulatory limits 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.

DTSC described potential routes of release of and exposure to particulate toxics, for which TTLCs were developed:

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

As further explained in the rulemaking file 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 regulatory limits. The most direct impact of indiscriminate disposal is contamination of

[158] 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.
[159] Toxicological Profile for Cadmium, U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, 2012.
[160] See www.epa.gov/sites/production/files/2016-09/documents/cadmium-compounds.pdf

the land and the attendant potential impact on organisms which contact the land. These can include persons, animals, or plants."[161]

In the rulemaking documents in which the STLC regulatory limits were established, DTSC 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, groundwater, 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."[162]

The establishment of the STLC and TTLC regulatory limits 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.

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 sec. 66264.1101 et seq., ch. 14, tit. 22, Cal. Code Regs.), 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 sec. 66264.250 et seq., ch. 14, tit. 22, Cal. Code Regs.).

The information presented in Section 2.3 demonstrates that metal shredder wastes are not currently managed within tanks or containers, inside containment buildings nor in waste piles that meet the design and operating standards in chapters 14 and 15, title 22, California Code of Regulations. 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 Treatment and Storage Activities at Metal Shredding Facilities

Treatment Activities

<u>Ferrous and Non-Ferrous Metal Separation</u>: 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

[161] 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.
[162] 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.

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.

Observations by DTSC and other regulatory agencies as noted in Section 2.3 have documented the release of LFM and particulate matter from the ferrous and non-ferrous metal separation processes and have also documented metal shredder aggregate being released during 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. U.S. 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 remediation actions performed included inorganic binders such as cement, fly ash, lime, phosphate, soluble silicates, or sulfur.

Chemical treatment of metal shredder residue is impacted by the highly heterogeneous composition of metal shredder residue, which is a mixture of materials (including plastics, rubber, foam, fabric, carpet, glass, wood, road dirt, and debris, along with 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 control of the application rates of silicate solution and alkaline cement to achieve the intended level of 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 in decreasing the levels of soluble lead, cadmium, copper, and zinc (although, as indicated previously, not consistently effective in reducing to levels below hazardous waste thresholds). 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 application of the treatment chemicals, the methods to verify or validate the effectiveness of the treatment are also critical. 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.

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 waste piles due to the volume of the waste being managed. 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 standards in section 66265 et seq., chapter 14, title 22, California Code of Regulations.[163] 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 offsite.

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 unprocessed obsolete scrap metal to confirm they have been adequately de-polluted could result in hazardous materials remaining in the metal feedstock that is being shredded by 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 feedstock being detonated by the hammer mill. These explosions create 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.

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[163] Waste pile storage of hazardous waste is not authorized without a RCRA hazardous waste facility permit, since this form of storage may be considered land disposal.

The chemical treatment system is automated to reflect belt scale and speed, but the treatment system does not measure the amount of contaminants present or 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 from hazardous constituents being released to the environment or to persons nearby. 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 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 management practices, could result in releases of hazardous waste or hazardous waste constituents that could expose people, namely onsite workers and potentially members of the public who live and work in the surrounding community, to health risks, contaminate the environment, or injure or harm other biological receptors outside the facilities' boundaries.

Required Monitoring of Treatment and Storage of Metal Shredder Wastes

The treatment processes, pollution control equipment, and pollution control 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 offsite 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

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 appear to sufficiently contain or control the metal shredder aggregate, which allows the aggregate and its constituents to be released into the environment (both on and offsite). Additionally, these practices do not meet the regulatory standards applicable to hazardous waste generators; thus, by definition, the aggregate is not sufficiently contained. 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, potentially creating circumstances of disposal when the metal shredder waste is released from the waste treatment equipment or storage areas.

The greatest chemical hazards these hazardous waste constituents pose is when they, or the waste they originate from, 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.

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. As previously noted, Cal/OSHA is one of the regulatory state agencies tasked with oversight of metal shredder activities, and the operation of the ferrous and non-ferrous separation processes and equipment must be done in conformance with Cal/OSHA worker safety requirements. While not the focus of this Final Report, 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 ADC (which is further discussed in Section 4 of this Final Report). 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.

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

In the context of this Final Report, the focus is on accidents related to the treatment and storage of metal shredder wastes. As defined in section 66260.10, 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:

- 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; and
- Flooding associated with local or regional events or unanticipated rainfall events.

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. For more information, please see Section 2.5 of this Final Report.

A consequence of spills or releases of metal shredder wastes would be the deposition of additional contaminants to areas already impacted by releases of metal shredder wastes and their constituents, resulting in cumulative impacts.

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 onsite impacts, and could result in worker health and safety concerns. Additionally, these spills could contribute additional chemical contaminants to areas already impacted by historical releases of metal shredder wastes and their constituents.

3.5 Demographics of Communities Around Metal Shredders

The six "f letter" metal shredding facilities are located in, or are immediately adjacent to, 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. Demographic information related to the areas where each metal shredding facility is located is presented in Table 12.

Table 11. Demographics of Metal Shredding Facility Locations [a]

City	Population [a]	Unemployment Rate [b]	Poverty Rate [c]
Redwood City	85,217	7.0%	9.6%
Oakland	421,042	14.3%	13.8%
Long Beach	468,883	18.4%	18.1%
Bakersfield	375,699	16.2%	18.5%
Anaheim	349,668	15.0%	15.2%
Colton	54,415	13.6%	15.8%

[a] U. S. Census Bureau, December 19, 2019
[b] California Employment Development Department, Labor Market Information Division, July 2020
[c] United States Census Bureau, 2018 American Community Survey, 5 Year Estimates

Proximity of Treatment and Storage of Metal Shredder Wastes to Sensitive Land Uses

Health and Safety Code section 25227 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 12th-grade schools, as identified in sec. 25227(c), Health & Saf. 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. Therefore, the distances recorded below may not accurately reflect the proximity of residences to the listed metal shredding facilities and landfills.

The following images (Figure 26 and Figure 27) of Schnitzer Steel in Oakland and Simi Valley Landfill in Simi Valley show the results of the GIS mapping for the facilities and landfills. The location and proximity of childcare facilities, health care facilities, residential housing, and schools are shown for the two facilities. Images for the additional facilities are included in Appendix C.

Figure 26. GIS mapping of Schnitzer Steel Products, Oakland CA, showing proximity to sensitive receptors

Figure 27. GIS mapping of Simi Valley Landfill, Simi Valley CA

Table 12. Proximity of Metal Shredding Facilities and Landfills to Sensitive Receptors

Location	Hospital for Humans (miles)	Schools[a] (miles)	Day Care Centers[b] (miles)	Residences (miles)
Sims Metal Management	1.58	1.57	1.79	0.73
Schnitzer Steel	0.35	0.12	0.39	0.23
SA Terminal Island	1.37	1.22	1.22	1.01
SA Bakersfield	1.6	1.4	1.12	0.1
SA Anaheim	0.4	1.1	1.1	0.18
Ecology Auto Parts	0.48	0.5	0.5	0.06
Altamont Landfill	None within 5 miles	3.8	None within 3 miles	0.79
Holloway Landfill	3.89	3.59	None within 3 miles	3.68
Vasco Road Landfill	None within 5 miles	1.37	1.85	0.02

Table 12. Proximity of Metal Shredding Facilities and Landfills to Sensitive Receptors

Chiquita Canyon Landfill	0.91	1.2	0.91	0.12
Simi Valley Landfill	1.33	0.34	1.11	0.75
Potrero Hills Landfill	4.46	2.27	2.6	0.10

[a] Schools for persons under 21 years of age
[b] Day care centers for children

Table 13 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.

Potential Hazards Posed by Proximity of Metal Shredder Waste Activities to Sensitive Land Uses

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 offsite 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 (CES) version 3.0 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.[164] Vulnerable communities are identified by CalEPA as geographic areas with CES scores between the 75th and 100th percentiles.[165] 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 webpage.[166]

[164] 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
[165] See Designation of Disadvantaged Communities Pursuant to Senate Bill 535 (De León), April 2017.
[166] See OHHEA https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-30

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 Table 14 and Table 15, respectively.

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 offsite releases could be made based on population size.

Table 13. CalEnviroScreen Population and Pollution Characteristics Near Metal Shredding Facilities

Facility Name	CalEnviroScreen Percentile Range [a]	Population in Census Tract	Pollution Burden Percentile [b]	Population Characteristics Percentile [c]
Sims Metal Management	61 – 65%	2,108	86%	42%
Schnitzer Steel Products	Not evaluated [d]	71	63%	Incomplete evaluation [e]
SA Recycling, Terminal Island	Not evaluated [d]	61	99%	Incomplete evaluation [e]
SA Recycling, Bakersfield	96 – 100%	3,378	86%	99%
SA Recycling, Anaheim	96 – 100%	6,488	97%	78%
Ecology Auto Parts	96 – 100%	4,268	97%	96%

[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, PM2.5 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).
[d] Data was not evaluated due to unreliable health data because of low population.
[e] Incomplete evaluation as data for only asthma and cardiovascular disease were contained.

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 15.

Table 14. CalEnviroScreen 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, PM2.5 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).

4 CLASSIFICATION AND DISPOSAL OF CTMSR

CTMSR that has been declassified as a hazardous waste pursuant to a DTSC-approved “f letter” for those metal shredding facilities that applied for and received approval from DTSC to manage the waste as nonhazardous waste is currently disposed of in five landfills (although 22 landfills are authorized to accept the waste for disposal). Of these five landfills, two of them, Altamont Canyon Landfill and Simi Valley Landfill, typically receive approximately 60 percent of the state’s total CTMSR for disposal.[167] The five California landfills currently accepting CTMSR for disposal or for use as ADC are shown in Table 16.

Table 15. Amount of CTMSR Accepted Annually by Landfills for Use as ADC from 2017 to 2019

Landfill	2017 (tons)	2018 (tons)	2019 (tons)
Altamont Landfill & Resource Recovery 10840 Altamont Pass Livermore, CA 94550	139,954	181,917	111,751
Simi Valley Landfill & Recycling Center 2801 Madera Road Simi Valley, CA 93065	159,283	176,513	144,048
Vasco Road Sanitary Landfill 4001 North Vasco Road Livermore, CA 94550	116,622	139,212	124,930
Chiquita Canyon Sanitary Landfill 29201 Henry Mayo Drive Castaic, CA 91384	82,942	73,406 (2015)	85,999 (2016)
Potrero Hills Landfill 3675 Potrero Hills Lane Suisun City, CA 94585	90,776	78,150	118,263
H.M. Holloway Surface Mine Landfill Lost Hills, CA 93249	N/A	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 ADC; it last accepted CTMSR for disposal in 2014 and is being included here for historical purposes only. At Altamont and Vasco Road landfills, CTMSR is also used to absorb free liquids from other liquid or semisolid wastes. Wastes that 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. The active face is the working surface of a landfill where solid wastes are deposited during operation.

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

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 (susceptible to decay) municipal wastes are being deposited. The municipal wastes are deposited into cells that 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. Vectors include insects, rodents, or other animals capable of transmitting the causative agents of human disease. The handling at H.M. Holloway is different because it does not accept municipal solid waste that requires the use of ADC, so it instead disposed of CTMSR directly.

4.1 Regulatory Oversight of Disposal of CTMSR

4.1.1 Water Quality: Regulation of Landfills by RWQCBs

The SWRCB issues 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 construction-sites within California; these General Permits are administered by the regional water boards. Please see Section 2.3.2 of this Final Report for further details regarding the regulation of landfills by RWQCBs.

4.1.2 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.

CalRecycle has approved 11 types of earthen materials for use as ADC 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 for purposes of specified provisions of the Public Resources Code.[168] In addition to CTMSR, CalRecycle has approved other waste-derived materials for use as ADC including construction and demolition waste, contaminated sediments, municipal wastewater treatment plant sludge, and shredded tires. In total, CTMSR accounts for approximately 15 percent of all waste materials diverted for use as ADC statewide.[169]

4.1.3 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

[168] This point does not impact DTSC's regulatory authority over CTMSR.

[169] 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 1.0 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.

4.2 Hazardous Waste Management Activities

Transportation

CTMSR is currently 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. According to the treatability study, CTMSR continues to exhibit the hazardous waste characteristic of toxicity even after chemical treatment to stabilize the soluble metals in the waste. If the nonhazardous waste classifications granted through 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 with DTSC as a California hazardous waste transporter; to comply with all hazardous waste transportation regulations; to accompany each shipment with a Uniform Hazardous Waste Manifest; and to transfer the CTMSR to an authorized treatment, storage, or disposal facility.

Landfill Management

There are two primary dispositions of CTMSR at landfills: (1) CTMSR is disposed of along with the other solid wastes shipped to the landfill facility, and (2) CTMSR is used as ADC. As previously discussed, CTMSR continues to exhibit the hazardous waste characteristic of toxicity, even after chemical treatment to stabilize the soluble metals in the waste. If the nonhazardous waste classifications granted through the “f letters” were not in place, its disposal or use as ADC 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 CTMSR would need to be sent to a permitted hazardous waste disposal facility, or to a solid waste landfill site that has received a variance to accept this waste. Alternately, CTMSR could be transported under a Uniform Hazardous Waste Manifest 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.

4.3 Assessment of Hazards Associated With Transportation of CTMSR

The hazards associated with the transportation of CTMSR to landfills include, but are not limited to:

- A release of CTMSR to the environment if an accident occurs during transport to the landfill;
- A release of CTMSR to the environment and potential worker exposure if the waste is not appropriately contained during loading and unloading;
- Potential mismanagement of CTMSR if not appropriately tracked during transport; and
- A release of CTMSR, or particulate from the waste, if the waste is not appropriately contained during transport.

As discussed previously, CTMSR exceeds STLCs for zinc and occasionally for lead, and TTLCs for lead, zinc, and copper. If a release of CTMSR into the environment were to occur, these hazardous constituents could pose risks to public health and safety and to 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 about 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.

Various protections and requirements related to the management of CTMSR during its transportation to landfills may need to be developed to ensure the safety of human health and the environment. Finally, given the nature of CTMSR as a waste that meets non-RCRA hazardous waste standards upon its generation, additional requirements should be developed to ensure that shipments of CTMSR are adequately tracked from the point of generation to disposal, and that any CTMSR lost or spilled during transportation is recovered and transported to its original destination or to another approved landfill.

4.4 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, surface water, and the air. Each of these potential pathways is discussed in detail in the following sections.

4.4.1 Migration of Contaminants Via Leachate and Groundwater

Contaminants in wastes that have been disposed of in 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 of 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 of 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 that 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 Final Report, Republic Services, owner and operator of several landfills in California (some of which use CTMSR as ADC), commissioned Geo-Logic Associates (Geo-Logic)[170] in 2014 to prepare a study to compare leachate from landfills that 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 (see Table 17 below). Since Geo-Logic did not provide the raw data they used to draw these conclusions, DTSC was unable to independently confirm the report's analysis or conclusions.

Table 16. Description of Landfills Used in the Geo-Logic Comparative Leachate Study

Landfill	Location	Received CTMSR	Number of Years CTMSR in the Landfill (as of 2014)
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

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 accept 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 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 18.

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 (U.S. 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

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

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 17. Landfill Leachate Analyte Concentrations

Analyte	Vasco Road [a]			Ox Mountain [b]		
	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

[a] Vasco Road landfill accepts CTMSR
[b] Ox Mountain landfill does not accept CTMSR

4.4.2 Migration of Contaminants Via Surface Water

Contaminants in wastes that have been disposed of 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 offsite migration could contaminate the surface water drainages of the solid waste landfills and potentially migrate offsite, where it can come into contact with people or animals, or contaminate the environment. Because CTMSR is currently being disposed of 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 that 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 19.

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 (U.S. EPA) was used to conduct the comparative statistical analysis.[171] 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 of 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.

Table 18. Storm Water Monitoring Analyte Concentrations

Analyte	Simi Valley Landfill [a]			Sunshine Canyon Landfill [b]		
	Number of Samples	Average Concentration (ug/L)	Number of Non-Detects	Number of Samples	Average Concentration (ug/L)	Number of Non-Detects
Lead	6	11.9	0	17	39.1	0
Zinc	4	200	0	17	829	0

[a] Simi Valley Landfill accepts CTMSR.
[b] Sunshine Canyon Landfill does not accept CTMSR.

4.4.3 Migration of Contaminants from Landfills Via Air

Contaminants in wastes that have been disposed of 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 offsite, where it could come into contact with people or animals, or contaminate the environment.

If CTMSR being disposed of 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 accepts CTMSR and a landfill that does not. The surface water analysis is evidence that DTSC's hypothesis of windborne dispersion is not confirmed, and that CTMSR, and constituents from the waste, do not appear to be migrating via the air from the landfills where it is being placed or disposed.

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

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.[172] Sampling was conducted at the landfills between August and September of 2017.[173]

The air samples were analyzed for TSP, PM10, and PM2.5, 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 that has an established regulatory regulatory limit. 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 NAAQS 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 below National Institute for Occupational Safety and Health (NIOSH) Recommended Exposure Limits and the OSHA Permissible Exposure Limits of 0.050 mg/m^3.[174]

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 offsite 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 offsite from 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 offsite from a landfill via windborne particulate dispersion.

4.5 Evaluation Findings and Conclusions

DTSC has concluded that CTMSR exceeds hazardous waste regulatory limit levels for the characteristic of toxicity. The metal shredding industry, through its treatability study, has demonstrated that while it can improve the performance of the treatment, 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 the absence of a nonhazardous waste determination by DTSC, for example the aforementioned "f letters" held by the facilities identified in this Final Report, CTMSR would need to be disposed of at an authorized hazardous waste disposal facility.

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[172] 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
[173] 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
[174] 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.

In evaluating the potential hazards and possible harm that could be associated with CTMSR when disposed of in solid waste landfills for the past 30 years, DTSC has found no evidence that its continued disposal as nonhazardous waste, including its use as ADC, has resulted in harm to human health or safety or to the environment. Additionally, DTSC found no evidence that demonstrates CTMSR's 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.

DTSC determined that, if appropriate conditions are adhered to, the disposal of CTMSR at certain solid waste landfills approved to accept this waste is acceptable and does not pose a risk to human health or safety or to the environment.

5 CONCLUSION

DTSC has prepared this Final Report to evaluate metal shredding facilities and the wastes they generate, to better understand the existing applicable regulatory framework, as well as to identify if that regulatory framework, as currently understood, is sufficient in achieving the goal of protecting public health and safety and the environment.

In addressing the concerns raised by stakeholders following release of the Draft Report for public comment in January 2018, DTSC again evaluated operational conditions for shredders and standards that are being employed. DTSC then reviewed several potential exemptions to the Hazardous Waste Control Law (Health & Saf. Code sec. 25100 *et seq.*) that had been raised by stakeholders.

First, DTSC determined that unprocessed obsolete scrap metal arriving at the metal shredding facilities, which has occasionally been referred to as "scrap metal" by various entities, is a waste, because consumers have discarded the material before it has arrived at the metal shredding facilities. Once this waste has arrived at metal shredding facilities, it needs to undergo various processing steps in order for the valuable metal components to be recycled. Subsequently, DTSC determined that, before being shredded, the depolluted metal feedstock did not meet the definition of a hazardous waste under California law. DTSC then evaluated whether the scrap metal exclusion is applicable once the material is shredded in the hammer mill and metal shredder aggregate is produced. DTSC determined that metal shredder aggregate exiting the hammer mill does not meet the definition of scrap metal under California law.

As described previously in this Final Report, metal shredder aggregate is a mixture of recoverable ferrous and non-ferrous metals, with non-recoverable metal shredder residue, which consists of metal-contaminated detritus such as plastics, rubber, glass, foam, fabrics, carpet, wood, residual amounts of fluids such as fuels, oils, and grease, dirt, and/or other debris. Based on sampling conducted at the California metal shredding facilities, DTSC has concluded that the residue component of metal shredder aggregate is a hazardous waste. Thus, DTSC has determined that metal shredder aggregate is a hazardous waste that does not meet the definition of scrap metal under California law and is not exempt from regulation under the California Hazardous Waste Control Law.

California law requires that any person who conducts activities that meet the regulatory definition of "treatment" or "storage" as defined in California Code of Regulations, title 22, section 66260.10 requires a grant of authorization from DTSC (Health & Saf. Code sec. 25201(a)). Because metal shredder aggregate and metal shredder residue must both be managed as hazardous waste, and because metal shredding facilities are engaged in treatment activities on the aggregate and residue, a form of authorization is required for these hazardous waste treatment activities. Treatment performed on the metal shredder aggregate includes separation based on differences in physical properties such as size, magnetism, or density. Treatment performed on the metal shredder residue includes chemical stabilization using silicates and/or cementitious types of reactions.

Many stakeholders questioned whether the findings from the Draft Report applied to all metal shredding facilities in California. While the findings from the Draft Report were based on testing performed only at the facilities discussed in it, the same environmental regulatory obligations are applicable to any metal shredding facilities engaged in similar activities. Additionally, where other industries conduct similar hazardous waste management activities to those described as occurring at metal shredding facilities, those same environmental regulatory obligations will apply as well.

DTSC's analysis also found that the sorted ferrous and non-ferrous metals reclaimed from metal shredder aggregate are generally not hazardous wastes. California Code of Regulations, title 22, section 66261.3(c)(1) states that "materials that are reclaimed from wastes and that are used beneficially are not wastes and hence are not hazardous wastes … unless the reclaimed material is … used in a manner constituting disposal." DTSC recognizes the sorted ferrous and non-ferrous metals, once removed from the metal shredder aggregate mixture, to be reclaimed materials. Consequently, the storage of sorted ferrous and non-ferrous metal, as long as the metal is contained appropriately and is not contaminated by hazardous waste, would not be regulated as a hazardous waste management activity, and a metal shredding facility would not need a grant of authorization from DTSC to conduct this activity.

However, residual amounts of metal shredder aggregate or residue, or hazardous constituents of the metal shredder aggregate or residue, could remain in the reclaimed metals. If a metal shredding facility's management practices (e.g., the storage of sorted metals on the ground) cause hazardous waste constituents to leach into the soil or surface water or disperse into the air, such a release may be considered abandonment through disposal and trigger hazardous waste regulations. Metal shredding facilities need to ensure that the storage and management of the sorted ferrous and non-ferrous metals is conducted in a manner that prevents the possibility of release of hazardous waste or hazardous waste constituents to air, soil, or surface water.[175]

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. Appropriate enforcement actions taken by DTSC in response to the above issues are detailed in Section 2.5 of this Report.

In 2016, DTSC conducted air sampling at metal shredding facilities. DTSC's analysis found that iron concentrations measured at the facilities ranged from 3 to 10 percent, which provides a strong indication that there is a correlation between the particulate matter measured at the boundaries of the facilities and the adjacent metal shredding operations. Those particulate matter samples also showed that the highest values recorded for lead ranged from 301 to 1,000 mg/kg, and the highest values for zinc recorded ranged from 2,211 to 12,020 mg/kg. These values can be compared to the regulatory limits for lead and zinc by TTLC, which are 1,000 and 5,000 mg/kg, respectively. Taken together, the air sampling data shows that there is a strong correlation between metals measured at the perimeter boundaries of the facilities and the metal shredding operations at the facilities. Further, the measured concentrations of lead and zinc in the TSP samples show that the potential exists for hazardous wastes or hazardous waste constituents to migrate from the facilities.

DTSC then performed an analysis of the understood 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 a risk to nearby communities.

[175] Cal. Code Regs., tit. 22, sec. 66265.31.

DTSC also evaluated the longstanding practice of disposal of chemically treated metal shredder waste in municipal landfills to identify threats and risks that would possibly warrant a change in these practices. DTSC found no evidence of migration from landfills that have been accepting CTMSR for over 30 years. DTSC evaluated the potential for migration of CTMSR through air dispersion, surface water runoff, and leaching into groundwater. DTSC found minimal impacts to air at the landfills. Comparing surface water and leachate data from landfills that receive CTMSR with data from landfills that have never accepted CTMSR, DTSC found no discernable difference in the data from the compared landfills. DTSC determined that, if appropriate conditions are adhered to, the disposal of CTMSR at certain solid waste landfills approved to accept this waste is acceptable and does not pose a risk to human health or safety or to the environment.