INDUSTRY OVERVIEW
- Industry Background
- Environmental Benefits of Industry
- Metal Recycling Process
- Auto Shredder Residue (ASR)

AUTO SHREDDER RESIDUE (ASR)
- Treatment Process
- Regulation
- Human Health & Environment

TREATABILITY STUDY WORKPLAN
- Purpose & Goals
- Sampling, Analysis & Data Review
- Timeline
Industry Statistics

- The U.S. recycling industry employs more than 130,000 men and women in highly skilled and well-paying jobs.
  - Over 15,000 of those are employed in California.
  - Another 30,000 indirect jobs are created in California from the recycling sector.

- California’s 11th Largest Export (by value) with a $4 billion economic impact on the state economy.

- There are six (6) DTSC-recognized shredder facilities in California.
  - Northern Cal (2)
  - Southern Cal (4)

- Annually, these facilities process millions of auto bodies, discarded appliances, and other miscellaneous metal products.

- Scrap metal recycling reduces landfill disposal of waste by over 2.2 million tons.
Benefits of Scrap Metal Recycling

Scrap Recycling is the first Green Industry in the U.S

- Scrap metal recycling provides a critical and beneficial service to California by converting discarded products into usable raw materials that diverts millions of tons of waste from landfills.

- Viable California shredder industry ensures that end-of-life vehicles and appliances are properly depolluted prior to recycling.

- Minimizes number of vehicles and appliances that are “logged” and shipped overseas for recycling without regard to environmental standards.

- Prevents urban blight and public nuisances caused by discarded and abandoned vehicles and appliances.

- Reduces the amount of native ores that must be mined to produce new products.

- Recycling of just one car saves the energy equivalent of 502 gallons of gasoline and reduces greenhouse gas emissions by 8,811 lbs. (of CO2 equivalent).
Materials Processed at Shredder Facilities

- Materials include **car bodies**, **household appliances**, and a vast array of discarded metal products (e.g., **metal furniture**, water heaters, gutters, **fencing**, metal roofing, rebar, **bicycles**, etc.).

- Metallic Discards Act: All “materials requiring special handling” must be removed from major appliances and vehicles before they are shredded.*

- Inbound Source Control Policies: Companies also have **strict written policies prohibiting** the acceptance or processing of **hazardous materials/wastes**.

- **Inspections** are conducted before material is introduced to the shredder.

- **Prohibited items are rejected** at gate or removed from infeed.

Material Accepted
Shredding Process

- Shredder is a hammermill that pulverizes scrap metal and allows it to be separated and sorted for later sale as commodities.

- **Ferrous metals are removed first by magnets** and stockpiled for later shipment, usually overseas.

- After recovery of the ferrous metal, the material (aggregate) is **further processed** for the remaining non-ferrous content (e.g. aluminum, stainless steel).

- Aggregate contains valuable nonferrous metals and is also an important process material.

- **Nonferrous metals are separated** and sorted by type and grade and for sale to customers.

- Remaining material is **Auto Shredder Residue (ASR)**.
Figure 1: Process Flow Diagram of Auto Shredding and Separation Processes

- Shredder In-feed
  - Hammermill Shredder
    - Oversize Return to Shredder
    - Magnet Separation
      - Ferrous Fraction
      - Non-Ferrous Fractions
        - Trommel
    - Eddy Current Separator (ECS)
      - Inductive Separation System (ISS)
        - Non-Ferrous Metal Products
      - Ferrous Metal Product
- Auto Shredder Residue (ASR)
  - Add Polysilicate & H₂O
    - Mixing Stage 1
  - Add Dry Alkaline Activator
    - Mixing Stage 2
  - ASR Treatment Pug Mill
  - Treated ASR
    - Final Magnet Separation
      - Alternative Daily Cover
Process Example

Steel 1,790 Lbs.
Copper 1 Lbs.
Radiator Elements 1 Lbs.
Breakage 10 Lbs.

Large Aluminum 111 Lbs.
Medium Aluminum 31 Lbs.
Small Aluminum 10 Lbs.
Wire 10 Lbs.
Stainless 4 Lbs.
TASR 532 Lbs.

Full Vehicle 2,500 Lbs.
Crushed Vehicle 2,500 Lbs.
What Is Auto Shredder Residue?

- ASR is a predominantly nonmetallic material that remains after separating ferrous and nonferrous metal from shredder output.

- ASR consists mainly of shredded foam, fabric, plastics, rubber, tires, glass, wood, incidental sediment and debris and other such non-metallic components.

- ASR is chemically treated to stabilize residual soluble metals.

- Treated ASR is safely and beneficially used as alternative daily cover (ADC) at municipal landfills.
  - No uncontrolled discharges
  - No threats to workers or nearby residents
ASR Regulations

- Under Federal standards, ASR is NOT classified a hazardous waste.

- The vast majority of ASR generated in the U.S. is disposed of in municipal landfills without any treatment.

- Under California’s more stringent standards, ASR contains some metals that exceed hazardous waste regulatory thresholds.

- In mid-1980’s, the shredder industry proactively developed a treatment process that chemically binds residual metals in ASR, making the material even safer.

- DTSC declassified treated ASR as a hazardous waste based on a determination that it poses an insignificant risk to human health and the environmental due to it low potential for leachability.

- Management of untreated and treated ASR in California landfills for over 50 years has not resulted in any harm to human health or the environment.
ABC’s of the Treatment Process

- **What**: ASR is mixed in a pug mill with chemical reagents, including polysilicates and an alkaline activator (typically cement).

- **Why**: The purpose of the treatment process is to reduce the concentration of residual soluble metals in the ASR, to minimize the leaching potential of the treated material in the landfill environment.

- **How**: A chemical reaction occurs that converts the metals to a different ionic form (metallosilicates). This process is also known as chemical stabilization and is widely used to reduce solubility of soil-like wastes.
ASR Treatment Process

ASR → Mixing Stage 1
  • Add Polysilicate & H₂O

Mixing Stage 2
  • Add Dry Alkaline Activator

→ Treated ASR

→ ADC
AUTO SHREDDER RESIDUE

Post Treatment
ASR Treatment Review

- Reason for DTSC Review
  - Passage of time since issuance of the declassification letters
  - Changes in the composition of automobiles and appliances
  - Advancements in the treatment process

- Major component of this review (and the subject of today’s workshop) is a renewed demonstration of the effectiveness of the treatment process

- Industry is cooperating with the Department in this review and has advocated for the development of statewide management standards for ASR to ensure a level playing field and continued beneficial use of ASR.
Goal of Treatability Study

To demonstrate the continued effectiveness of the treatment process for Auto Shredder Residue.
Study Parameters

- The study will be focused on California’s major shredder companies.
- Study will analyze effect of treatment on soluble metals.
- Study will be based on contemporary data.
- Studies will be presented in an industry-wide report and submitted to DTSC.
Study Variables

The following information will be considered in order to achieve the data collection and analytic goals set forth for the study.

- The type of treatment chemicals used.
- The rate of treatment chemical addition.
- The ratio of treatment chemicals to ASR.
- Particle size.
- Effects, if any, of scaling up the treatment process.
- The cost of the treatment options.
- The impacts of untreated and treated ASR in the landfill environment, including the potential toxicity of ASR in the landfill environment.
- Evaluation of variants on stabilization / fixation technology.
- Facility-specific data will be collected to account for differences in equipment or processes.
Sample Collection

- Samples will be collected pursuant to a specific sample collection plan to ensure representativeness.
- Same sample collection method will be used pre- and post-treatment.
- Individual samples are prepared for analysis through a process known as “coning and quartering.” This assures all components of the waste are represented in the sample.
- A sufficient number of samples will be analyzed during each batch of tests to adequately reflect the variability in the material.
- Some duplicate and split samples will be collected.
Testing Parameters

A certified laboratory will test the samples for the following:

- Total concentration of all regulated metals
- Extractable concentrations of all regulated metals
- PCBs
- Aquatic toxicity (bioassay)
Testing Results

- Analytical results from all samples will be included in the final report submitted to the agency.

- Statistical analysis will be applied to the data, as appropriate.

- The analysis will focus on determining the level of treatment required to effectively treat soluble lead and other metals.

- Correlations between soluble lead and zinc will be established to assess options for the most cost-effective, protective level of treatment.
Long-Term Efficacy

- The long-term efficacy of the treatment in terms of impacts in solid waste landfills will also be presented in the results.

- That analysis will involve sequential analysis of treated samples using a variety of extraction procedures to simulate different landfill conditions.

- Process will follow a methodology utilized and approved by the EPA for long-term leaching analysis.

- Past testing and actual experience has successfully demonstrated that treated ASR has a very low leaching potential.

- Absence of ASR-derived metals in landfill leachate is the hallmark of successful treatment.
The ASR Treatability Study and its report will:
- Provide new data to historical data sets to generate more statistically robust data set.
- Establish the baseline characteristics of untreated ASR using a combination of new and existing data.

- Demonstrate that treated ASR does not contain other hazardous constituents (other than metals) that would render it hazardous.
- Determine whether total concentrations of metals are affected by the treatment process.
- Determine whether the treatment process achieves applicable Soluble Threshold Limit Concentrations (STLCs) for the metals identified for treatment.
- Determine the relative cost effectiveness of different treatment formulas that could be used to achieve alternate levels of reduction in solubility.
- Demonstrate the role of pH in the analytical protocol.
- Demonstrate that the treatment process will have long-term effectiveness in a landfill environment using appropriate extraction procedures.
### Study Timeline

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<tr>
<th>Task</th>
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<tbody>
<tr>
<td>Baseline characterization of untreated ASR</td>
<td>March 30, 2014</td>
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<tr>
<td>Design treatment scenarios</td>
<td>May 31, 2014</td>
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<tr>
<td>Conduct treatability studies</td>
<td>July 31, 2014</td>
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<tr>
<td>Data analysis</td>
<td>September 30, 2014</td>
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<td>Submission of report to DTSC</td>
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Questions?

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