BCI Comments on Work Plan Implementation: Evaluation of Lead-acid Batteries as a Potential Priority Product

On October 23, 2017, the Department of Toxic Substances Control (DTSC) issued a background paper to provide an overview of DTSC's initial research to determine whether lead batteries should be evaluated as a potential priority product. DTSC notes it is a high-level document and meant to open a dialogue with several stakeholders. The lead battery manufacturers and recyclers would be most affected by any DTSC decision to move forward with our products under the Safer Consumer Products program. We believe there are numerous errors in the background paper, and as the stakeholder most directly impacted, we identify a few of the most troublesome statements below.

1. **Misstatement**
   Page 2: "A growing portion of lead-acid battery recycling/smelting has been moving from the United States to Mexico (CEC, 2013)."

   Fact
   A "growing proportion" of recycling is not moving to Mexico. There was an increase in exports to Mexico over the last decade, when Johnson Controls took over one recycling facility and built another, but at the same time the Exide Vernon recycling facility was closed, a new recycling facility was built in South Carolina and expansion of the Quemetco City of Industry facility was planned. Exports have remained relatively consistent since 2011.

2. **Misstatement**
   Page 4: "The blood from workers in lead-intensive industries is monitored for lead. Results routinely exceed the levels found in the general population and periodically exceed voluntary occupational limits (e.g., 30 µg/dL; ACGIH, 2004)."

   Fact
   Blood lead levels of battery manufacturing and recycling workers in the U.S. are consistently below regulatory requirements and voluntary occupational limits like the ACGIH. Bby the end of 2016, BCI's members met the industry's voluntary goal of having all workers below 30 µg/dL, a standard stricter than any federal or state requirement. Today the average blood lead level of workers in the lead battery manufacturing and recycling industries is below 11 µg/dL, which is less than two-thirds the national average for the general population in the 1970s.

3. **Misstatement**
   Page 4**: "**Personal hygiene and facility housekeeping standards are critical to keeping blood-lead levels down yet are often not achieved. In some countries, blood-lead levels are even higher (Gottesfeld and Pokhrel, 2011) or simply unmonitored."

Fact
It is flatly untrue that personal hygiene and facility housekeeping standards are not achieved in the battery industry in the U.S. BCI's member facilities exceed federal and state requirements such as those found in OSHA's lead standard (29 C.F.R. 1910.1025). Additionally, information on practices in countries outside the U.S. should have no relevance in evaluating U.S. policies and practices.

4. **Key Omission**
Page 5: "Other regulatory and statutory efforts in California regarding lead-acid batteries include the following:"

Fact
Missing from this list of relevant statutes and ordinances are the SCAQMD Rules 1420.1 and 1420.2, which cover all ongoing lead battery production and recycling in California and establish controls far tighter than anywhere else in the nation – e.g., two-thirds of the national ambient air level for lead.

5. **Misstatement**
Page 6: Table 2, 1980 US recycling rate, 70%.

Fact
The 1980 70% lead battery recycling rate was not based on BCI data, but is anecdotal. The rates stated for subsequent years come from BCI analyses of the volume of battery lead available for recycling and recycled annually, and have repeatedly been cited as reliable by USEPA. They are based on battery life and weight averages and recycler output from battery inputs, however, not on a count of individual units. (In excess of 120 million car batteries are recycled in North America annually.)

6. **Misstatement**
Page. 7: "A drop-in alternative to the 12V lead-acid battery entered the car market with the 2015 Mercedes S65 AMG Coupe (approximately 50,000 in Europe) and was built into the 2017 Hyundai Ioniq Hybrid and the Kia Niro (together selling around 4,000 per month in the United States). These are lithium-iron-phosphate 12V car batteries, and similar 12V batteries entered the motorcycle market in 2011."

Fact
The Hyundai/Kia battery is not a "drop-in" replacement, but rather a component of the hybrid drive-train battery pack. The lithium battery offered by Mercedes for their $235,000 S65 AMG Coupe is an option and Mercedes also offers a lead battery. Mercedes charges approximately $1,700 for its lithium ion battery but only $180 for the equivalent lead battery. Furthermore, there are currently more than 293 sizes and configurations of batteries used in the more than 160,000 different kinds of vehicles on the road today. These are listed in the industry's battery replacement guide. Even if an alternative system were developed, it could take many years to develop and market replacements for all of those variants.

7. Misstatement

Page 7: "A study by the National Highway Traffic Safety Administration found that battery explosions in 1993 injured 2,280 people with chemical burns, lacerations, or eye injuries (NHTSA, 1997)."

Fact

The NHTSA report cited by DTSC as evidence of lead battery explosions used dubious methodology and, in any event, is woefully out of date. NHTSA used a 1993 CPSC database to identify 43 allegations of "explosion" during ER visits at select hospitals, and used that number to predict a nationwide number of 2,280. NHTSA made no attempt to identify the root cause of those incidents. In the years since, most SLI batteries have been sealed and battery chemistries have improved, virtually eliminating the release of explosive gases, and all have carried new safety warning labels.

Today, the same CPSC database on which NHTSA relied contains only 5 similar incident reports in 2015, which if scaled up as did the NHTSA report did would suggest 156 unconfirmed incidents.

8. Misstatement

Page 7: "While some lithium-ion chemistries also can explode when mishandled, the chemistry currently used in 12V car batteries (i.e., lithium-iron-phosphate) does not explode or combust during charge, discharge, or puncture, and the cathode material will not burn and is not prone to thermal runaway (Electropaedia, 2005)."

Fact

The safety characterization of lithium iron phosphate batteries set forth in the report understates the risks. For example, lithium iron phosphate still contain a flammable electrolyte, in contrast to lead batteries which have an electrolyte which is non-flammable. Moreover, it is by no means certain that, when further development occurs, lithium iron phosphate chemistry will be used in alternative batteries. Among other things, such batteries still require extensive protective safety circuitry and contain very little material of economic value, making reclamation very expensive and the products unsustainable.

Further, the DTSC background document improperly dismisses out of hand the physical risks inherent in lithium batteries if a vehicle is in an accident. If a lead battery is crushed or physically deformed in an accident, it is designed to fail safely, and does not pose a risk of fire. On the other hand, crush impacts to and physical deformation of lithium batteries can readily create internal shorts, which can lead to thermal runaway events (even absent a puncture). Because of these risks, it is unclear whether lithium batteries can even be designed to meet safety standards for current vehicles where the battery is commonly placed within the "crumple zone" inside the engine bay.

Further, the document's statement that "cathode material will not burn" is irrelevant. As noted above, in lithium batteries the *electrolyte* poses the primary combustion hazard, and we are not aware of any marketed lithium battery with a non-combustible electrolyte.

9. Misstatement

Page 8: What are the environmental impacts of the current annual loss rate of 1% (i.e., non-recycled batteries)?

Fact

First, it's important to understand the current data. The National Recycling Rate Study released in 2017 by Battery Council International re-confirmed that nearly 100 percent of spent lead batteries in the U.S. are recycled annually.

In fact, lead batteries are the most recycled consumer product in America – and the most sustainable energy storage source available today.

About the Study

A 100-percent recycling rate is practically impossible for any industry. This new study shows the figure at more than 99.3 percent, which is an exceptionally high number. Here's what contributes to the "phantom" .7 percent:

- The study's statistical model has a normal standard deviation of plus or minus .2 percent.
- This was a rolling, five-year study, from 2012 – 2016. The recycling rate is based on the number of batteries available for recycling versus those collected for recycling. Variations can happen when a battery is counted, based on its expected lifespan.
- The study's uses the anticipated lifespan of a typical battery during regular use, but many batteries last much longer or are used infrequently. Batteries staying in service longer than the study's assumption would tend to reduce the statistical recycling rate for a given period– but BCI believes all of those batteries are eventually recycled.

The Percentage Will Remain High

- Most spent lead batteries are collected at the point of sale (for a new battery), using a routine recycling process.
- The U.S. has a well-established infrastructure for safe lead battery recycling, using a coast-to-coast network of advanced lead battery recyclers.
- Consumer awareness around the value of lead battery recycling is very high.
- There is a robust marketplace for the re-use of recycled lead battery materials. For example, every new lead battery contains over 80 percent recycled material from spent lead batteries.

Where do the "phantom" spent lead batteries go?

DTSC's worries about "phantom" batteries are misplaced – this is simply a statistical anomaly. The lead battery industry is highly invested in reaching a 100 percent recycling rate, and we believe we are there. But statistical models make it impossible to confirm.

However, we're very proud to be able to account for the 99.3 percent of spent lead batteries that are successfully recycled every year. The lead battery industry leads the way as the most recycled battery chemistry and the most recycled consumer product in the U.S. The industry is considered a model for closed-loop manufacturing.