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Wayne Cascio Director Center for Public Health and Environmental Assessment Office of Research and Development Office of Air Quality Planning and Standards U.S. Environmental Protection Agency

Dear Mr. Cascio:

On behalf of the Association of Battery Recyclers, Inc. ("ABR") and Battery Council International ("BCI"), we appreciate the opportunity to comment on the Integrated Science Assessment for Lead (Pb) (External Review Draft), Docket No. EPA-HQ-ORD-2020-0701, 88 Fed. Reg. 19,302 (March 31, 2023) ("Draft Pb ISA").

ABR is a non-profit trade association that represents the lead recycling industry. Members of ABR include companies that own and/or operate battery manufacturers, lead chemical manufacturers, secondary lead smelters, and lead fabricators, as well as consultants and vendors to the lead recycling industry.

BCI is a not-for-profit trade association formed in 1924 that represents companies worldwide engaged in every facet of the battery industry: manufacturers and recyclers, marketers and retailers, suppliers of raw materials and equipment, and expert consultants. In North America, BCI represents 98%+ of the lead battery manufacturing capacity (more than 206 GWh / year). BCI and its members are committed to safe, responsible battery manufacturing and recycling and sustaining the world's most successful circular economy.

The battery manufacturing and lead recycling industries in the United States are critical domestic industries. Lead batteries are America's most recycled consumer product and are a model of a successful circular economic system.<sup>1</sup> Moreover, the battery manufacturing and lead recycling industries have made substantial commitments to environmental stewardship. On average, each recycler in the U.S. invested more than \$70 million per facility in environmental, health, and safety improvements over the last decade.

Our industries' commitment to environmental stewardship has resulted in a dramatic reduction of their footprints. EPA's 2017 National Emissions Inventory shows that other emissions dwarf emissions from the lead-recycling and battery manufacturing industries. Of the 1,335,863 pounds of lead emissions in the U.S in 2017, lead battery manufacturers emitted only 7,532 of

<sup>&</sup>lt;sup>1</sup> EPA can find additional information on these and other aspects of the role of batteries in the circular economy at <u>www.batterycouncil.org</u> and <u>www.associationofbatteryrecyclers.com/</u>.

these pounds, which is 0.56 percent of total lead emissions. Emissions from secondary smelters were even lower, totaling 5,941 pounds, which is 0.44 percent of total lead emissions.<sup>2</sup>

Of course, this is only part of the story of reductions of atmospheric emissions since the first lead NAAQS was established. Today, levels of lead in air have been reduced 99% compared to 1980.<sup>3</sup> Just since 2010, nationwide ambient average concentrations of lead have been reduced by 88%.<sup>4</sup>

As an initial matter, the Draft Pb ISA is insufficient to discharge EPA's obligations under the Clean Air Act to conduct a comprehensive review not just of health, but of economic and practical factors related to a statutory NAAOS review. In addition to mandating that EPA establish air quality criteria such as the Draft Pb ISA, see 42 U.S.C. § 7408(a)(2), Clean Air Act § 108(b) requires that the Administrator consult with the appropriate advisory committees and Federal departments and agencies and simultaneous with the issuance of air quality criteria, provide to States and their air pollution control agencies information on air pollution control techniques, including at least data relating to the cost of installation and operation, energy requirements, emission reduction benefits, and environmental impact. Additionally, Clean Air Act § 109(d)(2)(C) requires that CASAC "advise the Administrator of any adverse public health, welfare, social, economic, or energy effects which may result from various strategies for attainment and maintenance of such national ambient air quality standard." The Draft Pb ISA does not include any information on these matters in its 2000+ pages. Accordingly, EPA should offer for public comment draft information on such air pollution control techniques and public health, welfare, social, economic, or energy effects which may result from various strategies for attainment, before it finalizes the Draft Pb ISA. If EPA does not rectify these deficiencies, the Agency will not have satisfied the statutory prerequisites for issuance of any rulemaking pertaining to revisions to the Pb NAAQS, rendering any decision on revisions to the Pb NAAQS unlawful.

Moreover, the Draft Pb ISA does not satisfy Clean Air Act § 108(a)(2)'s requirement that the air quality criteria "accurately reflect the <u>latest</u> scientific knowledge useful in indicating the kind and extent of all identifiable effects on public health or welfare which may be expected from the presence of such pollutant in the ambient air." The term "latest" means "something that is the most recent or current of its kind." *American Heritage Dictionary*, https://www.ahdictionary.com/word/search.html?q=latest. In this regard, EPA appears to have ignored a substantial and material amount of peer-reviewed scientific literature on lead-exposure science published both prior to and after the agency's arbitrary "cut-off" date for literature.

These studies provide the latest science on observed lead exposures. They suggest changes are needed in the conclusions reached in the Draft Pb ISA, and they provide further contextual

<sup>&</sup>lt;sup>2</sup> Memorandum from Joel Cohen, Sc.D., DABT and Shuo Zhao, M.S., Gradient, to Roger Miksad, BCI, and Rick Leiby, ABR (Jan. 10, 2023) (Attachment A).

<sup>&</sup>lt;sup>3</sup> Available at: <u>https://www.epa.gov/air-trends/air-quality-national-summary</u> (last accessed June 7, 2023).

<sup>&</sup>lt;sup>4</sup> *Id*.

information that would allow EPA to better characterize any public health and welfare of Pb exposure. <sup>5</sup>

This issue is discussed in substantial detail in the comments of the International Lead Association and in the analysis prepared by Gradient Corporation, which is hereby incorporated into ABR and BCI's comments. In particular, EPA appears to have largely ignored a tremendous body of ground-breaking scientific literature arising from the Study for Promotion of Health in Recycling Lead ("SPHERL"). SPHERL enrolled 500 newly hired workers in the lead-recycling industry and followed those workers for multiple years, considering the impact (if any) of Pb exposure on various health metrics pertaining to neurological, cardiovascular, and other impacts. The longitudinal design of SPHERL complies with the temporality principle of the Bradford-Hill criteria for assessing possible causality between outcomes and exposure. Due to its design, the statistical power created by the substantial number of enrolled workers, the fact that those workers began their participation with blood-lead levels below 2 µg/dl that are generally consistent with background levels in the public, and the fact that SPHERL is not afflicted with the confounding factors that impact the epidemiological studies that are described in the Draft Pb ISA, SPHERL is the gold standard of Pb exposure studies and the peer-reviewed literature that resulted from it should be afforded the highest weight in EPA's consideration of the healthimpacts in Pb.

EPA should review the SPHERL series of peer-reviewed articles and make appropriate revisions to the Draft Pb ISA to ensure that this important work is fully considered. And any failure to do so when presented with these studies in comments, even if such studies are purportedly after a "cut-off" date for literature, would render EPA's air quality criteria arbitrary and capricious, and contrary to law, for failing to "accurately reflect the <u>latest</u> scientific knowledge."

Furthermore, multiple conclusions reached in the Draft Pb ISA appear not to be supported by the scientific literature or to rest on an incomplete literature review. These matters are addressed at length in the comments of the International Lead Association and in the analysis prepared by Gradient Corporation. In particular, ABR and BCI note the following deficiencies in the Draft Pb ISA:

- The Draft Pb ISA appears to place substantial weight on epidemiological studies that suggest that adverse public health outcomes result from observations that are immaterial or within the margin of measurement error at the individual level, particularly as it pertains to IQ decrements.
- The Draft Pb ISA does not adequately discuss study quality considerations, in particular as it relates to Pb and health outcomes. Among other things, the Draft Pb ISA fails to provide an overall assessment of how the quality assessments impact the interpretation of

<sup>&</sup>lt;sup>5</sup> ABR and BCI are concerned that the ISA appears to ignore or omit, without explanation, numerous recent studies previously identified by industry as informative and critical to the agency's analysis in response to EPA's 2020 Request for Information. *See* Comments of International Lead Association, Sep. 4, 2020 (Docket No. EPA-HQ-OAR-2020-0312-0004).

or confidence in a study's results and fails to meaningfully describe why certain studies were deemed relevant to the Agency's causality determinations but others were not.

- The Draft Pb ISA does not fully recognize the limitations of current regression models used in epidemiological studies due to the existence of unrecognized and uncontrolled confounding factors. This matter is discussed in Van Landingham C, Fuller WG, Schoof RA. The effect of confounding variables in studies of lead exposure and IQ. Crit Rev Toxicol. 2020 Oct;50(9):815-825, a critical study that was omitted from the Draft Pb ISA.
- The Draft Pb ISA's consideration of nervous system effects of Pb exposure ignores a substantial amount of scientific literature demonstrating minimal neurological effects of low blood lead levels on neurobehavioral function, heart rate variability, and nerve conduction velocity.
- The Draft Pb ISA's consideration of cardiovascular effects and total mortality ignores a substantial amount of scientific literature that is inconsistent with the Draft Pb ISA's treatment of these subjects. In particular, the Draft Pb ISA ignored Yang WY, Zhang ZY, Mujaj B, Thijs L, Staessen JA. Environmental exposure to lead: old myths never die. Lancet Public Health. 2018 Aug;3(8):e362, and Staessen JA, Thijs L, Yang WY, Yu CG, Wei FF, Roels HA, Nawrot TS, Zhang ZY. Interpretation of Population Health Metrics: Environmental Lead Exposure as Exemplary Case. Hypertension. 2020 Mar;75(3):603-614, which provide critical explanations of the limitations in the literature on which EPA relied in the Draft Pb ISA.
- The Draft Pb ISA's treatment of renal function ignored multiple peer-reviewed articles from the SPHERL study that are inconsistent with the Draft Pb ISA's treatment of this subject.

Finally, the Draft Pb ISA does not plainly consider what is perhaps the most critical item that EPA noted in Volume 2 of its Integrated Review Plan, which are any "air-related risks remaining upon just meeting the current Pb Standard [are] important from a public health perspective." IRP vol. 2, p. 2-4. EPA should either reissue the Draft Pb ISA to address this issue or it should consider this in another manner, such as through its forthcoming quantitative risk and exposure assessment.

Thank you for the opportunity to provide these comments for EPA's consideration. ABR and BCI are committed to productive engagement with EPA throughout the lead NAAQS review process. If you have any questions, please feel free to reach out to either of us.

Sincerely,

Mark W. DeLaquíl

Mark W. DeLaquil, General Counsel, Association of Battery Recyclers, Inc.

## Roger Míksad

Roger Miksad, President, Battery Council International

cc: Rick Leiby, Association of Battery Recyclers



# Memorandum

| То:      | Roger Miksad, Battery Council International (BCI);<br>Rick Leiby, President, Association of Battery Recyclers | Date: | January 10, 2023 |
|----------|---------------------------------------------------------------------------------------------------------------|-------|------------------|
| From:    | Joel Cohen, Sc.D., DABT; Shuo Zhao, M.S.; Gradient                                                            |       |                  |
| Subject: | Report for evaluation of US EPA Lead emission data                                                            |       |                  |

#### **Overview**

The purpose of this analysis is to evaluate national lead emissions by industry and geography, to better understand the distribution of emitted lead across various sectors. Particular focus was placed on emissions related to the lead battery industry, as well as other industries contributing a measurable percentage of the total national emissions (*e.g.*  $\geq$ 7,000 lbs/yr, or  $\geq$ 0.5% of the total lead emissions nationwide).

#### **Data Collection**

Lead emission data were collected from the United States Environmental Protection Agency (USEPA) National Emissions Inventory (NEI). "NEI is a comprehensive and detailed estimate of air emissions of criteria pollutants, criteria precursors, and hazardous air pollutants from air emissions sources. The NEI is released every three years based primarily upon data provided by State, Local, and Tribal air agencies for sources in their jurisdictions and supplemented by data developed by the US EPA. (US EPA, 2021)".<sup>1</sup>

Gradient downloaded 2017 NEI point and non-point source data (last released in Jan 2021) and constructed a database in Microsoft SQL Server. Point sources are mainly comprised of large industrial facilities and electric power plants, airports, and smaller industrial, non-industrial and commercial facilities. Emission data specific for lead were then drawn from the downloaded database, and standard data quality control measures were taken to ensure no data loss during the database development.

For each point source emission data record, EPA assigned a North American Industry Classification System (NAICS) code, and in some cases also assigned a facility source type to indicate the industry classifications and activities. Based on the combination of this information, we aggregated similar industries into large sectors for the benefit of data analysis.

#### **Data Analysis and Results**

Total and relative lead emissions were calculated for each sector based on the 2017 NEI point and nonpoint source data. We identified 15 sectors with lead emissions  $\geq$ 7,000 lbs/yr as well as other sectors that are relevant to the automotive industry such as biofuel/ethanol. Table 1 lists the 15 industries meeting these

<sup>&</sup>lt;sup>1</sup> US EPA. 2021. "2017 National Emissions Inventory (NEI) Data (Updated January 19, 2021)." Accessed on August 15, 2022 at https://www.epa.gov/air-emissions-inventories/2017-national-emissions-inventory-nei-data.

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criteria, and details their respective primary sub-categories according to the NAICS description and facility source type assigned by EPA.

| Industry          | Primary Sub-Categories                                                        |  |  |  |
|-------------------|-------------------------------------------------------------------------------|--|--|--|
| Battery Plant     | Battery plant, Primary battery manufacturing, Storage battery manufacturing,  |  |  |  |
| Secondary Smelter | Secondary lead smelting plant                                                 |  |  |  |
| Airports          | Airport operations, Aircraft and aerospace product manufacturing              |  |  |  |
| Electricity       | Fossil fuel, geothermal, and nuclear electric power generation                |  |  |  |
| Generation        |                                                                               |  |  |  |
| Iron / Steel      | Iron and steel foundries and product manufacturing                            |  |  |  |
| Munitions         | Ammunition manufacturing                                                      |  |  |  |
| Manufacturing     |                                                                               |  |  |  |
| Mines/Quarries    | Metal ore mining, stone mining, and quarrying, coal mining                    |  |  |  |
| Primary Copper    | Primary copper smelting/refining                                              |  |  |  |
| Non-Ferrous       | Primary non-ferrous metal smelting/refining/alloying except Copper, Secondary |  |  |  |
| Metals            | non-ferrous metal smelting/refining/alloying except Lead                      |  |  |  |
| Ethanol           | Ethyl Alcohol manufacturing, Ethanol Biorefineries/Soy Biodiesel              |  |  |  |
| Coke Battery      | Coke battery manufacturing, Calcined pet coke plant                           |  |  |  |
| Glass             | No sub-categories                                                             |  |  |  |
| Manufacturing     |                                                                               |  |  |  |
| Portland Cement   | No sub-categories                                                             |  |  |  |
| Manufacturing     |                                                                               |  |  |  |
| Petroleum         | No sub-categories                                                             |  |  |  |
| Refineries        |                                                                               |  |  |  |
| Military Bases /  | No sub-categories                                                             |  |  |  |
| National Security |                                                                               |  |  |  |
| Paper and Pulp    | Paper mills, Pulp mills, Paperboard mills                                     |  |  |  |

Table 1 Breakdown of Industries Contributing ≥7,000 lbs of Lead per Year

| Table 2 Summary of Nation-<br>wide Lead Emissions (lbs/yr)<br>by Industry | Lead Emissions<br>(Ibs/yr) |
|---------------------------------------------------------------------------|----------------------------|
| Airports                                                                  | 449,013 (33.61%)           |
| Other Industries                                                          | 81,384 (6.09%)             |
| Iron / Steel                                                              | 77,449 (5.80%)             |
| Military Bases / National<br>Security                                     | 32,754 (2.45%)             |
| Primary Copper                                                            | 27,256 (2.04%)             |
| Mines/Quarries                                                            | 25,793 (1.93%)             |
| Electricity Generation                                                    | 22,469 (1.68%)             |
| Glass Manufacturing                                                       | 15,637 (1.17%)             |
| Paper and Pulp                                                            | 13,982 (1.05%)             |
| Non-Ferrous Metals                                                        | 12,579 (0.94%)             |
| Petroleum Refineries                                                      | 10,152 (0.76%)             |
| Coke Battery                                                              | 9,255 (0.69%)              |
| Battery Plant                                                             | 7,532 (0.56%)              |
| Portland Cement Manufacturing                                             | 7,499 (0.56%)              |
| Munitions Manufacturing                                                   | 7,418 (0.56%)              |
| Secondary Smelter                                                         | 5,941 (0.44%)              |
| Ethanol                                                                   | 320 (0.02%)                |
| Total Point Sources                                                       | 806,431 (60.37%)           |
| Total Non-Point Sources                                                   | 529,432 (39.63%)           |
| Total                                                                     | 1,335,863 (100.00%)        |

The total lead emission from stationary sources was 806.431 lbs/yr which accounted for more the majority (60.37%) of emissions from both point and non-point sources (1,335,863 lbs/yr) nationwide.



Figure 1 Summary of Relative Lead Emissions by Industry - Nationwide

As shown in Figure 1 and Table 2, non-point sources accounted for 39.63% of the lead emissions in the country, while point source emitters accounted for the majority (60.37%). Airport operations are by far the largest point source of lead emissions in the country. The >449,000 lbs/yr of lead attributed to this industry alone account for 33.61% of emissions from all the point and non-point sources. Lead emissions from airport activity are 5.8 times greater than the second largest contributor, the iron and steel industry sector, which comprised 5.8% of the national total (both point and non-point sources). The remaining major lead emission sources' contributions ranged from 0.02% to 2.45%, with the lead battery industry contributing 1.01% of total lead emissions nationally.

A variety of industries that did not individually emit  $\geq$ 7,000 lbs/yr were aggregated into a catch-all "Other Industries" sector. Since each industry accounted for less than 0.36% of the total emissions (both point and non-point source emissions), they were not considered a significant contributor individually. Notably, the summation of all these industries accounted for 6.09% of the total nation-wide emissions.

Furthermore, when combining point and non-point sources emission by industry sector, the aviation industry (including point source airport operations and non-point source emissions from aircrafts) accounted for 70% of the lead emissions in the country (Figure 2). In comparison, lead battery related emissions accounted for only 1.01% of the total point and non-point source emissions nationwide.



#### Figure 2 Summary of Relative Lead Emissions (point and non-point sources) by Industry - Nationwide

### **Conclusions/Key Findings**

Gradient conducted an assessment of EPA NEI 2017 lead emission point and non-point source data at the national level. The airport operation sector was the largest point source of lead emission followed by the iron and steel industry. Over 935,000 lbs/yr of lead emitted from the point source airport operations and non-point source emissions from aircrafts combined contributed 70% of the total lead emissions. In comparison, the lead battery industry only accounted for 1.01% of the total lead emissions nationwide (Battery Plants [0.56%]; Secondary Smelters [0.44%]).