Outdoor Power Equipment Institute

November 29, 2021

Via e-electronic submission: www.arb.ca.gov

RE: OPEI Comments to the California Air Resources Board's *Proposed Amendments to the Small Off-Road Engine Regulations: Transition to Zero Emissions*

The Outdoor Power Equipment Institute (OPEI) respectfully submits the following comments regarding the California Air Resources Board (CARBs) *Proposed Amendments to the Small Off-Road Engine (SORE) Regulations: Transition to Zero Emissions* ("the Proposed Rule").

OPEI is an international trade association representing more than 100 manufacturers and their suppliers of gas and electric-powered outdoor power equipment, golf cars, and personal transport and utility vehicles. OPEI member products are ubiquitous in California households and businesses, including equipment such as lawnmowers, garden tractors, grass trimmers, brush cutters, lawn edgers, chain saws, snow throwers, tillers, leaf blowers, utility vehicles and other similarly powered lawn and garden and vehicle applications.

Representing more than 85% of the U.S. market shipments in nearly all outdoor power equipment categories, OPEI reflects a majority of the stakeholders regulated by the CARB's SORE emissions rules. OPEI members are responsible manufacturers, committed to complying with emission regulations. OPEI and its members have been working with CARB to develop a reasonable regulatory landscape, cooperatively helping California meet air quality standards through the introduction of low and zero-emissions technology solutions for over three decades.

The Proposed Rules look to set zero-emissions limits for most SORE starting in Model Year 2024. The Proposed Rule relies on unsupported and unproven, data and assumptions and lacks sufficient evidence of technical feasibility (the term "technical feasibility" as used throughout these comments includes cost-effectiveness). The

Proposed Rule overestimates benchmark/baseline emissions and emission reductions expected from the Proposed Rule based on the aforementioned unreliable data. Rulemaking benefits, including emissions, cost and health related benefits, are directly proportional to the difference (delta) between benchmark/baseline emissions versus reductions modeled from the Proposed Rule. As a result, overestimates in benchmark/baseline emissions result in overestimates of all benefits outlined in the Proposed Rule.

The Proposed Rule fails to consider multiple other scenarios that would provide the reductions needed to meet the 2016 State Implementation Plan (SIP) and 2031 federal air-quality standards, without compromising the technology, performance and product availability needs of residential and professional equipment users. Additional scenarios must be further evaluated with consideration of the technology challenges, the impact of the COVID-19 pandemic on the supply chain, and the cost needed to support incentive programs to transition to Zero Emissions Equipment or ZEE for the applications and uses which are currently technology feasible. The Proposed Rule fails to evaluate the capital and development expenses required to certify zero-emissions engines and equipment and provides no time for industry to recover costs of these investments.

OPEI supports ZEE as one key emission reduction strategy where technology feasibility has been demonstrated. *However, there is currently no one-size-fits-all ZEE approach to satisfy the full range of SORE powered equipment and use cases.* The Proposed Rule poses numerous technical feasibility, economic, and implementation challenges for many industry stakeholders. The ability to work all day, and in some cases days on end, without recharging and/or needing dozens of expensive batteries, as well as the cost of battery maintenance over the life the product will continue to be a technology barrier for many user categories and applications which the Proposed Rule does not consider. Collectively these challenges are currently insurmountable and will result in significant and unnecessary hardships for manufacturers, retailers and end-users, culminating in an early market shortfall of products with high consumer need and demand.

These issues and concerns are discussed in detail in the comments that follow. In addition, OPEI is providing detailed comments on the Regulation Order, Test Procedure and Certification Procedure changes included in the Proposed Rule in Annex A.

CARB still has ample time to develop a data-supported and reasonable regulatory reduction strategy to achieve California's model year 2031 SORE State Implementation Plan goals without banning SORE. However, the first necessary step is to obtain stakeholder agreement on a representative SORE sector emissions inventory which serves as the basis for modeling reasonable, data-driven, fact-based, technologically feasible and cost-effective strategies that achieve the SIP SORE goals. Despite significant industry-led outreach, CARB's SORE2020 emissions inventory model ("SORE2020") largely ignores industry concerns and as a result fails to reasonably represent SORE sector emissions or the current ZEE trends which suggest continued growth and adoption of ZEE technologies in applications and uses where the technology currently permits. Until these issues are addressed, this Proposed Rule, is arbitrary and capricious without a reasonable or rational basis and fails to meet California's own administrative regulatory requirements. Moreover, the Proposed Rule continues to fall significantly short in demonstrating that the rule is needed to meet compelling and extraordinary conditions in California, is at its very foundation arbitrary and capricious, and inconsistent with Section 209 of the Clean Air Act by not allowing sufficient lead time to permit the development of the necessary technology or consideration of the cost of compliance. In light of these serious deficiencies, the Proposed Rule once finalized will be prohibited by the Clean Air Act.

Given these concerns and the following comments, OPEI opposes the Proposed Rule in its current form. OPEI requests the Board postpone the decision to adopt the Proposed Rule and direct staff to work with industry and stakeholders to develop a data-supported and fact-based rule, focused on the goals outlined in the 2016 State Implementation Plan – which are required to meet federal air quality standards.

OPEI Comments to the Proposed Rule

COMMENT 1 – The Proposed Rule is not based on sound data collection or modeling. The underlying inventory data is primarily survey-based, does not appropriately account for biased data, and does not reflect the real-world SORE sector use, age, or emissions. The data to support the Proposed Rule does not reflect SORE sector emission reductions or benefits. Without accurate data and modeling, there is no factual evidence the sector contributes to compelling and extraordinary conditions, or that the resulting benefits are achievable, and the Proposed Rule is arbitrary and capricious. As a result, the Proposed Rule fails to meet California administrative regulatory requirements and is prohibited by the Clean Air Act.

Section 209 of the federal Clean Air Act (CAA) preempts states and political subdivisions thereof from adopting specific emission standards for mobile sources. In recognition of California's unique air-quality challenges, Congress provided a specific waiver from preemption for California. However, to obtain the waiver needed in order for California to enforce standards and other requirements relating to the control of emissions from SORE, California must satisfy the following conditions.[1]

(i) The requirements must not be arbitrary and capricious,
(ii) The standards are needed to meet compelling and extraordinary conditions, or
(iii) The standards and accompanying enforcement procedures are consistent with section 209 of the CCA.

The Proposed Rule fails to meet *any of these* conditions.

Rulemaking must be fact-based and rooted in accurate, reliable and complete data. For emissions rulemaking activities, such as the Proposed Rule, an accurate emissions inventory model is critical to understand the emissions contributions and the benefits of a proposed rule for a given sector. CARB's OFFROAD2007 and CARB SORE2020 model the SORE sector emissions for the purpose of developing the Proposed Rule.

[1] Clean Air Act Section 209(e)(2)(A); 24 U.S.C. Section 7543(e)(2)(A).

Since 2018, OPEI has engaged CARB staff to raise concerns with the outdated OFFROAD2007 and SORE2020 emission models. Unfortunately, OPEI is concerned that the updated and final SORE2020 fail to reflect real-world SORE emissions inventories, and as a result, emissions and benefits calculated by the modeled emissions and outlined in the Proposed Rule are significantly overestimated. One of the main reasons for this concern is that the underlying data is survey-based, with no evidence that respondents accurately understood, kept track of, or reported equipment use and age. OPEI outlines these and additional survey and model concerns in additional detail in several of the following comments.

Due to the unrepresentative sector modeling, which OPEI is concerned results in significant overestimation of the sector inventory in both past and current modeling, the need for ***and*** benefits of emissions reductions cannot be accurately determined. The Proposed Rule notes "Staff calculated emission benefits based on the difference in modeled emissions between the (SORE2020) Baseline Scenario and Proposed Amendments scenario each year for the regulatory horizon of 2023 through 2024".[2] Without accurate modeling, there is no evidence to support staff's conclusion that the sector contributes to compelling and extraordinary conditions, and benefits cannot be accurately quantified - including benefits from the "*Incident Per-Ton Methodology*" and "the social cost of carbon benefits" described in the Proposed Rule. Given this lack of evidence and support, the Proposed Rule is arbitrary and capricious, fails to meet California administrative regulatory requirements, and is prohibited by the Clean Air Act.

COMMENT 2 – The Proposed Rule appears to present certification, testing and enforcement requirements that are different than EPA small spark-ignited engine requirements. These requirements must not diverge for California to obtain a valid EPA waiver of preemption under the Clean Air Act. Importantly, California's accompanying enforcement procedures appear to be inconsistent with section 202(a), one of the key requirements to obtain a waiver under Clean Air Act section 209.

[2] *CARB Public Hearing to Consider Proposed Amendments to the Small Off-Road Engine Regulations: Transition to Zero Emissions – Staff Report: Initial Statement of Reasons* (ISoR), pg. 63

In its 1994 Preemption of State Regulation for Nonroad Engine and Vehicle Standards final rule, EPA determined that it must determine nonroad authorization requests under the same consistency criteria that it reviews motor vehicle requests. With this determination, the rule states that the Administrator shall not grant a California motor vehicle waiver under section 209(b)(1)(C) if she finds that California standards and accompanying enforcement procedures are not consistent with section 202(a) of the Act. EPA interpreted this criterion in previous motor vehicle waiver decisions to say that California's accompanying enforcement procedures would be inconsistent with section 202(a) if the federal and California test procedures were inconsistent. That is, manufacturers would be unable to meet both the state and federal test requirements with one test vehicle or engine.[3]

OPEI is concerned the Proposed Rule includes several changes that would result in inconsistent procedures between CARB and EPA, and that the same test would not be allowed for both EPA and CARB certification and compliance. First, the Proposed Rule would establish California requirements for evaporative SHED testing for many products. An OPEI member recently reported that they discussed this Proposed Rule requirement with EPA. The member reported that EPA advised they would not accept SHED test results for handheld applications because 40 C.F.R. Part 1060 requires that fuel lines and tanks be tested and certified to the component-based standards. As a result, separate tests would need to be conducted for EPA and CARB certification and compliance. Second, the Proposed Rule includes a new definition for "handheld engines" that is not harmonized with EPA 40 C.F.R. Part 1054. The impact of the definition change is significant because engine test cycles are determined by the product definition – products that EPA consider "handheld" would be subject to one exhaust test cycle, while CARB would consider the same products "non-handheld" and subject to different a different exhaust test cycle. (OPEI also is concerned that based on the product category and engine classes, this could be an issue even with today's regulations.) Finally, the Proposed Rule includes a new exhaust emissions compliance testing strategy based on just one engine test. EPA's Selective Enforcement Audit for exhaust testing is significantly different, based on multiple engine tests, and OPEI is

[3] 40 CFR Part 85, FR Vol. 59, No. 138, pg 36983

certain EPA would not accept compliance test results as specified in the Proposed Rule based on just one test. These examples are not exhaustive. Stakeholders will need additional time to understand the differences and impact of the Proposed Rule versus EPA certification and compliance programs.

EPA's 1994 final rule is clear, federal and California test procedures must be consistent for certification vehicles and engines. The Proposed Rule presents new challenging requirements that are inconsistent with EPA procedures. As a result, manufacturers would be unable to meet both the state and federal test requirements with one test vehicle or engine which a key requirement to obtain a waiver of federal preemption under section 2019 of the Clean Air Act.

COMMENT 3 – The Proposed Rule strategies and resulting reductions are inconsistent with the 2016 State Implementation Plan, which identified specific strategies and reductions needed to meet federal air quality standards. Inconsistent with the SIP and needs to meet federal air quality standards, there is no evidence to support the conclusion that the Proposed Rule reductions are needed to address compelling and extraordinary conditions, rendering the rule arbitrary and capricious and without basis. As a result, the Proposed Rule fails to meet California administrative regulatory requirements and is prohibited by the Clean Air Act.

The 2016 SIP identifies specific SORE target reductions needed to meet federal air quality standards by 2031. Statewide the 2016 SIP seeks SORE emissions reductions of 4 tpd NOx and 36 tpd ROG as part of the overall strategy to achieve 2031 federal air quality standards. The SIP outlines methods to achieve this strategy, which include: (1) *promote* increased use of zero-emissions equipment; (2) propose tighter exhaust and evaporative emissions standards; and (3) enhance enforcement of current emissions standards for SORE.[4] This strategy does not suggest or require that CARB transition the SORE sector to zero emissions to meet federal air quality standards.

CARB staff first presented the need for additional SORE emissions reductions to stakeholders at a SORE Workshop in November 2015. During the workshop CARB

[4] *Revised proposed 2016 State Strategy for the State Implementation Plan*, March 7, 2017, pg., 115

presented the October 2015 Mobile Source Strategy goals, which included: (1) tighten exhaust and evaporative emission standards; (2) increase penetration of zero emission technology; and (3) enhance enforcement of current emissions standards. Staff presented the need to incentivize production and deployment of zero emission technology, with a goal of 25% replacement of SORE equipment with ZEE by 2030.[5] These strategies were developed in parallel with the 2016 SIP and determined to be the sector goals and reductions needed to achieve the federal air quality standards. The Proposed Rule is not reflective of the strategies originally presented to stakeholders, is not supported by established standards, data, or sufficient technical feasibility studies, and as a result is arbitrary.

According to CARB modeling, the Proposed Rule would result in emissions reductions of 7.4 tpd NOx and 55 tpd ROG by 2031,[6] well in excess of what is needed or technologically feasible to meet the SIP goals. CARB asserts the need for SORE reductions beyond those specifically detailed in the 2016 SIP as follows: "the increase in the SORE inventory (in the SORE2020 model) makes SORE a larger contributor to overall emissions and underscores the need to reduce NOx and ROG emissions from SORE to maximum extent feasible. Therefore, given SORE's larger share of the statewide NOx and ROG emissions, the potential proposed amendments to the SORE regulations seeks to exceed the emission reductions in the (SIP SORE measure) and to meet the further reductions needed from off-road sources."[7] This statement emphasizes the need for accurate modeling when determining what reductions are needed. In the absence of accurate modeling, as discussed in these comments, the underlying assumptions and the additional reductions "needed" are arbitrary.

Furthermore, CARB asserts it is necessary to utilize SORE to capture SIP "Further Deployment of Cleaner Technologies" reductions, which seek 17 tpd NOx and 20 tpd ROG reductions across many off-road sectors. During the March 24, 2021 SORE Workshop CARB staff suggested "specific measures are not defined in the (SIP)"[8]. OPEI disagrees with this assertion. As it relates to SORE, this SIP category focuses on

[5] Public Workshop to Discuss Proposed Changes to the Small Off-Road Engine Regulations. November 2015.
[6] *Standardized Regulatory Impact* Assessment (SRIA), September 20, 2021, pg 22
[7] SORE Workshop, Slide 7. March 24, 2021
[8] SORE Workshop, Slide 7. March 24, 2021

expanding and enhancing incentive and other innovative funding programs to increase the emphasis and support for zero-emission capable equipment – *not through immediate regulatory action and the imminent banning of SORE-powered equipment on an accelerated timeline*. The SIP identifies an implementation schedule for the deployment of cleaner technologies in which CARB will develop separate regulatory strategies in 2022-2025 based on the execution of prior incentive programs and the evaluation of technology and prototype demonstrations which would be implemented in 2027-2031, what is referred to as "further" deployment of cleaner technologies[9]. The Proposed Rule highlights air district programs which generated "overwhelming response(s)".[10] These realized contributions must be addressed and accounted for in order to determine how these programs have already contributed to emission reductions to each this SIP goal. Finally, SORE is not the sole focus of the "Further Deployment of Cleaner Technologies" category. The SIP focuses significantly on other categories in this strategy, including fork lifts, TRU's, ground support equipment, and constructing mining and industry equipment. The Proposed Rule and its inclusion of SORE "Further Deployment of Cleaner Technologies" emission reductions is inconsistent with the SIP and is arbitrary with respect to the emission reductions needed from SORE to achieve federal air quality standards given the inaccurate sector modeling.

CARB asserts that the DRAFT 2020 Mobile Source Strategy (MSS) "calls for SORE emission reductions of 7.9 tpd NOx and 64.5 tpd ROG in 2031" to support the Proposed Rule.[11] The characterization that the DRAFT MSS "calls for" these reductions is misleading. The DRAFT MSS summarizes CARB staff's Proposed Rule and recognizes that as the proposed strategy.[12] The DRAFT MSS does not call for particular reductions. Furthermore, the document is not consistent with or based on the SIP or reductions needed to achieve federal air quality standards. The DRAFT MSS is arbitrary as it regards needed reductions to achieve federal air quality standards.

Additionally, the SIP reduction strategy includes emission reductions by "enhance(ing) enforcement of current emissions standards." In 2017, CARB adopted

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[9] *Revised proposed 2016 State Strategy for the State Implementation Plan*, March 7, 2017, pg., 122
[10] ISoR, pg 27
[11] SRIA, pg 2
[12] *CARB Proposed 2020 Mobile Source Strategy*, pg. 165. September 28, 2021.

amendments to the current SORE regulations to address evaporative emissions non-compliance; however, the emission benefits from these regulatory amendments are not reflected in SORE2020, or considered as part of the sectors progress towards reducing emissions in accordance with this SIP goal. This is a substantive flaw because "leakers" account for significant HC emissions in SORE2020 model though 2043, including products produced well beyond the adoption and enforcement of the 2017 evaporative amendments. OPEI outlines this concern in additional detail in comments below. The Proposed Rule is not based on the 2016 SIP, lacks evidence that such additional reductions are technically feasible for many use cases, does not account for ZEE incentive program reductions or evaporative emissions reductions achieved though recent amendments. Furthermore, by establishing goals well beyond those established by the SIP, the Proposed Rule lacks consideration of and potentially prohibits (by overly focusing on ZEE) other existing and/or future technologies that may offer HC+NOx emissions, greenhouse gas, and related climate change benefits beyond today's "zero emissions" technology. The Proposed Rule is inconsistent with the strategy identified in the 2016 SIP, based on reductions "needed" from overestimated models, is not necessary to meet compelling and extraordinary conditions, is technology forcing, and is arbitrary and capricious and without reasonable or rational basis.[13] As a result, the Proposed Rule is not consistent with California administrative regulatory requirements and is prohibited by the Clean Air Act.

COMMENT 4 – Funds appropriated to support the mandatory ZEE transition in the Proposed Rule are significantly insufficient.

[13] OPEI met with CARB staff on January 8, 2019 to discuss the CARB OFFROAD2007 model – 18 months before SORE2020 was published. At the closing of the meeting Dr. Michael Benjamin (Chief, Air Quality Planning and Science Division) noted (paraphrasing) "if I can offer advice to your members, it would be to look at the (Innovative Clean Transit regulation)". This rule phases-in a requirement that public transportation bus purchases must be 100% ZEE by 2029. Similarly, on August 17, 2019 OPEI met with Dr. Sam Pournazeri (Chief, Mobile Source Analysis Branch) virtually to discuss questions about modeling and market statistics previously provided to CARB for model development purposes. While discussing the need and use for OPEI zero-emissions market statistics data, Dr. Pournazeri noted (paraphrasing) "the data will be used to give industry credit for ZEE penetration", but that "it's not a matter of if, but when" regarding CARB rules to force transition of SORE to ZEE. From these statements, it is clear that CARB was already developing strategies to force the transition to ZEE long before the SORE2020 model was finalized and sector emissions were appropriately analyzed and considered.

CARB has allotted $30,000,000 to support the Proposed Rule's transition to ZEE[14]. CARB and CSU-F estimate more than 80,000 "landscapers" in the state[15], the majority of which are sole-proprietorships, and many of which minority owned. This accounts for a one-time average of just $375 per landscaper. This would not include transition funding for hundreds of thousands of other "non-landscaper" small businesses that use SORE-powered equipment. As described in these comments, the upfront and on-going costs of batteries significantly could be in the range of $20,000 per average landscaper. Even if each landscaper was guaranteed $375, this would be woefully inadequate to support the up-front and ongoing battery maintenance costs associated with the Proposed Rule and will have a significant impact on sole-proprietorship landscapers, many of which are minority owned.

SORE2020 estimates approximately 180,000 "lawn and garden" units will be sold to landscapers, not including "light commercial" units. For just calendar year 2024, this would account to $166 per unit. As discussed earlier, the useful life of most landscaper equipment is assumed to be 4-5 years per SORE2020, meaning many landscapers will not turn over their entire fleet in 2024 – in-fact CARB assumes landscapers will turn-over their fleet as equipment fails, to minimize immediate impact of the Proposed Rule[16]. Even if each product was limited to $166, most landscapers would not receive any funding.

In execution, many of the existing programs provide incentives much more than $166 or $375 ***per piece of equipment***. The California South Coast Air Quality Management District (SCAQMD)"Commercial Electric Lawn and Garden Equipment" incentive and exchange program provides ***$218 to $16,600 per piece of equipment***.[17] At $16,600 per units, the SORE2020 modeled approximately 500 landscaper and commercial riding mowers would exhaust more than $8M in 2024 alone. A similar program would exhaust the $30M allotted for the transition in just months.

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[14] *CARB approves $1.5 billion investment – largest to date – in clean cars, trucks, mobility options*, November 19, 2021

[15] *Survey of Small Off-Road Engines (SORE) Operating within California: Results from Surveys with Four Statewide Populations,* May 15, 2019, pg 52-53.

[16]

[17] https://www.aqmd.gov/home/programs/community/lawn-and-garden-equipment

In addition, it is unclear how such programs would be monitored to assure funding is reserved for small-business landscapers, including sole-proprietors and minority-owned landscape businesses. University of California – Irvine used the above mentioned SCAQMD program to purchase units, including a riding mower eligible for the maximum rebate, and the LA Unified School District used the program to purchase many of the approximately 800 ZEE leaf blowers reported, and was considering 82 riding mowers. These non-landscaper entities certainly put an extensive dent in the SCAQMD program funding.

COMMENT 5 – The Proposed Rule and SORE2020 emissions model suggest gas-powered equipment sales will remain flat through 2040, that ZEE will only continue to increase marginally to accommodate the change in housing percentage, and consequently, SORE sector emissions will not decrease. These assumptions are contrary to market statistic facts which reflect a substantial increase in ZEE purchases, and a resulting decrease in SORE sector emissions. As battery technology continues to advance and develop, consumers are purchasing ZEE in record numbers, and those trends are expected to continue for applications where today's ZEE technology meets user needs. As a result, ZEE growth is significantly underestimated, and the long-term gas-powered equipment fleet is significantly overestimated, resulting in substantial overestimates of sector emissions in SORE2020 and reductions achieved by the Proposed Rule.

The rulemaking Standardized Regulatory Impact Assessment (SRIA) suggests: "Further deployment of ZEE is not expected to occur without the Proposed Amendments. Without further regulation, the SORE equipment population is projected to be higher in 2043 than it is in 2021".[18] Market statistics data collected by OPEI do not support this claim. Increased ZEE demand was one key factor in record industry sales in 2020.

Despite peaks in 2020 due record product demand during the COVID pandemic, shipment trends for gas-powered walk-behind mowers, handheld leaf blowers, and

[18] SRIA, pg 10

trimmers / brushcutters slope significantly downward, while percentage of ZEE equipment shipments generally continue to rise. See Figures 5-1 to Figure 5-4. Residential ZEE walk-behind mowers accounted for just 6% of products shipped in 2014 but will exceed 36% of products shipped in 2021. The handheld leaf blower category is already 80% ZEE. Chain saw shipments do suggest gas-powered equipment sales may continue to increase, although there were consecutive years of diminishing gas-powered chain saw shipments prior to the COVID pandemic, and the data does not differentiate between chain saws under 45cc within CARB SORE scope, versus over 45cc and federally exempted from CARB regulations.[19][20] (Additional analysis would be needed in this category to fully understand how to update models and rulemaking assumptions appropriately.) *Importantly, all products exhibit trends of increasing penetration of ZEE through 2021 and beyond*. These trends towards ZEE are significantly different that the 2018 Freedonia Group estimates outlined in the CARB SORE2020 report, which include an estimate of just 13% ZEE walk-behind lawnmower market share, and ***flat*** from 2007 to 2022.[21]

[19] The market data presented in these comments is based on OPEI's "Market Statistics" program which collects national shipment data from its member original equipment manufacturers. The leading OPEI Market Statistics program is more than 20 years old. Using a third-party to protect the confidentiality and security of the data, members report their U.S. shipments of industry products every month, which OPEI's third-party then aggregates to publish timely monthly market data reports. In the case of most domestic OPE categories, OPEI members and the aggregated data represent between 85-100% of the U.S. market. With consideration of OPEI member reported data, and offset factors for volumes not represented by the association and/or in the reporting program, OPEI adjusts U.S. market shipments for the purpose of quarterly industry forecasting. The totals and percentages included in the above tables are taken from these OPEI forecast projections. As a general matter all such data is the express copyright of OPEI, proprietary to member companies, and not available to the public.

[20] The data provided in the charts represents products sales on a 50 statewide basis. Figures specific for California ZEE sales as compared to SORE products are likely even higher than the nationwide average.

[21] *CARB 2020 Emissions Model for Small Off-Road Engines – SORE2020*, September 2020, Figure 6 ,pg. 22

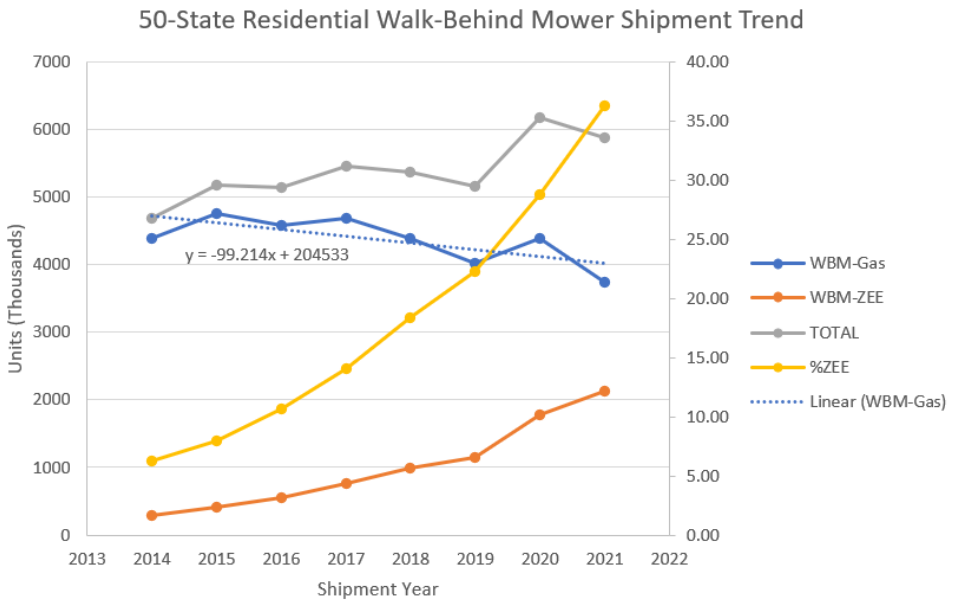

Figure 5-1 – 50-State Residential Walk-Behind Mower Shipments, 2014-2020. 2021 is forecasted as of September 2021. ZEE% is on the secondary (right) Y-Axis.

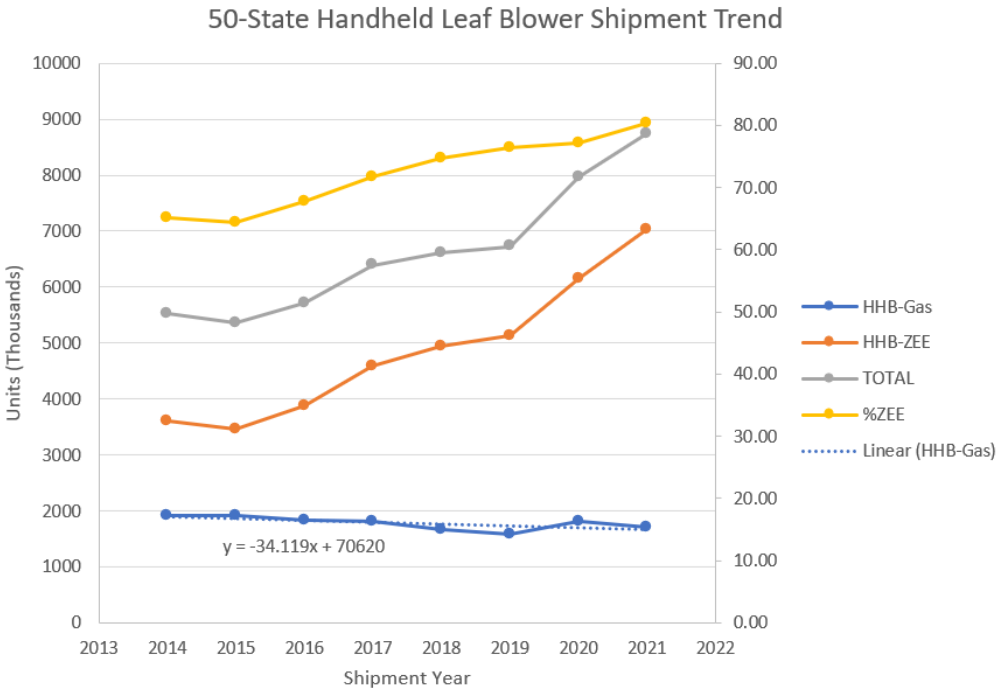

Figure 5-2 – 50-State Handheld Leaf Blower Shipments, 2014-2020. 2021 is forecasted as of September 2021. ZEE% is on the secondary (right) Y-Axis.

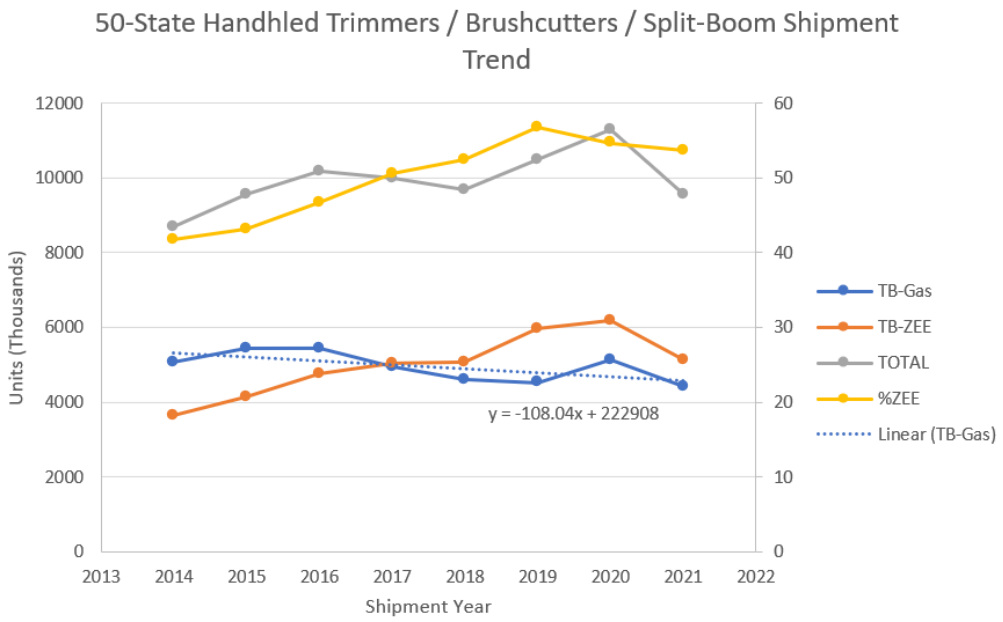

Figure 5-3 – 50-State Handheld Trimmer / Brushcutter Shipments, 2014-2020. 2021 is forecasted as of September 2021.

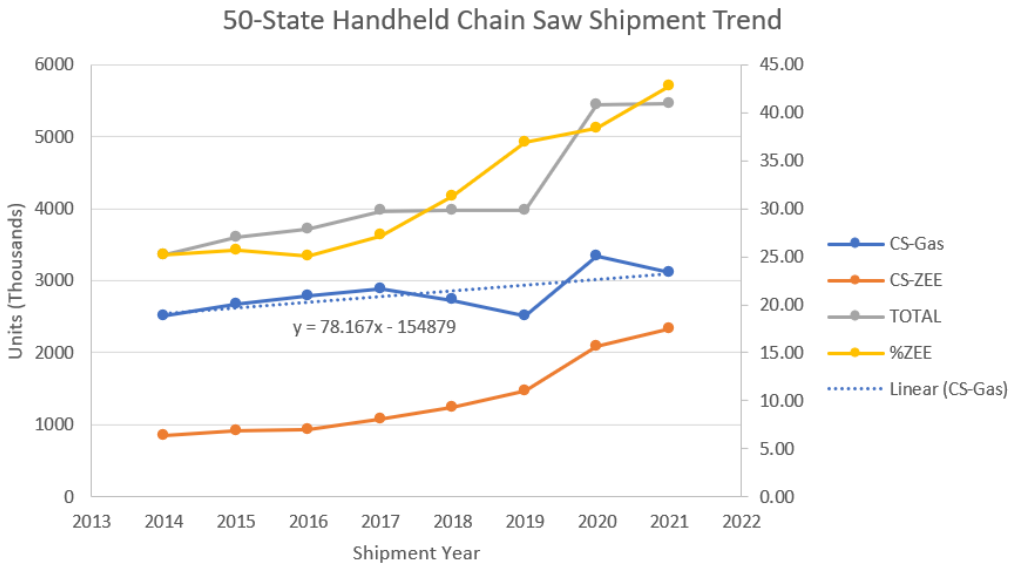

Figure 5-4 – 50-State Chain Saw Shipments, 2014-2020. 2021 is forecasted as of September 2021. ZEE% is on the secondary (right) Y-Axis.

The assumptions included in the Proposed Rule and SORE2020 are also contrary to manufacturer 50-state EPA Production Line Testing reports. At OPEI's

request, EPA provides OPEI annual PLT estimated U.S. directed engine production summaries. Total and handheld engine sales exhibit negative trends from 2016 to 2020. See Figure 5.5.

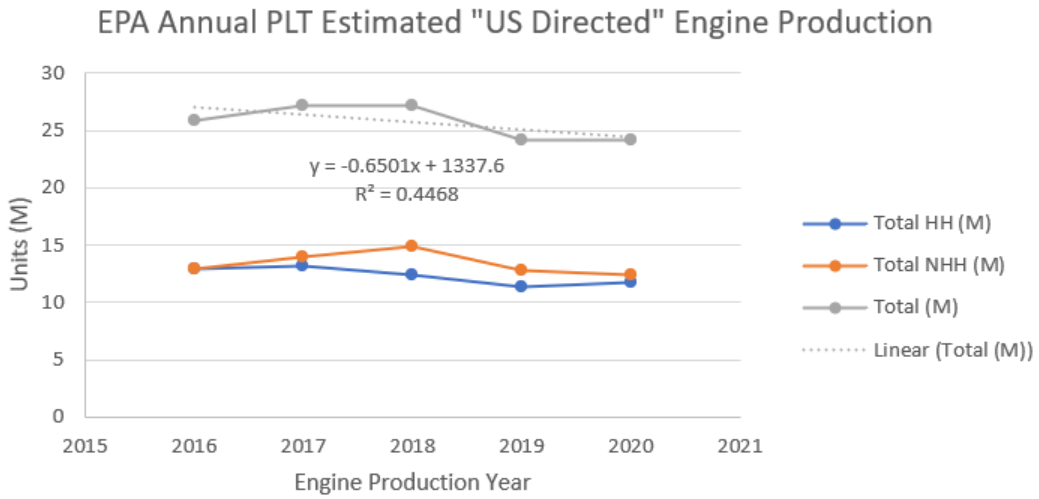

Figure 5-5 – EPA Annual PLT Estimated U.S. Directed Engine Production

As the above data demonstrates, the assumptions suggested in the Proposed Rule and that serve as the basis for SORE2020 that ZEE penetration will not continue unless forced by rulemaking, are not based on current trends and must be reexamined to accurately reflect the current and future SORE emission contributions and determine the additional emission reductions needed to meet SIP goals, as well as related benefits. Without considering the actual market trends, the Proposed Rule is arbitrary and capricious and lacks a reasonable or rational basis.

COMMENT 6 – The Proposed Rule does not comprehensively consider alternative solutions to meet federal air quality standards. The Proposed Rule is technology forcing, resulting ultimately in a "ban" of engine-powered equipment. In doing so, the Proposed Rule lacks consideration of existing and future technologies that may not only offer the reductions needed to meet federal air quality standards, but also may ultimately result in product life-cycle emission benefits beyond ZEE, including in areas of greenhouse gas reductions and related climate change benefits through product life cycle analysis (LCA).

The Proposed Rule offers just three alternative solutions, which staff rejected based on the emissions and cost benefits determined by the SORE2020 emissions overestimates. Rejection of these technologies based on the flawed SORE2020 is a significant concern for OPEI. Setting aside SORE2020 emissions overestimates, OPEI is concerned the Proposed Rule failed to consider several alternative solutions that could result in reductions needed to meet the 2031 federal air quality standards without compromising today's performance needs and/or future technologies that may result in product life-cycle emission benefits beyond ZEE.

CARB staff met with one major manufacturer of both SORE and ZEE in January 2020 to discuss reduction strategies. These strategies included consideration of lower emission limits, alternative fuels, and potential ZEE programs. The Proposed Rule does not consider these strategies. In addition, OPEI used SORE2020 (despite its shortcomings) to analyze multiple strategies that would meet 2031 federal air quality standards without equipment bans and/or through later transition dates. These strategies would allow time for additional ZEE development and opportunity to evaluate technology feasibility for many uses.

One alternative emissions reduction strategy would be to lower handheld product emissions from 50 (> 50cc displacement category) and 72 g/kW.hr (50 – 80cc displacement category) to 35 and 50 g/kW.hr, respectively. Using SORE2020, a 35/50 emissions standard for chain saws, trimmers, and leaf blowers starting for model year 2025, would result in HC+NOx exhaust emission reductions from approximately 36.9 tpd to 27.5 tpd by 2031 – a reduction of approximately 25%.[22] In combination with additional reductions from ground supported products, as well as HC evaporative emission reductions realized from the 2017 evaporative amendments, OPEI is confident the "as published" SIP SORE goals of 4 NOx tpd and 36 ROG tpd could be realized by 2031. This strategy would provide additional time to understand the technical feasibility of alternative technologies, including ZEE.

[22] OPEI developed the SORE2020 model in excel format for ease of modeling different emission reduction scenarios. This model uses SORE2020 populations and emissions factors, including summer adjustments. For simplicity, the OPEI excel-based replica does not apply some fuel adjustment factors, however these factors are negligible when comparing OPEI's model to the SORE2020 output. Furthermore, the factors would consistent across all modeling, therefore would not significantly impact the percent change.

A second alternative emission reduction would be to consider a full market transition to ZEE starting in model year 2028. This alternative is similar to the small business alternative in the Proposed Rule, except that it would include portable generators. Including portable generators is important as they are the largest emission contributor according to the SORE2020 model. Using SORE2020, a zero-emission limit for chain saws, trimmers, and leaf blowers starting in model year 2028 would result in HC+NOx exhaust emission reductions from approximately 36.9 tpd down to 18.2 tpd by 2031 – a reduction of approximately 50%. In combination with additional reductions from ground supported products set to zero, including portable generators, as well as HC evaporative emission reductions realized from the 2017 evaporative amendments, OPEI is confident the SIP SORE goals of 4 NOx tpd and 36 ROG tpd could be realized by 2031. The Proposed Rule supports this conclusion, reporting estimated reductions of 3.5 NOx tpd and 28.7 ROG tpd[23] without portable generators or the reductions realized from the 2017 evaporative amendments. This strategy would also provide additional time to understand the technical feasibility of alternative technologies, including ZEE for all business sectors including professional landscapers while significantly reducing the SORE fleet size by 2035.

In combination with the above solutions, the benefits of alkylate fuel and other future regeneratively produced fuels should have been considered, as they have the potential to significantly reduce ROGs without necessitating a ban of a wide range of needed essential products. According to William P. L. Carter's assessment[24] prepared for CARB, the analysis of an alkylate manufacturer showed a ***ROG reduction potential of approximately 60%***. In addition, alkylate fuels are fully compatible with older products that are already on market,[25] which will be un-impacted by the SORE regulations as written. On the other hand, encouragement of alkylate fuel would result in reductions of ROGs in new *and existing* equipment. Indeed, if 100% of the entire SORE fleet were

[23] ISoR, pg 142

[24] "Updated Maximum Incremental Reactivity Scale and Hydrocarbon Bin Re-activities for Regulatory Applications"; Prepared for California Air Resources Board Contract 07-339 by William P. L. Carter; College of Engineering; Center for Environmental Research and Technology University of California, Riverside, CA 92521; Revised January 28, 2010

[25] Alkylate fuel is, in fact, much more suitable for SORE products than standard fuel available at a local gas station. Small engine manufacturers recommend using alkylate fuels first; only if they are not available should regular gas station fuel be used.

converted to alkylate fuel from 2022, based on 2016 State SIP Strategy for SORE (Baseline Scenario emissions in 2016: 108 tpd of ROG), there would be a ROG savings of approximately 55 tpd of ROG.

Alkylate is a near drop-in for today's SORE technology and offers short term and long-term emission reductions, plus other customer-friendly benefits such long shelf life and increased engine performance. Use of alkylate fuel has been adopted, and even mandated, in other regions of the world. In Switzerland, for example, alkylate fuel is mandatory for certain uses; and end users are well informed about the environmental and quality benefits, resulting in a majority of users switching to alkylate fuel in their small engines. [26] Market acceptance of alkylate fuel for small engines in California likewise would not require the development of any new technologies, or the wasteful replacement of existing equipment. Alkylate fuels are already available on the shelves of local dealers and retail stores throughout California, priced reasonably, and well accepted by sophisticated users. Given the significant environmental benefits, ease of implementation and reasonably low burden it would impose on users, retailers and manufacturers, CARB should have thoroughly explored alkylate fuel as an alternative to its proposed regulations.

COMMENT 7 – The Proposed Rule fails to demonstrate ZEE is a technically feasible solution for many use cases. The Proposed Rule presents no technology feasibility test data, but instead relies exclusively on product marketing data, which highlight limited and sometimes misleading comparisons of performance and cost.

OPEI members manufacturer a wide range of outdoor power equipment products, including ZEE. OPEI recognizes and supports the organic growth of ZEE. Today's ZEE products offer economic and environmental benefits for many applications; however, there is no one-size-fits-all ZEE approach to satisfy the full range of SORE-powered equipment and use cases.

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[26] See, e.g., EINSATZFELDER UND NUTZEN DES ALKYLATBENZINS - EIN LAGEBERICHT (FIELDS OF APPLICATION AND BENEFITS OF ALKYLATE PETROL - A SITUATION REPORT); BAFU UND SMU; Switzerland; 2008. In Switzerland, alkylate fuel is mandatory in forestry for certain certified wood (e.g. Forest Stewardship Council (FSC) and in certain counties.

The Proposed Rule poses numerous technical feasibility, economic, and implementation challenges for industry stakeholders, such as landscapers, farmers, tree care experts, utility companies, rural property owners, trail clearers, and other professional users. The ability to work all day, and in some cases days on end, and/or needing dozens of expensive batteries, not to mention the cost of battery maintenance and replacement over the life of the product will continue to present challenges for many users. Collectively these challenges are currently insurmountable and will result in significant and unnecessary hardships for manufacturers, retailers and end-users, culminating in an early market shortfall of products with high consumer need and demand.

The Proposed Rule lacks a robust technical feasibility analysis. In particular, the Proposed Rule relies on very limited on-line product comparisons, minimizing the top technological requirements – continuous performance, run-time, and cost. Despite initial plans to conduct a detailed technical testing program of ZEE equipment as part of the rulemaking program, CARB conducted no ZEE product technical feasibility study of the products discussed in the rulemaking package. OPEI is concerned that the products and features selected to compare in the Proposed Rule are limited (to just one product for each category) and not "apples to apples." For example, the Proposed Rule notes one performance benefit of the residential ZEE walk-behind lawn mower is that "the zero-emissions lawn mower is self-propelled, while the SORE lawn mower is not, so the zero-emissions mower would be easier to operate for most users."[27] There are numerous ZEE walk-behind lawn mowers that are not self-propelled, and there are many gas-powered walk-behind lawn mowers that are self-propelled, so it is obvious that, in this example, the Proposed Rule fails to provide reliable conclusions regarding the comparison of SORE and ZEE products.

More importantly, the marketing performance metrics cited for ZEE in the Proposed Rule are momentary (peak, not sustainable) – this results in technical barriers for many users and applications that required further development to overcome extended duration performance concerns. The Proposed Rule states "for the most

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[27] ISoR, pg 14

common types of SORE equipment, there are ZEE equivalents available in the market with similar or better performance characteristics and lifetime".[28] The Proposed Rule describes the performance of ZEE and gas-powered handheld leaf blowers in terms of air flow and blowing force; however, the Proposed Rule does not disclose that these metrics are momentary, and that over equivalent run-times the gas-powered leaf blower sustains higher performance than the ZEE leaf blower due to battery performance loss. Due to the lack of technical feasibility and product testing in supporting the Proposed Rule, Industry conducted testing to understand how performance of the ISoR handheld leaf blowers compared. Industry was able to approximately correlate the marketing performance noted in the Proposed Rule for both units but found that after just 8 minutes of run-time, the ZEE leaf blower force fell below that of the gas-powered leaf blower. Additionally, the Proposed Rule referenced leaf blower force was only momentarily achieved at "turbo" mode, a mode where the battery lasts just 18 minutes. The leaf blower force performance cited in the Proposed Rule drops almost 50 percent over the 18-minute run-time. On the other hand, the gas-powered leaf blower is able to continuously run and sustain performance on a single tank of gas for over an hour. See Figure 7-1. These technical limitations of ZEE, and the impact on working professionals to complete jobs efficiently, must be further studied to understand the true technology feasibility of ZEE in many use cases.

[28] ISoR, pg 13

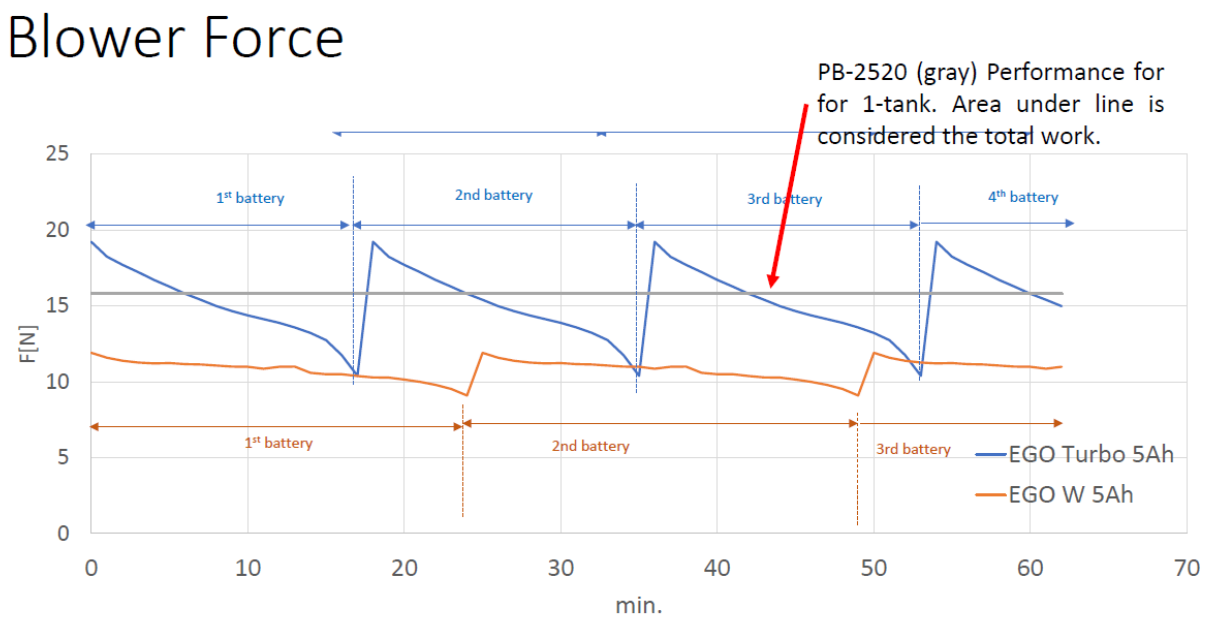

Figure 7-1 – Industry technology feasibility comparison of handheld leaf blowers cited in the Proposed Rule. Run-time (minutes) vs. blower force (N)

The SORE2020 model suggests the average residential leaf blower is used for 30 minutes per use. Accordingly, the average homeowner would need two batteries each use, regardless of leaf blower performance mode – At least one additional battery would need to be purchased to meet SORE2020 assumptions. Using SORE2020 emission factors, OPEI estimates 1.88 batteries would be needed to meet SORE2020 average residential user leaf blower needs. This closely correlates with the technology feasibility test shown in Figure 6-1. The SRIA does not include additional batteries in its residential blower analysis.[29] Similarly, many businesses and landscapers use handheld leaf blowers with equivalent performance characteristics. SORE2020 suggest the average landscaper uses each leaf blower 1.14 hour per use. To roughly match the performance of the gas-powered blower, using “turbo” mode, a landscaper would require three to four batteries per leaf blower per day. The SRIA provides no analysis of handheld blowers for professional use.

Industry further studied technical feasibility as a function of the number of batteries required for residents and landscapers to meet the average performance

needs suggested in SORE2020. Run-time is a critical consideration of many users, especially professional landscapers, and hence is an important factor in determining technical feasibility. For the average landscaper operating walk-behind mowers, string trimmers, leaf blowers and hedge trimmers, based on the CSU-F survey equipment distribution and SORE2020 suggested use factors, using conservative estimates of battery size, the average landscaper would require ***36.68 batteries per day***. If chain saws are included with the average landscaper equipment, they would require ***48.17 batteries per day***. Walk-behind lawn mowers would require 8 batteries per day, string trimmers would require 5.05 batteries per day, leaf blowers would require 18.34 batteries per day, hedge trimmers would require 5.28 batteries per day, and chain saws would require 12.5 batteries per day. Considering replacement batteries (as batteries wear out), which are not considered in Proposed Rule, an average landscaper could go through 84.32 to 103.37 batteries over the useful life (6 years) of the equipment. The associated costs with are discussed further in Comment 8. See Annex B for a summary of the OPEI battery and cost calculations

For a residential wanting to do all their yardwork in a single day (mow, string trim, trim hedges, blow), using conservative estimates of battery size, it would require 11.81 batteries to achieve the average residential user performance needs suggested by SORE2020. For a residential generator to meet the performance needs suggested by SORE2020, running for 3.85 hours, a residential user may need up to 20.36 batteries, and would have to change the batteries every 23 minutes. This is an important point, as the Proposed Rule assumes no battery changes are necessary for a homeowner to complete their landscaping tasks. Nevertheless, SORE2020 models performance that requires several battery changes – Both assumptions cannot be correct. If current product battery offerings are sufficient to fulfill the average residential user needs, then SORE2020 overestimates average performance and/or length of use, and in-turn overestimates sector emissions.

The SRIA underestimates the number of batteries needed to meet SORE2020 performance requirements for both residential and professional users and does not include sufficient chargers for professional users. For example, SORE2020 estimates

[29] SRIA, Tables G-1 though G-4, pg. 117

1.18 kW per day is needed per vendor/landscaper walk-behind lawn mower. The “professional ZEE” referenced in the SRIA includes one 48V 4A-h battery, supplying 192 w-hr per battery (without consideration of battery and motor efficiency losses). To operate the mower for one day under the assumptions included in SORE2020, a user would require 7 batteries (1180 W / 192 W-hr = 6.15 batteries); not 4 as assumed by the SRIA. 3 additional batteries and chargers would be needed for the professional user, increasing the upfront cost by more than $570 (not to mention additional chargers neglected in the original SRIA analysis or replacement batteries). The SRIA appears to include no additional batteries for chain saws.

Finally, regarding a “better lifetime”, the Proposed Rule provides no technical feasibility testing data to support this assumption. Professional users will need to replace batteries throughout the product life to meet SORE2020 performance estimates. To better understand survey responses and product use, OPEI visited two landscaping crews. One crew was in Ojai, CA and anther in South Pasadena, CA. These communities are important because they are American Green Zone Alliance (“AGZA”) communities that operate zero-emissions equipment. Because professional riding mowers typically have hour meters, OPEI focused this study on this equipment. OPEI visited both locations four times over approximately 13 months to understand the use of the equipment. Regarding performance of the equipment over the product lifetime, during OPEI’s May 2021 visit, at approximately 1400 hours on the surveyed ZEE Zero-Turn Riders (ZTR), the landscaping crew in South Pasadena reported the unit was not as powerful as it was new but reported no major issues. During OPEI’s September 2021 visit, at approximately 1600 unit hours, the crew reported significant performance loss. During OPEI’s September 2021 visit to Ojai, at approximately 636 hours on the surveyed ZEE ZTR, the landscaping crew reported performance loss as much as 40%, and that tall, wet grass was a particular issue. OPEI is unaware of any similar study conducted for the Proposed Rule. Being the only reliable hour and performance responses available, one cannot conclude ZEE offers “similar or better performance and lifetime (than gas-powered equipment).” OPEI’s landscaper study is additionally detailed in comments below.

With these concerns in mind, in addition to the concerns outlined in Comments 8 and 9 below, CARB must conduct a regulatory-appropriate technology feasibility study to understand the performance characteristics and limitations, and technology feasibility of ZEE products versus their gas-powered counter-parts – including accurate battery life and maintenance costs. During the October 27, 2017 SORE Working Group meeting CARB staff presented a test plan to "test the ability of currently available (ZEE) to meet the performance requirements of California Code of Regulations, title 13, section 2408.1 for professional level equipment". The need for testing was noted as follows: "the ability of currently-available SORE to meet tightened emission standards when retrofitted with additional emission control technology must be demonstrated."[30] No such testing was performed for ZEE for the Proposed Rule. In fact, none of the three technology feasibility tests outlined in the plan were completed. Lack of regulatory-appropriate testing to support the Proposed Rule not only calls into question whether the California administrative regulatory requirements were followed, but also provides another example of how the Proposed Rule is arbitrary and capricious.

COMMENT 8 – The Proposed Rule fails to accurately address the upfront and ongoing cost of ZEE equipment. As a result, the Proposed Rule overestimates the cost benefits of the rule.

As discussed in Comment 7, Industry studied technical feasibility as a function of the number and cost of batteries required for residents and landscapers to meet the average performance needs suggested in SORE2020. As noted earlier, conservatively, the average landscaper would require *36.68 batteries to* *48.17 batteries per day*. Considering replacement batteries, which are not considered in the Proposed Rule, an average landscaper could conservatively use 84.32 to 103.37 batteries over the useful life (6 years) of the equipment. The *total cost of batteries and chargers* for the average landscaper set-up could cost $18,000 to $22,000 over a six-year product useful life. It is important to note that these calculations do not account for equipment costs nor do they account for battery or motor efficiency losses. Battery and motor efficiency losses would

[30] *CARB Draft Test Plan – Testing to Establish Up-to-Date Exhaust Emission and Deterioration Factors for Small Off-Road Engines Using E10 Fuel*.

likely result in additional batteries and costs. It does not appear the Proposed Rule accounted for efficiency when estimating battery needs.

Also noted above, a residential user that wants to do all their yardwork in a single day would experience similar challenges. Conservatively, the average homeowner would require 11.81 batteries to achieve the average residential user performance suggested by SORE2020 for the pieces of equipment to do ordinary yardwork. For a residential generator to meet the performance needs suggested by SORE2020, running for 3.85 hours, a residential user may need up to 20.36 batteries, and would have to change the batteries every 23 minutes. Again, SORE2020 models performance that requires several battery changes but the Proposed Rule assumes no additional batteries are needed – Both assumptions cannot be correct. See Annex B for a summary of these calculations.

Based on OPEI's analysis, the SRIA significantly underestimated the number and cost of batteries for products throughout the useful life of equipment to maintain needed performance. The SRIA states "Professional-grade equipment costs include enough batteries for ZEE to operate for the relevant portion of a full eight-hour workday," but as discussed in Comment 7, this is not true. For another comparison, OPEI found the 21" "commercial" ZEE walk-behind lawn mower used for product feature comparison in the ISoR online for $499.00 plus tax (***without*** battery and charger).[31] SORE2020 suggests each day the ***average*** vendor/landscaper walk-behind lawn mower requires 1.18kW of power (some will require more, and in turn more batteries). An 82V 4A-hr battery (328 W-hrs) for this mower retails for $229.00 plus tax. Note these batteries for this unit are much larger than and more expensive than the batteries included in the SRIA. Four 82V 4A-hr batteries would be required for ***each*** mower to complete an average day of work according to SORE2020 assumptions (1180/328 = 3.6 batteries), without consideration of battery and motor efficiency. In addition, assuming batteries are charged at night, four chargers would need to be purchased at $79.00 plus tax each. The total upfront cost of this "commercial" ZEE mower would be $1731.00 plus tax, more than the $1030.71 after tax as noted in the SRIA. To achieve the 6-year useful life assumed in SORE2020,

each battery would need to sustain 1440 charges – This is not a reasonable assumption for fully discharged batteries, as is the case here (three of four batteries would be fully discharged each day). According to Grepow.com[32] the life of a lithium-ion battery is generally 300 to 500 charging cycles. This is consistent with performance reports of ZEE riding mowers after similarly estimated charge cycles in South Pasadena and Ojai, as previously discussed. Conservatively, four batteries would need to be replaced twice throughout the useful life of a walk-behind lawn mower, adding another $1832 plus tax to the total product cost. The conservative total product cost could be $3563 plus tax over its useful life. This is significantly more than the $1030.71 (tax included) cost assumed in the SRIA. These differences must be further examined to accurately estimate the true cost benefits of the Proposed Rule.

OPEI is also concerned about the selection method of units for comparison. The SRIA compares what appears to be a very low-end cost "professional" ZEE walk-behind mower with a cost of $499 to a very high-end cost commercial gas-powered walk-behind mower with a cost $1299. A quick Google search for "" shows there are several "professional" or "commercial" ZEE walk-behind lawn mowers available in the U.S. with costs ranging from $499 to $1,199.95. Similarly, there are "commercial" 21" walk-behind lawn mowers starting below $800. OPEI is concerned the durability of the products compared are not equal. Regarding the units selected for comparison in the SRIA, the deck design, wheels, and transmission of the gas-powered unit are significantly more robust than the ZEE walk-behind mower. Unfortunately, Industry's comparison of these units is still in-progress at this time (comment deadline), but initial findings are that the ZEE unit experienced failures of the transmission and wheels before durability testing could be completed.

Similarly, the SRIA suggests "Residential-grade ZEE frequently comes packaged with enough batteries for average use;" however, this claim is not supported with analysis. Most residential ZEE products come with one battery, and tools can be purchased without batteries. OPEI found the 21" "residential" ZEE walk-behind lawn

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[31] https://www.rcpw.com/equipment/push-mowers/GMS-210.html?gclid=CjwKCAiA7dKMBhBCEiwAO_crFKncRDC0qXZL2xNS7YOMKbdTXtpdb1wQDsG2c8WWVxOzCJBCX0hUMRoC4DcQAvD_BwE Note this cost is lower than advertised at other online retailers.

[32] https://www.grepow.com/blog/charging-cycles-of-lithium-ion-polymer-batteries/

mower used for product comparison in the ISoR online for $569.99 (with battery and charger).[33] SORE2020 suggests each day the ***average*** walk-behind lawn mower requires 0.78kW of power (some will require more, and in turn more batteries). A 56V 7.5A-hr battery (420 w-hrs) is included. A second battery would be required to complete an average day of work according to SORE2020 assumptions (780/420 = 1.86 batteries). A second 56 V 7.5 Ah battery for this walk-behind lawn mower retails for $349.99, resulting in a total product cost of $919.98 plus tax, significantly higher than the $432.92 tax included cost assumed in the SRIA. These differences must be further examined to accurately estimate the true cost benefits of the Proposed Rule.

OPEI is concerned the SRIA and Proposed Rule significantly underestimate the battery and associated cost requirements over the useful life of most products. Accurate costs are essential to understand the cost and health benefits of the Potential Rule.

A regulatory-appropriate technology feasibility study to understand the performance characteristics and limitations, and technology feasibility of ZEE products must be conducted, including the battery life and maintenance costs. No such testing was conducted for the Proposed Rule rendering the rulemaking arbitrary and capricious or without reasonable or rational basis.

COMMENT 9 – The Proposed Rule fails to demonstrate ZEE is a technically feasible solution for many use cases. CARB survey and Roadshow data support the conclusion that additional technology development is needed to meet many user needs.

According to the CSU-F survey, today's landscaper ZEE deployment continues to face challenges. Landscaper deployment of their most common equipment (walk-behind lawn mowers, chain saws, leaf blowers and trimmers) ranges from just 3 percent (chain saws) to 8.6 percent (leaf blowers).[34] The Proposed Rule notes that "60 percent of (surveyed) landscape vendors stated that they know of electric versions of the equipment types they own", and "landscape vendors use their equipment more regularly

[33] https://www.acehardware.com/departments/lawn-and-garden/lawn-mowers/push-mowers/7804826?store=14431&gclid=CjwKCAiA7dKMBhBCEiwAO_crFCnTpttyKYAeZYZWj5ebmS9OnOd1ETucL-iIfKO2WO-DpLd0nw2-aRoCHVIQAvD_BwE&gclsrc=aw.ds

[34] SRIA, pg 13

than residential users, and turnover is faster in this market segment so it is notable that only 8 percent of this extensively used equipment is ZEE."[35] OPEI agrees these points are notable. Despite knowledge and use of ZEE equipment, and frequent fleet turnovers, landscapers continue to rely on gas-powered equipment to meet many of their performance, run-time and cost needs.

The survey supports the conclusion that landscape vendors are familiar with ZEE, but ZEE equipment performance, run-time, and cost are common concerns for working professionals for many equipment types and uses. Further technology advancement is needed to overcome these challenges and for widespread ZEE deployment in high-performance and high use applications. The following CSU-F survey response examples support this conclusion.

Example 9-1: Survey respondent vendor/landscaper V38-G2 reports owning eight pieces of equipment. Of the eight pieces equipment two are ZEE, the remaining six are gas-powered. The oldest piece of equipment is reported to be a 10-year-old ZEE leaf blower. Despite a long familiarity with ZEE blowers, V38-G2 opted for a new gas-powered leaf blower just weeks before the survey. V38-G2 reported using the ZEE blower just 3.33 hours per year, and the gas-powered blower 260 hours per year. In the year before the survey, this landscaper bought five pieces of equipment, one ZEE hedge trimmer and four gas-powered units (a leaf blower, a chain saw, a string trimmer and a gas walk-behind lawn mower). It can be easily concluded V38-G2 understands ZEE equipment yet selects gas-powered equipment for certain performance needs.

Example 9-2: Survey respondent vendor/landscaper V3-G2 reports owning 12 pieces of equipment. Of the 12 pieces of equipment two are ZEE leaf blowers, the remaining 10 are gas-powered. Despite familiarity with ZEE leaf blowers, V3-G2 opted for a new gas-powered leaf blower just months before the survey. V3-G2 reported using the ZEE blowers 260 hours per year, and the two gas-powered leaf blowers 1820 hours per year. In the 2 years before the survey the landscaper bought nine pieces of equipment, the afore mentioned ZEE blowers, one gas-powered leaf blower, two gas-powered

[35] SRIA pg 11

string trimmers, one gas-powered hedge trimmer, one gas-powered chain saw, one gas-powered riding mower and one gas-powered walk-behind lawn mower. It can be easily concluded V38-G2 understands ZEE equipment yet selects gas-powered equipment for particular product and performance needs.

In addition to survey work, CARB staff organized a project call the ZEE Roadshow, where several brands of zero-emission lawn and garden equipment designed for professional use were loaned to "landscaping" crews throughout the state. While several respondents found the performance of ZEE equipment, in combination with the incentive programs, satisfactory, some did not. OPEI is concerned the Proposed Rule fails include an accurate recount of and summary of responses received about the program. Specifically, the Proposed Rule does not appear to include the response from the LA County Zoo, or provide enough context of the response from UC Santa Barbara, both highlighted below. Following are 2 of the 8 responses provided to staff regarding their experience with the ZEE Roadshow. The following responses support the conclusions that there is no-one-size-fits-all performance solution, that gas-powered units are critical for some performance needs, and that additional ZEE technology advancement is needed to address the performance needs of all users.

Example 9-3: UC Santa Barbara – "*Goal is to replace all 2-cycle power tools with battery. We will keep a select assortment of 2-cycle equipment for bigger jobs on check-out program. We will also keep a few 4-cycle pieces in the field, all blowers for staff that have large hardscapes to blow off – mostly tennis courts.*" Having participated in the ZEE Roadshow, it is clearly concluded the UC Santa Barbara understands ZEE equipment yet selects gas-powered equipment for particular product and performance needs.

Example 9-4: LA County Zoo – "*Testing of electric equipment went well even if the result was not as we had hoped. Several of our employees had trouble with the battery life and power output of the equipment when compared to gas powered equipment. Our surveys also concluded that most electric cutters and trimmers are inadequate for the*

time being. Survey results did not give us enough information to recommend a full overhaul of gas equipment for electric powered tools. Low user scores regarding being able to perform "normal work" when using the equipment. Husqvarna 436LiB worked well. The main negative takeaways from our crew was the lack of power output when compared to gas-powered equipment and battery life of electric equipment (including remember to charge the equipment the day before rather than fill up with fuel as needed)."

Regarding the ZEE Roadshow, it is important to note that none of the 20 entities that participated met the definition of "landscaper", as defined by the US Census and that was used by CARB and CSU-F in its survey. *No landscapers participated in the ZEE Roadshow*. OPEI is concerned that no professional landscapers participated in the ZEE Roadshow or were able to provide feedback on the performance of the equipment. Furthermore, there are a number of other flaws with regard to this survey. For one thing it appears that CARB did not monitor the equipment for use trends, including what equipment was used and for how long by each participant. Instead, CARB only appeared to seek feedback after OPEI inquired about the program in April 2021 – 2 years later in most cases.[36] In addition, more than half of the participants did not respond, or if participants did respond, their responses were excluded from the Proposed Rule package. Other issues identified by OPEI include that 2018 ZEE testing at Capital Park, Sacramento State and the Department of Transportation[37] are not discussed in the Proposed Rule package. OPEI's notes from an April 10, 2018 meeting with CARB indicate CARB received "generally positive feedback, with no negative feedback on trimmers, but that users had commented that ZEE leaf blowers were not the tool of choice when needing more power." None of these test participants or their feedback were included in the summary provided to OPEI in May 2021, nor does it appear were they included in the Proposed Rule's summary of the ZEE Roadshow.

[36] The majority of participants tested product in 2019. OPEI inquired about the status of the Roadshow on 4/12/2021. CARB staff solicited feedback on 5/18/2021.

[37] OPEI staff and members met with CARB staff at CARB facilities in El Monte, CA on April 10, 2018 to discuss rulemaking activities.

With these concerns in mind, CARB must conduct a regulatory-appropriate technology feasibility study to understand the performance characteristics and limitations, and technology feasibility of ZEE products versus their gas-powered counter-parts, including using the data to accurately understand the product life battery and maintenance costs. CARB has conducted no such testing for ZEE for the Proposed Rule, which is a fundamental flaw in this rulemaking.

COMMENT 10 – The Proposed Rule fails to consider real-world barriers to a complete transition to ZEE on its accelerated timeline, including in-service charging options, recycling strategies, and U.S. Department of Transportation regulations. Additional time is needed to allow for the development of adequate technology and infrastructure to support a successful ZEE transition.

In-Service Charging Challenges

While ZEE is an acceptable replacement for SORE for certain applications, charging remains a challenge for extensive and professional users. As discussed in Comment 7, dozens of batteries would be needed to complete a day's work for the average landscaper. Alternatively, users who require several batteries per piece of equipment may consider mobile charging. Industry continues to work towards viable mobile charging solutions, but such solutions are simply not yet available at a reasonable cost and are not readily available in the marketplace in sufficient volumes to support a wholesale transition to ZEE. For large residential landowners who must clear their properties for fire season preparation and other fuel mitigation purposes, and for landscapers, utilities companies, or other professionals who must transport equipment to work sites and extensively use outdoor power equipment and ground supported equipment throughout the day, away from charging sources, the option of remote charging poses significant challenges.

The best viable solution for mobile charging of battery powered handheld outdoor power equipment is portable gasoline generator charging. However, the resulting HC+NOx output from charging batteries with portable gasoline generators in the field

may be significantly HIGHER than SORE-powered equipment, negating zero emissions benefits.

Recycling Challenges

As more industries continue to shift into battery powered technologies, the need to properly care for these batteries at the end-of-life grows as well. Getting certain “high energy” lithium-ion batteries (i.e., batteries rated at greater than 300 W-h per battery), such as those batteries needed to power many professional SORE equivalent ZEE products, to the last step in a circular economy comes with various technical and economic challenges. As battery sizes and formats continue to evolve, it will be increasingly difficult for recycling vendors to create universal solutions, especially as there are increasing demands for raw material supplies and rare earth metals. Today’s regulations limit an end user’s ability to easily transport these batteries back to manufacturers or potential recycling partners unless there are proper drop-off locations with certified vendors. Title 49 C.F.R. Section 173.185 outlines the legal requirements for transportation of lithium-ion cells and batteries to, from and within the U.S. Currently regulations provide significant exemptions for transportation of small lithium-ion cells and batteries (i.e., batteries rated at less than 300 W-h per battery), however no such reverse-logistic or recycling exemptions exist for lithium-ion batteries exceeding 300 W-h. These batteries require fully regulated hazardous material shipping provisions.

Through industry outreach OPEI is learning of new developments that may fill these transportation gaps in the future. However, this will take time and may require special packaging that would include additional costs and could still be restricted by watt-hour ceiling limitations.

Individual states and the federal government are taking actionable steps forward to address the ongoing recycling initiatives for lithium rechargeable batteries. The EPA is developing a National Recycling Strategy with a roadmap that includes tangible goals that will incorporate EPR programs. However, current market solutions still require significant resources that may not be sustainable over time.

There are many other areas, beyond transportation, that are still being reviewed and developed around lithium-ion batteries including: Storage, Packaging, Air

Transport, UN Classification Scheme, Marking and Labeling requirements and much more. Implications from these areas will have immediate impacts from economics to impacts on the environment. As battery chemistries continue to advance and battery adoption grows then the market will need to approach long-term solutions with involvement from producers, regulators, and consumers to address the growing safety concerns.

U.S. Department of Transportation Regulations

U.S. Department of Transportation (DOT) regulations currently prohibit commercial users from transporting an adequate supply of batteries needed to power day-long usage of ZEE equipment. Until DOT requirements are updated to meet the reality of professional battery powered equipment usage, professional landscapers and other users will be forced to choose between violating DOT requirements, and/or carrying sufficient batteries to fulfill their clients' needs, and/or using portable generators to recharge batteries in the field.

According to the performance requirements of SORE2021, the average landscaper would require 37 to 48 batteries for a day worth of work. These batteries will need to be secured on landscapers' trucks, and, as a commercial user, will be subject to DOT requirements. DOT limits commercial users to 66 pounds "per container" for commercial usage and outlines handling requirements not considered by the Proposed Rule.[38] As batteries and ZEE products must be stored and contained securely in trucks for safety purposes, such transport could run afoul of DOT regulations. Additional costs will be needed to comply with these regulations. The Proposed Rule does not consider such costs.

Until a market-wide solution for mobile charging is readily available at a cost-effective price, until high-energy battery recycling is addressed, and until DOT regulations are revised, the implementation of the Proposed Rule should be delayed.

COMMENT 11 – The COVID-19 pandemic has resulted in worldwide supply chain disruptions, including in the SORE and ZEE sectors. Additional time is needed to

[38] Title 49 C.F.R. Section 173.6

resolve current supply and demand issues and prepare for such a paradigm shift to ZEE.

The Proposed Rule will drastically limit equipment choices for professional landscape contractors, outdoor power equipment dealers, and critical infrastructure workers (such as construction workers, utility workers, farmers, and clearing/fuel mitigation workers) throughout California. These small business owners and contractors rely on small engine powered equipment every day as cost-efficient and high-performing solutions. Banning of SORE on this accelerated timeline negatively impacts tens of thousands of small businesses, many of which are small and/or minority owned, at a time when small businesses are already reeling from the catastrophic effects of a global pandemic. Transitioning to a ZEE fleet adds significant cost at a time when small businesses (and all employers) are losing employees and facing significant staffing issues, while unchecked inflation continues to increase the cost of all equipment and services, nationwide.

In addition to the impact on small businesses, the Proposed Rule fails to consider whether it is even possible for battery and equipment manufacturers to meet demand on an accelerated 2024 timeline to replace an entire industry with ZEE. According to CARB, approximately 4,000,000 new SORE are sold in California each year.[39] As discussed in Comments 7 and 8, multiple batteries will be needed for each product. It is not unreasonable to estimate replacement of 4,000,000 SORE-products will result in a demand of 10,000,000+ new batteries *annually* (plus replacement batteries as ZEE fleets age). The world is currently experiencing an unprecedented interruption in the supply chain, initiated by the global COVID-19 pandemic. Port back logs, cargo shipping delays, materials shortages, global trade disputes and staffing issues, combined with record demand for products have led to empty shelves, increased prices, and lingering back orders. Manufacturers of both battery and gas-powered outdoor power equipment are struggling to keep up with demand, and the supply chain disruptions are not showing any signs of waning. The Proposed Rule fails to consider whether sufficient ZEE will even be available in the quantities and quality needed to replace combustion

[39] *Notice of Public Hearing to Consider Proposed Mobile Source Certification and Compliance Fees*, Table Appn D-2, pg 141

SORE across the entire state. To the contrary, the Proposed Rule vaguely acknowledges the need for construction or modification of associated manufacturing facilities to increase the supply of zero-emission technology, including battery powered equipment, but fails to explain how such manufacturers will construct or modify their facilities, source additional materials and adequately staff such new or expanded facilities quickly enough to supply California's needs in time for 2024.

The Proposed Rule likewise acknowledges that the increased demand for lithium-ion batteries could increase production, and increase lithium mining and exports from source countries, but fails to address the current international supply chain challenges or the specific challenges with sourcing the materials needed to manufacture lithium-ion batteries. The rapidly surging demand for lithium, especially battery-grade lithium hydroxide, is challenged by the limited number of qualified lithium producers in the battery supply chain. Indeed, the global lithium market is estimated to reach a deficit of 12,000 tons of lithium carbonate in 2022, compared with a surplus of 3,000 tons in 2021 and a surplus of 54,000 tons in 2020.[40]

Implementation of the Proposed Rule, and the transition of an entire industry to zero emission equipment should be delayed until the supply chain is able to adequately support

COMMENT 12 – The Cal-State University – Fullerton (CSU-F) survey and CARB SORE2020 emission inventory model are the datasets at the core of the Proposed Rule. SORE2020 is used to determine emissions, cost and health benefits described in the Proposed Rule. However, the CSU-F survey, the underlying dataset for much of SORE2020, does not accurately reflect real-world SORE equipment age or use patterns. Based on unreliable and inaccurate, SORE2020 significantly overestimates the sectors emissions contributions and related emission reductions needed to meet federal air quality standards.

The SORE2020 model relies significantly on telephone-based survey data collected by CSU-F's Social Research Center between 2017 and 2019 to determine

[40] See https://www.metalbulletin.com/Article/4002802/OUTLOOK-Securing-lithium-biggest-challenge-to-battery-supply-chain-in-H2-2021.html.

product annual use (average hours/year), fleet size and age distribution. These factors are critical emissions modeling factors, and overestimates in these specific factors easily lead to overestimates of the sectors emissions.

CARB staff first presented survey results in the form of the SORE2020 draft model during a CARB SORE Workshop in March 2020. During the workshop OPEI expressed concerns with the model and survey results, highlighting significant differences in past and proposed model assumptions. OPEI was provided survey data in April 2020 and immediately identified critical concerns with the survey dataset.

Based on the CSU-F survey data, as well as OPEI's own survey efforts, OPEI concludes that machine use and age metrics are not commonly tracked by operators for outdoor power equipment and/or that respondents do not understand the intent of the survey is to collect equipment run-time (vs. total task time), and therefore these metrics cannot be accurately assessed exclusively by a telephone survey. Based on OPEI's close analysis of the survey data, it is apparent that CSU-F survey responses were often inaccurate guesses, misleading, based on misunderstandings of the intent of questions, incorrectly recorded, or not reflective of average product age and use ("outliers"). Given these issues, OPEI strongly recommends that staff perform additional analysis of these responses. Specifically, to resolve these concerns, an in-service data collection program must be conducted to understand the accuracy of survey responses and develop an accurate dataset which could be used for modeling and to establish rulemaking needs. Without an additional study to understand the correlation of survey responses to real-world use the benefits included in the Proposed Rule must be heavily discounted.

Successful execution of the subject survey required in-depth knowledge of dozens of products by data analysts at both CSU-F and CARB, and a robust real-time quality control plan to be able to evaluate the real-world likelihood of responses. The survey datasets used to develop CSU-F's *Survey of Small Off-Road Engines (SORE) Operating within California: Results from Surveys with Four Statewide Populations* and draft SORE2020 models suggest additional product expertise and training were needed to execute the survey and develop the SORE2020 model. The original datasets used to develop the SORE2020 draft included residential responses of chainsaws and go-karts

being used 24-hours at a time, residential lawnmowers and welders being used 7 days a week 365 days a year, schools and dentist offices using portable generators 40 hours per week, 52 weeks a year, and landscapers using outdoor power equipment more than 40 hours *per employee per week* – sometimes more than 100 hours *per employee per week*. These responses, and many others like them, are not reasonable responses.

Due to concerns with the survey and underlying dataset, Industry conducted a deep-dive study of the dataset. Industry employed multiple tools to review data for outliers, including product expert review, correlation (triangulation) of survey responses, and a mathematical approach know as Interquartile Range (IQR) analysis. Based on the combination of these analyses techniques, Industry identified more than 200 potential outliers. Industry provided these outliers to CARB in June 2020. See Annex C.

In response to Industry outlier concerns, CSU-F and CARB conducted limited survey quality control investigations (years after the original survey). In July 2020 CSU-F attempted to contact *just three* of more than 3000 respondents, and more than 200 Industry-identified potential outlier respondents. CSU-F was able to discuss responses *with just one respondent*. This single follow-up resulted in CARB reporting "With the assistance of SSRC from CSUF, staff was able to clearly understand those response with relatively high usages. For instance, SSRC discovered that respondent R555 owns a large, 3-acre farming property, which correlated with the high annual activity for the various equipment reported." Offering that CSU-F and CARB staff "clearly understand responses with relatively high usages"[41] after publishing reports and draft models suggesting minimal product understanding and expertise is concerning.

Finally, to OPEI's knowledge, there is no evidence of any studies to correlate survey responses to real-world equipment use – for recent or past surveys. It is OPEI's understanding that no efforts were made to visit respondents, or otherwise seek to correlate survey comprehension, or reliability of the responses, including for test surveys and a limited number of surveys conducted in-person. The responses were assumed as factual, despite dozens of responses that suggest misunderstandings of the survey questions, and/or uncertain or untruthful responses, and/or errors by the interviewer.

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[41] *CARB 2020 Emissions Model for Small Off-Road Engines – SORE2020, pg 112*

OPEI confirms staff and industry members participated in survey questionnaire development with CARB in 2017 and 2018, and we believe this collaborative effort was helpful to develop the initial survey; however, that was Industry's only participation in the process. There was no additional training or data review/discussion until March 2020. Industry received the final survey report in November 2019, and the survey datasets themselves in April 2020. OPEI is confident had it participated in the training and test surveys along-side CSU-F and CARB staff that significant concerns could have been identified early on in the survey execution and collectively addressed. OPEI would have certainly drawn attention to test survey residential respondent R3 that reported using his lawnmower 12 hours per use and a riding mower 32 hours per year, despite having a landscaper or gardener 30 minutes per visit, and reporting several products older than 30 years old with plans to keep products for many more years (in some cases another 30 or 40 years), and reporting products to be used 12 hours per use and over 100 times per year. OPEI would have also drawn attention to R11 who provided identical age and use responses for three separate generators. A few of the outlier examples are discussed below.

EXAMPLE 12-1: Respondent Residential Survey Respondent 555 (R555)

R555 is single senior citizen male. The respondent reported living in a mobile or modular home with *no* lawn, garden or landscapable area. Despite these factors, and despite initially responding "don't know" to *55* survey questions, the *residential* respondent eventually reported using outdoor power equipment in excess of 125 hours/week. Responses included using one (of three) riding tractors 7 times/week for 2-3 hours/use, two electric chain saws 7 times/week for 2-3 hours/use, and a golf car 7 times/week for 1-2 hours/use. These products alone suggest equipment use of 9 hours/day, 365 days a year. This is not realistic. In addition, the respondent reports using a second tractor 4 days a week for 2-3 hours, a third tractor for 12 hours/use, using two gas-powered chain saws "more than 2-3 days" and "couple of days" and using multiple leaf blowers and string trimmers throughout the year. R555 also suggests using multiple generators several times a week, for hundreds of hours a year.

R555 is the lone respondent with whom CSU-F was able to follow-up. As a result of the follow-up CSU-F and CARB staff concluded “R555 owns a large, 3-acre farming property, which correlated with the high annual activity for the various equipment reported.” In follow-up, the respondent reported for three of four generators “they are all there in case of power outages at the farm,” including one generator originally reported to be used 50-70 times/year for 2-2.5 hours/use and a second generator used 3 times a week for “sometimes 5 minutes, sometimes 6 days.” (The inconsistency of this response should raise concerns – How can someone operate a single generator for 6 days in a row 3 days per week?) For reasons unknown, during the July 2020 follow-up, CSU-F did not ask to confirm the riding mowers or golf car responses, despite OPEI’s reported concerns.

OPEI believes the July 2020 response that all three generators are used for power outages is inconsistent with the January 15, 2018, survey responses, which include one generator used 3 times/week for “varies 5mins – 6 days”, a second generator used 5 times/year for 1 hour, and a third generator used 50-70 times/year for 2-2.5 hr/use. OPEI does not believe it is likely, nor would it be representative of normal homeowners to experience power outages 3 times a week, 52 weeks a year (156+ power outages a year) for prolonged periods. Nonetheless, in response, CARB ***randomly***, without sufficient explanation of why the data was deemed inaccurate, removed only the riding tractor reported to be used 7 times a week and ***changed*** the respondent’s response for the generator originally reported to be used 3 times/week for “varies 5mins – 6days.” CARB staff ***did not*** redact the generator data (like they did with the riding mower), or update the data based on a new number during the July 2020 follow-up, or use the average of the R555’s generator use, or use the average of the complete CSU-F dataset. CARB staff ***changed*** the response from “varies 5mins – 6days” to 2.25 hr/use, “based on the other generator usage,” despite one generator being reported a 1 hr/use and one being reported at 2.25 hr/use. The change of data is random. OPEI believes it is unconventional to change a survey respondent’s reply in this way. OPEI agrees the redacted / revised responses were not accurately reported or recorded, but CARB provides no rationale or data to support why these are inaccurate,

why some data was redacted, and some was changed, or why other higher than average responses from R555 are held as true and correct.

CSU-F provided OPEI the phone numbers of the three July 2020 follow-up respondents, including R555. OPEI was able to confirm with high confidence R555's property via an online telephone search and Google Maps.[42] See Figure 12-1 below.

OPEI's concerns that R555's responses are not realistic responses and are not reflective of average California homeowners are confirmed by the property view and remain unresolved by the action CARB undertook to address the outlier. First, CARB includes the 3-acre farming property with multiple structures in the residential dataset without appropriate bias adjustment. According to HomeAdvisor.com,[43] California has the second smallest average property and landscapable area in the U.S. – The average California lot size is 0.17 acres with a landscapable area of 0.13 acres. R555's property, at approximately three acres is ***18 times*** the average California property size – CARB does not adjust the results for this bias. In fact, because the respondent reported to be single and living in a mobile home, CSU-F assigned an adjustment weighting factor of 1.53 to their calculations for the number of pieces of equipment owned by this respondent. Moreover, to support the reported use, CARB suggests it's a "farming" property,[44] implying a large portion of it may be used for "farming" which would support the reported high use of outdoor power equipment. It is not. Finally, one of the images suggests the grass is brown, dormant. It is unclear if this is summer drought conditions or winter in Shasta county (Northern California), but such conditions would not require frequent use of lawn mowers or tractors (every day or every other day), string trimmers or other similar types of outdoor power equipment reported to be used frequently. Significantly, appropriate seasonal adjustment appears to be needed. CARB denied OPEI's recommendation included in its outlier summary that seasonal adjustment may be needed based on the residents location. There is nothing that supports the collective

[42] OPEI was able to correlate the first name according to the CSU-F follow-up tracking file *1710SOR_2020DataConfirmation_Outcomes_7-1-20*, the county from the survey dataset, and the property size reported to public records. Additionally, the several boats observed on the property in the Google Maps overhead correspond to R555 confirming he operated a marine research and development business on the property.
[43] https://www.homeadvisor.com/r/average-yard-size-by-state/
[44] According to CSU-F follow-up tracking file *1710SOR_2020DataConfirmation_Outcomes_7-1-20*, R555 refers to the property as "the farm".

or individual tractor use reported, annually *or* seasonally, or 35 hours/week of electric chain saw felling and limbing – responses which CARB staff did not redact.

Figure 12-1 – Arial views of R555 property

The accuracy and importance of R555's responses are substantive. The residential survey resulted in just 13 gas-powered tractors reported (just 10 out of 1202 residential respondents reported owing a lawn tractor), three of which were owned by R555. Inclusion of all 3 tractors in R555's response resulted in an increase of the Annual Use (average hours/year) from a reasonable 29 hours/year average in CARB's OFFROAD2007 model to an unrealistic 145 hours/year average in the first and second CARB SORE2020 draft models. Removing R555's first tractor (7x/week, 2-3 hr/use) but inclusion of R555's second tractor (4x/week, 2-3 hr/use) results in 83 hour/years average in the published CARB SORE2020 model, nearly 4 times previously surveyed and modeled estimate of 29 hours. Exclusion of all of R555's responses would result in a more reasonable average tractor use of 46 hours/year, *and decrease the residential tractor HC+NOx emissions by almost 50% versus the published CARB SORE2020 model.*

As a result of the collective concerns, OPEI concludes that R555 responses are not an accurate or realistic reflection of normal equipment use over any given day, week or year, and the complete R555 response should have been redacted.

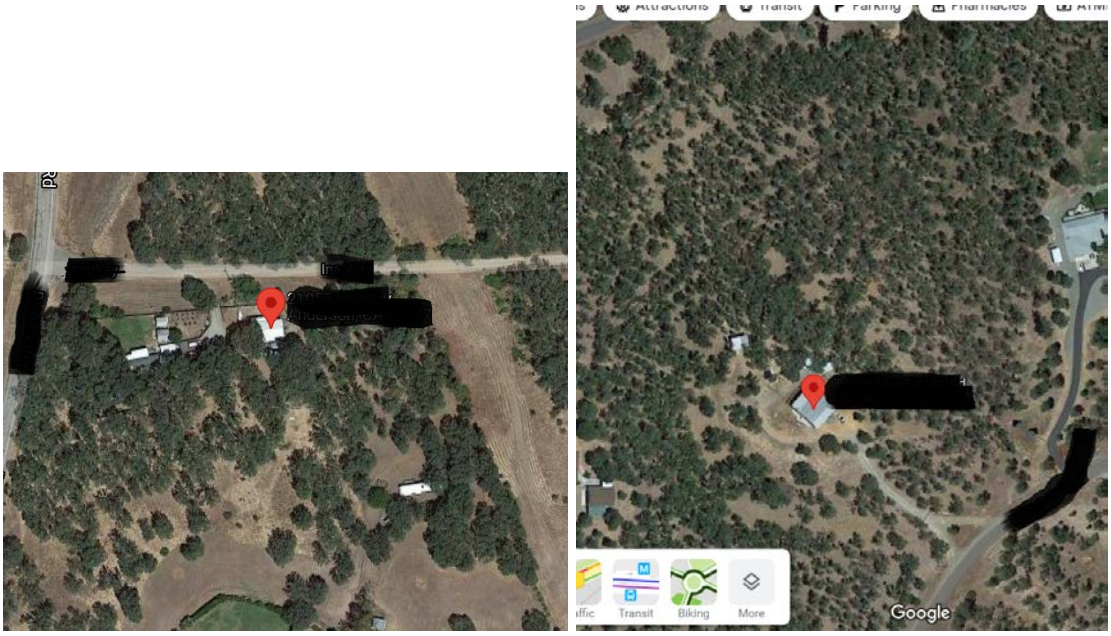
EXAMPLE 12-2: Respondent Residential Survey Respondent 658 (R658)

Residential respondent 658 (R658) reports abnormally high use of equipment. R658 reports lawnmower use for 14 hours/week, using three gas-powered chain saws a combined 10 hours/week, a gas-powered string trimmer 4 hours/week, 2 gas-powered pressure washers a combined 24 hours/week, an electric pump 12 hours/week, and a rare gas-powered welder 42 hours/week. These products alone result in more than 106 hours/week of equipment run-time. In total, R658 reports using gas-powered equipment more than 5,400 hours/year. *Regardless* of the property size or features, these are not reasonable responses.

R658 was the 2nd (of 3) "outliers" CSU-F attempted to reach in July 2020. Despite several attempts, and several answered calls, the respondents refused to cooperate with CSU-F staff in follow-up. Nonetheless, in response, CARB *randomly*, without sufficient explanation of why the data was deemed inaccurate, removed the lawnmower and welder reported being used 7 times a week. OPEI agrees the redacted responses

are not accurately reported, but CARB provides no logical rationale or data to support why these are not likely correct and why other higher than average responses are true and correct, *including more than 500 hours a year of chain saw use for residential purposes*.

In discussions with CSU-F, CSU-F provided OPEI the name and phone number of the three July 2020 follow-up respondents, including R658. OPEI was able to identify three properties that were linked to the respondent's phone number. See Image 12-2 below. One owner is reported to live at two significantly larger than average properties during the time of the survey, and a second owner is reported to live in a slightly larger than average property with minimal landscape and trees. These results pose significantly different concerns for the data.



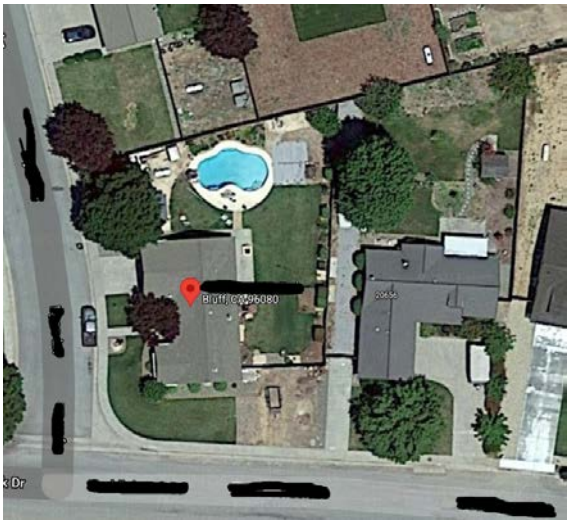


Image 12-2 – Ariel view of potential R658 properties

OPEI's concerns that the R658 responses are not realistic and are not reflective of average California homeowners are confirmed by the property overhead views and remain unresolved by the action CARB staff undertook to correct the data. According to on-line telephone number searches, the first potential respondent is reported to live at the top two images during the time of the survey. These properties are 3.64 and 10.37 acres respectively, ***21.4 and 61 times*** the average California property size. Importantly, CARB does not adjust the results for this bias. (Bias aside, OPEI does not believe more than 500 hours a year of chain saw use is reasonable for any homeowner.) The second potential respondent has a property with a lot size of 0.34 acres with 2 trees. This would not support any of the equipment use reported by the respondent, including 7 day a week walk-behind lawn mower use and more than 500 hours a year of chain saw use.

The accuracy of R658's responses are critical. R658 reports the 3rd highest residential chain saw use behind only R555 (see above), and R594 (OPEI has similar concerns with R594 reporting to use three chainsaws 200 hrs/yr ***each***). ***R658's responses alone resulted in an increase of residential chain saw Annual Use (average hours/year) by 3 hours***, an increase of approximately 15%. As a result, R658 is alone responsible for a 15% increase modeled residential chain saw emissions. Considering a

handful of similar outliers, OPEI believes residential chain saw emissions may be overestimated as much 4 times the CARB SORE2020 modeled emissions.

OPEI's concerns regarding the modeling data are not limited to residential respondent outliers. Commercial and Vendor/Landscaper responses likewise appear questionable many times.

EXAMPLE 12-3: Respondent Landscaper Survey Respondent 15 (V15-G2)

Vendor/Landscaper respondent 15 (V15-G2) reports abnormally high use of equipment. V15-G2 reports to be a single employee landscaper servicing 30 clients each once per week, for 2-4 hours per client – For a total of 90 hours every week. This is not reasonable or reflective of average landscapers. V15-G2 reports owning six chain saws, operating all six chain saws every day (SORE2020 assumes 6-days a week for calculations purposes) for more than an hour per chain saw (SORE2020 assumes 1.25 hour/use for "bulk" product reporting such as this), a lawnmower that they do not know how often or for how long they use, but when provided options said they use it at least once a day for 31-60 minutes per use, a string trimmer used 6 times per week for 2 hours per use, a hedge trimmer used once a month for 1 hour per use, 3 leaf blowers used at least once a week for 16-30 minutes per use. In total, V15-G2 reports 3710.09 hours of machine *run-time* a year, or *71 hours of run-time a week with a single employee and with just two 2-gallon gas cans refueled at least once a month but less than once a week.* Based on the above responses, V15-G2 reports that the single employee businessperson is *running* equipment more than 10 hours per day, six days a week.

These are not reasonable responses of equipment run-time, especially for chain saws (minimum 7.5 hours/day *run-time* every day for a single employee is not a realistic assumption for any one person, regardless of the business). Chainsaws typically have a 30-45 minute run-time on a single tank of gas,[45] meaning they would refuel every chain saw at least once per day. Additionally, chain sharpening is needed between refueling to maintain saw performance, which takes time. Also, chain saw work is dirty, resulting

[45] SEE YouTube LINK

in a lot of wood that needs to be cleared. Based on first-hand experience and studies discussed later in these comments, OPEI estimates at least half the amount of tree trimming / felling work for landscapers and homeowners can be attributed to clean-up, without consideration of splitting wood. With 7.5 hours of ***run-time*** a day, it is not unreasonable to assume 15 hours per day of just chain saw related time (including cutting and clean-up) for a single employee. The amount of gas reported similarly does not substantiate such use. It is not practical to assume the user refuels the units at the gas-station (most products are 2-cycle), and the cost of canned fuel would be an extraordinary assumption, considering they also carry gas cans. Finally, the respondent notes his wife conducts maintenance, but only reports one employee. This is inconsistent yet critically important as it relates to adjusting data for bias based on business size.

The accuracy of V15-G2 and other high hour use per employee responses are significant. OPEI attempted to calculate vendor/landscaper chain saw annual use using the CSU-F weighting factors; however, as a “single employee” landscaper, V15-G2 had the highest weighting factor of 2.25, which resulted in a weighted chainsaw use of 26,654 hours per year. This is not reasonable and ruins any opportunity to address survey bias.

The above examples are three of more than 200 potential “outlier” responses Industry provided to CARB in June 2020. Industry provided preliminary analyses of “outliers” in each category, including dozens in each Residential, Commercial (non-landscaper businesses) and Vendor (landscapers) categories. Unfortunately, CSU-F would not share additional residential or commercial business phone numbers with OPEI for additional “outlier” investigation which could substantiate responses.

To address Industry outlier concerns, CARB staff updated some data before the published CARB SORE2020 model. OPEI commends CARB staff for its consideration of Industry data and efforts to update the model after its initial draft publications; however, OPEI remains very concerned that the final datasets and CARB SORE2020 model significantly overestimate equipment use given OPEI findings that end-users likely overestimated equipment age and use, and limited and random CARB data

redaction. CARB staff decisions to remove select responses were random and inconsistent, and not based on real-world use of and/or expertise with outdoor power equipment. For example, CARB staff removed R482 lawnmower used 15 hours/use due to "atypical duration for that equipment", but left R3 lawnmower used 12 hours/use. CARB staff removed R518 chain saws used 24 hour/use, but left R284 who responded two chain saws were used 18 hours/use and 12 hours/use respectively. CARB staff removed V18-G4 (vendor/landscaper) leaf blower used 5 hours/use due to "high usage", and V138-G1 (vendor/landscaper) string trimmer used 5 hours/use due to "high use," but left ***many*** of other pieces of similar equipment reported to be used significantly longer than 5 hours/use. CARB removed several units from V362-G1 (vendor/landscaper) because inclusion of these units resulted in "the weekly operating hours highly exceeded the total employee work hours"; however, CARB provided no evidence of what expected employee work hours were, how "work hours" typically relate to equipment use (landscapers typically need time between jobs, which equipment is not operating during), or why one piece of equipment was completely removed, verses impeding a piece of data with an average, or lowering the use of ***all*** the respondents reported equipment in a way that would bring the overall equipment use below "total employee work hours[46]". Similarly, CARB removed V2-G4 (vendor/landscaper) 2 hedge trimmers used once/day for 1+ hours, but left identically used hedge trimmers and leaf blowers, apparently to reduce the hours of equipment run-time per employee from 53 hours/employee to approximately 40 hours/employee. The removal of these products, versus others is random and impacts the average use of products across the dataset. Furthermore, the single employee V2-G3 reported servicing 33 clients a week for a total of 25 hours, which CARB did not account for in redacting data to result in approximately 40 hours/week/employee of equipment use. Despite removing product from V362-G1 and V2-G3 due to "operating hours highly exceed the total employee work hours", CARB made no adjustments to V15-G2 discussed above, whose responses resulted in more than 71 hours per week of equipment run-time for the single employee landscaper. While OPEI agrees a reasonable assumption for a normal work week is 40 hours, we do not believe it is reasonable to assume landscaping employees would ***run***

[46] *2020 Emissions Model for Small Off-Road Engines – SORE2020, Table J1 & pgs. 113-114*

equipment non-stop for a full 40 hours per week. At a bare minimum, time between jobs, breaks and refueling would need to be considered.

It is also unclear if when redacting ("Remove…") data CARB assumed values to be zero (0 hours), meaning the equipment was indeed real, but was not being used, or if the use was deleted all together. This is significant because assuming they still own the equipment, setting the use to zero could lower the average more than just removing the value all together. Additionally, if the units were redacted ("removed") for the purpose of determining Annual Use and age-distribution, these units should have also been removed form the CSU-F and CARB estimates for populations. Based on no changes in the populations from the May 2020 draft to the September 2020 final model, it does not appear CSU-F or CARB re-calculated fleet sizes with these units "removed".

In highlighting these examples, it must be noted that CARB redacted only select responses by particular respondents, not entire respondents. In removing only select responses, CARB cherry-picked data and offered little or no rational as to why some of one individual respondent responses were redacted, while other responses for the same individual were held as true and correct, including some cases where landscaper equipment use was identical for equipment removed and equipment retained in the dataset.

Industry Follow-up with CSU-F

On Friday November 13, 2020 and Friday, November 20, 2020 OPEI and EMA staff met virtually with the CSU-F Social Science Research Center (SSRC) Director assigned to the project to discuss development and execution of the survey. While OPEI and EMA appreciate the candid discussion with the SSRC staff, the responses highlight OPEI's concerns about the quality of the dataset and survey execution, and the use of this data to develop SORE emissions models for rulemaking purposes.

During the November 13, 2020, call the Director noted responses like chain saws and go-karts being used 24 hour/use were "obvious outlier data points" and noted that it was the job the CSU-F analysis to review data for quality. The Director noted outlier data may be imputed (to the average value) or such datapoints are thrown out altogether. As previously discussed, this did not happen. No quality control was

conducted until after Industry was allowed to review the data, several years after surveys were completed. OPEI is concerned as to why quality assurance and quality control of the data this did not happen earlier. Regarding accuracy of interview responses, the Director noted “sometimes people are just snarky or sarcastic, or intentionally misleading,” adding that she wondered if these results should have been included in the CSU-F analysis.

During the November 20, 2020 meeting, when discussing residential respondents R659 and R695, both reporting to use chain saws 24 hour per use, responses recorded within just one survey day of each other, the Director expressed concerns that the interviewer could have extrapolated “24 hrs/use” from a more general response, such as “all day.” This admission was contrary to what the Director offered during the November 13, 2020 call, that interviewer extrapolation of non-specific responses (such as “I use it all day” to “8 hours” or “24 hours”) would not happen, and that interviewer would have pursued more specific answers. The Director also addressed OPEI’s concerns about repetitive (duplicative) responses across multiple products and questions, noting that she found the patterns that Industry pointed out “a little alarming, but not surprising as people are just trying to get though the survey as quickly as they could.” The Director noted that surveys like this are prone to respondents that think “I don’t want to engage in this survey,” which creates a tendency of “speeders” who provide pattern non-random data. Regarding landscaper responses, the Director noted that landscapers do not appear to account lunch, time between jobs, etc. when estimating use. The Director noted that short of shadowing or tracking with a journal, an accurate collection of use data may be unfeasible. The Director responses support OPEI’s conclusion that the survey responses are not reliable.

During the November 20, 2020 call, the Director also discussed the quality assurance/control for conducting the survey. The Director noted they would typically look for “don’t know” patterns, which she admits “got through us,” and (prefaced with “this is going to kill me”) outliers and missing data. Again, OPEI is concerned these practices were not followed for the survey.

The Director noted that CARB staff identified no data as “problematic” as it was provided to them during the ongoing survey, during development of the CSU-F survey

report, or during the development of CARB modeling, and that no data was discarded or imputed when compiling the data.

A Better Survey Method

In its SORE2020 model report CARB staff offered the following view regarding surveys:

"Since surveys are based on the recollection of past events, another way to obtain accurate data on usage would be to install a data logger on a pool of randomly selected SORE equipment for a designated duration period and download real-word data for analysis. However, such a study would be time-consuming, labor intensive, and cost-prohibitive for a large sample size;" and

"While staff acknowledges the level of uncertainty associated with surveys, this method is currently considered the best available approach to estimate the equipment usage for the purpose of inventory development. If there are ample resources available in the future, staff may consider adding the data logger component as part of the data collection efforts."

OPEI agrees that a data-collector based survey is better and necessary to accurately understand the SORE sector emissions, and in-turn accurately model emissions, cost and health benefits of *any* proposal. While the cost will be more, at a minimum, some data-collection is needed to understand the correlation of survey responses to real-world use. Neither CSU-F nor CARB have ever conducted such a survey response to real-world use correlation study, including question and data-collection based surveys used to develop SORE2020 and the Proposed Rule. The Proposed Rule has estimated costs and benefits in the *billions of dollars*, yet is based largely on a $250,000 telephone survey in which CSU-F staff raises major concerns about and CARB staff acknowledges has significant levels of uncertainty and that better survey methods exist.

Comment 12 Summary

Based on the CSU-F survey data, as well as OPEI's own survey efforts, OPEI concludes machine use and age metrics are not commonly tracked for outdoor power equipment, and therefore cannot be accurately assessed by a telephone survey. OPEI concludes CSU-F survey responses were often inaccurate guesses, and/or misleading, and/or incorrectly recorded, and/or not reflective of average product age and use, and/or that the intent of questions was not understood, and/or not reflective of "average" California households, collectively "outliers", and in-turn require additional analyses. These "outliers" have significant impact on the calculations of annual use and age distribution, both of which lead to overestimated 'baseline' emissions if they are not accurate. Based on these unresolved outliers, SORE2020 significantly overestimates the sectors emissions contributions and emission reductions needed to meet federal air quality standards. As a result, there is no factual evidence to support that the Proposed Rule reductions are needed to address compelling and extraordinary conditions, and therefore the Proposed Rule is arbitrary and capricious or without a reasonable or rational basis.

COMMENT 13 – CARB SORE2020 overestimates product Annual Hours (hour per year). CSU-F survey and CARB SORE2020 emission inventory model are the datasets at the core of the Proposed Rule. SORE2020 is used to determine emissions, cost and health benefits described in the Proposed Rule. However, the CSU-F survey, the underlying dataset for much of SORE2020, does not accurately reflect real-world SORE equipment age or use patterns. Based on unreliable, inaccurate, and at times unbelievable data, SORE2020 significantly overestimates the sectors emissions contributions and emission reductions needed to meet federal air quality standards.

Annual Use is a critical emission model factor. Exhaust emissions factors are directly multiplied by the Annual Use (average number of hours of use per year, per type of equipment and application/use) to determine yearly product emissions. Additionally, both exhaust and evaporative emissions deterioration factors are

determined by the number of hours equipment is operated. Consequently, overestimates in Annual Use result in greater overestimates of exhaust emissions.

OPEI Survey Correlation

As previously discussed, OPEI concludes CSU-F telephone survey metrics, including how often and for how long equipment is used are not typically tracked for outdoor power equipment, and therefore, cannot be accurately assessed by a telephone survey. CSU-F survey responses were often inaccurate guesses, and/or misleading, and/or incorrectly recorded, and/or not reflective of average product age and use, and/or that the intent of questions was not understood, and/or not reflective of "average" California households. Based on surveys conducted, OPEI concludes survey responses are more frequently overestimates of actual age and use, and in-turn require additional analyses. For these reasons, CARB SORE2020 overestimates the sectors emissions and the benefits of the Proposed Rule.

In August 2020 OPEI staff initiated an effort to better understand survey comprehension, responses, and real-world use correlation. To achieve this, OPEI approached landscapers in the field and asked them to participate in a brief survey about their equipment use. Staff identified itself as OPEI, noting that it was collecting product information to better understand equipment use. Respondents were given a $20 fast food gift certificate for their participation. OPEI asked landscapers the same CSU-F survey use and age questions for commercial riding and walk-behind mowers. OPEI focused exclusively on these equipment types because they are typically instrumented with hour meters. OPEI was able to follow-up with most landscapers several times and gather additional hour meter readings. Based on reported and confirmed equipment age and hour meter readings, and follow-up readings, OPEI was able to calculate and compare response age-hours and weekly use (hours) to survey responses to gauge respondents' understanding of the survey questions and real-world use correlation. The results are clear, respondents grossly overestimated equipment use. Given this, SORE2020 significantly overestimates the sectors emissions and the benefits of the Proposed Rule.

OPEI surveyed 7 landscaping crews in Grand Rapids, MI and 2 municipalities / landscapers in California. In total, OPEI surveyed 22 commercial riding and walk-behind mowers, for which OPEI was able to conduct at least one follow-up visit for 17 of these mowers. Of the 20 units surveyed for which the hour meter was operational, the survey response age-hours (frequency of use x length of use x age) exceeded the hour meter reading on 18 units. The reported age-hours exceeded the real-world hour meter readings by ***thousands*** of hours in many cases. In the 2 cases where the hour meter readings exceeded the reported age-hours, both operators noted the units were used less frequently before providing responses, and minimally understated the use. For the 17 units for which OPEI was able to conduct follow-up inspections, where an accurate weekly use estimate could be calculated based on hour-meter readings, OPEI calculates that on average ***the respondents overestimated use by 135-150%,[47] or more than double the actual use hours***. See OPEI Survey Results in Annex D.

It is difficult to say why use responses are so grossly overestimated. Based on the response, OPEI speculates respondents do not discern time spent between jobs, and/or on breaks, and/or time using other equipment when considering responses. In many cases, it appears they respond as if they ***run*** the subject piece of equipment the entire day, without consideration of breaks, yard preparation/clean up time, or time using other equipment. OPEI believes this could be true for respondents of all categories considering the responses and overall high average Annual Use factors in SORE2020. A homeowner may not discern the time a lawnmower is ***running*** versus the time they are working outdoors on yardwork. This conclusion could explain why several landscaper respondents in both the OPEI and CUS-F surveys reported using equipment 5-6 days/week for 6-8 hours a day. In reality OPEI found these units were used just 5-10 hours/week. For example, survey Landscaper1 reports using a walk-behind mower 5-6 days/week for 10 hours/day, for a calculated total of ***55 hours/week***. However, based on five hour meter readings between August and October 2020, the unit

[47] OPEI provides a range here because 2 units were observed being used by different crews (of the same respective companies). As discussed in the comments, surveying separate users for the same units resulted in significantly different survey response. As a result, OPEI calculated the average use considering responses for the same machine in separate calculations, using the high responses to calculate the high average of 1042 hr/year, or 152% above the hour meter average of 414 hr/year, and the low response to calculate the low average or 972 hr/year, or of 135% above the hour meter average of 414 hr/year.

averaged *20.5 hours/week* (the highest weekly average of all units tracked), overestimating use by almost triple. The landscaping crew that maintains municipal property in South Pasadena reports to use its ZEE ZTR a calculated total 17.5 hours/week, but based on four hour meter readings between August 2020 and September 2021, the unit averages at maximum 10.5 hours/week, overestimating use by almost double versus its survey responses.

The OPEI survey correlation study yielded a few additional findings. First, when OPEI surveyed different respondents for the same units, responses were significantly different, all drastically overestimating equipment run times. For example, when OPEI surveyed a crew from Landscaper5 on September 1, the respondent reported using a walk-behind mower 6 days/week for 8-9 hours/day (51 hours/week or 1636 hours/year), but when OPEI surveyed another crew from Landscaper5 on September 22, the respondent reported using the same walk-behind mower 5 days/week for 6-7 hours/day (985 hours/year). Both respondents significantly overestimated the use based on the hour meter readings of 374 and 423 hours at the respective interview times, and based on the calculated annual use of 643 hours by extrapolation of four hour meter readings. A unit from Landscaper6 was surveyed twice with similarly inconsistent and overestimated responses. Additionally, when OPEI first surveyed Landscaper6 on September 4, the respondent offered a specific unit was “old, 2005,” but his colleague interrupted offering the unit was “much newer, 2011 or 2012.” These inconsistencies support OPEI’s reported concerns that minutes or hours of use are not accurately tracked, and/or that the survey questions are not clear, and that as a result, the survey does not reflect real-world equipment use. Second, the responses from South Pasadena highlight concern about reported use and actual use. Specifically, the respondent stated that the ZEE riding mower (with a fixed battery system) was used 5 hours/use, but later responded that the battery lasted 3-5 hours. These responses are inconsistent and should raise questions. (For additional context, the respondent from Ojai with the same ZEE unit responded the battery lasts 2.5 hours.) This is similar to OPEI’s survey outlier investigation fuel correlation which suggested insufficient fuel for the number of hours of use reported for many respondents. Third, several of the OPEI surveyed units had engine replacements. Multiple respondents offered this information

without prompting, and OPEI was able to confirm several others by inspection of the emissions label. OPEI expressed this concern to CARB both before and after the survey. It is not uncommon for professional landscapers to rebuild or replace engines, especially on lawnmowers and chain saws, which in-effect resets the engine emissions to new and must be accounted for in modeling to not overestimate the sector's emissions. CARB modeling does not account for this common landscaper practice based on its survey findings. Finally, the survey questions resulted in almost every respondent providing non-specific responses at least once, including responses such as "everyday," "almost all day," or "same." This highlights OPEI's previous concern that interviewers may have been confronted by these responses frequently and may have extrapolated their own understandings of these responses. OPEI is concerned that no CARB or CSU-F training materials addressed this, and that there was no mention of non-specific responses in the survey report, despite multiple responses having unreasonable hours of use (for example residential chain saws being used 12, 16 or 24 hours per use) and many identical responses from a respondent for the same and different equipment types. Regarding OPEI surveyed units for which respondents initially responded "same," hour meter readings ***always*** resulted in significant real-world equipment usage differences.

Unfortunately, due to the COVID pandemic, OPEI was unable to conduct additional research. However, the investigation strongly supports OPEI's concerns that respondents do not accurately track equipment use in the survey terms, and consequently grossly overestimate equipment use, and in-turn equipment emissions. At a minimum CSU-F and CARB must consider additional survey correlation to understand the accuracy of survey results and the impact of survey responses on emissions modeling before proceeding with SORE rulemaking.

Additional Analysis

To further understand real-world equipment use OPEI applied mathematical techniques and studied YouTube videos and Facebook pages for some applications. From these analyses, OPEI has determined CSU-F survey-based Annual Use averages

(hours/year) are significantly overestimated and result in SORE2020 overestimating the sectors emissions.

Example 13-1: Residential Lawnmowers

According to HomeAdvisor.com, California has the second smallest average property and landscapable area in the U.S. The average Californian has an average lot size of 0.17 acres and a landscapable area of 0.13 acres. Exmark Manufacturing, a leading manufacturer of lawnmowers, hosts a blog committed to productivity which includes a productivity table based on mower size, speed, and cutting area.[48] The table reports a 21" lawnmower, at 80% cutting efficiency, at 2.0mph[49] will cut 0.34 acre per hour. At 3.0mph the 21" lawnmower will cut 0.51 acre per hour. SORE2020 estimates 45 minutes per-use for the average residential lawnmower. Comparing the productivity chart to the SORE2020 model, a 21" lawnmower at 80% efficiency will cut 0.26 and 0.39 acre respectively in 45 minutes, 2 to 3 times as much area as the average California residential property size. Based on this, SORE2020 likely overestimates average residential lawnmower use by 2 to 3 times, and in-turn overestimating the product emissions by more than 2 to 3 times.

Example 13-2: Residential Chain Saws

SORE2020 estimates the average homeowner chain saw is used 18 hours per year, 1.8 hours per use, and that each homeowner that owns a chain saw owns 1.41 chain saws. In summary, CSU-F and SORE2020 estimate that the average homeowner that owns a chain saw operates (run-time) the units for more than 25 hours per year. This is not reasonable. In comparison, OFFROAD2007 estimated a more reasonable 4 hours year use.

During the pandemic OPEI conducted extensive research on YouTube to better understand chain saw use. Additionally, staff purchased 2 chain saws to understand use, felling and cutting multiple trees at a nearby 23-wooded-acre residential property. 18 or 25 hours of usage per year is not reasonable for the average homeowner. Cutting

[48] https://blog.exmark.com/2015/04/understanding-productivity/

wood comes with several related tasks - cutting wood, and/or moving wood, and/or cleaning and disposing of wood, and/or splitting and stacking wood. It is OPEI's belief that many users may not differentiate these activities when responding to a question such as "how often do you use your chain saw" and "for how long each time do you use your chain saw." Users may confuse the tasks related to cutting wood with actual chain saw run-time.

OPEI studied a couple that lives "off the grid" in Alaska and hosts a YouTube channel. In one episode, the couple documented its collection of firewood for the season over three days; the process of bucking (cutting), moving, splitting and stacking wood.[50] The couple cut and moved logs on day one, split logs on day two and stacked logs on day three. The result of the work was 4 cords (128 cubic feet) of cut and stacked wood, enough to last them for the year. Watching the video, based on daylight, commentary, cutting, refueling and sharpening, and moving wood, OPEI estimates approximately four hours of saw run-time, or one hour per cord of wood – for a couple that lives off the grid and uses the wood year-around for heat and cooking.

OPEI additionally studied a part-time firewood business in Wisconsin that hosts a YouTube channel.[51] In multiple episodes, the business owner reports cutting a truck load of wood, or approximately 12-13 cords, in 8-12 hours.[52] [53] In response to one episode about firewood delivery, the host offers that his brother, who relies exclusively on a wood burner for heat in Wisconsin, uses 7-8 full cords of wood a year,[54] or approximately 7-8 hours of chain-saw run-time.

OPEI does not believe the Alaska couple or Wisconsin wood burning stove examples are reflective of the average California household, let alone 3 to 4 times this use (25 hours per year for the average California chain saw owner) as indicated by the CSU-F survey and SORE2020. OPEI is significantly concerned about chain saw use reports from R205 (104 hours/year), R289 (285 hours/year), R500 (111 hours/year), R594 (600 hours/year), R607 (144 hours/year), R658 (520 hours/year), R855 (156

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[49] According to healthline.com, the CDC estimates the average walking speed to be 3-4 mph. https://www.healthline.com/health/exercise-fitness/average-walking-speed#average-speed-by-sex
[50] https://www.youtube.com/watch?v=9_nH1yqEtbo&t=383s
[51] https://www.youtube.com/c/InTheWoodyard
[52] https://www.youtube.com/watch?v=mXSes4wPuCA&t=517s
[53] https://www.youtube.com/watch?v=JuNu0NawKoo&t=43s

hours/year), R971 (156 hours/year), and R1086 (96 hours/year) and the impact these outliers have on the "average" use overall in the model. Additionally, OPEI believes many residential chain saws are purchased for storm clean-up, for a one-time or very limited use basis, which is not reflected in the CSU-F responses or SORE2020 average. Finally, OPEI is concerned some survey users may have properties many times larger than the "average" California landscape, and their use may not be reflective of the average homeowner with adjustment for bias. Based on the data collected, and with consideration of the average California landscape size, OPEI is concerned SORE2020 may overestimate average residential lawnmower use by four or more times, and in-turn overestimate the product emissions estimates by more than four or more times.

Example 13-3: Residential Riding Mowers

SORE2020 estimates the average homeowner riding mower is used 83 hours per year. The CSU-F residential survey resulted in just 13 gas-powered tractors reported (just 10 out of 1202 residential respondents reported owing a lawn tractor), three of which were owned by R555. In comparison, CARB OFFROAD2007 assumed an average of 29 hours per year. First, OPEI is concerned such an average could be statistically relevant with just 12 tractors data (CARB removed one of R555 units). Second, inclusion of all three tractors in R555's dataset resulted in an increase of the Annual Use (average hours/year) from a previously assumed 29 hours per year average to an unrealistic 145 hours per year average in the first and second CARB SORE2020 draft models. Removing R555's first tractor (7x/week, 2-3 hr/use) but inclusion of R555's second tractor (4x/week, 2-3 hr/use) results in 83 hour/year average in the published CARB SORE2020 model – nearly three times previously surveyed and modeled estimate of 29 hours. Exclusion of all of R555's responses would result in a more reasonable average tractor use of 46 hours/year *and decrease the residential tractor HC+NOx emissions by almost 50% versus the published CARB SORE2020 model.*

To better understand riding mower use OPEI initiated a study of warranty analysis from major manufacturers. OPEI focused on riding equipment because it typically has hour-meters and the unit hours reported for warranty are likely more

[54] See YouTube LINK

accurate. Of 216,106 50-state residential zero-turn riding mowers included, the average ranged from 36 to 80 hours/year depending on a series of reasonable averaging assumptions.[55] OPEI believes 36 to 48 hours a year reflects the most reasonable residential use assumptions. Of 201,659 50-state residential lawn tractors included, the average ranged from 36 to 60 hours/year depending on series of reasonable averaging assumptions[56]. OPEI believes 36 to 48 hours a year reflects the most reasonable residential riding mower use assumptions. Collectively, based on OPEI analysis of more than 400,000 warranty claims, an average of 40 hours a year may be more reflective of the average. Based on this, and with consideration of the average California landscape size, OPEI is concerned the SORE2020 83 hour per year average may overestimate average residential riding mower use by more than twice the real-world use, and in-turn overestimate the product emissions estimates by more than double.

Example 13-4: Wood Splitters

SORE2020 estimates the average homeowner wood splitter is used 48 hours per year. The CSU-F residential survey resulted in just one gas-powered wood splitter reported (just one out of 1202 residential respondents reported owning a wood splitter). In comparison, CARB OFFROAD2007 assumed an average of 1.1 hours per year. First, OPEI is concerned such an average could be statistically relevant with just one wood splitter data point. Second, previously mentioned studies suggest wood splitter productivity of approximately one to two cords per hour.[57] As previously noted, a couple living off the grid in Alaska uses less than four cords a year, while a homeowner in Wisconsin using a wood burner to heat his house uses between 7-8 cords a year. It is unclear to OPEI how or why the average California residential wood splitter owner could or would cut 24-48 cords of wood every year for non-income generating use. OPEI

[55] Residential ZTR as reported by the OEM. Since data was reported for 50-states and seasonality could not be accurately adjusted, OPEI focused on warranty claims between 11 and 13 months and 23 and 25 months. Additionally, considering reasonable use and the potential that some "Residential" units may be used for commercial products, OPEI averaged the dataset with and without units reported to be used in excess of 15 hours per month.

[56] See footnote 55. Additionally, tractors were not subcategorized into commercial or residential for the purpose of reporting to OPEI.

[57] https://www.youtube.com/watch?v=fkgTpmBmd1I&t=12s

believes that 48 hours a year, based on one survey response, is a gross overestimation of average residential wood splitter use, and in-turn so are the modeled emissions.

Example 13-5 Business and Landscaper Equipment Age vs Miles Comparison

Many respondents reported unrealistic equipment age-hours (age * hours/year) for products. While not exclusive to commercial and landscaper use, high age-hour responses were more common by business and commercial users. For example, V30-G1 reports four lawnmowers each with 13,104 hours, three leaf blower each with 10,920 hours and a riding mower with 10,920 hours. V115-G1 reports a lawn mower with 8,320 hours and a leaf blower with 14,560 hours. V151-G1 reports a riding mower with 18,720 hours. V174-G1 reported a lawn mower with 17,680 hours and two leaf blowers with 8,736 hours each. V196-G1 reported a lawn mower with 15,288 hours and a leaf blower with 6,552 hours. V218-G reported a hedge trimmer with 8,112 hours. V284-G1 reported 5 identical chain saws with 7280 hours each. V324-G1 reported a riding mower with 18,200 hours. V376-G1 reported two hedge trimmers, one lawnmower and two string trimmers *all with an identical* 10,400 hours. The LA PD reported owning a utility vehicle with 23,000 hours. There are many more examples. These are not reasonable responses. See Annex D for real-world examples of landscaper equipment age, use and hours in comparison to reported responses.

To additionally understand the likelihood of commercial survey responses, OPEI evaluated the number of engine revolutions needed to reach the reported age-hours. OPEI then compared these revolutions to those of an automobile operating under average conditions for context and comparison. A string trimmer reported to be used 1820 hours (87,360,000 two-stroke engine revolutions), such as two of the three units reported by V3-G2, would be equivalent to a car running at 2400 rpm and 40 mph for 250,000 miles. The third string trimmer reported by V3-G2 at 5460 hours (2,620,800,00 two-stroke engine revolutions) would be equivalent to a car running for 1,050,000 miles. A string trimmer running 10,400 hours as reported by V376-G1 would be equivalent to a car running more than one million miles. Chain saws, leaf blowers and hedge trimmers operating at similar engine rpm ranges would result in comparable auto miles traveled. A lawnmower reported to be used for 3650 hours (744,600,000 four-stroke engine

revolutions), such as the unit reported by V10-G3 would be equivalent to a car running for approximately 200,000 miles. While OPEI is aware of riding lawnmowers engines with more than 3650 hours of use, we do not believe it is reflective of the average, much like an auto of 200,000 miles is not reflective of average. A lawnmower reported to be used 11,648 hours (2,376,192,000 four-stroke engine revolutions), such as the four units reported by V89-G1 would be equivalent to a car running approximately 650,000 miles.

Respondent V30-G1 reports ***four*** lawnmowers each with 13,104 hours, equivalent to approximately 750,000 car miles; ***three*** leaf blower each with 10,920 hours, equivalent to approximately 1M – 1.25M car miles (depending on if blowers are 2-stroke or 4-stroke); and a riding mower with 10,920 hours, equivalent to approximately 600,000 car miles. V30-G1 responded that they conduct maintenance "only when it stops working or breaks." These are not realistic responses.

In its SORE2020 final report CARB discounts OPEI's calculations and concerns offering that the survey was "intended to collect only the most recent activity from the past year and should not be assumed constant for all previous years, as external factors may cause variations in past usage," however in the same paragraph CARB offers "as noted in Appendix E, the usage of SORE equipment varies with age, with new equipment used more frequently as compared to older equipment." These statements are contradictory to CARB discounting OPEI's age-hour calculations. ***If*** it is assumed equipment is used more in its earlier life, than OPEI's estimates of annual use x age are ***underestimates*** and therefore conservative. The examples above are minimum age-hour calculations, further supporting OPEI's concerns that responses are not realistic. Furthermore, despite stating that the survey "should not be assumed constant for all previous years" in the SORE2020 report, CARB staff later uses the data in a way identical to OPEI's analysis to determine the 75th percentile durability period of survey responses and to suggest that much higher durability periods are needed. Of course the survey would suggest that, littered with dozens of products reported to far exceed the more sophisticated automotive engine technology.

Collectively, based on OPEI analyses of field units summarized in Annex D, with real-world product expertise, and with auto comparisons, it is clear that SORE2020

likely overestimates average use and age of the fleet by several times, and in-turn overestimates the product emissions estimates significantly.

COMMENT 14 – SORE2020 overestimates product Age (year), and in-turn engine durability periods. CSU-F survey and CARB SORE2020 emission inventory model are the datasets at the core of the Proposed Rule. SORE2020 is used to determine emissions, cost and health benefits described in the Proposed Rule. However, the CSU-F survey, the underlying dataset for much of SORE2020, does not accurately reflect real-world SORE equipment age or use patterns. Based on unreliable and inaccurate data, SORE2020 significantly overestimates the sectors emissions contributions and emission reductions needed to meet federal air quality standards.

Age is a critical emission model factor. Age represents the age of the equipment in years. Annual hours are multiplied by Age to determine how much equipment's emissions deteriorate each year for modeling purposes. The Age-based deteriorated emissions are then multiplied by the Annual Hours to determine yearly product emissions. As a result, overestimates in equipment Age result in overestimates in the aged emissions factors used to calculate annual emissions.

Based on the CSU-F survey data, OPEI concludes machine use and age metrics are not commonly tracked for outdoor power equipment, and therefore cannot be accurately assessed by a telephone survey. OPEI concludes CSU-F survey responses were often inaccurate guesses, and/or misleading, and/or incorrectly recorded, and/or not reflective of average product age and use, and/or that the intent of questions was not understood, and/or not reflective of "average" California households, collectively "outliers", and in-turn require additional analysis. These "outliers" have significant impacts on the calculations of annual use and age distribution, both of which will result in overestimated emissions deterioration and 'baseline' emissions if not accurate. Based on outlier data, SORE2020 significantly overestimates the sectors emissions contributions and emission reductions needed to meet federal air quality standards. As a result, there is no factual evidence to support that the Proposed Rule reductions are

needed to address compelling and extraordinary conditions, rendering the rule is arbitrary and capricious or without a reasonable or rational basis.

This comment is addressed in additional technical detail in Annex E.

COMMENT 15 – SORE2020 overestimates product Annual Use (hours per year), Age (years) and engine durability periods. In calculating emissions factors from survey data, CARB did not apply appropriate weighting factors to use and age responses to address survey bias.

Survey data must be weighed to account for bias. CSU-F and CARB developed criteria to address bias and to weight survey data. OPEI is concerned that the criteria for addressing bias are unsupported and that CARB did not address bias in evaluating use and age of surveyed equipment. Consequently, the CSU-F survey and SORE2020 are not reflective of real-world average use or age.

CSU-F and CARB identified two variables of interest by which data diverged for the residential survey: resident type and household size.[58] These criteria were used to address bias resulting from representativeness. However, no research was presented, nor does the survey support that these are the correct or necessary factors to weight residential outdoor power equipment survey responses. OPEI understands resident type plays a role, in-part, as apartment residents are unlikely to have outdoor power equipment. However, not all residential types should suggest different uses. For example, there is no evidence to suggest that a single-family home would trend differently than a manufactured mobile home and that they need different weighting. Additionally, OPEI does not believe there is significant evidence to assume the household size (number of people) influences the weight of outdoor power equipment a respondent may have. In fact, R555 discussed above, with one of the largest residential fleets, with one of the highest residential uses, has the second highest weighting factor due to reporting he was single and resided in a manufactured or mobile home.

Unfortunately, property size was not considered for the residential survey and to address bias. In hindsight, OPEI believes the landscapable area of home may be an

[58] *Survey of Small Off-Road Engines (SORE) Operating within California: Results from Surveys with Four Statewide Populations,* May 15, 2019, pg 393.

appropriate method for considering bias as it relates to many types of outdoor power equipment. For example, California has the second smallest average property (0.17 acres) and landscapable (0.13 acres) area in the U.S. It is reasonable to believe that homeowners with landscape sizes above average will use outdoor power equipment longer than the homeowner with the average 0.13 acre. In the case of R555, CSU-F, and OPEI were able to confirm the respondent's property size of 3 acres, ***18 times*** the average California property size. It is reasonable to believe, based on the property being a "large, 3-acre farming property," outdoor power equipment use such as lawn mowers and chain saws would be above average; however this important factor was not considered when developing the survey, including foresight into how survey bias would be addressed. The same holds true for R658 discussed above who may have resided on a 3.64 and/or 10.37-acre property, ***21.4 and 61 times*** the average California property size, and reported chain saw use of more than 500 hours of chain saw use annually. Including property size in the survey would also have provided another opportunity for analysts to evaluate responses for reasonableness.

Similarly, for the business survey response, CSU-F and CARB identified two variables of interest by which data diverged: industry and number of employees. However, there is no evidence, nor does the survey support that these are the correct and necessary factors to weight commercial outdoor power equipment survey responses. OPEI understands industry in-part plays a role; a golf course and an auto shop likely will have significantly different equipment use patterns. However, OPEI does not believe there is significant evidence to assume the number of employees influences the weight of outdoor power equipment a respondent may have. Some survey responses have high numbers of employees with no landscape area (they may be in a mall or office building), while other survey responses had small numbers of employees with significant landscape area (such as a dry storage marina).

OPEI does concur that business size may be an appropriate measure of bias when surveying landscapers. It may be safe to assume a landscaper with more employees would have higher equipment use; however, the subsectors of "landscaper" should be additionally considered when considering bias. The Census definition of landscaper includes a wide range of businesses that do not likely use equipment

similarly, such as a traditional yard care landscaper versus tree-trimmers vs landscape architects. If the survey responses are overrepresented with tree trimmers, it's reasonable to conclude that chain saw and hedge trimmer use may be overrepresented. These biases also need to be accounted for by CARB.

While additional factors should be considered, OPEI is concerned the landscaper survey may not accurately address bias by company size. This is an important factor because according to the CSU-F survey and U.S. Census, 86% of landscapers are sole proprietorships (single employee businesses) and survey data must be weighted appropriately. According to survey results, just 32.9% of those surveyed were sole proprietorships, and 67.1% were businesses with employees. As a result, a weighting factor of 2.25 was applied to sole proprietorships. However, in the SORE2020 report, CARB staff discounted OPEI's concerns about the number of hours of equipment use per employee for some landscapers stating "business owners may hire part-time workers as the work load fluctuates based on a growing season." This is a major concern for OPEI as explained in Comment 12. The accuracy of the employee response for V15-G2, who reported to be a single employee but also reported his wife conducts his equipment maintenance, is substantive in this regard. OPEI attempted to calculate chain saw annual use using the CSU-F weighting factors; however, as a "single employee" landscaper V15-G2 was assigned the highest weighting factor of 2.25, and the weighted use of their 7.5 hours per day, every day, of chain saw use resulted in 26,654 weighted hours per year. This is not reasonable and eliminates the opportunity to address survey bias based on this reasonable factor. Had V15-G2's wife or any part-time employees been included in the weighting, the weighted results would have been significantly different.

Finally, CARB did not address bias in its calculations of annual use or age-distribution. Setting aside OPEI's concerns about bias and weighting factors selected by CSU-F and CARB, and outliers, survey data must be adjusted for bias. There is no evidence that CARB surveys have ***ever*** been adjusted for ***appropriate and/or reasonable*** bias. As a result, all survey work and resulting models must be considered with extreme caution. However, outliers must be appropriately addressed, including

concerns in use, age, and number of employees before weighted calculations can be computed.

COMMENT 16 – SORE2020 does not account for emissions reductions achieved through tighter evaporative and enforcement of emissions standards. SORE2020 continues to model several categories of equipment as "leakers" resulting in tons per day of evaporative emissions, despite the 2017 SORE evaporative emissions amendments and ongoing enforcement of those amendments. As a result, SORE2020 overestimates sector emissions for 2018 and later.

The 2016 SIP includes multiple strategies to address SORE emissions reductions needs. Included in these strategies are: (1) *promote* increased use of zero-emissions equipment; (2) propose tighter exhaust and evaporative emissions standards; and (3) enhance enforcement of current emissions standards for SORE. To address strategies (2) in-part and (3), CARB adopted amendments to the evaporative emission regulations in 2017 and has been enforcing these amendments since 2018. The September 27, 2016, *Amendments to the Evaporative Emissions Requirements for Small Off-Road Engines, Staff Report: Initial Statement of Reason* states "*the current proposal will increase compliance with the existing diurnal emission standards, ensuring the ROG emissions reductions needed for the (SIP) are achieved…,*" and that "*the proposed amendments are intended to address the shortfall in emissions reductions.*" However, despite this rule making and CARB strict enforcement of the rule, SORE2020 continues to model walk-behind mowers, large leaf-blower vacuums (24-hour diurnal 3.278 g), large trimmers (24-hour diurnal 3.278 g), air-compressors (24-hour diurnal 8.178 g), and generators (24-hour from 2.460 to 4.350 g) on data collected for models before the adoption and enforcement of the evaporative amendments. The rule is effective and must be modeled accordingly to understand the current (benchmark) SORE emissions.[59]

This comment is addressed in additional technical detail in Annex F.

COMMENT 17 – SORE2020 determinations of zero-hour and deteriorated emissions and not supported by data and are overestimated. As a result emissions are overestimated for 2018 and later.

OPEI understands SORE2020 uses certification-level exhaust emissions as the values for determining zero-hour emissions[60]. SORE certification-level emissions reflect the deteriorated emissions at the end of the useful life, not the zero-hour emissions. As a result, SORE2020 overestimates the zero-hour emissions. Furthermore, SORE2020 assumes the emission at the useful life are equal the emissions limits, despite manufacturers running full durability periods and certifying Family Emissions Limits ("FELs") – In other words, the emissions CARB currently uses for the zero-hour estimates should be the useful life estimates.

In 2004 Nine OPEI handheld product manufacturers presented to EPA data analyzing in-service emissions deterioration. Manufacturers collected 45 units in-service units, representing a variety of handheld product emission control techniques, to understand deterioration trends. Of the 45 units tested, 44 units were significantly lower than the FEL as-received or after general maintenance. Of the 18 units for which measurements were collected both before and after general maintenance, only two exceeded FELs. Many units experienced minimal decrease after general maintenance, and some units even experienced minimal increase in emissions after maintenance. See Annex G. SORE2020 has no such dataset to support its assumption that emissions deteriorate to certification limits, in some cases well beyond volume-weighted FELs.

Finally, SORE2020 extends the linear deterioration rate to 150% of the engines useful life without supporting data.

As a result of assuming all products start at deteriorated emissions levels, then deteriorate to the emissions limits versus tested deteriorated values, and then continue to deteriorate beyond the emission limits for another 50% of the equipment's useful life, SORE2020 overestimates the sectors emissions.

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[59] OPEI recognizes Air Compressors are Preempt, but due to the typical engine/fuel system integrated nature, we believe many of the air-compressors include fuel systems certified in California for non-preempt products, such as walk-behind mowers or wood splitters.

COMMENT 18 – CSU-F Survey does not adequately take into consideration seasonal use of products. Furthermore, SORE2020 applies seasonal use factors. As a result, SORE2020 overestimates Annual Hours and Summer emissions.

The CSU-F survey included many responses of residents, commercial businesses and landscapers using products every day, several times a week, every week or every month. While these response may reflect general annual use trends for some products and for some portions of the state, other products and portions of the state likely require adjustment for seasonal use. For example, respondents in Northern California counties reported using lawnmowers every day or every week, despite Northern California experiencing seasonal trends which would not require lawnmower use.

There were no survey questions regarding seasonal use. Nevertheless, some respondents qualified responses by noting responded use seasonal. Residential respondent R672 reports using 2 leaf blowers once a week for 30 minutes each, however reported "it depends on the seasons when the equipment its used." Commercial respondent C1303 reports using an air compressor every week but also reports the business is seasonal (6 months a year). Vendor/Landscaper respondent V379 reports using multiple product 5 times a week, however reported "(use) responses depend upon the seasons/seasonal. For example: string trimmer, hedge trimmer – these are used mostly during winter." V500 reports five chain saws are used every day and another three are used at least once a month, however reported "this business is only open for seven months of the year, so all questions are in regards to the seven months span (the business) is open." Despite these hints, no seasonal-use adjustments were made to the survey dataset. As a result, SORE2020 Annual Use, and in-turn emission deterioration rates, are likely be overstated with bias towards year-round use.

In addition to not accounting for seasonal bias in survey responses, SORE2020 *increases* "Summer" use and emissions estimates by a factor of approximately 1.1 for many equipment types. Both assumptions that survey responses of every week, multiple times a week, or month are accurate, AND assuming use is greater in the

[60] *CARB Staff CARB/EMA Meeting Request for Additional Information on SORE2020 Model* presentation, April 29, 2020, slide 12

summer cannot be true. CARB may ignore seasonal use in survey responses, OR it may adjust for seasonal use in modeling, but it cannot do both. Ignoring seasonal use in survey responses, while at the same time adjusting the model for “summer” seasonal use results in significant overestimates of the SORE sector emissions. CARB must address seasonal use in survey responses and/or remove season use factors from SORE2020 to accurately reflect Annual Use and deteriorated emission estimates.

Setting the aforementioned concerns aside, OPEI is interested in further understanding how CARB determined seasonal use factors for SORE. OPEI believes the most populated portions of the state experience a similar climate year-round, and as a result equipment use may be consistent year-round. However, considering drought and rain trends, the “grown seasons” (highest use, if there is any need for adjustment), may not correlate to “summer” months. Additionally, OPEI believes some equipment, such as commercial air-compressors and generators use would be consistent year-round.

COMMENT 19 – Comments to Regulatory Orders, Test Procedures and Certification Procedures

Setting aside the concerns outlined in the previous comments, OPEI provides the following comments to the rulemaking Regulatory Orders (RO), Test Procedures (TP) and Certification Procedures (CP). Additional details and comments are included in Annex A.

COMMENT 19-1: Effective dates for many proposed amendments are unclear

The effective dates for many proposed amendments are unclear. For example, it is proposed that “engine” definition in RO 2401 is updated. The updated definition may impact engine certification, ATB strategies, replacement engine strategies and service part strategies and will require transition times. Another example is several sections in RO’s propose that the labels and warranty statements are reformatted. This will require manufactures to make changes to labels and warranty statements. A third example is the revised compliance testing in 2407. There many other sections in RO’s, Part 1054

and Part 1060 for which the effective dates are unclear. OPEI is seeking clarification of the effective dates of these changes if the Proposed Rule is adopted.

COMMENT 19-2: “Engine” Definition

The proposed definition of an engine is too vague. An engine block without a crankshaft should not be considered an engine. Furthermore, a kit that contains engine components may be considered a replacement engine for regulatory purposes. Additionally, unassembled parts could not be assigned an assembly date.

Additionally, the definition itself is inconsistent and confusing. First it defines an engine as a "complete, operational engine", but also suggests "any engine block or kit with the parts necessary to assemble an engine block with or without an installed crankshaft is also considered an engine." OPEI is also concerned how or why and engine block would be assembled without an crankshaft. OPEI is concerned that definition and rational will prevent users from servicing and maintaining their products, even with "authorized" parts, which is inconsistent with Right to Repair movements.

OPEI recommends the definition is harmonized with EPA.

COMMENT 19-3: “Handheld” Definition

OPEI is concerned the definition is inconsistent with EPA and may result in different certification and compliance requirements for identical engines and/or equipment for CARB and EPA, which would be inconsistent with Section 202(a) of the Clean Air Act. OPEI recommends the definition is harmonized with EPA.

COMMENT 19-4: Labeling and Warranty Statement Formatting

OPEI is concerned formatting changes to the labeling and warranty statement requirements will result in unique requirements for EPA and CARB, which will require duplicative labels and warranty statements (one for CARB and one for EPA) with no value. The cost of these additional requirements were not considered in the Proposed Rule. OPEI recommends the proposed formatting changes are withdrawn until CARB, EPA and Industry can harmonize requirements.

COMMENT 19-5: Exhaust Compliance Testing

Manufacturers demonstrate ongoing compliance with Production Line Testing process, calculated by the Cum-Sum method. This on-going manufacturer compliance testing allows deviation to account production variability. By removing the U-factor CARB may determine new engine compliance based on one engine. This is a significant increase in stringency versus what is permitted with the PLT program. The cost of this additional stringency was not considered in the Proposed Rule.

Additionally, changing the number of engines tested to one is a significant deviation and inconsistent with EPA's procedure. Manufacturers may not be able to meet both the state and federal test requirements for one family, which would be inconsistent with Section 202(a) of the Clean Air Act.

OPEI recommends CARB retain the original test and process or align with EPA CFR 40 Part 1680 Subpart E - Selective Enforcement Auditing.

COMMENT 19-6: There is no evaporative ATB program for handheld products. As a result, gas-powered handheld products would be banned from 2024, regardless of a manufacturers exhaust emissions credit bank.

In the absence of a handheld evaporative emissions ATB strategy, the Proposed Rule should be updated to reinstate current handheld product evaporative emissions procedures and limits (similar to CO). E10 Validation Study results suggest handheld products are compliant with existing standards. Exhaust credits will ultimately limit sales gas-powered products after 2024.

COMMENT 19-7: Evaporative emissions performance-based (SHED) testing will be required for SORE from 2024, including non-generator and handheld products. The cost and lead-time of this requirement have not been considered in the Proposed Rule, especially for handheld manufacturers who are currently not subject to diurnal performance-based compliance testing. Since the rule sets zero-emissions limits from 2024 for most SORE, the only way to certify most gas-powered products would be by the use of credits. This will result in a very limited number of gas-powered units

available for sale in California from 2024, and manufacturers will not be to recoup investment costs for diurnal testing.

The Proposed Rule should be updated to reinstate current handheld product evaporative emissions procedures. E10 Validation Study results suggest handheld products are compliant with existing standards. Exhaust credits will ultimately limit sales gas-powered products after 2024.

OPEI members are responsible manufacturers, committed to complying with emission regulations. OPEI and its members have been working with CARB to develop a reasonable regulatory landscape, cooperatively helping California meet air quality standards through the introduction of low and zero-emissions technology solutions for over three decades.

OPEI supports ZEE as one key emission reduction strategy where technology feasibility has been demonstrated. *However, there is currently no one-size-fits-all ZEE approach to satisfy the full range of SORE powered equipment and use cases.* The Proposed Rule poses numerous technical feasibility, economic, and implementation challenges for many industry stakeholders. These challenges are currently insurmountable and will result in significant and unnecessary hardships for manufacturers, retailers and end-users, culminating in an early market shortfall of products with high consumer need and demand.

Industry looks forward to continuing this dialogue to achieve our common goal of a thoughtful and measured emission reduction strategy, developed with consideration of all technical solutions, including ZEE and enhanced engine technologies, to help California meet Federal ambient air quality standards while avoiding unnecessary product bans and market disruption.

Sincerely,

Greg Knott
Vice President, Standards & Regulatory Affairs
Outdoor Power Equipment Institute

SUMMARY OF ANNEXES

ANNEX A

OPEI Comments to Amendments to Regulation Orders, Test Procedures, Certification Procedures and Part 1054

ANNEX B

OPEI ZEE Battery Use and Cost Analysis (Comment 7 & Comment 8)

ANNEX C

OPEI CARB Survey Outlier Analysis Summary (Comment 12)

ANNEX D (Comment 13)

OPEI Landscaper Survey Analysis

ANNEX E

Additional Discussion of Comment 14 – SORE2020 Age Calculation Concerns

ANNEX F

Additional discussion of Comment 16 – Consideration of 2017 Evaporative Amendments in SORE20202 and SORE “Benchmark” Emissions

ANNEX G (Comment 17)

Manufacturer In-Service Emission Test Data

ANNEX A

OPEI Comments to Amendments to Regulation Orders, Test Procedures, Certification Procedures and Part 1054

Small Off0Road Engine Regulations: Transition to Zero Emissions Appendix A	Issue / Comment	OPEI Proposed Changed Text
§ 2401. Definitions.		
(19) "Engine" means a complete, operational engine. Any engine block or kit with the parts necessary to assemble an engine block with or without an installed crankshaft is also considered an engine. Gas turbine engines are excluded from this definition. ~~(19)~~ (20) "Engine family" is a subclass of a basic engine based on similar emission characteristics or a subclass of zero-emission small off-road equipment based on similar performance characteristics. The engine family is the grouping of engines or zero-emission small off-road equipment that is used for the purposes of certification. ~~(20)~~ (21) "Engine family name" means a multi-character alphanumeric sequence that represents certain specific and general information about an engine family. ~~(21)~~ (22) "Engine manufacturer" means the manufacturer granted certification.	CARB's definition of an engine is too vague. An engine block without a crankshaft should not be considered an engine. Furthermore, a kit that contains engine components may be considered a replacment engine for regulatory purposes. Additionally, unassembled parts could not be assigned an assembly date. OPEI recommends the definition is harmomized with EPA. The definition itself is inconsistent. First it defines an engine as a "complete, operational engine", but also suggests "any engine block or kit with the parts necessary to assemble an engine block with or witout an installed crankshaft is also considered an engine." OPEI is also concerned how or why and engine block would be assembled without an crankshaft. OPEI is concerned that definition and rational will prevent users from servicing and maintaining their products, even with "authorized" parts, which is inconsistent with the Adminstrations push for Right to Repair legislation. OPEI is not aware of the concern and issues provided in the rational regarding complete sets of counterfit parts that could be assembed as an engine. Industry seeks additional information about this concern and or examples, and would like to discuss this concern further before adopting a defnition that is not harmonized with EPA requirements. The secnario does not consider the date of manufacturer for groups of parts not assembled - What would CARB consider the DOM in the event the requirement is changed? The scenario does not consider application of the emissions label. Emission label cannot be installed to components which do not represent a certified configuration. Emissions labels may not be able to be affixed to components due to durability requiements and material compabaility of the parts that are by the proposed definition considered an engine. The definition is not practical because a box of parts could be used on multiple families.	Engine means an engine block with an installed crankshaft, or a gas turbine engine. The term engine does not include engine blocks without an installed crankshaft, nor does it include any assembly of reciprocating engine components that does not include the engine block. (Note: For purposes of this definition, any component that is the primary means of converting an engine's energy into usable work is considered a crankshaft, whether or not it is known commercially as a crankshaft.)
~~(24)~~ (25) "Family emission level" or "FEL" means an emission level that is declared by the manufacturer to serve for the averaging, banking, and trading program and in lieu of an emission standard for certification. The FEL serves as the engine family's emission standard for emissions compliance efforts. If the manufacturer does not declare an FEL for an engine family, the applicable emissions standard must be treated as that engine family's FEL for the purposes of any provision of this Article.	The FEL definition is not harmonized with EPA - The termonology is inconsistent.	(25) "Family emission limit ~~level~~" or "FEL" means an emission limit ~~level~~ that is declared by the manufacturer to serve for the averaging, banking, and trading program and in lieu of an emission standard for certification. The FEL serves as the engine family's emission standard for emissions compliance efforts. If the manufacturer does not declare an FEL for an engine family, the applicable emissions standard must be treated as that engine family's FEL for the purposes of any provision of this Article.

(29) “Generator” means off-road equipment that exclusively produces electric power.	The ISOR (pg 24 under section F. Technological Feasibility) and SRIA (pg 53 under iv. Generators section) both provide explanation saying that stationary generators are excluded from the SORE Rule. However, the proposed Small Off-Road Engine Exhaust Emission Regulations do not make this clear. You can get to that conclusion by looking through definitions like below (29) “Generator” means off-road equipment that exclusively produces electric power. Generator = Off-Road Equipment (37) “Off-road vehicle” or “Off-road equipment” means any non-stationary device, powered by an internal combustion engine or motor, used primarily off the highways to propel, move, or draw persons or property including any device propelled, moved, or drawn exclusively by human power, and used in, but not limited to, any of the following applications: Marine Vessels, Construction/Farm Equipment, Locomotives, Small Off-Road Engines, Off-Road Motorcycles, and Off-Highway Recreational Vehicles. Off-Road Equipment = non-stationary (mobile) Therefore... Generator = non-stationary (mobile) By updating the "Generator" definition it could help clear up any confusion.	“Generator” means off-road equipment that exclusively produces electric power. This excludes stationary generators. “Stationary generator” - remains or will remain at a location for more than 12 consecutive months or a shorter period of time for an engine located at a seasonal source. A stationary source would not have the following features wheels and carrying handles.
(30) “Generator engine” means an engine installed exclusively in a generator.	General purpose small engines may be used in multiple applications, which may cause certification issues and confusion considering the proposed definition.	(30) “Generator engine family” means an engine installed exclusively in a generator.

(32) "Handheld" means relating to off-road equipment using an engine with displacement less than or equal to 80 cc that meets either of the following criteria: (A) It is carried by the operator throughout the performance of the manufacturer's intended function. (B) It has a combined engine and equipment dry weight under 16.0 kilograms, has no more than one wheel, and the operator provides support or attitudinal control for the equipment throughout the performance of the manufacturer's intended function. Support means to hold a piece of equipment in position to prevent it from falling, slipping, or sinking, without carrying it. Attitudinal control involves regulating the horizontal or vertical position of the equipment.	The handheld definition is not harmonized with EPA.	Handheld means relating to equipment that meets any of the following criteria: (1) It is carried by the operator throughout the performance of its intended function. (2) It is designed to operate multi-positionally, such as upside down or sideways, to complete its intended function. (3) It has a combined engine and equipment dry weight under 16.0 kilograms, has no more than two wheels, and at least one of the following attributes is also present: (i) The operator provides support or carries the equipment throughout the performance of its intended function. Carry means to completely bear the weight of the equipment, including the engine. Support means to hold a piece of equipment in position to prevent it from falling, slipping, or sinking, without carrying it. (ii) The operator provides support or attitudinal control for the equipment throughout the performance of its intended function. Attitudinal control involves regulating the horizontal or vertical position of the equipment. (4) It is an auger with a combined engine and equipment dry weight under 22.0 kilograms. (5) It is used in a recreational application with a combined total vehicle dry weight under 20.0 kilograms. (6) It is a hand-supported jackhammer or rammer/compactor. This does not include equipment that can remain upright without operator support, such as a plate compactor.
§ 2403. Exhaust Emission Standards and Test Procedures – Small Off-Road Engines.		
	See OPEI Comments 4, 5, 6 and 7.	

(2) (A) A new small off-road engine equal to or greater than 225 cc, intended solely to replace an engine in a piece of off-road equipment that was originally produced with an engine manufactured prior to the applicable implementation date as described in paragraph (b), shall not be subject to the emissions requirements of paragraph (b) provided that: 1. The engine manufacturer has ascertained that no engine produced by itself or the manufacturer of the engine that is being replaced, if different, and certified to the requirements of this article, is available with the appropriate physical or performance characteristics to repower the equipment; and 2. Unless an alternative control mechanism is approved in advance by the Executive Officer, the engine manufacturer or its agent takes ownership and possession of the engine being replaced; and 3. The replacement engine is clearly labeled with the following language, or similar alternate language approved in advance by the Executive Officer: ~~THIS ENGINE DOES NOT COMPLY WITH CALIFORNIA OFF-ROAD OR ON-HIGHWAY EMISSION REQUIREMENTS. SALE OR INSTALLATION OF THIS ENGINE FOR ANY PURPOSE OTHER THAN AS A REPLACEMENT ENGINE IN AN OFF-ROAD VEHICLE OR PIECE OF OFF-ROAD EQUIPMENT WHOSE ORIGINAL ENGINE WAS NOT CERTIFIED IS A VIOLATION OF CALIFORNIA LAW SUBJECT TO CIVIL PENALTY.~~ This Engine Does Not Comply with California Off-Road or On-Highway Emission Requirements. Sale or Installation of this Engine for Any Purpose Other Than as a Replacement Engine in an Off-Road Vehicle or Piece of Off-Road Equipment Whose Original Engine Was Not Certified Is a Violation of California Law Subject to Civil Penalty.	This is inconsistent with EPA labeling and will result in the need for separate labels for EPA and CARB with identical information. OPEI recognizes CARB desire to meet accessiblity needs, however this change needs to be organized cooperatively with EPA and Industry in order to maintain a single 50-state emissoins label.	3. The replacement engine is clearly labeled with the following language, or similar alternate language approved in advance by the Executive Officer: THIS ENGINE DOES NOT COMPLY WITH CALIFORNIA OFF-ROAD OR ON-HIGHWAY EMISSION REQUIREMENTS. SALE OR INSTALLATION OF THIS ENGINE FOR ANY PURPOSE OTHER THAN AS A REPLACEMENT ENGINE IN AN OFF-ROAD VEHICLE OR PIECE OF OFF-ROAD EQUIPMENT WHOSE ORIGINAL ENGINE WAS NOT CERTIFIED IS A VIOLATION OF CALIFORNIA LAW SUBJECT TO CIVIL PENALTY.
§ 2404. Emission Control Labels and Consumer Information – 1995 and Later Small Off-Road Engines.		
(c) Engine Label Content and Location. (1) A plastic or metal tune-up label must be welded, riveted or otherwise permanently attached by the engine manufacturer to an area on the engine (i.e., block or crankcase) in such a way that it will be readily visible to the average person after installation of the engine in the equipment. If such an attachment is not feasible, the Executive Officer may allow the label to be attached on components of the engine or equipment assembly (as applicable) that satisfy the requirements of Subsection (c)(2). Such labels must be attached on all engine assemblies (incomplete and complete) that are produced by an engine manufacturer. (2) In selecting an acceptable location, the engine manufacturer must consider the possibility of accidental damage (e.g., possibility of tools or sharp instruments coming in contact with the label). Each engine label(s) must be affixed in such a manner that it cannot be removed without destroying or defacing the label, and must not be affixed to any engine (or equipment, as applicable) part that is likely to be replaced during the engine's (or equipment's, as applicable) useful life. The engine label must not be affixed to any engine (or equipment, as applicable) component that is easily detached from the engine. If the manufacturer claims there is inadequate space to affix the label, the Executive Officer will determine a suitable location. (3) The engine label information must be written in the English language and use ~~block~~ sans serif letters and numerals ~~(i.e., sans serif, upper-case characters)~~ that must be of a color that contrasts with the background of the label.	This is inconsistent with EPA labeling and will result in the need for separate labels for EPA and CARB with identical information. OPEI recognizes CARB desire to meet accessiblity needs, however this change needs to be organized cooperatively with EPA and Industry in order to maintain a single 50-state emissoins label.	The engine label information must be written in the English language and use block letters and numerals (i.e., sans serif, upper-case characters) that must be of a color that contrasts with the background of the label.

(4) The engine label must contain the following information: (A) The label heading must read: "~~IMPORTANT ENGINE INFORMATION~~" "Important Engine Information"; or "~~IMPORTANT EMISSION INFORMATION~~" "Important Emissions Information"; or "~~EMISSION CONTROL INFORMATION~~" "Emission Control Information". (B) The full corporate name or trademark of the engine manufacturer. 1. An engine manufacturer may request the Executive Officer's approval to delete its name and trademark, and substitute the name and trademark of another engine manufacturer, original equipment manufacturer, or third-party distributor. 2. Such an approval does not relieve the engine manufacturer granted an engine family Executive Order of any requirements imposed on the applicable engines by this Article. (C) For alternate-fuel or dual-fuel engines, ~~"THIS ENGINE IS CERTIFIED TO OPERATE ON (specify operating fuel(s))."~~ "This engine is certified to operate on (specify operating fuel(s))." (D) Identification of the Exhaust Emission Control System. The method utilized to identify the exhaust emission control systems must conform to the emission-related nomenclature and abbreviations method provided in ~~the Society of Automotive Engineers' recommended practice~~ SAE J1930, "Electrical/Electronic Systems Diagnostic Terms, Definitions, Abbreviations and Acronyms - Equivalent to ISO/TR 15031-2: ~~April 30, 2002~~", ~~April 2002~~ Revised March 2017, and which is incorporated by reference in this Article; and as specified in Section 1977, Title 13, California Code of Regulations.	This is inconsistent with EPA labeling and will result in the need for separate labels for EPA and CARB with identical information. OPEI recognizes CARB desire to meet accessiblity needs, however this change needs to be organized cooperatively with EPA and Industry in order to maintain a single 50-state emissoins label.	(A) The label heading must read: "IMPORTANT ENGINE INFORMATION"; or "IMPORTANT EMISSION INFORMATION"; or "EMISSION CONTROL INFORMATION". (C) For alternate-fuel or dual-fuel engines, "THIS ENGINE IS CERTIFIED TO OPERATE ON (specify operating fuel(s))."
(E) For otto-cycle engines, the maintenance specifications and adjustments recommended by the engine manufacturer, including, as applicable: valve lash, ignition timing, idle air/fuel mixture setting procedure and value (e.g., idle CO, idle speed drop), and high idle speed. For diesel-cycle engines, the specifications and adjustments recommended by the engine manufacturer, including, as applicable: initial injection timing, and fuel rate (in mm3 /stroke) at rated power. These specifications must indicate the proper transmission position, (if applicable), during tune-up and what accessories, if any, should be in operation, and what systems, if any (e.g., vacuum advance, air pump), should be disconnected during the tune-up. If the engine manufacturer does not recommend adjustment of the foregoing specifications, the engine manufacturer may include in lieu of the "specifications" the single statement "~~NO OTHER ADJUSTMENTS NEEDED~~." "No other adjustments needed." For all engines, the instructions for tune-up adjustments must be sufficiently clear on the engine label to preclude the need for a mechanic or equipment owner to refer to another document in order to correctly perform the adjustments. (F) Any specific fuel or engine lubricant requirements (e.g., lead content, research octane number, engine lubricant type). (G) The date of engine manufacture (month and year). (H) An unconditional statement of compliance with the appropriate calendar year (for 1995-1999) or model year(s) (for 2000 and later) California regulations; for example, "~~THIS ENGINE MEETS 2005 CALIFORNIA EXH EMISSION REGULATIONS FOR SMALL OFF-ROAD ENGINES~~." "This engine meets 2021 California exh emission regulations for small off-road engines." For engines certified to emission standards subject to a durability period as set forth in §2403(b), the durability period must be stated in the owner's manual. (I) Engine displacement (in cubic centimeters) of the engine upon which the engine label is attached.	This is inconsistent with EPA labeling and will result in the need for separate labels for EPA and CARB with identical information. OPEI recognizes CARB desire to meet accessiblity needs, however this change needs to be organized cooperatively with EPA and Industry in order to maintain a single 50-state emissoins label.	(H) An unconditional statement of compliance with the appropriate calendar year (for 1995-1999) or model year(s) (for 2000 and later) California regulations; for example, "THIS ENGINE MEETS 2005 CALIFORNIA EXH EMISSION REGULATIONS FOR SMALL OFF-ROAD ENGINES." For engines certified to emission standards subject to a durability period as set forth in §2403(b), the durability period must be stated in the owner's manual.

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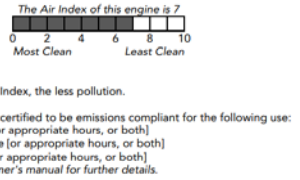
<td>(5) If there is insufficient space on the engine to accommodate an engine label that contains all of the information required in Subsection (4) above, the Executive Officer may allow the engine manufacturer to modify the engine label as follows:
(A) Exclude the information required in Subsections (4)(C), (D), (E), (F), and (I) from the engine label. The fuel or lubricant information must be specified elsewhere on the engine, or in the owner's manual.
(B) Substitute the information required in Subsection (4)(E) with the statement: ~~"REFER TO OWNER'S MANUAL FOR MAINTENANCE SPECIFICATIONS AND ADJUSTMENTS."~~
"Refer to owner's manual for maintenance specifications and adjustments." When such a statement is used, the information required by Subsection (4)(E) must appear in the owner's manual.
(C) Exclude the information required by Subsection (4)(G) on the engine label if the date the engine was manufactured is stamped permanently on the engine, and this stamped date is readily visible.
(D) Make such other reasonable modifications or abbreviations as may be approved by the Executive Officer.
(d) An engine label may state that the engine conforms to any applicable federal, Canadian, or European emission standards for new equipment engines; or any other information that the engine manufacturer deems necessary for, or useful to, the proper operation and satisfactory maintenance of the engine.
(e) Supplemental Engine Label Content and Location.
(1) When a final equipment assembly that is marketed to any ultimate purchaser is manufactured and the engine label attached by the engine manufacturer is obscured (i.e., not readily visible), the manufacturer of the final equipment assembly (i.e., original equipment manufacturer) must attach a supplemental engine label upon the engine or equipment. The supplemental engine label must be plastic or metal, must meet the visibility, durability and formatting requirements of paragraphs (f), (g) and (h), and must be welded, riveted or otherwise attached permanently to an area of the engine or</td>
<td>This is inconsistent with EPA labeling and will result in the need for separate labels for EPA and CARB with identical information. OPEI recognizes CARB desire to meet accessiblity needs, however this change needs to be organized cooperatively with EPA and Industry in order to maintain a single 50-state emissoins label.</td>
<td>(B) Substitute the information required in Subsection (4)(E) with the statement: "REFER TO OWNER'S MANUAL FOR MAINTENANCE SPECIFICATIONS AND ADJUSTMENTS." When such a statement is used, the information required by Subsection (4)(E) must appear in the owner's manual.</td>
</tr>
<tr>
<td>(l) Air Index Label Content and Location. For engines certified to emission standards subject to a durability period as set forth in §2403(b) and for engines used to meet the requirements of §2403(c), each engine manufacturer must make Air Index and durability period information available to potential ultimate purchasers.
(1) The Air Index for each engine family is determined by the following formula:

Air Index = FEL x 3 / Standard,
rounded to the nearest whole number in accordance with ASTM E 29-93a (May 1993), where
FEL= the Family Emission Limit Level (or standard, if averaging is not being used) for the engine; and
Standard = The HC+NOx emissions standard, as applicable in § 2403 (b).
(2) The emissions durability period must be indicated by the actual hours, by the descriptive terms shown in the table below, or by both.
For 2000 through 2004 model year small off-road engines:
<table>
<tr><th>Descriptive term</th><th>Applicable to Emissions Durability Period</th></tr>
<tr><td>Moderate</td><td>50 hours (0-65 cc, inclusive)
125 hours (greater than 65 cc)</td></tr>
<tr><td>Intermediate</td><td>125 hours (0-65 cc, inclusive)
250 hours (greater than 65 cc)</td></tr>
<tr><td>Extended</td><td>300 hours (0-65 cc, inclusive)
500 hours (greater than 65 cc)</td></tr>
</table>
For 2005 ~~and subsequent~~ through 2023 model year small off-road engines:
<table>
<tr><th>Descriptive term</th><th>Applicable to Emissions Durability Period</th></tr>
<tr><td>Moderate</td><td>50 hours (0-80 cc, inclusive)
125 hours (greater than 80 cc)</td></tr>
<tr><td>Intermediate</td><td>125 hours (0-80 cc, inclusive)
250 hours (greater than 80 cc)</td></tr>
<tr><td>Extended</td><td>300 hours (0-80 cc, inclusive)
500 hours (greater than 80 cc)
1000 hours (225 cc and greater)</td></tr>
</table>
</td>
<td>OPEI is not aware of the required hearing to assess the consumer awareness of air index information in purchasing decisions § 2404 (l) (4). As a result, these labeling requirements should be removed.</td>
<td>Strike the entirity of § 2404 (l).</td>
</tr>
</table>

(3) The Air Index information must include a graphical representation of the Air Index, information regarding the significance of the Air Index, and an indication of the emissions durability period of the engine. (A) The Air Index information should be conveyed in the general the form of the following example.  (B) The Executive Officer, upon request, may waive or modify the form of the Air Index information or may approve alternative forms, provided that the intent of providing Air Index information is met.		
(4) No earlier than January 1, 2003, the Executive Officer will conduct a hearing to assess consumer awareness of Air Index information in purchasing decisions. (A) At such hearing the Executive Officer will compare the degree of consumer awareness of Air Index information by purchasers of engines not meeting specifications (A)-(C) in subsection (l)(5) to the degree of consumer awareness of Air Index information by purchasers of engines substantially meeting specifications (A)-(C) of subsection (l)(5). If the Executive Officer determines that the degree of consumer awareness is statistically equivalent, the provisions of subsections (l)(1-3) shall remain in effect and the Executive Officer will not require engine manufacturers to meet the requirements of subsection (l)(5). (B) If the Executive Officer determines that there are insufficient engines meeting specifications (A)-(C) in subsection (l)(5) to make the above comparison, the Executive Officer will compare the degree of consumer awareness of Air Index information by purchasers of engines not meeting specifications (A)-(C) in subsection (l)(5) to other similar consumer information programs including, but not limited to, the passenger car Smog Index labeling program. If the Executive Officer determines that the degree of consumer awareness is statistically equivalent to other similar consumer information programs, the provisions of subsections (l) (1-3) shall remain in effect and the Executive Officer will not require engine manufacturers to meet the requirements of subsection (l)(5). (C) If the Executive Officer determines that the degree of consumer awareness is not statistically equivalent under (A) and (B), then no earlier than at the beginning of the first full model year following the Executive Officer's final determination, provided that manufacturers have no less than 9 months of lead time, the Executive Officer will require engine manufacturers to meet the requirements of subsection (l)(5).		

(5) If the Executive Officer has made the determination in subsection (l)(4)(C), then the following requirements apply: (A) All information required on the Air Index Label must be no smaller than 2 millimeters in height. (B) The Air Index Label must be noticeable from a distance of 150 centimeters (59 inches) without any obstructions by equipment or engine parts, including all engine manufacturer or original equipment manufacturer (as applicable) available optional equipment. For engines that are installed in an engine compartment that is easily accessible to the ultimate purchaser, this subsection (l)(5)(B) may be satisfied by a generic label or hang tag stating "LOOK INSIDE THE ENGINE COMPARTMENT FOR IMPORTANT EMISSIONS INFORMATION," "Look inside the engine compartment for important emissions information," or by other means, subject to the Executive Officer's approval. (C) The Air Index Label must be located in at least one of the following locations: 1. included on the engine label; 2. included as an additional engine label, designed and intended for removal only by the ultimate purchaser; or 3. included as an engine or equipment hang-tag designed or intended for removal only by the ultimate purchaser; (D) For engines 0-65 cc (up to 80 cc beginning with the 2005 model year), inclusive, the engine manufacturer must also arrange for a label with the engine family's Air Index to be attached to the equipment packaging. (E) The Executive Officer, upon request, may waive or modify the form of the Air Index Label or may approve alternative forms, sizes or locations, provided that the intent of the Air Index Label requirement is met. (6) The labeling and consumer information provisions of subsection (l) shall not apply to engines that are not the primary power source of the equipment in which they are installed or to engines that are installed in equipment that the engine or equipment		
§ 2405. Defects Warranty Requirements for 1995 and Later Small Off-Road Engines.		
(e) Each manufacturer must furnish with each new engine written instructions for the maintenance and use of the engine by the owner. The instructions must be consistent with this article and applicable regulations contained herein. (f) Each engine manufacturer must submit the documents required by Subsections (d) and (e) with the engine manufacturer's application for engine certification for approval by the Executive Officer. Approval by the Executive Officer of the documents required by Subsections (d) and (e) is a condition of certification. he Executive Officer will approve or disapprove the documents required by Subsections (d) and (e) within 90 days of the date such documents are received from the engine manufacturer. Any disapproval must be accompanied by a statement of the reasons thereof. In the event of disapproval, the engine manufacturer may file for an adjudicative hearing pursuant to Title 17, California Code of Regulations, Section 60040 et seq., to review the decision of the Executive Officer. (g) In the application for engine certification, each engine manufacturer must include a statement regarding the maintenance of the engine for clean air. The statement must include, but not be limited to, information on carburetor adjustment, air filter care and replacement schedule, spark plug maintenance and inspection, proper fuel/oil ratio for low emissions, use of appropriate fuel, proper fueling and fuel mixing, proper method of disposing of oil and oil containers, engine maintenance, and a maintenance schedule to ensure that the owner returns to a servicing center to check for deposits, debris build-up, etc.	OPEI is seeking clarification if the intent of the inclusion of section (e) in section (f) is requiring that the complete manual is provided, or just the relative sections? The manual may not be available at the time of application for certification. The manual may be revised for reasons unrelated to to the emissions and maintenance information. What will need to be provided in these cases?	
§ 2406. Emission Control System Warranty Statement.		

(a) Each manufacturer must furnish a copy of the following statement with each new 1995 and later small off-road engine, using those portions of the statement applicable to the engine. ~~CALIFORNIA EMISSION CONTROL WARRANTY STATEMENT YOUR WARRANTY RIGHTS AND OBLIGATIONS~~ California Emission Control Warranty Statement Your Warranty Rights and Obligations The California Air Resources Board (and manufacturer's name, optional) is pleased to explain the emission control system warranty on your (year(s)) (equipment type or small off-road) engine. In California, new small off-road engines must be designed, built and equipped to meet the State's stringent anti-smog standards. (Manufacturer's name) must warrant the emission control system on your (equipment type or small off-road) engine for the periods of time listed below provided there has been no abuse, neglect or improper maintenance of your small off-road engine. Your emission control system may include parts such as the carburetor or fuel-injection system, the ignition system, and catalytic converter. Also included may be hoses, belts, connectors and other emission-related assemblies. Where a warrantable condition exists, (manufacturer's name) will repair your (equipment type or small off-road) engine at no cost to you including diagnosis, parts and labor. ~~MANUFACTURER'S WARRANTY COVERAGE:~~ Manufacturer's Warranty Coverage: The 1995 and later small off-road engines are warranted for two years. If any emission-related part on your engine is defective, the part will be repaired or replaced by (manufacturer's name).	This is inconsistent with EPA and will result in the need for separate warranties for EPA and CARB with identical information. OPEI recognizes CARB desire to meet accessiblity needs, however this change needs to be organized cooperatively with EPA and Industry in order to maintain a single 50-state emissoins warranty.	(a) Each manufacturer must furnish a copy of the following statement with each new 1995 and later small off-road engine, using those portions of the statement applicable to the engine.
~~OWNER'S WARRANTY RESPONSIBILITIES:~~ Owner's Warranty Responsibilities: - As the (equipment type or small off-road) engine owner, you are responsible for the performance of the required maintenance listed in your owner's manual. (Manufacturer's name) recommends that you retain all receipts covering maintenance on your (equipment type or small off-road) engine, but (manufacturer's name) cannot deny warranty solely for the lack of receipts or for your failure to ensure the performance of all scheduled maintenance. - As the (equipment type or small off-road) engine owner, you should however be aware that (manufacturer's name) may deny you warranty coverage if your (equipment type or small off-road) engine or a part has failed due to abuse, neglect, improper maintenance or unapproved modifications. - You are responsible for presenting your (equipment type or small off-road) engine to a (manufacturer's name) distribution center as soon as a problem exists. The warranty repairs should be completed in a reasonable amount of time, not to exceed 30 days. If you have any questions regarding your warranty rights and responsibilities, you should contact (Insert chosen manufacturer's contact) at 1-XXX-XXX-XXXX. (b) Warranty Contact Requirement (1) Commencing with the 1995 calendar year, each manufacturer must furnish with each new engine a warranty statement that generally describes the obligations and rights of the manufacturer and owner under this article. Manufacturers must also include in the warranty statement a phone number the consumer may use to obtain their nearest franchised United States service center. (2) The service center phone number must be staffed with at least one English speaking	This is inconsistent with EPA labeling and will result in the need for separate labels for EPA and CARB with identical information. OPEI recognizes CARB desire to meet accessiblity needs, however this change needs to be organized cooperatively with EPA and Industry in order to maintain a single 50-state emissoins label. Additionally, inclusion of "but (manufacturer's name) cannot deny warranty solely for the lack of receipts or for your failure to ensure the performance of all scheduled maintenance" in the current language is inconsistent with EPA 1054.120(d) which allow denial of warranty claims if the operator caused the problem through improper maintenance or use. Finally, the requirement is inconsistent with 15 USC Chapter 50 - Consumer Product Warranties, Section 2304 - As follows: (c) Waiver of standards The performance of the duties under subsection (a) shall not be required of the warrantor if he can show that the defect, malfunction, or failure of any warranted consumer product to conform with a written warranty, was caused by damage (not resulting from defect or malfunction) while in the possession of the consumer, *or unreasonable use (including failure to provide reasonable and necessary maintenance).*	Owner's Warranty Responsibilities: - As the (equipment type or small off-road) engine owner, you are responsible for the performance of the required maintenance listed in your owner's manual. (Manufacturer's name) recommends that you retain all receipts covering maintenance on your (equipment type or small off-road) engine~~, but (manufacturer's name) cannot deny warranty solely for the lack of receipts or for your failure to ensure the performance of all scheduled maintenance~~.
§ 2407. New Engine Compliance and Production Line Testing – New Small OffRoad Engine Selection, Evaluation, and Enforcement Action.		

(a) Compliance Test Procedures. (1) The Executive Officer may, with respect to any new engine family or subgroup being sold, offered for sale, or manufactured for sale in California, order an engine manufacturer to make available for compliance testing and/or inspection ~~a reasonable number of~~ one or more engines, and may direct that the engines be delivered to the state board at 4001 Iowa Street, Riverside, CA 92507 ~~the Haagen-Smit Laboratory, 9528 Telstar Avenue, El Monte, California~~ or where specified by the Executive Officer. The Executive Officer may also, with respect to any new engine family or subgroup being sold, offered for sale, or manufactured for sale in California, have an engine manufacturer compliance test and/or inspect ~~a reasonable number of~~ one or more engines at the engine manufacturer's facility under the supervision of an CARB Enforcement Officer. Engines must be selected at random from sources specified by the Executive Officer according to a method approved by the Executive Officer, that, insofar as practical, must exclude engines that would result in an unreasonable disruption of the engine manufacturer's distribution system. ~~A subgroup may be selected for compliance testing only if the Executive Officer has reason to believe that the emissions characteristics of that subgroup are substantially in excess of the emissions of the engine family as a whole.~~ ~~(8) Engines must be tested in groups of five until a "Pass" or "Fail" decision is reached for each pollutant independently for the engine family or subgroup in accordance with the following table:~~		
~~Number of Engines Tested / Decide "Fail" If "U" is greater than or equal to / Decide "Pass" If "U" is less than or equal to~~ ~~5 / 2.18 / -0.13~~ ~~10 / 2.11 / 0.51~~ ~~15 / 2.18 / 0.88~~ ~~20 / 2.29 / 1.16~~ ~~where:~~ $U = \frac{\sum_{i=1}^{n}(x_i - \mu_0)}{\sqrt{\sum_{i=1}^{n}(x_i - \mu_0)^2}}$ xi = the projected emissions of one pollutant for the ith engine tested. µ0 = the applicable calendar year emission standard for that pollutant. n = the number of engines tested.		

~~(9)~~ (8) The Executive Officer will find that a group of engines has failed the compliance testing pursuant to the above table if the Executive Officer finds that the average emissions of the any engines within the selected engine family or subgroup exceed the applicable calendar model year new engine emission standard for at least one pollutant. ~~(10) If no decision can be reached after 20 engines have been tested, the Executive Officer will not make a "Fail" decision for the selected engine family or subgroup on the basis of these 20 tests alone. Under these circumstances the Executive Officer will elect to test 10 additional engines. If the average emissions from the 30 engines tested exceed any one of the exhaust emission standards for which a "Pass" decision has not been previously made, the Executive Officer will render a "Fail" decision.~~ ~~(11)~~ (9) If the Executive Officer determines, in accordance with the procedures set forth in Subsection (a) that an engine family or any subgroup within an engine family, exceeds the emission standards for one or more pollutants, the Executive Officer will: (A) Notify the engine manufacturer that the engine manufacturer may be subject to revocation or suspension of the Executive Order authorizing sales and distribution of the noncompliant engines in the State of California, or enjoined from any further sales or distribution, of the noncompliant engines in the State of California pursuant to Section 43017 of the Health and Safety Code. Prior to revoking or suspending the Executive Order, or seeking to enjoin an engine manufacturer, the Executive Officer will consider production line test results, if any, and any additional test data or other information provided by the engine manufacturers and other interested parties, including the availability of emission reductions credits to remedy the failure. *****	Manufacturers demonstrate ongoing compliace with Production Line Testing process, calcluated by the Cum-Sum method. This on-going manufacturer compliance testing allows deviation to account production variability. By removing the U-factor and allowing CARB to determine new engine compliance based on one engine, it is a significant increase in stringency versus what is permitted with the PLT program. Changing the number of engines tested to one is a significant deviation and inconsistent with EPA's procedure and manufacturers may be unable to meet both the state and federal test requiremetns for one family, which would be inconsistent with Section 202(a) of the Clean Air Act.	Keep original test and process or align with EPA CFR 40 Part 1680 Subpart E - Selective Enforcement Auditing
(3) Engine Sample Selection ***** (B) 1. Prior to the beginning of the 2000 model year, if an engine manufacturer cannot provide actual California sales data, it must provide its total production and an estimate of California sales at the end of the model year. The engine manufacturer must also provide supporting material for its estimate. 2. For the 2000 and later model years, engine manufacturers must provide actual California sales, or other information acceptable to the Executive Officer, including, but not limited to, an estimate based on market analysis and federal production or sales. <u>Information supporting the manufacturer's market analysis and any other information forming the basis of a manufacturer's determination of sales must be provided to the Executive Officer within 30 days upon request.</u> *****	The proposed lanugage may be misinterpreted to include suggest additional requirements of criteria. Revise the sentence to simply say information is required within 30 days of request	~~Information supporting the manufacturer's market analysis and any other information forming the basis of a manufacturer's determination of sales~~ <u>The information</u> must be provided to the Executive Officer within 30 days upon request.
§ 2408. Emission Reduction Credits – Certification Averaging, Banking, and		

(a) Applicability. The requirements of this section are applicable to all small off-road engines produced in the 2000 and later model years. Engines certified to the voluntary standards in subsection 2403(b)(2) are not eligible for participation in this program. Participation in the averaging, banking and trading program is voluntary, but if a manufacturer elects to participate, it must do so in compliance with the regulations set forth in this section. The provisions of this section are limited to HC+NOx (or NMHC+NOx, as applicable), CO, and Particulate Matter emissions. (b) General provisions. (1) The certification averaging, banking, and trading provisions for HC+NOx, CO, and Particulate Matter emissions from eligible engines are described in this section. (2) An engine family may use the averaging, banking and trading provisions for HC+NOx, and NMHC+NOx, CO, and Particulate Matter emissions if it is subject to regulation under this article with certain exceptions specified in paragraph (3) of this section. (3) A manufacturer must not include in its calculation of credit generation and may exclude from its calculation of credit usage, any new engines that are exported from California, or that are not destined for California, unless the manufacturer has reason or should have reason to believe that such engines have been or will be imported in a piece of equipment. (4) For an engine family using credits, a manufacturer may, at its option, include its entire production of that engine family in its calculation of credit usage for a given model year.	There is no need for CO ABT with if the current CO limits are maintained.	Remove CO ABT
(5) A manufacturer may certify engine families at Family Emission ~~Limits~~ Levels (FELs) above or below the applicable emission standard subject to the limitation in paragraph (6) of this section, provided the summation of the manufacturer's projected balance of credits from all credit transactions ~~for each engine class~~ in a given model year is greater than or equal to zero, as determined under paragraph (f). (A) A manufacturer of an engine family with an FEL exceeding the applicable emission standard must obtain positive emission credits sufficient to address the associated credit shortfall via averaging, banking, or trading. (B) An engine family with an FEL below the applicable emission standard may generate positive emission credits for averaging, banking, or trading, or a combination thereof. (C) In the case of a production line test failure, credits may be used to cover subsequent production of engines for the family in question if the manufacturer elects to recertify to a higher FEL. Credits may be used to remedy a nonconformity determined by production line testing or new engine compliance testing, at the discretion of the Executive Officer. (D) In the case of a production line testing failure pursuant to section 2407, a manufacturer may revise the FEL based upon production line testing results obtained under section 2407 and upon Executive Officer approval. The manufacturer may use certification credits to cover both past production and subsequent production as needed. (6) No engine family may have an FEL that is greater than the emission levels in the table below.	See FEL definition comment above.	

(h) Maintenance of records. (1) The manufacturer must establish, maintain, and retain the following adequately organized and indexed records for each engine family: (A) CARB engine family identification code, (B) Family Emission ~~Limit~~ Level (FEL) or FELs where FEL changes have been implemented during the model year, (C) Maximum modal power for each configuration sold or an alternative approved by the Executive Officer. (D) Projected sales volume for the model year, and (E) Records appropriate to establish the quantities of engines that constitute eligible sales for each power rating for each FEL. (2) Any manufacturer producing an engine family participating in trading reserved credits must maintain the following records on a quarterly basis for each such engine family: (A) The engine family, (B) The actual quarterly and cumulative applicable production/sales volume, (C) The values required to calculate credits as given in paragraph (f), (D) The resulting type and number of credits generated/required, (E) How and where credit surpluses are dispersed, and (F) How and through what means credit deficits are met.	See FEL definition comment above.	
§ 2408.1 Emission Reduction Credits – Zero-Emission Equipment Credits Averaging, Banking, and Trading Provisions.		
(4) A manufacturer of zero-emission small off-road equipment that wishes to generate ~~zero-emission~~ zero-emission equipment credits must certify zero-emission equipment engine families at Family Emission ~~Limits~~ Levels (FEL) of zero grams per kilowatt-hour. (A) A manufacturer of zero-emission small off-road equipment which certifies an engine family as a zero-emission equipment engine family may generate positive zero-emission equipment credits for averaging, banking, or trading, or a combination thereof. (B) Except as noted in section 2408.1(b)(4)(C), an engine family certified as a zero-emission equipment engine family must meet the following durability requirements: 1. 300 hours for zero-emission small off-road equipment that functions and performs equivalently to equipment using spark-ignition engines with a displacement of less than or equal to 80cc, 2. 500 hours for zero-emission small off-road equipment that functions and performs equivalently to equipment using spark-ignition engines with a displacement between 80cc and 225cc. (C) An engine family that is certified as a zero-emission equipment engine family, but cannot achieve the full durability period, may generate 75 percent of the zero-emission equipment credits if the zero-emission equipment engine family can meet a minimum of 75 percent up to 99 percent of the durability period. The amount of zero-emission credits would be calculated as 75 percent of the result obtained using the equation in section 2408.1(f). This allowance will remain in effect through the 2012 model year, after which all zero-emission small off-road equipment will be required to meet the full durability requirement specified in subsection 2408.1(b)(4)(B).	See FEL definition comment above.	

(h) Maintenance of records. (1) The manufacturer of zero-emission small off-road equipment must establish, maintain, and retain the following adequately organized and indexed records for each engine family: (A) CARB engine family identification code, (B) Family Emission ~~Limit~~ Level (FEL), (C) Maximum equivalent modal power for each configuration sold or an alternative approved by the Executive Officer, (D) Projected sales volume for the model year, (E) Records appropriate to establish the quantities of equipment that constitute eligible sales for each power rating for each FEL, and (F) Records of standard battery package sales per equipment sales, if batteries were sold separately from the equipment. (2) Any manufacturer of zero-emission small off-road equipment participating in trading reserved zero-emission equipment credits must maintain the following records on a quarterly basis for each such engine family: (A) The engine family, (B) The actual quarterly and cumulative applicable production/sales volume, (C) The values required to calculate zero-emission equipment credits as given in subsection 2408.1(f), (D) The resulting number of zero-emission equipment credits generated, and (E) How and where zero-emission equipment credit surpluses are dispersed.	See FEL definition comment above.	
§ 2408.2 Emission Reduction Credits – Zero-Emission Generator Credits Averaging, Banking, and Trading Provisions.		
(a) Applicability. The requirements of this section 2408.2 are applicable to all zero-emission generators as defined in section 2401 produced in the 2022 through 2026 model years. Participation in this program is voluntary, but if a manufacturer elects to participate, it must do so in compliance with the provisions set forth in this section 2408.2. The provisions of this section 2408.2 are limited to HC+NOx (or NMHC+NOx, as applicable) emissions. (b) General provisions. (1) Zero-emission generator credits may be used to offset emissions for any engine family comprised of generator engines. (2) A manufacturer must only include in its calculation of zero-emission generator credit generation zero-emission generators that are sold and used in California. (3) For an engine family using zero-emission generator credits to compensate for negative certification emission credits, a manufacturer may, at its option, include its entire production of that engine family in its calculation of credit usage for a given model year. (4) A manufacturer of zero-emission generators that wishes to generate zero-emission generator credits must certify zero-emission generators at a family emission level (FEL) of zero grams per kilowatt-hour. (A) A manufacturer of zero-emission generators that certifies an engine family as a zero-emission generator engine family may generate positive zero-emission generator credits for averaging, banking, or trading, or a combination thereof. (B) Except as noted in section 2408.2(b)(5)(C), an engine family certified as a zero-emission generator engine family must meet the durability requirements listed in Table	Remove 2026 sunset date to continue to incentivize transition through 2027. OPEI is additionally interested in understanding how and when new credit programs will be initiated. Seeking feedback how the programs will be initiated as early as 2022.	...produced in the 2022 through 2027 model years.

Table 1. Minimum Requirements for Zero-Emission Generator Credit Eligibility.

Product Type	Durability Period	Energy and Power Requirements	Credit Eligibility
Level 1 zero-emission generator	500 hours	Supply: 2.5 kWh over 8 hours Surge capability: 3,000 watts for 10 seconds	Exhaust 1,500 g HC+NO_x
Level 2 zero-emission generator	500 hours	Supply: 6 kWh over 8 hours Surge capability: 3,000 watts for 10 seconds	Exhaust 2,200 g HC+NO_x
Level 3 zero-emission generator	500 hours	Supply: 12 kWh over 8 hours Surge capability: 5,000 watts for 10 seconds	Exhaust 3,200 g HC+NO_x
Level 4 zero-emission generator	500 hours	Supply: 25 kWh over 8 hours Surge capability: 5,000 watts for 10 seconds	Exhaust 4,700 g HC+NO_x

Credit Eligibility should be raised so that it is closer to a 1:1 ratio to encourage use of the ZE Generator Credit program.

1 IC Generators Sales – similar to Level 1 ZE Generator
SORE Credits = (Standard – FEL) x Sales x Power x EDP x Load Factor
SORE Credits = (0 g/kWhr – 6.0 g/kWhr) x 1 unit x 4 kW x 500 hours x 0.47
SORE Credits = -5640 g

ZE Generators Sales to generate credits to cover an IC Generator Sales
Zero-emission generator credits = Credit eligibility as specified in Table 1 of this section × Sales
Zero-emission generator credits = 1,500 g HC+NOx * Sales
Zero-emission generator credits = 5640 g = 1,500 g HC+NOx * Sales
Sales = 3.7 units

Roughly 3.7 to 1 ratio based on proposed credits. Credit Eligibility should be raised to a 1:1 ratio to encourage use of the ZE Generator Credit program.

Level 1 Credit Eligibility: Exhaust 5,000 g HC+Nox
Level 2 Credit Eligibility: Exhaust 15,000 g HC+Nox
Level 3 Credit Eligibility: Exhaust 20,000 g HC+Nox
Level 4 Credit Eligibility: Exhaust 30,000 g HC+NOx

ARB Proposal Document ID	Issue / Comment	OPEI Proposed Changed Text
§2750. Purpose.		
(b) In order to give manufacturers maximum flexibility, certification programs are available beginning the 2006 model year. The two options are identified in section 2754(a) and in section 2754(b), and require running loss emissions to be controlled during engine operation, which results in greater evaporative emissions reductions. Manufacturers must select one option for each evaporative family they certify through the 2023 model year. Beginning with model year 2024, manufacturers must certify each evaporative family to meet the hot soak plus diurnal emission standards in section 2754(a).	OPEI believes the component based cerification is effective and necessary for certain types of equipment and the non-intergrated nature of the SORE industry and manufacting process for many products. OPEI belives the enforcment of the 2017 evaporative amendments have addressed non-compliance with ground-supported products. CARB has not conducted testing or provided data to show that the 2017 evaporative amendments are not effective. Additionally, there is no evidence that handheld products cannot achieve todays limits based on component-level testing. The 2015 E10 validation study, the September 26, 2019 Workshop data (slides 30-31), and the SORE2020 final report (tables 20 an 25) confirm handheld products comply with regulations without the need for more expensive diurnal testing. In addition, new diurnal testing for handheld products would require additional SHED costs and compliance leadtimes that are not addressed in the Proposed Rule and would be very short term. There would be no opportunity to recover these investments based on the Proposed Rule. Finally, handheld products should be excluded from hot soak testing because the components suggested in the rationale, such carbon canisters, are not applicable to handheld products.	No changes to limits and procedures included in to current evaporative rules.
§2751. Applicability.		
(c) This Article does not apply to: (1) engines or equipment that use compression-ignition engines, or engines or equipment powered with compressed natural gas (CNG), propane, liquefied petroleum gas (LPG), or liquefied natural gas (LNG).	CARB has proposed to allow credit generation for compressed natural gas (CNG), propane, liquefied petroleum gas (LPG), or liquefied natural gas (LNG) engines.	OPEI does not object to this change, however this part must now be applicable to engines / equipment for these fuel types.
§2752. Definitions.		
(a)(5) "CP-902" means Certification Procedure for Evaporative Emission Control Systems on Small Off-Road Engines ~~With Displacement Greater Than 80 Cubic Centimeters~~, adopted July 26, 2004, and last amended ~~September 18, 2017~~ [insert amended date].	As discussed in these comments, component based certifiation is needed for many products, including handheld. As a result, CP-901 needs to be retained beyond 2023 for products certified by "design-based" method. CP-901 should be reviewed and updated accordingly.	"CP-902" means Certification Procedure for Evaporative Emission Control Systems on Small Off-Road Engines With Displacement Greater Than 80 Cubic Centimeters, adopted July 26, 2004, and last amended ~~September 18, 2017~~ [insert amended date].
(a)(22) "Passively-Purged Carbon Canister" means a carbon canister which draws in ambient air to purge adsorbed compounds using a vacuum created within the fuel tank by normal diurnal temperature variations.	Passively-purged carbon canisters are also purged during engine operation	"Passively-Purged Carbon Canister" means a carbon canister which draws in ambient air to purge adsorbed compounds using a vacuum created within the fuel tank by normal diurnal temperature variations and when the engine is running.
(a)(35) "TP-901" means Test Procedure for Determining Permeation Emissions from Small Off-Road Engine Fuel Tanks, adopted July 26, 2004, and last amended ~~May 6, 2019~~ [insert amended date].	As discussed in these comments, component based certifiation is needed for many products, including handheld. As a result, CP-901 needs to be retained beyond 2023 for products certified by "design-based" method. CP-901 should be reviewed and updated accordingly.	
§2753. Certification Requirements and Procedures.		

(a) Certification Small off-road engines or equipment that use small off-road engines subject to this Article must contain evaporative emission control systems. The evaporative emission control systems must be certified annually to the evaporative emission standards set out in sections 2754 through 2757 of this Article by the California Air Resources Board. An Executive Order of Certification for such engines or equipment must be obtained prior to the sale or lease, or the offering for sale or lease, for use or operation in California or the delivery or importation for introduction into commerce in California. Engine manufacturers or equipment manufacturers may apply for an Executive Order of Certification. For model years 2006-2019, applicants must follow the certification procedures outlined in CP-901, Certification and Approval Procedure for Small Off-Road Engine Fuel Tanks, adopted July 26, 2004, or CP-902, Certification and Approval Procedure for Evaporative Emission Control Systems, adopted July 26, 2004, as applicable, which are incorporated by reference herein. For model years 2020 and ~~subsequent model years~~ through 2023, applicants must follow the certification procedures outlined in CP-901, adopted July 26, 2004, and amended September 18, 2017, or CP-902, adopted July 26, 2004, and amended September 18, 2017, as applicable, which are incorporated by reference herein. For model year 2018 and 2019, an applicant may follow the certification procedures outlined in CP-901, adopted July 26, 2004, and amended September 18, 2017, or CP-902, adopted July 26, 2004, and amended September 18, 2017, as applicable, in lieu of those in CP-901, adopted July 26, 2004, or CP-902, adopted July 26, 2004, as applicable. For model year 2024 and subsequent model years, applicants must follow the certification procedures outlined in CP-902, adopted July 26, 2004, and last amended [insert amended date], which is incorporated by reference herein. For model year 2022 and 2023, an applicant may follow the certification procedures outlined in CP-902, adopted July 26, 2004, and last amended [insert amended date], in lieu of those in CP-901, adopted July 26, 2004, and amended September 18, 2017, or CP-902, adopted July 26, 2004, and amended September 18, 2017, as applicable. An applicant following the certification procedures outlined in CP-902, adopted July 26, 2004, and last amended [insert amended date], for model year 2022 or 2023 must meet the emission standards for model year 2024 and subsequent model years, as shown in Table 2 or 3 of Section 2754, as applicable. An applicant must also meet the bond requirements in section 2774 before an Executive Order of Certification will be issued for model year 2020 and subsequent model year evaporative families.	As discussed in these comments, component based certifiation is needed for many products, including handheld. As a result, CP-901 needs to be retained beyond 2023 for products certified by "design-based" method. CP-901 should be reviewed and updated accordingly.	
(b) Certification of Complete Systems for Engines or Equipment using engines with displacement greater than 80 cc through model year 2023. Certification of a complete evaporative emission control system is required. An application for certification of an evaporative emission control system to the diurnal emission standards in section 2754 or 2757 of this Article must include a determination of the engine or equipment model in the evaporative family that is expected to exhibit the highest diurnal emission rate relative to the applicable diurnal emission standard and detail the criteria used to make that determination. The applicant must also include one of the following for the engine or equipment model in the evaporative family that is expected to exhibit the highest diurnal emission rate relative to the applicable diurnal emission standard: *****	As discussed in these comments, component based certifiation is needed for many products, including handheld beyond 2023.	
(c) Certification of Complete Systems for Engines or Equipment using engines with displacement less than or equal to 80 cc through model year 2023. *****	As discussed in these comments, component based certifiation is needed for many products, including handheld beyond 2023.	

(d) Certification of Complete Systems for Engines or Equipment using small off-road engines for model year 2024 and subsequent model years. Certification of a complete evaporative emission control system is required. An application for certification of an evaporative emission control system to the hot soak plus diurnal emission standards in section 2754 of this Article must include a determination of the engine or equipment model in the evaporative family that is expected to exhibit the highest hot soak plus diurnal emission rate relative to the applicable hot soak plus diurnal emission standard and detail the criteria used to make that determination. The applicant must also include a test report for a test performed according to TP-902 for the engine or equipment model in the evaporative family that is expected to exhibit the highest hot soak plus diurnal emission rate relative to the applicable hot soak plus diurnal emission standard.	As discussed in these comments, component based certifiation is needed for many products, including handheld beyond 2023 and this new section needs additional consideration.	
(f) Manufacturers meeting the requirements of section 2766 of this Article must be certified annually by the California Air Resources Board by submitting a Letter of Conformance. The Letter of Conformance must include, at a minimum, a statement citing the basis for complying with section 2766. An Executive Order of Certification for such engines or equipment must be obtained prior to the sale or lease, or the offering for sale or lease, or the delivery or importation for introduction into commerce in California of such engines or equipment in California.	The language of Sec. 2753(e)(2) requires a new CP-902 certification process for any modifications of evaporative control systems except fuel lines. "New certification" implies a full test with 140-day preconditioning is needed. However, CP-902 Sec. 5.11 accepts a document-only running change for modifications which do not override the worst case. Therefore, Sec. 2753(e)(2) should be revised to harmonize with or simply refer CP-902 Sec. 5.11.	
(g) A Holder whose Executive Order has been suspended or revoked must submit diurnal or hot soak plus diurnal emission test results, determined using TP-902, for all evaporative families ~~using engines with displacement greater than 80 cc~~, as described in subsection (b) or (d) of this section, as applicable, according to the following schedule:	As discussed in these comments, component based certifiation is needed for many products, including handheld beyond 2023.	
§2754. Diurnal and Hot Soak Plus Diurnal Emission and Design Standards.		
(a)(1) Table 1 below specifies the diurnal emission and design standards for small off-road engines, and equipment that use small off-road engines, with displacements greater than 80 cc, on and after the model years indicated, through the 2023 model year. The standards in Table 1 shall continue to apply to large spark-ignition engines subject to section 2433(b)(4)(B) in Title 13, Chapter 9, Article 4.5 of the California Code of Regulations after the 2023 model year.	OPEI appreciates the flexibility and clarification of the added text.	
(a)(3) Table 2, below, specifies the hot soak plus diurnal emission standards for small off-road engines on and after the model years indicated, except for generator engines.	As discussed in these comments, component based certifiation is needed for many products, including handheld beyond 2023.	

Table 2 **Hot Soak Plus Diurnal Emission Standards for Small Off-Road Engines, Except Generator Engines** **Displacement Category** / **Effective Date Model Year** / **Hot Soak Plus Diurnal Emission Standards[1] (g organic material hydrocarbon equivalent·test^{-1})** ≤ 80 cc / 2024 / 0.00 > 80 cc - < 225 cc Walk-Behind Mowers / 2024 / 0.00 > 80 cc - < 225 cc (except Walk-Behind Mowers) / 2024 / 0.00 ≥ 225 cc / 2024 / 0.00 [1] The standards for hot soak plus diurnal emissions are measured in grams of organic material hydrocarbon equivalent per test, which includes both the hot soak test and the 24-hour diurnal test, as specified in TP-902.	See OPEI Comments 4, 5, 6 and 7 regarding technical feasibility of ZEE. Limts need to be retained to allow use of currently banked credits. Generally, the exhaust credits will limit the number of new products from 2024, as discussed in the ISoR, so evaporative limits do not need to change. There is no ABT program currently or proposed for handheld evaporative emissions. Therefore, regardless of exhaust ABT programs, a zero HC evaporative limit would prohibt sales of gas-powered handheld products from 2024. At a minimum, handheld product limits need to be retained to allow use of exhaust credits for products. OPEI believes the impact of the 2017 evaporative amendments needs to be considered before it can be determined if lower evaporative limits are needed to meet SIP goals for all products.	
(a)(4)On or after the model year set out in Table 2 of this section, hot soak plus diurnal emissions from any small off-road engine, except generator engines, must not exceed the hot soak plus diurnal emission standard specified in Table 2 of this section. The emission standards in Table 2 of this section are optional for model years 2022 and 2023.	As discussed in these comments, component based certifiation is needed for many products, including handheld beyond 2023.	
(a)(5) Table 3, below, specifies the hot soak plus diurnal emission standards for generator engines on and after the model years indicated.		
Table 3 **Hot Soak Plus Diurnal Emission Standards for Generator Engines** **Displacement Category** / **Effective Date Model Year** / **Hot Soak Plus Diurnal Emission Standards[1] (g organic material hydrocarbon equivalent·test^{-1})** ≤ 80 cc / 2024 / 0.50 2028 / 0.00 > 80 cc - < 225 cc / 2024 / 0.60 2028 / 0.00 ≥ 225 cc / 2024 / 0.70 2028 / 0.00 [1] The standards for hot soak plus diurnal emissions are measured in grams of organic material hydrocarbon equivalent per test, which includes both the hot soak test and the 24-hour diurnal test, as specified in TP-902.	OPEI believes the component based cerification is effective and necessary for certain types of equipment and the non-intergrated nature of the SORE industry and manufacting process for many products. OPEI belives the enforcment of the 2017 evaporative amendments have addressed non-compliance with ground-supported products. CARB has not conducted testing or provided data to show that the 2017 evaporative amendments are not effective. OPEI believes the impact of the 2017 evaporative amendments needs to be considered before it can be determined if lower evaporative limits are needed to meet SIP goals for all products.	

(f) For model years 2020 ~~and subsequent model years~~ through 2023, all fuel lines must be securely connected to prevent fuel leakage throughout the useful life of the evaporative emission control system. Fuel line assembly testing shall be conducted in accordance with the Fuel Line Assembly Tensile Test in section 5.4 of ANSI/OPEI B71.10-2013, ~~which is incorporated by reference herein~~ or the Fuel line connection tensile test in section 5.5 of ANSI/OPEI B71.10-2018.	The regulation states "all" fuel lines; however, OPEI's standard exempts fuel lines as stated below: "- Fuel lines of less than 50 mm (2 inches) in length and which are held in place by compression after assembly; - Fuel line assembly connections which cannot reasonably be exposed to a tensile pull in the end use." ANSI/OPEI B71.10-2018 test procedures applies to the gasoline fuel systems for off-road ground-supported outdoor power equipment with spark ignition engines of less than one liter displacement. Off-road ground-supported outdoor power equipment for which this standard may apply include walk-behind and riding lawn-mowers, snow throwers, powered log-splitters, shredders/grinders and tillers. An exemption is needed for small off-road engines with displacement less than or equal to 80 cubic centimeters (cc) and/or fuel system requirements of the ANSI/OPEI B175 series (handheld products) should be referenced.	Revise as follows: Section 2754 (f) – "all fuel lines subjected by the section 4.4 of ANSI/OPEI B71.10-2013 or section 4.2.1 of ANSI/OPEI B71.10-2018" Section 2754 (g) – "all fuel lines subjected by the section 4.2.1 of ANSI/OPEI B71.10-2018"
(g) For model year 2024 and subsequent model years, all fuel lines must be securely connected to prevent fuel leakage throughout the useful life of the evaporative emission control system. Fuel line assembly testing shall be conducted in accordance with the Fuel line connection tensile test in section 5.5 of ANSI/OPEI B71.10-2018.	ANSI/OPEI B71.10-2018 test procedures applies to the gasoline fuel systems for off-road ground-supported outdoor power equipment with spark ignition engines of less than one liter displacement. Off-road ground-supported outdoor power equipment for which this standard may apply include walk-behind and riding lawn-mowers, snow throwers, powered log-splitters, shredders/grinders and tillers. An exemption is needed for small off-road engines with displacement less than or equal to 80 cubic centimeters (cc) and/or fuel system requirements of the ANSI/OPEI B175 series (handheld products) should be referenced.	
(h)An applicant certifying engines or equipment to comply with the hot soak plus diurnal emission standards under this section shall submit a determination in the certification application that running loss emissions are controlled from being emitted into the atmosphere. The Executive Officer must approve the determination for an Executive Order of Certification to be issued. Approval by the Executive Officer is not required if actively-purged carbon canisters meeting the requirements of this Article are used. To demonstrate that running loss emissions are controlled from being emitted into the atmosphere, an applicant shall follow the procedure in section 2.4 of TP-902.	As discussed in these comments, component based certifiation is needed for many products, including handheld beyond 2023.	
§2754.1. Certification Averaging, ~~and~~ Banking, and Trading.		
(b)(3) A Holder shall not include in its calculation of credit generation and may exclude from its calculation of credit usage, any new engines or equipment not subject to this Article. Small off-road engines powered with compressed natural gas (CNG), propane, liquefied petroleum gas (LPG), or liquefied natural gas (LNG) may be certified under this Article, in order to generate evaporative emission credits. CNG, propane, LPG, and LNG engines must meet all applicable requirements in this Article to earn evaporative emission credits.	2751 (c), needs to be adjusted to include optional applicability to gaseous product.	

<table>
<tr><td>(f)(1) For each evaporative family, ~~diurnal~~ evaporative emission credits (positive or negative) are to be calculated according to the following equations ~~and rounded to the nearest tenth of a gram.~~ Consistent units with two significant digits are to be used throughout the equations.

EFELD = Applicable diurnal or hot soak plus diurnal emission standard – EMEL

Credits = EFELD × Production Volume

Where:
EMEL = the declared evaporative model emission limit for the model tested within the evaporative family in grams
EFELD = the calculated evaporative family emission limit differential for the evaporative family in grams

Production Volume is as defined in section 2752(a)~~(21)~~ (25)</td><td>Proposed text is unclear with regards to handling rounding of digits. Generally the number of significant digit reporting is correlated to the number of significant digits of the standard. That said, rounding ABT evaporative credits to hundredths of a gram is insignificant.</td><td>For each evaporative family, diurnal evaporative emission credits (positive or negative) are to be calculated according to the following equations and rounded to the same number of significant digits as the published standard. Consistent units
with two significant digits are to be used throughout the equations.

EFELD = Applicable diurnal or hot soak plus diurnal emission standard – EMEL

Credits = EFELD × Production Volume

Where:
EMEL = the declared evaporative model emission limit for the model tested within the evaporative family in grams
EFELD = the calculated evaporative family emission limit differential for the evaporative family in grams</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>§2754.3. Evaporative Emission Reduction Credits – Zero-Emission Generator Credits Averaging, Banking, and Trading Provisions.</td><td></td><td></td></tr>
<tr><td>Table 1. Minimum Requirements for Zero-Emission Generator Credit Eligibility.
<table><tr><th>Product Type</th><th>Useful Life</th><th>Energy and Power Requirements</th><th>Credit Eligibility</th></tr><tr><td>Level 1 zero-emission generator</td><td>5 years</td><td>Supply: 2.5 kWh over 8 hours

Surge capability: 3,000 watts for 10 seconds</td><td>0.5 g organic material hydrocarbon equivalent·day⁻¹
or
0.5 g organic material hydrocarbon equivalent·test⁻¹</td></tr><tr><td>Level 2 zero-emission generator</td><td>5 Years</td><td>Supply: 6 kWh over 8 hours

Surge capability: 3,000 watts for 10 seconds</td><td>0.5 g organic material hydrocarbon equivalent·day⁻¹
or
0.5 g organic material hydrocarbon equivalent·test⁻¹</td></tr><tr><td>Level 3 zero-emission generator</td><td>5 Years</td><td>Supply: 12 kWh over 8 hours

Surge capability: 5,000 watts for 10 seconds</td><td>0.6 g organic material hydrocarbon equivalent·day⁻¹
or
0.6 g organic material hydrocarbon equivalent·test⁻¹</td></tr><tr><td>Level 4 zero-emission generator</td><td>5 Years</td><td>Supply: 25 kWh over 8 hours

Surge capability: 5,000 watts for 10 seconds</td><td>0.6 g organic material hydrocarbon equivalent·day⁻¹
or
0.6 g organic material hydrocarbon equivalent·test⁻¹</td></tr></table></td><td>Credit Eligibility should be raised so that it is closer to a 1:1 ratio to encourage use of the ZE Generator Credit program. These changed credit eligibility values more closely match the diurnal plus hot soak emission standards for the generators these ZE generator would be replacing.
The current credit eligibility doesn't increase with each level generator. OEMs should receive an increase in credit eligibility for higher level generators to encourage use of the program.
The adjusted values are calculated by Fuel Consumption x 8 hours and then applying the current EVAP standard to a fuel tank that holds that amount of fuel. This creates equivalency for the 8 hour run time between a portable generator and ZEE product.</td><td>Level 1 = 2.0 g/day
Level 2 = 3.0 g/day
Level 3 = 4.0 g/day
Level 4 = 6.0 g/day</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>§2755. Permeation Emission Standards.</td><td></td><td></td></tr>
<tr><td>Permeation Emission Standards.
On or after the model year set out herein, and through model year 2023, fuel tanks and fuel lines used on equipment subject to this section must not exceed the following permeation rates:</td><td>As discussed in these comments, component based certifiation is needed for many products, including handheld beyond 2023.</td><td></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>§2756. Fuel Cap Performance Standard.</td><td></td><td></td></tr>
<tr><td>On or after the model year set out herein, no person shall sell, supply, offer for sale or manufacture for sale fuel caps for fuel tanks for small off-road engines ~~or equipment that use small off-road engines with displacements > 80 cc~~ subject to this Article that do not meet the following performance standards unless exempted in an Executive Order issued pursuant to section 2767 of the Article:</td><td>As discussed in these comments, component based certifiation is needed for many products, including handheld beyond 2023.</td><td></td></tr>
<tr><td>(d) Fuel cap tether must meet the durability requirements in TP-902.</td><td></td><td></td></tr>
</table>

Engines Subject to the Fuel Cap Performance Standards **Effective Date Model Year** / **Applicability** 2007 — Fuel caps for all small off-road engines > 80 cc to < 225 cc (must meet subsections (a) and (b) only) 2008 — Fuel caps for all small off-road engines ≥ 225 cc (must meet subsections (a) and (b) only) 2020 — Fuel caps for all small off-road engines > 80 cc (must meet subsections (a), (b), and (c)) 2024 — Fuel caps for all small off-road engines (must meet subsections (a), (b), (c), and (d))	Fuel cap splash requirements are unnecessary. OPEI does not believe it is typical to fill full fuel tanks and the issues experienced by CARB in testing are not reflective of typical practice. Addtionally, external tethers may pose catch and snag risks on some products due to operating environments. OPEI believes as a result external tethers would be more frequently tampered with. See comment to TP-902.	Remove tether drip requirements.
§2758. Test Procedures.		
(b)(3) for model years 2020 and ~~subsequent model years~~ 2021,	As discussed in these comments, component based certifiation is needed for many products, including handheld. As a result, TP-901 needs to be retained beyond 2023 for products certified by "design-based" method. If TP-901 is updated accordingly, these transition dates must also be updated.	
(b)(4) for model years 2022 and 2023, (A) One of the following: 1. TP-901, adopted July 26, 2004, and amended May 6, 2019, or 2. TP-901, adopted July 26, 2004, and last amended [insert amended date], which is incorporated by reference herein, and (B) One of the following: 1. SAE J1737, 2. SAE J30, or 3. SAE J1527, or 4. only for fuel lines with inner diameter 4.75 mm or less, SAE J2996.	As discussed in these comments, component based certifiation is needed for many products, including handheld. As a result, TP-901 needs to be retained beyond 2023 for products certified by "design-based" method. If TP-901 is updated accordingly, these transition dates must also be updated.	
§2759. Equipment and Component Labeling.		
(c)(4)(A)The label heading must read: ~~"IMPORTANT EMISSIONS INFORMATION."~~ "Important Emissions Information." When combined with an exhaust label, ~~"EMISSIONS"~~ "Emissions" relates to both exhaust and evaporative emissions.	This is inconsistent with EPA requirements and will result in the need for separate labels and documents for EPA and CARB with identical information. OPEI recognizes CARB desire to meet accessiblity needs, however this change needs to be organized cooperatively with EPA and Industry in order to maintain a single 50-state emissoins label and documents.	
(c)(4)(E) An unconditional statement of compliance with the appropriate model year(s) (for 2006 and later) California regulations; for example, ~~"THIS ENGINE MEETS 2006 CALIFORNIA EVP EMISSION REGULATIONS FOR SMALL OFF-ROAD ENGINES"~~ "This engine meets 2006 California evp emission regulations for small off-road engines".	This is inconsistent with EPA requirements and will result in the need for separate labels and documents for EPA and CARB with identical information. OPEI recognizes CARB desire to meet accessiblity needs, however this change needs to be organized cooperatively with EPA and Industry in order to maintain a single 50-state emissoins label and documents.	
§2764. Evaporative Emission Control System Warranty Statement.		

(b) ~~CALIFORNIA EVAPORATIVE EMISSION CONTROL WARRANTY STATEMENT YOUR WARRANTY RIGHTS AND OBLIGATIONS~~ California Evaporative Emission Control System Warranty Statement Your Warranty Rights and Obligations and ~~MANUFACTURER'S WARRANTY COVERAGE:~~ Manufacturer's Warranty Coverage: and ~~OWNER'S WARRANTY RESPONSIBILITIES:~~ Owner's Warranty Responsibilities: As the (equipment type) owner, you are responsible for performance of the required maintenance listed in your owner's manual. (Holder's name) recommends that you retain all receipts covering maintenance on your (equipment type), but (Holder's name) cannot deny warranty coverage solely for the lack of receipts or for your failure to ensure the performance of all scheduled maintenance.	This is inconsistent with EPA requirements and will result in the need for separate labels and documents for EPA and CARB with identical information. OPEI recognizes CARB desire to meet accessiblity needs, however this change needs to be organized cooperatively with EPA and Industry in order to maintain a single 50-state emissoins label and documents. Additionally, inclusion of "but (manufacturer's name) cannot deny warranty solely for the lack of receipts or for your failure to ensure the performance of all scheduled maintenance" in the current language is inconsistent with EPA 1054.120(d) which allow denial of warranty claims if the operator caused the problem through improper maintenance or use. Finally, the requirement is inconsistent with 15 USC Chapter 50 - Consumer Product Warranties, Section 2304 - As follows: (c) Waiver of standards The performance of the duties under subsection (a) shall not be required of the warrantor if he can show that the defect, malfunction, or failure of any warranted consumer product to conform with a written warranty, was caused by damage (not resulting from defect or malfunction) while in the possession of the consumer, *or unreasonable use (including failure to provide reasonable and necessary maintenance).*	
§2768. [Repealed]~~Variances.~~		
~~§2768. [Repealed]Variances.~~ ~~(a) Any manufacturer of small off-road engines or equipment that use small off-road engines subject to this Article that cannot meet the requirements set forth in sections 2754 through 2757 of this Article, due to extraordinary reasons beyond the manufacturer's reasonable control, may apply in writing for a variance. The variance application must set forth:~~ ~~(1) The provisions of the regulations for which a variance is sought;~~ ~~(2) the specific grounds upon which the variance is sought;~~ ~~(3) the proposed date(s) by which compliance will be achieved; and~~ ~~(4) a compliance plan detailing the method(s) that will achieve compliance.~~ ~~(b) Within 75 calendar days of receipt of a variance application containing the information required in subsection (a), the Executive Officer or his nominee shall hold a public hearing to determine whether, under what conditions, and to what extent, a variance is necessary and should be allowed. Notice of the time and place of the hearing must be sent to the applicant by certified mail not less than 30 days before the hearing. Notice of the hearing must also be submitted for publication in the California Regulatory Notice Register and sent to every person who requests such a notice, not less than 30 days before the hearing. The notice must state that the parties may, but are not required to, be represented by counsel at the hearing. At least 30 days before the hearing, the variance application must be made available to the public for inspection. Interested members of the public must be allowed a reasonable opportunity to testify at the hearing and their testimony must be considered.~~ ~~(c) No variance may be granted unless all of the following findings are made:~~ ~~(1) that, due to reasons beyond the reasonable control of the applicant, compliance would result in extraordinary economic hardship;~~ ~~(2) that the public interest in mitigating the extraordinary hardship to the applicant by issuing the variance outweighs the public interest in~~	Variances need to be retained due to complexity of industry and interpretations of regulations. In order to take measures for extraordinary circumstances beyond their reasonable control, such as pandemics, natural disasters (earthquakes, floods, wildfires), supplier shortages, etc., variances should be kept.	Retain this section.

ARB Proposal Document ID	Issue / Comment	OPEI Proposed Changed Text
5 ~~EQUIPMENT~~Equipment		
~~(a) A handheld, thermostatically-controlled, Teflon-coated aluminum hot plate (handheld fusion welder) and coupons of the same material as the tank. Both the hand held fusion welder and coupons must be of sufficient diameter to completely cover the opening(s) of the tank (optional).~~ ~~(b)~~ (a) A balance that meets the requirements of section 4 above. ~~(c)~~ (b) A vented enclosure with a temperature conditioning system capable of controlling the internal enclosure air temperature to within ± 2.0 °C over the duration of the test. Data confirming this performance shall be recorded at a rate no slower than once every 5 minutes. ~~(d)~~ (c) A barometric pressure transducer capable of measuring atmospheric pressure to within ± 2.0 millimeters of mercury. ~~(e)~~ (d) A temperature instrument capable of measuring ambient temperature to within ± 0.2 °C. ~~(f)~~ (e) A relative humidity measuring instrument capable of measuring the relative humidity (RH) accurately to within ± 2 percent RH ~~(optional)~~. ~~(g)~~ (f) Instrumentation meeting the requirements of section 4 of TP-902, ~~adopted July 26, 2004, and last amended May 6, 2019,~~ (if permeation testing will be performed according to section 12 of this test procedure).	Removing coupon sealing changes this procedure from a tank-only certification test into equipment-level certification testing and increases the stringency. Additionally, tank manufacturers may not manufacturer the fuel cap - Different OEMs may use different fuel caps which would result in many additional families and unnecessarily burden for minimal benefit. The new regulations would require equipment certification (via diurnal testing), this extra step at this level is overly burdensome and unnecessary. This change is a significant deviation and inconsistent with EPA's procedure and manufacturers may be unable to meet both the state and federal test requiremetns with one test, which would be inconsistent with Section 202(a) of the Clean Air Act. The proposed change would require relative humidity measurements. As discussed there is no need to measure relative humidty as it is not part of any calculation nor is used to correct any measurments. This only requires a lab to buy and maintain more equipment.	Retain current langauge.
7. ~~CALIBRATION PROCEDURE~~Calibration Procedure		
~~CALIBRATION PROCEDURE~~Calibration Procedure All instruments and equipment used in this procedure shall be calibrated at the time interval specified by the manufacturer or more often as needed per manufacturer instructions (e.g., if equipment undergoes repair). The balance listed in section 5~~(b)~~ (a) shall be calibrated annually per the balance manufacturer's instructions, or more often as needed per the manufacturer instructions (e.g., if the balance is moved), using ~~National Institute of Standards and Technology (NIST)~~ Système International d'Unités (SI)-traceable mass standards through National Institute of Standards and Technology (NIST) or another member of the Mutual Recognition Arrangement of the Comité International des Poids et Mesures (CIPM MRA). The ~~NIST~~ SI-traceable mass standards shall be calibrated annually by an independent organization or more often as needed. The instrumentation for measuring permeation emissions according to section 12 of this test procedure must be calibrated as specified in section 4 of TP-902.	The addition of "more often as needed per manufacturer instructions" is redudent with "interval specified by the manufacturer" and introduces opportunity for subjectivity of "more often". The example that "if a balance is moved" is inappropriate and unnecessary - The example would prohibit a balance from being moved for the purpose of calibration (to calibration area / measuring center or shipped).	CALIBRATION PROCEDURECalibration Procedure All instruments and equipment used in this procedure shall be calibrated at the time interval specified by the manufacturer. The balance listed in section 5(b) (a) shall be calibrated annually per the balance manufacturer's instructions, or more often as needed per the manufacturer instructions, using National Institute of Standards and Technology (NIST) Système International d'Unités (SI)-traceable mass standards through National Institute of Standards and Technology (NIST) or another member of the Mutual Recognition Arrangement of the Comité International des Poids et Mesures (CIPM MRA). The NIST SI-traceable mass standards shall be calibrated annually by an independent organization or more often as needed. The instrumentation for measuring permeation emissions according to section 12 of this test procedure must be calibrated as specified in section 4 of TP-902.
8 ~~DURABILITY DEMONSTRATION~~Durability Demonstration		

8.1 Pressure Test (a) Determine the fuel tank system's design pressure and vacuum limits under normal operating and storage conditions considering the influence of any associated pressure/vacuum relief components. To do this, measure the pressure limits using a fuel tank from an evaporative emission control system that is not used for any other portion of this test procedure by installing a pressure transducer in the fuel tank. With the exception of the use of the pressure transducer and connection to a carbon canister, as applicable, the fuel tank and fuel tank configuration used for these pressure measurements shall be identical to those used in the remainder of this test procedure. Using compressed air of no less than 21 °C, pressurize the fuel tank with compressed air, seal the fuel tank, and measure the pressure every second for 5 minutes. Use a vacuum pump to draw a vacuum in the fuel tank, seal the fuel tank, and measure the pressure every second for 5 minutes. Record the maximum and minimum pressure measurements on the test report.Subsection (b) of this test is not required if the fuel tank pressure does not exceed a gauge pressure of + 1.0 kPa for at least one minute when pressurized and the fuel tank vacuum does not exceed a gauge pressure of – 1.0 kPa for at least one minute when a vacuum is drawn in the fuel tank.	OPEI does not believe this is an issue. OPEI believes manufacturer data submitted in recent years show that vented tanks do not sustain pressure. Notwithstanding this issue, the proposal is insufficient to test because it does not recommend a test pressure or fill rate that is reflective of evaporating fuel.	Additional instructions are necessary to provide the clarity and consistency necessary to ensure different testers use a consistent approach known to provide accurate test results, which is necessary to ensure that fuel tanks determined to be in compliance with emission standards assessed using TP-901 are indeed compliant and do not result in excess emissions. In addition, adding explicit instructions to measure and record the pressure limits is necessary to provide the information needed to determine whether the pressure test may be omitted, per the Proposed Amendment described next.
~~Tanks that have a secondary operation for drilling holes for insertion of fuel line and grommet system may have these eliminated for purposes of durability and permeation testing.~~	OPEI has received feedback that manufacturers are being advised of different sealing requirements. Addiitonal language is needed to address specifically how holes need to be sealed, including what holes must be machined and what materials may be used to seal. Additionally, component suppliers such as the fuel tank manufacturer, may not have information regarding additional components and may be unable to account for materials reflective of cap and grommets (for example). This change would require significant additional tests and evaporative emissions families with minimal benefit.	"Any holes in the fuel tank for insertion of fuel lines, vent lines, and/or grommet systems shall be eliminated (if drilled during production) or sealed using metal plugs or material blanks that match the material of the fuel tank or grommet under test, attached with an appropriate epoxy."
8.3 Ultraviolet Radiation Exposure A sunlight-exposure test shall be performed by exposing each fuel tank to an ultraviolet light of at least 24 W·m-2 (0.40 W·hr·m-2·min-1) on the tank surface for at least 450 hours. Measure and record ultraviolet light intensity at least every hour. Alternatively, each fuel tank may be exposed to direct natural sunlight for at least 450 daylight hours. The ultraviolet radiation exposure test may be omitted if no part of the fuel tank, including the filler neck and fuel cap, will be exposed to light when installed on an engine.	Measuring UV exposure every hour under artificial lights is not required as this testing is stable. Daily checks would catch if bulbs weaken or burn out. Adding the time back for out of spec would ensure the full UV conditioning is achieved. This is an unnecessary and burdensome requirement for the 450 hours required of this test. Costs and resources to accomplish this are not in line with any possible benefit. Additionally, 24-hour testing would be nearly impossible (or costly with automation) and greatly increase the length of time for certification testing that already takes multiple months to complete.	A sunlight-exposure test shall be performed by exposing each fuel tank to an ultraviolet light of at least 24 W·m-2 (0.40 W·hr·m-2·min-1) on the tank surface for at least 450 hours. Measure and record ultraviolet light intensity at the beginning and end of the test. Alternatively, each fuel tank may be exposed to direct natural sunlight for at least 450 daylight hours. The ultraviolet radiation exposure test may be omitted if no part of the fuel tank, including the filler neck and fuel cap, will be exposed to light when installed on an engine.

8.5 Fuel Cap and Tether Spill Test Fill the fuel tank to its nominal capacity with fresh test fuel as specified in section 6 of this procedure. Install the fuel cap. Loosen the fuel cap completely. Once the fuel cap is completely loosened, remove it and fully extend the tether, if one is used, within 2 seconds. If no tether is connected to the fuel cap, remove the fuel cap to a height of 15 centimeters above the top of the fill neck within 2 seconds. Any dripping, spraying or leaking of fuel from any part of the fuel cap or tether denotes a failure and shall be reported on the test report. Reinstall the fuel cap within one minute after removing it.	Fuel cap splash requirements are unnecessary. OPEI does not believe it is typical to fill full fuel tanks and the issues experienced by CARB in testing are not reflective of typical practice. Addtionally, external tethers may pose catch and snag risks on some products due to operating environments. OPEI believes as a result external tethers would be more frequently tampered with.	Remove the proposed requirement.
9. ~~PRECONDITIONING PROCEDURE~~Preconditioning Procedure		
After performing the durability tests, fill each tank to its nominal capacity with the fuel specified in section 6 of this procedure and install a production fuel cap expected to have permeation emissions at least as high as the highest-emitting fuel cap that will be used with fuel tanks from the evaporative family. Place the tanks in a suitable vented enclosure. Record the preconditioning start date on the data sheet. Soak the tanks at a temperature that never falls below 38 °C for not less than 140 days. Measure and record the temperature at least every five minutes. Take steps to ensure that the fuel remains at nominal capacity throughout preconditioning. Accelerated preconditioning of the tanks shall not be less than 70 days and can be accomplished by soaking the tanks at an elevated temperature.	The addition of "to ensure that the fuel remains at nominal capacty throughout preconditioning" introduces significant burden without benefit. This could mean very frequent checks, as fuel is continuously evaporating and could arguably immediately be below nominal capacity. Other procedures require that the fuel not drop below 50% of the nominal capacity. Harmonize the requirement to ensure that the fuel does not drop below 50% of the nominal capacity throughout preconditioning.	After performing the durability tests, fill each tank to its nominal capacity with the fuel specified in section 6 of this procedure and install a production fuel cap expected to have permeation emissions at least as high as the highest-emitting fuel cap that will be used with fuel tanks from the evaporative family. Place the tanks in a suitable vented enclosure. Record the preconditioning start date on the data sheet. Soak the tanks at a temperature that never falls below 38 °C for not less than 140 days. Measure and record the temperature at least every five minutes. Take steps to ensure that the fuel does not drop below 50% of the nominal capacity throughout preconditioning. Accelerated preconditioning of the tanks shall not be less than 70 days and can be accomplished by soaking the tanks at an elevated temperature.
Data documenting that permeation emissions from the fuel tanks will not increase with further preconditioning must be provided for tanks soaked less than 140 days as follows: seal each fuel tank as described in section 10 of this test procedure, and either 1) perform a gravimetric permeation test on each fuel tank as described in section 11 of this procedure, and calculate the coefficient of determination, r2, as described in section 11.(a)(8) of this test procedure; or 2) perform two permeation tests with a FID, as described in section 12 of this procedure, on each fuel tank separated by at least 15 days, and calculate the permeation rate as described in section 14 of this test procedure. The coefficient of determination for a gravimetric permeation test used to demonstrate that permeation emissions from the fuel tanks will not increase with further preconditioning must be equal to or greater than 0.95 without any rounding. The permeation rate measured in the second of two permeation tests with a FID separated by at least 15 days that are used to demonstrate permeation emissions from the fuel tanks will not increase with further preconditioning must be no greater than the permeation rate measured in the first test. Fuel tanks shall continue to be preconditioned at a temperature that never falls below 38 °C between permeation tests. The time of the durability demonstration in section 8.2 through 8.5 of this procedure may be counted as part of the preconditioning procedure if the ambient temperature remains within the specified temperature range, ~~the same fuel cap is used throughout the durability demonstration and preconditioning period,~~ and each fuel tank is at least 50 percent full; fuel may be added or replaced as needed to conduct the specified durability tests. Record the fuel	Add the temperature range "(≥ 38 °C)"	…The time of the durability demonstration in section 8.2 through 8.5 of this procedure may be counted as part of the preconditioning procedure if the ambient temperature remains within the specified temperature range (≥ 38 °C) , the same fuel cap is used throughout the durability demonstration and preconditioning period, and each fuel tank is at least 50 percent full; fuel may be added or replaced as needed to conduct the specified durability tests. Record the fuel fill amount and dates on the test report if fuel is added or replaced. Drain the fuel tank and refill with fresh fuel to nominal capacity 15 days prior to ending preconditioning. The fuel tank must not be empty for more than 15 minutes. Record the date and time the fuel tank is drained and refilled with fresh fuel, and record the fuel fill amount on the test report.

Small Off-Road Engine Evaporative Emissions Test Procedure TP-902	Issue / Comment	OPEI Proposed Changed Text
Small Off-Road Engine Evaporative Emissions Test Procedure TP-902 Test Procedure for Determining Evaporative ~~Diurnal~~ Emissions from Small Off-Road Engines Adopted: July 26, 2004 Amended: September 18, 2017 Amended: May 6, 2019 Amended: [insert amended date]	See comment to RO 2750 evaporative amendments	
2.~~ PRE-CERTIFICATION REQUIREMENTS~~Pre-Certification Requirements		
2.1 Durability Demonstration		
(a) Actuate all control valves, cables, and linkages, where applicable, for a minimum of 5000 cycles. Install and remove the fuel cap 300 times. Tighten the fuel cap each time in a way that represents the typical in-use experience.	This requirement is vague considering types of valves, cables and linkages on typical outdoor power equipment. The requirement should be clarified as follows: Actuating cycle test is not required for any of the following control valves, cables or linkages. - Not designed to control evaporative emissions (based on FAQ) - Failure of component would not increase evaporative emissions (based on FAQ) - Component operation is synchronized with engine revolution such as fuel injectors or valves operated by intake oscillation (operate more than 5000 cycles on 5-minute engine operation before preconditioning soak)	
(b)(1) Determine the fuel tank system's design pressure and vacuum limits under normal operating and storage conditions considering the influence of any associated pressure/vacuum relief components. To do this, measure the pressure limits using a fuel tank from an evaporative emission control system that is not used for any other portion of this test procedure by installing a pressure transducer in the fuel tank. With the exception of the use of the pressure transducer and connection to a carbon canister, as applicable, the fuel tank and fuel tank configuration used for these pressure measurements and the evaporative emission control system in which it is used shall be identical to those used on the engine tested in the remainder of this test procedure. Using compressed air of no less than 21 °C, pressurize the fuel tank with compressed air, seal the fuel tank, and measure the pressure every second for 5 minutes. Use a vacuum pump to draw a vacuum in the fuel tank, seal the fuel tank, and measure the pressure every second for 5 minutes. Record the maximum and minimum pressure measurements on the test report. Subsection (2) of this test is not required if the fuel	OPEI does not believe this is an issue. OPEI believes manufacturer data submitted in recent years show that vented tanks do not sustain pressure. Notwithstanding this issue, the proposal is insufficient to test because it does not recommend a test pressure or fill rate that is reflective of evaporating fuel.	
(e) Ultraviolet Radiation Exposure A sunlight-exposure test shall be performed by exposing each test engine or equipment unit to an ultraviolet light of at least 24 W·m-2 (0.40 W·hr·m-2·min-1) for at least 450 hours. Measure and record ultraviolet light intensity at least every hour. Alternatively, each test engine or equipment unit may be exposed to direct natural sunlight for at least 450 daylight hours. The ultraviolet radiation exposure test may be omitted if no part of the evaporative emissions control system will be exposed to light when installed on an engine.	Measuring UV exposure every hour under artificial lights is not required as this testing is stable. Daily checks would catch if bulbs weaken or burn out. Adding the time back for out of spec would ensure the full UV conditioning is achieved. This is an unnecessary and burdensome requirement for the 450 hours required of this test. Costs and resources to accomplish this are not in line with any possible benefit. Additionally, 24-hour testing would be nearly impossible (or costly with automation) and greatly increase the length of time for certification testing that already takes multiple months to complete.	A sunlight-exposure test shall be performed by exposing each fuel tank to an ultraviolet light of at least 24 W·m-2 (0.40 W·hr·m-2·min-1) on the tank surface for at least 450 hours. Measure and record ultraviolet light intensity at the beginning and end of the test. Alternatively, each fuel tank may be exposed to direct natural sunlight for at least 450 daylight hours. The ultraviolet radiation exposure test may be omitted if no part of the fuel tank, including the filler neck and fuel cap, will be exposed to light when installed on an engine.

(f) Fuel Cap and Tether Spill Test Fill the fuel tank to its nominal capacity with fresh test fuel as specified in section 6 of this procedure. Install the fuel cap. Loosen the fuel cap completely. Once the fuel cap is completely loosened, remove it and fully extend the tether, if one is used, within 2 seconds. If no tether is connected to the fuel cap, remove the fuel cap to a height of 15 centimeters above the top of the fill neck within 2 seconds. Any dripping, spraying or leaking of fuel from any part of the fuel cap or tether denotes a failure and shall be reported on the test report. Reinstall the fuel cap within one minute after removing it.	Fuel cap splash requirements are unnecessary. OPEI does not believe it is typical to fill full fuel tanks and the issues experienced by CARB in testing are not reflective of typical practice. Addtionally, external tethers may pose catch and snag risks on some products due to operating environments. OPEI believes as a result external tethers would be more frequently tampered with.	
2.2 Canister Working Capacity		
(a) For evaporative emission control systems that use a carbon canister and do not pressurize the fuel tank, the carbon canister must have a working capacity of at least 1.4 grams of vapor storage capacity per liter of fuel tank ~~nominal~~ total capacity for tanks greater than or equal to 3.78 liters, and 1.0 grams of vapor storage capacity per liter of fuel tank ~~nominal~~ total capacity for tanks less than 3.78 liters. For evaporative emission control systems that use a carbon canister and pressurized fuel tank, the working capacity must be specified by the applicant. For all systems utilizing actively- purged carbon canisters, running loss emissions must be controlled from being emitted into the	The proposed change increases the stringency on carbon canister working capacity (total > nominal) without justification. The requirement is inconsistent with the diurnal performance requirement which is ultimately the purpose of TP-902.	No change to current language
2.4 Running Loss Emission Control Test		
(a)(1) Perform this sequence in order to ensure integrity of the test. The mass of the trap canister must not increase during the running loss emission control test. If the carbon canister is integrated into the fuel cap, carbon canister shall mean fuel cap only for this subsection (1). Record all measurements in the test report. (i) Fill the fuel tank to nominal capacity and install the fuel cap; (ii) Within 15 minutes of completion of step (i) weigh the carbon canister; (iii) Within 15 minutes of completion of step (ii) install the carbon canister; (iv) Within 30 minutes of completion of step (iii) expose the engine with the carbon canister installed to three 24-hour diurnal cycles as defined in Table 5-1 in section 5.4 of this Test Procedure; (v) Within 15 minutes of completion of step (iv), weigh the carbon canister and a secondary (trap) canister; (vi) Within 15 minutes of completion of step (v), install the carbon canister and the secondary (trap) canister in series on the engine; (vii) Within 60 minutes of completion of step (vi), run the engine at full load (100% of	VII requires a 60 minutes dyno test 30 minutes after the SHED test. This may not be achievable depending on the engine installation and/or test facility (not all SHED laboratories have dynos). Notwithstanding other comments about the need for design-based for handheld products, this section should be clarified that it does not apply to handheld products.	
(a)(2) Perform this sequence in order to ensure integrity of the test. Data from a pressure transducer in the fuel tank must show that the pressure in the fuel tank is less than ambient pressure throughout the entire running loss test. Record all measurements in the test report. (i) Install a pressure transducer in the fuel tank; (ii) Fill the fuel tank to nominal capacity and install the fuel cap; (iii) Within 60 minutes of completion of step (ii), run the engine at full load (100% of rated torque) until the fuel tank is empty, measuring ambient pressure and pressure in the fuel tank once per second throughout the sequence.	The trap canister mass measurement in the proposed Running Loss procedure is the direct measurement if running loss vapors are being managed. This pressure testing does not have correlation to running loss vapor control. Notwithstanding other comments about the need for design-based for handheld products, this section should be clarified that it does not apply to handheld products as there is no data to support handheld could pass this requirement.	
3. ~~GENERAL SUMMARY OF TEST PROCEDURE~~General Summary of Test Procedure		

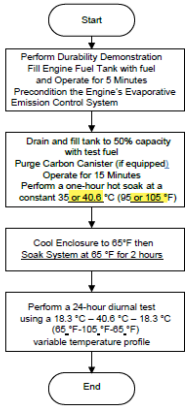
A Sealed Housing for Evaporative Determination (SHED) is used to measure ~~diurnal~~ evaporative emissions. This method subjects test engines to a preprogrammed temperature profile while maintaining a constant pressure and continuously sampling for hydrocarbons with a Flame Ionization Detector (FID). The volume of a SHED enclosure can be accurately determined. The mass of total organic material hydrocarbon equivalent that emanates from a test engine over the test period is calculated using the ideal gas equation. This test procedure measures hot soak and diurnal emissions from engines or equipment with complete evaporative emission control systems as defined in title 13, Cal. Code Regs., section 2752 (a)~~(7)~~ (9) by subjecting them to a hot soak and diurnal test sequence. The engine with complete evaporative emission control system can be tested without the equipment chassis. The basic process is as follows: • Fill the engine fuel tank with fuel and operate at maximum governed speed for 5-minutes • Precondition the evaporative emission control system • Drain and fill fuel tank to 50% capacity with California certification fuel • Operate engine at the maximum governed speed for fifteen minutes • Subject engine/equipment to a one-hour constant 35 or 40.6 °C hot soak • Soak engine/equipment for two hours at 18.3 °C	What is the rationale for multiple test temperature options (35 and 40.6°C)? Will CARB compliance testing be conducted at the same temperature as the manufacturer per this section? Additionally, tolerance of the following conditions should be defined. - 5 minutes - 50% capacity - fifteen minutes - two hours - 18.3 °C OPEI requests CARB consider flexiblity to conduct the Hot Soak test separately from the diurnal result.	
4. ~~INSTRUMENTATION~~Instrumentation		
4.1 Diurnal Evaporative Emission Measurement Enclosure		
The diurnal evaporative emissions measurement enclosure shall be equipped with an internal blower or blowers coupled with an air temperature management system (typically air to water heat exchangers and associated programmable temperature controls) to provide for air mixing and temperature control. The blower(s) shall provide a nominal total flow rate of 0.8 ± 0.2 ft3/min per ft3 of the nominal enclosure volume, Vn. The inlets and outlets of the air circulation blower(s) shall be configured to provide a well-dispersed air circulation pattern that produces effective internal mixing and avoids significant temperature or hydrocarbon and alcohol stratification. The discharge and intake air diffusers in the enclosure shall be configured and adjusted to eliminate localized high air velocities which could produce non-representative heat transfer rates between the engine fuel tank(s) and the air in the enclosure. The air circulation blower(s), plus any additional blowers if required, shall maintain a homogeneous mixture of air within the enclosure. The enclosure temperature shall be taken with thermocouples located 3 feet above the floor at the approximate mid-length of each side wall of the enclosure and within 3 to 12 inches of each side wall. The temperature conditioning system shall be capable of controlling the internal enclosure air temperature to follow the prescribed temperature versus time cycle as specified in 40 CFR §86.133-90 as modified by section III.D.10. (diurnal breathing loss test) of the "California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles," as last amended September 2, 2015, within an instantaneous tolerance of ± 3.0oF and an average tolerance of ± 2.0oF as measured by side wall thermocouples. The control system shall	0.8 ± 0.2 ft3 /min per ft3 of the nominal enclosure volume, Vn – The enclosure volume (Vn) to evaluate the blower flow rate is not defined which latch point volume to be used. Propose to define as a latched volume at 18.3°C which is the base volume of diurnal test. Other enclosure requirements – OPEI agrees that the enclosure needs to be designed as TP-902 requires. However, the all requirements are qualitative and not quantitative. For test accuracy and correlations, more concrete condition should be defined. Honda is ready to discuss for details. Additional blowers – Propose the following language to correlate with other requirements without redundancy. As far as the enclosure meets the homogeneous requirements of temperature and HC concentration, and wind velocity requirements as prescribed, blowers or fans not associated with the heat exchangers can be added as necessary besides the temperature conditioning blowers with the heat exchangers. Auxillary blowers shall be positioned so that they do not create airflow across the unit such that it will artifically increase the evaporative emissions through engine and evaporative vents. Tolerance of 3 feet should be defined.	

A variable volume enclosure shall have the capability of latching or otherwise constraining the enclosed volume to a known, fixed value, Vn. The Vn shall be determined by measuring all pertinent dimensions of the enclosure in its latched configuration, including internal fixtures, based on a temperature of 84oF, to an accuracy of ± 1/8 inch (0.5 cm) and calculating the net Vn to the nearest 1 ft3. In addition, Vn shall be measured based on a temperature of 65oF and 105oF. The latching system shall provide a fixed volume with an accuracy and repeatability of 0.005xVn. Two potential means of providing the volume accommodation capabilities are; a moveable ceiling which is joined to the enclosure walls with a flexure, or a flexible bag or bags of Tedlar or other suitable materials, which are installed in the enclosure and provided with flowpaths which communicate with the ambient air outside the enclosure. By moving air into and out of the bag(s), the contained volume can be adjusted dynamically. The total enclosure volume accommodation shall be sufficient to balance the volume changes produced by the difference between the extreme enclosure temperatures and the ambient laboratory temperature with the addition of a superimposed barometric pressure change of 0.8 in. Hg. A minimum total volume accommodation range of ±	Vn determination based on SI units should be allowed. The enclosure dimensions are typically measured in millimeter and Vn is determined in liter or cubic meter. Propose to delete the rounding requirement of Vn value to the nearest 1 ft3.	

An online computer system or strip chart recorder shall be used to record the following parameters during the diurnal evaporative emissions test sequence:
 	
- Enclosure internal air temperature
- Diurnal ambient air temperature specified profile as defined in 40 CFR 86.133-90 as modified in section III.D.10 of the "California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles," as last amended September 2, 2015, (diurnal breathing loss test).
- Enclosure internal pressure
- Enclosure temperature control system surface temperature(s)
- FID output voltage recording the following parameters for each sample analysis:
  - zero gas and span gas adjustments
  - zero gas reading
  - enclosure sample reading
  - zero gas and span gas readings
 	
The data recording system shall have a time resolution of 30 seconds and shall provide a permanent record in either magnetic, electronic or paper media of the above parameters for the duration of the test.
 	
Other equipment configurations may be used if approved in advance by the Executive
	Today's analyzer systems digitally outputs in concentration such as ppmC, not voltage. Propose to delete a requirement of output voltage recording.	

4.2 Calibrations		
Evaporative emission enclosure calibrations are specified in 40 CFR §86.117-90. Amend 40 CFR §86.117-90 to include an additional subsection 1.1, to read: The diurnal evaporative emission measurement enclosure calibration consists of the following parts: initial and periodic determination of enclosure background emissions, initial determination of enclosure volume, and periodic hydrocarbon (HC) and ethanol retention check and calibration. Calibration for HC and ethanol may be conducted in the same test run or in sequential test runs.	OPEI proposes the following revision if the ethanol factor is used.	If manufacture uses the ethanol factor for E10 fuel (1.08) for hot soak and diurnal test without ethanol measurement, a retention check by ethanol injection is not required.

4.2.3 The HC and ethanol measurement and retention checks shall evaluate the accuracy of enclosure HC and ethanol mass measurements and the ability of the enclosure to retain trapped HC and ethanol. The check shall be conducted over a 24-hour period with all of the normally functioning subsystems of the enclosure active. A known mass of propane and/or ethanol shall be injected into the enclosure and an initial enclosure mass measurement(s) shall be made. The enclosure shall be subjected to the temperature cycling specified in section III. D.10.3.7 of the "California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles," as last amended September 2, 2015, (revising 40 CFR §86.133-90(l)) for a 24-hour period. The temperature cycle shall begin at 105°F (hour 11) and continue according to the schedule until a full 24-hour cycle is completed. A final enclosure mass measurement(s) shall be made. The following procedure shall be performed prior to the introduction of the enclosure into service and following any modifications or repairs to the enclosure that may impact the integrity of this enclosure; otherwise, the following procedure shall be performed on a monthly basis. (If six consecutive monthly retention checks are successfully completed without corrective action, the following procedure may be determined quarterly thereafter as long as no corrective action is required.) (A) Zero and span the HC analyzer. (B) Purge the enclosure with atmospheric air until a stable enclosure HC level is attained. (C) Turn on the enclosure air mixing and temperature control system and adjust it for an initial temperature of 105.0oF and a programmed temperature profile covering one diurnal cycle over a 24 hour period according to the profile specified in section III. D.10.3.7. Of the "California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles " as last amended September 2, 2015, (revising	An "enclosure mass measurement" does not make sense. It should be corrected to "concentration measurement(s) of hydrocarbon and/or ethanol in the enclosure". Propose "monthly basis" to be within 35 days before testing.	
(D) When the enclosure temperature stabilizes at 105.0oF ± 3.0oF seal the enclosure; measure the enclosure background HC concentration (CHCe1) and/or background ethanol concentration (CC2H5OH1) and the temperature (T1), and pressure (P1) in the enclosure. (E) Inject into the enclosure a known quantity of propane between 0.50 to 1.00 grams and/or a known quantity of ethanol in gaseous form between 0.50 to 1.00 grams. The injection method shall use a critical flow orifice to meter the propane and/or ethanol at a measured temperature and pressure for a measured time period. Techniques that provide an accuracy and precision of ± 0.5 percent of the injected mass are also acceptable. Allow the enclosure internal HC and/or ethanol concentration to mix and stabilize for up to 300 seconds. Measure the enclosure HC concentration (CHCe2) and/or the enclosure ethanol concentration (CC2H5OH2). For fixed volume enclosures, measure the temperature (T2) and pressure in the enclosure (P2). On variable volume enclosures, unlatch the enclosure. On fixed volume enclosures, open the outlet and inlet flow streams. Start the temperature cycling function of the enclosure air mixing and temperature control system. These steps shall be completed within 900 seconds of sealing the enclosure.	A gravimetric method should also be allowed. Critical flow orifice method by using ethanol is not technically feasible. 0.5% of accuracy should be required regardless of the techniques.	

4.3 Other Instruments and Equipment All instruments and equipment used in this Test Procedure, TP-902, shall be calibrated at the time interval specified by the manufacturer or more often as needed per manufacturer instructions (e.g., if equipment undergoes repair). For mass measurements more than 6,200 grams, the minimum sensitivity of the balance must be 0.1 grams. For mass measurement between 1,000 and 6,200 grams, the minimum sensitivity of the balance must be 0.01 grams. For mass measurements less than 1,000 grams, the minimum sensitivity of the balance must be 0.001 grams. The balance shall be calibrated annually per the balance manufacturer's instructions, or more often as needed per the manufacturer instructions (e.g., if the balance is moved), using Système International d'Unités (SI)-traceable mass standards through National Institute of Standards and Technology (NIST) or another member of the Mutual Recognition Arrangement of the Comité International des Poids et Mesures (CIPM MRA). The SI-traceable mass standards shall be	OPEI is concerned 0.001g accuracy for the measurement of canister weight is not directly relevant to the standard. Also, changing the accuracy requirement depending on the mass of subjects does not make sense. Harmonize requirements with standard significant figures. The addition of "more often as needed per manufacturer instructions" is redudent with "interval specified by the manufacturer" and introduces opportunity for subjectivity of "more often". The example that "if a balance is moved" is inappropriate and unnecessary - The example would prohibit a balance from being moved for the purpose of calibration (to calibration area / measuring center or shipped)	
5. ~~TEST PROCEDURE~~Test Procedure The test sequence is shown graphically in Figure 1. The temperatures monitored during testing shall be representative of those experienced by the equipment. ~~The equipment shall be approximately level during all phases of the test sequence to prevent abnormal fuel distribution.~~ The temperature tolerance of a soak period may be waived for up to 10 minutes to allow purging of the enclosure or transporting the equipment into the enclosure. The 24-hour diurnal test sequence is sho **Figure 1. 24-Hour Diurnal Test Sequence**  		10-minute temperature waiver should be clarified which test processes to be applied. The following conditions should also be waived from temperature requirements. - Interruptions of preconditioning soak (e.g., power out) should be allowed as long as the total exposure period meets the requirements. - 15 minutes of engine operation and period to move the test unit to allow engine operation at outside without temperature control. As CP-902 addresses, TP-902 as a test procedure should clarify a retest is allowed by omitting durability test and preconditioning. The equipment should remain level during all phases of the test sequence. Tilting the unit may be inconsistent with manufacturers recommendations and bias evaporative test results.

5.1 Evaporative Emission Control System Preconditioning The purpose of the preconditioning period is to introduce gasoline into the evaporative emission control system and precondition all evaporative emission control system components. Precondition the evaporative emission control system by filling the fuel tank to its nominal capacity with fresh test fuel as specified in Section 6 of this procedure. After filling the tank, start the engine and allow it to run at maximum governed speed (unloaded or blade load) for approximately five minutes. Stop the engine and add fuel to fill the fuel tank to its nominal capacity. Soak the evaporative emission control system at 30 ± 10 °C for not less than 140 days. Measure and record the temperature at least every five minutes. Take steps to ensure that the fuel remains at nominal capacity throughout preconditioning. As an alternative, accelerated preconditioning of the evaporative emission control system can be accomplished by soaking at an elevated temperature. Accelerated preconditioning shall not be less than 70 days. Data documenting that the hot soak and diurnal emissions will not increase with further preconditioning must be provided for tanks soaked less than 140 days as follows: perform the test sequence in sections 5.2 through 5.4twice, separated by at least 15 days, and calculate hot soak and diurnal emissions as described in section 5.5 of this procedure. The hot soak and diurnal emissions measured in the second test sequence must be no higher than the hot soak and diurnal emissions measured in the first test sequence to demonstrate that the hot soak and diurnal emissions will not increase with further preconditioning. The fuel tank shall be filled to nominal capacity and the evaporative emission control system shall continue to be preconditioned at the elevated temperature between the test sequences. Record the preconditioning temperature on the test report. The period of slosh testing and ultraviolet radiation exposure may be considered part of the preconditioning period provided the ambient temperature remains within the specified temperature range and each fuel tank is at least 50 percent full; fuel may be added or replaced as needed to conduct the specified durability tests. Record the fuel fill amount and dates on the test report if fuel is added or replaced. Drain the fuel tank and refill with fresh fuel to nominal capacity 15 days prior to ending preconditioning. The fuel tank must not be empty for more than 15 minutes. Record the date and time the fuel tank is drained and refilled with fresh fuel, and record the fuel fill amount on the test report.	The proposed change introduces "fresh fuel" for the first time. To avoid subjectivity, use "test fuel" as used in other parts of this TP and TP-901. Hot soak and diurnal emissions to judge accelerated preconditioning – Since hot soak emission is typically much less and not very feasible to judge evaporative system saturation, comparison and judgement of accelerated preconditioning should be based on “hot soak + diurnal”, not individual comparison of each hot soak and diurnal. The drain and refuel performed 15 days before the end of preconditioning is not representative of real world usage. An operator would likely top off the fuel tank before every use, which is likely to occur before 125 or 55 days. Furthermore, the D/F before the end of preconditioning doesn't benefit accelerated preconditioning as a D/F must be performed after the preconditioning as specified in section 5.2 of TP-902	5.1 Evaporative Emission Control System Preconditioning The purpose of the preconditioning period is to introduce gasoline into the evaporative emission control system and precondition all evaporative emission control system components. Precondition the evaporative emission control system by filling the fuel tank to its nominal capacity with ~~fresh~~ test fuel as specified in Section 6 of this procedure. After filling the tank, start the engine and allow it to run at maximum governed speed (unloaded or blade load) for approximately five minutes. Stop the engine and add fuel to fill the fuel tank to its nominal capacity. Soak the evaporative emission control system at 30 ± 10 °C for not less than 140 days. Measure and record the temperature at least every five minutes. Take steps to ensure that the fuel remains at nominal capacity throughout preconditioning. Measure fuel loss of the fuel tank or system by weight and add fuel as needed to maintain nominal capacity at least every 10 days of preconditioning. As an alternative, accelerated preconditioning of the evaporative emission control system can be accomplished by soaking at an elevated temperature. Accelerated preconditioning shall not be less than 70 days. Data documenting that the hot soak ~~and~~ + diurnal emissions will not increase with further preconditioning must be provided for tanks soaked less than 140 days as follows: perform the test sequence in sections 5.2 through 5.4twice, separated by at least 15 days, and calculate hot soak ~~and~~ + diurnal emissions as described in section 5.5 of this procedure. The hot soak ~~and~~ + diurnal emissions measured in the second test sequence must be no higher than the hot soak ~~and~~ + diurnal emissions measured in the first test sequence to demonstrate that the hot soak ~~and~~ + diurnal emissions will not increase with further preconditioning. The fuel tank shall be filled to nominal capacity and the evaporative emission control system shall continue to be preconditioned at the elevated temperature between the test sequences. Record the preconditioning temperature on the test report. The period of slosh testing and ultraviolet radiation exposure may be considered part of the preconditioning period provided the ambient temperature remains within the specified temperature range and each fuel tank is at least 50 percent full; fuel may be added or replaced as needed to conduct the specified durability tests. Record the fuel fill amount and dates on the test report if fuel is added or replaced. The fuel tank must not be empty for more than 15 minutes. Record the date and time the fuel tank is drained and refilled with ~~fresh~~ test fuel, and record the fuel fill amount on the test report.
5.2 Refueling and Hot Soak Following the preconditioning period, drain the fuel tank and refill to 50 percent of its nominal capacity with test fuel. The fuel tank must not be empty for more than 15 minutes. Record the date and time the fuel tank is drained and refilled with fresh fuel, and record the fuel fill amount on the test report. For evaporative emission control systems that use ~~a~~ an actively-purged carbon canister, the canister must be purged following the preconditioning period but prior to initiating the hot soak test. Prior to purging the carbon canister, measure and record the carbon canister mass on the test report. Purging for an actively-purged carbon canister consists of drawing 400 bed volumes of ~~nitrogen or dry~~ air through the canister at the canister manufacturer’s recommended purge rate. For evaporative emission control systems that use a passively-purged carbon canister, purging occurs due to vacuum created in the fuel tank when the engine is run in this section 5.2 and during forced cooling in section 5.3 of this procedure. Measure and record the carbon canister mass on the test report after purging.	Canister mass measurement – Repeated canister removal and reinstallation in the limited access space may damage the hoses of evaporative control system which can make the evaporative emission not to be representative. Therefore, canister removal and installation should be limited as less as possible. Propose to accept the following. - Partial modifications of non evaporative-related frame components to make canister removal and installation easier - Installation of quick connectors between canister and hoses without modification of original hoses The language could mislead as even passive purge canisters are required to be weighed. A tolerance of 400 bed volumes should be defined. Not only purge volume but purge duration and minimum flow rate of nitrogen or dry air should be defined. This is inconsistent with Section 6.2 of Attachment 1 to TP-902 which allows nitrogen or dry air to be used to purge the canister. A 15 minute run is insufficient to drain the tank and simulate actual usage for a passively purged canister. The purge for a passively-purged canister should be the run time equal to the nominal fuel tank volume.	Following the preconditioning period, drain the fuel tank and refill to 50 percent of its nominal capacity with test fuel. The fuel tank must not be empty for more than 15 minutes. Record the date and time the fuel tank is drained and refilled with fresh fuel, and record the fuel fill amount on the test report. For evaporative emission control systems that use a an actively-purged carbon canister, the canister must be purged following the preconditioning period but prior to initiating the hot soak test. Prior to purging the carbon canister, measure and record the carbon canister mass on the test report. Purging for an actively-purged carbon canister consists of drawing 400 bed volumes of nitrogen or dry air through the canister at the canister manufacturer’s recommended purge rate. For evaporative emission control systems that use a passively-purged carbon canister, purging occurs due to vacuum created in the fuel tank when the engine is run in this section 5.2 and during forced cooling in section 5.3 of this procedure. Measure and record the actively-purged carbon canister mass on the test report after purging, this requirement is waived for passively-purged carbon canisters.

Perform a tilt sequence by rotating the test unit in three of the following four directions with respect to the plane on which the test unit sits and leaving the test unit in each position for 5 minutes: 90° forward, 90° backwards, 90° to the left, and 90° to the right. It is not required to tilt the engine in the direction which results in the air inlet of the engine pointing downward. This tilt sequence may be omitted for a test unit with displacement greater than or equal to 225 cc if engines from the evaporative family will not be used in equipment that is designed to be tilted during operation, transport, maintenance, or storage. Any fuel leaking from any part of the engine or evaporative emission control system denotes a failure and shall be reported on the test report. Measure and record the carbon canister mass on the test report after performing this tilt sequence.	Industry does not believe the tilt test is reflective of normal operation, including service and maintance. In fact, in many cases manufacturers have maximum product angles, which are not consistent with these procedures. The procedures need to be removed. CARB may already request diagrams to evaluate fuel levels and evaporative system designs. Analysis of enginering drawings will more acurately demonstrate the system is designed to prevent fuel from entering vents or the carbon canister.	Remove this section.
Operate the engine at its maximum governed speed for fifteen minutes. If the engine runs out of fuel during the fifteen minute run, restart this section 5.2 and fill the fuel tank to nominal capacity rather than 50 percent of nominal capacity. Immediately place the engine in the SHED enclosure preheated to 35 °C. The enclosure shall be configured to provide an internal enclosure ambient temperature of 35 ± 5.6 °C for the first 5 minutes, and 35 ± 2.8 °C (35 ± 1.1 °C on average) for the remainder of the hot soak test. The hot soak enclosure doors shall be closed and sealed within 180 seconds of engine shutdown. Record the time elapsed between engine shutdown and the start of the hot soak on the test report. Perform a one-hour hot soak at a constant 35 °C. The one-hour hot soak may alternatively be performed at 40.6 °C. If the hot soak is performed at 40.6 °C, the enclosure shall be configured to provide an internal enclosure ambient temperature of 40.6 ± 5.6 °C for the first 5 minutes, and 40.6 ± 2.8 °C (40.6 ± 1.1 °C on average) for the remainder of the hot soak test. The hot soak enclosure doors shall be closed and sealed within 180 seconds of engine shutdown. Record the time elapsed between engine shutdown and the start of the hot soak on the test report.	The process needs additional clarificaiton regarding the engine processes which are necessary to represent actual in-use not to be included as a duration of 15-minute engine operation. - The duration from engine start to reaching eventual maximum governed speed after resuming choke lever and verifying normal engine operation. - The duration after setting speed control lever to minimum speed to eventual engine stop after holding 5-10 seconds of low idling operation. Consideration of the situtation where the engine is unable to start should be clarified. Propose the following procedures. In the case of the engine does not start, the following actions can be taken. - If the electric starter does not turn the engine enough, the battery can be replaced or a backup battery can be connected. - If repeated cranking are assumed to make the spark plug wet, the spark plug can be cleaned or replaced. - If the fuel in the carburetor chamber is suspected to be degraded, the fuel can be drained from carburetor chamber however the following hot soak and diurnal tests needs to be invalid. Some products could not run for 15 min with a fuel tank filled to 50 percent of it's nominal capacity. This requires additional consideration for some applications if this procedure is required for handheld products. OPEI is concerned the machine cannot be transported between operation and measurement in a period of 180 seconds. Currently, the requirement is to place the machine in the SHED test chamber immediately after operation. As a rule, this may not be possible, since the test chambers must be located separately from operating areas - As background emissions may interfere with the SHED measurement if eqiupment is run near the SHED. Additionally OPEI is concerned a unit "rushed" into the chamber may trap carbon exhaust emission components and raises concerns of handling of equipment. OPEI proposes that equipment shall be placed in the SHED and the doors sealed in between 180 and 300 seconds. This time will ensure the unit is still experiencing "hot soak" when the SHED is sealed. See comment above regarding multiple test temperatures.	Passively-purged carbon canister run time is equal to the nominal fuel tank volume. Once the engine runs out of fuel the engines is allowed to cool before refueling to nomial fuel tank volume. Once the fuel tank is refilled the engine is operated for 15 minutes at maximum governed speed.

5.4 24-Hour Diurnal Test Immediately after soaking for two hours at 18.3 °C, purge the enclosure to reduce the hydrocarbon concentration to background levels and perform a 24-hour diurnal test using the temperature profile shown in Table 5-1. Measure and record the carbon canister mass after the diurnal test on the test report.	Repeated canister removal and reinstallation in the limited access space may damage the hoses of evaporative control system which can make the evaporative emission not to be representative. Therefore, canister weighing except before and after 400 bed-volume purge should be optional. OPEI is unclear what is the purpose of recording the carbon canister mass. There is no pass / fail criteria associate with this.	
7 ~~Alternative Test Procedures~~Alternative Test Procedures Test procedures, other than specified above, such as the use of a mini-SHED to measure diurnal evaporative emissions, shall only be used if prior written approval is obtained from the CARB Executive Officer. In order to secure the CARB Executive Officer's approval of an alternative test procedure, the applicant is responsible for demonstrating to the CARB Executive Officer's satisfaction that the alternative test procedure is equivalent to this test procedure.	Because of many qualitative requirements, especially enclosure requirements, it is hard to judge itself whether the test procedure meets TP-902 or needs to apply/approval of alternative procedure. Request to make the requirements quantitative. "Diurnal" in this section should be deleted or “hot soak” should be added.	7 Alternative Test Procedures Test procedures, other than specified above, such as the use of a mini-SHED to measure hot soak + diurnal evaporative emissions, shall only be used if prior written approval is obtained from the CARB Executive Officer. In order to secure the CARB Executive Officer's approval of an alternative test procedure, the applicant is responsible for demonstrating to the CARB Executive Officer's satisfaction that the alternative test procedure is equivalent to this test procedure.
Attachment 1 to TP-902		
2. ~~PRINCIPLE AND SUMMARY OF TEST PROCEDURE~~Principle and Summary of Test Procedure This test procedure is designed to provide consistent methods to evaluate the durability and working capacity of carbon canisters utilized on small off-road engines. Working capacity is a defining parameter expressing the mass of total organic material hydrocarbon equivalent that can be stored in the canister under controlled conditions. The canister’s working capacity is established by repeated canister loading and purging. This procedure involves a cycle that includes a 400 bed volume purge, a 5 minute pause, and then loading the canister with butane mixed 50/50 by volume with air or nitrogen to a measured breakthrough.	Since a purity of butane is not specified, propose as follows. Butane gas for canister loading should contain 95% or more n-butane. Tolerance of 50/50 needs to be defined.	
5. ~~EQUIPMENT CALIBRATIONS~~Equipment Calibrations Mass flow meters must undergo an annual multiple point calibration with a primary standard. A plot of the rate measured by the flow meter versus the true flow rate shall have a coefficient of determination, r^2 ~~R^2~~, of 0.99 or greater. The balance shall be calibrated by an i ndependent organization using ~~National Institute of Standards and Technology (NIST)~~ Système International d'Unités (SI)-traceable mass standards annually. The accuracy of the balance shall be checked using ~~NIST~~ SI-traceable mass standards prior to and following mass measurements (25 measurements maximum). At minimum, the accuracy shall be checked at approximately 80~~%~~ percent, 100~~%~~ percent, and 120~~%~~ percent of the canister’s expected test mass. If the measured mass of any of the ~~NIST~~ SI-traceable mass standards drifts more than ± 0.02 grams for a balance with 0.01gram sensitivity or ± 0.002 grams for a balance with 0.001 gram sensitivity between initial and final measurements, the balance shall be re-calibrated or a different balance that is within specification shall be used. The ~~NIST~~ SI-traceablemass standards shall be calibrated annually by an independent organization.	A canister working capacity determination test takes one day or so to complete all the cycles depending on the size of canister. Typically, electric balances have daily fluctuations caused by buoyancy so that TP-901 requires to weigh the same volume of reference tank in parallel to determine fuel tank permeation. In the case of working capacity measurement, since the volumes of canister and mass standard are different so that the impact of buoyancy is also different, 0.02 g is too severe to ensure. Also, such an accuracy is unnecessary for canister weight measurement. Also, accuracy requirement should not depend on sensitivity of balance. Therefore, propose to accept 0.05 g drift regardless of the mass to measure.	

6.2 Canister Purge The sequence starts by first purging the canister with 400 bed volumes of dry air or nitrogen in 30 minutes at laboratory conditions. Bed volume is the design volume of the carbon contained in the canister. The purge rate will therefore vary with canister size. Purge may be accomplished by drawing a vacuum at the tank or purge port, or by pushing air or N2 into the atmospheric vent.	The tolerances of 400 bed volume and 30 minutes should be defined.	
6.3 Pause Pause testing for approximately 5 minutes between both purge and load and also load and purge sequences.	The tolerance of 5 minutes should be defined.	
6.5 Canister Load Load the test canister with butane mixed 50/50 by volume with air or nitrogen until the specified breakthrough criterion has been met. The canister load is accomplished by flowing the butane mixture into the canister via the tank fitting. The butane load rate must be within ± 10 percent of the specified load rate below. The butane load rates and breakthrough criteria are determined by canister's bed volume. In order to accommodate the expected wide range of canister bed volumes expected in small off-road engines, four ranges of canister loading and breakthrough criteria are defined: small (~~< 99cc~~< 100 cc), medium (~~100 to 249cc~~≥ 100 cc and < 250 cc), large (~~249 to 550cc~~≥ 250 cc and ≤ 550 cc), and extra large (> 550 cc). The load and breakthrough criteria are defined as follows: Carbon Canister Bed Volume: Small ~~< 99cc~~< 100 cc; Medium ~~100 to 249cc~~≥ 100 cc and < 250 cc; Large ~~249 cc to 550~~≥ 250 cc and ≤ 550 cc; Extra Large > 550 cc Butane Load Rate [grams C_4H_{10} / hour]: 5.0; 10.0; 15.0; 15.0 Breakthrough limit [grams](*): 2.0; 2.0; 2.0; 2.0 (*) If the canister shows mass loss prior to the 2.0 grams breakthrough then an alternate lower breakthrough limit can be used.	The tolerance of 50/50 should be defined. "Within 10 percent" should be "within ±10 percent". Tolerances for breakthrough and load rate must be defined.	

Small Off Road Engine Regulations: Appendix E	Issue / Comments	OPEI Proposed Changed Text
Proposed Amendments to Small Off-Road Engine Evaporative Emission Control System Certification Procedure, CP-902, Certification Procedure for Evaporative Emission Control Systems on Small Off-Road Engines		
California Environmental Protection Agency Air Resources Board Small Off-Road Engine Evaporative Emission Control System Certification Procedure CP-902 Certification Procedure for Evaporative Emission Control Systems on Small Off-Road Engines ~~With Displacement Greater Than 80 Cubic Centimeters~~ Adopted: July 26, 2004 Amended: September 18, 2017 Amended: [insert amended date]	As discussed in these comments, component based certifiation is needed for many products, including handheld. As a result, CP-901 needs to be retained beyond 2023 for products certified by "design-based" method. CP-901 should be reviewed and updated accordingly.	
1. ~~GENERAL INFORMATION AND APPLICABILITY~~General Information and Applicability This document describes the procedure for evaluating and certifying evaporative emission control systems on small off-road engines ~~> 80 cc or equipment that use small off-road engines > 80 cc.~~ By definition, evaporative emission control systems are fuel system components that are designed to reduce evaporative and permeation emissions. Fuel system components may include fuel tanks, fuel lines and any or all associated fittings, mechanisms to control fuel tank venting, tethered fuel caps, and any other equipment, components, or technology necessary for the control of evaporative and permeation emissions. This Certification Procedure, CP-902, is proposed pursuant to section 43824 of the California Health and Safety Code (CH&SC) and describes the process required to certify evaporative emission control systems on small off-road engines (SORE) or equipment that use small off-road engines to evaporative emission standards. Small off-road engines are defined in title 13.	As discussed in these comments, component based certifiation is needed for many products, including handheld. As a result, CP-901 needs to be retained beyond 2023 for products certified by "design-based" method. CP-901 should be reviewed and updated accordingly.	
2. ~~EVAPORATIVE EMISSION STANDARDS~~ Evaporative Emission Standards The ~~diurnal~~ evaporative emission ~~and design~~ standards for small off-road engines ~~with displacement greater than 80 cc~~ are specified in title 13, Cal. Code Regs., section 2754.	As discussed in these comments, component based certifiation is needed for many products, including handheld. As a result, CP-901 needs to be retained beyond 2023 for products certified by "design-based" method. CP-901 should be reviewed and updated accordingly.	
4 ~~CERTIFICATION OVERVIEW~~Certification Overview		
4.1 Summary For certification purposes, small off-road engines (SORE) are grouped into ~~three~~ four categories. The first category includes all engines with displacement less than or equal to 80 cc. The second category includes all walk-behind mowers with displacements greater than 80 cc to less than 225 cc. The ~~second~~ third includes all other engines with displacements greater than 80 cc to less than 225 cc. The ~~third~~ fourth category includes engines with displacements greater than or equal to 225 cc. Executive Orders certifying the evaporative emission control system on engines or equipment are valid for only one model-year of production. New Executive Orders in each subsequent model year must be obtained for each evaporative family.	As discussed in these comments, component based certifiation is needed for many products, including handheld. As a result, CP-901 needs to be retained beyond 2023 for products certified by "design-based" method. CP-901 should be reviewed and updated accordingly.	

5. ~~GENERAL INSTRUCTIONS – EVAPORATIVE EMISSION CONTROL SYSTEM CERTIFICATION~~ General Instructions – Evaporative Emission Control System Certification These instructions provide guidance regarding the preparation, submission and revision of small off-road engine evaporative emission control system certification applications for 2007 and subsequent model year small off-road engines ~~with displacement greater than 80 cc~~. Only information essential for certification is required in this format. Other information required by the test procedures (e.g., test equipment build records, test and maintenance records, etc.) must be maintained by the applicant and made available to ~~the~~ CARB within 30 days upon request. An application submitted in accordance with these instructions would enable an expedited review and approval by ~~the~~ CARB. This Section covers the following subject matter: • Where To Submit Applications for Certification • Letter of Intent • Emission Label • Engineering Description of Evaporative Emission System • Emission Warranty • Test Procedures • Modified Test Procedures • Adjustable Parameters and Anti-Tampering Devices • Certification Test Fuels • Amendments to the Application • Running Changes and Field Fixes • Confidentiality • Summary of Certification Process • Submission of an engine or equipment unit	As discussed in these comments, component based certifiation is needed for many products, including handheld. As a result, CP-901 needs to be retained beyond 2023 for products certified by "design-based" method. CP-901 should be reviewed and updated accordingly.	
5.2 Letter of Intent An applicant shall submit a Letter of Intent (LOI) prior to the initial model year submission of the applicant's certification application(s) indicating the applicant's intent to seek evaporative emission control system certification. Such LOI shall list the evaporative families for which the applicant will apply for certification and the date of expected submission for each application. An applicant's LOI for evaporative emission control systems may be combined with that required in California Exhaust Emission Standards and Test Procedures for New 2013 and Later Small Off- Road Engines; Engine-Testing Procedures (Part 1054), adopted October 25, 2012,	OPEI recommends the CP outlines the informaiton required in the LOI. This could be a template in an annex. This will ensure consistent information is requested by certification offices and submitted by manufacturers.	
5.11 Running Changes and Field-Fixes Any factory change to an evaporative family during the model-year production that could potentially affect the evaporative emissions must be approved by CARB via a running change request in a revised certification application. In addition, any post assembly line change that could potentially affect the evaporative emissions (e.g., at factory warehouses, distribution centers, dealers) must be approved by CARB via a field fix request in a revised certification application; a field fix request typically occurs after the model-year production has ended. Running changes and field fixes not approved by CARB will invalidate the certification of any affected evaporative family and subject the Holder to CARB enforcement actions. If the change affects an emission-related part or results in a new model in the evaporative family exhibiting the highest hot soak plus diurnal emission rate relative to the applicable hot soak plus diurnal emission standard, new test data and engineering evaluations shall be submitted in a revised certification application to demonstrate that the evaporative family will remain in compliance. If the change does not result in a new model in the evaporative family exhibiting the highest hot soak plus diurnal emission rate relative to the applicable hot soak plus diurnal emission standard, only the affected pages and information fields of the certification application need to be submitted.	To clarify that if the modification doesn't create a new worst case then no new full TP902 is required. To clarify that manufacture shall use Good Engineering Judgement for the worst case determination. Under current regulation, a modification which affects on emission related part but theoretically does not increase evaporative emissions could trigger new full TP902 testing. For example, •Replacing material of original part with better permeation material. •Increasing thickness of the material for better permeation (e.g., introducing hose with thicker barrier layer, or average thickness increases due to shape change with the same material) A strict certification assessments can impede or obstruct improvements of evaporative control system which can result better evaporative emissions.	Proposed text ----- Running Changes and Field-Fixes Any factory change to an evaporative family during the model-year production that could potentially affect the evaporative emissions must be approved by CARB via a running change request in a revised certification application. In addition, any post assembly line change that could potentially affect the evaporative emissions (e.g., at factory warehouses, distribution centers, dealers) must be approved by CARB via a field fix request in a revised certification application; a field fix request typically occurs after the model-year production has ended. Running changes and field fixes not approved by CARB will invalidate the certification of any affected evaporative family and subject the Holder to CARB enforcement actions. If the change ~~affects an emission-related part or~~ results in a new model in the evaporative family exhibiting the highest hot soak plus diurnal emission rate relative to the applicable hot soak plus diurnal emission standard, new test data and engineering evaluations shall be submitted in a revised certification application to demonstrate that the evaporative family will remain in compliance. If the change does not result in a new model in the evaporative family exhibiting the highest hot soak plus diurnal emission rate relative to the applicable hot soak plus diurnal emission standard, only the affected pages and information fields of the certification application need to be submitted. Manufacturer shall use good engineering judgement for determination of the worst case. For example, a component or material-based permeation evaluation shall be used if applicable. -----

6. ~~APPLICATION FORMAT INSTRUCTIONS~~ Application Format Instructions An application for certification shall contain the following information: • Application type (e.g., new, running change) • Model year • Full corporate name of the applicant • U.S. EPA-assigned manufacturer code • Engine family name • Evaporative family name • Applicant contact information - Name - Title - Company Name - Address - Phone Number - Fax Number - Email Address • Production plant contact information - Name - Title - Company Name - Address - Phone Number - Fax Number - Email Address	OPEI notes the following concerns: 1) Section 6 of the corresponding application template should be modified to include a fuel cap description number field 2) Section 3 of the corresponding application template should be modified to include fuel cap and tether approval number 3) Section 6 of the CP does not include the letter of intent 4) Section 6 of the CP does not provide details on what data is required to be submitted (data currently requested) from TP902 5) The "model summary table" of the corresponding application for >80cc does not include outside diameter of fuel line (with tolerance) 6) Are Fax numbers still relevant (also applicable to CP-901 if retained per OPEI request)	Add the following bullets to application requirements: - Description of fuel cap including a design diagram - Letter of Intent - Outside diameter of fuel line Add appendix after following the TP-902 test procedures for: A) Cap/tether approval requirements - Engineering drawings of cap, tether, and tank(s) - Evaporative family used in - Exhaust family(s) - Engine model(s) - Fuel cap part number - Fuel cap tether part number - Fuel tank(s) part number Add appendix after following the TP-902 test procedures for: B) Running loss approval requirements - Running loss test data and results - carbon canister part number - Carbon cap volume (cc) - Weight of carbon in cap (g) - Activated carbon type and brand - Trap canister working capacity (g) - Evaporative family - Exhaust family(s) - Engine model(s) - Fuel tanks(s) - Nominal fuel tank volume (L) - Total fuel tank volume (L) - Description of worst case criteria
• Projected model year production volume in California • Projected model year production volume in U.S. • Proof the applicant has met the bond requirements of title 13, Cal. Code Regs., section 2774 • Date of expected introduction into California commerce • All results from all emissions-related tests performed on the units tested for certification, including test results from invalid tests or from any other tests, whether or not they were conducted according to ~~TP-901~~, TP-902, or ~~SAE J1737 (Stabilized May 2013), SAE J30, SAE J1527, or SAE J2996~~. The Executive Officer may require an applicant to send other information to confirm that testing according to ~~TP-901~~, TP-902, or ~~SAE J1737 (Stabilized May 2013), SAE J30, SAE J1527, or SAE J2996, as applicable,~~ was valid. • Description of any special test equipment • List of equipment types in the evaporative family • List of equipment brands using engines from the evaporative family, if known • Description of each engine and equipment model in the evaporative family - Model number - Fuel cap information - Model number - Description of fuel tank tether - Description of indication of establishment of vapor seal - Innovative Product approval, if applicable	OPEI is concerned with the scope of invalid or other tests in this language. OPEI believes the requirement is limited to certification tests on certification units.	• All emissions certification tests performed on production intent certification units in accordance with Section 2750 and TP-901, including test results from invalid Section 2750 and TP-901 certification tests on prodution intent units.

- Description of each fuel tank model in the evaporative family - Model number - Total capacity (L) - Internal surface area (m2) - Tank materials, including pigments, plasticizers, UV inhibitors, or other additives that are expected to affect control of emissions - Gasket material - Production method - Permeation barrier - Engineering drawings (may be simplified) ~~- Executive Order number, if applicable, or the following:~~ ~~- Tank materials, including pigments, plasticizers, UV inhibitors, or other additives that are expected to affect control of emissions~~ ~~- Gasket material~~ ~~- Production method~~ ~~- Permeation barrier~~ ~~- Engineering drawings (may be simplified)~~	OPEI is concerned information including tank materials, pigments, plasticizers, etc.. .may be proprietary and not available to OEMs.	

Appendix F	Issue / Comment	OPEI Proposed Changed Text
~~CALIFORNIA EXHAUST EMISSION STANDARDS AND TEST PROCEDURES FOR NEW 2013 AND LATER SMALL OFF-ROAD ENGINES~~ California Exhaust Emission Standards and Test Procedures for New 2013 and Later Small Off-Road Engines ~~The following provisions of Part 1054, Title 40, Code of Federal Regulations, as proposed by the United States Environmental Protection Agency on the date listed, are adopted and incorporated herein by this reference for 2013 model year and later small off-road engines as the California Exhaust Emission Standards and Test Procedures for New 2013 and Later Small Off-Road Engines, except as altered or replaced by the provisions set forth below.~~ ~~PART 1054 – CONTROL OF EMISSION FROM NEW, SMALL NONROAD SPARK-IGNITION ENGINES AND EQUIPMENT~~ Part 1054 – Control of Emission from New, Small Nonroad Spark-Ignition Engines and Equipment ~~SOURCE: 75 FR 59259, November 8, 2010, unless otherwise noted~~ Subpart A—Overview and Applicability	The format of the propsoed part 1054 no longer provides direct REDLINE/UNDERLINE/*** comparisons to EPA 1054 and presents challenges to understand how and where CARB Part 1054 differs.	
§ 1054.107 What is the useful life period for meeting exhaust emission standards?		
This section describes an engine family's useful life, which is the period during which engines are required to comply with all emission standards that apply. The useful life period is ~~five years or a~~ number of hours of operation, ~~whichever comes first~~, as described in this section. (a) (1) ~~The~~ For model years 2013 through 2023, the useful life period for exhaust requirements is the number of engine operating hours from Title 13, California Code of Regulations, Chapter 9, Article 1, Section 2404 that most closely matches the expected median in-use life of your engines. The median in-use life of your engine is the shorter of the following values: (i) The median in-use life of equipment into which the engine is expected to be installed. (ii) The median in-use life of the engine without being scrapped or rebuilt. (2) For model year 2024 and later engines, the useful life period for exhaust requirements is specified in the table in Title 13, California Code of Regulations, section 2403(b)(1). (3) You may select a longer useful life than that specified in paragraph (a)(1) or (a)(2) of this section as applicable in 100-hour increments not to exceed 3,000 hours for Class I, III, IV, and V engines, or 5,000 hours for Class II engines. Engine classes are defined in Title 13, California Code of Regulations, section 2403. For engine families generating emission credits, you may do this only with our approval.	The effective timing of these the change to delete "five years" is unlcear here, and throughout the RO, TP and CPs. It seems five years is needed as the reasonable limit to determine the useful life category for lower-use engines, which are optionally through 2023. This implies this change would be affective from 2024 with the Proposed Rule removal of lower EDPs. Section (a) (3) : The intent of this section is unclear - A useful life longer than that specified in paragraph (a)(1) or (a)(2) of this section for class IV and V engines, applicalbe from 2024, would be irrelevant because 0.00 g/kW-hrs for for model year 2024 and later engines. If engines are permitted beyond 2023, as alternatives may permit based on OPEI comments, this section could be applicable. Finally, it is unclear if EPA would permit a harmonized label, or even seperate labels with differnt EDPs.	
§ 1054.110 What evaporative emission standards must my handheld equipment meet?		
All equipment must meet the evaporative emission requirements as specified in Title 13, California Code of Regulations, Chapter 15, Article 1. The evaporative emission requirements apply for handheld equipment over a useful life of five years.	The "Useful Life" is defined in 1054.107 as the number of hours, but as five years here. We recongize one is exhaust and one is evap, but separate definitions of the same term in the same document is confusing. Should this be harmonized with 1054.107?	
§ 1054.112 What evaporative emission standards must my nonhandheld equipment meet?		

All equipment must meet the evaporative emission requirements as specified in Title 13, California Code of Regulations, Chapter 15, Article 1. The evaporative emission requirements apply for nonhandheld equipment over a useful life of five years.	The "Useful Life" is defined in 1054.107 as the number of hours, but as five years here. We recongize one is exhaust and one is evap, but separate definitions of the same term in the same document is confusing. Should this be harmonized with 1054.107?	
§ 1054.115 What other requirements apply?		
The following requirements apply with respect to engines that are required to meet the emission standards of this part: (a) Crankcase emissions. Crankcase emissions may not be discharged directly into the ambient atmosphere from any engine throughout its useful life, except as follows: (1) Snowthrower engines may discharge crankcase emissions to the ambient atmosphere if the emissions are added to the exhaust emissions (either physically or mathematically) during all emission testing. If you take advantage of this exception, you must do the following things: (i) Manufacture the engines so that all crankcase emissions can be routed into the applicable sampling systems specified in ~~40 CFR part~~ Part 1065. (ii) Account for deterioration in crankcase emissions when determining exhaust deterioration factors. (2) For purposes of this paragraph (a), crankcase emissions that are routed to the exhaust upstream of exhaust aftertreatment during all operation are not considered to be discharged directly into the ambient atmosphere. (b) Adjustable parameters. Engines that have adjustable parameters must meet all the requirements of this part for any adjustment in the physically adjustable range. An operating parameter is not considered adjustable if you permanently seal it ~~or if it is not normally accessible using ordinary tools.~~ Operating parameters that can be adjusted using tools are considered adjustable. We may require that you set adjustable parameters to any specification within the adjustable ranges during any testing including certification testing, production-line testing, in-use testing, or new engine compliance testing.	The effective timing of these the change is unlcear here, and throughout the RO, TP and CPs. Making the proposed change may require a redesign of adjustable parameter controls if this will be enforced from 2022. Further, for products that will have zero limits from 2024 may require redesign only to use exhaust emissions credits if this is applicable from 2024. OPEI does not believe there is any significant issue or benefit based on the potential cost to redesign for just one or 2 years and limited products. Products for which limits are zero from 2024, if the Proposed Rule is adopted, should be exempt. The proposed rule implies any tool may be used to evaluate if an operating parameter is adjustable. Consideration needs to be given for use of tools that may break or damage the unit in anyway that may impact performance. Additionally, cost needs to be considered - It is not reasonable to assume most users would purchase expensive tools which serve limited or special applications if cost of those tools are a significant portion of the unit cost. Section (b) Adjustable parameters: From MY 2024 all engines applied with carburetors using special screw heads needs to be changes to limiter cap systems . How may manufacturer / industry avoid such a design change for this limited period until all emission creditshas been used up?	
§ 1054.125 What maintenance instructions must I give to buyers?		

Give the ultimate purchaser of each new engine written instructions for properly maintaining and using the engine, including the emission control system as described in this section. The maintenance instructions also apply to service accumulation on your emission-data engines as described in §1054.245 and in ~~40 CFR part~~ Part 1065. ~~Note that for engines with a displacement of less than or equal to 80 cc you may perform maintenance on emission-data engines during service accumulation provided that exhaust emission tests are performed before and after the maintenance is performed.~~ (a) Critical emission-related maintenance. Critical emission-related maintenance includes any adjustment, cleaning, repair, or replacement of critical emission-related components. This may also include additional emission-related maintenance that you determine is critical if we approve it in advance. You may schedule critical emission-related maintenance on these components if you meet the following conditions: (1) You demonstrate that the maintenance is reasonably likely to be done at the recommended intervals on in-use engines. We ~~will~~ may accept scheduled maintenance as reasonably likely to occur if you satisfy any of the following conditions: (i) You present data showing that any lack of maintenance that increases emissions also unacceptably degrades the engine's performance. (ii) You present survey data showing that at least 80 percent of engines in the field get the maintenance you specify at the recommended intervals. If the survey data show that 60 to 80 percent of engines in the field get the maintenance you specify at the recommended intervals, you may ask us to consider additional factors such as the effect on performance and emissions. For example, we may allow you to schedule fuel-injector replacement as critical emission-related maintenance if you have survey data showing this is done at the recommended interval for 65 percent of engines and you demonstrate	If "service accumlation" is the engine period between new and the 0-hour test ("break in", "stabilization period"), OPEI agrees with removal of this clause. However, if "service assumulation" is considered the time to achieve EDP, that OPEI disagrees with this proposed change. Part 1054.125 allows maintenance as long as conditions can be satisfied, regardless of engine category. OPEI is concerned with the proposed change of "will" to "may" in (a)(1) - It is unclear how CARB will make a determination, what CARB's "discretion" will be based-on, if a manufactuer provides survey data in accordance with (ii).	
(b) Recommended additional maintenance. You may recommend any additional amount of maintenance on the components listed in paragraph (a) of this section, as long as you state clearly that these maintenance steps are not necessary to keep the emission-related warranty valid. If operators do the maintenance specified in paragraph (a) of this section, but not the recommended additional maintenance, this does not allow you to disqualify those engines from in-use testing or deny a warranty claim. Do not take these maintenance steps during service accumulation on your emission-data engines. (c) Special maintenance. You may specify more frequent maintenance to address problems related to special situations, such as atypical engine operation. You must clearly state that this additional maintenance is associated with the special situation you are addressing. You may also address maintenance of low-use engines (such as recreational or stand-by engines) by specifying the maintenance interval in terms of calendar months or years in addition to your specifications in terms of engine operating hours. We may disapprove your maintenance instructions if we determine that you have specified special maintenance steps to address engine operation that is not atypical, or that the maintenance is unlikely to occur in use. For example, this paragraph (c) does not allow you to design engines that require special maintenance for a certain type of expected operation. If we determine that certain	The term low-use engines is unclear. OPEI looking for clarificaiton of this term and applicability to this section.	

(m) Identify the emission family's deterioration factors and describe how you developed them (see § 1054.245). Present any emission test data you used for this. (n) State that you operated your emission-data engines as described in the application (including the test procedures, test parameters, and test fuels) to show you meet the requirements of this part. (o) Present emission data to show that you meet exhaust emission standards, as follows: (1) Present emission data for hydrocarbons (such as THC, THCE, or NMHC, as applicable), NOX, and CO on an emission-data engine to show your engines meet the applicable exhaust emission standards as specified in § 1054.101. Show emission figures before and after applying deterioration factors for each engine. Include test data from each applicable duty cycle specified in § 1054.505(b). If we specify more than one grade of any fuel type (for example, low-temperature and all-season gasoline), you need to submit test data only for one grade, unless the regulations of this part specify otherwise for your engine. (2) Note that §§ 1054.235 and 1054.245 allow you to submit an application in certain cases without new emission data. (p) Report test results as follows: (1) Report all test results involving measurement of pollutants for which emission	Regarding (p)(1) See OPEI comments to CP-902.	
your engines will comply with applicable emission standards throughout the useful life with the altitude kit installed according to your instructions. Describe any relevant testing, engineering analysis, or other information in sufficient detail to support your statement. In addition, describe your plan for making information and parts available such that you would reasonably expect that altitude kits would be widely used in the high-altitude counties. For example, engine owners should have ready access to information describing when an altitude kit is needed and how to obtain this service. Similarly, parts and service information should be available to qualified service facilities in addition to authorized service centers if that is needed for owners to have such altitude kits installed locally. (s) If your engines are subject to any handheld engine provisions on the basis of meeting the definition of "handheld" in Title 13, California Code of Regulations, section 2401, describe your analysis showing that you meet the applicable criteria. (t) State whether your certification is limited for certain engines. If this is the case, describe how you will prevent use of these engines in applications for which they are not certified. This applies for engines such as ~~the following:~~ ~~(1) W~~wintertime engines not certified to the specified HC+NOX standard. ~~(2) Two-stroke snowthrower engines using the provisions of § 1054.101(d).~~ (u) Unconditionally certify that all the engines in the engine family comply with the requirements of this part, other referenced parts of the CFR as incorporated and modified herein, California's Health and Safety Code, and ~~CCR~~ Title 13, California Code of Regulations, §§ 2400-2409.	See OPEI comment to 2400 RO regarding definition of exhaust. The definition and the use of handheld here should be aligned with EPA.	
§ 1054.245 How do I determine deterioration factors from exhaust durability testing?		
(3) CARB may reject a DF if ~~it has evidence that~~ the DF is not appropriate for that engine family ~~within 30 days of receipt from the manufacturer.~~ The manufacturer must retain actual emission test data to support its choice of DF and furnish that data to the Executive Officer upon request. Manufacturers may request approval by the Executive Officer of alternative procedures for determining deterioration. ~~Any submitted DF not rejected by ARB within 30 days shall be deemed to have been approved.~~ (4) Calculated deterioration factors may cover ~~families and~~ model years in addition to the one upon which they were generated if the manufacturer submits a justification acceptable to the Executive Officer in advance of certification that the affected engine families can be reasonably expected to have similar emission deterioration characteristics. (5) Engine families that undergo running changes need not generate a new DF, if the	The DF is a critical, time-consuming function of the certification process, therefore manufactuers need to be advised of concerns related to DF as quickly as possible - DF evaluation should be a top priority when evaluating application. The Proposed Rule does not describe what evaluation CARB would need to confirm the DF is appropriate or why such a decision would take longer than 30 days. Maintain 30 day evaluation period for this ciritcal factor.	No change to current language.

ANNEX B

OPEI ZEE Battery Use and Cost Analysis (Comment 7 & Comment 8)

Landscaper ZEE Cost Analysis

Eqiupment Type	Power (kW)[1]	Load Factor[1]	Annual Use[1]	Uses/Year[1]	Hr/Use[1]	Avg # Units/Landsacper[2]	Total kW/day for Equipment Type	# Batteries Day[4]	# Batteries Rounding Up[5]	Start-Up Battery Cost[6]	Additional Battery Cost Per Repower[7]	Additional Charger Cost[8]	Age Where Less Than 50% of Population Remains ("Useful Life")[9]	Age-Hours at Useful Life	Number of Battery Repowers	Total Repower Batteries	Total Repower Baattery Cost	Total Batteries	Total Battery Cost	Final Total Battery & Charger Cost Per Equipment Cycle[10]
Walk Behind Mower	2.86	0.36	240	210	1.14	2.04	2.40	8.00	8	1341.33	1800.33	350.07	6	1440	1.52	12.16	2736.50	20.16	4077.83	4427.90
String Trimmer	0.8	0.94	162	184	0.88	2.29	1.52	5.05	6	621.88	1137.13	202.70	6	972	1.21	6.11	1373.66	11.16	1995.54	2198.24
Leaf Blower	2.36	0.94	240	210	1.14	2.17	5.50	18.34	19	3637.97	4126.22	866.94	6	1440	1.52	27.87	6271.86	46.21	9909.83	10776.77
Hedge Trimmer	0.8	0.94	126	107	1.18	1.79	1.59	5.28	6	786.08	1188.83	214.18	6	756	0.28	1.50	337.63	6.78	1123.70	1337.89
Chain Saw	1.23	0.7	140	127	1.10	3.95	3.75	12.50	13	1923.06	2811.81	574.85	6	840	0.52	6.55	1473.39	19.05	3396.45	3971.29
	2.36					TOTAL W/O Chain Saw[3]	11.00	36.68	39	6387.27	8252.52	1633.89	8021.16			47.64	10719.65	84.32	17106.91	18740.80
						TOTAL W/ Chain Saw	14.75	49.17	52	8310.32	11064.32	2208.74	10519.06			54.19	12193.03	103.37	20503.36	22712.10
Commercial Riding Mower	16.90	0.38	246	160	1.54		9.87	1.00		0.00	UNK									
Residential ZEE Cost Analysis																				
Walk Behind Mower	2.86	0.36	19	25	0.76		0.78	2.61		361.87		0.00								361.87
String Trimmer	0.8	0.94	15	18	0.83		0.63	3.13		320.00		0.00								320.00
Leaf Blower	0.80	0.94	15	30	0.50		0.38	1.88		131.37		0.00								131.37
Hedge Trimmer	0.8	0.94	10	13	0.77		0.58	2.89		283.85		0.00								283.85
Chain Saw	1.23	0.7	18	10	1.80		1.55	7.75		1012.35		0.00								1012.35
						TOTAL Turf W/O Chain Sa	2.36	11.81		1097.09		0.00								1097.09
						TOTAL Turf W/ Chain Saw	3.91	19.56		2109.44		0.00								2109.44
Residential ZEE Generator Cost Analysis																				
Generator (2-5hp category)	2.33	0.68	50	13	3.85		6.11	20.36		4355.15		967.81								5322.96
Commercial ZEE Generator Cost Analysis																				
Generator (2-5hp category)	2.33	0.68	146	49	2.98		4.73	15.77		3323.22	3548.22	738.49	6	876	0.00	0.00	0.00	15.77	3323.22	4061.71
Generator (5-15hp category	7.05	0.68	146	49	2.98		14.28	47.61		10487.67	10712.67	2330.59	6	876	0.00	0.00	0.00	47.61	10487.67	12818.26

[1] Per CARB SORE2020

[2] Per CSU-F survey. Not all landscapers own each type of equipment, but those that do on average own this many pieces

[3] Per the CSU-F survey it is reasonable many professional landscapers use at least these items - WBM, ST, LB & HT. Some may additionally use chainsaws, so these summaries have been analyized separately.

[4] Assumes 300 W-hr battery and that batteries are charged once per day of use for landscape and commerical use, and generators. Assumes 200-W-hr battery charged once per day of use for residential use, excluding walk-behind mowers and generators which are assume 300 W-hr battery. Assumes 13-19 kW battery for commercial mowers based on product comparison of one brand.

[5] For reference only. The batteries calcluated in column result in fractions of a battery, so it could be argued that actual batteries need to be rounded up. However, since the other calculations rely on fractions of units/landscaper, this is just for reference and is not used the other calcluations in this table.

[6] Assumes retail cost $0.75 per W-hr. This is a conservative estimate for professional products (low cost estimate). A 40V 5amp-hour (200 w-hour) battery from the leading brand at The Home Depot retails for $179. This assumes 1 battery is included for in the cost of the machines - Those batteries are not included in "start-up battery cost".

[7] Assumes batteries are replaced after 500 charge cycles. Assumes retail cost $0.75 per W-hr. This is a conservative estimate for professional products (low cost estimate). Replacing all original batteries (ie.. Including battery originally provided with machine).

8 Assumes reatil cost of $50 per charger and that the chargers do not need to be replaced over the useful life. Assumes no additional chargers needed for residential (one comes with product). This is a conservatie estimate for professionals products (low cost estimate). A 40V battery charger from the leading brand at The Home Depot retails for $55. "Fast chargers" a significanltly more expensive.

[9] Per CARB SORE 2020 the average useful life (Age at which 50% of the population is no longer in use) is 6-7 years for these products. For the purpose of estimating total landscaper cost over one period, 6 years was used for all points.

[10] Does not include initial cost of equipment. Sum of new batteries and chargers purchased to achieve useful life. This cost will be less for units that do not achieve useful life, and more for products that do.

ANNEX C

OPEI CARB Survey Outlier Analysis Summary (Comment 12)

KEY
R – Residential
C – Commercial/Business
V – Vendor/Landscaper
- Survey Respondent Number Reference (“R2”); Unit Number (“CS2”)
MR – Male Respondent
FM – Female Respondent
CS – Chainsaw
LM – Lawn Mower
LBV – Leaf Blower / Vacuum
ST – String Trimmer
LT/RM – Lawn Tractor / Riding Mower
COMP – Air Compressor
GEN - Generator
PW – Pressure Washer
PUM – PUM
WELD – Welder
UTV/GC – Utility Vehicle / Golf Car
HR = Hour
YR = Year
YO = Years Old
YELLOW – AMENDED – SEE CARB 2020 Emissions Model for Small Off-Road Engines – SORE2020, Section 4.2 & TABLE J1

IDX	DESCRIPTION	CONCLUSION
RESIDNETIAL AIR IQR + GTK PEER REVIEW		
R3	The MR responses are erratic and unbelievable. The MR utilizes a landscaper and gardener, yet product use time is well above survey averages. The MR initially “refused” to respond or “didn’t know” responses more than 20 times, many times for frequency and duration of use. Considering the full response, Industry suspects much of the dataset responses were unknown or exaggerated. Unfortunately, it is not possible to distinguish what is true or not and as a result Industry has removed the full response. Following are more specific concerns regarding this dataset: *Chainsaw Abnormalities* – After refusing to answer, the MR responded for CS1 and CS2 that the units were operated identically 12-24x/year and both units were used for 2hr/use (2x 18*2hr = 72hr/yr). Industry believes this 36 hr/yr/unit of saw run time is high for residential users. In total the MR reports runningfour chainsaws approximately 80 hr/year. The MR noted that his CS3 was 35 yo and planned to keep the unit for an additional 40 years. Small engine powered equipment that is greater than 30 years old is rare, and expecting to keep equipment for 75 years is not a reasonable or realistic response.	REJECT & REMOVE R3

	Lawn Mower Abnormalities – After refusing to answer the frequency and responding "don't know" for time/use, the MR responded operating the LM for "12 HOURS" /use. The MR reported that the unit was 25yo and he was planning to keep for another 10 years. These are not a reasonable or realistic responses. *String Trimmer Abnormalities* – After refusing to answer the ST use, the MR responded that he operated the ST1 for 3hr/use and ST2 for 4hr/use. Industry believes 3 & 4 hr/use of ST run time is high for residential users, especially for units used multiple times per year. The MR also stated that ST2 is 30yo. This is not a reasonable response. *Air Compressor Abnormalities* – When asked about the age and retention of COMP2, the MR responded that the unit was 40yo, and he planned to keep the unit for an additional 30 years. Small engine powered equipment that is greater than 30 years old is rare, and expecting to keep equipment for 70 years is not a reasonable response. *Generator Abnormalities* – When asked the age and retention of GEN2, the MR responded that the unit was 45yo, and he planned to keep the unit for an additional 30 years. Small engine powered equipment that is greater than 30 years old is rare, and expecting to keep equipment for 75 years is not a reasonable response. *Go-cart Abnormalities* – After refusing to answer the go-cart use, the MR stated that the unit was used 12-24x/yr for 3hr/use, that the unit was 60yo, and that he planned to keep the unit for an additional 30 years. Small engine powered equipment that is greater than 30 years old is rare, and expecting to keep equipment for 90 years, is not a reasonable response. *Pump Abnormalities* – After initially refusing to provide the use frequency and duration for four reported pumps, the MR noted that all four pumps were used identically "OVER 100 TIMES A YEAR", with PUM1, PUM2 and PUM3 being used identically for 7hr/use (minimum 700hr/yr x3 units), and PUM4 being used for 12hr/use (total 36,000hrs) and 30 yo. These are not reasonable or realistic responses.	
R11	The FR responded owning and operating four welders, including one rare gas-powered welder, all identical frequency (4-11x/year) and similar minutes/use (WEL1, WEL3 reported as 20mins, and WEL2 and WEL4 reported as 30mins), and that all four welders were identically 6 years old. Industry finds identical responses across each piece of equipment in a category odd. Industry questions whether the respondent considered the use of each unique piece of equipment, or if they owned multiple pieces of equipment to being with. Additionally, the frequency response for WEL1 appears to include multiple data entry errors. The use is recorded as "More than 52 times per year" and specifies just "3 or 4"? Yet, WEL2, WEL3 and WEL4 all are recorded as being used "4 to 11 times per year", with "3 OR FOUR TIMES A YEAR" as the specified answer.	REJECT & REMOVE R11

R20	The interviewer reported "the wording of the survey is very odd and led to confusion between myself and the respondent". The note and responses are confusing seeing as the respondent reports owning and maintaining a lawn, garden or landscaped area, but reports owning no equipment. Industry is concerned the interviewer expressed confusion executing the survey, especially if related to the fundamental early questions. Without knowing the basis for the interviewer's confusion, or if and how it was resolved, the span or impact of the interviewers confusion cannot be determined, and jeopardizes the entire survey. The accuracy of the responses are not reliable.	REJECT & REMOVE R20
R59	The FR responded that she uses the electric-powered air compressor 300x/year for 8hr/use, and that the compressor is 8yo (total 300*8*8 = 19,200hr). This is not a reasonable or realistic response. Oddly, other answers seem reasonable, which raises the question as to whether the COMP1 responses were entered or interpreted correctly by the interviewer.	REMOVE COMP1
R71	The MR responded that he uses the gas-powered welder 2x/week for 6hr/use, and that the welder is 15yo (total 104*6*15 = 9360hrs). This is not a reasonable or realistic response for a residential-use only welder. Oddly, other answers seem reasonable, which raises the question as to whether the WELD1 datapoints were entered or interpreted correctly by the interviewer.	REMOVE WELD1
R91	The FR began the survey before eventually passing the survey to her husband "since he knew more (about the equipment)". This raises Industry concern with accuracy of the answers submitted by the FR. Regardless of who answered, the respondents reported very high annual use on several types of equipment, despite only having two gas cans (1x3gal, 1x5gal) which are refilled twice a month (max 16 gal/month). The uncertainty of the accuracy and reliability of the initial FR, the unusually high number of reported hours on several types of equipment, and lack of correlation between machine run-time and estimated annual fuel use are collectively not reasonable or realistic. Considering the full dataset, Industry suspects much of the dataset was unknown or exaggerated. Unfortunately, it is not possible to distinguish what is true or not. Following are more specific concerns regarding this dataset: *Chainsaw Abnormalities* – The respondent (FR or MR UNK) stated that the gas-powered chainsaw is used 10x/year for 6hr/use (60hr/yr). 6hr run time per use several times per year is not a reasonable or realistic response. Industry questions whether the respondent answered estimating the length of all tasks related to using the saw (vs saw operation time), or if the interviewer extrapolated a non-specific response, such as "half the day" for this response. *Leaf Blower Abnormalities* – The respondent (FR or MR UNK) stated that electric leaf blower is used 365x/year for 10min/use (61hr/yr). We believe it is possible the respondent answered "every day", and the interviewer extrapolated the response to 365x/year, however Industry does not believe that a residential leaf blower is actually used 365x/year.	REJECT & REMOVE R91

	String Trimmer Abnormalities – The respondent (FR or MR UNK) stated that gas-powered string trimmer is used 25x/year for 4hr/use (100hr/yr), is 10yo (total 25*4*10 1000hr), and is planning to keep for an additional 20 years (total 3000hr). Industry believes the combined frequency and duration of ST run time is not reasonable or realistic for residential-only use. The response is more peculiar when considering she/he responded they only use their lawnmower 1x/month for 1x/hr. Considering all the information, the use of ST1 is not a reasonable answer. *Air Compressor Abnormalities* – The respondent (FR or MR UNK) stated that gas-powered COMP1 is used 4x/month for 6hr/use (288 hr/yr), and that that compressor is 15yo (total 48*6*15 = 4320hr), planning to keep the unit for another 20 years (total 10,000hr). This is not a reasonable or realistic response for residential-only use air compressor. *Generator Abnormalities* – The respondent (FR or MR UNK) stated that GEN1 is 40yo and plans to keep the unit for another 20 years. Small engine powered equipment that is greater than 30 years old is rare, and expecting to keep equipment for 60 years is not a reasonable response.	
R95	The MR responded that CS2 and GEN2 were not working and no longer in-use. Nevertheless, the interviewer reported that he/she elected to put "don't know" for the use characteristics. The result of the interviewer artificially inflates the average use since the true zero-use/zero-hour datapoints would not have been included in the average calculations. The decision by the interviewer raises great concern about the survey team inappropriately and incorrectly interpreting results. Industry is concerned that such actions, which without survey recordings the span or impact of cannot be determined, jeopardizes the entire survey. CARB corrected to "don't' know to zero hour /use"	CORRECT CS2 AND GEN2 TO 0x/YEAR AND 0HR/USE.
R97	The MR responded that his gas-powered chainsaw is used multiple times a year for 6hr/use. 6hr run time per use several times per year is not a reasonable or realistic response. Industry questions whether the respondent answered estimating the length of all tasks related to using the saw (vs saw operation time), or if the interviewer interpreted a non-specific response, such as "half the day" for this response.	REMOVE CS1
R98	The MR responded owning four gas-powered chainsaws, all used identically 5x/year for 2hr/use, with all saws are 3-5yo, and two welders, both used identically 6x/year for 4hr/use. Industry finds identical above average responses across every piece of equipment in a category odd. The responses draw more attention when repetitive patterns exist across categories with multiple pieces of equipment. Industry questions whether the respondent considered the use of each unique piece of equipment, or simply answered "same" without considering use time of each saw and welder, or if they owned multiple pieces of equipment to being with. OPEI believes many of the dataset responses were not appropriately considered.	REJECT & REMOVE R98

R109	The MR, residing in an Apartment, reported to own 4 electric air-compressors that used an identical 5x/mon and 10hr/use, and all 6 or 7yo (total 1x 3600 hours, 2x 4300 hours). The respondent also reported that he owned 2 pumps which he also reported operating identically 5/mon for 45min/use. The interviewers reported that MR "maybe had some trouble understanding some questions or how to answer them" and noted the respondents "(ability) to understand questions?" as "with some difficultly. Foremost, these are not reasonable responses. Industry finds identical, long hour/use, responses across every piece of equipment in a category odd. The responses draw more attention when repetitive patterns exist for all categories with multiple pieces of equipment. Industry questions whether the respondent considered the use of each unique piece of equipment, or simply answered "same" without considering use time of each piece of equipment, or if they owned multiple pieces of equipment to being with. Optionally, Industry wonders if, due to the difficulty of the MR understanding the questions, the interviewer simply answered the same for additional identical units. When considering the full dataset, and that equipment is used for several thousand hrs/year, Industry believes many of the dataset responses were not appropriately considered, the respondent did not understand the questions, or that the equipment may be used for business purposes.	REJECT & REMOVE R109
R110	The MR is reported using electric PUMP1 365x/year for 24hr/use, for 5 years (total 365*24*5 = 43800). This is not a reasonable or realistic number for a pump used comparable to SORE-powered pumps. Other equipment responses appear reasonable. Industry is concerned the interviewer extrapolated non-specific responses, such as "everyday" and/or "all day" for these responses.	REMOVE PUMP1
R125	The MR is reported using 2x electric golf car 6x/year 5hr/use and a 3rd electric golf car (new) <4x/year 5hr/use. However, respondent comments note "MR has not used his scooter golf cart yet". First, 5 hr/use (continuous) is unlikely due to charge capacity of electric vehicles an second, the 3rd (new) unit appears to be answering in future speculated tense.	
R145	The interviewer reported that the FR "didn't know much about the equipment, but husband wouldn't take the survey". To that point, the FR reported three rare gas-powered air compressors and originally responded "don't know" for their uses patterns. However, in accordance with interviewer training, the respondent was further probed to guess usage. The FR eventually guessed identical frequencies of 4-11x year for COMP1 and COMP2, and identical time/use of 4hr/use for all three units. Industry finds identical above average responses across every piece of equipment in a category odd. Industry is particularly concerned that the FR appeared to suggest that her husband was better suited to answer the survey, yet when she responded "don't know" the interviewer continued to probe for answers. When considering these factors, Industry is concerned the respondent was not familiar with the surveyed equipment and her responses are not reliable.	REJECT & REMOVE R145

R158	The MR reported using electric UTV/Golf Car 70x/year for 5hr/use for 25 years (total 70*5*25 = 8750hr). This is not a realistic response. Additionally, the respondent using PW1 3hr/use. Industry questions whether the respondent answered estimating the length of all tasks related to using the equipment (vs equipment operation time), and/or if the unit (vehicle) is used for business purposes, and/or if the responses are simply unknown or exaggerated. However, other equipment responses appear reasonable.	REJECT & REMOVE R158
R164	The MR reported that multiple electric compressors were used 7x/week, 8hr/use (2x total 7*52*8 = 2912hr), with COMP2 being 10yo (total 29120hrs). The MR also reported that a welder was used 3x/week for 2hr/use (312hr/yr). Foremost, these are not reasonable or realistic responses. Second, Industry finds identical, long hour/use, responses across every piece of equipment in a category odd. Industry questions whether the respondent considered the use of each unique piece of equipment, or simply answered "same" without considering use time of each piece of equipment, or if they owned multiple pieces of equipment to being with. When considering the full dataset, and that equipment is used for more than 6000 hr/year, Industry believes many of the dataset responses were not appropriately considered, or that the equipment is used for business purposes.	REJECT & REMOVE R164
R167	The interviewer noted at some point into the 13 minutes survey that "(the respondent) was getting very impatient throughout the survey and wanted to hang up. I tired my best to persuade him to say on the line and he told me to say all the equipment he had previously mentioned was broken and refused (to answer other questions)." As a result, "refused" was entered fom 68 responses. Industry is concerned that survey fatigue may resulted in less thoughtful or descriptive responses as the survey proceeded, eventually leading to the respondent just giving up. Additionally, the dataset raises another concern related to interviewer interpretive and selective recordings, seeing as the respondent answered that equipment was broken, and as a result not in use; nevertheless, the interviewer chose to enter that the respondent "refused" to answer questions. Industry is concerned that such actions, which without survey recordings the span or impact of cannot be reviewed, jeopardizes the entire survey.	INCOMPETE SURVEY - REJECT & REMOVE R167
R181	The MR reported to reside in an apartment with abnormally high air compressor use on multiple electric units. The MR reported to use COMP1 2x/week for 8hr/use (832hr/yr) and COMP2 4x/month for 2hr/use (96hr/yr). The MR also reported to use an electric pressure washer 3x/week for 1hr/use (156hr/yr). Industry does not believe these are reasonable responses for residential-only use.	REJECT & REMOVE R181
R192	The FR reported a rare gas-powered air compressor was used 7 days/week for 8hr/use (2912 hr/yr). The FR also reported a rare diesel-powered generator used 7 days/week for 8hr/use. These are not a reasonable or realistic responses. Industry is concerned that the respondent did not understand the questions, seeing as the interviewer reported that the FR was able to understand questions "with a great deal of difficultly".	REJECT & REMOVE R192

	CARB removed air compressor. CARB did *not* remove generator used 7x/week 8hr/use.	
R201	The MR noted pressure washers are used only in the summer, however the response is 1x/week (15min/use).	
R205	The MR reported using a gas-powered chainsaw 52x/year for 2hr/use and a gas-powered string trimmer 5x/year for 6hr/use. 104hr/year for a saw and 6hr/use for a string trimmer are reasonable responses. Industry questions whether the respondent answered estimating the length of all tasks related to using the saw (vs saw operation time), or if the interviewer interpreted a non-specific response, such as "half the day" for this response, of if the equipment is used for business purposes. However, it should be noted that use datapoints for other equipment in this response appear reasonable.	REMOVE CS1 AND ST1
R242	The FR is recorded noting "I feel like I'm not the best person to answer these questions because my husband likes tools". Additionally, the interviewer reported that the respondent was able to understand the questions "with some difficulty". Industry is concerned the accuracy of the responses, while minimal, are not reliable.	REJECT & REMOVE R242
R255	The MR reported using two electric compressors 20x/year for 1hr/use. Industry finds identical, above average responses across each piece of equipment in a category odd. Industry questions whether the respondent considered the use of each unique piece of equipment, or simply answered "same" without considering use time of each compressor, or if they owned multiple pieces of equipment to being with.	REJECT & REMOVE R255
R284	The FR reported using one gas-powered chainsaw for 18hr/use and one electric chainsaws for 12hr/use. These are not reasonable or realistic responses. Industry questions whether the respondent considered the use of each unique piece of equipment, or simply answered similarly for both units, or if the interviewer extrapolated non-specific responses, such as "half the day" or "all day" for these responses.	REJECT & REMOVE R284
R289	The MR reported using two gas-powered chainsaws for very high hours/use. The MR reported CS1 is used 50x/year for 3hr/use and CS2 45x/year for 3hr/use. The combination of frequency and hours are not reasonable or reasonable responses. Industry questions whether the respondent answered estimating the length of all tasks related to using the saw (vs saw operation time), or if responses were unknown or exaggerated, or uses the equipment for business purposes.	REJECT & REMOVE R289
R390	The FR is reported using electric PUMP1 7x/week for 6hr/use for 5 year total (7*52*6*5 = 10920hr). This is not a realistic number for a pump used comparable to SORE-powered pumps. Industry additional is concerned the interviewer extrapolated non-specific responses, such as "everyday" and/or "all day" for these responses. Electric LM1 is also reported at an unrealistic 2hr/use.	REJECT & REMOVE R390
R482	The FR responses are not reasonable. When considering the complete dataset, Industry believes much of the dataset is unknown or exaggerated. It is difficult for Industry to speculate why the dataset is so erratic. It is not clear if the respondent was actually a business, and/or not in good mental health, and/or confusing the time it takes to complete related tasks, and/or	REJECT & REMOVE R482

	was just dishonest, and/or if the interviewer exercised extreme interpretation in combination with probing techniques. While the respondent reports more than 80hr/month of gas-powered product use, she reports filling her 3x5 gal gas cans just once a month. Finally, it should be noted that the respondent resides in Placer County, which averages measurable snowfall November – April. Following are more specific concerns regarding this dataset: *Chainsaw Abnormalities* – The respondent reported using her gas-powered CS1 1x/month for 1hr/use, then gas-powered CS2 for high frequency and hours/use, 6x/month for 1hr/use. CS2 responses are not reasonable or realistic for residential use. *Lawnmower Abnormalities* – The respondent then reported to use her lawnmower 1x/week for 15hr/use for 8 years (total 15*52*8 = 6240hr). This is not a reasonable or realistic number. *Additional L&G Abnormalities* - The respondent reported using a gas-powered LBV 1x/week for 30min/use, a gas-powered string trimmer 1x/week for 1hr/use for 15 years (total 52*15 = 780hrs). Industry concedes, while on the high end, standing with reasonable data the use could considered, however, considering the other high categories, along with the abnormally high number of hours on the aged string trimmer, Industry is concerned these datapoints are also not realistic. *Light Industrial Equipment Abnormalities* – The respondent reported electric pump 7x/week for 2hr/use for 8 years (total 7*52*2*8 = 5824hr). This is not a realistic number for a pump used comparable to SORE-powered pumps. CARB removed only lawnmower used 15 hr/use.	
R514	The MR reported using one chainsaw and an electric compressor in high frequency and for high hours/use. The MR reported using a chainsaw 5x/year for 6hr/use. Industry does not believe that 6hr run time per use is a reasonable response multiple times a year. Industry questions whether the respondent answered estimating the length of all tasks related to using the saw (vs saw operation time), or if the interviewer interpreted a non-specific response, such as "half the day" for this response. The respondent also reported COMP1 is used 5x/mon for 6hr/use, and that the unit was 7yo (total 5*12*6*7 = 2520hr). Industry does not believe the COMP1 response is reasonable for residential-only use.	REJECT & REMOVE R514
R518	The MR reported using CS2 for 24hr/use. This is not a reasonable or realistic response. Industry believes that the interviewer extrapolated a non-specific response, such as "all day" or "for a day" for this response. Industry is concerned that such actions, which without survey recordings the span or impact of cannot be determined, jeopardizes the entire survey. CARB removed chainsaw used 24 hr/use, but did *not* remove R659 and R695 both reporting chainsaw 24 hr/use.	REMOVE CS2

R555	The MR responses are not reasonable or realistic. The 65+ bachelor MR responded that he lives in a mobile or modular home with *no* lawn, garden, or landscapable area, yet uses a variety of outdoor power equipment, in excess of 80+ hr/week. The MR initially answered "don't know" 55 times, including for many of the use and age-related questions. However, in accordance with interviewer training, the respondent was further probed to guess usage, consequently guessing unrealistic answers for many use characteristics. When considering the complete dataset, Industry believes much of the dataset is unknown or grossly exaggerated. It is difficult for Industry to speculate why the dataset is so erratic. It is not clear if the MR was actually a business, and/or not in good mental health, and/or misunderstood the survey to be responsive to equipment he has owned over his lifetime, and/or was just dishonest, and/or if the interviewer exercised extreme interpretation in combination with probing techniques. In total, the user, with no lawn or garden are, responded that he used equipment for an unrealistic 130+hr/week, with 80+hrs/week on units that requires a physical operator. Finally, it should be noted that the respondent resides in Shasta County, which averages measurable snowfall November – March. As a result, the use of these products would likely be seasonal. Following are more specific concerns regarding this dataset: *Chainsaw Abnormalities* – The MR reported owning six chainsaws. The MR reported unclear uses for gas-powered CS1 and CS2, reporting that the saws are used "More than 2-3 days" and "COUPLE OF DAYS" per use respectively, then reported 7x/week and 2.5hr/use for both electric CS4 and CS5 (2x 17.5 hr/week, 2x 910 hr/yr) after initially responding that he did not know the use duration. These frequency and operation time are not reasonable or realistic responses for saws. OPEI questions whether the respondent answered estimating the length of all tasks related to using the saw (vs saw operation time). The responses are more peculiar when considering the MR did not know, or reported 0 hr/use for the first three units, then suddenly responded 910 hr/year for units CS4 and CS5. OPEI believes it is unusual for a respondent to list the most common used products fourth and fifth, of six reported products. These are not reasonable responses. *Leaf Blower Abnormalities* – The MR reported not using gas-powered LBV1 (0 x/year), but also reported using the unit 2-3 hr/use after initially responding that he did not know how long he used the product each time. Subsequently, for LBV2, after initially responding that he did not know how often or how long the product was used, he answered 25-51x/year for 2-3hr/use. This high frequency and use/time are not reasonable or realistic answers. The response is more peculiar when considering the MR responded that LBV1 was not used, then suddenly suggests LBV2 is used nearly 100hr/year. These are not reasonable responses. *String Trimmer Abnormalities* – The MR reported using multiple gas-powered and electric string trimmers, one multiple times a month for 2-3 hrs/use after	REJECT & REMOVE R555

	initially responding that he did not know how long he used ST1 and ST2 per use. These are not reasonable responses. *Lawn Tractors / Riding Mowers Abnormalities* – Of the thirteen lawn tractors / riding mowers reported over the 1152 households surveyed, the MR, who owns no lawn or garden area, reported owning three units, two with very high frequency and hr/use. The MR reported using LM/RM1 7x/week for 2-3hr/use and LM/RM2 4x/week for 2.5hr/use after initially responding that he did not know how long he used the units per use. These high frequencies and hr/use are not reasonable or realistic responses. The respondent then reports that LM/RM3 is not used (0hr), but that that it is used for 3-4hr/use. As a result, Industry calculates that this respondent alone increases the average annual use for gas-powered lawn tractors/riding mowers from 146 hr/year to 46 hr/year resulting in 6+ tons/day of excess emissions for riding mowers alone in the CARB SORE2020 model[1] (without consideration of the impact on the population distribution as a result of the small sample size) *Light Industrial Equipment Abnormalities* – The MR reports similar high count, high use/year and high hr/use for several of the light industrial equipment categories surveyed. The MR reports owning four generators, and despite again originally answering "don't know" for several of the use questions, the respondent reports to use GEN1 "SOMETIMES 5MIN, SOMETIMES 6 DAY" and GEN3 50-70x/year for 2-2.5hr/use on an 18yo unit. The respondent reports using gas-powered golf car #1 7x/week for 1-2hr/use after initially answering he did not know, gas golf car #2 1x/week for 1hr/use and electric golf car #3 0x/year, but for 12hr/use. Finally, the MR reported using his electric welder 3x/week "FROM 10 MIN – 2 HR", again despite originally responding "don't know" for the time/use. Collectively, these responses are not reasonable. CARB removed riding mower used 7x/week and changed response of generator from "Sometimes 5MIN, Sometimes 6 DAY" to 2.25 hr/use. No other responses were removed or changed.	
R575	The interviewer reported "she was Russian and very hesitant in answering questions because she doesn't understand much. She rents a home so all of the equipment that she has she didn't know much info about them so she just put no or IDK for most questions". Industry is concerned the accuracy of the responses, while minimal, are not reliable.	REJECT & REMOVE R575
R588	The MR reported using COMP1 2x/month for 5min/use, but COMP2 for 2x/month, 5hr/use. Setting aside our previously stated concerns about duplicative data, Industry is concerned one of the time/use reflects a data entry error. Industry suspects both entries should be the same, especially considering the second reported unit was recorded as being used 60x more that the first reported unit, and the second reported use is unusually high for a residential air compressor used somewhat frequently.	CORRECT COMP2 TO 5MIN/USE

[1] CARB SORE2020 Model, CY2031, Summer Emissions, as provided by CARB to OPEI 4/3/2020.

R592	The FR is reported using electric PUMP1 8x/week for 8hr/use. This is not a realistic number for a pump used comparable to SORE-powered pumps. Industry additional is concerned the interviewer extrapolated non-specific responses, such as "everyday" and/or "all day" for these responses. Gas-powered ST1 is also reported at an unrealistic 4hr/use.	REJECT & REMOVE R592
R594	The MR responses are simply not reasonable ore realistic. The respondent reports near the highest hours/use of all respondents for several categories. The respondent reports identical very high use for multiple categories of equipment. Industry finds identical, long hour/use responses across each piece of equipment in a category odd. The responses draw more attention when repetitive patterns exist for all categories with multiple pieces of equipment. Industry questions whether the respondent considered the use of each unique piece of equipment, and/or simply answered "same" without considering use time of each product, and/or if they owned multiple pieces of equipment to being with, and/or if the interviewer simply answered the same for additional identical units, and/or if they were just dishonest. Additionally, Industry questions the long operation of the equipment based on the response that he only services units when they break. Industry does not believe it is possible that the equipment listed would last so far beyond engine durability periods without some type of general maintenance. It should also be noted that the MR resides in Humboldt County, which likely limits product use to less than 12 months/year based on its seasonal climate. Considering the full dataset, and that equipment is used for *several* thousand hrs/year, OPEI believes many of the dataset responses were not reasonable or realistic, or that the equipment is used for business purposes. Following are more specific concerns regarding this dataset: *Chainsaw Abnormalities* – The MR reports owing 3 gas-powered chainsaws with identical high annual use rates of 50x/year and 4hr/use (3x 200hr/year). The MR reports CS1 and CS2 are both 5 years old (total 1000hrs each) while CS3 is 2yo (400hrs). These are not reasonable or realistic responses. *Lawn Mower Abnormalities* – The MR reports using his gas-powered lawn mower 4x/month for 5hr/use. 5hr/use is not a reasonable or realistic response considering the frequency of use. *Leaf Blower Vacuum Abnormalities* – The MR reports operating his gas-powered leaf blower 20x/year for 2hr/use. The combined frequency and time/use are not reasonable for residential-only use. *String Trimmer Abnormalities* – The MR reports operating two gas-powered string trimmers 10x/year for 8hr/use. 8hr/use is not a reasonable or realistic response. *Light Industrial Equipment Abnormalities* – The MR reports similar high count, high use/year and high hr/use for several of the light industrial equipment categories surveyed. The MR reports owning three generators, with GEN1 being used 5x/month for 8hr/use and 13yo (total 5*12*8*13 =	REJECT & REMOVE R594

	6240hrs), GEN2 being used 4x/month for 6hr/use and 12yo (total 4*12*6*12 = 3456hrs), and GEN3 7x/month for 4hr/use. These are not reasonable residential-use responses.	
R607	The FR reported high hr/use for the chainsaw is used 12-24x year for 8hr/use (144hr/use). 8hr/use is not reasonable or realistic response for frequent use. Industry questions whether the respondent answered estimating the length of all tasks related to using the chainsaw (vs chainsaw operation time). Additionally, Industry questions if the interviewer extrapolated non-specific response, such as "half the day" or "all day" for these responses. The FR also reports lawn mower use 1x/week for 30min/use. While the respondent reports approximately 170hr/year gas-powered equipment use, she reports using no more than 10 gal/year fuel. Finally, it should be noted that the FR resides in Stanislaus County, which likely limits product use to less than 12 months/year based on its seasonal climate. Considering the full dataset, the responses are not reasonable or reslistic.	REJECT & REMOVE R607
R616	The FR reported using the gas-powered lawn mower 1x/week for 2hr/use and the golf car 5x/week for 3hr/use, for 13 years (10140 hrs). OPEI questions whether the respondent answered estimating the length of all tasks related to using the mower (vs mower operation time) and vehicle use. 2-3hr/use are not reasonable responses for these equipment types, especially considering the frequency reported of each. Additionally, it should be noted that the MR resides in Tehama County, which likely limits product use to less than 12 months/year based on its seasonal climate. CARB removed trimmer w/ 208hr/yr. It is unclear why CARB removed this unit reported to be use twice a week, but left many other residential products throughout the survey reported to be used twice or more times a week.	REJECT & REMOVE R616
R645	The FR reported abnormally high string trimer use. Industry is particularly concerned that the senior respondent initially answered "don't know" 32 times, including for many of the use and age-related questions. However, in accordance with interviewer training, the respondent was further probed to guess usage, consequently guessing unrealistic answers for many use characteristics for some equipment. In turn, the responded reported ST1 is used 24-52xyear 4hr/use after initially responding "don't know", and after much lower usage of typically associated equipment, including a reasonable 7.5hr/yr on a LM1 and 3hr/yr LBV1.	CHANGE ST1 USAGE to "don't know"
R658	The MR responses are simply not reasonable or realistic. The respondent reports near the highest hours/use of all respondents for several categories. The respondent reports identical very high use for multiple categories of equipment. Industry finds identical, long hour/use responses across each piece of equipment in a category odd. The responses draw more attention when repetitive patterns exist for all categories with multiple pieces of equipment. Industry questions whether the respondent considered the use of each unique piece of equipment, and/or simply answered "same" without considering use time of each product, and/or if they owned multiple pieces of equipment to being with, and/or if the interviewer simply answered the same for additional identical units, and/or if the equipment was used for	REJECT & REOMVE R658

	business purposes, and/or if they were just dishonest. In total, the respondent reports using gas-powered equipment more than 5450 hr/year. Additionally, it should be noted that the MR resides in Tehama County, which likely limits product use to less than 12 months/year based on its seasonal climate. Following are more specific concerns regarding this dataset: *Chainsaw Abnormalities* – The MR reports owing 3 gas-powered chainsaws with identical similar high annual use rates, including CS1 2x/week and 1hr/use, and CS2 and CS3 2x/week 2hr/use. These are not reasonable or realistic responses. *Lawn Mower Abnormalities* – The MR reports using his gas-powered lawn mower 7x/week for 2hr/use. This is not a reasonable or realistic response. *String Trimmer Abnormalities* – The MR reports operating his gas-powered string trimmer 2x/week for 2hr/use. This is not a reasonable or realistic response. *Light Industrial Equipment Abnormalities* – The MR reports similar high count, high use/year and high hr/use for several of the light industrial equipment categories surveyed. The MR reports owning two gas pressure washers, both used 4x/week for 3hr/use, an electric pump used 4x/week for 3hr/use and a rare gas welder used 7x/week for 6hr/use for 16 years (total 7*52*6*16 = 34,944 hours) . These are not reasonable or realistic responses. CARB removed only lawnmower and gas welder used 7x/week.	
R659	The FR reported using a chainsaw 3x/year for 24hr/use. This is not a reasonable or realistic response. Industry believes that the interviewer extrapolated a non-specific response, such as "all day" or "for a day" for this response. Industry is concerned that such actions, which without survey recordings the span or impact of cannot be determined, jeopardizes the entire survey.	REMOVE CS1
R672	The FR commented that "it depends on the seasons when equipment is used", however two leaf blowers were reported to be used 1x/week each for 30min/use. Was it intended that this response was seasonal? FR also responded that the power source for the 2nd pump was the "battery in the car". This suggests the FR is thinking about a tire pressure pump, not a SORE-powered equivalent pump.	
R688	The FM reported using the lawnmower 1x/week for 90min/use. Industry is concerned that respondent resides in Shasta County, which likely limits product use to less than 12 months/year based on its seasonal climate.	CONFIRM DATA ANALSYIS METHOD WITH CARB
R695	The FR reported using a chainsaw for 24hr/use. This is not a reasonable response. Industry believes that the interviewer extrapolated a non-specific response, such as "all day" or "for a day" for this response. Industry is concerned that such actions, which without survey recordings the span or	REMOVE CS1

	impact of cannot be determined, jeopardizes the entire survey. The reoccurrence of the response, just 36 respondents after 659 and one survey day later raises additional concerns about the frequency of non-descriptive responses and potential interviewer interpretation throughout the survey.	
R720	The FR reported using electric UTV/Golf Car 3x/week for 6hr/use for 6 years (total 3*52*6*6 = 5616hr). This is not a reasonable or realistic response. Industry questions whether the senior respondent answered estimating the length of all tasks related to using the vehicle (vs vehicle operation time), and/or if the vehicle is used for business purposes, and/or if the response is just untrue. The respondent also reported using an electric pump 1x/year for 24hr/use. Industry is concerned this not a realistic number for a pump used comparable to SORE-powered pumps.	REJECT & REMOVE R720
R711	The MR is reported using electric PUMP1 7x/week for 24hr/use for 1 year (total 7*52*24 = 8760hr). This is not a realistic number for a pump used comparable to SORE-powered pumps. This is the only piece of survey equipment reported by the respondent. Industry additional is concerned the interviewer extrapolated non-specific responses, such as "everyday" and/or "all day" for these responses. The reoccurrence of the response, just 16 respondents after R695 and the same survey day raises additional concerns about the frequency of non-descriptive responses and potential interviewer interpretation throughout the survey.	REMOVE PUMP1
R750	The MR reported using his cordless electric string trimmer for 10hr/use, but his hedge trimmer 20min/use. 10hr/use is not a reasonable response, and even less so for a battery powered trimmer. Industry suspects this is a data entry error and the units should be min/use.	CORRECT ST1 to 10min/use
R751	The FR is reported using electric PUMP1 7x/week for 6hr/use for 1 year total (7*52*6 = 2190hr). This is not a realistic number for a pump used comparable to SORE-powered pumps. Other equipment responses appear reasonable. Industry additional is concerned the interviewer extrapolated non-specific responses, such as "everyday" and/or "all day" for these responses.	REMOVE PUMP1
R761	The MR is reported using electric PUMP1 365x/year for 24hr/use, for 6 years (total 365*24*6 = 52416hr). This is not a realistic number for a pump used comparable to SORE-powered pumps. Other equipment responses appear reasonable, although it should be noted there are several "refused" to respond for equipment other equipment category. Industry additional is concerned the interviewer extrapolated non-specific responses, such as "everyday" and/or "all day" for these responses. This response is the next survey day following other unrealistic 24hr/use responses.	REMOVE PUMP1
R783	The MR reported owning a rare gas air compressor, operating 7x/week for 1hr/use and that the unit is 70 years old (an unrealistic 25480 hours). Despite the heavy use, the respondent is reported as filling 2 gas cans just 3x/year. Collectively these are not realistic or reasonable responses.	REJECT & REMVOE R783
R799	The FR reported using two rare gas-powered compressors 7x/year for 10min/use, then "didn't know" *any* information about the third reported unit. The respondent also reported identical use and age for two gas-powered blowers 2x/month for 20min/use, 8 years old. Industry finds	REJECT & REMOVE R799

	identical use responses across each piece of equipment in a category odd. The responses draw more attention when repetitive patterns exist for all categories with multiple pieces of equipment. Industry questions whether the respondent considered the use of each unique piece of equipment, or simply answered "same" without considering use time of each unit, or if they owned multiple pieces of equipment to being with.	
R825	The MR reported unusually high frequency and use/hr on a variety of equipment. The respondent reported 3hr/use on electric-corded CS1, 2x/week and 2hr/use for gas-powered LM1, and 1x/week and 1hr/use for ST1. Industry questions whether the respondent answered estimating the length of all tasks related to using the equipment (vs saw, mower and trimmer operation time), and/or if the responses are just untrue. The combined high use on these products is not reasonable or realistic.	REJECT & REMOVE R825
R855	The FR reported using a chainsaw 52x/year for 3hr/use. The combined frequency and duration are not reasonable or realistic. The respondent also reported an unusually high combination of string trimmer use (1x/week) and frequency (1hr/use).	REJECT & REMOVE R855
R860	The MR reported unusually high frequency and use on a variety of gas-powered equipment, exceeding 380hr/year. The respondent reports operating a chainsaw for more than 60hr/year, a leaf blower for 17hr/year, a lawn mower for 10hr/year, a riding mower for 120hr/year, and a string trimmer for 160hr/year. Despite the heavy use, the respondent is reported as filling 2x 2.5 gal gas cans just 1x/month. The combined particularly high product use, and low overall fuel consumption are not reasonable or realistic.	REJECT & REMOVE R860
R866	The MR reported identical high frequency use on three chainsaws. The respondent reported using all three saws 24x/year for 30min/each, with CS1 20yo, and CS2 and CS3 both 15yo. Additionally, the respondent reports identical use, 6x/year for 30min/use of two string trimmers. Industry finds identical responses across each piece of equipment in a category odd. The responses draw more attention when repetitive patterns exist across categories with multiple pieces of equipment. Industry questions whether the respondent considered the use of each unique piece of equipment, or simply answered "same" without considering use time of each unit, or if they owned multiple pieces of equipment to being with.	REJECT & REMOVE R866
R883	The MR reported identical high frequency and use on two lawnmowers 1x/week for 2hr/use. The respondent also reports using a gas-powered string trimmer 2x/month for 2hr/use and an electric string trimmer 1x/month for 2hr/use, as well as an electric leaf blower 365x/year for 15min/use. The MR additionally reported using two air compresses identical frequencies (1/week) and time/unit (3/min). Industry finds identical, somewhat long hour/use, responses across each piece of equipment in a category odd. The responses draw more attention when repetitive patterns exist across categories with multiple pieces of equipment. Industry questions whether the respondent considered the use of each unique piece of equipment, or simply answered "same" without considering use time of each unit, or if they owned multiple pieces of equipment to being with.	REJECT & REMOVE R883

R899	The FR reported using electric UTV/Golf Car 3x/week for 4hr/use. This is not a realistic response. Industry questions whether the senior respondent answered estimating the length of all tasks related to using the vehicle (vs vehicle operation time), and/or if the vehicle is used for business purposes, and/or if the response is unknown or exaggerated. This is the only piece of survey equipment reported by the respondent.	REMOVE UTV/GC1
R921	The MR responses are erratic and unbelievable. The MR reported abnormally high use of several pieces of equipment. Additionally, Industry finds the pattern of responses odd on several occasions when the second or third units reported were unusually higher than the first. One possibility for the erratic responses could be the repetitive questions and probing following refusals or unknown response. The respondent answered "don't know" 17 times and "refused" to answer 10 questions. Industry is concerned the several number/unit responses were unknown or exaggerated. Finally, the respondent reported that all but one of the 14 pieces of equipment was three years old or less, with many pieces being one or two years old, and the outlier being just 5 years old. Unfortunately, it is not possible to distinguish what is true or not. Following are more specific concerns regarding this dataset: *Lawn Mower Abnormalities* – The MR reported using gas-powered LM1 1x/week and 1hr/use, then reported using gas-powered LM2 1x/month for 6-7hr/use after first responding "don't know". *Leaf Blower Abnormalities* – The respondent reported using gas-powered LBV1 1x/week for 35min/use, then gas-powered LBV2 1x/week for 3hr/use and electric LBV3 200x/year for 10min/use. *String Timmer Abnormalities* – The respondent reported using gas-powered ST1 1x/week for 30min/use, electric ST2 for 1x/week for 1hr/use, gas-powered ST3 1x/week for 30min/use, then "refused" to answer anything about ST4. *Pressure Washer Abnormalities* – The respondent also reports using electric PW1 & PW2 multiple times a year each, both "4 TO 5 HOURS"/use.	REJECT & REMOVE R921
R925	The MR reported using electric PUMP1 7x/week for 24hr/use for 5 year (total 7*52*24*5 = 43680hr). This is not a realistic number for a pump used comparable to SORE-powered pumps. This is the only piece of survey equipment reported by the respondent. Industry additional is concerned the interviewer extrapolated non-specific responses, such as "everyday" and/or "all day" for these responses.	REMOVE PUMP1
R934	The senior MR reported operating an electric go-kart 365 days/year for 24hr/use while living in a retirement center. This is not a realistic number. The go-kart is the only surveyed equipment reported.	REJECT & REMOVE R934
R969	The FR reported identical high frequency and use on two chainsaws, both 2x/month, 1hr/use. Industry finds identical, somewhat long hour/use, responses across each piece of equipment in a category odd. Industry questions whether the respondent considered the use of each unique piece	REJECT & REMOVE R969

	of equipment, or simply answered "same" without considering use time of each saw, or if they owned multiple pieces of equipment to being with.	
R971	The senior FR responses are not reasonable. When considering the complete dataset, Industry believes much of the dataset is unknown or exaggerated. It is difficult for Industry to speculate why the dataset is so erratic. It is not clear if the respondent was confusing the time it takes to complete related tasks, and/or was confused or dishonest. The respondent reports using a chainsaw 1x/week for 3hr/use, a lawnmower 12-24x/year for 2hr/use, a string trimmer 2x/month for 2hr/use and a lawn tractor 4x/month for 3hr/use. While the respondent reports nearly 30hr/month of gas-powered product use, she reports filling her single 2.5 gal gas cans just once a month.	REJECT & REMOVE R971
R976	The MR reported using the lawn mower, leaf blower and string trimmer identically 1x/week for 1hr/use, and the that all three pieces of equipment were 13 years old. Industry finds identical, somewhat long hour/use, responses across equipment categories odd. Industry questions whether the respondent considered the use of each unique piece of equipment, or simply answered "same" without considering use time of each piece of equipment. Additionally, Industry questions whether the respondent answered estimating the length of all tasks related to using the equipment, such as a total of 1 hour for "cutting the grass" (including blowing and trimming), vs the use of each piece of equipment.	REJECT & REMOVE R976
R1065	The FR is reported using electric PUMP1 90x/year for 8hr/use, for 15 years (total 90*8*15 = 10800hr). This is not a realistic number for a pump used comparable to SORE-powered pumps. Other equipment responses appear reasonable. Industry additional is concerned the interviewer extrapolated non-specific responses, such as "everyday" and/or "all day" for these responses.	REMOVE PUMP1
R1086	The FR responses are erratic and unbelievable. The respondent reported abnormally high use of several pieces of equipment, despite reporting no landscapable area. The respondent reported identical high frequency and use on two chainsaws, 24x/year for 2hr/use, and on two string trimmers, 2x/month for 1hr/use. Industry finds identical, somewhat long hour/use, responses across each piece of equipment in a category odd. The responses draw more attention when repetitive patterns across multiple categories with multiple pieces of equipment. Industry questions whether the respondent considered the use of each unique piece of equipment, or simply answered "same" without considering use time of each saw and welder, or if they owned multiple pieces of equipment to being with.	REJECT & REMOVE R1086
R1107	The MR reported owning multiple pieces of equipment for many applications, with similar or identical use for many pieces of equipment and similar ages. Industry finds identical, somewhat long hour/use, responses across equipment categories odd. The responses draw more attention when repetitive patterns exist across categories with multiple pieces of equipment. Industry questions whether the respondent considered the use of each unique piece of equipment, or simply answered "same" without considering use time of each piece of equipment, or if they really owned multiple pieces of equipment to being with.	REJECT & REMOVE R1107

R1148	The MR reported operating a gas-powered compressor and generator unreasonably high frequencies and time/use. The respondent reported operating a rare gas-powered air compressor 7x/week for 5hr/use and a gas generator 7x/week for 6hr/use for 8 years (total 17,472hrs). He expects to keep the generator another 7 years (total 32760hrs). Despite the unrealistically high usage, the respondent does not report owning a gas can. These are not realistic responses.	REMOVE & REJECT R1148
R1144	The FR is reported using electric PUMP1 365x/year for 8hr/use, for 3 years (total 365*8*3 = 8760hr). This is not a realistic number for a pump used comparable to SORE-powered pumps. Other equipment responses appear reasonable. Industry additional is concerned the interviewer extrapolated non-specific responses, such as "everyday" and/or "all day" for these responses.	REMOVE PUMP1
R1149	The MR is recorded as living in a single-family home but interviewer comments note the respondent lived in a elderly center. These would be significantly different weighting factors.	
R1174	The FR is reported using electric PUMP1 365x/year for 24hr/use, for 2 years (total 365*24*2 = 17520hr). This is not a realistic number for a pump used comparable to SORE-powered pumps. Other equipment responses appear reasonable. Industry additional is concerned the interviewer extrapolated non-specific responses, such as "everyday" and/or "all day" for these responses.	REMOVE PUMP1
R1181	The MR reported unusually high frequency and use for equipment, as well as identical use for lawn mowers. The respondent reported using the electric corded chainsaw 2x/month for 90min/use for 10 years, two gas-powered lawnmowers identical 4x/month for 2hr/use for 10 years, an electric blower 3x/month for 10 years, and an electric trimmer 2x/month for 1hr/use for 10 years. Industry finds identical, somewhat long hour/use, responses across each piece of equipment in a category odd. The responses draw more attention when repetitive patterns exist across categories with multiple pieces of equipment. Industry questions whether the respondent considered the use, and/or age of each unique piece of equipment, or simply answered "same", or if they owned multiple pieces of equipment to being with.	REMOVE & REJECT R1181
COMMERCIAL SURVEY AIR IQR + BASCO PEER REVIEW + GTK PEER REVIEW		
C4	The respondent reported landscape maintained by contracted landscaper, yet reports bi-monthly use of lawnmower, leaf blower and string trimmer. These is not a reasonable response for a company that does not maintain its own landscape.	REMOVE & REJECT C4
C26	The respondent reported no landscaped area at the eight employee business, but reports using LB1 & LB2 1x/month for a high 6hr/use for and LB3 2x/month for 14hr/use. These are high use responses for a small non-landscape oriented company with no landscapable area. 14hr/use is not reasonable.	REMOVE & REJECT C26

	CARB removed leaf blower used 14 hr/use.	
C46	The respondent reported using gas-powered WEL1 7x/week, 6hr/use (2184 hr/year), but owns just two 1 or 2.5 gallon gas cans refueled twice/month. Gas-powered welders are typically larger single-cylinder or v-twin engines, well loaded, with fuel consumption >0.5gal/hr. The fuel consumption does not match the reported fuel use. Gas-powered welders are also typically portable for mobile jobs. They are not economical full-time welding solutions for facility-based businesses. This is not a reasonable response.	REMOVE & REJECT C46
C49	The respondent reported using gasoline-powered LM1 30x/year 3hr/use, LB1 364x/year 1hr/use, LB2 2x/mon 1hr/use, ST1 16x/month 2hr/use 4years (total 1536hr), go-kart1 365x/y 6hr/use 4yo (total 8760hr), go-kart2 150x/year 3hr/use 19yo (total 8550hr), PUMP1 90x/year 6hr/use 12yo (total 6480hr), but owns just 5 5-gallons gas cans refueled 2-6x/year. Many products have abnormally high hours for SORE powered equipment and the fuel consumption does not match reported fuel use. This is not a reasonable response.	REMOVE & REJECT C49
C36	The respondent reported landscape maintained by contracted landscaper, yet reports bi-monthly use of lawnmower, leaf blower and string trimmer. These is not a reasonable response for a company that does not maintain its own landscape.	REMOVE & REJECT C136
C93	The respondent reported identical use across all equipment and all categories. Industry finds identical hour/use, responses across each piece of equipment in a category odd. The responses draw more attention when repetitive patterns exist across categories with multiple pieces of equipment. Industry questions whether the respondent considered the use of each unique piece of equipment, or simply answered "same" without considering use time of each unit, or if they owned multiple pieces of equipment to being with.	REMOVE & REJECT C93
C148	The "Front Desk" respondent reported using an electric-motor powered generator 5x/week 11hr/use, an electric pressure washer 5x/week 12hr/use and an electric pump 5x/week 12hr use. The collective response, with non-existent product (electric motor generator) and long hr/use are not reasonable responses.	REMOVE & REJECT C148
C234	The respondent responded "don't know" for every product type answer, 53 times in total.	
C239	The Dentist Office business respondent reported using a generator 4x/week for 9hr/use. Commercial business generators are intended for back-up power use, not as primary sources of power. They are not economical solutions to power facilities year-round. This is not a reasonable response.	REMOVE & REJECT C239
C268	The respondent reported using a gas-powered generator and a gas-powered compressor high hours, but with potentially low fuel use. Additional discussion required.	3
C301	The respondent reported operating a single 5-acre marina boat-storage facility with just 3 employees, yet reports using LM1, LM2 & ST1 all 3.5x/week 6hr/use, with LM2 8yo (total 8737hr). Assuming all 5-acres were grass covered and a 21"WBM was used, it would take approximately 10hr to cut the property, yet the respondent reports 42hr/week of lawnmower use	REMOVE & REJECT C301

	and more than 21hr/week string trimmer use (ST2 is electric and not accounted for here). It is not economical for a business to cut the grass more that 4+ times/week using gas-powered equipment (thousands of unnecessary gallons/fuel/year). These are not reasonable responses. CARB changed "at least once a week" to "once a week" for lawn mowers and string trimmers. It is unclear how CARB can change responses for multiple pieces of equipment without justification and yet keep the response in the dataset.	
C319	The respondent reported using a propane-powered welder 365x/year 8hr/day for 60 years (total 175200hr). This is not a reasonable use or number of hours response for any type of equipment.	REMOVE & REJECT C319
C360	The respondent ("owners wife") reported having no landscaped area, yet reports using a gas-powered chainsaw 1x/week 1hr/use, and a lawnmower and leaf blower both less than 1hr/use. 1hr/week chainsaw run time is high for non-landscaping use. Additional discussion required.	3
C393	The respondent is reported as a "firewood" business with high chainsaw use/year. Considering the types of similar businesses (arborists and tree removal) included in the "vendor" survey, why is this respondent not considered a "landscaper", or alternatively, why are tree service companies not considered "commercial businesses"? Additional discussion required.	3
C416	The respondent reported high "commercial" use on lawn and garden machinery. The respondent reports the business as "mobile home maintenance". Considering the types of similar businesses (home maintenance and landscaping) included in the "vendor" survey, why is this respondent not considered a "landscaper"? Additional discussion required.	3
C453	The respondent, reported using LB1 and LB2 an identically high 4x/week 2hr/use in Los Angeles, which has banned the use of gas-powered blowers within 500ft of residential properties at its 1-acre municipal police station. The respondent also reports using a >25hp gas-powered UTV 5x/week 6hr/use 15yo (total 23400hr). In comparison, a car at the average life of 175,000miles with an average speed of 30mph would accumulate approximately 6000 total hours. Collectively, these are not reasonable responses.	REMOVE & REJECT C319
C483	The respondent reports no landscapable area yet uses LM1 2x/week 4hr/use and LM2 2x/week 1hr/use, LBV1 2x/week 30min/use, ST1 2x/week 1hr/use, then later reports 1600 landscapable acres at the facility. These responses are not consistent.	
C529	The respondent reported owning two electric-corded go-carts used 5x/week 4hr/use. Additional discussion required.	3
C535	The respondent reported landscape maintained by contracted landscaper, yet reports high identical use of multiple lawnmowers, leaf blowers and string trimmers. These is not a reasonable response for a company that does not maintain its own landscape.	REMOVE & REJECT C535
C545	The respondent reports no landscapable area yet uses LM1 1x/week 30min/use, LBV1 1x/month 45min/use, LBV2 1x/month 30minutes, ST1	

	2x/week 1hr/use, then later reports 100-500 sq ft of landscapble area at the facility. These responses are not consistent.	
C575	The respondent reported using multiple gas-powered welders, despite owning no fuel cans. Gas-powered welders are typically larger single-cylinder or v-twin engines, well loaded, with fuel consumption near a gal/hr. The fuel consumption does not match the reported fuel use. Gas-powered welders are also typically portable for mobile jobs. They are not economical full-time welding solutions for facility-based businesses. Considering the business is an Orchard which may require some mobility, and use is not excessively high, it is possible these are gas-powered welders. Additional discussion required.	3
C670	The (Financial Department "Controller") respondent reported operating an electric-motor generator 25x/week for 3min/use. The equipment type nor the use pattern make sense.	REMOVE & REJECT C670
C688	The respondent reported landscape maintained by contracted landscaper, yet reports weekly use of lawnmower and leaf blower. These is not a reasonable response for a company that does not maintain its own landscape.	REMOVE & REJECT C688
C753	The respondent reported landscape maintained by contracted landscaper, yet reports weekly use of lawnmower, leaf blower and string trimmer. These is not a reasonable response for a company that does not maintain its own landscape.	REMOVE & REJECT C753
C819	The respondent reported identical high use on multiple compressors (2x260hr) and pressure washers (2x1040hr/yr), however reports using 5-5gallon containers 2-6x/year. The reported equipment use would require several times as much fuel as reported. Collectively, these are not reasonable responses.	REMOVE & REJECT C819
C956	The respondent reports no landscapable area yet uses CS1 & CS2 an identical 3x/year 2hr/use (both 10 years old), LM1 1x/week 1hr/use and ST1 1x/month 20 min/use, then later reports 0.75 acre of landscapble area at the facility. These responses are not consistent.	
C965	The respondent reported using an electric welder 7x/week 23min/use 87yo (12139hr). This is not a reasonable age and number of hours.	REMOVE & REJECT C965
C971	The (elementary school Administrative Secretary) respondent reported using a gas-powered generator "at least 1x/day", 8hr/use, 4yo (total 11776hr). Both responses were a result of probing after original "don't know" responses. Commercial business generators are intended for back-up power use, not as primary sources of power. They are not economical solutions to power facilities year-round. Additionally, 11776hr is not a realistic number of hours on a SORE powered generator. This is not a reasonable response.	REMOVE & REJECT C971
C974	The (industrial truck rental "counter service person") reported using a gas-powered pump 30x/week 2hr/use 3120hr/yr (age UNK), 6 gas-powered compressors "at least 1x/day" "23min/use", 2 electric welders 12x/week 6hr/use. The respondent reports owning no gas cans despite more than 5000hr/year gas-powered equipment use. The high hour use of gas-powered equipment is also not economical for facility-based services. These are not reasonable responses.	REMOVE & REJECT C974

C979	The respondent reported using a gasoline-powered generator 10x/year 24hr/use while reporting no gas cans. This is not a reasonable response.	REMOVE & REJECT C979
C993	The respondent reported using an electric compressor 5x/week 2hr/use 20yo (10400hr). This is not a realistic number of hours on an equivalent SORE powered compressor.	REMOVE & REJECT C993
C1096	The respondent reported using multiple chainsaws and hedge trimmers frequently for 4-8hr/use. Chainsaw use for 4-8hr/use with such frequency is not realistic. Similarly, 6hr/use of hedge trimmers is unlikely. Additionally, most of the equipment is reported as identical 6 months old, with 10-year retention plan. Collectively, these are not reasonable responses.	REMOVE & REJECT C1096
C1104	The respondent reported using CS1 2x/week 3hr/use (312 hr/yr) to maintain a 2 acre area. Collectively, the high run time for a single employee mortgage broker and relatively speaking small area of land is not a reasonable response. Other responses appear reasonable.	REMOVE CS1
C1144	The respondent reports no landscapable area yet uses LM1 1x/month 15min/use, then later reports 100 sq ft of landscapble area at the facility. These responses are not consistent.	
C1222	The respondent reported using a gas-powered compressor and a gas-powered pressure washer identical 6x/year 24hr/use. 24hr/use is not a reasonable response. CARB removed the pressure washer and compressor with 24 hr/use.	REMOVE & REJECT C1222
C1233	The respondent reported use of 4 generators 13 hr/year and 4 lawnmowers 0.04 hr/yr. The MR responded "don't know" 52 times.	
C1240	The respondent reported using five chainsaws identical 10x/year 8hr/use. Chainsaw 8hr/use is not realistic and the identical responses raise concern.	REMOVE & REJECT C1240
C1256	The respondent reported operating a single 5-acre reservation facility, yet reports using LM1, LM2, ST1 & ST2 3x/week 2hr/use, LB1 7x/week 2hr/use, LB2 3x/week 1hr/use and ST3 36x/year 4hr/use and ST4 36x/year 3hr/use and a riding mower 3x/week 3hr/use. Assuming all 5-acres were grass covered and a 21"WBM was used, it would take approximately 10hr to cut the property, yet the respondent reports 12hr/week of lawnmower and 9hr/week of riding mower time (approx. 1 acre/hr), and more than 15hr/week string trimmer use. It is not economical for a business to cut the grass 3 times/week using gas-powered equipment (potentially thousands of unnecessary gallons/fuel/year). These are not reasonable responses.	REMOVE & REJECT C1256
C1277	The respondent reported identical use across all equipment and all categories. Industry finds identical hour/use, responses across each piece of equipment in a category odd. The responses draw more attention when repetitive patterns exist across categories with multiple pieces of equipment. Industry questions whether the respondent considered the use of each unique piece of equipment, or simply answered "same" without considering use time of each unit, or if they owned multiple pieces of equipment to being with.	REMOVE & REJECT C1277
C1293	The respondent responded "don't know" 82 times.	

C1301	The respondent reported using a gas-powered compressor 6x/week, 3hr/use, but reports just 2-2.5gal gas cans filled 2x/month. This is less than half the fuel needed to operate the compressors for the reported time. This is not a reasonable response.	REMOVE & REJECT C1301
C1303	The respondent reported using COMP1 1x/week, WELD1 2x/month. Other equipment reported in x/year. Interviewer notes state "They are seasonal. For 38M gas cans are refilled once a day (5x a week) for only 6 months a year." These are not consistent responses.	
C1352	The respondent reported using gas-powered compressor 5x/week, 8hr/use (2080 hr/year), but reports no gas-cans. Gas-powered compressors are typically portable for mobile jobs. They are not economical full-time compressor solutions for facility-based businesses. This is not a reasonable response.	REMOVE & REJECT C1352
C1378	The respondent reported identical use and ages across all equipment and all categories, with particularly high annual generator use. Industry finds identical hour/use, responses across each piece of equipment in a category odd. The responses draw more attention when repetitive patterns exist across categories with multiple pieces of equipment. Industry questions whether the respondent considered the use of each unique piece of equipment, or simply answered "same" without considering use time of each unit, or if they owned multiple pieces of equipment to being with.	REMOVE & REJECT C1378
C1462	The respondent reported identical high use on leaf blowers, 3x/week 2hr/use, with LB2 15yo (4680hr). The respondent reported 8acre of landscaped area maintained by staff, but 0hr annual lawnmower use and only 6hr/year string trimmer use. Collectively, including the high hours on LB2, these responses are not reasonable.	REMOVE & REJECT C1462

VENDOR SURVEY AIR IQR & PEER + GTK PEER REVIEW G1-"Licensed Outreach" G2-"Non-Licensed Outreach" G3/G4/G5-Other			
V2	G4	The respondent reports 2770hr/yr use on gas-powered equipment with just one employee. This is 53hr/week engine running time per employee. This is not reasonable for one person. Additionally, the respondent reports servicing 33 clients once a week, for between 31-60mins, for a total of 25hrs (33*45/60). The equipment use time does not match the client service time. CARB removed 2 hedge trimmers used 1x/day 1+hr, but left 2HT and 2LBV used identical durations, seemingly to get 2770 hr/yr/employee down to <= 2080 hr/yr/employee (equipment run time). Appears to be random selection of equipment to discard. All responses reported in multiple format despite just 2 or 3 units each because CSU-F/CARB decided 5 was too many to report individually at some point in Vendor survey. In this case CARB removed nearly everything (seemingly due to high hr/yr/employee), but in others CARB removed just enough to get to approximately <= 2080 hr/yr/employee.	REMOVE & REJECT V2-G4

V2	G5	The respondent reports >3000hr/yr use on gas-powered equipment with just one employee. This is >58hr/week engine running time per employee. This is not reasonable for one person. Additionally, the respondent reports servicing 50 clients once a week and 10 clients once a month, for between 0-60mins, for a total of 27hrs ((50*30+2.3*45)/60) to 29hrs ((42.3*30+10*45)/60). The equipment use time does not match the client service time. CARB "removed lawnmower/ leafblower/ trimmer data", includes 2LMx202hr/yr, 4LBVx227hr/yr, 3HTx390hr/yr and 3STx156.7hr/yr. Based on data CARB included, the per-unit use is not unreasonably high, so it appears CARB randomly removed all the equipment. This is inconsistent with other equipment removals to get worker hours <= 2080 in other responses.	REMOVE & REJECT V2-G5
V3	G2	The respondent reports 13332 hy/yr use on gas-powered equipment with 5 employees, servicing 30 clients a year. This is 51 hr/week engine running time per employee. The respondent reports using LB#4 15x/mo, 7hr/use, 5yr (total 6300hr). Much of the equipment is reported as being used 7days/week for hours/use. Collectively, these is not reasonable responses. CARB removed riding mower (2548hr/yr) but left 3STx1820hr/yr, 2LBV (x1820hr/yr, x1260hr/yr) and LMx1820hr/yr, seemingly to get 2660 hr/worker/year down to <= 2080 hr/worker/year (still 2156.8 hr/yr/employee, 42.5hr/week/employee of engine run time). It is again a random approach to just completely remove a unit.	REMOVE & REJECT V3-G2
V3	G5	The respondent noted, 2920 hours on a string trimmer (8*365), 208 hours on pressure washer. The respondent reports 6778hr/yr use on gas-powered equipment with just three employees. This is 43hr/week engine running time per employee. This is not reasonable equipment run-time per person. CARB removed ST 2920 hrs. The respondent reports to own only one ST. In effect, CARB has assumed the respondent does not use a string trimmer. This is a random assumption.	AIR REMOVE ST1 GTK – REMOVE & REJECT V3-G5
V7	G2	The respondent noted identical operating time and ages of all product withing their respective categories including five chainsaws (520hr/year, 2yo), four hedge trimmers (104hr/yr, 2yo), four lawn mowers (12h/yr, 1yo). CS1-5 all reported an unusually high chainsaw use520 hours; =0.25*2080. Industry finds identical, somewhat long hour/use, responses across every piece of equipment in a category odd. The responses draw more attention when repetitive patterns exist across categories with multiple pieces of equipment. Industry questions whether the respondent considered the use of each unique piece of equipment, or simply answered "same" without considering use time of each product, or if they owned multiple pieces of equipment to being with. When considering the full dataset, OPEI	REMOVE & REJECT V7-G2

		believes many of the dataset responses were not appropriately considered.	
V10	G3	The respondent reports 5968hr/yr use on gas-powered equipment with just three employees. This is 38hr/week engine running time per employee. This is not reasonable equipment run-time per person.	REMOVE & REJECT V10-G3
V12	G1	The respondent reports 2340hr/yr use on gas-powered equipment with just one employee. This is 45hr/week engine running time per employee. This is not reasonable for one person.	REMOVE & REJECT V12-G1
V12	G4	The respondent reports >2600hr/yr use on gas-powered equipment with just one employee. This is >50hr/week engine running time per employee. The respondent also reports servicing 60 clients at least once a week. This is not reasonable for one person.	REMOVE & REJECT V12-G4
V13	G1	The Respondent noted identical operating time and ages for all products within their categories, including five chainsaws (520hr/year, 2yo), and two string trimmer (104h/yr). CS1-CS5 all reported an unusually high chainsaw use520 hours; =0.25*2080. Industry finds identical, somewhat long hour/use, responses across every piece of equipment in a category odd. The responses draw more attention when repetitive patterns exist across categories with multiple pieces of equipment. Industry questions whether the respondent considered the use of each unique piece of equipment, or simply answered "same" without considering use time of each product, or if they owned multiple pieces of equipment to being with. When considering the full dataset, OPEI believes many of the dataset responses were not appropriately considered.	REMOVE & REJECT V13-G1
V13	G2	The Respondent noted identical operating time and ages for many products within their categories, with unusually high hours on leaf blower/vacuums. The responses draw more attention when repetitive patterns exist across categories with multiple pieces of equipment. Industry questions whether the respondent considered the use of each unique piece of equipment, or simply answered "same" without considering use time of each product, or if they owned multiple pieces of equipment to being with. When considering the full dataset, OPEI believes many of the dataset responses were not appropriately considered; however there are some differences between responses so additional review should be considered.	ADDITIONAL DISCUSSION REQUIRED
V15	G2	The respondent reports 3650hr/yr use on gas-powered equipment with just one employee. This is 70hr/week engine running time per employee. The respondent also reports servicing 30 clients/week between 1-2hr/service (90hrs/week). The respondent reports owning two 2-gallon gas cans, refueling at least once a month. The equipment use, client service time and fuel consumption are not consistent.	REMOVE & REJECT V15-G2
V17	G2	The respondent reports 4048hr/yr use on gas-powered equipment with just two employees. This is 39hr/week engine running time per employee. This is not a reasonable run-time per person.	REMOVE & REJECT V17-G2

V18	G4	The respondent reports unusually high hours on all equipment, with a total 2600 hr/yr on gas-powered equipment, 50hr/week engine operating time, while servicing exclusively residential customers (number UNK). LB1 is reported as 5x/week, 5hr/use, 2yo (total 2600hr). This is not reasonable for one person. 2600hr is not realistic total hour for handheld products. CARB "remove leaf blower hours due to high use of 5hr/use". Unclear why 5hr/use is high for this user but not for other users and/or equipment types – other than removing this units lowers the hr/yr/employee from 2600 hr/yr/employee to approx. 1300 hr/yr/employee. The user only reports to own 1 of each type of equipment, so in-effect CARB assumes the respondent does not use a leaf blower.	REMOVE & REJECT V18-G4
V19	G2	The Respondent noted, 1092 hr/yr blower use, and 884 hr/yr string trimmer use, with a total gas-powered equipment operating time of 2688 hr/year, or 52hr/week. The respondent also reports servicing 50 clients/week for 2-4hr/service, or 250hr/week with just one employee. The respondent reports owning one 5-gallon gas can, refueling at least once a month. The equipment use, client service time and fuel consumption are not consistent. CARB "remove string trimmer #2 with 2x/week and 6hr/use" (624hr/yr), seemingly to get 2770 hr/yr/employee down to <= 2080 hr/yr/employee (2064 hr/yr/employee equipment run time). However, CARB left a LMx624hr/yr, LBV 1092hr/yr and STx260hr/yr. This is inconsistent with other equipment that CARB retained in the survey.	REMOVE & REJECT V19-G2
V30	G1	The Respondent noted using CS1 16hr/use and CS2 8hr/use. Additionally, the Respondent reports identical use for hedge trimmers 7x/week, 2hr/use, 4yo (total 2912hr/unit), lawn mowers 7x/week, 6hr/use, 6yo (total 13104 hr/mower), leaf blowers 7x/week, 6hr/use, 5yo (total 10920hr/unit), and string trimmers 7x/week, 3hr/use, 4yo (4368hr/unit). These are not realistic responses. Industry finds identical, unrealistic long hour/use, responses across every piece of equipment in a category odd. The responses draw more attention when repetitive patterns exist across categories with multiple pieces of equipment. Industry questions whether the respondent considered the use of each unique piece of equipment, or simply answered "same" without considering use time of each product, or if they owned multiple pieces of equipment to being with. The respondent reports 28180hr/yr use on gas-powered equipment with twelve employees. This is 45hr/week engine running time per employee. This is not reasonable run-time per person. When considering the full dataset, OPEI believes many of the dataset responses were not appropriately considered.	REMOVE & REJECT V30-G1

V30	G2	The respondent reports 2255hr/yr use on gas-powered equipment with just one employee. This is 43hr/week engine running time per employee. This is not reasonable for one person.	REMOVE & REJECT V30-G2
V35	G1	The Respondent noted identical operating time and ages for all products within their categories, with unusually high operating hours/use hedge trimmers, reporting using all hedge trimmers 16hr/use. The respondent reports that LB1 is used 1/week, 8hr/use, 8yo (Total 3328hr). These are not realistic responses. The responses draw more attention when repetitive patterns exist across categories with multiple pieces of equipment. Industry questions whether the respondent considered the use of each unique piece of equipment, or simply answered "same" without considering use time of each product, or if they owned multiple pieces of equipment to being with. It is also curious to see this kind of product use distribution across just 1 employee. Additionally, the respondent reports average equipment run-time 26hr/week, yet only reports servicing 15 clients less than once/week for less than hr/service (maximum 11hr/week). When considering the full dataset, OPEI believes many of the dataset responses were not appropriately considered.	REMOVE & REJECT V35-G1
V55	G1	The respondent reports using CS1 5x/week, 3hr/use, 5yo (total 3900hrs). This is unreasonably high use every day (6 refills of fuel per day) for a respondent that reports no tree-related services, with an unrealistic product total number of hours.	REMOVE & REJECT V55-G1
V58	G1	The respondent reports using LM1 3x/week, 3hr/use, 15yo (total 7020hr) and LBV1 5x/week, 2hr/use, 6yo (total 3120hr). These are not realistic product life-hours.	REMOVE & REJECT V58-G1
V59	G2	The respondent reports unusually high hours on a riding mower 7x/week, 8hr/use, 3yo (total 8736hr), plus operating 3 chainsaws, 1 hedge trimer, 2 leaf blowers, 4 string trimmers and a hedge trimmer, as a single employee landscaper, while servicing a variety of different multi-resident complexes. The respondent reports 5696hr/yr or 109hr/week engine operating time. This is not a realistic response. CARB removed RM (7x/week, 8hr/use, 2912hr/yr). The removal results in 2368hr/yr/employee engine run time (46hr/week, 2340hr/year LBV & ST use). It is unclear what the mower was removed and other reported very high use equipment was retained.	REMOVE & REJECT V59-G2
V63	G2	The respondent report using a string trimmer 7x/week, 4hr/use for a total of 1456 hours on a string trimmer for a single employee business that reports service as landscaper architecture / design & other. This is not a reasonable response.	REMOVE & REJECT V63-G2
V71	G1	The respondent reports CS1 is used 5x/week, 3hr/use, 5yo (total 3900hrs). This is not a realistic response. However, additional chainsaws are reported with much less utilized. Considering the company is a tree trimming company and employees 10 employees, it may be reasonable that one saw has such high use, but it is unclear	AIR ADDITIONAL DISCUSSION REQUIRED GTK REMOVE CS1

		how much use based on either the use or age being exaggerated. Remove CS1 and additional review should be considered.	
V72	G2	The respondent reports >3900hr/yr use on gas-powered equipment with just one employee. This is >75hr/week engine running time per employee. This is not reasonable for one person. Additionally, the respondent reports servicing 10 clients weekly and 30 clients less than once a week, all for 31-60 minutes. This results in 12.7 ((10+30/4.33)*45/60) to 30 hrs/week (40*45/60) total. The equipment use time does not match the client service time. CARB remove all units; 6 chainsaws, 3 lawnmowers, 2 leaf blower, 4 string trimmer, 3 hedge trimmer, 1 rototiller. It is unclear why, considering CARB only redacted portions of other responses.	REMOVE & REJECT V72-G2
V77	G1	The respondent reports similarly unusual age and hours across four chainsaws. CS1 4x/week, 4hr/use, 7yo (total 5824hr), CS2 3x/week, 2hr/week, 7yo (total 2184hr), CS3 & CS4 3x/week, 3hr/use, 7yo (total 3276hr). These are not realistic total hour numbers for handheld products.	REMOVE & REJECT V77-G1
V79	G1	The respondent reports identical 250x/year, 2hr/use, 7yo (3500hr/unit) across all 5 chainsaws. These are not realistic total hour numbers for handheld products. Industry finds identical, unrealistic long hour/use, responses across every piece of equipment in a category odd. The responses draw more attention when repetitive patterns exist across categories with multiple pieces of equipment. Industry questions whether the respondent considered the use of each unique piece of equipment, or simply answered "same" without considering use time of each product, or if they owned multiple pieces of equipment to being with. When considering the full dataset, OPEI believes many of the dataset responses were not appropriately considered.	REMOVE & REJECT V79-G1
V89	G1	The respondent reports using a lawnmower 2912 hours per year, with gas-powered total machine use over 3200 hours with just one employee. The respondent reported "Don't Know" 37 times. The respondent reported he owned 4 chainsaws but didn't know how often or for how long any were used (then proceeded to provide responses for other types of equipment). The respondent reported he didn't know how many people work for the company, then said "less than 5". Additionally, the respondent reports only doing tree trimming, yet reports 2912 hr/year on lawnmower (roughly 30x more than the hedge trimmer). CARB removed LM1 2912hr/yr. The respondent reported owning only 1 LM. In-effect CARB assumes the respondent does not use a lawn mower.	REMOVE & REJECT V89-G1
V91	G1	The respondent reported identical operating times and ages of four leaf blowers, 5x/week, 8hr/use, 3yo (total 6240hr/unit). Additionally, the respondent reports 11000 annual hours of gas-powered equipment	REMOVE & REJECT V91-G1

		use across just 3 employees, 70hr/week run time per employee, without considering operating time of CS#1, four reported string trimmers and two hedge trimmers. These are not realistic responses. The MR repots servicing 20 clients once/week, 20 clients once a month and 10 clients once a year for 1-2hr/job, for a total of 38hrs/week. This is not consistent with the reported run times. Industry finds identical, unrealistic long hour/use, responses across every piece of equipment in a category odd. The responses draw more attention when repetitive patterns exist across categories with multiple pieces of equipment. Industry questions whether the respondent considered the use of each unique piece of equipment, or simply answered "same" without considering use time of each product, or if they owned multiple pieces of equipment to being with. CARB removed all four leaf blowers.	
V96	G1	The respondent reported identical 5x/week, 8hr/use, total 2080hr/year on all products used, including one hedge trimmer, one lawn mower, one leaf blower, one string trimmer. In total, the respondent reports 8325hr/year equipment use, despite just 2 employees, 80hr/week per employee equipment runtime. This is not a realistic response. Additionally, the respondent reports servicing 50 clients total, 20 weekly, 20 less than once a week and 10 less than once a month, all between 1-2hrs/service. If all 50 were serviced per week, which they are reportedly not, it would equal 75hr/week run-time. The equipment use time does not match the client service time. Industry finds identical, unrealistic long hour/use, responses across every piece of equipment in a category odd. The responses draw more attention when repetitive patterns exist across categories with multiple pieces of equipment. Industry questions whether the respondent considered the use of each unique piece of equipment, or simply answered "same" without considering use time of each product, or if they owned multiple pieces of equipment to being with. CARB removed one hedge trimmer, lawn mower and leaf blower. It is unclear how CARB remove so much yet retain the survey response.	REMOVE & REJECT V96-G1
V105	G1	The respondent reported identical operating time and ages for all products within their categories, with unusually high operating hours/use chainsaws, every one of their 140 chainsaws being used everyday for greater than 1hr/use (min 390hr/yr/unit), while having 90 employees. Every other employee is using two saws a day, 6 days/week, for at least 1.25hr/use. This is not a reasonable response. Industry finds identical, unrealistic long hour/use, responses across every piece of equipment in a category odd. The responses draw more attention when repetitive patterns exist across categories with multiple pieces of equipment. Industry questions whether the respondent considered the use of each unique piece of equipment, or simply answered "same" without considering use time of each product, or if they owned multiple pieces of equipment to being with.	REMOVE & REJECT V105-G1

V107	G2	The respondent reports 2421hr/yr use on gas-powered equipment with just one employee. This is 47hr/week engine running time per employee. This is not reasonable for one person.	REMOVE & REJECT V107-G2
V111	G1	The respondent reports identical high use for all 30 chainsaws 25 saws at least 1x/day, greater than 1hr/use for a minimum 390hr/year/unit, and 5 saws at least 1x/month, greater than 1/hr/use. Additionally, the respondent reports operating five battery powered chainsaws greater than 1hr/use and battery-powered HT3 & HT4 for 8hr/use. This is not realistic.	REMOVE & REJECT V11-G1
V121	G2	The respondent reports 2080hr/yr use on gas-powered equipment with just one employee. This is 40hr/week engine running time per employee. This is not a reasonable run-time for one person. Additionally, the respondent reports servicing 90 jobs / week, spending 67.5 hr/job. These responses collective are not realistic.	REMOVE & REJECT V121-G2
V127	G1	The respondent noted identical high operating time and ages for most products within their categories. The respondent reports using the lawn mower 3x/week, 4hr/use 6yo (total 3744hr), LB1 3x/week 4hr/use, 8yo (total 4992hr), LB2 LB3 LB4 4x/week, 4hr/use, 6yo (total 4992hr) and LB5 4x/week, 4hr/use, 4yo (total 3328hr). Additionally, the respondent reports 7952 annual hours of gas-powered equipment use across just one employee, 146hr/week run time. This is not a reasonable or realistic response. Industry questions whether the respondent considered the use of each unique piece of equipment, or simply answered "same" without considering use time of each product, or if they owned multiple pieces of equipment to being with. It is also curious to see this kind of product use distribution across just 1 employee. When considering the full dataset, OPEI believes many of the dataset responses were not appropriately considered. CARB "Remove all leaf blower and all trimmer data". It is unclear how CARB can remove so much of the data but retain the response.	REMOVE & REJECT V127-G1
V129	G2	The respondent reports 2048hr/yr use on gas-powered equipment with just one employee. This is 39hr/week engine running time per employee. This is not reasonable for one person.	REMOVE & REJECT V129-G2
V138	G1	The respondent reports high use across all equipment, with a gas-powered equipment use of 3120hr/yr use across just one employee, 60hr/week. The respondent reports using the lawnmower 5x/week, 5hr/use, 5yo (total 6500hr), leaf blower 5x/week, 2hr/use, 5yo (total 2600hr), and string trimmer 5x/week, 4hr/use, 3yo (total 3120hr). These are not realistic responses. CARB "Remove string trimmer due to high usage of 5 hr/use". Again, 5 hr/use if deemed "high usage" for this respondent, but not for many others, including residential and commercial respondents.	REMOVE & REJECT V138-G1
V140	G2	The respondent reports 2078hr/yr use on gas-powered equipment with just one employee. This is 40hr/week engine running time per	REMOVE & REJECT V140-G2

		employee. The respondent reports servicing approximately 50 clients per week. Industry does not believe this is reasonable for one person.	
V142	G2	The respondent reports 5252hr/yr use on gas-powered equipment with just one employee. This is 101hr/week engine running time per employee. This is not reasonable for one person. Additionally, the respondent reports servicing just twenty clients, 1 client daily, 19 clients once/week for no more than an hour per service or 17 – 44hr/week. The equipment use time does not match the client service time. The respondent reports owning one 2.5 gallon and one 5-gallon gas can, refueling at least once a week. The fuel consumption, equipment run time and client service times are not consistent. CARB remove 1 lawnmower, 1 leaf blower, 2 string trimmer with no explanation and while retaining other parts of the response.	REMOVE & REJECT V142-G2
V146	G2	The respondent reports identical high use and age for all 8 chainsaws at least 1x/day, greater than 1hr/use for a minimum 390/year/unit, 6-10yo (min total 8yo estimate 3120hr/unit). The respondent reports 4203hr/yr use on gas-powered equipment with just two employees. This is 40hr/week engine running time per employee. This is no reasonable for one person. However, the respondent reports servicing jobs just 10 hrs/week/employee.	REMOVE & REJECT V146-G2
V147	G2	The respondent reports identical high use and age for all 3 chainsaws at least 1x/day, greater than 1hr/use for a minimum 390/year/unit. Unfortunately, despite just 3 units, the response was collected in bulk and not per unit, so it is unclear if the respondent answered identically for each unit, which as previously described Industry may question. Additional review should be considered.	AIR REMOVE & REJECT V147-G2 GTK ADDITIONAL DISCUSSION REQUIRED
V150	G1	The respondent reports identical high use and age for all 10 chainsaws at least 1x/day, greater than 1hr/use for a minimum 390/year/unit, 6-10yo (min total 8yo estimate 3120hr/unit). These are not realistic responses.	REMOVE & REJECT V150-G1
V151	G1	The respondent reports 4 hedge trimmers, with HT4 7x/week, 2hr/use, 7yo (total 5096hr). This is not a realistic total hour use for handheld products. However, HT1, HT2 and HT3 are all only 52 hours per year. Additional review should be considered.	REMOVE HT1
V155	G1	The respondent reports identical high use and age for all 8 chainsaws at least 1x/day, greater than 1hr/use for a minimum 390/year/unit, 6-10yo (min total 8yo estimate 3120hr/unit). The respondent reports 3893hr/yr use on gas-powered equipment with just two employees. This is 37hr/week engine running time per employee. Collectively, Industry does not believe this is a reasonable response.	REMOVE & REJECT V155-G1
V155	G2	The respondent reports identical high use and age for all 27 chainsaws at least 1x/day, greater than 1hr/use for a minimum 390/year/unit, 6-10yo (min total 8yo estimate 3120hr/unit). These are not realistic responses.	REMOVE & REJECT V155-G2

V162	G1	The respondent reports 4680hr/yr use on gas-powered equipment with just two employees. This is 45hr/week engine running time per employee. This is not reasonable for one person. Additionally, the respondent reports servicing 35 clients daily and 15 clients weekly, from 31 minutes to greater than 4 hours. Evenly distributing the frequency over service time results in 580hr/week of service time, or 290hr/week per employee. This is not a realistic run-time per employee. The equipment use time does not match the client service time.	REMOVE & REJECT V162-G1
V164	G2	The respondent reports 2759hr/yr use on gas-powered equipment with just one employee. This is 53hr/week engine running time per employee. This is not reasonable for one person. The respondent reports servicing 50 clients once a week for 30-60 min/job, or 37hr/week. The equipment use time does not match the client service time.	REMOVE & REJECT V164-G2
V169	G2	The respondent reports 4160hr/yr use on gas-powered equipment with just two employees. This is 40hr/week engine running time per employee. This is not reasonable run-time per person. Additionally, the respondent reports servicing 35 clients less than once/week, for 31-60minutes, 26hr/week. The equipment use time does not match the client service time.	REMOVE & REJECT V169-G2
V174	G1	The respondent reports LM1 4x/week, 5hr/use, 17yo (total 17680hr), and LB1 and LB2 an identical 4x/week, 3hr/use, 14yo (total 8736hr). These are not realistic responses.	REMOVE & REJECT V174-G1
V186	G2	The respondent reports 5023hr/yr use on gas-powered equipment with just two employees. This is 48hr/week engine running time per employee with approximately 62 clients/week. This is not reasonable run-time per person.	REMOVE & REJECT V186-G2
V189	G2	The respondent reports 3305hr/yr use on gas-powered equipment with just one employee. This is 64hr/week engine running time per employee with approximately 85 clients/week. This is not reasonable for one person.	REMOVE & REJECT V189-G2
V196	G1	The respondent reports high use across all equipment, with a gas-powered equipment use of 5304hr/yr use across just one employee, 102hr/week, while servicing 60 residential customers. The respondent reports using the lawnmower 6x/week, 7hr/use, 7yo (total 15288hr), leaf blower 6x/week, 7hr/use, 3yo (total 6552hr), and string trimmer 5x/week, 4hr/use, 3yo (total 3120hr). These are not realistic responses.	REMOVE & REJECT V196-G1
V198	G2	The respondent reports identical high use and age for all six (of 7) chainsaws at least 1x/day, greater than 1hr/use for a minimum 390/year/unit and 10-20yo (min total 15yo estimate 5850hr). These are not realistic responses. The respondent reports 4065hr/yr use on gas-powered equipment with just one employee. This is 78hr/week engine running time per employee. This is not reasonable for one person.	REMOVE & REJECT V198-G2

V199	G2	The respondent reports identical high use and age for all 15 chainsaws at least 1x/day, greater than 1hr/use for a minimum 390/year/unit, 6-10yo (min total 8yo estimate 3120hr/unit). These are not realistic responses.	REMOVE & REJECT V199-G2
V203	G2	The respondent reports 2018hr/yr use on gas-powered equipment with just one employee. This is 39hr/week engine running time per employee. This is not reasonable for one person.	REMOVE & REJECT V203-G2
V212	G1	The respondent reports identical high hours on LB1 and LB2 5x/week, 6hr/use, with LB1 3yo (total 4680hr) and LB2 2yo (total 3120hr). These are not realistic numbers. CARB "Remove 3 leaf blowers – 5x/week; 6-8hr/use"	REMOVE & REJECT V212-G1
V218	G1	The respondent reports high use across all equipment, with a gas-powered equipment use of 13750hr/yr use across just three employees, without accounting for multiple chainsaws and lawnmowers, and blowers, in excess of 88hr/week runtime per employee, while servicing 60+ clients/week. This is not realistic run-time per person. CARB "Remove all the string/hedge trimmers". By removing the string trimmers CARB assumes no string trimmer use. This is a random removal of units to lower total equipment hours per employee.	REMOVE & REJECT V218-G1
V218	G2	The respondent reports 2793hr/yr use on gas-powered equipment with just one employee. This is 54hr/week engine running time per employee. This is not reasonable for one person.	REMOVE & REJECT V218-G2
V239	G1	The respondent reports high operating hours on CS1, 6x/week, 4hr/use, 2yo (total 2496hr). This is an unreasonably high number for a handheld product. That said, the units are all 1 or 2 years old. Additional discussion needed.	AIR REMOVE & REJECT V239-G1 GTK REMOVE CS1
V261	G1	The respondent reports 2304hr/yr use on gas-powered equipment with just one employee. This is 44hr/week engine running time per employee. This is not reasonable for one person.	REMOVE & REJECT V261-G1
V270	G1	The respondent reports using electric CS1 10hr/use after responding idk to frequency and originally hr/use. Additional discussion needed	ADDITIONAL DISCUSSION REQUIRED
V271	G1	The respondent report high string trimmer use, with a total of gas-powered equipment use of 9347 hr/yr across just 2 employees, for 90hr/week run time per employee, while servicing over 500 clients. These are not realistic responses. CARB removed string trimmer 1. Again a random approach to lower total equipment hours per employee.	REMOVE & REJECT V279-G1
V282	G1	The respondent reported using CS1 12hr/use and COMP1 24hr/use. These are not realistic responses.	REMOVE & REJECT V282-G1

V284	G1	The respondent reported identical operating time and ages for all products within their categories, with unusually high operating hours/use chainsaws. The respondent reported all five saws are operated 7x/week, 2hr/use, 10yo, (total 7280hr/saw), planning to keep all saws another 20years. These are not realistic responses. Industry finds identical, unrealistic long hour/use, responses across every piece of equipment in a category odd. The responses draw more attention when repetitive patterns exist across categories with multiple pieces of equipment. Industry questions whether the respondent considered the use of each unique piece of equipment, or simply answered "same" without considering use time of each product, or if they owned multiple pieces of equipment to being with.	REMOVE & REJECT V284-G1
V289	G1	The respondent reports operating LB1 3.5x/week, 15hr/use, total of 2730hr/year, 6yo (total 16380hr). Considering the high total hours on other reported equipment, the response is not reasonable. CARB removed the leaf blower reported to be used 15hr/use.	REMOVE & REJECT V289-G1
V292	G1	The respondent report high lawnmower, leaf blower and string trimmer use, with a total of gas-powered equipment us of 5372 hr/yr, across just 2 employees, 51hr/week run time per employee, while servicing over 80 clients/week. The respondent reports LM1 6x/week, 6hr/use, 5yo (total 9360hr), LB1 6x/week, 6hr/use, 4yo (total 7488 hr), and ST1 6x/week, 4hr/use, 3yo (total 3744hr). These are not realistic responses. CARB removed LM1. It is unclear why CARB did not remove LB1 used 6x/week and 6hr/use based on other CARB analysis (see V18, V91, V212 CARB determines 5hr/use is "high usage")	REMOVE & REJECT V292-G1
V294	G1	The respondent reported using LM2 16hr/use and HT1 and HT2 18x/year, 20hr/use. These are not realistic responses.	REMOVE & REJECT V294-G1
V305	G1	The respondent reports 12699hr/yr use on gas-powered equipment with six employees. This is 41hr/week engine running time per employee. This is not reasonable run-time per person.	REMOVE & REJECT V305-G1
V308	G1	The respondent reported identical operating time and ages for all products within their categories, with unusually high operating hours/use of lawnmowers and string trimmers. The respondent reported not knowing the age of LM1, LM3 and LM4, but reported LM2 and LM5, the later reported as 7x/week, 2hr/use, 10yo (total 7280hr). The reported ST1 ST2, ST3 and ST5 6x/week, 2hr/use, 10yo (total 6240hr) and ST4 6x/week, 2hr/use, 5yo (total 3120hr). These are not realistic responses. Industry finds identical, unrealistic long hour/use, responses across every piece of equipment in a category odd. The responses draw more attention when repetitive patterns exist across categories with multiple pieces of equipment. Industry questions whether the respondent considered the use of each unique piece of equipment, or simply answered "same" without considering use time	REMOVE & REJECT V208-G1

		of each product, or if they owned multiple pieces of equipment to being with.	
V315	G1	The respondent reports identical high use and age for all six chainsaws at least 1x/day, greater than 1hr/use for a minimum 390/year/unit, 6-10yo (min total 8yo estimate 3120hr/unit). These are not realistic responses.	REMOVE & REJECT V315-G1
V324	G1	The respondent reports using RM1 7x/week, 5hr/use, 10yo (total 18200hr). This is not a realistic response.	REMOVE & REJECT V324-G1
V359	G1	The respondent reports COMP1 3x/week, 30min/use, 50yo (total 3900hr). The combination of relatively high hours and 50yo is hard to believe. This response requires additional discussion.	ADDITIONAL DISCUSSION REQUIRED
V361	G1	The respondent reports using the leaf blower 4x/week for 2hr/use, 3yo (total 1248hr), with a gas-powered equipment use of 4706hr/yr use across just one employee, 90 hr/week. These are not realistic responses. Additionally, the respondent reports servicing 36 clients/week for between 31min and 2hrs, or approximately 30hrs/week. The equipment use time does not match the client service time. CARB removed a leaf blower used 4x/week for 2 hr/use. It is unclear why this was removed the reminder of the response still results in excessive and inconsistent hours of equipment use per employee.	REMOVE & REJECT V361-G1
V362	G1	The respondent reports identical high use for leaf blowers and string trimmers with a gas-powered equipment use of 8748hr/yr use across just two employees, 84hr/week per employee. Additionally, the respondent reports servicing 100 clients at least once a week for between 30minutes and 4 hours, or approximately 826hr/week with just 2 employees. The respondent reports using the LB1 and LB2 5x/week for 8hr/use, with LB2 3yo (total 6240hr), and ST1 and ST2 5x/week, 8hr/use, with ST1 4yo (total 5200hr) and ST2 2yo (total 2600hr). The equipment use time does not match the client service time. These are not realistic responses. CARB removed both leaf blowers and both string trimmers due to hours of equipment use per employee.	REMOVE & REJECT V362-G1
V365	G1	The respondent reports high use on a chainsaw 780 hours, and identical high use on 3 leaf blowers operating and identical 1300 hours/year each. However, the units are only reported to be one year old, and only expected to last one more year. Hedge trimmers and lawnmowers both have identical 43.33hr/year with 2 units each. In total, the 3 employees average 33hr/week run time, which is high, especially considering they service 100 clients weekly and another 100 clients at least once a month, approximately 125 clients/week. All thing considered, these are not realistic responses.	REMOVE & REJECT V365-G1

V376	G1	The respondent reported identical operating time and ages for all products in their categories, with unusually high operating hours/use of lawnmowers and string trimmers. The respondent reported lawnmower 4x/week, 5hr/use, 10yo (total 10400hr), and ST1 ST2 HT1 and HT2 all 5x/week, 4hr/use 10yo (total 10400hr). These are not realistic responses. Additionally, the respondent reports servicing 10 clients weekly and 10 clients at least once/month for 9.4 to 15hr/week service. The equipment use time does not match the client service time. Industry finds identical, unrealistic long hour/use, responses across every piece of equipment in a category odd. The responses draw more attention when repetitive patterns exist across categories with multiple pieces of equipment. Industry questions whether the respondent considered the use of each unique piece of equipment, or simply answered "same" without considering use time of each product, or if they owned multiple pieces of equipment to being with.	REMOVE & REJECT V376-G1
V379	G1	The respondent reports 1996hr/yr use on gas-powered equipment with just one employee. This is 39hr/week engine running time per employee. This is not reasonable for one person. Additionally, the respondent reports servicing 9 clients once per week for between 1-2hr/service. The equipment use time does not match the client service time.	REMOVE & REJECT V379-G1
V380	G1	The respondent reports using the LB2 5x/week for 1hr/use, 8yo (total 2080hr), ST2 5x/week, 2hr/use, 5yo (total 2600hr), with a gas-powered equipment use of 3624hr/yr use across just one employee, 70hr/week, while servicing approximately 85 clients/week. These are not realistic responses. CARB Remove lawnmower 1, leaf blower 1, string trimmer 1	REMOVE & REJECT V380-G1
V401	G1	The respondent reports high use for multiple products with a gas-powered equipment use of 7410hr/yr use across just two employees, 71hr/week per employee, while servicing 150 clients at least once a month. The respondent reports using the LM1 and LM2 1300hr/year and LB1 LB2 & LB3 520hr/year. Collectively, these are not realistic responses. CARB Remove lawnmower 1 (5x/week*5hr/use) / 1 leaf blower (5x/week*2hr/use) / 1 trimmer (3x/week*3hr/use), but retained other high hour units in an effort to lower the number of hours equipment is run per employee.	REMOVE & REJECT V401-G1
V402	G1	The respondent reports high use for multiple products with a gas-powered equipment use of 3412hr/yr use across just one employee, 65hr/week, while servicing 50 residential ("idk") customers. The respondent reports using LB1 5x/week, 4hr/use, 2yo (total 2080hr), ST1 5x/week, 4hr/useV, 6yo (total 10240hr) and ST2 5x/week, 2hr/use, 19yo (total 9880hr). These are not realistic responses. Additionally, the respondent reports servicing 50 clients per week between 31-60 minutes/service, for approximately 38hrs/week. The equipment use time does not match the client service time.	REMOVE & REJECT V402-G1

V409	G1	The respondent reports LM1 3x/week, 3hr/use, 11yo, (total 5148hr), LB1 4x/week, 3hr/use, 11yo (total 6864hr) and ST1 3x/week, 2hr/use 11yo (3432hr). These are not realistic responses.	REMOVE & REJECT V409-G1
V426	G1	The respondent reports 17430hr/yr use on gas-powered equipment with eight employees. This is 42hr/week engine running time per employee. This is not reasonable run-time per person.	REMOVE & REJECT V426-G1
V436	G1	The respondent reports 6253hr/yr use on gas-powered equipment with three employees. This is 40hr/week engine running time per employee. This is not reasonable run-time per person.	REMOVE & REJECT V436-G1
V437	G1	The respondent reports 5122hr/yr use on gas-powered equipment with two employees. This is 49hr/week engine running time per employee. This is not reasonable run-time per person.	REMOVE & REJECT V437-G1
V448	G1	The respondent reported six employees operating 7 chainsaws 390 hr/yr. Considering this is a minimum 1.25hr/unit/day, the amount of saw time requires additional discussion.	AIR REMVOE & REJECT V448 G1 GTK ADDITIONAL DISCUSSION REQUIRED
V470	G1	The respondent reports 2064hr/yr use on gas-powered equipment with just one employee. This is 40hr/week engine running time per employee while servicing 40 clients per week. This is not reasonable for one person.	REMOVE & REJECT V470-G1
V473	G1	The respondent reports identical high hours on multiple products. The respondent reports 2x ST and 4x HT 10-20yo (min 6*52*1.25*15 = 5850hr/unit). The respondent reports 7300hr/yr use on gas-powered equipment with just three employees. This is 47hr/week engine running time per employee. This is not reasonable run-time per person. Additionally, the respondent reports servicing 30 clients/week for 31-60minutes/service. The equipment use time does not match the client service time.	REMOVE & REJECT V473-G1
V484	G1	The respondent reported 10 employees operating 20 chainsaws 390 hr/yr. The respondent reports 25935hr/yr use on gas-powered equipment with ten employees. This is 50hr/week engine running time per employee. This is not reasonable run-time per person.	REMVOE & REJECT V484 G1
V507	G1	The respondent reported 6 employees operating 15 chainsaws 390 hr/yr while servicing 600 clients a year. Considering this is a minimum 1.25hr/unit/day, the amount of saw time requires additional discussion.	AIR REMVOE & REJECT V507 G1 GTK ADDITIONAL DISCUSSION REQUIRED
V509	G1	The respondent reported 6 employees operating 6 chainsaws 390 hr/yr while servicing 600 clients a year. Considering this is a minimum 1.25hr/unit/day, the amount of saw time requires additional discussion. The similarities to V507, just one respondent away may require additional discussion.	AIR REMVOE & REJECT V509 G1 GTK ADDITIONAL

			DISCUSSION REQUIRED
V510	G1	The respondent reported 6 employees operating 12 chainsaws 390 hr/yr. Considering this is a minimum 1.25hr/unit/day, the amount of saw time requires additional discussion. The similarities to V507 and V510, in series in this survey may require additional discussion.	AIR REMVOE & REJECT V510 G1 GTK ADDITIONAL DISCUSSION REQUIRED
V514	G1	The respondent reported 2 employees operating 5 chainsaws 390 hr/yr. Considering this is a minimum 1.25hr/unit/day, the amount of saw time requires additional discussion. The respondent reports 4276hr/yr use on gas-powered equipment with just two employees. This is 41hr/week engine running time per employee while servicing 200 clients. This is not reasonable run-time per person.	REMVOE & REJECT V514 G1
V517	G1	The respondent reports identical high use and age for all three chainsaws at least 1x/day, greater than 1hr/use for a minimum 390/year/unit, CS1 6-10yo (min total 8yo estimate 3120hr), CS2 10-20yo (min total 15yo estimate 5850hr), and CS3>20yo (min total 20yo estimate 7800hr). These are not realistic responses.	REMOVE & REJECT V517-G1
V521	G1	The respondent reports using LB1 6x/month, 1hr/use, 30yo (total 9360hr). This is not a realistic response. Oddly, the other answers appear reasonable. Industry wonders if this is a data entry error.	REMOVE LB1
V525	G1	The respondent reported 6 employees operating 6 chainsaws 390 hr/yr. Considering this is a minimum 1.25hr/unit/day, the amount of saw time requires additional discussion.	AIR REMVOE & REJECT V525 G1 GTK ADDITIONAL DISCUSSION REQUIRED
V532	G1	The respondent reports being a single employee business with 100 chainsaws, all less than 5 years old. This does not seem realistic, especially considering the infrequent use reported. Furthermore, the respondent is unable to account for how long the equipment is used each time. As a result 100 chain saws are included in the total number of units, but omitted from the average hr/year calculation. Even IF the respondent owned 100 saws, and used 6 saws 1x/week, and 94 saws between once a month and once a year, as responded, the average worst max use (1.25hr/use) would have a significant impact on the average number of hours of total saws.	

ANNEX D (Comment 13)

OPEI Landscaper Survey Analysis

OPEI Landscaper Survey & Tracking August 2020 - October 2021

Owner	Location	Date	Mower Description	Q1 Tell me about your electric Zero Turn riders. How ZEE Mowers do you own?	Q1 How often do you use the mowers?	Q2: For how long do you use the mowers?	Q3: How old is this mower?	Q4: How long does the battery last?	CALCLUTED HR/YR BASED ON RESPONSES	CALCLUTED AGE-HRS BASED ON RESPONSES	Hour Meter Reading	CALCLUATED HR/YR BASED ON HR MEETING & FOLLOW-UPS
Municapility	South Pasadena, CA	18-Aug	Mean Green	2	3-4 days/week	5hr	3 years old	3-5hours	910	2730	8/18 11XX 11/12 12XX 5/27 14X7 9/25 16X4	547.4
Municapility	Ojai, CA	19-Aug	Mean Green	2	2 days/week	2.5hr	2 years old	2.5hours	260	520	8/19 396 11/12 458 5/27 557 9/24 636	218.9

Owner	Location	Date	Mower Descri	Q1 Tell me about your electric Zero Turn riders. How ZEE Mowers do you own?	Q1 How often do you use the mowers?	Q2: For how long do you use the mowers?	Q3: How old is this mower?	Q4: How many months a year do you mow?	CALCLUTED HR/YR BASED ON RESPONSES	CALCLUTED AGE-HRS BASED ON RESPONSES	Hour Meter Reading	CALCLUATED HR/YR BASED ON HR MEETING & FOLLOW-UPS
			Exmark Turf T	NA	4-5 days/week	"Almost all day" 6-8h	8 years old		1227.56	9820.44	8/26 3163.9 9/9 3198.2 9/16 3223.7	776.80
LANDSCAPER1	GR MI FC1	26-Aug	Exmark Turf T	NA	5-6 days/week	10hr	2016 model	March - November (9 months)	2143.35	8573.40	8/26 1520.2 9/9 1549.2 9/16 1570.1 10/2 1616.8 10/14 1663.9	800.00
			Exmark Turf T	NA	4 days/week	10hr	"2016. 5 years old"		1212.40	6062.00	8/27 1546.4 9/4 1550.2 9/11 1555.0 9/25 1564.4 10/15 1575.8	127.74
LANDSCAPER2	GR MI FC2	27-Aug	Exmark Turf T	NA	"SAME"	"SAME"	7 years old	7 months	1212.40	8486.80	8/27 1227.6 9/4 1233.6 9/11 1241.2 9/25 1256.2 10/15 1272.2	193.12
			Exmark Lazer Z	NA	"EVERYDAY" 6 days/	5hr	6 years old		909.30	5455.80	8/27 2390.8 4/16/2021 2536.4	551.64
LANDSCAPER3	GR MI Meijer Lot	27-Aug	Exmark Lazer Z	NA	1 day/week	3hr	12 years old	7 months	90.93	1091.16	8/27 1470.7 4/16/2021 1495.9	95.48
			Exmark Lazer Z	NA	"EVERYDAY" 6 days/	5hr	4 years old		1039.20	4156.80	8/28 579.4 9/4 584.0 9/10 589.5 10/6 623.5	254.60
LANDSCAPER4	GR MI FC3	29-Aug	Exmark Turf T	NA	"SAME"	"SAME"	Owned since 2005	8 months	1039.20	15588.00	2327.5	
			Toro Grandsta	NA	"EVERYDAY" 6 days/	9hr	2020	April - October	1636.74	1169.10	9/1 373.5 9/22 422.7 10/14 501.7 10/21 521.9	642.57
	GR MI Meijer Gas Stati	1-Sep	Exmark Turf T	NA	"EVERYDAY" "SAME"	8-9hr	2020	(7 months)	1545.81	1104.15	9/1 305.6	
			Exmark Turf T	NA	"EVERYDAY" 5 days/	7hr	2020		1060.85	833.53	9/22 261.9 10/21 326.2	487.23
		22-Sep	Grandstand Stander (Same as above -	NA	"SAME"	"SAME, 6-7hr/day"	2020	7 - 7.5 months (assume April-Oct per response above)	985.08	773.99	9/1 373.5 9/22 422.7 10/14 501.7 10/21 521.9	
LANDSCAPER5	GR MI FC5	14-Oct	Toro Grandsta	NA	"EVERYDAY" 5-6 day	15min/use, 7-10 hr/	2019	May-October (6 months)	1214.565	1113.35125	10/14 569.1 10/21 585.6	428.67
			Toro Grandsta	NA	"EVERYDAY" 5-6 day	7hr	"2015. 4 years old"		1333.64	5334.56	9/4 1706.7 9/18 1735.7	502.28
			Toro Grandsta	NA	"SAME"	"SAME"	"Ownded unit for at		1333.64	8001.84	1860.4	
			Toro 3000 Ser	NA	"SAME"	"SAME. 7hr"	"2005. 2011 or 2012		1333.64	10669.12	2062.7	
		4-Sep	Toro Grandsta	NA	"SAME"	"SAME"	2011 (9 years old)	April - December 1 (8 months)	1333.64	12002.76	9/4 2743.9 9/12 2750.7	235.55
			Toro Grandsta	NA	"EVERYDAY" 6 days/	6hr	2012 (8 years old)		936.00	7488	9/12 625.9 9/18 641.9	415.68
			Toro Z-Master	NA	"Not as much" 6 day	1hr	New for 2020 season		156.00	144	9/12 300.5 9/18 314.0	350.73
		12-Sep	Toro Grandsta	NA	"EVERYDAY" 6 days/	5-6hr	2013 (7 years olds)	26 Weeks (6 months)	858	6006	9/4 2743.9 9/12 2750.7	
LANDSCAPER6	GR MI FC4	19-Sep	Toro Z-Master	NA							650.3	
LANDSCAPER7	GR MI GrandRiver	1-Oct	Husqvarna ZT	NA	Once a week	5hr	3 years old	May-October (6 months)	129.9	389.7	305.8	

ANNEX E – Additional discussion of Comment 14 – SORE20202 Age Calculation Concerns

COMMENT 14 – SORE2020 overestimates product Age (year), and in-turn engine durability periods. CSU-F survey and CARB SORE2020 emission inventory model are the datasets at the core of the Proposed Rule. SORE2020 is used to determine emissions, cost and health benefits described in the Proposed Rule. However, the CSU-F survey, the underlying dataset for much of SORE2020, does not accurately reflect real-world SORE equipment age or use patterns. Based on unreliable and inaccurate data, SORE2020 significantly overestimates the sectors emissions contributions and emission reductions needed to meet federal air quality standards.

Age is a critical emission model factor. Age represents the age of the equipment in years. Annual hours are multiplied by Age to determine how much equipment's emissions deteriorate each year for modeling purposes. The Age-based deteriorated emissions are then multiplied by the Annual Hours to determine yearly product emissions. As a result, overestimates in equipment Age result in overestimates in the aged emissions factors used to calculate annual emissions.

CSU-F Survey Results Are Not Statistically Representative of Fleet Age

CSU-F survey results suggest users grossly overestimate the age of their equipment. CARB staff used this data to develop survival curves for each category of equipment and to calculate the population of a given model year over time. Age distribution of equipment in SORE2020 is derived from the CSU-F survey data. Overestimating the fleet age based on overestimated survey age responses results in overestimated models of the sectors emissions.

CSU-F survey results consistently show users estimate product ages by years of five, rounding up. Based on SORE2020, sales for all residential products increased year-over-year since the 2009 Recession through 2018. As a result, the population of new units (0-1 years old, or Age=0) surveyed in 2018 should be the maximum, with each year thereafter being less considering attrition. More units should be 0-1 years old

than five or 10 years old. (CARB OFFROAD2007 modeled age distribution as an “S curve” of fleet age vs population, with midpoint of the curve representing the product useful life in age.) This is not the case for the surveyed population which resulted in the residential product maximum population typically at 5 or 10 years, and considerably higher than Age=0 products. See Figures 14-1 through 14-3.

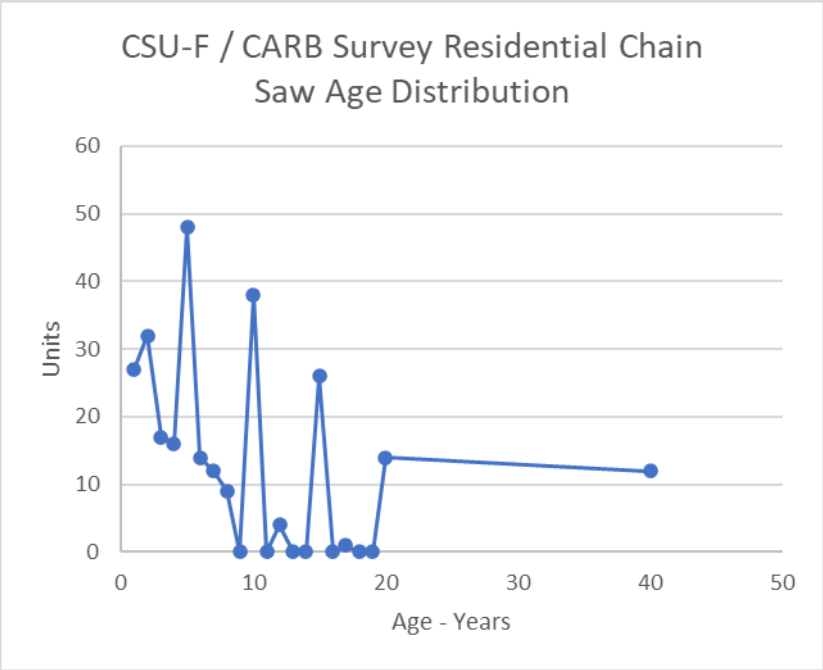


Figure 14-1: CARB Survey Residential Chain Saw Age Distribution – Max Population Age 5 (2013-2014)

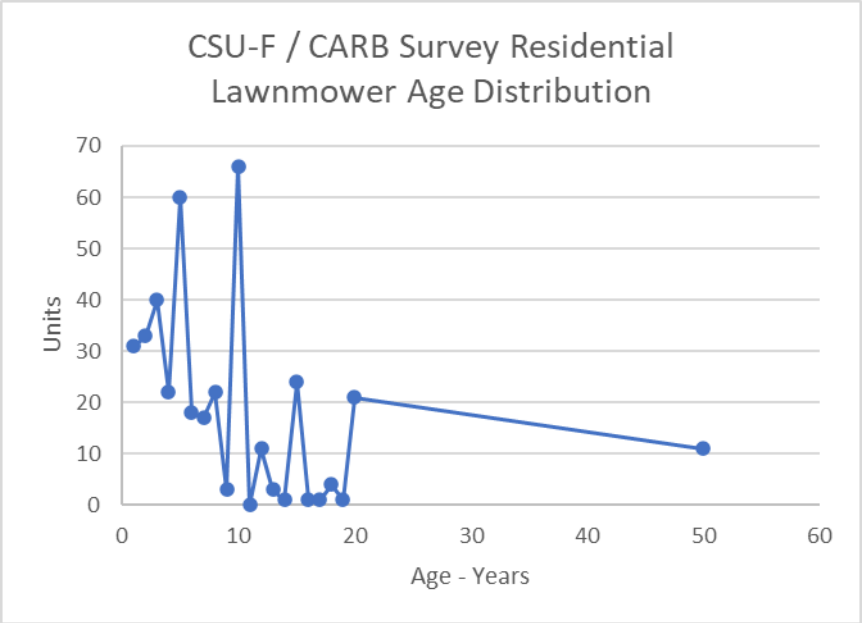


Figure 14-2: CARB Survey Residential Lawn Mower Age Distribution – Max Population Age 10 (2008-2009)

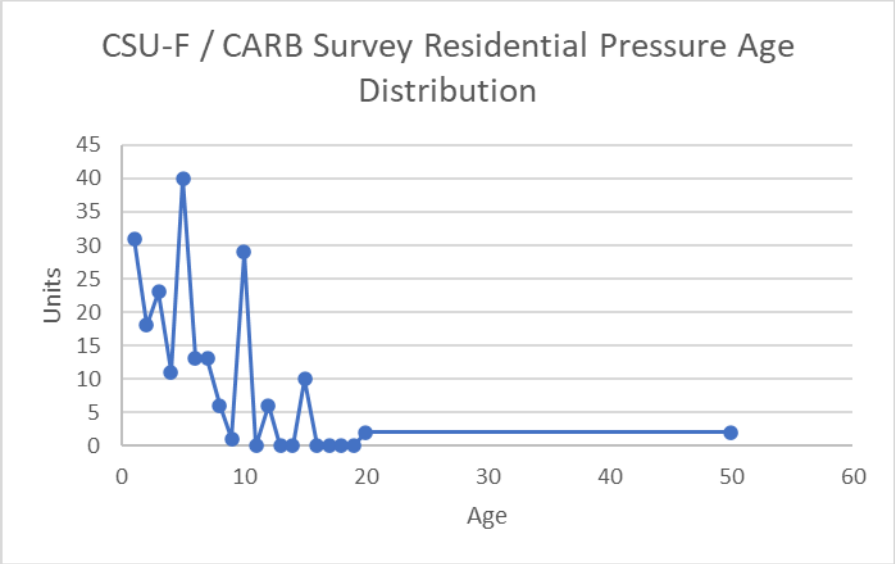


Figure 14-3: CARB Survey Residential Pressure Washer Age Distribution – Max Population Age 5 (2013-2014)

Based on SORE2020, sales during the 2009 Recession were considerably lower than previous and past years. OPEI data also recognizes the housing market crash (2006-2009) significantly impacted outdoor power equipment sales. Nevertheless, the

survey results suggest the population of residential equipment 10 years old (ie.. during the housing crash and recession) is often greater than the population of new equipment (0-1 years old, or Age=0), and in some cases has the highest population distribution. This is not consistent with market trends or reality and results in overestimates of equipment age and age-related emissions.

CSU-F survey data suggests (1) respondents do not know and/or accurately report the age of their outdoor power equipment during surveys; and/or (2) respondents often significantly overestimate the age of their outdoor power equipment during surveys; and/or (3) respondents often round up to the next 5th year (5, 10, 15…); and/or (4) the survey does not accurately reflect the population of California outdoor power equipment users. This results in significantly older product modeled useful life, with a higher number of products with significantly more deteriorated emissions, and as a result an overestimate of the sectors emissions contributions.

CARB Age Factors ("Effective Age Correction") Overestimate New Equipment Age

SORE2020 models the Age Factor ("Effective Age Correction") for new equipment (0-1 years, Age=0) as 1.0. Age Factor is a critical emissions model factor used to determine the ratio of new sales to existing fleet units for a given calendar year, and in turn the average number of aged-hours on a piece of equipment for a given Age. Modeling the Age Factor as 1.0 for Age=0 equipment assumes all equipment sold in a given calendar year is one year old (365 days), instead of sales, and in-turn equipment use, being distributed throughout the calendar year. In other words, an Age Factor of 1.0 for Age=0 assumes all units were sold on January 1 of the calendar year. This is not realistic. The assumption results in an overestimate of the Annual Use (hours) for new units, an overestimate of the Age Factor for every year thereafter, and as a result an overestimate of collective hours (Annual Use x Age x Age Factor) and deteriorated emissions on equipment every year thereafter. Overestimating the fleet Age Factor factors result in overestimated models of the sectors emissions.

EXAMPLE 14-1: For calendar year 2031 CARB SORE2020 models 224,374 G4 5hp RESIDENTIAL model year 2031 lawnmowers were sold. CARB survey data suggests

these lawnmowers operate 21 hours annually. As a result, with an Age Factor of 1 for new units sold in 2031, CARB multiplies the entire fleet (224,374 units) by the corresponding emissions factors by the full annual hours (21 hours) to determine the products emissions for calendar year 2031. However in reality, not all units sold in calendar year 2031 were sold on January 1, 2031. Lawnmowers are likely sold throughout the year in California. While sales trends likely vary throughout the state due to local climate, a more appropriate assumption might be to distribute sales linearly throughout the year, which would result in an age factor of 0.5 for product 0-1 years. In this lawnmower example, a linear distribution of sales would result in estimated annual use of 21/2 = 10.5 hours for these products, not 21 hours as currently assumed. This change in Annual Use for would reduce the emissions units 0-1 years old more than 50%. Table 1 below shows a comparison of the CARB SORE2020 modeled Age Factors (assuming all January 1 sales) vs the Age Factor for equally distributed sales, using CARB SORE2020 modeled populations. See Figure 14-4.

AGE	SORE2020 Jan 1 Sales	Equally Distributed Sales	AGE	SORE2020 Jan 1 Sales	Equally Distributed Sales	AGE	SORE2020 Jan 1 Sales	Equally Distributed Sales
0	1.00	0.50	10	10.66	10.12	20	20.66	20.04
1	1.71	1.21	11	11.66	11.12	21	21.66	21.05
2	2.66	2.16	12	12.66	12.12	22	22.66	22.05
3	3.66	3.16	13	13.66	13.12	23	23.66	23.05
4	4.66	4.16	14	14.66	14.09	24	24.66	24.05
5	5.66	5.16	15	15.66	15.10	25	25.66	25.02
6	6.66	6.16	16	16.66	16.10	26	26.66	26.03
7	7.66	7.15	17	17.66	17.10	27	27.66	27.02
8	8.66	8.15	18	18.66	18.07	28	28.66	27.88
9	9.66	9.11	19	19.66	19.08	29	29.66	28.94

Figure 14-4 – Example table of CARB SORE2020 Age Factors for residential lawnmowers assuming all sales January 1 vs equally distributed sales Age Factor

As the table shows, the remainder of the Age Factors (Age 1 and older) would additionally need to be recalculated to account for this overestimate in annual hours of new equipment because (1) the model continues to estimate model year sales for several calendar years later, and (2) the new hours are less than originally modeled, which would reduce the hours and deteriorated emissions each year thereafter.

CARB Age Factors ("Effective Age Correction") Do Not Account for Attrition for Several Years – Overestimating the Fleet Size and Age

The Age Factor calculations are unrepresentative of real-world use in that they do not account for attrition as long as the Survival rate is greater than one (new sales are assumed). As a result, the calculations significantly overestimate the fleet size and/or fleet age. In other words, for as many calendar years as a particular model year is assumed to be sold, there is attrition. Overestimating the fleet size and/or age due to no attrition results in overestimated models of the sectors emissions.

SORE2020 took a new approach to survival (attrition) versus its predecessor OFFROAD2007. SORE2020 attempts to model equipment not only by age, but also by model year. In doing so, CARB SORE2020 distributes sales of a specific model year over multiple calendar years ("Age0", "Age1", "Age2"…), assuming some prolonged shelf life. As a result, a particular Age (calendar year minus model year) includes products of multiple "absolute" ages (calendar year minus purchase year). The Age Factor was developed to account for multiple "absolute" ages grouped in a particular modeled Age. However, as demonstrated in CARB's *2020 Emissions Model for Small Off-Road Engines – SORE2020* report, the Age Factor does not account for attrition in years beyond the original model year when new engines are sold, and as a result overestimates the fleet size and/or age and results in overestimated models of the sectors emissions.

Table 29, Table A7 and Table C1 of CARB's *2020 Emissions Model for Small Off-Road Engines – SORE2020* report describe CARB staff's calculation of Age Factors and Survival Rates based off *survey* age distribution data. (This again highlights the importance of a representative survey age distribution response.) According to 4.10.6 of the report and Table C1, CARB multiplies CY2019 Age 0 by residential lawnmower Survival Rate for Age 1 as follows: 225,473 x 1.4 = 315,662 model year 2019 units in calendar year 2020 (Age 1). As CARB shows this in Table 29, this means in calendar year 2020, for "Age 1", there is still ***all*** 225,473 1 year old units (model year 2019 units sold in calendar year 2019) plus 90,189 Age 0 (model year 2019 units sold in calendar year 2020), resulting in an "Effective Age" (Age Factor) of 0.71 (years). In other words, there is no attrition of the original 225,474 model year 2019 units from calendar years

2019 to 2020. Furthermore, in this example, the Survival Rate is again greater than 1 for "Age 2", 1.030, meaning that in calendar year 2021 there is 315,662 x 1.030 = 325,132 model year 2019 unit – all 224,473 model year 2019 units sold in calendar year 2019, all 90,189 model year 2019 units sold in calendar year 2020, and 9470 model year 2019 units sold in calendar year 2021, resulting in a "Effective Age" (Age Factor) of 1.66 (years) for Age 2. Again, there is *no* attrition of 225,474 units sold in calendar year 2019 or 90,189 calendar year 2020. Residential chain saws have Survival Rates greater than one through Age 4, meaning there is no attrition assumed for the first 5 years of chain saws life (including the model year).

Assuming no attrition each year is inconsistent with other CARB modeling and real-world situations, OFFROAD2007 assumes residential lawnmower attrition of 0.993 for Age 0, 0.985 for Age 1 and 0.98 for Age 2. Using the 90,189 units above as an example, this means at Age 2 approximately 4,000 units would have dropped out of the population. SORE2020 has no attrition and as a result artificially increases the age and deteriorated emissions of the Age 2 population. For the 225,474 units sold in calendar year 2, nearly 10,000 units would have dropped out of the population by the time they were Age 2. This is compounded considering at Age 2 since there would also be attrition for new equipment (Age 0, 0-1 years old) and equipment 1-2 years old (Age 1). For residential chainsaws, which continue sales through Age 4 (and assume no attrition of units sold before that time), OFFORAD2007 assumes attrition of 0.995 for Age 0, 0.99 for Age 1, 0.99 for Age 2, 0.99 for Age 3 and 0.98 for Age 4, resulting in more than 5% attrition of the original equipment by Age 4 (4-5 years old).

The approach of fitting unrepresentative survey-based age distribution results in random and inconsistent Survival Rates for equipment if attrition (percentage) is appropriately assumed constant equipment of a given age. Populations and Survival Rates based solely on survey response age distributions result in random, and often volatile attrition swings from year to year, and make it increasingly difficult, if not impossible, to understand what products are new, what Age products drop out, what Age what remain, and the true "Effective Age" of any given Age. For example, assuming that the attrition rate stays the same for all products of the same age, for residential walk-behind lawn mowers after model year 2019, the Survival Rates result in a

decrease in 1618 units (99.3% survival) at Age 3, but only 963 units (99.6% survival) at Age 4, then 5953 units (97.3% survival) at Age 5, then 3856 units (98.2% survival) at Age 6. The Survival Rates result in a decrease of 7446 units (96.3% survival), then 39,108 units (80% survival) at Age 9, then 20,193 units (87% survival) at Age 10. In real-word application, assuming the same Annual Use (hour) year-over-year, OPEI does not believe that significantly more units would survive from Age 3 to Age 4, again from Age 5 to Age 6, and again from Age 9 to Age 10 as suggested by the SORE2020 survey-based survival trends. See Figure 14-5 below.

RESIDENTIAL LAWNMOWER ATTRITION EXAMPLES								
Age	Rate	Attrition	Age	Rate	Attrition	Age	Rate	Attrition
0	1	0	10	0.869656	-20192.7	20	0.665758	-6050.09
1	1	0	11	0.844078	-21006.6	21	0.715431	-3429.29
2	1	0	12	0.851682	-16866.5	22	0.694392	-2634.81
3	0.99279	-1617.74	13	0.849556	-14570.8	23	0.701926	-1784.49
4	0.995679	-962.555	14	0.773667	-18622.9	24	0.699386	-1263.25
5	0.973158	-5953.44	15	0.810448	-12066.6	25	0.617312	-1124.71
6	0.982133	-3856.48	16	0.796607	-10493.4	26	0.666376	-605.284
7	0.950408	-10512.8	17	0.801024	-8177.58	27	0.643507	-430.995
8	0.963041	-7446.13	18	0.721453	-9169.97	28	0.394501	-471.073
9	0.798441	-39107.6	19	0.762119	-5649.85	29	0.583227	-127.916

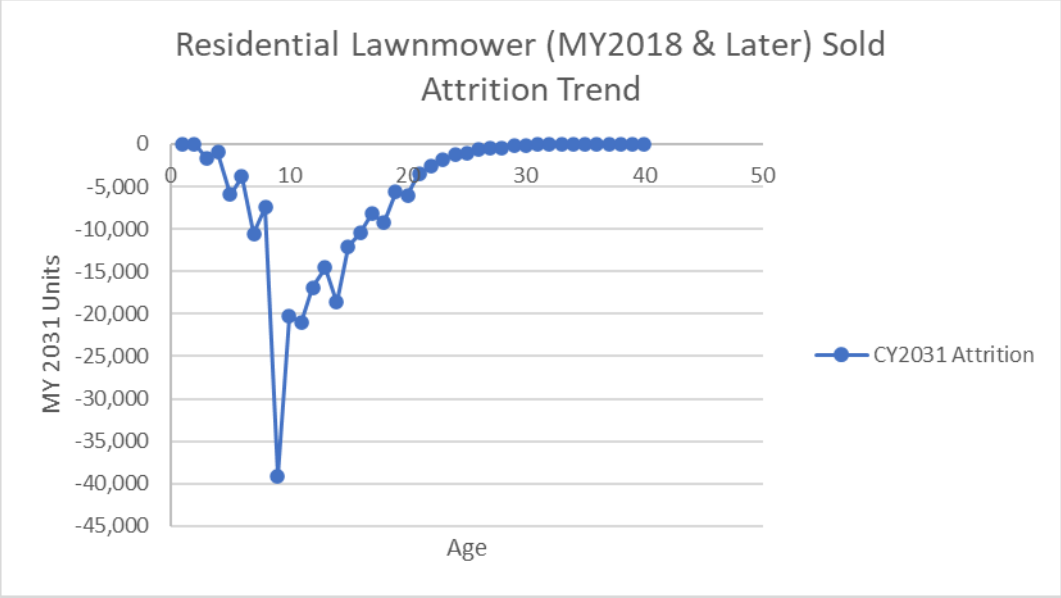


Figure 14-5 – Example SORE2020 Residential Lawnmower Survival (Attrition) Trend

The result is an unrealistic and unconventional approach, meshing age distribution from unreliable survey responses with manufacturer production reports. As a result, the modeled age is older than the real-world and the sectors emissions are overestimated due to excessive age and hour-related deterioration factors.

Comment 14 Summary

Based on the CSU-F survey data, OPEI concludes machine use and age metrics are not commonly tracked for outdoor power equipment, and therefore cannot be accurately assessed by a telephone survey. OPEI concludes CSU-F survey responses were often inaccurate guesses, and/or misleading, and/or incorrectly recorded, and/or not reflective of average product age and use, and/or that the intent of questions was not understood, and/or not reflective of “average” California households, collectively “outliers”, and in-turn require additional analysis. These “outliers” have significant impacts on the calculations of annual use and age distribution, both of which will result in overestimated emissions deterioration and ‘baseline’ emissions if not accurate. Based on outlier data, SORE2020 significantly overestimates the sectors emissions contributions and emission reductions needed to meet federal air quality standards. As a result, there is no factual evidence to support that the Proposed Rule reductions are needed to address compelling and extraordinary conditions, rendering the rule is arbitrary and capricious or without a reasonable or rational basis.

ANNEX F – Additional discussion of Comment 16 – Consideration of 2017 Evaporative Amendments in SORE20202 and SORE "Benchmark" Emissions

COMMENT 16 – SORE2020 does not account for emissions reductions achieved through tighter evaporative and enforcement of emissions standards. SORE2020 continues to model several categories of equipment as "leakers" resulting in tons per day of evaporative emissions, despite the 2017 SORE evaporative emissions amendments and ongoing enforcement of those amendments. As a result, SORE2020 overestimates sector emissions for 2018 and later.

The 2016 SIP includes multiple strategies to address SORE emissions reductions needs. Included in these strategies are: (1) *promote* increased use of zero-emissions equipment; (2) propose tighter exhaust and evaporative emissions standards; and (3) enhance enforcement of current emissions standards for SORE. To address strategies (2) in-part and (3), CARB adopted amendments to the evaporative emission regulations in 2017 and has been enforcing these amendments since 2018. The September 27, 2016, *Amendments to the Evaporative Emissions Requirements for Small Off-Road Engines, Staff Report: Initial Statement of Reason* states "*the current proposal will increase compliance with the existing diurnal emission standards, ensuring the ROG emissions reductions needed for the (SIP) are achieved…,*" and that "*the proposed amendments are intended to address the shortfall in emissions reductions.*" However, despite this rule making and CARB strict enforcement of the rule, SORE2020 continues to model walk-behind mowers, large leaf-blower vacuums (24-hour diurnal 3.278 g), large trimmers (24-hour diurnal 3.278 g), air-compressors (24-hour diurnal 8.178 g), and generators (24-hour from 2.460 to 4.350 g) on data collected for models before the adoption and enforcement of the evaporative amendments. The rule is effective and must be modeled accordingly to understand the current (benchmark) SORE emissions.[61]

Despite the 2017 evaporative amendments, SORE2020 models lawnmower evaporative emissions assuming units will significantly leak, including units

[61] OPEI recognizes Air Compressors are Preempt, but we believe many of the air-compressors include fuel systems certified in California for non-preempt products.

manufactured in 2018 through 2040. SORE2020 models initial lawnmower deteriorations rates of (0hr – “useful life”) as 0.02 gram/event, then increases the deterioration rate to 1.0 gram/event after useful life, including all mowers certified after the adoption and enforcement of the 2017 evaporative amendments. This means mower emissions are modeled to deteriorate at a rate 50 times faster each year after useful life due to assumed leakage. Resting loss is similarly modeled, with initial deterioration rates of 0.008 gram/event, then increasing to 0.43 gram/event after useful life, including all mowers certified after the adoption and enforcement of the 2017. This assumption is inconsistent with the requirements set-forth in and ongoing enforcement of the 2017 evaporative amendments and results in significant ROG emissions in the SORE2020 model. These emissions reductions must be accounted for to correctly reflect the sector’s emissions today and moving forward, to understand the sectors ongoing reduction contributions and to understand the reductions still needed as part of the 2016 SIP strategy, as well as to correctly understand the emissions, cost and health benefits of the Proposed Rule.

Not recognizing the 2017 evaporative emissions in SORE2020 has a significant impact. If just walk-behind lawn mower ‘leakers’ are assumed to be addressed by the 2017 evaporative amendments, setting the second deterioration rate equal to the first deterioration rate would result in a reduction of diurnal + resting evaporative ROG emissions of 2.4 tpd by 2031. By 2040, assuming the 2017 evaporative amendments are effective would result in 7.2 tpd reduction by 2040.

Despite CARB staff minimizing the impact of leakers in its 2003 report due to the affected population size (vs the original population), the impact is significant, as shown in Figure 16-1. As the figure shows, due to assumed aggressive leakage rates for products beyond their useful lives, the evaporative emissions from a small percentage of well-aged-products far outweigh majority volume mean and new age contributions.

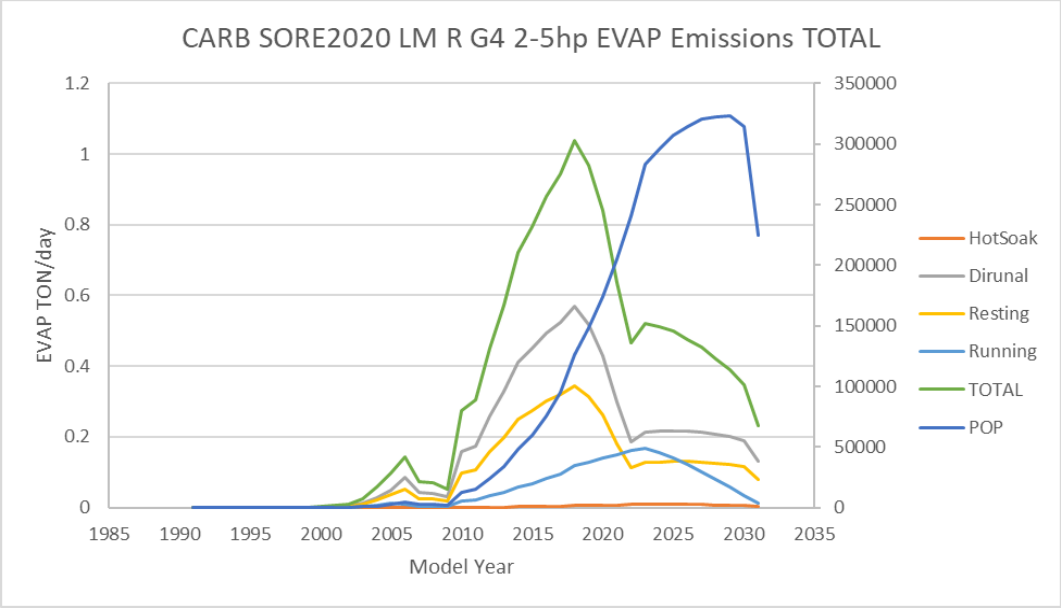


Figure 16-1 – Graphic example of evaporative emission contribution due assumed leaking of lawnmowers.

The overall reduction of contributions from the 2017 amendments will be higher if leaf blower, trimmer, air-compressor and generator leakage are assumed to be addressed by the 2017 amendments. These reductions must be accounted for in determining SIP reductions already achieved and further reductions needed to meet the SIP goals, as well as to understand the Proposed Rule emissions reductions, cost and health benefits in 2031 and 2043.

OPEI also is concerned that the leakage modeled in SORE2020 is not statistically supported or reflective of today's equipment. Lawnmower leakage is based on testing of just two "old" mowers reported 2003. The testing of "old" units reported in 2003 included a 28-year-old unit with diurnal emissions of 3.94 g/day and a 12-year-old unit with reported leakage and a 23.99 g/day diurnal emission rate. It is OPEI's understanding that the leaking unit was repaired at the time and excessive evaporative emissions were resolved.

As modeled, some "leakers" will result in diurnal emissions exceeding 55 g/day. First, OPEI does not believe it is fair to assume leaking trends are the same today based on one leaking unit and anecdotal dealer reports of units leaking 20+ years ago. There were several recalls to walk-behind mowers in the late 1990's and early 2000's

due to material and fuel capability issues (due to simultaneous changes in materials and ethanol levels in fuel). As a result, industry developed the OPEI/ANSI B71.10 fuel systems standard and incorporated fuel system durability standards into OPEI/ANSI B175 handheld product standards which has successfully addressed many known issues. OPEI is not aware of significant evidence from the 2013-2015 “Validation Study” or 2018 compliance testing to suggest that 50% of lawnmower tanks will experience such gross leakage. Second, basing a multi-billion-dollar rulemaking on two units with very different results of tens of thousands in the subject population is not statistically sound. Third, OPEI does not believe it is fair to assume leakers are not fixed based on one leaking lawnmower with no information about the origin and history of the sample unit when procured for the study, and anecdotal dealer reports of units leaking 20+ years ago. In the 2003 report CARB notes that dealers report that units leak, but CARB does not offer if they are repairing leaking units. It could fair to assume if dealers were aware of leakers on residential walk-behind mowers it was because they were fixing them. It is easy to find SORE equipment fuel system replacement parts in the marketplace (both brick and mortar and online); dealers and end users are purchasing these parts. Fourth, many major outdoor power equipment manufacturers are diligent in addressing fuel system issues with CPSC recalls. Finally, there is no repeatable evidence to support the modeled conclusion that such extraordinary evaporative emissions rates are reasonable. CARB’s 2013-2015 Validation Study included units with visible fuel leakage from carbon canisters. These units had maximum evaporative emissions of 16.647 g/day.

On a sales volume basis, Industry believes it is, and has been largely compliant with evaporative emissions since the introduction of CARB and EPA regulations. OPEI believes collaborative discussion is needed to resolve evaporative modeling assumptions and to accurately reflect emissions moving forward in order to develop sound rulemaking modeling.

ANNEX G

Manufacturer In-Service Emission Test Data (Comment 17)

OPEI Handheld Manufacturers' Field Aging Data Comparison to FEL Values

Family	Unit#	Prod. Date	Engine Class	Engine App	Engine Technology	Rated Power (hp)	EDP	Est Hours of Use	Use vs. EDP	HC+NOx FEL (g/kW-hr)	THC+NOx Emission As-Received (g/kW-hr)	THC+NOx Emission After Maintenance (g/kW-hr)	THC+NOx Field Aged (g/kW-hr)[1]	Field Aged vs. FEL
A	1	Mar-01	IV	BP Blower	2S-Cat	1.57	300	300	100%	72.4	No Test	43.69	43.69	60.3%
A	2	Jul-02	IV	BP Blower	2S-Cat	1.57	300	300	100%	72.4	48.603	No Test	*48.603*	*67.1%*
A	3	Mar-01	IV	BP Blower	2S-Cat	1.57	300	300	100%	72.4	60.89	No Test	*60.89*	*84.1%*
A	4	Mar-01	IV	BP Blower	2S-Cat	1.57	300	300	100%	72.4	100.174	69.46	69.46	95.9%
A	5	Jul-02	IV	BP Blower	2S-Cat	1.57	300	312	104%	72.4	39.748	No Test	*39.748*	*54.9%*
B	1	Apr-01	IV	BP Blower	2S-Cat	2.42	300	300	100%	72.4	40.83	44.53	44.53	61.5%
B	2	Mar-01	IV	BP Blower	2S-Cat	2.42	300	300	100%	72.4	92.52	53.29	53.29	73.6%
B	3	Jun-03	IV	BP Blower	2S-Cat	1.45	300	300	100%	72.4	54.722	No Test	*54.722*	*75.6%*
B	4	Jun-03	IV	BP Blower	2S-Cat	1.45	300	300	100%	72.4	62.33	No Test	*62.33*	*86.1%*
C	1	Feb-05	IV	Chainsaw	2S-Cat	1.04	300	300	100%	74	64.742	No Test	*64.742*	*87.5%*
C	2	Feb-05	IV	Chainsaw	2S-Cat	1.04	300	300	100%	74	71.826	No Test	*71.826*	*97.1%*
C	3	Feb-05	IV	Chainsaw	2S-Cat	1.04	300	300	100%	74	71.984	No Test	*71.984*	*97.3%*
D	1	Sep-98	IV	Chainsaw	2S-Cat	1.25	50	50	100%	52	43	n/a	*43*	*82.7%*
D	2	Sep-98	IV	Chainsaw	2S-Cat	1.25	50	50	100%	52	47	n/a	*47*	*90.4%*
D	3	Sep-98	IV	Chainsaw	2S-Cat	1.25	50	100	200%	52	43	n/a	*43*	*82.7%*
D	4	Sep-98	IV	Chainsaw	2S-Cat	1.25	50	100	200%	52	51	n/a	*51*	*98.1%*
E1	1	Mar-02	IV	T/B/H	2S-Cat	0.559	300	300	100%	67	57.051	51.554	51.554	76.9%
E2	1	Jan-02	IV	T/B/H	2S-Cat	0.523	300	300	100%	72.4	No Test	31.194	31.194	43.1%
F	1	Nov-04	IV	T/B/H	E-Tech II (w/ca	0.83	125	100.4	80%	65	41.7	46.9	46.9	72.2%
F	2	Nov-04	IV	T/B/H	E-Tech II (w/ca	0.83	125	100.5	80%	65	58.4	48.5	48.5	74.6%
F	3	Nov-04	IV	T/B/H	E-Tech II (w/ca	0.83	125	100.1	80%	65	59.4	49.0	49	75.4%
F	4	Nov-04	IV	T/B/H	E-Tech II (w/ca	0.83	125	100	80%	65	49.2	53.5	53.5	82.3%
G	1	Sep-00	V	Blower	2S-Cat	2.24	300	150	50%	45	27	28	28	62.2%
G	2	Nov-00	V	Blower	2S-Cat	2.24	300	150	50%	45	29	28	28	62.2%
G	3	Oct-00	V	Blower	2S-Cat	2.24	300	150	50%	45	34	32	32	71.1%
G	4	Dec-00	V	Blower	2S-Cat	2.24	300	150	50%	45	32	35	35	77.8%
G	5	Sep-00	V	Blower	2S-Cat	2.24	300	200	67%	45	58	56	56	124.4%
G	6	Feb-01	V	Blower	2S-Cat	2.24	300	300	100%	45	35	32	32	71.1%
G	7	Sep-00	V	Blower	2S-Cat	2.24	300	300	100%	45	37	38	38	84.4%

H	1	Jun-04	V	Chainsaw	Strat.charge	3.95	300	229	76%	68	50.1	49.1	49.1	72.2%
H	2	Jun-04	V	Chainsaw	Strat.charge	3.95	300	230	77%	68	45.7	47.1	47.1	69.3%
H	3	Jun-04	V	Chainsaw	Strat.charge	3.95	300	292	97%	68	61.1	58.1	58.1	85.4%
H	4	Jun-04	V	Chainsaw	Strat.charge	3.95	300	430	143%	68	No Test	50.2	50.2	73.8%
I	1	Mar-04	V	Cut-off Saw	atified scaveng	4.5	300	4	1%	72	43	n/a	*43*	*59.7%*
I	2	Mar-04	V	Cut-off Saw	atified scaveng	4.5	300	15	5%	72	41	n/a	*41*	*56.9%*
I	3	Mar-04	V	Cut-off Saw	atified scaveng	4.5	300	15	5%	72	60	n/a	*60*	*83.3%*
I	4	Mar-04	V	Cut-off Saw	atified scaveng	4.5	300	16	5%	72	42	n/a	*42*	*58.3%*
I	5	Mar-04	V	Cut-off Saw	atified scaveng	4.5	300	20	7%	72	43	n/a	*43*	*59.7%*
I	6	Mar-04	V	Cut-off Saw	atified scaveng	4.5	300	21	7%	72	44	n/a	*44*	*61.1%*
I	7	Mar-04	V	Cut-off Saw	atified scaveng	4.5	300	21	7%	72	44	n/a	*44*	*61.1%*
I	8	Mar-04	V	Cut-off Saw	atified scaveng	4.5	300	21	7%	72	47	n/a	*47*	*65.3%*
I	9	Mar-04	V	Cut-off Saw	atified scaveng	4.5	300	23	8%	72	43	n/a	*43*	*59.7%*
I	10	Mar-04	V	Cut-off Saw	atified scaveng	4.5	300	58	19%	72	49	n/a	*49*	*68.1%*
I	11	Mar-04	V	Cut-off Saw	atified scaveng	4.5	300	63	21%	72	44	n/a	*44*	*61.1%*
I	12	Mar-04	V	Cut-off Saw	atified scaveng	4.5	300	108	36%	72	49	n/a	*49*	*68.1%*

[1] Data shown is after maintenance, if available. If not, data shown is "as-is"