Outdoor Power Equipment Institute

December 7, 2020

Clerks Office
California Air Resources Board
1001 I Street, Sacramento, CA 95814

Via electronic submission: http://www.arb.ca.gov/lispub/comm/bclist.php

RE: OPEI Comments to CARB 11/24/2020 Draft Mobile Source Strategy

Dear Chairman Nichols and Board Members,

The Outdoor Power Equipment Institute (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 utility and personal transport vehicles. OPEI member products are ubiquitous in California households and businesses, including equipment such as lawnmowers, garden tractors, grass trimmers and brushcutters, chain saws, leaf blowers, snow throwers, utility vehicles and other similarly powered lawn and garden equipment. OPEI members represent the majority of stakeholders regulated by CARB's Small Off-Road Engine (SORE) emission rules. OPEI and its members have been committed to working with CARB to develop a reasonable regulatory landscape for SORE, cooperatively helping California achieve federal air quality goals for nearly three decades.

The draft Mobile Source Strategy (MSS) includes a staff proposal to reduce SORE emissions through a sequence of emission reductions, resulting in a ban of SORE powered equipment in 2028. The proposed reduction strategy, first introduced by CARB staff during a June 9, 2020 workshop, poses numerous technology feasibility, economic, and implementation challenges for industry stakeholders. Collectively these challenges are insurmountable and will surely result in significant hardships for manufacturers, retailers and end-users, culminating in an early market shortfall of products with high consumer need and demand. OPEI has provided comments and

presentations to CARB staff detailing and describing this and other concerns with the SORE2020 proposal.

Indeed, from the draft MSS its obvious that significant issues with the proposed rule remain. OPEI has serious concerns with the assumptions made and the lack of technical data to support the proposed changes, as well as significant concerns regarding CARB's underlying inventory data and new SORE2020 model on which the agency must rely to qualify rulemaking needs and goals. OPEI continues to study the recently published SORE2020 model and underlying survey data in preparation for formal comments related to the upcoming SORE proposal and formal rulemaking process. It is our understanding that the appropriate timing for providing CARB with feedback on the new SORE2020 model and the inventory data is once the formal rulemaking process begins. The thoroughness and accuracy of this data is imperative to state and federal rulemaking, including the eventual determination of the EPA to issue a wavier for the rule as required by the federal Clean Air Act. These issues must be addressed and resolved.

As noted above, OPEI submitted detailed comments outlining numerous industry concerns in advance of any formal rulemaking activity. These comments were submitted on June 30, 2020. OPEI has several times engaged CARB to express and resolve these issues; however, to-date the agency has largely ignored, and/or remained silent regarding the concerns laid out in the comments or the related presentations. OPEI is optimistic that CARB's recent delay of the SORE rule presentation to the Board from 2020 to 2021[1] indicates that the agency is more thoroughly considering stakeholders' concerns, including the reductions and regulations needed from the SORE sector to help the state achieve its overall 2031 federal air quality standards. In fact, when discussing the delays with CARB staff, staff suggested the delay was needed to allow CARB time to fully consider all the available information[2]. Given these comments by CARB staff and the state of the SORE2020 rulemaking, OPEI believes it is premature to identify a SORE proposal in the MSS.

[1] https://content.govdelivery.com/accounts/CARB/bulletins/2a225cd
[2] 9/25/2020 OPEI staff (Knott) call to CARB staff (Singh) in advance of the SORE rulemaking delay announcement.

Attached for your reference are OPEI's June 30, 2020 comments for the Board's consideration as they review the SORE reduction proposal outlined in the draft MSS. With consideration of these outstanding stakeholder concerns, as well as the delayed SORE rulemaking, OPEI recommends that the SORE proposal be withdrawn from the MSS until stakeholder concerns are adequately addressed and/or resolved.

Kind regards,

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Outdoor Power
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June 30, 2020

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RE: OPEI Comments to CARB 6/9 Potential SORE Regulations Workshop

Dear Mr. Dilbeck and Ms. Fibiger,

The Outdoor Power Equipment Institute (OPEI) respectfully submits the following comments regarding the California Air Resources Board (CARBs) Small Off-Road Engine (SORE) June 2, 2020 Potential SORE Regulations ("The Potential Rules") and the June 9, 2020 SORE Rule Workshop ("The Workshop").

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. OPEI members represent the majority of the stakeholders regulated by the CARBs Small Off-Road Engine emissions rules. OPEI

members are responsible, regulation-abiding manufacturers. OPEI and its members have been committed to working with the CARB to develop a reasonable regulatory landscape, cooperatively helping California meet air quality goals for nearly three decades.

CARB's June 9, 2020 SORE Workshop outlined emission reductions approximately forty and ninety percent versus today's limits, paired with engine durability period increases roughly three to twenty times the current design requirements starting with model year 2023. The tiered Potential Rules set zero-level emission limits starting with model year 2025, and ban SORE starting with model year 2028. The Potential Rules pose numerous technology feasibility, economic, and implementation challenges for industry stakeholders. Collectively these challenges are insurmountable and will result in significant hardships for manufacturers, retailers and end-users, culminating in an early market shortfall of products with high consumer need and demand.

OPEI believes it is not too late to develop a data-supported and reasonable regulatory reduction strategy to achieve California's model year 2031 SORE State Implementation Plan (SIP) goals without banning SORE. This process starts with agreement on a representative SORE sector emissions model which serves as the basis for modeling reasonable, data-driven, technology feasible and cost-effective strategies that achieve the SIP SORE goals.

CARB June 9, 2020 SORE Workshop Comment Response Period Insufficient to Provide Substantive Comments

On June 9, 2020 CARB staff presented to stakeholders the Potential Rules, including new exhaust and evaporative emissions standard limits, engine durability periods and test procedures. The Workshop marked the first time since CARB staff originally presented the need for additional SORE reductions in November 2015 that quantitative emission limits, durability periods and timelines were presented for stakeholder feedback. Industry must now consider the technology feasibility and cost effectiveness of these drastic new Potential Rules, which will take time. However, stakeholders were only provided 21 calendar days to submit comments on the

Workshop presentation. While industry appreciates CARB's presentation of the Potential Rule and stakeholder outreach in advance of the formal rulemaking process, the Workshop comment deadline is insufficient to adequately consider the substantive aspects of the expansive Potential Rules and to provide comments.

The Potential Rules and the SORE2020 draft model report were released in parallel, requiring that stakeholders analyze and provide comment on a high volume of data and material in a short timeframe. It is challenging to analyze these materials and coordinate comments among OPEI's 100+ member body and other industry stakeholder groups, including the Truck and Engine Manufacturers Association (EMA) and the Portable Generator Manufacturers Association, under the current COVID-19 working situation. CARB staff recently expressed its own COVID-19 related deadline challenges in response to Industry inquires.

Today's comments outline several key industry questions and concerns, however they should not be considered a comprehensive list of comments and questions related to the Potential Rules given the abbreviated comment period. OPEI and our members reserve the right to supplement these comments as our members and technical staff continue to review the Potential Rules and the supporting SORE2020 draft model. OPEI is committed to working with CARB to develop reasonable SORE rules, however additional industry-agency engagement will be needed beyond these comments and questions. With these comments OPEI respectfully requests that CARB staff confirm at its earliest convenience the schedule by which (1) the Initial Statement of Reason ("ISOR") will be published, and (2) the rules will be presented to the Board in order for Industry to prioritize concerns and coordinate further agency discussions aimed at shaping reasonable and rational rules that are based on quality assured and quality controlled data.

CARB SORE Emission Reduction Needs Unclear Due to Inaccurate SORE Inventory Models

CARB's emission reduction strategy to achieve by 2031, the Federal ambient air quality standards are outlined in California's SIP and in the May 2016 Mobile Source Strategy. The strategy is based on sector-by-sector modeling available at the time of

the development of the plan. Through these models the SIP concluded that regulatory schemes in place at the time achieve approximately two-thirds of the emission reductions needed to attain the 2031 Federal air quality standards. As a result, the SIP establishes a "fair-share" SORE NOx and ROG reduction strategy for 2031, targeting approximately a one-third reduction in emissions for the year versus previously modeled levels.

Since 2018 OPEI and the EMA have engaged CARB staff to discuss and address concerns with the current "OFFROAD2007" and under-development "SORE2020" small off-road engine powered equipment emission model[1]. An accurate emissions model is the necessary first step to understand the SORE fleet emission contribution, and in-turn to develop reasonable and rational strategies to help California attain the Federal ambient air quality standards.

As part of this undertaking, on May 20, 2020, OPEI and EMA presented CARB staff with industry's outlier analysis of the Agency's 2017 to 2019 SORE inventory survey dataset (provided to OPEI in April 2020). See Annex A. A high-quality survey dataset is critical to the development of an updated and accurate SORE inventory model; CARB is relying on survey data to establish key emission input and survival factors, including annual use (hrs/year), fleet age distribution and survival rates (age). Unfortunately, as presented in detail last month to CARB staff, Industry is concerned that CARB's most recent survey results, and in-turn the CARB SORE2020 May 29, 2020 draft model, lack the necessary expert review and application of thorough quality-control to assure an accurate and representative dataset to support the upcoming rulemaking. For example, the CARB SORE2020 draft model underlying data includes two residential respondents who reported using gas-powered air compressors (1) everyday (365 days/year), six hours a day, for sixteen years (accumulating an unrealistic 35,000 residential engine-use hours) and (2) everyday for five hours a day.

[1] OPEI and EMA met with CARB staff on January 8, 2019 to present concerns with the OFFROAD2007 model. The presentation from that meeting has not been annexed to these comments due to the inclusion of Confidential Business Information contained there-in. Reference January 8, 2019 *SORE Rulemaking Presentation Discussion 190108* presentation. On July 26, 2019 OPEI provided additional feedback to CARB staff regarding CARB follow-up questions to the January 8, 2019 presentation, an updated confidential industry data to support new model development. This communication has not been annexed to these comments due to inclusion of Confidential Business Information contained there-in. Reference July 29, 2019 letter to Dr. Michael Benjamin *RE: OPEI/EMA CA SORE Inventory Analysis Follow-up*.

These are not reasonable or realistic responses for a gas-powered air-compressor and their inclusion significantly increases the modeled annual use of this product. As a result of these responses, and others like them (see Annex B), CARB's SORE2020 draft model significantly overestimates SORE fleet HC+NOx tons per day.

OPEI and EMA continue to try to work with the Agency to provide expert review of the underlying dataset in the spirit of developing and accurate and mutually agreeable model, however CARB has informed Industry that it is not required to provide information in return at this stage in rulemaking. Nevertheless, in continued cooperative spirit, Industry has scheduled a meeting with CARB staff in July to review industry's expansive outlier dataset. Unfortunately, OPEI is concerned recent agency efforts to be transparently responsive to stakeholder requests have not met our expectations for a rule of this importance, which has delayed industry feedback efforts and what we believe to be our mutual goal of achieving consensus support for the SORE2020 model.

OPEI is additionally concerned with CARB staff statements throughout the June 9th workshop that the potential SORE reductions achieve "most of the additional off-road reductions needed'. CARB is unnecessarily and unreasonably seeking emission reductions from the SORE sector beyond the SIP SORE goals outlined to achieve the state's attainment in 2031 of the Federal ambient air quality standards. The 2016 SIP goals identify specific reduction goals for the SORE sector, quantifying statewide SORE NOx reductions of 4tpd and ROG reductions of 36tpd. The SIP further notes that most of the six other off-road equipment category reductions were either entirely or partially "NYQ" (not yet quantified). However, the SIP identifies that "Further Deployment of Cleaner Technologies" for the off-road equipment sectors should result in NOx reductions of 17tpd and ROG reductions of 36tpd, with cumulative off-road equipment category reduction goals of 31tpd NOx and 56tpd ROG. See Table 1. Given the specifically quantified and significant reduction goals from the SORE category, OPEI does not agree that attempting to capture most of the off-road emission sector reductions, including "Further Deployment of Cleaner Technologies" from SORE is necessary or reasonable.

Off-Road Equipment			
Zero-Emission Off-Road Forklift Regulation Phase 1	2	0.2	<0.1
Zero-Emission Off-Road Emission Reduction Assessment	NYQ	NYQ	NYQ
Zero-Emission Off-Road Worksite Emission Reduction Assessment	NYQ	NYQ	NYQ
Zero-Emission Airport Ground Support Equipment	<0.1	<0.1	<0.1
Small Off-Road Engines	4	36	<0.1
Transport Refrigeration Units Used for Cold Storage	NYQ	NYQ	NYQ
Low-Emission Diesel Requirement	8	NYQ	1
Further Deployment of Cleaner Technologies	17	20	NYQ
Total Category Reductions	**31**	**56**	**1**

Table 1 – California State Implementation Plan September 1, 2016 Workshop Handout – Off-Road Equipment Category Statewide 2031 Category Reduction Goals (table excerpt from handout)

As stated during our ongoing dialogue with the Agency, the current and in-development models have yet to accurately reflect the SORE sectors emissions contributions. Accordingly, new regulatory strategy proposals to achieve the quantified SIP SORE reduction goals are arbitrary and premature at this time and have no basis or support.

CARB Transition Schemes in the Potential Rule are Insufficient for Product Development Leadtime and Regulatory Stability

CARB's Potential Rules propose a tiered emission reduction approach, starting with emission standard reductions for model year 2023, transitioning to a credit-based zero emission limit for model year 2025, and culminating with an outright ban of SORE in model year 2028. See Figure 1.

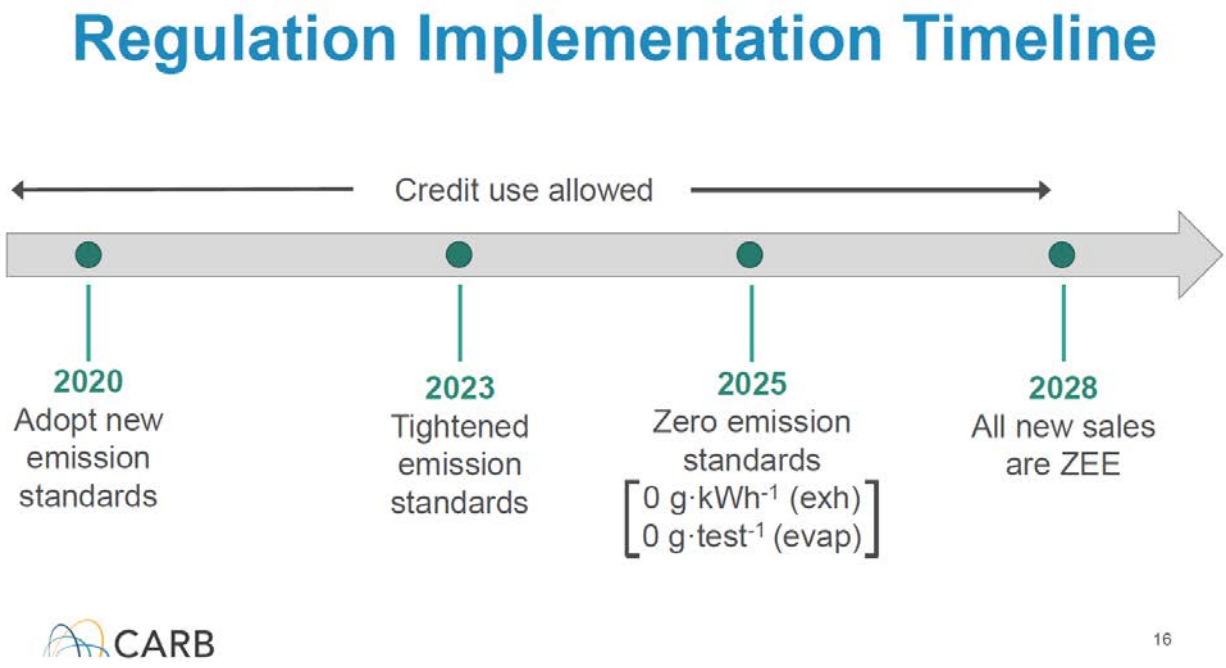

Figure 1 – CARB Potential Rule transition (table excerpt from CARB 6/9 SORE Workshop presentation)

The Potential Rules development schedule does not provide adequate time to investigate the technology and cost feasibility, to provide substantive feedback, an opportunity for dialogue in advance of the rule being presented to Board, or to design and implement new technologies before proposed model year transition dates. Furthermore, the Potential Rules do not provide the regulatory stability needed to support the level of technology and capital investment required by manufacturers to comply with the proposals.

CARB's preliminary implementation schedule fundamentally runs afoul of the requirements in the Federal Clean Air Act. CARB must obtain a waiver of preemption for any upcoming new SORE standards in order for those standards to be enforceable. *See* 42 U.S.C. § 7543(e)(2). Section 209(e)(2) requires EPA, "after notice and opportunity for public hearing, authorize California to adopt and enforce standards and other requirements relating to the control of such vehicles or engines if California determines that California standards will be, in the aggregate, at least as protective of

public health and welfare as applicable Federal standards." *See* 42 U.S.C. § 7543(e)(2). Unfortunately, CARB has disregarded the importance and requirements of this wavier process in recent SORE rulemaking. On April 2010 CARB approved SORE exhaust and evaporative emission amendments, declaring the rule effective May 2010. However, the rule was not submitted to EPA for a "within the scope of an existing waiver" determination until December 2, 2013, and EPA did not issue a determination until May 6, 2015. More recently, in November 2017 CARB approved SORE evaporative emission amendments, declaring the rule effective January 2018. CARB has adopted and has been enforcing the latest amendments since 2018, requiring manufacturers to provide new reporting requirements outlined in the amendments and conducting compliance testing. However, despite Federal requirements and several requests from Industry to do so, the Agency has yet to submit to EPA a "within the scope of an existing waiver" determination. By all intents and purposes, stakeholder due process in accordance with the Clean Air Act has been lost.

The statute requires that EPA evaluate whether California's determination is arbitrary or capricious, necessary to meet compelling and extraordinary conditions, or whether the standards and enforcement procedures are consistent with the overall statutory requirements in section 209 (which includes section 201(a)). *See* 42 U.S.C. § 7543(e)(2)(A). In prior SORE waiver determinations, EPA has explained that the Agency cannot authorize CARB to enforce any nonroad standards if EPA finds that the standards are not consistent with section 202(a) of the Clean Air Act. To determine whether the CARB standards are consistent, EPA has applied to California nonroad standards the same test used for California motor vehicle standards; specifically, that "state standards are inconsistent with section 202(a) if there is inadequate lead time to permit the development of the necessary technology giving appropriate consideration to the cost of compliance within that time period or if the Federal and State test procedures impose inconsistent certification requirements." 71 Fed. Reg. 75,536, 75,537 (Dec. 15, 2006) (California State Nonroad Engine and Vehicle Pollution Control Standards: Decision of the Administrator (Authorization of Emission Standards for Small Off-Road Engines (SORE)) at 14 (Dec. 11, 2006)).

In our initial review of the Potential Rules, Industry estimates that it will require 18-24 months to provide initial technology feasibility and cost feedback for substantive changes to engine durability periods, and an additional 30-60 months to start production of new technology engines (*if* even feasible). For each family, Industry must consider initial durability and emissions feasibility (estimate 6-18 months), integrated-equipment redesign (estimate 12-18 months), non-integrated equipment redesign (estimate 12-18 months), general engine performance and durability testing, including multi-season field testing (12-18 months, portions may be in parallel with OEM testing for non-integrated equipment design), certification testing (6-18 months) and certification lead-time (4-6 months). Some engine family testing may be conducted in parallel, but much of the development work will more likely be conducted in series for families, considering the need for "proof of concept" to comply with the proposal, different engine designs and manufacturer resources. Given that some manufacturers certify dozens of emission families, OPEI estimates it could take five to ten years to complete the necessary new technology development required for the wide-range of SORE engines and hundreds of unique SORE-powered equipment types to comply.

Furthermore, the implementation schedule of the Potential Rules does not provide reasonable regulatory stability. SORE evaporative rule amendments just went into full effect and the Potential Rules unrealistically limits the time period by which manufacturers can recoup their investments. Due to the proposed durability requirements (for gas-powered engine ***and*** ZEE products) and the more stringent emission reductions, sufficient exhaust and evaporative emission credits cannot be generated to continue SORE sales beyond model year 2025. The Potential Rules would in-effect mandate termination of new SORE technologies and models just a year or so after introduction into the market.

Given the new stringent standards in the Potential Rules, CARB must recognize the proposal requires significant manufacturer investments for compliance (*if* even feasible) and must provide adequate lead time and regulatory stability from the time the rulemaking process has been completed, when the EPA Administrator has approved CARBs waiver request. The Potential Rules presented on June 9th fail to provide an appropriate lead time considering new product development and the waiver approval

process, or the regulatory stability required for manufacturers to be recoup the costs that would be borne by manufacturers as a result of the rule. The rule fails to meet the criteria needed to obtain a waiver of preemption from EPA, which is necessary for CARB to adopt and enforce new SORE standards.

OPEI believes it is unnecessary to establish such stringent standards or ban SORE-powered equipment to achieve the SIP SORE goals. Industry looks forward to discussing proposals that could alleviate lead time and regulatory stability concerns following agreement on a new SORE inventory model, in advance of CARB staff's proposed rule presentation to the Board.

CARB SORE Engine Durability Period Proposals Are Not Reflective of SORE Technology

CARB's Potential Rules include significant changes to the engine emission durability periods ("EDPs"). The Potential Rules propose eliminating use and design-based EDP options with a single "professional"-use survey-based EDP (per engine-type and displacement-category). The Workshop presentation notes the proposed EDPs are to "simplify" durability periods, and that the new hours are based on the 75th percentile for "professional users", as reported in the CARB inventory survey. Table 2 summarizes the Potential Rules proposal.

Engine Displacement Category	Current Durability Period (hours)	2023 Durability Period (hours)
< 50 cc Handheld	50/125/300	1,000
50-80 cc, inclusive, Handheld	50/125/300	1,000
< 225 cc non-Handheld	125/250/500	2,000
≥ 225 cc - < 825 cc	125/250/500/1,000	5,000
≥ 825 cc	125/250/500/1,000	5,000

Table 2 – CARB Potential Rules proposed EDPs (table excerpt from CARB 6/9 SORE Workshop presentation)

The EDPs in the Potential Rules are not representative or realistic expectations of current SORE technology. OPEI is not aware of ***any*** industry or agency test data that suggests current SORE technology can meet the proposed EDPs in accordance with the Part 1054 regulatory median in-use requirements. CARB confirmed the lack of agency test data during the workshop. This is of great concern to industry. The Potential Rules development and phase-in schedule do not sufficiently allow for technology feasibility studies or for the engine and equipment design and testing work necessary to evaluate if the proposed durability periods can be safely and effectively achieved for the wide range of SORE-powered equipment.

In support of the proposed EDPs, agency staff confirmed that many existing engine durability factors (DF) are typically 1, which in several cases indicates a real-test DF < 1. While industry agrees with CARB staff's observation that many engines do not exhibit increasing emissions over the engine durability period, and in many cases certain emissions decrease as engines age, this is not sound engineering evidence that engine median-lives can be extrapolated to 3 to 20 times current EDPs. As explained in additional detail below, CARB is relying on current engine family certification data as evidence of technology feasibility of proposed exhaust emissions limits, however in review of the 2020 CARB certification dataset OPEI found all but one of the emission families with certification limits below the proposed limits have DF's > 1.0 and several have durability periods less than the current maximum EDPs.

Industry is additionally concerned that the move to a single "professional"-use based durability period will result in unnecessary product cost increases and hardships for all users, including residential; regardless of whether zero-emission technology options are necessary to achieve SIP SORE emission reduction goals or if they offer the necessary and/or equivalent solutions for the wide-range of traditionally SORE-powered equipment. In fact, during the Workshop CARB staff stated they expected the cost

associated with higher EDPs to drive transition to residential zero-emission equipment. User impacts are discussed more later.

As previously discussed, annual engine hours, equipment age, and expected equipment life-cycle (survival rates) based off the CARB 2017-2019 survey are not an accurate representation of SORE in-service use, and as-such should not be relied on by CARB to establish new EDPs without technology feasibility confirmation testing. Furthermore, the durability impact in combination with the proposed emission limits require an additional level of consideration and testing evaluation not yet presented by CARB to stakeholders for feedback.

The nearly two-decades' old EDPs and options per category provide the necessary and generally appropriate options to categorize SORE based on the shorter of (1) the median in-use life of the equipment into which an engine is expected to be installed, or (2) the median in-use life of the engine without being scrapped or rebuilt.

In May, OPEI conducted a detailed analysis of eXmark's pre-owned equipment on-line marketplace. The marketplace included 145 used pieces of equipment from dealers across the U.S. (excluding "demo" units). The dataset is a useful case-study because the manufacturers' equipment includes engine hour meters, with the hours typically reported for each unit, and also includes a "notes" field for the dealer to provide equipment details. Of the 145 pieces of >225cc equipment reported[2], the average age was six years old and the average engine hours was 986 hrs. Included in the notes were nine engine replacements, occurring at an average of 1259 hours[3]. Of the 145 units, only 2 units were reported to have greater than 3000 hours of runtime, with the max being 3784 hours (additional outreach would be necessary to confirm the collective hours are indeed on the original engine, and that the engine has not been rebuilt). This data much more closely aligns with the current EDPs than the 75th percentile, 5000 hour engine life extrapolated from CARBs telephone survey.

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[2] The displacement category is presumed based on the recorders subject matter expertise.

[3] It should be noted that OPEI does not believe notes are required and the types of notes and level of details may vary from dealer to dealer and from equipment to equipment. It should also be noted that OPEI believes there were likely more than 9 engine replacements, and some engine "rebuilds". Nevertheless, the dataset provides independent documented evidence that engine replacement is a common occurrence for commercial equipment, where the equipment life may be, anecdotally speaking, 2-3x greater than the engine life, and that current EDPs are appropriate for this category of equipment.

OPEI is confident the current EDPs accurately reflect SORE technology and use, and recommends CARB maintain the current EDPs for future SORE rules.

Finally, OPEI requests clarification as to why CARB believes it is necessary to "simplify durability periods". This aspect of the rulemaking seems arbitrary. Industry is not aware of any unresolved confusion or a need to further simplify EDPs for industry or Agency certification or for compliance purposes. OPEI additionally requests clarification and/or explanation regarding how survey responses were used to determine the 75th percentile EDP for professional users which serve as the basis for the Potential Rule proposals. OPEI kindly requests that CARB provide this information at its earliest convenience for industry review and potential industry-agency discussion in advance of formal rulemaking.

CARB SORE Exhaust Emission Reduction Proposals Unproven for Many Common SORE-powered Applications

CARB's Potential Rules include significant changes to the engine exhaust emission limits. The Workshop presentation notes the new standards are based on currently certified engines, that several engines in each displacement category meet the standard, and that all common equipment types are represented. Table 3 summarizes the Potential Rules new emission standards.

Engine Displacement Category	HC + NOx standard (g/kW•h)	2023 HC + NOx standard (g/kW•h)
< 50 cc, handheld	50	20
50-80 cc, inclusive, handheld	72	13
< 225 cc, non-handheld	10	6
≥ 225 cc - < 825 cc	8	3
≥ 825 cc	8	0.8

Table 3 – CARB Potential Rules proposed exhaust standard limits (table excerpt from CARB 6/9 SORE Workshop presentation)

1. *General Feasibility*

OPEI is concerned that the proposed limits are not achievable by many common SORE designs and technologies, and the small number of engines that certify limits below these values are not reflective of all common equipment types. Additionally, the Potential Rules development and phase-in schedule do not sufficiently allow for technology feasibility studies or for the engine and equipment design and testing work necessary to evaluate if the reductions can be safely and effectively achieved for the wide range of SORE-powered equipment.

In reviewing CARB's small nonroad spark-ignition database[4] OPEI found for model year 2020:

a) Only four of 135 CARB 2020 model year certified <50cc displacement category engine families achieve HC+NOx certification levels at or below the proposed 20 g/kW.hr standard level at the current EDPs (LCZHS.0354H1, LHNSX.0484BA, LHNSX.0494BA, and LHNSX.0364BA). All four engine families are "mini" four-strokes, which are significantly less likely than already suggested to meet the proposed 1000 hour EDPs, since multi-position operation could present carbon and soot build-up challenges in and around the valve train for extended engine hours. Contrary to CARBs Workshop statement, these engine families are not representative of engines integrated into chainsaw applications, one of the three most common application types for this displacement category, as chainsaws require high engine speeds (up to 16,000rpm) and high power-to-weight ratios not possible with four-stroke engines in this category. Finally, one of the engine families is certified to the minimum EDP and all four have HC+NOx DF > 1.

[4] https://ww3.arb.ca.gov/msprog/offroad/cert/cert_results.php?order=0 CARB's website does not offer the certification levels directly, requiring that each Executive Order is examined. CARB's website, nor the Executive Order publish the engine DF. Therefore, the linked CARB database summary was used in combination with EPA's 2020 certification database to extract HC+NOx certification levels and DFs for each CARB certification for the purpose of these comments.

b) Eleven of 50 CARB 2020 model year certified 50-80cc displacement category engine families achieve HC+NOx certification levels at or below the proposed 13 g/kW.hr standard level at the current EDPs (LA8XS.0805RA, LCDPS.0805DC, LCPDS,0805DL, LCRPS.0805GI, LCRPS.0805GA, LCZHS.0795H1, LHNXS.0575BA, LJDGS.0795CG, LCGPS.0805GR, LFNXS.0765MA, and LSUMS.0805GB), with nearly half of these at the 13 g/kW.hr limit. Similar to the <50cc displacement class, all engine families are "mini" four-stroke, which present the same challenges noted above for extended durability periods. Additionally, OPEI believes the primary applications for most of these engines are generators or "non-handheld" applications, which would be subject to the lower 6 g/kW.hr HC+NOx emissions standard under the Proposed Rules. Finally, four of the engine families are certified to durability periods below the maximum EDP and all but one have HC+NOx DF > 1.

c) Only three of 116 CARB 2020 model year certified 80-225cc displacement category engine families have HC+NOx certification levels at or below the proposed 6 g/kW.hr standard levels at the current EDPs (LCDPS.2241DC, LCDPS.2241GD, and LCRPS.2121GA). All three engine families are horizontal shaft engines installed primarily in light commercial applications. Contrary to CARBs Workshop statement, these are not representative of the vertical-shaft engines installed to *the* most common SORE-powered application, walk-behind mowers. Finally, all three engine families are certified to the lowest durability period for this class (125 hours) and have HC+NOx DF > 1.

d) Only five of 168 CARB 2020 model year certified 225-825cc displacement category engine families have HC+NOx certification levels at or below the proposed 3 g/kW.hr standard levels at the current EDPs (LN5XS.2042LC, LN5XS653NC, LKAXS.4012FA, LKHXS.4292LE, and LKXS.4562HD). The five engine families are all horizontal shaft engines installed primarily in generator and utility vehicle applications. Contrary to CARBs Workshop statement, these are not representative of the larger displacement vertical-shaft engines installed to the most common lawn and garden equipment in this displacement category,

riding mowers. Finally, two of the five engine families are certified to durability periods below the maximum EDP and all five has HC+NOx DF > 1.

e) None of the CARB 2020 model year certified >825cc displacement category engines with HC+NOx certification levels at or below the proposed 0.8 g/kW.hr standard levels.

This analysis compiled engine family "certification level" test data to capture the highest number of engine families that may meet the proposed limits. A more appropriate datapoint to consider when evaluating an engine family's technology feasibility with the Preliminary Rules standard limits would be the Family Emission Limit (FEL). The FEL, which defines a compliance limit between the certification data point and standard limit for averaging, banking and trading purposes, is more reflective of an engine's technology feasibility, requiring manufacturers to consider production deviation, emission tolerances and test repeatability. Reviewing the dataset for engine family FELs resulted in just one of 135 <50cc displacement category engines and none of the 80-225cc or >225cc displacement category engines having HC+NOx levels below the proposed standards at the current EDPs.

Finally, the Agency's technology feasibility study, as described in the October 2017 *Test Plan – Testing to Establish Up-to-Date Exhaust Emission and Deterioration Factors for Small Off-Road Engines Using E10 Fuel,* reported to OPEI on February 2, 2020, resulted in no walk-behind or riding mower engines achieving the Potential Rule proposed standards at either zero-hour or after durability testing, and included no chainsaw engine test data.

2. Aftertreatment Systems

In the absence of test data representative of many common SORE-powered equipment categories, significant aftertreatment studies will be needed to determine if the Potential Rules limits can be safely and reliably achieved. New catalyst designs, as a result of more stringent limits and extended EDPs, may present heat management concerns in many SORE-powered equipment types that will require study in normal and off-normal operation modes. SORE exhaust system external ***and*** internal temperatures

will require careful design consideration and testing to assure component durability and to mitigate material and refueling fire concerns. SORE-powered vehicle applications, such as personal transport vehicles (similar to golf cars) and low-speed utility vehicles, which typically run for short-periods will require further consideration due to engine and exhaust systems infrequently reaching catalyst light-off temperatures.

These safety considerations will need to be addressed by CARB if a waiver of Federal preemption is to be obtained from EPA. Congress directed EPA to take safety into account when revaluating technology, feasibility, and lead time when assessing whether the requisite statutory criteria in section 209 are met. *See* 71 Fed. Reg. 75,536, 75,537 (Dec. 15, 2006) (Decision Document for California State Nonroad Engine and Vehicle Pollution Control Standards: Decision of the Administrator (Authorization of Emission Standards for Small Off-Road Engines (SORE)) at 18 (Dec. 11, 2006)). Thus, the safety implications of the new standards in the Potential Rule will need to be evaluated carefully by CARB and EPA during the waiver determination process to assure that the new SORE standards will not lead to increased safety risks.

3. *PM Measurement*

OPEI is concerned with the Potential Rules requirement to measure PM emissions for handheld engines. Several industry members have reported they do not currently have the test capability to measure PM and are concerned with the lead-time and cost associated with additional test requirements. Industry would need to determine new equipment needs and cost, purchase and install, train and then begin using to meet the CARB proposal. Costs and other previously noted factors aside, Industry is unsure if equipment manufacturers can provide equipment for manufacturers to implement in time for model year 2023 certification testing. It is estimated the cost may be $500,000 per manufacturer, which based on the Potential Rules time line provides no opportunity for handheld manufacturers to recoup their investments. OPEI is looking for CARB feedback as to why the current estimates are no longer acceptable and what benefits are expected as a result of measuring PM data versus estimating PM by the current methodology.

CARB SORE Evaporative Emission Reduction Proposals Unproven for Many Common SORE-powered Applications

CARB's Potential Rules include significant changes to the engine and equipment evaporative emission limits. Table 4 summarizes the Potential Rules proposal.

Engine Displacement Category	Current Diurnal Standard (g HC/day)	2023 Diurnal + Hot Soak Standard (g HC/test)
≤ 80 cc	N/A	0.50
> 80 cc - < 225 cc, walk-behind mowers	1.0	0.60
> 80 cc - < 225 cc, other equipment	0.95 + 0.056 × capacity	0.60
≥ 225 cc	1.20 + 0.056 × capacity	0.70

Table 4 – CARB Potential Rules proposed evaporative standard limits (table excerpt from CARB 6/9 SORE Workshop presentation)

OPEI is concerned that the proposed limits are not achievable with common SORE designs and technologies. The Workshop presentation notes the proposed standards are based on currently certified engines, however Industry is not aware of data that demonstrates potential compliance across the four engine displacement categories given consideration of the addition of hot soak requirements, increased hot soak test temperatures and limited handheld testing. Additionally, development and phase-in schedule provided in the Potential Rules do not sufficiently allow for technology feasibility studies or for the engine and equipment design and testing work necessary to evaluate if the reductions can be safely and effectively achieved for the wide range of SORE-powered equipment.

OPEI is additionally concerned that eliminating the design-based diurnal compliance demonstration option, in combination with the addition of diurnal

requirements for handheld products will add exorbitant cost and testing infrastructure demand; neither of which can likely be resolved due the aforementioned lead time concerns and lack of regulatory stability.

CARBs August 8, 2003 Staff Report – Initial Statement of Reasons for (SORE) Proposed Rulemaking outlined costs associated with SHED-based diurnal testing. At that time Industry estimated the cost for an individual manufacturer to build and operate a SHED for seven years was estimated at 3.5 million dollars. The considerable cost notwithstanding, CARB staff deemed the absolute cost and resulting cost-effectiveness reasonable. Today, few manufacturers own SHEDs and limited third party test houses offer SORE SHED testing service.

In its September 2016 Staff Report for SORE evaporative emission amendments, CARB estimated that eliminating the design-based certification and new compliance strategy would require ten additional third-party test lab SHEDs, costing industry approximately $67,375,200 over five years. This reflects minimum costs, assuming most manufacturers outsource to a testing service. This demand would again hold true for entire >80cc displacement categories if design-based certification was eliminated, as equipment previously SHED tested would require retesting in accordance with the new requirements. Additionally, manufacturer or third-party SHED resources would be required to fulfill the new demand generated by handheld equipment diurnal certification and compliance resolution requirements. Depending on each manufacturers strategy, to invest in SHED technology or to outsource testing, proposed diurnal related costs could exceed $200-300 million dollars over five years for minimal emission reduction. Given the lack of regulatory stability, manufacturers cannot recoup these costs and it would no longer be reasonable for manufacturers to continue to operate in California after 2022.

Costs aside, Industry is concerned that even with ten additional third-party facilities in-place, which is unlikely achievable by the end of 2021, the infrastructure will still not be able to support the amount of testing needed to validate designs and conduct compliance testing for the current number of evaporative emission families in time to submit applications for the 2023 model year. This likely testing infrastructure constraint calls into question whether the current implementation schedule for the standards can

satisfy the lead time requirements in section 209(e) for a waiver of Federal preemption. CARB must consider the capacity of the existing SHED infrastructure to meet the demand generated by the proposed requirements across the full field of SORE evaporative families.

Zero-Emission Equipment Credit Program Concerns

CARB's Potential Rules include significant changes to the zero-emission equipment (ZEE) credit program. The Potential Rules propose to align ZEE durability periods with the proposed gas-powered equipment EDPs, which are similarly not representative or realistic expectations of current SORE-equivalent battery-powered technology. OPEI is not aware of ***any*** industry or agency test data that suggests current battery-powered technology can meet the proposed durability periods, which will have a significant impact on manufacturers ability to generate credits required offer model year 2025 product. Additionally, the development and phase-in schedule do not sufficiently allow for technology feasibility studies or for the engine and equipment design and testing work necessary to evaluate if the proposed durability periods can be safely and effectively achieved for the wide range of ZEE that would replace SORE-powered equipment. These issues will be problematic for purposes of satisfying the waiver criteria.

The above concerns aside, OPEI is interested in discussing inclusion of additional products in the ZEE program. OPEI will follow-up with CARB staff shortly after the submission of these comments with additional details.

Additional / General Concerns

Engine Definition – The Potential Rules redefine an engine to include an engine block without an installed crankshaft. CARB's definition includes "a kit that includes a substantial portion of the parts required to assemble and engine" and "any engine block with or without an installed crankshaft". This is not harmonized with EPA's engine definition. The EPA engine definition, in which an installed crankshaft is specifically required, is reasonable because the crankshaft is always one of the first components installed, and its installation requires several other critical engine components to secure

the crankshaft, and in-turn their assembly requires the crankshaft for assembly, including the crankcase, the piston(s) and the covercase. The proposed definition is concerning because crankcases ("engine blocks") may or may not be manufactured at the point of final engine assembly, which could create unnecessary logistical concerns for manufacturers during production (potentially requiring that a crankcase be labeled as a partially assembled engine). Additionally, it is possible that a crankcase could be damaged during use, for example by a thrown object, but all emissions critical components are reused in rebuilding the engine. Depending on the damage, engine cost, ect…, a crankcase replacement may be a less expensive optional than replacing the engine. For this reason a crankcase may not be an unusual service part for engine manufacturers. The revised, non-harmonized definition will drive unnecessary service parts control and cost since a crankcase service part will need to be accounted for in California as an engine, but by definition may not be in the remaining 49-states. OPEI is seeking clarification of the meaning of "substantial portion of parts" and of the emission benefit of defining a engine block without a crankshaft as an engine.

Adjustable Parameters – The Potential Rules disallows the use of (any and all) tools to discourage adjustment of emission control features. There are currently many designs that rely on plastic capped adjustment screws, or non-common fasteners to deter adjustment beyond certified limits. These are important because some adjustment maybe needed in some SORE-powered applications to compensate for air density (temperature, elevation). The current regulations allow CARB to test compliance at any manufacturer recommended setting. These necessary features would require significant lead time to redesign with no quantitative emission benefit. OPEI is seeking clarification for the need (emission benefit and cost impact) for the proposed change.

Fuel Cap Performance Standards – The Potential Rules introduce new fuel cap requirements for handheld products, including permanent cap retention and audible seal feedback. These requirements are unnecessary for handheld equipment because the cap must be installed for the engine to operate in the intended multi-position nature of the equipment. Additionally, today's handheld equipment comply with ANSI and ISO standards for functionality, which has long demonstrated success in reducing fuel leaks from this equipment. Finally, the Potential Rules will require significant fuel tank and

cap redesigns for some types of handheld equipment, such as chainsaws, which do not have fuel filler necks. The Potential Rules development and phase-in schedule do not sufficiently allow for the tank and cap design and testing work necessary to safely, effectively and cost efficiently implement the unnecessary changes. OPEI is seeking clarification for the need (emission benefit and cost impact) for the proposed change.

EVAP Tilt Test – The Potential Rules introduce new tilt test requirements that are not reflective of intended or recommended use for most SORE Class I and Class II applications. In many cases tipping equipment in directions it is not intended will result in detrimental fluid (fuel and oil) migration resulting in starting and performance degradation, or possible engine failure. OPEI recognizes CARB staff tilted a walk-behind mower in a direction not recommended by the equipment manufacturer resulting in a temporary small fuel spill, however we do not believe this common practice for end-users familiar with SORE-powered equipment. Additionally, the proposal is not rationale or realistic for heavier equipment, such as riding mowers, which cannot easily be turned and/or the engine is installed in such a manner that the oil is drained without tilting the product. OPEI is seeking clarification for the need (emission benefit and cost impact) for the proposed change.

Replacement Engines & Service Parts – The Workshop and Potential Rules did not address strategies for equipment manufacturers to continue to provide replacement engines and service parts for once emission regulations can no longer be met or for model year 2028 and beyond if SORE is banned. OPEI requests confirmation from CARB regarding how the Potential Rules would allow for manufacturers to meet the demand for replacement engines and service parts following each manufacturers discontinuation of new engine certification in California.

CO ABT – The Potential Rules lack CO credit generation mechanism required for 2025 zero-emission stage. CARB must provide a mechanism to generate credits for CO in order for manufactures to achieve net-zero CO emissions for model years 2025-2027.

Transition Scheme for Previous Year Engines and Components – The workshop and Potential Rules did not address emission transition phases for non-integrated equipment manufacturers. Equipment manufacturers may have a few years of engine inventory due to production time and inventory control at engine manufacturers,

shipping lead time (sometimes from overseas), and production control at its facility. From an exhaust side CARB and EPA have historically permitted previous-tier certified engines (compliant when manufactured), however in-combination with reduced engine exhaust and equipment evaporative emission diurnal requirements, OPEI is unclear how CARB will enforce new evaporative regulations during the transition years. OPEI is seeking CARB feedback regarding the agency's expected certification and compliance strategies for separately certified non-integrated engines and equipment during emission limit transition years.

Credit Control Strategies for Model Years 2025-2027 – The workshop and Potential Rules did not address emission credit control methods or costs for model years 2025-2027 in what will become an uncertain competitive landscape. The market is generally stable and as a result manufacturers have some certainty about credit generation and use. However, the 2025 market demand will be unclear for manufacturers, based on each manufacturers credits situation and the relatively uncertainty of their competitors CA market (credit) position. Additional resources may be needed to bifurcate production for the California market. CARB must consider the manufacturer and end-user cost must for this level of CA-only production control by engine and equipment manufacturers alike.

Residential and Commercial / Vendor User Impacts of the Potential Rules

1. *Residential User Impacts*

Thousands of California's experience power outages everyday[5] due to many reasons, including storms, earthquakes, forest fires and brownouts. The most common residential chainsaw and generator uses are after these frequent outage types, being storm clean-up and emergency power, respectively. Gas-powered equipment is currently the only "SORE" market technology that offers extended equipment run-time in these emergency situations, were there is no grid power to recharge zero-emission equipment and battery banks for extended periods. Additionally, California has experienced an unprecedented number of "brownouts" recently, which has at times unexpectedly left homeowners without power for days. Eliminating cost-effective

[5] https://poweroutage.us/area/state/california reported 2,880 state outages on 6/28/2020 08:34:55 AM EST.

residential solutions and forcing battery-powered technology will result in users unwillingly and unnecessarily being left without reliable power for their homes or the ability to use their outdoor power equipment during these unexpected and prolonged "brownouts".

2. *Commercial / Vendor (Landscaper) User Impacts*

Reflected in the current equipment fleet, commercial ZEE deployment continues to face challenges. According to CARB's most recent survey greater than 90 percent of landscaper outdoor power equipment is gas-powered. Equipment performance, run-time, and cost are common concerns for landscapers and technology challenges that must be overcome for widespread ZEE deployment.

CARB has several times suggested that break-even point for commercial ZEE is less than three years based on the purchase price and energy costs for the most popular gas and battery-electric zero-turn mowers. However, the assumptions are not based on real-world product use. The 2018 assumption estimated an annual gas-costs of $7965. Assigning an annual average gas price of $3.55 for years 2018 and 2019 results in fuel use of 2,244 gal/year. Assuming 1.5 gal/hour fuel consumption for this unit, the equation yields a 3-year break-even point based on approximately 1500 engine-hours per year, or 4500 machine life-hours. This annual use is ***five times*** CARBs most recent survey and SORE2020 draft (266 hr/year) landscaper average use estimate, and industry experience suggests that 4500 machine-hours is the upper bound of a commercial ZTR's life (setting aside consideration of engine or motor durability, which was previously discussed). At the current equipment and fuel costs, there is no break-even point for zero-emission commercial wide-area walk and rider mower deployment.

Closing Comments

OPEI would like to thank CARB for the opportunity to review the Potential Rule and provide comments in advance of agency staff's presentation to the Board. Industry has identified several substantive concerns with the Potential Rules that require additional consideration, discussion and qualification. OPEI is certain a reasonable reduction strategy ***can*** be developed to achieve California's 2031 SORE SIP goals without banning SORE engines. By continuing our collaborative survey and model

work, we know an effective and data-supported model can be developed, and in-turn a comprehensive and reasonable emission reduction strategy that will achieve CARB's 2031 SIP SORE goals can be developed in the next one to two years.

Industry looks forward to continuing this dialogue to achieve our common goal of a thoughtful and measured emission reduction strategy 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

ANNEX A

OPEI & EMA May 20, 2019 CARB Survey Outlier Analysis Presentation

CARB SORE2020 Survey Analysis

AGENDA

- Background
- Executive Summary
- Industry Survey Outlier Analysis
  - Investigation Methods
  - Real World Use Examples
  - Outlier Examples
  - Outlier Root Causes
  - Data Extrapolation Questions
- Emission Inventory Impact Examples
- Next Steps

Background

- CARB contracted California State University – Fullerton in 2017-2019 to execute a SORE inventory survey. The purpose of the survey was to update population and product use estimates for use in a new CA SORE emission inventory model ("SORE2020").
- The Outdoor Power Equipment Institute ("OPEI") and the Truck and Engine Manufacturers Association ("EMA"), collectively "Industry", received the survey data on April 6, 2019. Industry, together with its outside consultant Air Improvement Resources, conducted an in-depth analysis of CARB's 2017-2019 SORE inventory survey. Industry will submit formal comments following this presentation.

Executive Summary

- The analysis of the CSU-Fullerton Survey data conducted by Industry demonstrates that an appropriate QA/QC of the data used for the March 25th Workshop was not conducted in accordance with accepted research practices. As a result, fundamental elements and outputs of the SORE2020 model, including population, hours of use and emissions, likely are overestimated.
- Industry's review of the CSU-Fullerton Survey data after applying an appropriate QA/QC analysis results in lower annual use for most categories.
- This presentation provides an overview of Industry's QA/QC methods and examples that could be considered as part of ongoing data review.

Executive Summary - Example

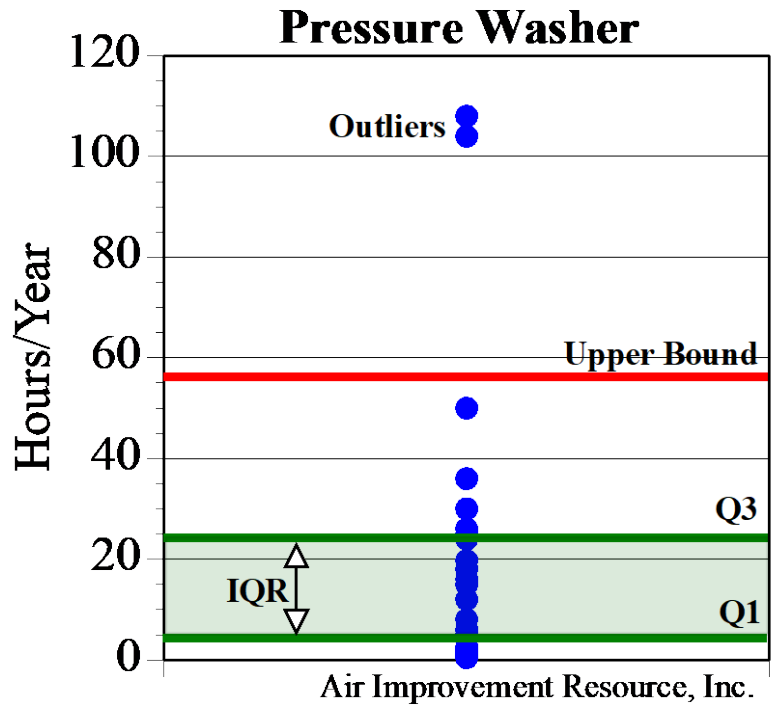
- Residential Respondent 555
  - 65+ years old, lives in a mobile home, reports no landscapable area, Shasta County
  - Owns three of the total 13 gas-powered riding mowers reported, using RM#1 7x/week, 2.5hr/use (910hr/year) and RM#2 3.5x/week, 2.5hr/use (520hr/year).
  - Additionally owns six chainsaws, 2 electric powered which are used 7x/week, 2.5hr/use (total 35hr/week, 910hr/year/unit), while also using multiple leaf blowers, trimmers, compressors, generators, pumps and welders.
  - Total equipment use greater than 130hr/week, 52 weeks/year
  - If all factors are considered together, the response cannot be accurate, and the result is significant; Inclusion of this respondent's data increases the average riding mower annual use from approx. 46hr/year to 152hr/year due to the small lawn tractor sample size (13/1152 households surveyed). The respondent accounts for an increase of approx. 1.8tpd to 7.52tpd HC+NOx emissions from the 5-25hp residential riding mower categories.
  - This is an example of one of many outliers that should be removed from the dataset.

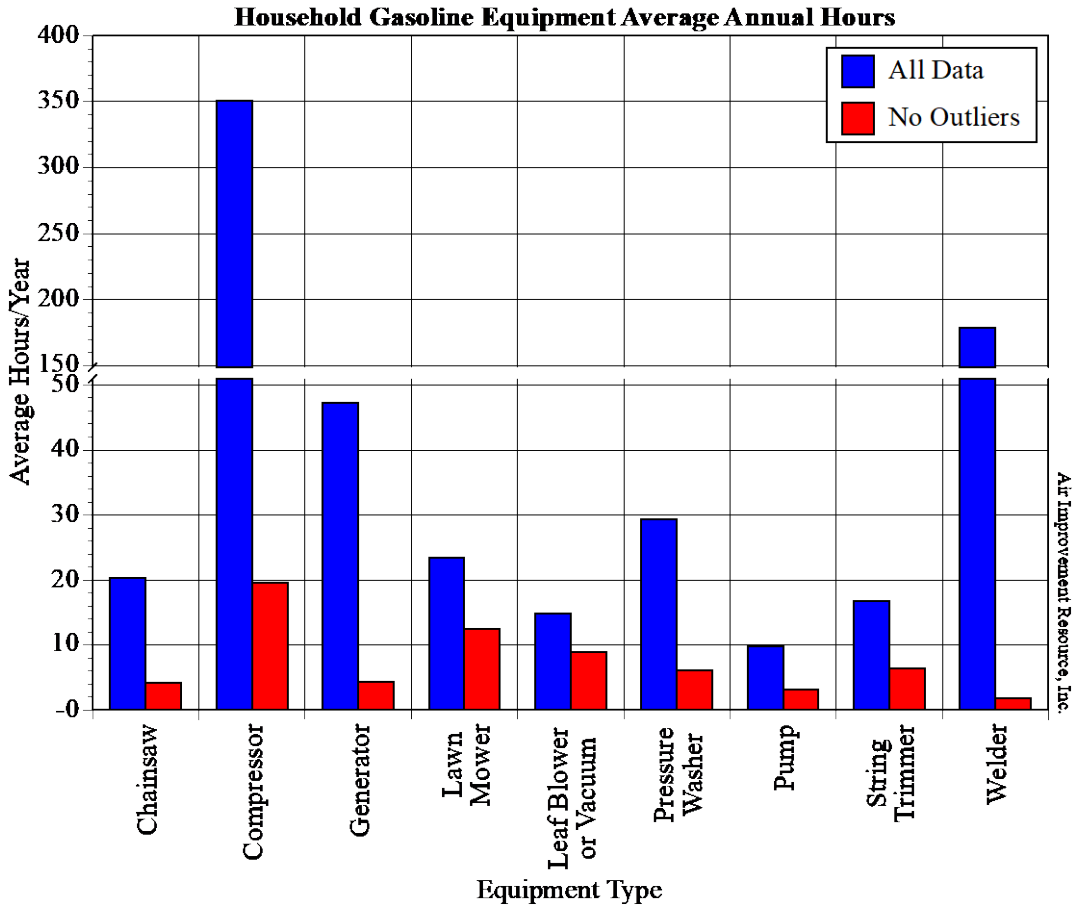
Industry Survey Outlier Analysis

Outlier Analysis Investigation Methods

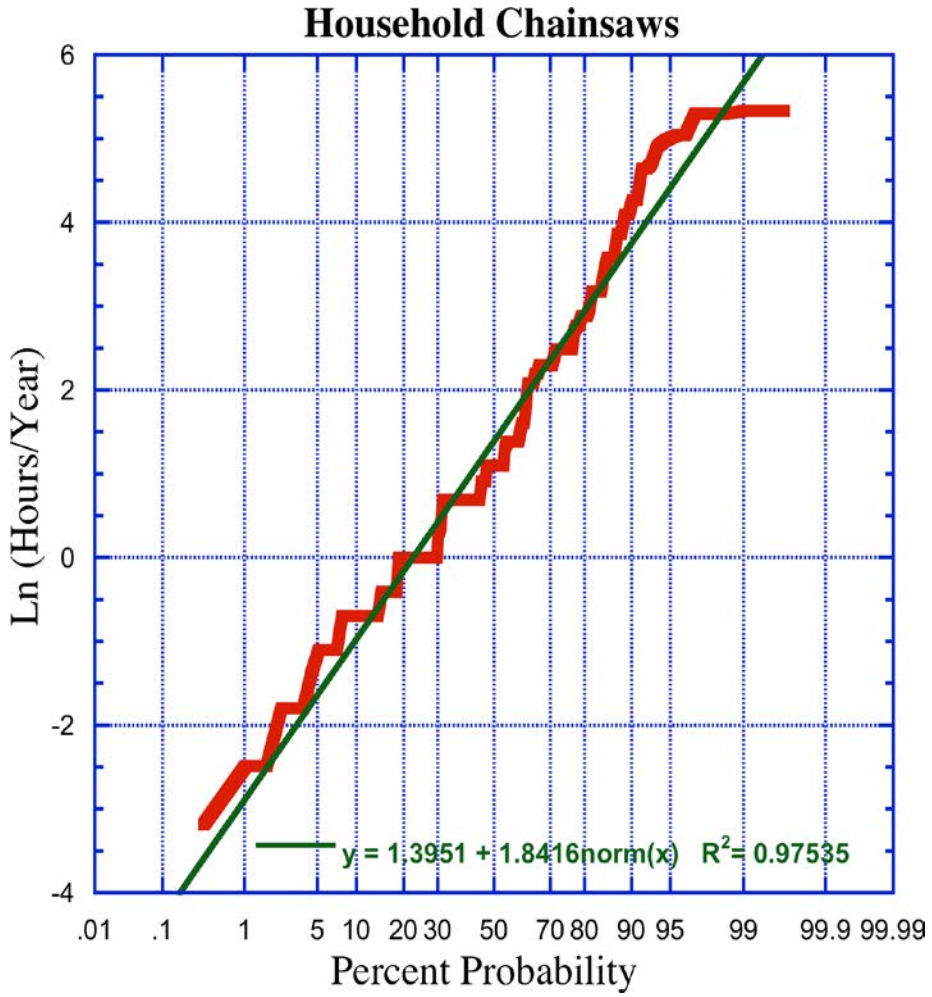
- Method A – Interquartile Range Analysis
  - Outliers > Q3 + 1.5*IQR
  - Applied to hrs/use/year for all surveys; hrs/use/employee for Vendor
  - Screening tool used in parallel and/or series with “peer analysis”
- Method B – Geometric Means Analysis
  - Geometric means from log-normal distribution
- Method C – Peer Analysis – Expert Review
  - Data Review
    - Hours/use, fuel use, use/employee, total equipment hours, etc…
  - Survey Execution
    - Data entry, survey technique, etc…

IQR Analysis Overview





Geometric Means Analysis Overview



Equipment	Use 0.01	Ignore
Chainsaw	1.87	4.39
Compressor	13.02	21.74
Generator	1.95	6.25
Hedge Trimmer	3.76	3.76
Lawn Mower	4.98	10.24
Leaf Blower Or Vacuum	4.84	8.28
Pressure Washer	4.51	5.97
Pump	2.41	2.41
Riding Mower	19.47	88.57
String Trimmer	4.17	6.58
Welder	2.12	4.55

Real World Use Examples

Real World Use Examples - Chainsaws

Husqvarna Chainsaw 545 AutoTune Felling, Limbing and Bucking a Dry Spruce.

One Year's Worth of Firewood in Three Days

Unloading and cutting some logs

How I process my firewood!

Real World Use Examples – Chainsaws

www.fireplacemall.com

Cords/Tree

DIA/HGT	30	40	50	60	70
6	0.05	0.07	0.09	0.11	
8	0.08	0.11	0.14	0.19	
10		0.16	0.2	0.24	0.28
12		0.22	0.27	0.33	0.43
14		0.28	0.35	0.5	0.57
16			0.45	0.54	0.72
18			0.55	0.67	
20			0.67	0.81	

TIME PER CUT

DIA	Sec/in	Reset	Total	
6	1	3	9	
8	1	3	11	
10	1	3	13	
12	1	3	15	
14	1.25	5	22.5	
16	1.5	5	29	
18	1.75	5	36.5	12"
20	2	5	45	16"

Time/Cord (min) - 16" rounds

DIA/HGT	30	40	50	60	
6	67.5	64.28571	62.5	61.36364	
8	51.5625	50	49.10714	43.42105	
10		40.625	40.625	40.625	40.625
12		34.09091	34.72222	34.09091	30.52326
14		40.17857	40.17857	33.75	34.53947
16			40.27778	40.27778	35.24306
18			41.47727	40.85821	41.47727
20			41.97761	41.66667	41.8883

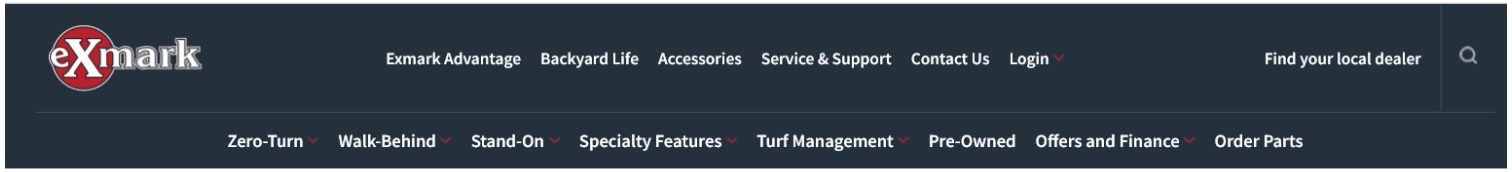
- Alaska Couple
  - 4 cords cut (est 6hr sawtime)
  - 3 cords needed to heat for year
    - 1 Cord = 8’x4’x4’ = 128ft^3 (pictured left)
- Survey response – Residential
  - Average 18.59hr/year
  - 9.7use/year
  - 115min/use
- Mathematical Cords / 115min
  - 0.7 – 2.3 cords / use
  - CA Average: 1.5cords * 9.7use = 14.6 cords/year (6 cords seen pictured left)

Real World Use Examples – WBM

- US Census 2010 “West” new single-family average lot size
  - 0.22 acre
    https://www.census.gov/const/C25Ann/malotsizesold.pdf
  - Avg SF 0.13, SJ 0.15, LA 0.15, RSD 0.2
- Average home size
  - 1700 ft^2
- Average walking speed: 3mph
- Survey Responses
  - 2018 23hr/yr, 27use/yr = 51min/use
  - 2011 670/955 <30min per use
  - 2001 Data Collection = 14min/use (176 units)

- Assuming:
  - 50x192 lot size (min sidewalk, driveway = max grass)
  - 850 ft^2 home footprint (2 stories)
  - Walking speed 2.5mph
  - 18” cut-width
    - Note typical WBM 21”, 18” conservative cut overlap
  - +4.5min maneuver time (>5sec/pass for the modeled lot configuration)
  - Total = 25.7 + 4.5 = 30.2min/avg lot
- Result: CARB 2018 survey 20.8min (69 %) higher than average West new single-family lot size time per use.

OPEI Use Examples – WB & Riding Mowers



MOWER PRODUCTIVITY | TURF MANAGMENT PRODUCTIVITY

Exmark Mower Acres Per Hour Productivity

MPH	21" Width 100%	21" Width 80%	30" Width 100%	30" Width 80%	32" Width 100%	32" Width 80%	34" Width 100%	34" Width 80%	36" Width 100%	36" Width 80%	42" Width 100%	42" Width 80%	44" Width 100%	44" Width 80%	48" Width 100%	48" Width 80%	50" Width 100%	50" Width 80%	52" Width 100%	52" Width 80%
1.5	0.32	0.25	0.45	0.36	0.48	0.39	0.52	0.41	0.55	0.44	0.64	0.51	0.67	0.53	0.73	0.58	0.76	0.60	0.79	0.63
2.0	0.42	0.34	0.61	0.48	0.65	0.52	0.69	0.55	0.73	0.58	0.85	0.68	0.89	0.71	0.97	0.77	1.01	0.81	1.05	0.84
2.5	0.53	0.42	0.76	0.60	0.81	0.65	0.86	0.69	0.91	0.73	1.06	0.85	1.11	0.89	1.21	0.97	1.26	1.01	1.31	1.05
3.0	0.64	0.51	0.91	0.73	0.97	0.77	1.03	0.82	1.09	0.87	1.27	1.02	1.34	1.06	1.45	1.16	1.52	1.21	1.58	1.26
3.5	0.74	0.59	1.06	0.85	1.13	0.90	1.20	0.96	1.27	1.02	1.48	1.19	1.56	1.24	1.69	1.35	1.77	1.41	1.84	1.47
4.0	0.85	0.68	1.21	0.97	1.29	1.03	1.37	1.10	1.45	1.16	1.70	1.35	1.78	1.41	1.94	1.55	2.02	1.61	2.10	1.68
4.5					1.45	1.16	1.55	1.23	1.64	1.31	1.91	1.52	2.00	1.60	2.18	1.74	2.27	1.81	2.36	1.89
5.0					1.62	1.29	1.72	1.37	1.82	1.45	2.12	1.69	2.22	1.77	2.42	1.94	2.53	2.02	2.63	2.10
5.5					1.78	1.42	1.89	1.51	2.00	1.60	2.33	1.86	2.45	1.95	2.67	2.13	2.78	2.22	2.89	2.31
6.0					1.94	1.55	2.06	1.65	2.18	1.74	2.55	2.03	2.67	2.13	2.91	2.32	3.03	2.42	3.15	2.52
6.5							2.23	1.78	2.36	1.89	2.76	2.20	2.89	2.30	3.15	2.52	3.28	2.62	3.41	2.73
7.0							2.40	1.92	2.55	2.03	2.97	2.37	3.11	2.48	3.39	2.71	3.54	2.82	3.68	2.94

Industry QA/QC Outlier Examples

- R3 reported using his lawnmower 12hr/use, that chainsaws and air compressors are 30 years old, and expects to retain them for another 40 years, that a go-kart is 60 years old, and expects to retain it for another 30 years. R3 reported using multiple pumps over 100x/year for 7-12hr/use, with Pump 4, used over 100x/year for 12hr/use for 30years has accumulated 37,440hrs. These product annual and aged run-time responses are not realistic for SORE powered (or equivalent) equipment.
- R71 reported using a gas-powered welder 2x/week for 6hr/use for 15 years (total 9360hr). Gas-powered welders are uncommon compared to their electric counterparts. Gas-powered engines are installed in welders for their mobility. They are not intended for all-day everyday use at fixed locations. This product type and run-time pattern are not economically efficient and not realistic for residential use.

Industry QA/QC Outlier Examples

- R555 responded “don’t know” 55 times. Despite frequent / repeated “don’t know” responses, “probing techniques” continued, and the senior respondent reported use of two electric chainsaws 7x/week, 2.5hr/use, two riding mowers 27hr/week and golf car use 11h/week, among other surveyed equipment. In total R555 reported using surveyed equipment greater than 130hr/week. These product annual and aged run-time responses are not realistic for SORE powered (or equivalent) equipment.
- R658 reported using gas-powered surveyed equipment, including 522hr/year of chainsaw use, 1248 hr/year of pressure washer use, and a gas-powered welder 2190 hr/year for 16years (total 34,944hrs), a total of 5450hr/year (105hr/week). These product annual and aged run-time responses are not realistic for SORE powered equipment.

Industry QA/QC Outlier Examples

- R659 reported using her chainsaw 3x/year for 24hr/use. 24hr/use is not a realistic product run-time response.
- R783 reported using a gas-powered air compressor 7x/week, 1hr/us (365hr/year) for 70 years, for a total of 25,480hrs, despite filling his 2 gas cans just 3x/year. Gas-powered air compressors are uncommon compared to their electric counterparts. Gas-powered engines are installed in compressors for their mobility. They are not intended for all-day everyday use at fixed locations. This product type and use pattern are not economically efficient and not reasonable run-time responses for residential use. The aged product use is not realistic for SORE powered equipment. The reported fuel consumption is far short of what would be required to run product as reported. This response is not realistic for SORE powered equipment.

Industry QA/QC Outlier Examples

- C46 (auto-repair) reported using a gas-powered welder 7x/week 6hr/use (2184hr/yr), refueling two 2.5 gallon gas cans just twice a month. Gas-powered welders are typically larger single-cylinder or v-twin engines, well loaded. The fuel consumption does not match the reported fuel use. Additionally, gas-powered welders are uncommon compared to their electric counterparts. Gas-powered engines are installed in welders for their mobility. They are not intended for all-day everyday use at fixed locations. This product type and use pattern are not economically efficient and not realistic run-time responses.
- C239 (dentist office) reported using a generator 4x/week 9hr/use (1872 hy/yr). 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 realistic product run-time response.

Industry QA/QC Outlier Examples

- C301 reported using two lawnmowers and a string trimmer 3.5x/week 6hr/use (LM2 total 8737hr), plus additional electric trimmer use on a 5acre property. A 21” WBM takes approximately 10hr to cut 5 acres. The reported use would be equivalent to cutting the grass 4x/week, and thousands of gallons of fuel/year. It is not economical or reasonable to maintain a commercial marina warehouse property this way. Collectively these are not realistic product run-time responses.

Industry QA/QC Outlier Examples

- C319 reported to use a propane-powered welder 365x/year 8hr/day for 60years (total 175200hr). This is not an equivalent SORE powered type of equipment, as evident by the description of equipment use pattern and age.

Industry QA/QC Outlier Examples

- C453 (LAPD) reported using multiple gas-powered leaf-blowers identically high 4x/week 2hr/use at its 1-acre facility, despite the city ban on residential gas-powered leaf blower ban. Additionally, the respondent reported using a UTV 5x/week 6hr/use for 15 years (total 23400hrs). This equates to a car traveling 700,000miles at an average 30mph. Collectively, these are not realistic product run-time responses for SORE (or equivalent) powered equipment.
- C535 reported that grounds are maintained solely by a contract landscaper, yet reports the business uses surveyed gas-powered equipment >3600hr/yr. These are not consistent responses.
- C971 (school) reported using a gas-powered generator “at least 1x/day” 8hr/use for 4 years (total 11776hr) after originally responding “don’t know”.

Industry QA/QC Outlier Examples

- V72-G1 reported gas-powered equipment use of 4413 hr/year, 85 hr/week, with just one employee. This is not realistic equipment run-time per employee per week. Additionally, the respondent reports servicing 10 clients/weekly and 30 clients less than once a week, all for 31-60minutes/service. This results in 12.7 to 30hrs/week total. The equipment use time does not match the client service time.

Industry QA/QC Outlier Examples

- V196-G1 reported;
  - Using a lawnmower 6x/week, 7hr/use for 7 years (total 15,288hr), a leaf blower 6x/week, 7hr/use for 3 years (total 6552hr), and a string trimer 5x/week, 4hr/use for 3 years (total 3120hr). These product annual and aged run-time responses are not realistic.
  - Total 5304 hr/year equipment run-time, with just one employee (104hr/week). The respondent reported servicing 15 clients daily and 45 clients once/week, all for between 31-60min/service (total 6*15*45/60+45*45/60 = 101hrs). It is not realistic to assume one person's equipment run-time exceeds 100hr/week, and working hours far exceed that plus transport time between 135 jobs/week, every week.

Industry QA/QC Outlier Examples

- V319-G1 reported using multiple lawnmowers, leaf blowers, string trimmers and 30x snowblower “at least once a day” (6x/week), >1hr/use (1.25hr/use), 390hr/year/unit. Collectively, these are not realistic responses because these types of equipment are used seasonally, not used simultaneously year-round.
- V571-G1 reported identical high use on three chainsaws (bulk response despite just 3 units), reporting “at least 1x/day” and “greater than 1hr/use” (total 6*52*1.25 = 390hr/yr) with CS1 6-10 years (total 3120hr) CS2 10-20 years (total 5850hr) and CS3 >20 years (7800+hr). These are not realistic aged run-times for this type of equipment.

Industry QA/QC Outlier Examples – Annual (hrs)

3

Combined Landscape Gasoline Equipment Annual Hours															
			Chainsaw		ledge Trimme		Lawn Mower		Blower Or Vac		Riding Mower		String Trimme	
	ID	Unit	Gas	Hours	Gas	Hours	Gas	Hours	Gas	Hours	Gas	Hours	Gas	Hours
8	3-G2	1	1	60	1	91	1	1820	1	1820	1	2548	1	1820
9		2			1	273			1	1260			1	1820
0		3											1	1820
1	30-G1	1	1	96	1	728	2	4368	1	2184	1	1092	1	1092
2		2	1	24	1	728	1	2184	1	2184			1	1092
3		3	1	16	1	728	1	2184	1	2184			1	1092
4		4	1	16	1	728							1	1092
3	91-G1	1	1	5	1	104			1	2080				
4		2			1	208			1	2080				
5		3							1	2080				
6		4							1	2080				
7		6+											6	456.25
4	96-G1	1	1	5	1	2080	1	2080	1	2080			1	2080
3	127-G1	1	1	104	1	312	1	624	1	624			1	312
4		2	1	208	1	312			1	832			1	312
5		3	1	208	1	312			1	832			1	312
6		4							1	832			1	312
7		5							1	832			1	312
7	174-G1	1			1	208	1	1040	1	624			1	1040
8		2			1	208	1	1040	1	624			1	832
0	182-G1	1	1	208	1	416							1	624
1		2	1	208	1	624							1	624
2		3	1	208	1	624							1	624
3		4	1	208	1	624							1	624
4		5	1	208	1	624							1	624
5		6+					10	65	10	456.25				

2

2

Combined Landscape Gasoline Equipment Annual Hours														
			Chainsaw		ledge Trimme		Lawn Mower		Blower Or Vac		Riding Mower		String Trimme	
	ID	Unit	Gas	Hours	Gas	Hours	Gas	Hours	Gas	Hours	Gas	Hours	Gas	Hours
3	218-G1	1			1	312							1	1248
9		2			1	312							1	1248
0		3			1	312							1	1248
1		4			1	312							1	1248
2		5											1	1248
3		6+	8	19.93			7	456.25	8	358.44				
9	271-G1	1			1	26			1	91			1	2880
0		2			1	34.67			1	65			1	2160
1		3			1	34.67			1	60.67			1	2160
2		6+	13	140.82										
5	284-G1	1	1	728										
6		2	1	728										
7		3	1	728										
8		4	1	728										
9		5	1	728										
2	305-G1	1	1	9.97	1	416	1	832	1	1560			1	780
3		2	1	4.6	1	312	1	832	1	1560			1	780
4		3	1	4.6			1	832	1	1560			1	780
5		4							1	1560			1	312
6		5											1	468
3	362-G1	1	1	12	1	416			1	2080			1	2080
9		2							1	2080			1	2080
1	365-G1	1	1	780	1	43.33	1	43.33	1	1300	1	43.33	1	43.33
2		2			1	43.33	1	43.33	1	1300			1	43.33
3		3							1	1300			1	43.33
5	376-G1	1			1	1040	1	1040					1	1040
6		2			1	1040							1	1040
5	436-G1	1												
6		6+	2	9.1	2	139.92	3	456.25	5	456.25			5	456.25
7	437-G1	6+			4	139.92	3	456.25	3	456.25			4	456.25

Industry QA/QC Outlier Examples – Age (hrs)

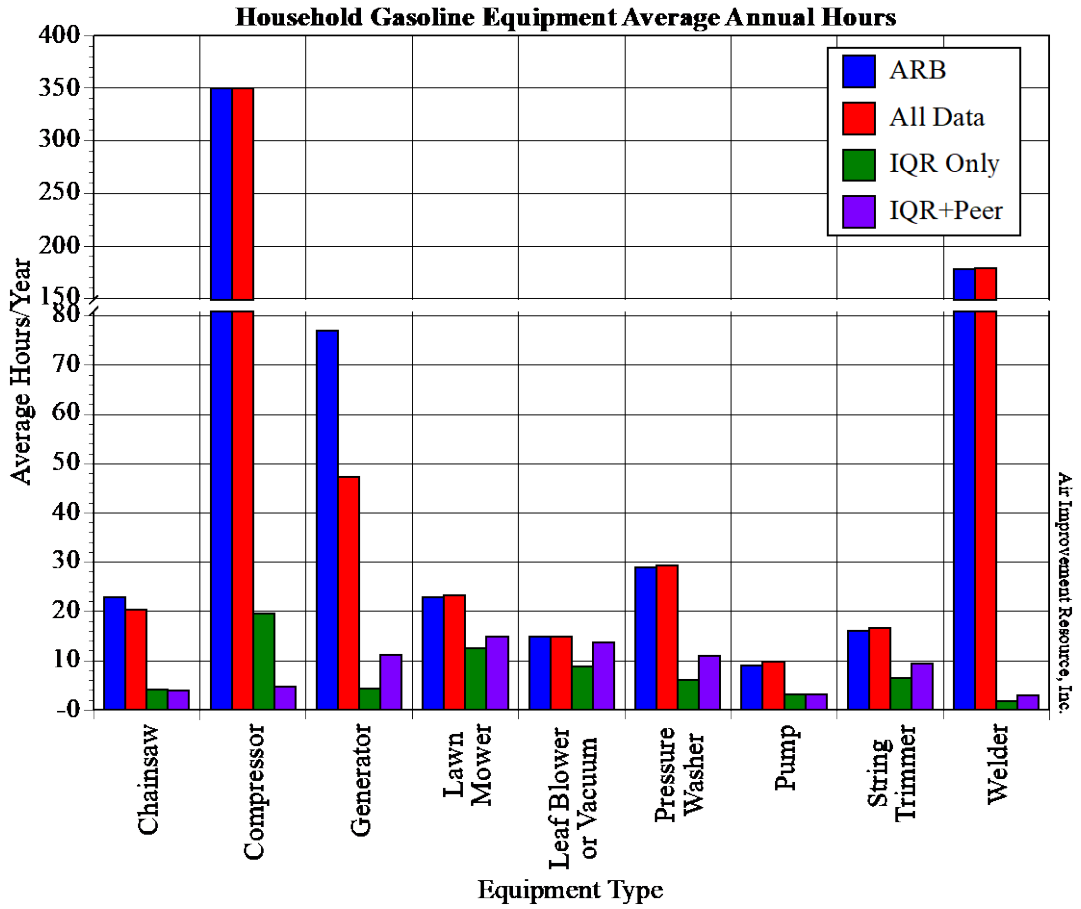
Landscape Equipment Age in Hours															
			Chainsaw		Hedge Trimmer		Lawn Mower		Leaf Blow/Vac		Riding Mower		String Trimmer	
	ID	Unit	Gas	Age	Gas	Age	Gas	Age	Gas	Age	Gas	Age	Gas	Age
5	30-G1	1	1	576.00	1	2,912.00	1	13,104.00	1	10,920.00	1	10,920.00	1	4,368.00
6		2	1	168.00	1	2,912.00	1	13,104.00	1	10,920.00			1	4,368.00
7		3	1	64.00	1	2,912.00	1	13,104.00	1	10,920.00			1	4,368.00
8		4	1	144.00	1	2,912.00	1	13,104.00					1	4,368.00
24	89-G1	1			1	455.00	1	11,648.00	1	364.00			1	485.33
2	91-G1	1	1	10.00	1	624.00			1	6,240.00				
3		2			1	1,248.00			1	6,240.00				
4		3							1	6,240.00				
5		4							1	6,240.00				
6		6+											6	228.13
4	115-G1	1	1	346.67	1	240.00	1	8,320.00	1	14,560.00			1	2,496.00
5		2	1	240.00	1	80.00	1	320.00						
6		3					1	320.00						
7		4					1	0.00						
4	127-G1	1	1	520.00	1	1,248.00	1	3,744.00	1	4,992.00			1	936.00
5		2	1	728.00	1	1,248.00			1	4,992.00			1	468.00
6		3	1	728.00	1	936.00			1	4,992.00			1	624.00
7		4							1	4,992.00			1	312.00
8		5							1	3,328.00			1	312.00
0	151-G1	1			1	156.00					1	18,720.00		
1		2			1	156.00					1	2,496.00		
2		3			1	26.00					1	832.00		
5	174-G1	1			1	624.00	1	17,680.00	1	8,736.00			1	3,120.00
6		2			1	624.00	1	3,120.00	1	8,736.00			1	3,328.00
4	196-G1	1					1	15,288.00	1	6,552.00			1	936.00
5		2											1	1,872.00
0	284-G1	1	1	7,280.00										
1		2	1	7,280.00										
2		3	1	7,280.00										
3		4	1	7,280.00										
4		5	1	7,280.00										
0	289-G1	1	1	360.00	1	624.00	1	24.00	1	16,380.00			1	2,184.00

Landscape Equipment Age in Hours															
			Chainsaw		Hedge Trimmer		Lawn Mower		Leaf Blow/Vac		Riding Mower		String Trimmer	
	ID	Unit	Gas	Age	Gas	Age	Gas	Age	Gas	Age	Gas	Age	Gas	Age
0	289-G1	1	1	360.00	1	624.00	1	24.00	1	16,380.00			1	2,184.00
1		2	1	360.00	1	1,248.00			1	780.00			1	1,248.00
2		3	1	360.00	1	1,248.00								
3		4	1	56.00										
4		5	1	120.00										
8	292-G1	1	1	48.00	1	24.00	1	9,360.00	1	7,488.00	1	80.00	1	3,744.00
9		2	1	100.00	1	0.00	1	1,040.00	1	192.00			1	72.00
0		3	1	48.00					1	600.00			1	0.00
2	308-G1	1	1	208.00			1	2,912.00			1	2,080.00	1	6,240.00
3		2	1	130.00			1	3,640.00					1	6,240.00
4		3	1	390.00			1	2,184.00					1	1,872.00
5		4					1	10,920.00					1	3,120.00
6		5					1	7,280.00					1	1,872.00
7		6+							10	3,650.00				
0	324-G1	1	1	1,248.00							1	18,200.00		
1		2									1	0.00		
2		6+			9	1,254.69	10	1,007.93	7	1,368.75			9	1,254.69
5	361-G1	1			1	780.00	1	13.00	1	12,480.00			1	520.00
6		2			1	0.42	1	2.50						
1	376-G1	1			1	10,400.00	1	10,400.00					1	10,400.00
2		2			1	10,400.00							1	10,400.00
3	402-G1	1	1	34.67	1	1,092.00	1	260.00	1	260.00	1	5,200.00	1	6,240.00
4		2							1	520.00			1	9,880.00

Overview of Outlier Potential Root Causes

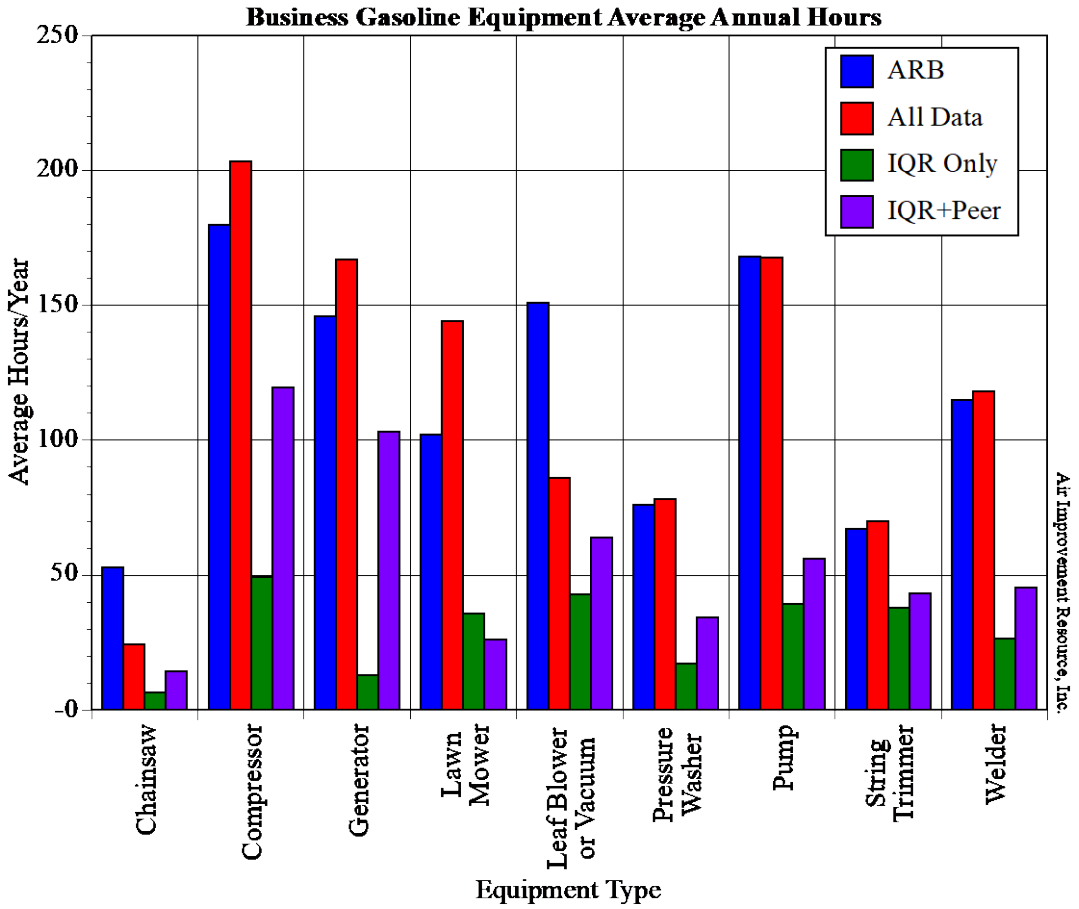
- Respondent did not understand the scope of the survey
- Respondent did not understand the survey / questions
- Respondent was not the person most familiar with the use of the product
- Respondent provided unrealistic or exaggerated responses
- Survey “probing techniques” spurred in guessing
- Interviewer lacked subject matter expertise
- Interviewer interpreted (mis-interpreted) non-specific responses
- Interviewer incorrectly entered data

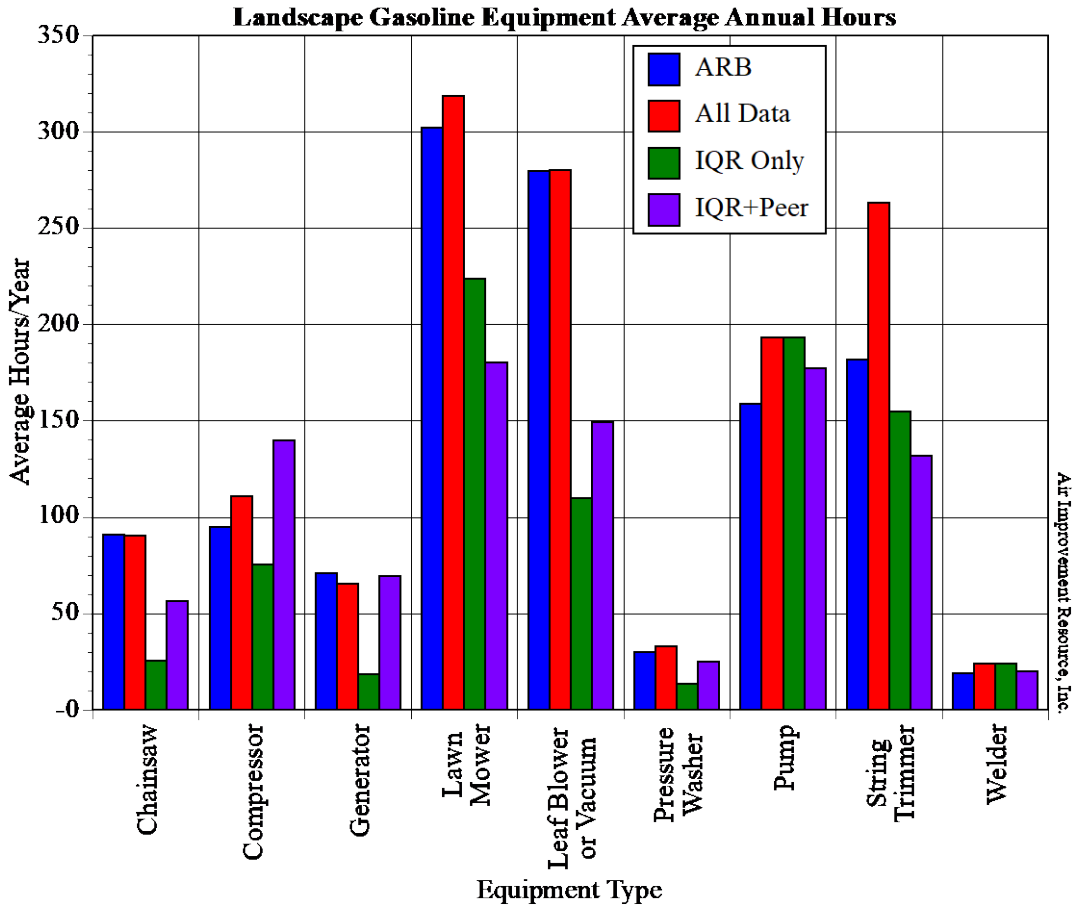
Industry Outlier Overview – Household



*DRAFT EXAMPLES FOR DISCUSSION PURPOSES ONLY – NOT FINAL CONCLUSIONS OR RECOMMENDATIONS

Industry Outlier Overview – Commercial & Vendor





*DRAFT EXAMPLES FOR DISCUSSION PURPOSES ONLY – NOT FINAL CONCLUSIONS OR RECOMMENDATIONS

Additional Data Extrapolation Questions

- Statistical confidence questions:
  - What is the statistical confidence of emission factors based on extrapolation of small sample population?
    - (R) Lawn Tractors / Riding Lawn Mowers – 13 units, 152hr/year (proposed SORE2020)
      - OFFROAD2007 28hr/yr
      - 2001 Survey Data Collection Method – 14.6 / 28.2 hr/yr, 3 Tractors & 6 Riding Mowers
      - 2012 Survey (2,999 complete surveys) 45/62 units < 1hr/use, <31use/year
    - (R) Wood Splitters – 1 unit, 48hr/year (proposed SORE2020)
      - OFFROAD2007 1.1hr/yr
      - 2001 Survey Data Collection Method – 1.1 hr/yr
      - 2012 Survey (2,999 completed surveys) 8/15 units < 1hr/use, <17use/year
    - (V) Wood Splitters – 2 units, 14hr/year, but maintained OFFROAD2007 128.6hr/yr
    - (R) Tillers – 4 units, 21hr/year (proposed SORE2020)
      - OFFROAD2007 18hr/yr
      - 2012 Survey (2,999 completed surveys) 32/40 units < 1hr/use, <10use/year

Additional Data Extrapolation Questions

- Statistical confidence questions:
  - What is the impact of removing outliers – Population and age-distribution considering updated sample sizes, and survey statistical confidence after removing outliers?
- “Other Equipment” questions:
  - (R) How was the “other equipment” annual use calculated?
    - Despite carving out unique riding mower, wood splitter and tiller categories, they appear to be included in the “other equipment” annual use average calculation, resulting in an increase from roughly 4 hr/year to 43hr/year?
      - OFFROAD2007 4.3hr/yr
      - 2001 Survey Data Collection Method – 4.3hr/yr
      - 2012 Survey “Not Listed” (2,999 completed surveys) 14/14 units < 1hr/use, <20use/year

Additional Data Extrapolation Questions

- Additional questions
  - How was seasonal product use considered when reviewing, extrapolating, and analyzing data?
    - Many respondents report weekly use rates for NO CA counties, some of which have significant average snowfall Nov/Dec – Mar, which would impact annual use of mowers, string trimmers, leaf blowers, etc…
  - How were product bans and use-restrictions considered when reviewing, extrapolating and analyzing data?
    - At least 1.6M residential homes in municipalities with leaf-blower bans (estimated based off 2016 population estimates and assuming 3 persons/household)
    - Many municipalities have time and day/week use restrictions for OPE
    - General courteous use and daylight considerations

Emissions Inventory Impact Examples

Chainsaws Non-Preempt Res (<2hp = <50cc)

CVRU	Annual	UL	Year	HCzr	HCDR	NOxzr	NOxDR		DR CAP
			1994	226.47	0	0.96	0		450
			1999	141.82	0	0.9	0		
			2004	20.25	0.251	1.92	0		
C	53	4	2040	30.608	0.072407	0.977	0.002311		
			1994	226.47	0	0.96	0		
			1999	141.82	0	0.9	0		
			2004	20.25	0.251	1.92	0		
V	91	4	2040	30.608	0.072407	0.977	0.002311		
			1994	226.47	0	0.96	0		
			1999	141.82	0	0.9	0		
			2004	20.25	0.251	1.92	0		
R	18	7	2040	30.608	0.434439	0.977	0.013865		
GK SURVEY ANALYSIS R=5hr									
AIR IRQ SURVEY ANALYSIS C=42 , V=110									
					Commercial-Business				
EquipType	MODEL YE	TECH GRO	HP GROUP		POP-C	HRS	HC g/hp.h	NOx g/hr.	HC+NOx
Chainsaws	2031	G2-Carb	2	1	5759.704	53	34.44557	1.099483	35.54505
Chainsaws	2030	G2-Carb	2	2	15785.46	106	38.28314	1.221966	39.50511
Chainsaws	2029	G2-Carb	2	3	22296.18	159	42.12071	1.344449	43.46516

- SORE2020 Draft
  - Annual 53/91/18hr
  - Standard 72g/kW.hr
  - Total 13.6tpd
  - Total Adj to 50g/kW.hr 7.45tpd
- Industry IQR / Peer
  - Annual 42/110/5hr
  - Standard 50g/kW.hr
  - Total 3.84tpd
- Residential 18 to 5hr (50g/kW.hr)
  - 4.84tpd to 1.01tpd

Riding Mowers 5-25hp Residential

B	C	D	E	F	G	H	I	J	K
CVRU	Annual	UL	Year	HCzr	HCDR	NOxzr	NOxDR		DR CAP
			1994	7.46	0.0141	3.48	0.00109		1500
			2001	4.42	0.0166	2.32	0		
			2007	4.12	0.00495	2.68	0.00321		
C	330	8	2040	3.14	0.00115	1.252	0.000459		
			1994	7.46	0.0141	3.48	0.00109		
			2001	4.42	0.0166	2.32	0		
			2007	4.12	0.00495	2.68	0.00321		
V	330	4	2040	3.14	0.00115	1.252	0.000459		
			1994	7.46	0.0141	3.48	0.00109		
			2001	4.42	0.0166	2.32	0		
			2007	4.12	0.00495	2.68	0.00321		
R	152	9	2040	3.14	0.004601	1.252	0.001834		
GK SURVEY ANALYSIS R=46hr				0.714936	0.002299	0.285064	1.710383	0.000917	
				4.289617			Commercial-Business		
EquipType	MODEL YE	TECH GRO	HP GROUF	COUNTER	POP-C	HRS	HC g/hp.h	NOx g/hr.	HC+NOx g/h
Riding Mov	2031	G4-Carb	25	1	58.77542	330	3.5195	1.40347	4.92297
Riding Mov	2030	G4-Carb	25	2	140.3592	660	3.899	1.55494	5.45394
Riding Mov	2029	G4-Carb	25	3	146.6439	990	4.2785	1.70641	5.98491
Riding Mov	2028	G4-Carb	25	4	144.4552	1320	4.658	1.85788	6.51588

- SORE2020 Draft
  - Annual 330/330/152hr
  - Total 5-15hp 4.65tpd
  - Total 15-25hp 2.87tpd
- Industry IQR / Peer
  - Annual Res 50hr
  - Total 5-15hp 1.18tpd
  - Total 15-25hp 0.61tpd
- Total 152hr to 50hr
  - 7.5tpd to 1.8tpd

Leaf Blower/Vacuum Vendor (<2hp = 50cc)

B	C	D	E	F	G	H	I	J	K
CVRU	**Annual**	**UL**	**Year**	**HCzr**	**HCDR**	**NOxzr**	**NOxDR**		**DR CAP**
			1994	226.47	0	0.96	0		450
			1999	141.82	0	0.9	0		
			2004	20.25	0.251	1.92	0		
C	151	4	2040	29.463	0.078547	0.54	0.001441		
			1994	226.47	0	0.96	0		
			1999	141.82	0	0.9	0		
			2004	20.25	0.251	1.92	0		
V	280	3	2040	29.463	0.078547	0.54	0.001441		
			1994	226.47	0	0.96	0		
			1999	141.82	0	0.9	0		
			2004	20.25	0.251	1.92	0		
R	15	5	2040	29.463	0.471283	0.54	0.008645		
AIR IRQ SURVEY ANALYSIS R=9hr, C=43 , V=110									
					Commercial-Business				
EquipType	**MODEL YE**	**TECH GRO**	**HP GROUP**		**POP-C**	**HRS**	**HC g/hp.h**	**NOx g/hr.**	**HC+NOx**
Leaf Blowe	2031	G2-Carb	2	1	6039.376	151	41.3236	0.757591	42.08119
Leaf Blowe	2030	G2-Carb	2	2	29789.64	302	53.18419	0.975182	54.15938
Leaf Blowe	2029	G2-Carb	2	3	37119.08	453	64.80915	1.18845	65.9976
Leaf Blowe	2028	G2-Carb	2	4	34474.94	604	64.80915	1.18845	65.9976
Leaf Blowe	2027	G2-Carb	2	5	27247.12	755	64.80915	1.18845	65.9976
Leaf Blowe	2026	G2-Carb	2	6	19072.98	906	64.80915	1.18845	65.9976

- SORE2020 Draft
  - Annual 151/280/15hr
  - Standard 72g/kW.hr
  - Total 8.7tpd
  - Total Adj to 50g/kW.hr 5.4tpd
- Industry IQR / Peer
  - Annual 43/110/9hr
  - Standard 50g/kW.hr
  - Total 1.98tpd
- Vendor 280 to 110hr (50g/kW.hr)
  - 2.33tpd to 0.87tpd

Next Steps – Discussion

- Model Schedule:
  - May/June – Draft model published
  - June/July – 45-day formal comment period
  - September/October – Final model published
- Rulemaking Schedule
  - May – SORE Workshop Doodle Poll
  - May – SORE Rulemaking Workshop – Draft Rule Presentation
  - September – ISOR
  - September/November – 45-day formal comment period
  - November – Presentation to CARB

Next Steps – Discussion

- Industry would like to work with CARB on revising existing data used for the 2020 SORE Inventory Model and exploring additional data collection methods to assure the SORE emissions inventory is properly reflected.

Thank You

ANNEX B

OPEI & EMA CARB Survey Outlier Summary

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

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. *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	REJECT & REMOVE R3

	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,	REJECT & REMOVE R20

	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.	
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. *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	REJECT & REMOVE R91

	(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.	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.	REJECT & REMOVE R109

	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.	
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
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	REJECT & REMOVE R164

	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.	
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
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 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.	REJECT & REMOVE R482

	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.	
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.	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:	REJECT & REMOVE R555

	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 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,	

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

	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.	
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
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:	REJECT & REMOVE R594

	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 = 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.	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	CHANGE ST1 USAGE to “don’t know”

	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.	
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 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.	REJECT & REOMVE R658
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

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 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.	REMOVE CS1
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	REMOVE PUMP1

	"everyday" and/or "all day" for these responses. This response is the next survey day following other unrealistic 24hr/use responses.	
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 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.	REJECT & REMOVE R799
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 of equipment, or simply answered "same" without considering use time of each saw, or if they owned multiple pieces of equipment to being with.	REJECT & REMOVE R969
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	REJECT & REMOVE R1086

	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.	
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
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
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
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 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.	REMOVE & REJECT C301
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 using a gas-powered chainsaw 1x/week 1hr/use, but 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
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
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	3

	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.	
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
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
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.	REMOVE & REJECT C1222
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
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
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 3234hr/yr use on gas-powered equipment with just one employee. This is 62hr/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.	REMOVE & REJECT V2-G4
V2	G5	The respondent reports 3447hr/yr use on gas-powered equipment with just one employee. This is 66hr/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.	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.	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.	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 2673hr/yr use on gas-powered equipment with just one employee. This is 51hr/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 3710hr/yr use on gas-powered equipment with just one employee. This is 71hr/week engine running time per employee. The respondent also reports servicing 30 clients/week between 1-2hr/service (90hrs/week). This is not reasonable for one person.	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	REMOVE & REJECT V18-G4

		(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.	
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. This is not reasonable a reasonable.	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 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 lawnmower, 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.	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 how much use based on either the use or age being exaggerated. Remove CS1 and additional review should be considered.	AIR ADDITIONAL DISCUSSION REQUIRED GTK REMOVE CS1
V72	G2	The respondent reports 4413hr/yr use on gas-powered equipment with just one employee. This is 85hr/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.	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. This is not realistic run time for a single employee. Additionally, the respondent reports only doing tree trimming, yet reports 2912 hr/year on lawnmower.	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 11374 annual hours of gas-powered equipment use across just 3 employees, 73hr/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. 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 V91-G1
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.	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.	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.	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 employee. The respondent reports servicing approximately 50 clients per week. Industry does not believe this is reasonable for one person.	REMOVE & REJECT V140-G2
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 –	REMOVE & REJECT V142-G2

		44hr/week. The equipment use time does not match the client service time.	
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	REMOVE & REJECT V164-G2

		37hr/week. The equipment use time does not match the client service time.	
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.	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	REMOVE & REJECT V218-G1

		employee, while servicing 60+ clients/week. This is not realistic run-time per person.	
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.	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.	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.	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 of each product, or if they owned multiple pieces of equipment to being with.	REMOVE & REJECT V208-G1
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.	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	REMOVE & REJECT V362-G1

		2600hr). The equipment use time does not match the client service time. These are not realistic responses.	
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.	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.	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),	REMOVE & REJECT V402-G1

		ST1 5x/week, 4hr/use, 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.	
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