March 16, 2023

Clerks' Office
California Air Resources Board
1001 I Street
Sacramento, California 95814
Electronic submittal: https://www.arb.ca.gov/lispub/comm/bclist.php

Subject: Comments Regarding the Revised In-Use Locomotive Regulation
CCR, Chapter 9, Article 8, Sections 2478 through 2478.16

Dear California Air Resources Board Freight Systems Section:

The California Grain and Feed Association (CGFA) is pleased to offer the following comments regarding the revised In-Use Locomotive Regulation, California Code of Regulations (CCR), Chapter 9, Article 8, Sections 2478 through 2478.16.

INTRODUCTION

CGFA represents Grain and Feed suppliers throughout California. CGFA member companies provide a critical link in the food supply in California by managing feed from the growers to the livestock. Grain and Feed operators use small locomotives to move railcars around their facilities to facilitate offloading. As currently written, these locomotives would be subject to the Draft Proposed In-Use Locomotive Regulation.

The Draft Proposed In-Use Locomotive Regulation would impose a significant financial burden on the affected Grain and Feed facilities without a significant corresponding benefit to air quality or public health. CGFA member companies are low-emitting facilities predominately located in remote rural areas. Thus, the facility emissions do not contribute significantly to the regional emission inventory, do not significantly contribute to exceedances of NAAQS or CAAQS, and do not pose direct unreasonable health risks to local populations.

CGFA provided extensive comments on the draft rule in November 2022; our comments concerned the following areas:

- The high cost and unproven reliability of proposed ZE technologies;
- The lack of analysis during rulemaking of the Industrial category of locomotives;
- The inappropriateness of the Spending Account as a regulatory requirement;
- Suggested improvements to the timelines allowed for the Temporary Locomotive Operating Waiver;
- Availability of offsite emissions reductions for use for the Alternative Compliance Plan;

- The threshold for access to the Small Business Hardship Extension;
- Cost Effectiveness as an exemption alternative; and
- Deficiencies in the CEQA Analysis prepared for the Draft rule.

Since our comments were not addressed in the revised rule, we are resubmitting our comments for additional consideration. Our November 2022 comments are provided in Attachment 1.

We appreciate the opportunity to provide comments for the revised rule and hope that CARB will consider changes to the rule described herein.

PROCEDURAL COMMENTS

CGFA provided extensive comments on the draft rule in November 2022. It is not obvious that CARB has considered our comments. We ask that CARB either revise the regulation to address our prior comments or, in the interest of transparency, publish the Draft Final Statement of Reasons so that the reasons for accepting or rejecting all comments received are available for public review.

CGFA requests that the Public Comment period for the revised rule be extended by 30 days. With the Technical Support Document, CARB suggested that existing locomotives can be retrofitted with batteries and/or fuel cells and that the economics of such retrofit render the proposed rule more cost-effective than the previous analysis developed for the original draft rule. The 15 days allowed for this public comment period is insufficient to review the extensive documentation upon which CARB based its determination or to identify and evaluate information that may either support or contradict CARB's analysis.

COMMENTS ON REVISED DRAFT REGULATION

The remaining comments herein address subjects raised with the rule revision and supporting documentation and are subject to the 15-day comment period.

Low-Use Exemption

In our November 2022 comments, CGFA suggested that low-use operators be exempted from the regulation (in addition to the low-use exemption allowed for historic locomotive operators), as the cost of implementation does not provide corresponding air quality benefits. The revised rule does not address our concerns or suggestion. However, CARB did make changes to the regulation that potentially benefit some operators (i.e., the Alternative Fleet Milestone Option [AFMO]) and implied that those changes would have a negligible (i.e., less than 1%) impact on program emissions, as noted in the Summary of Proposed 15-Day Changes and Technical Support Document. As explained in our November 2022 comments, all CGFA operators combined emit less than 0.4% of the rail emissions in California. If AFMO is allowed because it results in a negligible emissions increase (1%), exempting operators that emit only 0.4% of the statewide rail emissions should be incorporated into the rule.

Delayed Compliance Schedule
If CARB is unwilling to exempt low-emitting operators (as suggested above), CGFA requests that CARB consider incorporating a delayed compliance option for operators of single locomotives. The AMFO offers a delayed compliance option for fleet operators. Fleet operators have higher emissions than single locomotive operators. As noted in the Summary of Proposed 15-Day Changes and Technical Support Document, this portion of the revised rule is expected to be utilized by rail operators transporting passengers through densely populated areas. Logically, CGFA operators with lower emissions that operate in lightly populated rural areas should also be afforded a delayed compliance schedule alternative.

COMMENTS ON TECHNICAL REPORT

While we request additional time to review and comment on the proposed regulations and accompanying documents, CGFA offers the following comments developed before the posted deadline.

Industrial Users are Not Evaluated During Rule Development
CARB continues to propose to regulate the Industrial category of locomotive operators despite failing to conduct an evaluation of the impacts on the Industrial user category. We provided evidence of this omission in our November 2022 comments. Additional evidence of this omission is found in the Technical Support Document developed to support the revised rule. Figure 1 (page 3) and Table 1 (page 4) provide data for Line Haul, Switcher, and Passenger locomotives. Switcher locomotives appear to have been the focus of the Technical Support Document; however, Industrial locomotives were not evaluated. As discussed in our November 2022 comments, the Industrial locomotives operated by CGFA members have vastly different operating profiles and schedules, power demands, fuel use, emissions, and economics than Line Haul, Switcher, or Passenger locomotives. We ask that CARB evaluate Industrial locomotives as a separate source category and evaluate the Industrial category to the same level of detail that these other categories were evaluated so that any conclusions reached can be validated and any regulations developed for the category reflect the operating conditions and constraints of the category.

Battery Cost
CARB has relied on published data and assumptions regarding the future price of batteries in making its economic assessment of the proposed rule, including an industry report from 2013 that suggests battery costs will decline over time.[1] In the Technical Support Document, CARB cites the following information from a 2020 Department of Energy (DOE) report: "Significant advances in battery technologies have occurred in the last 10 years, leading to battery pack cost decreases of approximately 85 percent, reaching $143/kilo-Watt-hour (kWh) in 2020. "[2] CARB uses this information to conclude: "Using $143/kWh, the 20 MWh battery will cost about $2.86 million. This is similar to the cost estimate from 2013 by TransPower, even with over three times the battery capacity. As battery cost falls and their energy density increases, staff estimates

[1] From the Technical Support Document, page 10: "TransPower estimated the battery cost to be $3 million in 2015 and $1 million in 2030."
[2] The DOE report does not cite lithium prices during the period that battery costs were evaluated, and does not make any projections for battery pricing in the future.

that the cost of a battery tender could be around $3–5 million depending on the required battery capacity. ”[3]

The cost data upon which the TransPower and DOE reports are based is out-of-date, as the price of lithium carbonate (a key raw material in battery production) has increased substantially since those reports were published. Lithium carbonate traded at around $5,125 per ton in 2015.[4] The global weighted average price of lithium carbonate was $6,128 in August 2020 and $59,928 per metric ton in August 2022, according to Benchmark Mineral Intelligence.[5] Thus, while lithium prices were relatively flat for the period of 2015 to 2020, the price has increased more than 1000% since the TransPower report was published and more than 900% since the DOE report was published. In the last 10 years, the cost of nickel, another key ingredient for cathode production, has ranged from a low of $6,227.70 per ton in February 2016 to a high of $48,132.50 per ton in March of 2022,[6] an increase of almost 800%. Given that the cost of the metals in the cathode of a battery is 34%[7] to 51%[8] of the total cost of the battery, by failing to consider the materials cost variations in its analysis, CARB has potentially underestimated the cost of batteries by more than 70%.[9] The global push towards electric vehicles will likely continue to drive higher lithium carbonate and nickel prices. CARB's failure to consider cost variations in critical battery component metals severely impacts the cost burden to the industry and the cost-effectiveness of any emission reductions achieved.

The Technical Support Document describes the two favored ZE technologies as battery and fuel cell-battery hybrid. However, besides the outdated costing information discussed above, the Technical Support Document provides little information regarding batteries. Considering that CARB concludes that all ZE options will likely include batteries for some or all the power, it is surprising that in the development of the Technical Support Document, CARB did not consult any mining companies, metals brokers, or mining industry analysts to understand how metals pricing or availability are expected to change in the coming years.[10] Perhaps, given the pace of battery development, improvements in battery efficiency and energy density will compensate for the increase in raw material cost; however, CARB also did not consult with any battery manufacturers to understand the trends in the industry when developing the Technical Support Document. At a minimum, CARB should revise both the technical and cost-benefit analyses in

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[3] Technical Support Document, page 11.

[4] Argus White Paper: Lithium pricing at a crossroads, https://www.argusmedia.com/-/media/Files/white-papers/argus-white-paper-lithium-pricing-at-a-crossroads.ashx; 2018, accessed March 14, 2023.

[5] https://www.axios.com/2022/09/21/lithium-prices-electric-vehicles-evs, accessed March 14, 2023.

[6] https://tradingeconomics.com/commodity/nickel, accessed March 14, 2023.

[7] https://www.newsweek.com/precious-metal-values-are-raising-battery-prices-slowing-ev-uptake-1694807, accessed March 14, 2023.

[8] https://www.visualcapitalist.com/breaking-down-the-cost-of-an-ev-battery-cell/, accessed March 14, 2023.

[9] If we assume the $143.kWh battery cost published by DOE in 2020 is an accurate value at the time of publication, assume that the cost of a battery is 13% lithium and 21% nickel (per reference 7), and adjust for the 2022 prices for lithium and nickel, batteries would cost approximately $512/kWh, and a 20 MWh battery would cost approximately $10.25 MM.

[10] CARB's lack of diligence in this area is all the more surprising because the cost and availability of lithium has been widely reported in the mass media in recent years due to public interest in EVs. The cost and availability of minerals (and petroleum) mined in Russia has also been widely reported following the Russian invasion of Ukraine (Russia is a major producer of nickel).

consideration of current and realistic future lithium and nickel pricing and provide an assessment of potential improvements in battery efficiency.

Hydrogen Fuel Cell Locomotives

In the Technical Support Document, CARB referenced the Canadian Pacific's hydrogen-powered locomotive's first revenue run in October 2022 as proof of concept of a hydrogen-fueled fuel cell locomotive. While this is an exciting development, the details of the test run are nonexistent in the referenced article. One test run of unknown duration, load, efficiency, reliability, repeatability, or equipment durability/longevity is insufficient evidence that the concept is commercially viable for Industrial locomotive users who require reliable equipment over a 30-year operational life. While Canadian Pacific may have the financial resources to absorb a $3 million loss if its fuel cell locomotive does not perform to expectations and has to be scrapped, CGFA member companies do not have the same deep pockets. CARB should consider following up with Canadian Pacific to find out if the locomotive in question is still in operation four short months after the publicized test run.

ZE Conversion Examples

Given the extremely short timeline for public comments, CGFA has not had time to fully vet the ZE Conversion examples provided in the Technical Support Document. Should CARB grant our request for additional time, we may provide more extensive comments.

Upon initial review, however, we note that none of the examples provided in the Technical Support Document demonstrated the long-term durability or reliability of the equipment. Of specific interest is vibration. According to the U.S. Department of Transportation, "…the vibration and shock experienced in the rail environment is significantly higher than current hydrogen fuel cell applications, such as light-duty vehicles and stationary applications. This makes vibration testing on all aspects of hydrogen fuel cell systems critically important, including the electronics in the fuel cell system, fuel storage tanks, pipes, and connections."[11] None of the demonstration projects operated long enough to evaluate the impact of vibration on the durability of the fuel cells or auxiliary equipment. None of the projects operated in normal commercial operation and none were operated long enough to establish the maintenance requirements.

Further, all the projects discussed in the Technical Support Document are demonstration projects that required bespoke engineering and all cost significantly more than the cost estimates that CARB has put forth in its economic analysis for the revised rule. Some of these projects have not even been built yet. We offer the following additional comments:

- Gas Technology Institute (GTI) Hydrogen Fuel Cell Switcher Locomotive – This example is discussed as a proposal, and no evidence was provided that a working locomotive was developed or operated.
- Ballard Fuel Cell System Development for Freight Transport Applications – This example is from the trucking industry, not the rail industry. While such an example may indicate the potential for technology transfer, it does not prove the long-term commercial viability of a locomotive application. As noted above, the vibration in the trucking

[11] U.S. Department of Transportation, Federal Railroad Administration, "Study of Hydrogen Fuel Cell Technology for Rail Propulsion and Review of Relevant Industry Standards," June 2021, page 2.

industry is not the same as the vibration expected in the rail industry. It is concerning that CARB is relying on a 2016 report from Ballard, the manufacturer, and not an independent study.

- Rail Propulsion Systems (RPS) Battery Switcher Locomotive – This locomotive was tested briefly and retired, as it was not a fully functional locomotive.
- Wabtec Battery-Electric Locomotive – This was a $45 million project that developed one diesel-battery hybrid locomotive that operated for a total of 13,300 miles. While the overall project probably funded more than one locomotive (and thus the cost is misleading), the cost of the locomotive conversion itself was not disclosed in the cited reference. In this demonstration project, the batteries were employed in populated areas, and the diesel was used outside of the populated areas – but the actual distance operated under battery power was not disclosed in the reference. In addition, diesel engines were used to recharge the batteries. It is not clear if the batteries were recharged using line power at any time, as would be required for a full battery operation. The locomotive was operated only 13 times over 2 years and was not placed into normal commercial operation.
- University of British Columbia Fuel Cell Switcher – This project was proposed in 2021, but according to multiple websites, work on the project had just begun in November 2022. Thus, the locomotive hasn't even been constructed yet.

RECOMMENDATIONS

CARB is asking Industrial locomotive operators to invest at least $3 million and perhaps more than $10 million per locomotive in what is, to date, costly technology that is unproven over the long term in an industrial workplace. We ask that CARB:

- Revise the regulation to address our prior comments or, in the interest of transparency, publish the Draft Final Statement of Reasons so that the reasons for accepting or rejecting all comments received are available for public review;
- Extend the Public Comment period for the revised rule by 30 days to allow the regulated community time to review CARB's revised regulation and supporting documentation;
- Provide an exemption for low-use operators (in addition to the historic locomotive operators that are currently exempted);
- Provide a delayed compliance alternative for low-emitting operators;
- Revise its cost analysis for battery locomotives in consideration of material cost and availability, in consultation with the metal suppliers and battery manufacturers; and
- Provide more substantial evidence that fuel cell locomotives are commercially viable over the long term, in consideration of durability, operating costs, and maintenance requirements.

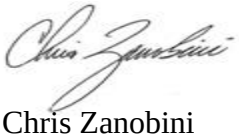
CONCLUSION

CGFA believes that compliance with the In-Use Locomotive regulation will significantly burden the Grain and Feed industry without a substantial corresponding benefit to air quality or public health. With the comments provided herein, we have identified weaknesses in CARB's fundamental analysis of the locomotive industry as it applies to the Grain and Feed operators,

and we have suggested several changes to the regulation that would reduce the burden on the industry, without significantly altering the goals of the regulation.

Should you have any questions or concerns, please contact me at (916) 441-1064.

Best Regards,



Chris Zanobini
Chief Executive Officer
California Grain and Feed Association
chris@agamsi.com

cc: Ajay Magnat, Manager, Freight Systems Section, California Air Resources Board
Layla Gonzalez, Staff Air Pollution Specialist, Freight Systems Section, California Air Resources Board

ATTACHMENT 1: CGFA COMMENT LETTER, NOVEMBER 2022

November 7, 2022

Clerks' Office
California Air Resources Board
1001 I Street
Sacramento, California 95814
Electronic submittal: https://www.arb.ca.gov/lispub/comm/bclist.php

Subject: Comments Regarding the Proposed In-Use Locomotive Regulation
CCR, Chapter 9, Article 8, Sections 2478 through 2478.16

Dear California Air Resources Board Freight Systems Section:

The California Grain and Feed Association (CGFA) is pleased to offer the following comments regarding the proposed In-Use Locomotive Regulation, California Code of Regulations (CCR), Chapter 9, Article 8, Sections 2478 through 2478.16.

INTRODUCTION

CGFA represents Grain and Feed suppliers throughout California. CGFA member companies provide a critical link in the food supply by managing feed from the grain and commodity producers by rail in what are called "unit trains" that consist of 100-110 rail cars loaded with animal feed, (e.g., corn, canola, or dried distiller grain), to the livestock producer. Grain and Feed operators use small locomotives, categorized as yard switchers, to move railcars exclusively around their facilities to facilitate offloading. The locomotives would be subject to the Draft Proposed In-Use Locomotive Regulation as it is currently written.

The Draft Proposed In-Use Locomotive Regulation, as currently written, would impose a significant financial burden on the affected Grain and Feed facilities without a significant corresponding benefit to air quality or public health. CGFA member companies are low-emitting facilities that are predominately located in remote rural areas. Thus, the facility emissions do not contribute significantly to the regional emission inventory, do not significantly contribute to exceedances of NAAQS or CAAQS, and do not pose unreasonable health risks to local populations.

The reliability, tractive effort requirements, duty cycle, maintenance needs of, and economic impacts on, the Grain and Feed industry do not appear to have been considered during the development of the draft regulation.

We appreciate the opportunity to provide comments and hope that CARB will consider changes to the rule described herein.

Overview of Operations

Grain and Feed operators buy grain and feed from farmers around the country and have it shipped to California by rail. The Grain and Feed operators unload the railcars into storage (e.g., silos, piles, tanks). The grain and feed are subsequently trucked to local animal feeding operations or other customers. Approximately 85% of the grain and feed consumed in California is supplied by rail.

CGFA member companies operate switcher locomotives, typically about 2,100 horsepower (Hp); however, because of their operation on site for very short distances, the locomotives are up to, but never more than 800 Hp during operation. The locomotives typically operate 16 to 24 hours per day when operating 1 to 2 times per week. The locomotive is required to move railcars over the "pit" so that they can be unloaded via bottom dump through a chute and onto conveyors to the appropriate storage. Unloading typically takes 2 to 10 minutes per railcar, depending on the product. The locomotive is idling during the unloading period. Once the railcar is unloaded, the locomotive moves the train (up to 110 railcars) so that the next railcar in line can be unloaded. This duty cycle results in the locomotive operating idle for approximately 90% of the operating hours and operating at Notch 1, 2, or 3 power levels for the remaining 10%. Grain and Feed operators typically do not operate above the Notch 3 power levels.

CGFA member companies include the Grain and Feed operators covered by the proposed rule, who operate 23 locomotives. The locomotives include pre-Tier and Tier 0 through Tier 4 engine technology. Diesel fuel use ranges from about 2,000 gallons per year per locomotive to about 40,000 gallons per year, with an average of about 10,000 gallons per year per locomotive (typically only one locomotive operating at each facility). Diesel fuel consumed by the Grain and Feed operators represents only 0.014% of the diesel fuel consumed in California[12]. CARB reports that NOx emissions from the industrial category of locomotives, of which Grain and Feed operators are a subset, emit only 0.4% of the NOx emissions in the railroad industry[13].

With 23 locomotives and 10,000 gallons of fuel per year each (average), the entire Grain and Feed industry in California uses approximately 230,000 gallons of fuel, which is less than the fuel consumption of a single-line haul locomotive of 300,000 gallons per year.[14]

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[12] Total diesel sales in California = 1,611,000,000 gallons per https://www.energy.ca.gov/data-reports/energy-almanac/transportation-energy/california-retail-fuel-outlet-annual-reporting. Total Grain and Feed purchases are 230,000 gallons per year. Percent of total consumption is 230,000/1,611,000,000 x 100 = 0.014%.

[13] CARB, "Technology Assessment: Freight Locomotives", November 2016, Table ES-1.

[14] CARB, "Technology Assessment: Freight Locomotives", November 2016, pg. l-4.

Cost and Reliability Considerations

The rule is substantially based on the 2016 CARB Technology Assessment which states that the analysis is based primarily on the line haul industry since it contributes 85% of the emissions in this category[15]. The reliability, tractive effort requirements, duty cycle, maintenance needs of, and economic impacts to, the Grain and Feed industry do not appear to have been considered during rulemaking. The Technology Assessment states that the technologies for line haul would be suitable for other locomotive applications[16], without substantiation. Indications that CARB has not considered the circumstances of the Grain and Feed industry are illustrated by the following examples:

- Grain and Feed operators are low-margin businesses; they purchase used locomotives from the line haul operators after the end of life. The Technology Assessment cites a line haul fleet turnover rate of approximately 30 years[17], but suggests that some portion of the fleet may transition to local or regional service after 15 years. So, CARB recognized that local operators, such as the Grain and Feed operators, rely on used equipment. However, since the battery and/or hydrogen-fueled locomotives will not be available as used equipment for at least 15 years after they are required (in 2030, if the compliance dates remain unchanged) and perhaps as much as 30 years, the Grain and Feed operators cannot rely on used equipment for rule compliance. This places a significant financial burden on the Grain and Feed operators that were not considered during rulemaking.
- Grain and Feed locomotives are operated at significantly different loads than line haul and switcher locomotives, as shown in Table 1. The substantially lower loads utilized by the Grain and Feed locomotives, combined with the smaller, lower power engines, resulting in lower fuel consumption and thus lower emissions than line haul or switcher locomotives operating for the same number of hours. Note that the line haul and switcher locomotive data was available in the CARB Technology Assessment, but the Grain and Feed data was not – another indication that CARB did not evaluate this category during rule development.

Table 1: Comparison of Duty Cycle

Mode	Percent Time in Mode Line Haul[1]	Percent Time in Mode Switch Locomotive[2]	Percent Time in Mode Grain and Feed[3]
Low and Normal Idle	38%	59.8%	92%
Dynamic Brake	12.5%	0%	0%
Notch 1	6.5%	12.4%	5%
Notch 2	6.5%	12.3%	2%
Notch 3	5.2%	5.8%	1%
Notch 4	4.4%	3.6%	0%
Notch 5	3.8%	3.6%	0%

[15] CARB, "Technology Assessment: Freight Locomotives", November 2016, pg. ES-5.
[16] CARB, "Technology Assessment: Freight Locomotives", November 2016, pg. ES-5.
[17] CARB, "Technology Assessment: Freight Locomotives", November 2016, pg. lll-10.

Notch 6	3.9%	1.5%	0%
Notch 7	3.0%	0.2%	0%
Notch 8	16.2%	0.8%	0%
Total	100%	100%	100%

1. CARB, "Technology Assessment: Freight Locomotives", November 2016, Table lll-4
2. CARB, "Technology Assessment: Freight Locomotives", November 2016, Table lll-5
3. Confidential operating report, 2021.

CARB does not appear to have considered reliability during rulemaking either. CGFA member companies have found Tier 3 and Tier 4 equipment less reliable than pre-tier, Tier 1, or Tier 2 equipment. Operating experience at CGFA member companies shows that a Tier 4 engine will operate approximately 25,000 hours between engine rebuilds, while older pre-tier, Tier 1, or Tier 2 equipment will operate up to 50,000 hours between rebuilds. Engine rebuilds, in addition to being expensive, require significant locomotive downtime. The impacts of downtime are explained in more detail below.

Tier 4 locomotives also require significantly more maintenance than pre-Tier, Tier 0, Tier 1, or Tier 2 engines. A Tier 4 engine requires maintenance every 500 hours to maintain EPA certification. This involves oil and filter changes and may also involve servicing fuel injectors and other worn items. The typical service takes about 16 hours and costs $9,000. Pre-Tier, Tier 0, Tier 1, or Tier 2 engines require maintenance every 2,000 to 2,200 hours, and service costs are $3,500 per service event. Maintenance costs aside, the locomotive downtime for maintenance is costly and disruptive.

While reliability and downtime are a consideration for all industries, poor reliability and excessive downtime disproportionately affect an operator who owns only one locomotive. A large operator (e.g., UP, BNSF) is likely to have spare equipment, thus allowing it to take a locomotive out of service for maintenance or repairs. An operator with a single locomotive does not have that opportunity – a locomotive out-of-service will have severe financial consequences, in addition to the cost of maintenance or repairs. For example, if a locomotive is out-of-service at a Grain and Feed operation, the operator may:

- Incur demurrage charges of $10,000 if the railcars are not unloaded in a timely manner[18];
- Need to rent a locomotive for $10,000 to $15,000 per day from a line haul operator;
- Have to divert railcars to a siding for temporary storage, incurring penalties of $150 per day per railcar during storage;
- Must divert product to a facility with an operable locomotive and truck the feed and grain to the customers at additional trucking cost and emissions on a per-ton basis.

A temporary service disruption may seem insignificant, but for Grain and Feed operators, it is not. Grain and Feed operators take bulk shipments of grain from suppliers and provide the last leg of transportation for that grain to large animal feeding operations. These operations operate

[18] As one example, Grain and Feed operators receive up to 100 railcars of corn in a single delivery once or twice per month. The railcars must be unloaded within 15 hours to avoid the demurrage charges, which requires a railcar to be unloaded every 6 minutes. Such a schedule does not allow for downtime associated with maintenance or reliability.

365 days of the year, as livestock must be fed every day, including holidays. The Grain and Feed operators are just-in-time businesses, as there is a little buffer in the system to accommodate service disruptions. Service disruption means that animals will not get fed. This, in turn, means that the animal feeding operation must 'depopulate' the animal herds, where animals are harvested prematurely and taken to the market undersized because there isn't enough feed. Reliability problems at the Grain and Feed facility thus adversely affect the entire food supply chain in the United States.

The documentation CARB has made available makes it clear that the specific circumstances, constraints, business limitations, and industry needs were not considered during rulemaking. The rule should not be applied to an industry without adequate study of the impacts of the regulation on that industry. CGFA recommends that CARB evaluate the rule's impacts on the Grain and Feed industry, and all other affected users, and publish its findings for public review and comment before proceeding with rule adoption.

COMMENTS ON DRAFT REGULATION

CGFA offers the following comments on specific sections of the draft regulation.

§ 2478.4. Spending Account

CGFA is requesting that CARB remove the spending account requirements from the rule. The concept of a spending account for environmental compliance is virtually unprecedented in California. There are many other CARB engine replacement programs, including, but not limited to, heavy-duty vehicle fleets, off-road diesel vehicle fleets, Large Spark Ignition (LSI) equipment, etc. - all rules intended to address air quality and health impacts, yet none have spending account requirements. Imagine the public outcry if CARB instituted a spending account requirement on heavy-duty vehicle operators for their eventual EV purchase.

The spending account is also unjustified. If CARB has concerns about the railroad industry regarding regulatory compliance or financial management that it does not have with other operators or industries, the public documents offered in support of the regulation do not identify those concerns.

Further, the spending account is unnecessary for large operators. UP and BNSF have regular locomotive replacement programs and associated capital, spending approximately $490 million in California on capital equipment annually[19]. These companies do not need CARB to impose a spending account to ensure that sufficient funding will be available to ensure compliance.

On the other hand, this program represents a significant burden to small operators, including the Grain and Feed operators. A spending account ties up significant capital without justification. It appears to be a punitive measure with no corresponding air quality benefit. Capital tied up in a spending account would be unavailable for normal operating costs such as capital upgrades, payroll, earnings distribution, taxes, etc. A spending account would have an adverse impact on business operations that was not explained, justified, or evaluated during rule development.

[19] Presentation to SCAQMD regarding Proposed Rule 2306 entitled: "Railroad Technology", BNSF Railway and Union Pacific, September 30, 2021.

The spending account does not include provisions on how the funds are withdrawn or if an entity discontinues business, meets the regulatory threshold through alternative compliance, or meets the requirements with a less costly alternative.

Finally, the proposed rule allows funds in the spending account to be used for the lease or rental of equipment. Since both lease and rental are "pay-as-you-go" arrangements, there is no reason to put money in escrow, years in advance of a spending requirement.

For all these reasons, CGFA recommends that the Spending Account provisions of the rule be eliminated in their entirety. Alternatively, CGFA requests that CARB:

- Provide evidence supporting CARB's concerns regarding regulatory compliance and financial management so that the railroad industry can properly respond; and
- Evaluate the economic impacts of the Spending Account on small operators and provide the study results for public review and comment.

§ 2478.5. In-Use Operational Requirements

CARB seems to provide additional compliance time for line haulers over small operators such as CGFA members. By requiring any locomotive or switcher older than 23 years to be replaced by 2030, it creates an additional burden on our members who have older equipment but operate far fewer hours. Class I operators have until 2035 to meet the ZE mandate. At a minimum, this date needs to be 2035 for small operators such and CGFA members.

§ 2478.6. Temporary Locomotive Operating Waiver

CARB has provided a temporary waiver to allow the operation of non-compliant locomotives. We believe this is a necessary provision in the regulation; however, the timelines for application submittal and approval do not provide the flexibility necessary to support Grain and Feed operations. As explained in the Cost and Reliability section above, unplanned locomotive downtime has severe consequences for Grain and Feed operations and the food chain in California.

In addition, we need to be assured these waivers will be available for poor reliability and lack of parts for service. Grain and Feed operators that have Tier 3 and Tier 4 locomotives in operation are experiencing far higher mechanical issues and more downtime. These units experience mechanical issues at a far higher rate and when they breakdown, it is often more difficult to get the units repaired and source spare parts. One member operator has had a Tier 4 locomotive out of operation for almost a year because of these issues.

CGFA is requesting that a Temporary Waiver be available on an as-needed basis, without prior approval from CARB. This would allow Grain and Feed operators to employ older standby equipment on a limited basis to support operations in the event of unplanned downtime (e.g., a breakdown and ongoing maintenance). CGFA suggests either a limit of 1,000 hours per year or a limit of 2,000 gallons of diesel fuel. These suggested limits are well below the exemption of 10,000 gallons per year provided in the rule for historic railroads, and thus would not cause emissions or health risk impacts exceeding what is allowed for these other operators.

CGFA suggests that CARB require a report be submitted within 30 days following the use of a non-compliant locomotive under this waiver, to document the reason the locomotive was used, the hours of operation, and the fuel consumed.

§ 2478.7. Alternative Compliance Plan (ACP)

The ACP requires that all emission reductions occur within 3 miles of a rail facility. The pollutants subject to regulation are NOx, PM, and GHG. The 3-mile restriction is unreasonable and/or unworkable for several reasons:

- GHG is a global pollutant – there is no reason that GHG reductions need to occur within 3 miles of a rail facility to provide an equivalent benefit.
- NOx is a local pollutant as NO_2 and a regional pollutant as an ozone precursor.
    - There are no NOx non-attainment areas in the State, so reducing NOx within 3 miles of a rail facility is unnecessary to ensure continued NO_2 attainment.
    - As an ozone precursor, NOx is a regional pollutant, reacting with VOC in the atmosphere. Any NOx reduction within the same air basin should be allowed.
- Impacts from PM emissions are local; however, the locomotives operated by Grain and Feed operators are remote, with few possible receptor exposures; thus, local reductions will provide no tangible health benefits.
- Because Grain and Feed operations are remote from population centers or other industrial facilities, there are few, if any, opportunities for emission reductions from other (i.e., non-Grain and Feed sources) within 3 miles of their facilities. Thus, the ACP alternative, as currently written, does not provide a viable compliance mechanism for Grain and Feed facilities. Please click on the link to review the Grain and Feed Operations in California.

For these reasons, the ACP should allow reductions over a much wider range of area – worldwide for GHG and at least air basin-wide for NOx and PM.

Alternatively, CGFA suggests that CARB consider a "Remediation Fund" similar to that available to Ocean-Going Vessels at Berth (H&S Code 93130.15), or SJVAPCD's Voluntary Emission Reduction Agreement (VERA) program.[20] The fund could be administered by either CARB or the air district in which the facility is operated and could be used to fund emission reduction programs in the air basin. Such a program would reduce the administrative burden on small facilities for identifying and implementing emission reduction projects and would provide funding for the air district to implement emission reduction projects it has identified. Such a program would also reduce the administrative burden on CARB for approving and enforcing ACPs.

§ 2478.13. Small Business Hardship Extension

CARB recognized that the rule should have exemptions and has included a Small Business Hardship exemption in the draft rule. Exemptions are common in many air quality rules, and exemptions typically seek to exclude low-emitting sources that do not contribute significantly to adverse air quality.

[20] CGFA has no specific recommendation at this time as to the appropriate fee for each ton of NOx or PM emissions; however, the fees associated with Ocean-Going Vessels and VERA program would appear to be much higher than would be warranted for the In-Use Locomotive regulation.

However, the applicability threshold for the hardship exemption is so low as to be useless for the Grain and Feed industry and, we suspect, all other locomotive operators. A typical Grain and Feed operator will receive one or two corn trains per month, with each train having 100 railcars. The value of a single corn train is approximately $4 million. For this reason, CGFA believes that the hardship exemption will not provide the intended relief to small operators, and certainly does not provide relief to many operators who have low emissions and minimal health impacts.

While CGFA has no objection to retaining the hardship exemption in the rule, CGFA recommends that CARB develop other exemption strategies that would achieve the goals of reducing emissions and protecting public health while exempting those operators who do not have significant emissions or cause adverse health impacts. CGFA offers an alternative for CARB consideration, as explained below.

Cost Effectiveness

CGFA recommends that CARB consider a provision for exemption for facilities for which the purchase of a new Tier 4 or ZE locomotive is not cost-effective, as cost-effectiveness is commonly understood in the air quality arena. CGFA believes that cost-effectiveness is a better measure of economic viability than hardship (as hardship is currently defined in the proposed rule), as cost-effectiveness takes into account the cost of compliance relative to the potential emission reductions from the equipment, and thus better reflects the goals of the regulation. The 2016 CARB Technical Assessment identifies the cost-effectiveness of the proposed rule as $29,159/ton[21]. The cost-effectiveness thresholds for NOx in several major CA air districts are listed in Table 2.

Table 2: Cost Effectiveness Thresholds

Air District	NOx Cost Effectiveness Threshold ($/ton)
SCAQMD	$38,575
SJVAPCD	$32,900
SDAPCD	$18,000
BAAQMD	$17,500

At $29,159 per ton, it is understandable why CARB has pursued this regulation, as the calculated cost-effectiveness is lower than the SCAQMD and SJVAPCD thresholds. It is notable that the proposed regulation is not cost-effective when compared to the BAAQMD and SDAPCD thresholds. CGFA believes that the relatively higher emissions from line haul users heavily skew the CARB cost-effectiveness calculation making the program, as a whole, appear to be cost-effective.

[21] CARB, "Proposed In-Use Locomotive Regulation, Standardized Regulatory Impact Assessment (SRIA)", May 26, 2022, Table 6.5. The report cites the Carl Moyer methodology as the basis for the calculation but does not identify which pollutant(s) is/are evaluated in the cost effectiveness analysis. We've assumed it is NOx.

CGFA recommends that the rule be amended to include an exemption from regulation for operations for which locomotive replacement is not cost-effective. A cost-effectiveness threshold for NOx of $50,000 per ton[22] is suggested as a conservative threshold that would ensure that program participation would exclude operators that contribute low levels of emissions to the regional inventory, and for which this regulation is not cost-effective.

The urgency of grain and feed operators to unload a train requires constant continuous power for 12-24 hours, the operational standard of zero-emission locomotives requires recharging or hydrogen refueling on site, which will necessitate additional downtime and/or additional locomotives (we estimate 3 or 4 for a single one) the cost-effective standard does not include the investment required in these additional locomotives to meet the operation requirements of the industry.

As an alternative to a cost-effectiveness calculation, it may be useful to back-calculate a fuel use value that would serve as a surrogate for cost-effectiveness. A threshold of 50,000 gallons per year of diesel is suggested. Fuel use is easier for the operator to track and for CARB to regulate and enforce.

California Environmental Quality Act (CEQA)

The Draft Environmental Analysis (EA) prepared in support of the regulation is woefully inadequate. It does not identify many of the reasonably foreseeable consequences of the proposed regulation, fails to analyze many of the reasonably foreseeable consequences, and misrepresents many of the impacts that were analyzed. The rationale offered by CARB for not analyzing the project in more detail was to not be "unduly speculative"[23]. This is unacceptable, as it does not require much speculation to identify many potential impacts that could have been, but was not, evaluated.

The 2016 Technical Assessment describes two potentially viable replacement locomotive technologies[24]: (i) batteries and (ii) hydrogen fuel cells. If batteries are selected, the existing power grid either has the capacity to recharge the batteries, or more power plants would be needed. If hydrogen technology is selected, existing hydrogen plants would either have the capacity or new hydrogen plants would be needed. This is a total of just four scenarios, none of which require much speculation, and none of which were analyzed in the EA.

- The EA states that no new power plants would be required to recharge battery tenders[25], which contradicts the 2016 CARB Technology Assessment, which identifies the need to construct five 50 MW power plants to support battery-powered locomotives in the South Coast Air Basin alone[26]. Power plants consume fuel, have localized air quality impacts, emit GHG, and consume water for cooling.

[22] The SCAQMD has used $50,000 per ton for certain stationary prime-use engine replacement projects subject to Rule 1110.2.

[23] CARB, Locomotive Engine Regulation Draft Environmental Analysis: Posted September 20, 2022, pg. 8.

[24] CARB also identified direct electrification as an alternative; however, due to the capital cost and potential line losses, CARB appears to have discounted this as a viable option, and we will not discuss further.

[25] CARB, Locomotive Engine Regulation Draft Environmental Analysis: Posted September 20, 2022, pg. 120.

[26] CARB, "Technology Assessment: Freight Locomotives", November 2016, pg. VIII-7.

- If CARB contends that no new power plants would be required, no adverse impacts would be expected. However, the EA does not evaluate the cumulative impacts associated with the State's EV mandate for on-road vehicles. The EV mandate will require significant upgrades to the State's electrical infrastructure, including possibly new power plants and transmission lines. Recharging battery-powered locomotives will exacerbate any infrastructure challenges. Because the EV mandate has already been adopted, it requires no speculation to determine that this potential issue exists.
- The EA describes the project's impacts on long-term operational air quality as beneficial. While the proposed regulation may reduce total State-wide air emissions on a mass basis and may reduce pollutants in the vicinity of existing rail facilities, there is the potential for localized air quality impacts in the vicinity of any newly constructed power plant(s) built to support the proposed regulation. Adverse air quality impacts associated with those power plants were not evaluated.
- Alternatively, solar power plant(s) may be viable for battery recharge. Solar power plants need significant acreage and are typically constructed in sensitive desert habitats. Desert tortoises, burrowing owls, fringe-toed lizards, and other sensitive and endangered species may be impacted by solar plant construction/operation. The EA does not evaluate the potential biological resource impacts associated with solar energy facilities, and the proposed biological resource mitigation measures do not address these potential impacts.
- The EA describes the long-term operational impacts to hydrology and water quality as potentially significant, but only lists mitigation measures that would limit impacts to stormwater run-off. As noted above, the proposed regulation may trigger the need to construct multiple new power plants to support battery recharge. Conventional natural gas-fueled power plants commonly use water for cooling. The EA suggests a Water Supply Assessment (WSA) be conducted for any projects triggered by the regulation. Since any WSA would be conducted after the adoption of the regulation, the regulation would have impacts that were not evaluated in advance, as required by CEQA. In a State that has a stressed water supply and that endured a persistent, decade-long drought, the EA should analyze the impacts on water supply in advance of the adoption of the regulation, not after.

- If hydrogen-fueled locomotives are the chosen technology, hydrogen would either be produced at existing hydrogen plants, or new plants developed for the railroad industry. Hydrogen is a highly flammable fuel; it is odorless, colorless, and burns with an invisible flame.

  Hydrogen is currently produced at 'Gas Plants' that are almost exclusively located at or near existing refineries, as hydrogen use in hydrocracking is the most significant industrial use of hydrogen. Because California has an EV mandate, it is reasonable to assume these existing hydrogen plants will have excess capacity in the future, as

petroleum demand declines. Further, it is reasonable to assume that the gas plant operators want to continue operations and sell hydrogen to the locomotive market. Since the location of all existing hydrogen plants is known, it requires no speculation to evaluate the impacts, such as:

  - Transporting hydrogen from existing gas plants to railyards would require transport via rail on existing railroad rights-of-way (most refineries are serviced by rail) or trucking on public roadways. Because hydrogen is a flammable/explosive gas, hydrogen transportation potentially exposes the general public to fire and explosion hazards that were not analyzed in the EA. Because the gas plants are existing facilities, servicing the rail industry would, likely, NOT require an environmental assessment by any public agency, as no discretionary permit(s) would be needed. Thus, a reasonably foreseeable adverse impact to the community (i.e., an explosion hazard) could result from rule adoption that has not been, nor ever would be, analyzed under CEQA.

- Alternatively, the EA discusses the possibility of constructing and operating new hydrogen plants, should hydrogen become the fuel of choice for the ZE locomotives. The generation, storage, and transport of hydrogen represent risks to the community that requires detailed analysis. The EA suggests that the hydrogen plants would be constructed at or near the rail facilities[27]. Since the location of all existing railyards is known, it requires no speculation to evaluate the impacts on the affected communities from the construction and operation of new hydrogen facilities collocated at those facilities.
  - The EA describes the long-term operational impacts on hazardous materials as potentially significant, but only lists mitigation measures that deal with the temporary handling or storage of hazardous materials or waste, i.e., during construction. The EA does not address the hazards associated with the generation, storage, or transport of hydrogen that may be used to fuel ZE locomotives.
  - CARB appears to suggest that replacing the health risk impacts from diesel particulate matter (DPM) exposure with the potential for explosion impacts from a hydrogen storage accident can be made without analysis or public review. While it is possible (and likely) that an environmental assessment would be required prior to the construction of a new hydrogen plant, at that point, it is too late – once the rule is adopted, the railroad industry would be on a path that could require hydrogen production.
- The EA does not adequately address battery recycling requirements, despite the fact that CARB's Technology Assessment estimates that the batteries in thousands of battery tenders will have to be replaced every 5 years.

While CGFA agrees that an EA should not have to evaluate every possible consequence of regulation at a detailed level, CARB commissioned a study through the University of Illinois in 2016 and prepared its own Technology Assessment in 2016 that evaluated the technologies that would potentially be employed to comply with this regulation. Both studies provide substantial

[27] CARB, Locomotive Engine Regulation Draft Environmental Analysis: Posted September 20, 2022, pg. 26.

details with respect to the development and infrastructure requirements necessary to implement ZE technologies.

What makes this situation untenable for the regulated community is that upon adoption of the regulation, the regulated community will either have to recharge batteries or refuel with hydrogen, without certainty that the power and/or hydrogen will be available. CARB's studies indicate that power plants will have to be constructed, and/or hydrogen gas plants will have to be constructed. Both power plants and hydrogen gas plants would likely trigger review under CEQA, but there is no guarantee that such projects would be approved. Power plant projects are routinely canceled because CEQA approval cannot be secured, or the projects are delayed for years because the approval process is so time-consuming. Approval of new hydrogen plants, especially small plants co-located at rail facilities, may not be possible due to concerns with explosion hazards, and there is certainly no track record of such approvals. Without CEQA approval of power and/or hydrogen projects, the regulated community would have no means of achieving compliance and would have no recourse under the rule for relief.

CARB has had six years since its studies were published to develop an EA that analyzes the impacts of rule implementation and could have/should have evaluated the rule impacts based, at a minimum, on its own studies. It is simply not enough to say in the EA that the fallout from rule implementation cannot be analyzed because the details are "unduly speculative," or that the impacts will be evaluated by some other agency at some later date. The development and infrastructure requirements necessary to implement the rule have already been identified, and failure to achieve CEQA approval of the necessary infrastructure may render compliance impossible.

CGFA strongly recommends that CARB undertake a thorough CEQA evaluation of the regulation prior to rule adoption. Further, CGFA recommends that CARB conduct a public scoping meeting in advance of further EA development so that the EA can be as comprehensive as possible.

MISCELLANEOUS

Finally, CGFA takes exception to the use of the term "zero emission (ZE)" in association with this regulation. Advanced technology locomotives may reduce emissions but do not eliminate emissions. CGFA recommends that the terminology be replaced with something that better reflects the actual purpose of the rule –e.g., reduced emissions. While this distinction may appear trivial, the general public is being misled to think that the rule will achieve zero emissions, which is not the case. An electric locomotive will require line power, and a battery-powered locomotive would have to be recharged – the emissions from the use of these technologies will occur at power plants. Public receptors near the railyard may benefit from reduced emissions, but public receptors near power plants may be adversely impacted. The 2016 CARB Technology Assessment suggests that multiple 50 MW power plants would have to be constructed near rail facilities to recharge tender batteries for use in the South Coast Air Basin alone – these power plants would not be zero emission facilities.

Similarly, hydrogen production will emit pollutants. If hydrogen is produced electrolytically, emissions will occur at a power plant. If hydrogen is produced via steam methane reforming,

there will be combustion emissions from heating the process and GHG emissions as a byproduct of the process itself. Thus, the use of the term zero emissions misrepresents the reality of the technology and misleads the public.

CONCLUSION

CGFA believes compliance with the In-Use Locomotive regulation will impose a significant burden on the Grain and Feed industry without a substantial corresponding benefit to air quality or public health. With the comments provided herein, we have identified weaknesses in CARB's fundamental analysis of the locomotive industry as it applies to the Grain and Feed operators, and we have suggested several changes to the regulation that would reduce the burden on the industry, without significantly altering the goals of the regulation.

CGFA finds that the CEQA analysis prepared in support of the regulation does not address reasonably foreseeable consequences and believes deficiencies in the CEQA analysis may prevent compliance with the regulation. A more robust CEQA evaluation is required prior to rule adoption.

Should you have any questions or concerns, don't hesitate to get in touch with me at (916) 441-1064.

Best Regards,

Chris Zanobini
Chief Executive Officer
California Grain and Feed Association
chris@agamsi.com

cc: Ajay Magnat, Manager, Freight Systems Section, California Air Resources Board
Layla Gonzalez, Staff Air Pollution Specialist, Freight Systems Section, California Air Resources Board