THE CALIFORNIA RAILROAD INDUSTRY

September 6, 2011

Harold Holmes
California Air Resources Board
1001 "I" Street
Sacramento, CA 95812

RE: Freight Railroad Comments on ARB's Functional Equivalent Document (FED) Prepared for the 2010 Commitments

BNSF Railway and Union Pacific Railroad Company (the Railroads) are pleased to have the opportunity to provide comments on ARB's FED prepared for the 2010 Commitments.

Attached you will find the following:

- Policy comments
- Technical comments on the various alternatives evaluated in the FED or suggested by other commenters
- Legal comments

The Railroads and ARB have had a successful partnership over the past twelve years developing and implementing effective strategies to reduce emissions from locomotives and from rail operations through voluntary and enforceable agreements. During this period, ARB has consistently determined that the Railroads have met or exceeded all substantive requirements of the 1998 MOU and other past agreements, as verified by ARB. The Railroads are proud of our past accomplishments to do our fair share to reduce emissions from locomotives and rail operations.

Thank you for the opportunity to provide ARB comments on this matter. Please contact Darcy Wheeles at 415-421-4213 x33 or darcy@ceaconsulting.com if you have any questions regarding this submittal.

Sincerely,

Kirk Marckwald
Principal, California Environmental Associates
On behalf of the California Railroad Industry

cc:

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RAIL COMMENTS ON ARB FUNCTIONAL EQUIVALENT DOCUMENT PREPARED FOR 2010 COMMITMENTS

POLICY CONSIDERATIONS

I. The Commitments are voluntary agreements that provide significant environmental benefits to the communities around the four railyards and statewide.

A. Communities around the four railyards will benefit from implementation of the Commitments.

The Commitments represent an opportunity to reduce diesel particulate matter (DPM) emissions by 85% from 2005 levels by 2020 at four major railyards in Southern California regardless of growth in railroad operations. These emission reductions will directly benefit the communities around the railyards. The Commitments build on ARB's extensive work to reduce DPM emissions from a wide variety of sources. US EPA and ARB regulations, the prior ARB/Railroad MOUs, and these new Commitments are part of a coordinated and consistent program to achieve the goals of ARB's statewide Diesel Risk Reduction Plan. Without the Commitments, these significant emission reductions would not be possible in such a short period of time.

The Southern California goods movement system plays a critical role in both the local and national economy. The Commitments have been designed to reduce DPM emissions at these four railyards using performance-based emission targets in such a way that will not significantly interfere with interstate (or intrastate) Railroad operations.

B. Other railyards in California will benefit from implementation of the Commitments.

The FED states that "[b]ased on staff experience with the 1998 ARB/Railroads Locomotive NO_x Fleet Average Agreement in the South Coast Air Basin (1998 Agreement), staff anticipates that communities across the State that are not near the four high-priority railyards would receive about 15 percent of the benefits from the lower-emission locomotives brought in to meet the emission levels at the high-priority railyards."[1] In fact, according to ARB staff, each year between 2005 and 2010 the California locomotive inventory (not just the South Coast Air Basin) showed reduced statewide emissions and a lower emitting fleet operating statewide.[2] The Railroads concur with ARB's assessment.

II. The Commitments will not result in older equipment being moved to other railyards in the State.

Due to the 1998 Agreement, the locomotives serving the South Coast Air Basin, including the Commitment yards, are already some of the cleanest in the nation. The Commitments will likely further encourage the voluntary deployment of clean locomotives to Southern California and the Commitment yards.

As stated by BNSF at the June 24, 2010 ARB hearing,

[1] ARB, "Supplement to the June 2010 Staff Report on Proposed Actions to Further Reduce Diesel particulate Matter at High-Priority California Railyards," July 5th, 2011, pg. F-44.

[2] Personal communication, ARB Staff, July 22, 2011.

> …the ones [switch locomotives] that are displaced will be retired from service or they'll be sent out of state. To the extent that some of them are Tier 0 locomotives that can go to other locations in other yards, they would be cleaner than the switch engines in the other yards. And it would be a net benefit for those other yards. But we will not take non pre-Tier 0 or pre-Tier 0 locomotives and put them in other yards, contrary to what a number of people say is likely to happen. It won't happen.[3]

In any event, after the June 2010 Board hearing, the Commitments were revised to include an express prohibition against moving the oldest locomotives from the Commitment yards to other yards in California. The following statement was added to the Commitments: "BNSF/UPRR shall not reassign any pre-Tier 0 locomotive formerly based in the [Commitment] Railyard to another railyard in California."

III. The Railroads support having an independent auditor review Commitment submittals.

The ARB Board supported a suggestion[4] presented at the June 24, 2010, meeting to have an independent auditor review the Railroad Commitment submittals.[5] The Railroads do not oppose such independent audits. However, since some of the information the Railroads will submit under this program is clearly business confidential (similar to portions of 1998 Agreement, the 2005 MOU, and California statewide locomotive emission inventory information), the auditor must be bound by a standard non-disclosure agreement.

IV. ARB properly exercised its discretion in omitting other provisions that members of the public sought to include in the Commitments.

Commenters have also suggested several other provisions that have not been incorporated into the Commitments. In February 2010, the ARB Board asked ARB staff and the Railroads to create a voluntary program, within the regulatory and legal context/constraints, that would achieve the largest emissions reductions in the shortest period of time at the four Commitments railyards. If, after reviewing all the comments received as part of the environmental review process, the ARB Executive Officer decides to go forward with the Commitments' program, its elements would embody and represent the collective agreements of ARB and the Railroads of how best to achieve the shared goal of reducing emissions at and around the affected railyards.

As explained in detail below, the following suggestions from the public were not chosen by mutual agreement of ARB and the Railroads.

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[3] Mark Stehly, BNSF Railway, ARB Board Meeting Transcript, June 24, 2010.

[4] Andrea Hricko, ARB Board Meeting Transcript, June 24, 2010, pg. 104.

[5] Chair Nichols: "Yes, we have added the addition of the third-party monitoring auditor to oversee the implementation of the agreement. So how that person or entity would be selected is also subject to some further discussion, but it would be someone that the ARB would choose and would retain for this purpose, but would be a non-ARB person." ARB Board Meeting Transcript, June 24, 2010.

A. The alternative timing proposed (i.e., goal of achieving an 85% DPM reduction by 2015) is not feasible.

Public commenters[6] at the June 24, 2010, ARB Board meeting suggested that the Commitments should establish the target of 85% reductions (from 2005 levels) by 2015, rather than 2020.

Tier 4 line haul locomotives will not be available until 2015. When they are, the Commitments will likely further encourage the voluntary deployment of clean line haul locomotives to these railyards to help meet the Commitments' targets. The development of Tier 4 technology will likely be a critical element in meeting the Commitments' 85% goal. Therefore, it would be impossible to replace line haul locomotives at such a rate to reduce railyard emissions by 85% *by* 2015, as Tier 4 line haul locomotives are not available until that same year. It is thus infeasible to set an 85% emissions reductions target for 2015.

B. The air monitoring requirements should remain unchanged.

Several public commenters expressed concern that commitments related to air monitoring were insufficient.[7]

ARB currently conducts extensive air quality monitoring throughout the state in coordination with local air districts. The Commitments will add two new monitors near two of the Commitment yards (The other two yards already have nearby monitors) .

In addition, public commenters recommended additional "fence line" monitoring at all of the Commitment yards.[8]

Diesel PM cannot be measured directly in ambient air. Typically, air monitors measure a surrogate for DPM—such as PM2.5, black carbon, or elemental and organic carbon. This data is then analyzed to attempt to establish a site-specific relationship between the surrogate and DPM. Both the measurement of these surrogates, and the establishment of the site-specific relationship to DPM, can require specialized monitoring and extensive laboratory analysis. Even when the ambient DPM concentration can be inferred from the surrogate measurement, a challenge remains in attributing that DPM to a specific source or group of sources. The Commitment yards are in urban areas near highways, refineries, and other sources of DPM and its surrogates, and any DPM levels inferred from ambient measurements cannot be readily attributed to a railyard versus another nearby source such as a highway. Since DPM cannot be directly measured, dispersion modeling, rather than fence line monitoring, is the current method to estimate fence line DPM emissions at railyards.[9]

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[6] Coalition for a Safe Environment, Letter to ARB, June 23, 2010, pg. 5.

[7] East Yards Communities for Environmental Justice, et. al, Letter to ARB, June 21, 2010, pg. 2; Coalition for a Safe Environment, Letter to ARB, June 23, 2010, pg. 3.

[8] East Yards Communities for Environmental Justice, et. al, Letter to ARB, June 21, 2010, pgs. 5-6; Coalition for a Safe Environment, Letter to ARB, June 23, 2010, pg. 2.

[9] In 2005, ARB entered into a statewide agreement with UP and BNSF that required the preparation of health risk assessments (HRAs) for each of the 17 major railyards in California. These HRAs estimated health risk at railyards utilizing air pollution emission inventory and air dispersion modeling.

C. Accelerated deployment of Tier 4 locomotives is infeasible.

One commenter suggested ARB should pursue a prescriptive requirement to accelerate the introduction of Tier 4 locomotives.[10] This suggestion is infeasible because such a mandate requiring the Railroads to use a specific technology would most likely interfere with rail operations. The Commitments are designed with a performance-based structure (and do not include prescriptive requirements) that allow the Railroads to achieve substantial DPM emission reductions in the most efficient manner possible without unduly disrupting the national rail network.

Some commenters have also suggested that such a program would be akin to what the Railroads committed to in the 1998 Agreement.[11] It should be noted that the 1998 Fleet Average Agreement is similar to the Commitments in that both set clear emissions reductions timelines, but neither includes prescriptive requirements to purchase a certain number of locomotives of a specific Tier by a specific point in time. However, there are vast differences between the acceleration of Tier 2 locomotives in 2005-2010 and a potential acceleration of Tier 4 locomotives in 2015-2020.

First, Tier 4 emission requirements for line haul locomotives will require a revolutionary leap in both engine and aftertreatment technologies. These new technologies are untested and unproven in line-haul locomotive applications. In contrast, Tier 2 (and Tier 3 due in 2012) technology requirements were evolutionary and ran parallel to projected locomotive technological developments. Developing Tier 4 locomotives under the US EPA regulatory timeline is a huge challenge for locomotive and aftertreatment manufacturers.

Historically, the development of new effective locomotive technology has taken, on average, about seven to eight years (and some changes have taken more than a decade to reach or approach reliability goals). However, the US EPA regulation (a technology forcing regulation) allows locomotive manufacturers just six and one half years to complete Tier 4 research and development, design, reliability field testing, and to begin full-scale production of these complex locomotives. Since locomotive manufacturers are accomplishing a major technological change in an abbreviated timeframe time, there are development risks associated with Tier 4 technology. These risks include the potential for in use locomotive failures that would in turn cause train delays and interruptions across the goods movement system. Therefore, the Railroads, while optimistic and actively working with manufacturers to develop Tier 4 technology, are appropriately cautious about it at this time.

Second, there was a different economic environment in 2005-2008, and the California Railroads were purchasing 600 locomotives per year, combined; that number in recent years has been less than 200. The Railroads cannot agree to purchase large numbers of new locomotives using an unproven (in this application) technology in uncertain economic circumstances.

Further, requiring a certain number of Tier 4 locomotives to operate at the Commitment yards by a set date would not necessarily result in greater emissions reductions than a performance target.

[10] SCAQMD, letter to ARB, June 22, 2010, pg. 2-3.

[11] Peter Greenwald, SCAQMD, ARB Board Meeting Transcript, June 24, 2010, pg 56.

[12] In fact, the Commitments performance-based program is similar to virtually all air pollution regulations in the U.S.

D. Unannounced onsite inspections are unsafe and impracticable.

At the June 24, 2010, ARB hearing, several public commenters questioned the current railyard inspection process and requested ARB conduct unannounced railyard inspections inside the fence line.[13] ARB already conducts unannounced inspections around the perimeter of the railyards. However, railyards are complex industrial facilities with dangerous equipment that is continuously in motion onsite. The Railroads' policy is to cooperate with inspectors while ensuring their safety and security. This policy is applied to all inspectors who visit a railyard, including those from OEHHA and the Federal Railroad Administration (FRA). ARB and the Railroads recognize the necessity to coordinate onsite inspections to ensure the safety of both the inspectors and Railroad employees, and to maximize the gathering of real time mechanical information.

[12] As part of the Commitments, the Railroads have agreed to meet and confer with ARB in 2013 to discuss the status of Tier 4 locomotive technology and its use in California.

[13] Coalition for a Safe Environment, letter to ARB, June 23, 2010, pg. 3; Andrea Hricko, Transcript of Oral Testimony to ARB Board, June 24th, 2010, Public Hearing, pg. 103

RAIL COMMENTS ON ARB FUNCTIONAL EQUIVALENT DOCUMENT PREPARED FOR 2010 COMMITMENTS

ALTERNATIVES

I. The FED complies with CEQA by considering a reasonable range of alternatives to the proposed project.

Pursuant to the California Environmental Quality Act (CEQA),[1] an environmental impact report (or its functional equivalent) must identify feasible alternatives that could avoid or substantially lessen the proposed project's significant environmental effects.[2] The CEQA document must describe and analyze the comparative merits of a reasonable range of alternatives to the proposed project that would feasibly attain most of the project's basic objectives while reducing or avoiding any of its significant effects.[3] It must also briefly identify alternatives rejected as infeasible and explain why they were rejected.[4] The functional equivalent document (FED) prepared pursuant to ARB's certified regulatory program[5] satisfies CEQA by identifying and discussing alternatives considered and rejected, as well as fully evaluating three alternatives that would achieve part of the project objectives. As noted in the FED, the primary project objective is to "reduce air emissions of diesel particulate matter (PM) from operations at the four identified high-priority railyards, beyond the levels expected under the existing program of adopted regulations and agreements…and specifically to achieve at least an 85 percent reduction in diesel PM emissions at each railyard between 2005 and 2020, regardless of growth in activity or operations."[6]

A. Alternatives Considered But Properly Rejected

CEQA permits an agency to consider but reject alternatives that are infeasible either for failure to avoid or substantially reduce the project's environmental effects, or because the alternative fails to achieve the project objectives.[7] The FED correctly considers but rejects as infeasible several alternatives to the project that were previously proposed by members of the public.

1. ARB Regulation of Preempted Locomotives

Public comments have encouraged ARB to adopt locomotive regulations that are preempted by federal law. One commenter stated that "CARB's August 2009 Technical Options report concluded that statewide replacement and retrofit of many older locomotives are feasible, cost-effective and likely not preempted by federal law."[8] The commenter implies that Options 1, 2, 5,

[1] Cal. Pub. Res. Code § 21000 et. seq. CEQA is implemented through the State CEQA Guidelines ("Guidelines"), 14 Cal. Code Regs. § 15000 et seq.

[2] CEQA §§ 21002, 21002.1(a), 21100(b)(4), 21150, 21080.5(d)(3)(a); *see also* Guidelines § 15126.6.

[3] Guidelines § 15126.6(a).

[4] Guidelines § 15126.6(c).

[5] CEQA §21080.5 and CEQA Guidelines, §15251, subd. (d).

[6] FED, page F-18.

[7] Guidelines § 15126.6(c).

[8] Gideon Krackov letter to ARB, June 23, 2010, pg 5.

and 7 identified in the report meet these three criteria.[9] However, Options 1, 2, 5, and 7 relate to preempted locomotives or require upgrades of non-preempted locomotives to a standard higher than ARB is legally able to mandate.

The Technical Options document alone should not be referenced to support feasibility under CEQA. While the Technical Options document evaluated options for "technical feasibility, potential emission reductions, costs and relative cost-effectiveness,"[10] it did not consider legal authority as a criterion for evaluation.[11] As explained in the FED (p. F-70), ARB is preempted by Section 209(e) of the federal Clean Air Act (CAA) from regulating the vast majority of locomotives operating in California.[12] In addition, the Interstate Commerce Commission Termination Act (ICCTA) limits state and local authority to regulate railroads.[13] Therefore, ARB has correctly rejected this proposed alternative as legally infeasible and not warranting further study.

2. ARB Regulation to Limit Locomotive Idling or to Control Locomotive Idling Emissions During Maintenance Operations

Public commenters have suggested that ARB enact regulations to limit or control locomotive idling as an alternative to the Commitments.[14] As explained in the FED and further discussed below, however, regulatory limits on locomotives will not achieve the primary objectives of the project and therefore are not potentially feasible alternatives worthy of detailed analysis in the FED.

[9] Option 1 – replace 152 older switch locomotives with new ULESL; Option 2 – retrofit 244 ULESL with DPF and SCR; Option 5 – repower 400 older MHP locomotives with new LEL engines; Option 7 – retrofit 400 LEL or gen-set MHP locomotives with DPF and SCR.

10 ARB Technical Options document, August 2009, p.1 and confirmed by UP and BNSF technical representatives in August 2011.

[11] "This report is intended to provide an initial technical assessment of various options that are available or may be available in the near future to accelerate and provide additional emissions reductions from locomotives and major railyards in California. It is not intended to serve as an implementation blueprint, as it does not evaluate which agency or agencies may have authority to implement such options." ARB Technical Options document, August 2009, p.1.

[12] ARB's recognition of its limited authority to regulate locomotives led staff to recommend an incentive program to implement several strategies to upgrade locomotives regularly operating in California: "ARB has limited authority to directly establish emission standards for locomotives (See attachment A and discussion, infra, at pages 20-21.). Therefore, staff recommends that ARB work cooperatively to combine investments from the railroads with a mix of federal and state incentive programs to achieve the emission reductions." ARB Recommendations Document, September 2009, p.14.

[13] The ICCTA's preemption of state and local regulations that impose an unreasonable burden on the railroad industry has been upheld in multiple court decisions. *See City of Auburn v United States Government* (154 F.3d 1025, 1029-31 (9th Cir. 1998) ("Congress intended to preempt a wide range of state and local regulation of rail activity"); *Association of American Railroads v South Coast Air Quality Management District* (9th Cir. 2010) 622 F.3d 1094 ("[the] ICCTA preempts those [local and state] rules unless they are rules of general applicability that do not unreasonably burden railroad activity").

[14] Gideon Kracov, Letter to ARB, March 18, 2010, pg. 1.

a. Locomotive Idling Limits

The FED correctly states that adopting state[15] idling regulations for locomotives, similar to those proposed by the SCAQMD (Rules 3501-3503), is unnecessary since the Railroads have already installed idling reduction devices (IRDs) on over 99 percent of intrastate locomotives[16] and the railroads have limited non-essential idling through the 2005 ARB/Rail MOU.[17] To date, over 95 percent of locomotives operating in California (both interstate and intrastate) are equipped with IRDs.[18] Additionally, the percentage of locomotives without IRDs continues to decrease rapidly due to attrition of older locomotives, aggressive retrofits of IRDs on existing locomotives, and mandated inclusion of IRDs on all new locomotives and overhauled locomotive engines. Idling regulations would not provide additional emission reductions beyond those already being achieved from existing programs; and therefore such a regulation would not meet the primary project objective of reducing DPM emissions at the four Commitment railyards.

b. Control of Locomotive Idling During Maintenance Operations

The FED correctly concludes that the advanced locomotive emission control system technology ("ALECS", also referred to as the "hood" or "bonnet") is not feasible under CEQA. The FED analyzes the possibility of requiring UP to install a prototype ALECS system, which comprises an Emissions Collection System (ECS) and a stationary Emissions Treatment System (ETS).[19] Based on analysis in the Technical Options Document, as well as an updated analysis, the FED states: "ARB staff found this approach to be infeasible under CEQA because this technology is not currently available or proven in actual railyard operations. Current analyses have not demonstrated that the technology is cost-effective and implementation could impact railroad operations, potentially triggering a conflict with the ICCTA."[20] The Railroads agree that the ALECS technology is not feasible at this time.[21]

The ALECS system has only been subjected to limited prototype testing on a near-stationary locomotive[22] at a single location in Roseville, California, in 2006. This Phase I testing showed that it was difficult to properly position the ECS to capture locomotive emissions and the ECS did not capture 100% of the locomotive's emissions. Of the exhaust captured, the ECS removed 98% of the NOx, 97% of the SOx and 92% of the PM emissions. While the Phase I testing demonstrated successful removal of air pollutants from captured exhaust, ALECS has not been tested in an active railyard environment. In addition, the original ETS demonstrated at Roseville

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[15] The Railroads comply with Federal regulations governing idling locomotives. State regulations would be unnecessary, adversely affects operations, and is overly burdensome.

[16] ARB Transcript for April 24, 2008, Board hearing, pg. 172. (http://www.arb.ca.gov/board/mt/2008/mt042408.txt).

[17] ARB, "Update on the Implementation of the 2005 ARB/Railroad Statewide Agreement," April 11, 2008, pg 9.

[18] Data from UP and BNSF technical representatives, August 2011.

[19] ARB, "Supplement to the June 2010 Staff Report on Proposed Actions to Further Reduce Diesel particulate Matter at High-Priority California Railyards," July 5th, 2011, pg. F-71.

[20] ARB, "Supplement to the June 2010 Staff Report on Proposed Actions to Further Reduce Diesel particulate Matter at High-Priority California Railyards," July 5th, 2011, pg. F-72.

[21] It is also not clear that ARB could require implementation of ALECS at California railyards since the hood system could impose an unreasonable burden on railroad activity. *City of Auburn v United States Government*, supra, 154 F.3d at 1029-31.

[22] The locomotive moved back and forth over a distance of 50 feet during portions of the test program.

has been significantly redesigned and modified in such a manner that an entirely new demonstration of its capability would be necessary.

In summary, no tests to date provide evidence that ALECS can be integrated with and function effectively as part of a fully operational railyard. Before hood technology can be implemented on a wide-scale basis, it must undergo "full-scale railyard demonstration testing…to determine the potential utilization rates and emissions reductions within actual railyard operations;" "to determine what effects, if any, the ALECS system would have on the timeliness and effectiveness of railyard operations (i.e., moving locomotives in and out of the railyard);" and "to assess ALECS multiple bonnet system options to determine which can best be utilized between the locomotives and the stationary control equipment."[23]

The FED states that "the stationary collection system could potentially be cost-effective in future years, but at this time there were a number of more cost-effective strategies (e.g., diesel particulate filters on locomotives) to reduce locomotive emissions and associated public health risks."[24] Leaving aside feasibility concerns, the Railroads are skeptical that this technology will ever prove to be cost effective given the tremendous initial investment and annual operating and maintenance costs, the fact that the locomotive fleet will continue to become significantly cleaner over time, and the fact that currently implemented locomotive idle reduction technologies will continue to limit emissions from locomotives while in a railyard.

The Revised 2010 Commitments require UP to "evaluate and provide recommendations, if any, for the implementation of . . . changes in railyard operations that UP believes may significantly reduce railyard DPM emissions . . . including a stationary collection system," i.e., ALECS, at the UP Commerce yard. At the time the draft Revised 2010 Commitments were developed, UP and the Placer County Air Pollution Control District (PCAPCD) planned to further evaluate ALECS at the Roseville yard. Recently, however, Placer County APCD has indicated that it has returned funds to the agencies sponsoring Phase II testing and canceled the remainder of the Phase II project. PCAPCD cited the manufacturer's inability to raise the cost-share funding necessary to proceed.[25] While UP will evaluate the "hood" technology as part of the Commitments and provide recommendations for the use of this technology, if any, it appears that at this point the anticipated Phase II testing will not occur in the near future.

c. Other Idling Alternatives Not Considered by the FED

Other commenters have suggested that the creation of no-idle zones be included in the Commitments.[26] Some amount of idling in railyards is necessary due to operational and safety requirements, e.g., to charge brakes, build trains, and perform maintenance activities.

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[23] ARB, "Supplement to the June 2010 Staff Report on Proposed Actions to Further Reduce Diesel particulate Matter at High-Priority California Railyards," July 5th, 2011, pg. F-71.

[24] ARB, "Supplement to the June 2010 Staff Report on Proposed Actions to Further Reduce Diesel particulate Matter at High-Priority California Railyards," July 5th, 2011, pg. F-71.

[25] Placer County Air Pollution Control District Letter to Larry Greene, Sacramento Metropolitan Air Quality Management District, Subject: Termination of ALECS Phase II Project." June 3, 2011. (incorporated by reference)

[26] Gideon Kracov, Letter to ARB, March 18, 2010, pg 1.

Additionally, locomotives on the mainline must idle when they are performing essential work, e.g., waiting for a signal to pass or switching. As noted above, IRDs have been installed on almost all locomotives operating in California and IRDs eliminate non-essential idling. Thus the creation of no-idle zones does not meet the primary project objective to reduce DPM emissions from the four Commitment railyards.

3. ARB Actions to Determine Compliance with U.S. EPA Locomotive Standards

a. California Testing of Existing ("In-Use") Locomotives

The FED correctly indicates that states are prohibited by U.S. EPA regulations from (1) requiring in-use locomotive testing and (2) implementing a state-run locomotive in-use testing program. This alternative is legally infeasible and, furthermore, would not lead to additional emission reductions; therefore, it does not meet the project objectives.

b. California Remote Sensing Program

The Railroads concur with the FED's conclusion that remote sensing technology cannot accurately measure in-use locomotive emissions. The results of a joint pilot program involving ARB, the South Coast Air Quality Management District ("SCAQMD"), and the Railroads show that this alternative is technically infeasible.

4. Voluntary Commitments with Prescriptive Requirements

The FED considers multiple additional prescriptive requirements suggested for inclusion in the Commitments by public commenters. A summary of these options as presented in Table 1 shows that these options are not feasible and should not be included in the Commitments.

Table 1: Critique of Other Prescriptive Requirements Suggested for Inclusion in the Commitments, But Rejected

Suggested measure to include in Commitments or ARB regulation	Railroad Comments
Acceleration of Tier 4 locomotives[27]	ARB does not have the authority to require the Railroads to purchase or preferentially deploy Tier 4 locomotives to California (Clean Air Act Section 209(e)). Additionally, Tier 4 line haul locomotives will not be available for purchase until 2015 at the earliest.
Electrify Cargo Handling Equipment[28]	Electrification of CHE is a major undertaking that, to date, has only been implemented at new yards or as a part of complete railyard renovations. Retrofitting a yard can completely disrupt operations and is not generally cost effective. See Attachment A.
Hood/ALECS	As noted above, ALECS is not a proven technology, and is not cost effective, in railyard settings.

[27] SCAQMD, letter to ARB, June 22, 2010, pg. 2-3.

[28] Gideon Krakov, Letter to ARB, June 23, 2010, pgs 5-6; Colton Folk, Attachment to Gideon Krakov Letter to ARB, June 23, 2010, pg X; Peter Greenwald, Transcript of June 24, 2010, ARB Board Meeting, pg X.

Suggested measure to include in Commitments or ARB regulation	Railroad Comments
Install walls and trees as an AQ buffer, to reduce noise, and enforce noise regulations[29]	The primary project objective is to reduce DPM emissions from four railyards. There is no evidence that the installation of walls and trees would reduce railyard emissions, and therefore, this measure does not satisfy the primary objective of the Commitments.
Weatherize and retrofit homes to prevent air pollution from entering buildings[30]	The primary project objective is to reduce DPM emissions from four railyards. This suggested measure does not achieve the project objectives.
Install AC units with filters in homes or nearby daycare facilities[31]	The primary project objective is to reduce DPM emissions from four railyards. This suggested measure does not achieve the project objectives.
Install dual pane and tinted windows to reduce noise and light pollution[32]	The primary project objective is to reduce DPM emissions from four railyards. This suggested measure does not achieve the project objectives.
Fund a health clinic in the community[33]	The primary project objective is to reduce DPM emissions from four railyards. This suggested measure does not achieve the project objectives.
Fund a medical mapping study of the community[34]	The primary project objective is to reduce DPM emissions from four railyards. This suggested measure does not achieve the project objectives.
Fund community recreation centers[35]	The primary project objective is to reduce DPM emissions from four railyards. This suggested measure does not achieve the project objectives.

[29] Gideon Krakov, Letter to ARB, March 18, 2010, pg. 1.

[30] East Yard Communities for Environmental Justice, et al., Letter to ARB, June 21, 2010; Gideon Krakov, Letter to ARB, March 18, 2010, pg. 1.

[31] Gideon Krakov, Letter to ARB, March 18, 2010, pg. 1.

[32] Gideon Krakov, Letter to ARB, March 18, 2010, pg. 1.

[33] East Yards Communities for Environmental Justice, et al., Letter to ARB, June 21, 2010; Coalition for a Safe Environment, Letter to ARB, June 23, 2010, pg. 2.

[34] Coalition for a Safe Environment, Letter to ARB, June 23, 2010, pg. 2.

[35] ARB, "Supplement to the June 2010 Staff Report on Proposed Actions to Further Reduce Diesel particulate Matter at High-Priority California Railyards," July 5th, 2011, pg. F-73.

Suggested measure to include in Commitments or ARB regulation	Railroad Comments
Move emission sources farther from residences[36]	As noted in the FED, as part of the Commitments, each railroad will evaluate specified operational changes at each yard to determine if they would be consistent with the objective of the project and other railroad operational goals. However, the relocation of some emission sources further from residences may result in overall increases in emissions at certain railyards, which would be inconsistent with the project objectives.
Install ambient monitors to measure individual railyard DPM[37]	The primary project objective is to reduce DPM emissions from four railyards. This suggested measure does not achieve the project objectives. However, as noted in the FED, as part of the Commitments, ARB will work with the SCAQMD to install additional air monitors at or near the railyards. Note that it is not technologically feasible to measure ambient DPM; only surrogates can be measured and inferences drawn regarding the sources of emissions contributing to the measured values. The Commitment railyards are in urban areas near highways, refineries, and other sources of PM and it will be difficult, if not impossible, to ascribe monitored ambient PM levels to a railyard versus nearby sources.

5. Voluntary Commitments with Performance Targets for all 18 Major Railyards

The Board directed ARB staff in February 2010 to work with the Railroads to reduce DPM at the four railyards in Southern California at which ARB estimated there were the highest health risks. The Commitments, therefore, target these four yards. Once the Commitments for these yards are underway, the Railroads have also committed to updating the inventories at the Oakland, Roseville, and Barstow railyards and, based on the inventory results, discussing possible future actions at these yards (which, according to the 2005 HRAs conducted by ARB, have much lower predicted risks). The Railroads agree that focusing efforts on the four Commitment yards is the best use of resources to make early and cost effective reductions. In addition, by focusing intensive efforts at the four Commitment railyards, new approaches to reducing emissions can be evaluated for possible application to other yards. Lastly, state and federal regulations have reduced and will continue to reduce railyard emissions statewide. Given the factors listed above, ARB and the Railroads have mutually agreed upon a set of commitments to reduce emissions at the four high-priority railyards.

B. Alternatives to the Project

The FED considers three feasible alternatives to the Commitments, each of which consists of a possible regulatory approach that might achieve the project objectives. The three alternatives considered are (1) regulation of non-preempted locomotives, (2) a regulation requiring zero-

[36]Peter Greenwald, SCAQMD, Transcript of June 24, 2010, ARB Board Meeting, pg. 66.

[37]Gideon Krakov, Letter to ARB, March 18, 2010, pg. 1.

emission cargo handling equipment, and (3) a regulation requiring risk reduction audits, plans, and measures.[38] As discussed below, while each of these regulatory alternatives would result in additional emissions reductions at the four railyards, all of the alternatives achieve fewer emissions reductions than the Commitments.

1. ARB Regulation of Non-preempted Locomotives

a. State Authority to Regulate Locomotives is Limited

The FED correctly indicates that CAA Section 209(e) limits California's ability to regulate locomotive emissions.

b. ARB's Estimate of Possibly Non-preempted Locomotives is Accurate

The FED correctly states that as of December 2010, there were approximately 80 locomotives in California that were built before 1973 and therefore might be subject to an ARB locomotive emissions regulation. However, since there are no such locomotives at the four yards covered by the Commitments, a regulation would not meet the project objectives. Currently, as of August 1, 2011, only 59 locomotives built before 1973 operate in California, and these locomotives are scheduled to be moved out of California over the next 16 months. Therefore, the number of locomotives that could be subject to a possible future ARB regulation is small and declining at a rapid pace.

c. There can be no PM Benefits From a Statewide Locomotive Regulation

The FED correctly indicates that a potential new statewide locomotive regulation that requires locomotives to meet Tier 0 standards would result in no PM reductions. Since there are no PM benefits associated with remanufacturing pre-Tier 0 locomotives to Tier 0 standards, there would not be any statewide PM benefits from such a regulation.

d. Tier 2 Locomotives Would not be Subject to an ARB Rule by 2020

The FED correctly concludes that since Tier 2 line haul locomotives will likely be rebuilt to Tier 2+ standards, these units will not exceed 133 percent of their useful life before 2020 and would therefore not be subject to a potential ARB locomotive regulation. Given normal fleet turnover and the uncertainties associated with Tier 4 technology, Tier 2 and Tier 2+ locomotives (which will have equivalent emissions to Tier 3 locomotives by 2013) will continue to make up a large portion of the Railroads' interstate line haul fleet beyond 2020. Interstate locomotives would not be subject to a State locomotive rule due to conflicts with federal law; therefore no emission benefits from Tier 2 locomotives could be attributed to a statewide rule.

2. ARB Regulation for Zero-emission Cargo Handling Equipment

[38] The FED also correctly considered a "No Project" alternative as required by Guidelines § 15126.6(e). The FED rightly concludes that the No Project alternative would not achieve any of the project objectives since non-action would not result in any additional emissions reduction benefits.

The FED correctly concludes that a cargo handling equipment rule requiring electrically powered yard equipment (such as cranes or electric yard hostlers) is not cost effective.[39] The FED concludes that installing electric Wide-Span Gantry cranes at the four Commitment railyards would reduce DPM emissions by about 2.6 tons per year.[40] Although there are no diesel PM emissions associated with offsite electricity generation, there are emissions of other PM components and their precursors. Thus, the 2.6 tpy estimate does not reflect the negative environmental impacts associated with emissions from offsite generation.

ARB's estimated implementation timeframe of 5-6 years for rule adoption and implementation of electric cargo handling equipment is overly optimistic. Both UP and BNSF are seven years into their permitting processes for the proposed ICTF Modernization Project and the proposed Southern California International Gateway (SCIG). Even if the environmental review documents for these two projects were released this fall, it could be a few years before either company breaks ground on a project that will take two to four years to build, resulting in at least a ten year timeframe for planning, permitting and construction.

With respect to electric trucks, ARB's analysis assumes a 1:1 replacement rate between electric and diesel trucks. However, recent testing and experience indicate that a 4:3 replacement rate[41] would be more appropriate, given the battery-life and charging time of existing electric hostlers. The electric truck's poor technical performance combined with the high price point of electric hostlers (the cost of an electric hostler ranges from 2.5 to 3.5 times the cost of a standard diesel holster) makes this technology both technically and financially infeasible.

Attachment A provides additional information regarding the feasibility and cost effectiveness of zero and near zero cargo handling equipment.

3. ARB Regulation Requiring Risk Reduction Audits, Plans, and Measures

The FED correctly concludes that federal law limits ARB's ability to require risk audits, plans, and measures for locomotives.[42] This option is legally infeasible.

In addition, ARB and the Railroads have already voluntarily conducted these types of analyses. The 2005 MOU required the Railroads to prepare emission inventories and emission modeling and ARB to prepare health risk assessments (HRAs) for 17 major railyards in California. The 2005 MOU also required the Railroads to prepare a plan to reduce emissions at these yards. The BNSF and UP HRAs for various railyards already comply with and, in many instances, provide more rigorous assessments than expected from Hot Spots Program requirements—principally due to the inclusion of mobile sources, whether owned by the railroads or not.

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[39] According to ARB's analysis in the FED, requiring the installation of electric cranes at railyards is 229 times more expensive than ARB's 2007 drayage truck rule.

[40] ARB, "Supplement to the June 2010 Staff Report on Proposed Actions to Further Reduce Diesel particulate Matter at High-Priority California Railyards," July 5th, 2011, pg. F-84.

[41] The ratio of 4 Electric Hostlers to replace every 3 diesel hostlers is calculated from manufacturer reported battery charging times as listed in Port of Los Angeles, "Electric Truck Demonstration Project Fact Sheet."

[42] ARB, "Supplement to the June 2010 Staff Report on Proposed Actions to Further Reduce Diesel particulate Matter at High-Priority California Railyards," July 5th, 2011, p. F-93.

II. Additional alternatives submitted by the public are infeasible.

A. Use of Fuel Cell Technology for Switch Locomotives is Not Feasible.

Public commenters encouraged ARB to: "[r]equire the railroads to replace all diesel locomotives…with Zero or Near Zero Emission VOC technologies such as …Hydrogen Fuel Cell Power or equivalent technologies"[43] and asserted that "[BNSF] has an all hydrogen powered yard locomotive in its LA yard that can serve as both a yard switcher and an emergency power source."[44]

In 2006, BNSF joined with the U.S. Army Corp of Engineers and Vehicle Projects, Inc., to develop the first prototype hydrogen-fuel-cell-powered switch locomotive in Topeka, Kansas. The prototype emits no NO_x, PM, or CO_2 emissions, and no noise. However, the technology is still in the testing stage and the prototype only produces low horsepower and has limited range. In fact, the prototype locomotive is currently in a BNSF locomotive shop in Topeka, where testing on fuel cell technology, different batteries, and larger fuel storage capacity is taking place. At this point in time, fuel cell technology for switch locomotives is not technically feasible. If the technology proves to be technically feasible in the future, the need to develop hydrogen fueling stations and infrastructure as well as the cost effectiveness of the technology, could still prevent deployment.

B. Use of Natural Gas Equipment to Run Yard Equipment is Feasible Only in Limited Circumstances[45]

One public commenter asked ARB to require the 18 high-risk railyards "to establish a schedule to only allow Zero emissions and Near Zero Emissions Drayage Trucks to enter their facilities" and recommended 25% of drayage trucks be LNG/Natural Gas. [46] Another commenter testified in support of LNG tractors, suggesting that staff analysis of LNG trucks in the Technical Options report was inaccurate since it used out-of-date data.[47] A third commenter also stated that "[n]atural gas yard trucks are available today and in use today," citing "thousands" of trucks in operation at railyards and "thousands" at the port terminals in California.[48]

Yard trucks (also called yard hostlers) can be manufactured specifically to run on LNG, or a heavy-duty diesel engine in an existing unit can be retrofitted to operate on LNG. In contrast, conversion of a diesel truck to LNG requires replacement of the entire fuel system, addition of a spark ignition system (unless diesel fuel will be used in a pilot injection system), and modifications to the electronic engine control system.

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[43] Coalition for a Safe Environment, Letter to ARB on Agenda Item # 10-6-5, 6/23/10, pg 3.

[44] Michael Bailey, People First, Letter to ARB on Agenda Item # 10-6-5, 6/24/11, pg 1.

[45] It should also be noted that the development of an LNG-powered locomotive presents a number of technical issues. These issues are discussed in detail in a white paper developed by the Railroads and discussed at an ARB locomotive technology symposium in 2007. The Railroad white paper can be found at: http://www.arb.ca.gov/railyard/ryagreement/112807lngqa.pdf and is incorporated herein by reference.

[46] Coalition for a Safe Environment, Letter to ARB on Agenda Item # 10-6-5, 6/23/10, pg 2.

[47] Tim Carmichael, California Natural Gas Vehicle Coalition, Transcript of 6/24/11 Hearing, pg 90.

[48] Phillip Ford, Capacity of Texas, Letter to ARB on Agenda Item # 10-6-5, 6/23/10, pg 1.

The San Pedro Bay Ports began testing LNG hostlers in intermodal service in 2005 through a demonstration project partnership with Sound Energy Solutions.[49] In 2007 BNSF began using and testing ten LNG hostler trucks at its Commerce Eastern facility.

While both Railroads agree that the performance of LNG trucks is satisfactory, the high capital cost of LNG hostlers is a significant limiting factor to consider when evaluating its potential use. The current cost of an LNG hostler is approximately $120,000 compared to roughly $85,000 for a standard diesel hostler. The replacement of all diesel yard hostlers at a railyard with LNG hostlers would also require either the installation of an on-site LNG fueling station, estimated to cost $700,000,[50] or the costly daily transport and delivery of LNG via remote fueling trucks, which add emissions of their own.

ARB's cargo handling rule will require Tier 4 technology by about 2015 (depending on the site and specific fleet characteristics); therefore, the incremental DPM reductions that would be delivered by requiring the use of LNG hostlers would be minimal.

LNG hostlers may ultimately have a role in reducing emissions at railyards in California and may be a candidate for incentive funding. However, due to high costs, this technology is not feasible for widespread application at the present time. The Commitments are deliberately performance-based, rather than prescriptive, to allow the Railroads to take advantage of the best technologies that develop over the next 10 years. As such, the Commitments do not preclude LNG hostlers and either Railroad may decide to purchase LNG hostlers for use at one of the Commitments railyards.

C. Use of ZECMS to Bring Containers to Railyards is Not Feasible.

Written and oral public comments at the June 23, 2010 ARB Board hearing critique the commitments on the grounds that they "do not require the replacement of forever polluting diesel fuel locomotive engines with Green ZERO Emissions Electric Trains currently being used in Europe or the newest maximum efficiency ZERO Emissions Electric MagLev Train System."[51] Attachment B provides detailed information regarding Zero Emission Container Movement Systems (ZECMS) and demonstrates these technologies are not feasible under CEQA. Note Attachment B does not include a discussion of electric trucks, which are discussed below.

D. Electric On-Road Trucks are Not Feasible.

A commenter in the June 2010 written comments to ARB suggested the agency "[r]equire that the 18 California High Cancer Risk Railyards establish a schedule to only allow ZERO Emissions and Near Zero Emissions Drayage Trucks to enter their facilities."[52]

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[49] Port of Long Beach, "Liquefied Natural Gas Yard Hostler Demonstration and Commercialization Project, Final Report." August, 2008, pg 1.

[50] ARB, "Technical Options to Achieve Additional Emissions and Risk Reduction from California Locomotives and Railyards, pg 81.

[51] Coalition for a Safe Environment, Letter to ARB on Agenda Item # 10-6-5, 6/23/10, pg 2.; Jesse Marquez, Transcript of June 24, 2010 ARB Board Meeting, pg. 98-99.

[52] Coalition for a Safe Environment, Letter to ARB on Agenda Item # 10-6-5, 6/23/10, pg 2.

The replacement of diesel-powered drayage trucks with electric battery or fuel-cell powered models is an alternative to the construction of fixed guideway or track-based ZECMS, discussed in Attachment B. Since 2008, the Ports of Los Angeles and Long Beach have been testing electric and fuel-cell trucks in drayage and yard applications.

In 2008, the Port of Los Angeles, in partnership with SCAQMD, began an Electric Truck Demonstration Project and ordered five electric drayage trucks powered by a lithium ion phosphate battery pack that could be recharged by a 40 KW charger.[53] To date, only one truck has been tested at the Port.[54] As discussed in Attachment A, a March 2011 report from the Port of Los Angeles[55] indicates the Port is not satisfied with the lithium ion battery electric drayage truck's performance.

In November 2010, the Port of Long Beach established an agreement with a second vendor to develop and demonstrate one hydrogen fuel cell/plug-in electric "TYRANO" on-road truck and evaluate the suitability of this technology for drayage duty as an alternative to the battery-electric model.[56] A third vendor has received grant support from the SCAQMD[57] and has announced its intention to "demonstrate the first practical electric port truck technology in actual drayage service by the end of 2011."[58] However, at this time, the Railroads are not aware of any test units from this company in service at either of the San Pedro Ports.

Although there has been some recent progress toward the development of a zero-emissions drayage truck, none of the proposed truck technologies have been successfully tested in a port or intermodal facility. Therefore, electric drayage trucks are not yet ready for service at the railyards and are not a feasible alternative under CEQA.

E. Diesel Particulate Filter Retrofits for Existing Switch Locomotives are Not Presently Feasible.[59]

June 2010 written comments to ARB reference ARB's 2009 Technical Options report and suggest that Option 2—retrofit of Gen-Set switch locomotives with PM emissions controls—is feasible and cost effective.[60]

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[53] http://www.balqon.com/product_details.php?pid=2

[54] Note the Port of Los Angeles tested both an electric drayage truck and electric yard hostlers as part of the Electric Truck Demonstration Project. The Port ordered five E-30 model electric drayage trucks and twenty E-20 model electric yard hostlers. The Port received and tested one drayage model and 14 hostler models. See Attachment A for further discussion of this Electric Truck Demonstration project.

[55] Resolution No. 11-7104 Award of Purchase Order Contract with Vision Motor Corporation to Retrofit Harbor Department-Owned Balqon Electric Yard Trucks, Executive Director's Report to the Board of Harbor Commissioners, March 31, 2011.

[56] Port of Long Beach and Vision Sign Agreement for Zero Emission Truck Demonstration." Press Release, Nov. 17, 2010. http://www.globenewswire.com/newsroom/news.html?d=207167.

[57] http://www.transpowerusa.com/wordpress/http:/www.transpowerusa.com/wordpress/18/.

[58]" http://www.transpowerusa.com/wordpress/zero-emissions-transportation-solutions/electric-port-trucks/.

[59] Tier 4 line haul locomotives, which will not be commercially available until 2015, are expected to incorporate DPFs; however, prototypes are not yet in service and little information on line haul DPF technology is currently available.

[60] Gideon Kracov, Letter to ARB on Agenda Item # 10-6-5, 6/23/10, pg. 5.

Diesel Particulate Filters (DPFs) are an aftertreatment technology that can be installed onto a diesel engine to reduce particulate emissions. DPF technology has not proven feasible in past tests on conventional, older switch locomotive engines. Starting in 2005, UP, BNSF, and ARB conducted extensive testing of multiple types of DPFs for non-Gen-Set, twenty-five year-old switch locomotives. All DPFs tested in the lab and field exhibited significant shortcomings, including structural failure and poor PM removal efficiencies, and further testing has not been pursued.[61] Both UP and BNSF, in conjunction with ARB, are currently testing DPF technology on Gen-Set engines through the AB118 technology program; results of these field tests are expected in late 2012. It should also be noted that although DPFs have been developed for non-locomotive engines of similar size to those used in a Gen-Set locomotive, a switch locomotive has a more severe duty cycle that presents new challenges when transferring this technology to this application.

Although DPFs on Gen-Set locomotives would reduce PM emissions at the railyards, this technology is still in a testing phase and is not proven or feasible under CEQA.

[61] Personal communication, Michael Iden, Union Pacific, August 2011.

Attachment A:
Additional Information on Zero or Near Zero Emissions Cargo Handling Equipment (CHE)

Introduction

Alternative C of the Functional Equivalent Document considers the option of amending the existing statewide regulation for cargo handling equipment (the CHE Rule) to require that certain equipment at the railyards meet zero-emission levels. Alternative C examines the feasibility and cost effectiveness of installing Wide Span Gantry Cranes (WSGs) and effectively eliminating the need for the majority of the yard hostlers.

Other possible near zero emission CHE alternatives include (1) replacement of diesel yard hostlers with electric models, (2) replacement of diesel powered hostlers with hybrid hostlers, and (3) retrofit or replacement of diesel Rubber Tire Gantry Cranes (RTG's) with hybrid cranes. While these newer and lower emitting alternatives would reduce emissions, all are presently unproven technologies.

This attachment provides additional information on electric and hybrid cargo handling equipment technology and supports ARB's rejection of the zero-emissions cargo handling rule alternative.

Installation of Wide Span Gantry Cranes

Overview

Wide Span Gantry (WSG) Cranes, also known as Rail Mounted Gantry Cranes, lift, stack, and transfer container cargo between trucks and trains. Although they still require some support equipment, WSGs require fewer yard hostlers, forklifts, or other cargo handling equipment. WSGs are much larger than traditional Rubber Tired Gantry Cranes (RTGs) and are powered electrically.

Since the installation of WSGs cranes nearly eliminates the need for most other diesel-powered cargo handling equipment, they represent one compliance option for a zero-emissions CHE rule. Although WSG technology is currently available, electrifying existing railyard CHE with WSGs is extremely expensive and difficult given the complexity and logistics of completely retrofitting an entire existing railyard. Such a retrofit would require removal and replacement of yard tracks, roadways, lighting, maintenance shops and other infrastructure, and installation of WSG cranes. A project of this scale cannot be done without significant disruption in operations. This type of mandate would make it extremely difficult for the Railroads to maintain existing levels of competitiveness and customer service.

Existing and Proposed Uses

WSGs are currently installed at several intermodal container facilities including BNSF's Seattle International Gateway (SIG) (four cranes) and Memphis Intermodal Facility (five strip and three stacking cranes).[62] WSGs have also been installed at ports in Germany and Switzerland.

[62] http://www.bnsf.com/employees/communications/bnsf_today/2007/08/2007-08-02-a.html

However, the installation of WSGs at new facilities cannot be used to justify the conversion of existing railyards without site-specific analyses. For example, the Memphis Intermodal Facility was constructed on a greenfield site (essentially bare land), thereby avoiding the additional costs and complexities of overhauling existing infrastructure and disrupting regular rail operations. The installation of four WSGs at SIG was part of a $50 million WSG technology demonstration program. This demonstration program added the WSG's in an area adjacent to the existing intermodal operations specifically to evaluate the capability of this new equipment. Therefore, it cannot be used as a comparison for the feasibility of renovating the four Commitment yards. As ARB states, "generally, WSG crane systems are implemented at brand new or key port and railyard facilities designed to handle large volumes of containers."[63]

The only valid example available for the purpose of examining the feasibility of a WSG mandate for *existing*, heavily-trafficked railyards is the proposed Intermodal Container Transfer Facility (ICTF) Modernization Project, which, if constructed, would result in the installation of 39 WSGs. The ICTF example clearly demonstrates that the installation of WSGs at an existing railyard requires extensive planning and permitting, as well as the piecemeal demolition and reconstruction of the entire railyard.

The installation of WSGs at ICTF will require reconfiguration and reconstruction of the entire yard including scrapping of existing yard infrastructure and buildings, excavation and removal of pavement and existing tracks, installation of approximately 28,000 feet of new fixed tracks, installation of new electric infrastructure including electric substations and crane power systems, and construction of new crane parts/repair building.[64] In addition, Union Pacific will need to train equipment operators, establish new operational procedures, and negotiate electricity rates. Consistent with ARB's estimates in the FED, installing the WSGs at ICTF will cost approximately $390 million. (This estimate includes approximately $5 million for each crane and an average additional $5 million per crane for installation of related infrastructure.)

In addition, the planning and permitting processes are likely to delay the ultimate emissions benefits of the WSG technology. For example, UP submitted the ICTF development application to the Joint Powers Authority of the Ports of Los Angeles and Long Beach at the end of 2007 following several years of internal planning.[65] At the time of writing this comment, a draft EIR has not yet been released. Environmental review of the project is expected to be completed in 2012 at the earliest. Union Pacific's plan projects that construction will take 3 to 4 years,[66] meaning total project development will span over 10 years.

ARB suggests in the FED that compliance with a zero-emissions CHE rule through WSG installation would occur in the 2016-2017 period given regulatory processes, permitting, and

[63] ARB, Technical Options Document, August 2009, pg. 86.

[64] Union Pacific Railroad, Application for Development Project Approval, "Intermodal Container Transfer Facility (ICTF) Modernization Project, December 26, 2007, pg. 31.

[65] Union Pacific Railroad, Application for Development Project Approval, "Intermodal Container Transfer Facility (ICTF) Modernization Project, December 26, 2007, pg. 1.

[66] Union Pacific Railroad, Application for Development Project Approval, "Intermodal Container Transfer Facility (ICTF) Modernization Project, December 26, 2007, pg. 34.

construction.[67] However, noting the ICTF example, if this type of rule were to be adopted in January 2012, it is more likely that construction would not be completed before the 2020-2022 timeframe. During this period of time, other ARB regulatory programs (including the new engine certification requirements and CHE rule as well as voluntary railroad efficiency initiatives and new equipment purchases) will have resulted in substantial emission reductions of DPM from cargo handling equipment, thus greatly reducing the incremental benefits of WSG retrofits. The cost-effectiveness of the CHE rule would also be greatly diminished (much higher costs) if, after wholesale conversions of the CHE fleet to reduce emissions to comply with the CHE rule, new regulations were to require that the equipment be scrapped in favor of WSGs.

This extensive process precludes the Railroads from complying with a zero-emissions CHE rule within a reasonable timeframe.

Costs of Implementing WSGs at Existing Railyards

Although the ICTF modernization plan provides the best benchmark for estimating the costs of a WSG mandate, ARB correctly notes that "installation of WSG cranes carries widely varying costs…there is no one route to electrification which means that construction and installation at an existing facility is extremely difficult and costly. Every facility is different, and projects of this magnitude require extensive planning...The type of electric equipment which may be operationally feasible at one yard may not be operationally feasible at another railyard."[68]

As referenced in the FED, individual elements at each yard, such as the Fourth Street Bridge at the San Bernardino railyard, will result in more complicated, and more costly, WSG installation. Depending on the number of cranes installed, there may be differing economies of scale at each yard. It should also be noted that although the ICTF modernization plan phased construction, significant disruption in cargo traffic through the yard may still occur. That disruption would have an adverse impact, adding to the cost of any railyard renovation project.

While there are multiple unknowns that make it challenging to estimate the cost of a WSG installation mandate at the four yards, the Railroads believe that $10 million per new WSG crane ($5 million for each crane and an average additional $5 million per crane for installation of related infrastructure) is a reasonable starting cost estimate. In the limited circumstances of the ICTF Modernization and Expansion Project, UP has determined that the electrification of CHE through installation of WSGs is warranted because it is part of a larger modernization plan that will allow the railyard to double capacity from an average of 725,000 containers/year to 1.5 million containers/year while decreasing the yard's footprint.[69] The same business case cannot be made for other yards.

Cost Effectiveness of WSGs

[67] ARB, "Supplement to the June 2010 Staff Report on Proposed Actions to Further Reduce Diesel particulate Matter at High-Priority California Railyards," July 5th, 2011, pg. F-85.

[68] ARB, "Technical Options to Achieve Additional Emissions and Risk Reduction from California Locomotives and Railyard." August 2009, pg. 86.

[69] Union Pacific Railroad, Application for Development Project Approval, "Intermodal Container Transfer Facility (ICTF) Modernization Project, December 26, 2007, pg 5.

ARB estimates in the FED that the installation of WSGs would reduce diesel PM emissions at the four railyards by under 2.6 tons/year and would cost $1.1 billion.[70] ARB also reports, "[f]or context, ARB's 2007 regulation to reduce emissions and health risk from drayage trucks serving ports and intermodal railyards (including the four priority yards) had roughly the same estimated total cost to reduce diesel PM by 949 tons per year."[71] Much of that cost was also paid for by government funded grants. The expected cost effectiveness of the WSG would not be sufficient to win funding under current grant guidelines. That means that ARB's drayage truck rule would be nearly 230 times more cost-effective than WSG installation would be on a dollar per tons of PM reduced basis, even though the cost effectiveness for the Drayage Truck Rulewas at the high-end of the range for rules previously adopted by ARB (See table A-1). Further, the existing CHE rule currently enforced by ARB will reduce DPM emissions by approximately 76% by 2015 and 85% by 2020. By 2020, total emissions reductions from the existing program are expected to be 15.5 tons/year less than the 2005 emissions levels.[72] As discussed above, it is most appropriate to compare emissions reductions from WSG installation with 2020 emissions under the existing scenario, given the likely timeline for railyard reconstruction.

[70] ARB, "Supplement to the June 2010 Staff Report on Proposed Actions to Further Reduce Diesel particulate Matter at High-Priority California Railyards," July 5, 2011, pg. F-84.

[71] ARB, "Supplement to the June 2010 Staff Report on Proposed Actions to Further Reduce Diesel particulate Matter at High-Priority California Railyards," July 5, 2011, pg. F-84.

[72] ARB, "Supplement to the June 2010 Staff Report on Proposed Actions to Further Reduce Diesel particulate Matter at High-Priority California Railyards," July 5, 2011, pg. F-85.

Table A-1: Comparison of the Average Cost-Effectiveness of Recently Adopted Air Toxic Control Measures

Rule	PM Cost Effectiveness ($/lb)	Implementation Date of Regulation or Amendments	Program lifetime (years)
Transportation Refrigeration Unit ACTM	$10 - 20[73]	2008	13 years
Cargo Handling Equipment Rule	$21[74]	2007	13 years
Harbor Craft Rule	$17-35[75]	2009	12 years
Amendments to the Truck and Bus Regulation[76]	$44	2008 (2012 amended)	13 years
Drayage Truck Rule	$46[77]	2008	13 years
Hypothetical Wide Span Gantry Crane Requirement	$10,577[78]	2020 (estimated)	20 years

Conclusions

In summary, while the Railroads acknowledge the benefits of the WSG technology and have installed or proposed to install WSGs at new or expanding yards where it is economically sustainable, it is not feasible or cost effective for the Railroads to comply with a zero-emissions cargo handling rule through the implementation of WSGs at the four Commitment railyards.

Replace Diesel Yard Hostlers with Electric Models

Overview

Yard hostlers, also known as yard trucks or yard tractors, transport containers around a yard for loading or unloading onto trains by cranes, or for storing for the customer. Electric yard hostlers use an on-board battery to supply electricity that powers the yard truck. Compared to conventional diesel yard hostlers, electric yard trucks have the potential to reduce on-site emissions from the roughly 270 diesel yard trucks operating at the four railyards by 100%.

[73] ARB, Staff Report: Initial Statement of Reasons for Proposed Rulemaking, ATCM for In-Use Diesel Fueled Transport Refrigeration Units (TRU)," October 2003, pg xviii.

[74] ARB, Staff Report: Initial Statement of Reasons for Proposed Rulemaking, Regulation for Mobile Cargo Handling Equipment at Ports and Intermodal Rail Yards," October 2005, pg. ES-9.

[75] ARB, Staff Report: Initial Statement of Reasons for Proposed Rulemaking, Amendments to the Regulation to Reduce Emissions from diesel Engines on Commercial Harbor Craft," May 2010, pg. 19.

[76] ARB, "Staff Report: Initial Statement of Reasons for Proposed Rulemaking, Proposed Amendments to the Truck and Bus Regulation." October 2010, pg. 57.

[77] ARB, "Supplement to the June 2010 Staff Report on Proposed Actions to Further Reduce Diesel particulate Matter at High-Priority California Railyards," July 5, 2011, pg. F-84.

[78] Calculated based on a 20 year project life time with total cost of WSG installation projected in: ARB, "Supplement to the June 2010 Staff Report on Proposed Actions to Further Reduce Diesel particulate Matter at High-Priority California Railyards," July 5, 2011, pg. F-84.

Currently, the technology for electric yard hostlers is unproven and unavailable for the duty cycles needed for rail operations.

Existing and Proposed Uses

Recent testing at the Port of Los Angeles has demonstrated that electric yard hostler technology is not yet available for use at ports or intermodal yards. Following testing of one electric hostler in 2007, the Port of Los Angeles, in 2008, ordered 25 additional electric hostlers that could operate for roughly eight hours, depending on load, and could fully re-charge in three to four hours.[79]

A March 2011 Port of Los Angeles Report for their Technology Advancement Program indicates only 14 of the 20 electric yard hostlers ordered were delivered because testing results indicated that when an electric truck pulls extra-heavy loads (more than 50,000 lbs), "it exhibits reduced battery life."[80] Because fully loaded electric hostlers were operational only four to five hours per charge, the Board of Harbor Commissioners approved a resolution to retrofit six electric hostlers with hydrogen fuel cell hybrid systems.[81] The hydrogen fuel cell hostlers have only recently been built and are undergoing testing in port applications. The technology is too new to confirm effectiveness without further testing. In addition, it appears the initial capital cost of the hydrogen fuel cell trucks, not including the fueling infrastructure, will be approximately three times more expensive than current new class 8 drayage trucks.

Reports from drivers indicate the electric yard hostlers may take eight to ten hours to charge and only last three to four hours in use at the yard. One reported, "While the driver is working, they run out of juice and the truck has to be towed back. It just ruined daily operations."[82] California Cartage, a company which was allowed to use the electric trucks for free, returned the trucks back to the ports before the end of the testing period due to their limited performance.[83]

Cost Effectiveness of Electric Hostlers

The conversion of diesel hostlers to battery-electric hostlers is also not a cost-effective option. Electric yard hostlers currently cost approximately $210,000 each ($190,000 per truck plus $75,000 for a four-truck charging station).[84] This is nearly 2.5 to 3.5 times the current cost of diesel hostlers. In addition, the Railroads would need a larger fleet of electric yard hostlers to maintain 24-hour operations while a portion of the hostlers re-charge. If the yard trucks performed as the manufacturer intended, a railyard would need to replace every three existing

[79] Port of Los Angeles, "Electric Truck Demonstration Project Fact Sheet."

[80] Resolution No. 11-7104 Award of Purchase Order Contract with Vision Motor Corporation to Retrofit Harbor Department-Owned Balqon Electric Yard Trucks, Executive Director's Report to the Board of Harbor Commissioners, March 31, 2011, pg. 3.

[81] Resolution No. 11-7104 Award of Purchase Order Contract with Vision Motor Corporation to Retrofit Harbor Department-Owned Balqon Electric Yard Trucks, Executive Director's Report to the Board of Harbor Commissioners, March 31, 2011.

[82] Los Angeles Business Journal, "Underpowered Electric Trucks Spin Wheels at L.A. Ports," Alfred Lee, June 6, 2011.

[83] Pacific Maritime Online, "Stressful Week for LA Port Regarding Trucks." June 10, 2011, http://www.pmmonlinenews.com/2011/06/stressful-week-for-la-port-regarding.html

[84] Port of Los Angeles, "Electric Truck Demonstration Project Fact Sheet."

diesel hostlers with four new electric hostlers to maintain existing operations. However, if the hostlers require eight hours of charging for four hours of work, as suggested from POLA reports, then the Railroads would need three electric hostlers to replace each diesel hostler currently in use at the railyards.

This replacement rate of electric:diesel, which currently ranges from 4:3 to 3:1, could significantly decrease the cost-effectiveness of this alternative. ARB estimates that conversion of Tier 4 yard trucks to electric models could reduce DPM at the four railyards by 1.8 tons/year at a cost of $56 million, at minimum. In calculating this cost, ARB used a replacement rate of 1:1 for conversion from diesel to electric hostlers.[85] If the replacement rate were higher, as noted above, then the cost of deploying electric hostlers at the yards would be between $75 (4/3 *$56 million) and $168 million (3*$56 million).

Conclusions
Based on the results of the initial testing of this technology, significant technological advancement/improvement is necessary before future testing will be scheduled. Electric yard hostlers are neither technologically feasible nor cost effective under CEQA at this time.

I. Replace Diesel Yard Hostlers with Hybrid Models

Overview
Hybrid Yard Hostlers employ a similar technology to that which has been successfully proven in on-road vehicles. However, on-road hybrid vehicles are built on gasoline engines, at present. Hybrid yard hostlers instead combine a hybrid-electric drive system with a diesel or alternative fuel engine and an electric motor.

Existing and Proposed Uses
In partnership with US EPA and CALSTART, the Port of Long Beach began testing of three Kalmar Ottawa 4X2 yard hostlers fit with U.S. Hybrid hybrid drive systems. The hybrid hostler was expected to achieve emission reductions of 67% for NOx and 50% for PM.[86] In addition, the potential improvements in the fuel economy (predicted to be at least 30%)[87] were expected to produce savings that would make the hybrid more cost competitive with standard diesel hostlers.

The hybrid hostlers were tested for six months at the Ports in 2010 and failed to demonstrate significant fuel savings.[88] Test results showed that at low loads, hybrid hostlers actually used 7% more fuel and emitted only 3% less NOx than diesel hostlers. At higher loads, the hybrid was 3% more fuel efficient and emitted 7% less NOx. CALSTART suggests that a higher rear differential

[85] ARB, "Supplement to the June 2010 Staff Report on Proposed Actions to Further Reduce Diesel particulate Matter at High-Priority California Railyards," July 5, 2011, pg. F-87.

[86] San Pedro Bay Ports Technology Advancement Program Annual Report, 2009, pg. 18.

[87] Hybrid Yard Hostler Demonstration and Commercialization Project, Final Report, March 2011; Prepared by CALSTART for POLB and POLA, pg. 9.

[88] Hybrid Yard Hostler Demonstration and Commercialization Project, Final Report, March 2011; Prepared by CALSTART for POLB and POLA, pg. 9.

ratio was the cause of this increased fuel consumption.[89] Further, testing of hybrid hostlers at the ports revealed issues with the hostlers' acceleration, with 30.4% of respondents rating acceleration to be worse than that of the diesel hostler.

More recently, Union Pacific conducted a 10-week test of a hybrid diesel-battery powered hostler. With a fully charged battery, the hybrid hostler only lasted for a little more than two hours before the battery was depleted and the 40hp diesel engine turned on to run the equipment. Once the unit completed an 8 hour shift, it needed to be charged for 16 hours. The hybrid hostler was much slower (max speed was 15 mph) compared to the traditional diesel hostlers (max speed of 25 mph) and the trailer dolly mechanism worked three times slower than the diesel counterpart. Due to the lower work output, it would take three times as many hybrid units to replace the existing conventional diesel hostlers.

Once improvements are made in the reliability and battery-life of the electric yard truck, further testing will need to be done to ensure that horsepower, acceleration and other performance indicators are can satisfactorily perform railyard operational requirements.

Cost Effectiveness of Hybrid Hostlers

Because the hybrid yard hostler costs $134,000 compared to $85,000 for a new diesel hostler, the Port study concluded that "with current pricing and assumptions used in the life cycle cost analysis, incentives are necessary to make the business case viable, given the level of performance delivered by the prototypes."

Conclusions

As shown in the recent San Pedro Bay Ports Technology Advancement Program demonstration project, the disappointing emission reduction capacity of the hybrid yard hostler combined with the hybrid's high cost and minimal fuel savings indicates that this technology is not yet available in a form that is both cost effective and technically feasible.

II. Retrofit or Replacement of Diesel RTG's with Hybrid Cranes

Overview

An existing diesel RTG can be retrofit with a hybrid diesel-electric system by installing a smaller engine and batteries to capture braking energy when a cargo container is lowered. Hybrid RTGs have the potential to reduce emissions of NOx and PM by up to 80% and 90%, respectively. Diesel-electric RTGs can be retrofit to the hybrid system for approximately $350,000 each.[90]

Existing and Proposed Uses

The Ports of Los Angeles and Long Beach established a program with ARB and Long Beach Container Terminal to test six EcoCranes™ under the San Pedro Ports' Technology Advancement Program. As of summer 2009, only one crane had been tested and "a number of

[89] Hybrid Yard Hostler Demonstration and Commercialization Project, Final Report, March 2011; Prepared by CALSTART for POLB and POLA, pg. ES-4

[90] San Pedro Bay Ports Technology Advancement Program Annual Report, 2009, pg. 21.

operational integration issues were encountered during initial testing."[91] Further testing was planned to evaluate whether reducing the engine's horsepower from 680 to 120 will compromise the efficiency or effectiveness of the hybrid cranes in lifting the heaviest loads. Further updates on the results of this additional testing are not available. As a result, the performance and emissions reduction potential of this technology has not yet been verified.

Union Pacific has also been testing a hybrid RTG at ICTF, and while UP is supportive of the technology, the crane is not yet performing adequately for regular railyard use. For example, the crane has dropped six containers and, periodically, the lateral movement suddenly terminated leaving the crane unable to perform critical and time sensitive work. UP is working with the vendor to fix the defects, continue the evaluation of its performance, and perfect the technology to ensure safety and operational requirements are met.

Conclusions
The hybrid RTG system is a potentially promising development, but since the technology is still in a testing phase, it is not feasible as a technology to replace existing railyard cranes.

Conclusion: Electric and/or Hybrid CHE are not Feasible or Cost Effective
In summary, it is not currently feasible or cost effective under CEQA to implement a regulation requiring zero-emission electric cargo handling technology. Wide Span Gantry cranes are available and have been proven in-use at ports and railyards in the United States. However, the costs, logistics, and timeframe required to reconfigure and rebuild a railyard to accommodate this technology does not make this option feasible or cost-effective for a rail operation duty cycle.

The technologies for electric yard hostlers, hybrid yard hostlers, and hybrid diesel-electric Rubber Tired Gantry Cranes are still in testing and development and thus these technologies are not available. Based on the above analysis, it is appropriate for ARB to reject the Zero-Emissions Cargo Handling Rule alternative as infeasible.

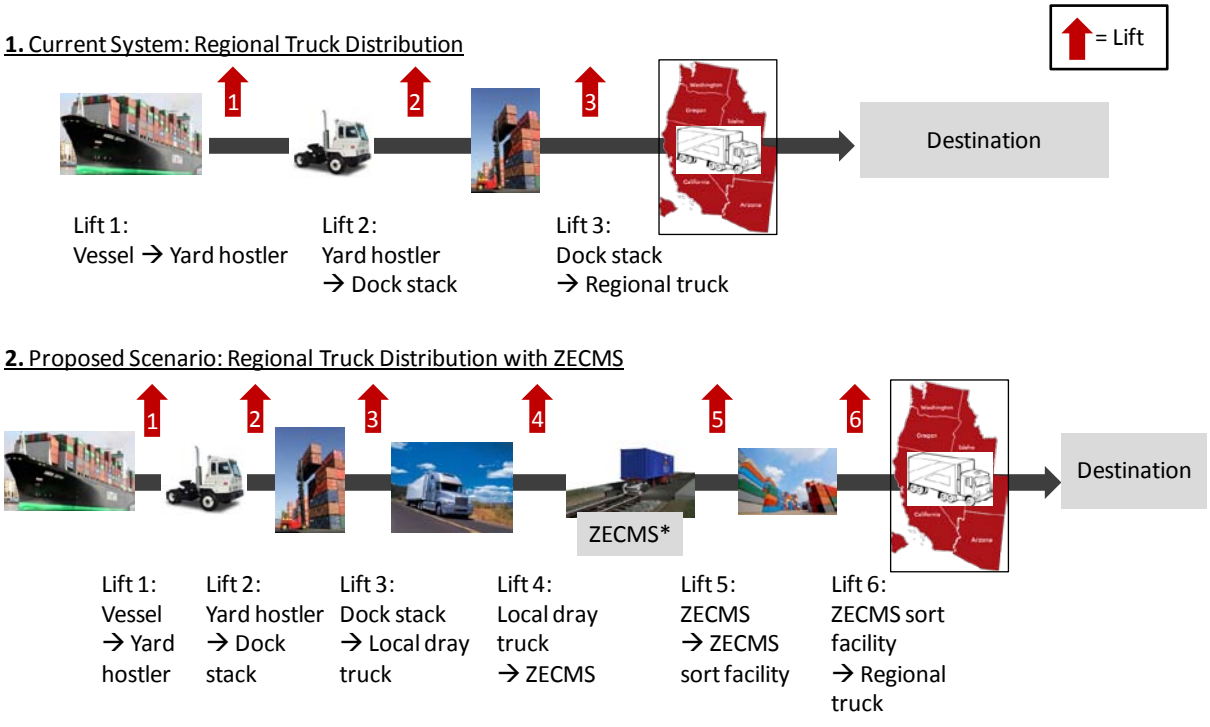
[91] San Pedro Bay Ports Technology Advancement Program Annual Report, 2009, pg. 21.

Attachment B:
"Zero- and Near Zero" Emissions Container Movement Systems

Overview

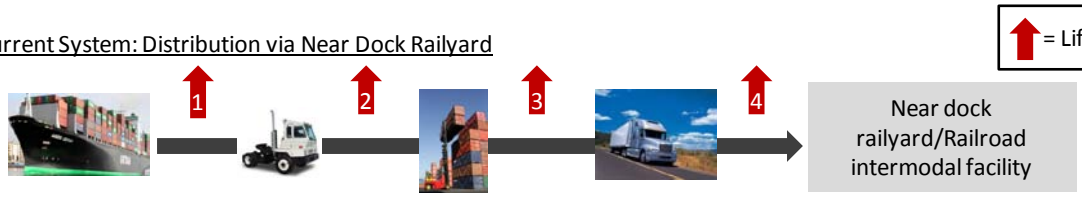
Zero Emissions Container Movement Systems (ZECMS) are intended to replace existing diesel powered equipment in the goods movement system with alternatives powered by electricity. Most current ZECMS proposals would move (or "dray") a container between the marine terminals to an intermodal or warehouse facility along a fixed track or guideway. Note this attachment does not discuss zero emission trucks. ZECMS is a completely new proposal that would create a new element in the goods movement system; this type of system would substantially reduce the miles driven by drayage trucks, but could not completely elimitate them. The new technologies will require complete loading and unloading facilities at each end of the system. ZECMS fixed guideway systems add three lifts per container to the goods movement system and therefore would pose the risk of lowering the current system's throughput and efficiency. In addition, the new expanded loading and unloading facilities will compete for valuable real estate at each end of the system. The Figure B-1 shows a schematic of a ZECMS system.

Figure B-1: Comparison of Current Container Distribution System with a ZECMS



*Only fixed guideway ZECMS

3. Current System: Distribution via Near Dock Railyard



Lift 1: Vessel → Yard hostler

Lift 2: Yard hostler → Stack

Lift 3: Stack → Local dray truck

Lift 4: Local dray truck → Rail car

4. Proposed Scenario: Distribution via Near Dock Railyard with ZECMS

Lift 1: Vessel → Yard hostler

Lift 2: Yard hostler → Dock stack

Lift 3: Dock stack → ZECMS

Lift 4: ZECMS → Yard hostler

Lift 5: Yard hostler → ZECMS sort facility

Lift 6: ZECMS sort facility → Local dray truck

Lift 7: Local dray truck → Rail car

*Only fixed guideway ZECMS

Key

Vessel with containers – Arrive at ports where containers are unloaded onto yard hostlers

Yard hostlers – Unload vessels and deliver containers to dock/gate stacks

Local drayage truck– Short distance transport from ports or intermodal yards as part of longer overall move

Dock/gate stacks – Containers sit at dock/gate stacks until lifted onto another mode of transport such as a train or truck

ZECMS (fixed guideway systems) – Zero emission fixed guideway systems to replace certain delivery streams of the current goods movement system (does not include zero emission drayage trucks)

Regional trucks – Deliver containers to destinations within California and in Western U.S. region

ZECMS sort facility – Gathering point for sorting and dispatching containers by destination

ZECMS Technologies

ZECMS systems have been proposed in many forms. Most proposals involve propelling a container along a fixed track or guideway through magnetic force or vacuum propulsion. Battery-electric or fuel-cell trucks would be an alternative to such track or guideway mounted technologies, but are not discussed in this attachment.

The proposals received by the ports for ZECMS have fallen into four categories: linear motors without maglev, linear motors with maglev, vacuum propulsion technology, and zero emissions trucks (catenary, hybrid diesel-electric, hydrogen fuel cell hybrid, lithium battery).

There are two types of linear motors that can be utilized in either non-maglev or maglev trains: linear induction motors and linear synchronous motors. Most proposals for ZECMS have utilized linear synchronous motors in combination with maglev.

Linear Induction Motors (LIM)

Linear induction motors use non-permanent magnets placed on the track. When a current goes through the rotor on the bottom of the train car and creates a magnetic field, the non-permanent magnet gets charged (+, -, +, -) and pulls the train car forward. Magnetic Levitation on a fixed guideway, or "maglev", is one type of proposal that utilizes LIM propulsion.

Existing proposals are at various levels of development, including some operating in passenger contexts. The Linimo maglev in Japan is probably the best known example of a passenger train utilizing LIM. However, there are no existing freight applications of LIM at this time.

Linear Synchronous Motors (LSM)

Linear synchronous motors use permanent magnets that already have a charge (+,-,+,-) regardless of whether a current is put through the rotor on the bottom of the train car. Although a DC excitation is needed in an LSM system unlike in the LIM system, less energy is lost in an LSM system. As such, the power efficiency of an LSM maglev would be higher than that of an LIM maglev.

LSM has gained increasing popularity in potential applications to high speed passenger rail systems, but there are few applications of LSM to freight even at the prototype level. There is one existing system designed for the military to launch fighter planes from naval ships, but it is not sufficiently analogous to port freight operations. There are also prototypes that demonstrate potential applications to freight but none have been demonstrated at full-scale and under port conditions. Even Japan, which has been leading LSM maglev research, does not expect to have a commercially viable LSM passenger maglev until 2025 at the earliest.

Neither LIM nor LSM technologies are mature enough to be applied to freight without major disruptions to current goods movement operations and are therefore currently not available or feasible alternatives to the existing drayage systems in California. Tables B-1 and B-2 below compares ZECMS technologies.

Evaluating New Technologies

ZECMS, like all other new emission reduction technologies, need to be evaluated in the context of the objectives and limitations of the current freight movement system. The existing truck distribution system allows for flexibility and efficiency in delivering containers to their destination. New technologies should be evaluated with criteria specific to the port or rail duty cycle and must preserve or enhance flexibility, velocity, reliability, safety, and throughput of the goods movement system. In a joint presentation to the Harbor Commissioners in July 2011, the Ports of Long Beach and Los Angeles stated "For zero emission technology to be considered a good candidate for advancement by the ports, it must be capable of being implemented successfully and within a reasonable period of time, taking into account economic, environmental, legal, operational and technological factors."[92]

In addition, the emissions benefits of new technologies should be compared to the emissions of the future technology they would be replacing (i.e. diesel trucks will be much cleaner in 2015, likely the earliest possible date that a ZECMS system might be deployed, than they are today). A key factor in maintaining or improving system efficiency is limiting the number of lifts required to move a container through the system because additional lifts result in increased time and costs. Additionally, given the densely developed and urban nature of Southern California, new proposals must address the limited land available for additional facilities. Furthermore, some of the attributes of these propulsion technologies that are beneficial for passenger applications– rapid acceleration and rapid speeds – become a liability when applied in the freight context. For example, the rapid acceleration and rapid speeds of some ZECMS would require a complete system redesign when applied to a freight application.

[92] Port of Long Beach and The Port of Los Angeles, "Roadmap to Zero Emissions," presented at Joint Workshop on Zero-Emissions Cargo Movement Systems, July 7, 2011.

Table B-1: Readiness of ZECMS Technologies

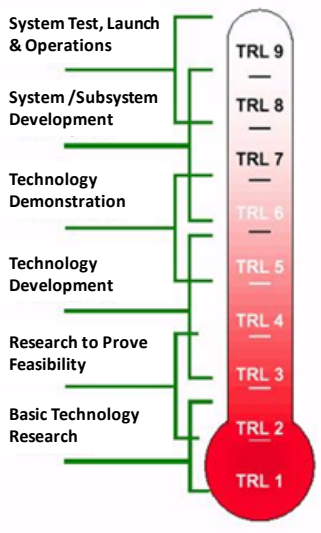
Key

○ None/very weak ◔ Very few/weak ◐ Some/ medium ◕ More than few/strong ● Many/very strong

ZECMS	Potential providers	Proof of concept	Utilize existing infrastructure	Financial feasibility	Potential clients
Linear motors without maglev	◔	◔	◐	◐	◔
Linear motors with maglev	◕	◐	○	◔	○
Vacuum propulsion	◔	◐	○	◔	○

NASA has developed a widely applicable framework for evaluating technologies that identifies the steps that are necessary before a new technology is ready for implementation. Contrary to assertions by some commenters that the NASA framework is designed for "putting a man on the moon," many of the world's major companies (and government agencies) use this approach to assess the maturity of evolving technologies (materials, components, devices, etc.) prior to incorporating that technology into a system or subsystem. The Technology Readiness Levels (TRL) index is presented below:

Figure B-2: NASA Technology Readiness Levels (TRL) Index



TRL 9	Actual system proven by successful operations
TRL 8	Actual system qualified through test and demo
TRL 7	Prototype demo in operational environment
TRL 6	Model or prototype demo in relevant environment
TRL 5	Component/breadboard validation in real environment
TRL 4	Component/breadboard validation in lab environment
TRL 3	Analytical/experimental proof of concept
TRL 2	Technology concept and/or application formulated
TRL 1	Basic principles observed and reported

Source: "Technology Readiness Levels: A White Paper", John C. Mankins, Office of Space Access and Technology, NASA 1995

All parties agree that there has been no demonstration of any of the ZECMS technology in the freight or goods movement context. Absent a rigorous application testing and technology readiness evaluation, the various ZECMS technologies remain theoretical proposals corresponding to Level 5-6 in the figure above.[93] In fact, the ports of Long Beach and Los Angeles conclude in their July 2011 "Road to Zero Emissions" presentation, "None of the zero emissions technology options considered to date [are] ready for full-scale implementation."[94]

Technical and Operational Issues

Further, there are a number of operational unknowns which inhibit the feasibility of ZECMS at this time. In 2006, the San Pedro Ports began evaluating the technical and business potential of various ZECMS proposals. Two separate reports completed in 2008 and 2010 by independent consultants commissioned by the Ports found:

- *….the panel was left with many unanswered questions regarding the robustness, durability, and reliability of any of the six guideway systems. The panel believes it is one thing to propel a test vehicle along a well-maintained test track under carefully controlled conditions and quite another to haul heavy freight containers on a near continuous basis in the operating realities of a busy port.*[95]

- *Another area of concern that emerged during the panel's review of the initial submissions had to do with market and financial risks. … In light of the capital intensive nature of fixed guideway systems and the best case assumptions regarding growth in container volume, market share, capital costs, and system availability used in many of the proposers' analyses, the panel believes that… a ZECMS will have difficulty competing economically with conventional truck drayage, particularly given the rapid advances being made in hybrid-electric vehicles and their inherent flexibility and scalability.*[96]

- *As a result of its review of the seven submissions initially received in response to the RFCS and information provided subsequently for the individual interviews, the panel does not believe that any of the systems proposed are sufficiently mature to commit valuable port and other public rights-of-way for a full-scale operational deployment at this time. …On this basis, the panel believes that the process could be fairly terminated at this time.* [97]

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[93] Keston Institute for Public Finance, "Review of Concepts and Solutions to Provide Zero-Emission Container Movement Systems (ZECMS) to the Ports of Long Beach and Los Angeles," July 2010.

[94] Port of Long Beach and The Port of Los Angeles, "Roadmap to Zero Emissions," presented at Joint Workshop on Zero-Emissions Cargo Movement Systems, July 7, 2011.

[95] Port of Los Angeles Executive Director's Report to the Board of Harbor Commissioners, "Zero Emissions Container Mover System Request for Concepts & Solutions: Evaluation Results," July 29, 2010, pg. 4.

[96] Ibid pg. 4.

[97] Ibid pg. 4.

Additionally, none of the proposed systems has a back up propulsion system to prevent disruptions and delays when the system suffers an electric power outage. ZECMS proponents have not addressed the issues of maintenance and support infrastructure that would be required to combat a power outage.

Table B-2 Comparison of ZECMS technology proposals to-date

ZECMS	Companies	Working system?		Fixed Guideway or Retrofit?	TRL	Funders or customers?	Additional lifts needed?
		Freight	Passenger				
Linear motors applied to existing tracks or wheeled locomotives	Innovative Transportation Systems Corp.; Freight Shuttle Partners	No	Bombardier ART uses linear motors w/out maglev	Retrofit	5-6	ITSC seeking funding for proof of concept; FSP financing demo and found potential clients (mostly to replace trucks)	No
Linear motors applied to Maglev	General Atomics; Bombardier; American Maglev; Magna Force LEVX	No	No	Fixed guideway	5-6	Keston found that these options were either not financially viable or that funding details were not yet mature enough	Yes
Vacuum propulsion	Flight Rail Corporation	No	A few systems exist but most were phased out b/c of technological problems	Fixed guideway	5-6	Financial details were not provided	Yes

Cost Effectiveness of ZECMS Proposals

Existing proposed "Zero Emissions Container Systems" have not been demonstrated in a freight application, and therefore the true costs and benefits are largely unknown. ARB's Technical Options Document [98], reviewed a technology proposal for "maglev electrification from the Ports of Los Angeles/Long Beach to UP ICTF/BNSF SCIG." ARB reported that "[t]he estimated costs for Maglev projects have ranged from $65 million to $100 million per mile. At these rates, Maglev capital costs for 4.7 miles of track would range between $306 million and $470 million. ARB concluded that:

> *Assuming a project lifetime of 15 years, and 12 tons per year of drayage truck diesel PM emissions reduced per year, the cost effectiveness could range from about $57 to $148 per pound of diesel PM reduced. The cost-effectiveness would largely depend on the capital costs that staff estimated would range between $300 and $800 million.*[99]

As a point of comparison, the ARB drayage truck rule has a cost effectiveness of about $46 per pound of diesel PM reduced, and is estimated to cost about $1.1 billion to replace all 20,000-30,000 drayage trucks that currently serve the port areas[100]. The maglev system would be limited to the 4.7 mile track that would only be able to serve facilities at either end of the system. Further, it should be noted that the cost estimates contained in some proposals by ZECMS vendors are highly speculative since they rely on forecasted cost of capital and assumptions

[98] ARB, Technical Options to Achieve Additional Emissions and Risk Reductions from California Locomotives and Railyards, California Air Resources Board, August 2009, pg. 132-133.

[99] Ibid, pg. 133.

[100] ARB, "Supplement to the June 2010 Staff Report on Proposed Actions to Further Reduce Diesel particulate Matter at High-Priority California Railyards," July 5, 2011, pg. F-84.

about potential funding sources. It is also difficult to determine what a reasonable cost estimate is because there are no comparable systems that may be used as reference.

In the Technical Options Document ARB also analyzed "A Retrofit of Existing Major Rail Infrastructure with Linear Induction Motors (LIMs) in the South Coast Air Basin." ARB concluded:

> *The cost to retrofit existing track with LIMs is estimated between $10 million/mile and $20 million/mile. The cost to retrofit locomotives and railcars with LIMs is currently under evaluation. Assuming that 460 miles of track were to be retrofitted with LIMs, the cost would be about $7.4 billion. The retrofit of the locomotive pool and railcars would be in addition to this cost. The retrofit of the UP and BNSF locomotive pool and/or railcars would be in addition to this cost and could approach $2 to $3 billion…..Including costs to retrofit locomotives, and using a 30 year project life, the cost effectiveness of this option is about $29 per pound of NOx and PM reduced*[101].

However, the ARB estimate does not include multiple factors. First, the act of retrofitting rails is not as simple as placing magnets on railway ties. There are serious problems to be overcome regarding the federally required clearances between the rails and the bottom of the cars and how the magnets would be incorporated into this dynamic railroad operational environment. The following issues must be considered: labor, safety, availability of right of way, collection during construction, and space for collection points, yards, and facilities. In addition, routine, periodical track maintenance (i.e. – replacing wood and/or concrete rail ties and track, dressing the ballast under the track, surfacing and aligning, etc.) must be performed to ensure suitable trackage for operation of trains.

Furthermore, the cost of retrofitting the existing system should include losses as a result of operational disruptions and should consider the potential permanent loss of clients who decide to utilize other ports.

In addition, several issues have not been addressed in existing ZECMS proposals which would need to be addressed before the feasibility or cost-effectiveness of this solution could be fully evaluated, including: The cost of modifying or building the originating and receiving intermodal container yard or warehouse to accommodate a ZECMS; whether conventional lift equipment could be used or new crane equipment would be required; how to compensate for the disruption in marine terminal operations which would result from the increased number of lifts required for most ZECMS; what the additional costs associated with the extra lifts would be to the customer;[102] and whether there is suitable land on an available right of way to build or operate the system.

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[101] ARB, Technical Options to Achieve Additional Emissions and Risk Reductions from California Locomotives and Railyards, , August 2009, pg. 134.

[102] For example, the Railroads estimates it would cost $600-800 to transport one container via maglev from San Pedro Bay to a facility located in the Inland Empire and back, versus roughly $500-550 round-trip via clean-truck transportation. Estimate of $500-550 includes marine terminal transfer ($90 per direction), round-trip port/inland

Given ARB's preliminary cost evaluation and the additional yet-to-be quantified costs, all ZECMS proposals are not cost effective under CEQA.

Conclusion

Despite the variety of potential ZECMS technologies, all such systems have critical, fundamental deficiencies regarding their technology readiness, applicability to freight rail and cost-effectiveness that must be addressed prior to any serious consideration for use. Significant additional research is required to determine if ZECMS are suitable for reducing emissions from container movements. None of the ZECMS technologies are available and therefore are not feasible alternatives under CEQA.

facility drayage of $185-220 plus fuel surcharge (3-5%), clean-truck surcharge ($45-50), and inland facility lift (~$45 per direction).

pillsbury

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September 6, 2011

Mr. Harold Holmes
California Air Resources Board
1001 "I" Street
Sacramento, CA 95814

Re: Revised 2010 Commitments Between the Air Resources Board and Union Pacific Railroad and BNSF Railroad to Further Reduce Diesel Particulate Emissions at Four High-Priority Railyards

Dear Mr. Holmes:

This letter addresses comments made by members of the public concerning the process followed by the California Air Resources Board ("ARB" or "the Board") for consideration of the Revised 2010 Commitments Between the Air Resources Board and Union Pacific Railroad and BNSF Railway to Further Reduce Diesel Particulate Emissions at Four High-Priority Railyards ("Revised 2010 Commitments" or "Project"). Certain comments have alleged that the Board improperly deferred preparation of the Functional Equivalent Document ("FED")[1] to ARB's Executive Officer ("EO"), abused its discretion by committing to the Project prior to CEQA review, or promulgated an illegal "underground regulation." As discussed in detail below, the process followed by ARB in preparing the FED and considering the Revised 2010 Commitments is consistent with ARB's statutory authority (*see* Cal. Health & Safety ("H&S") Code §§ 39515-39516), its certified regulatory program, and CEQA.

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[1] ARB prepared the Draft FED pursuant to its certified regulatory program (*See* Title 17, §§ 60005-60007 of the California Code of Regulations ("CCR").) enacted and approved to implement the California Environmental Quality Act ("CEQA"). Cal. Pub. Res. Code § 21000 et. seq. CEQA is implemented through the State CEQA Guidelines ("Guidelines"), 14 Cal. Code Regs. § 15000 et seq. *See* CEQA § 21080.5; Guidelines § 15251(d).

I. ARB Did Not Violate CEQA by Delegating Preparation of the FED and Approval Authority of the Revised 2010 Commitments to the Executive Officer.

On June 24, 2010, ARB held a public hearing concerning the 2010 Commitments (since revised) and, after extensive testimony, enacted Resolution 10-29 directing the EO to comply with CEQA and determine whether to enter into the Revised 2010 Commitments.[2] In subsequent letters to the Board, certain members of the public claimed that ARB's decision to delegate this authority to the EO violates CEQA because it is purportedly the "duty" of the Board, as the "decision-making body," to make any CEQA determinations and final approvals.[3] This contention fails for several reasons.

First, the case law cited in the 7/5/10 Kracov Letter and the 7/9/10 SCAQMD Letter involves local agencies acting pursuant to Chapter 4 of CEQA (§§ 211501-21154).[4] Specifically, those cases involve the process by which a local agency must prepare and certify an EIR. ARB is a state, rather than local agency, and is not subject to Chapter 4 of CEQA. Thus, CEQA § 21151 and the cases cited in the Kracov and SCAQMD letters are simply inapplicable to ARB.

Further, because ARB has an approved certified regulatory program pursuant to CEQA § 21080.5, it is also exempt from Chapter 3 of CEQA (§§21100-21108),[5] which sets forth the procedural requirements for preparation and certification of an EIR by a state agency. Thus, to the extent Chapters 3 and 4 of CEQA contain analogous provisions concerning the duty of the "decision-making body" to make findings and final approvals pursuant to CEQA, the cases cited in the Kracov and SCAQMD letters are still inapposite because ARB's certified regulatory program is exempt from the procedural requirements applicable to the preparation and certification of EIRs. CEQA § 21080.5(c).

Critically, Guidelines § 15356 specifically defines "decision-making body" to mean "*any person* or group of people within a public agency *permitted by law to approve or disapprove the project* at issue." (Emphases added). California H & S Code § 39515(a) provides that the Board "may delegate any duty to the executive office that the state board deems appropriate," and H & S Code § 39516 provides that any power of the Board that may be delegated "shall be conclusively presumed to have been delegated to the executive

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[2] Transcript of June 24, 2010 Meeting of State of California Air Resources Board ("6/24/10 Tr."), p. 165.

[3] July 5, 2010 Letter from Gideon Kracov to Mike Terris ("7/5/10 Kracov Letter"), p. 1; July 9, 2010, the South Coast Air Quality Management District ("SCAQMD") ("7/9/10 SCAQMD Letter"), p. 2-3.

[4] *See* 7/5/10 Kracov Letter, p. 1 (citing *Vendanta v. California Quartet* (84 Cal.App.4th 517, 527; *Bakersfield Citizens for Local Control v. County of Bakersfield* (2004) 124 Cal.App.4th 1184, 1200; *Kleist v. City of Glendale* (1976) 56 Cal.App.3d 770, 779); 7/9/10 SCAQMD Letter, p. 2-3 (citing *Sundstrom v. County of Mendocino* (1988) 202 Cal.App.3d 296, 307).

[5] *See* CEQA § 21080.5(c).

office ...." Here, the Board both generally delegated authority to the EO to act pursuant to its certified regulatory program (17 CCR 60005-60007) and expressly delegated authority to the EO to comply with the certified regulatory program for purposes of, and to approve or disapprove, the Revised 2010 Commitments (6/24/10 Tr. at p. 161; Resolution 10-29, p. 9). Since the EO is a person permitted by law to approve or disapprove the project, the EO is properly the "decision-making body" for purposes of the Revised 2010 Commitments.[6] Thus, the Board did not abuse its discretion and violate CEQA when it delegated final approval authority of the FED and the Revised 2010 Commitments to the EO.

II. The Board Did Not Take Any Action at the June 24, 2010 Hearing That Committed ARB to a Particular Course of Action with Regards to the Revised 2010 Commitments.

In a letter dated July 9, 2010, the South Coast Air Quality Management District ("SCAQMD") alleged that, by enacting Resolution 10-29, the Board has improperly committed itself to a course of action prior to completing CEQA review contrary to the California Supreme Court's decision in *Save Tara v. City of West Hollywood* (2008) 45 Cal.4th 116. However, the facts of *Save Tara* are readily distinguishable from ARB's consideration of the Revised 2010 Commitments, and a review of the record makes clear the Board did not forestall the EO's consideration of alternatives and/or mitigation measures for the project.

Save Tara concerned a challenge to a preliminary agreement between a developer and the city for development of a senior affordable housing project. The agreement outlined the parameters of the project and the set forth each party's respective obligations, and was specifically contingent on compliance with CEQA prior to the agreement being finalized. *Save Tara* concluded:

> "[a] CEQA compliance condition can be a legitimate ingredient in a preliminary public-private agreement for exploration of a proposed project, but if the agreement, viewed in light of all the surrounding circumstances, commits the public agency as a practical matter to the project, the simple insertion of a CEQA compliance condition will not save the agreement from being considered an approval requiring prior environmental review." *Save Tara*, 45 Cal.4th at 132.

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[6] Case law supports delegation of final decision-making authority as well. In *El Morro Community Association v. California Department of Parks and Recreation* (2004) 122 Cal.App.4th 1341 and *California Oak Foundation v. Regents of the University of California* (2010), the courts held that the agency in question had properly delegated authority to take final CEQA action to a staff member (*El Morro)* and a subcommittee of the larger board (*California Oak Foundation*). Here, the delegation of authority to the EO is even stronger than in either of those cases.

Save Tara was concerned that, in certain circumstances, even conditional agreements could, as a practical matter, commit the agency "to the project as a whole or to any particular features, so as to effectively preclude any alternatives or mitigation measures that CEQA would otherwise require to be considered, including the alternative of not going forward with the project." *Id.* at 139. Some of the surrounding circumstances that *Save Tara* found indicative of the city's commitment to the project included a loan of nearly $500,000 that was to be repaid from project revenue, meaning the city would not get repaid if the city did not approve the final project (*Id.* at p. 140), as well as the City commencement of relocation of existing tenants, a step in the development process the court found likely to be irreversible." (*Id.* at p. 142).

Save Tara is inapposite here. First, the Revised 2010 Commitments are "public-private agreements" and the Board has taken no action to "approve" or enter into the Commitments, contingent on CEQA or otherwise. The Board held a hearing on June 24, 2010 at the end of which it passed Resolution 10-29 delegating CEQA compliance and approval authority, and final entry into the Revised 2010 Commitments if and when approved, to the EO. Thus, unlike *Save Tara*, where the city council actually approved the challenged agreement, subject to a condition related to CEQA compliance, approval of the Revised 2010 Commitments in any form has been properly deferred to the EO. Cal. H & S Code §§ 39515(a), 39516. The Revised 2010 Commitments therefore have no effect whatsoever at this time, and indeed it is telling that substantive changes have been made to the Revised 2010 Commitments since the Board's adoption of Resolution 10-29.

Moreover, none of the "surrounding circumstances" cited in *Save Tara* supporting the Court's conclusion that the city had effectively committed to the project are present here. ARB has not loaned the railroads any money for purposes of implementing the Commitments; nor has ARB taken any irreversible actions akin to relocating tenants which significantly advance implementation of the Commitments. And, while many of the Board's members stated their explicit support for the Commitments in principal at the June 24, 2010 hearing, as *Save Tara* noted, approval of a project "cannot be equated with the agency's mere interest in, or inclination to support, a project, no matter how well defined. 'If having high esteem for a project before preparing an environmental impact statement (EIR) nullifies the process, few public projects would withstand judicial scrutiny, since it is inevitable that the agency proposing a project will be favorably disposed to it.'" *Id.* at pp. 136–137 (internal citations omitted).

In the end, the Revised 2010 Commitments will undergo thorough CEQA review, including extensive alternatives analysis, prior to any action by ARB constituting an "approval" of a project. Thus, *Save Tara* is inapplicable, and the Board did not abuse its discretion in adopting Resolution 10-29.

III. The Revised Commitments Do Not Constitute an "Underground Regulation."

In a letter dated June 23, 2010, Coalition for a Safe Environment ("CFSE") contended that the 2010 Commitments constitute an "underground regulation" subject to the California Administrative Procedures Act ("APA") (Cal. Govt. Code §§ 11340 *et seq*). The term

"regulation" is defined to mean "every rule, regulation, order, or standard of general application, or the amendment, supplement, or revision of any such rule, regulation, order, or standard adopted by any state agency to implement, interpret, or make specific the law enforced or administered by it, or to govern its procedure." Cal. Govt. Code § 11342.600. CSFE contends that, because the Revised 2010 Commitments concern two railroads and a "class" of railyards designated as "high priority," this is sufficient to warrant the Commitments being treated as regulations subject to the APA. This position lacks merit for several reasons, however.

First, the Revised 2010 Commitments are structured and documented, and will be implemented, as a contract between the participating railroads and the ARB. They are not a "rule, regulation, order, or standard" under the APA. The terms, implementation and enforcement of the Revised 2010 Commitments are governed by California contract law, not by the APA. By its terms, the Revised 2010 Commitments defer and displace ARB adoption of any "rule, regulation, order, or standard." Thus, ARB approval and entry into the Revised 2010 Commitments cannot constitute an "underground regulation."

Also, while it is generally true that an agency rule or standard need not apply to all citizens of the state to be considered a regulation, it does need to apply to all members of a particular class, kind, or order. *Roth v. Dept. of Veterans Affairs* (1980) 110 Cal. App. 3d 622. The Revised 2010 Commitments apply to only four ARB selected railyards, which does not amount to a "class" as CSFE suggests. Further, the Revised 2010 Commitments are voluntary agreements under the terms of which both parties (ARB and the two railroads) have obligations; a regulation does not have such reciprocal requirements.

Finally, the Revised 2010 Commitments do not specify the manner in which the proposed diesel particulate matters emissions reductions are supposed to be achieved. Rather, each yard is free to achieve those reductions in completely different ways. CSFE has failed to site a single case supporting its position that voluntary agreements that do not mandate a specific method of performance amount to an underground regulation, and case law has consistently recognized that, where an agency adoption leaves discretion in the manner in which it is implemented, such an adoption does not amount to an underground regulation. *See Modesto City Sch. v. Education Audits Appeal Panel* (2004) 123 Cal. App. 4th 1365, 1381-1382; *Taye v. Coye* (1994) 29 Cal.App.4th 1339, 1346.

Thank you for your consideration of these comments.

Very truly yours,

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