Attachment 2

Potential Economic Impacts of Modifications to the "No VDECS Available" Compliance Extension for Mobile Cargo Handling Equipment Operating at Ports and Intermodal Rail Yards

The Board directed staff to make modifications to the amendments to the "Regulation for Mobile Cargo Handling Equipment at Ports and Intermodal Rail Yards" (Cargo Handling Regulation or regulation). These modifications involved subsection 2479(f)(2), Compliance Extension Based on No Verified Diesel Emission Control Strategy (VDECS) for Non-Yard Truck Mobile Cargo Handling Equipment. This section was modified such that fleets applying for a third and fourth year "No VDECS Available" compliance extension would be required to replace eligible equipment with electric or hybrid equipment, if available. The modifications were made to incentivize the addition of electric and hybrid cargo handling equipment (CHE) to fleets operating at ports and intermodal rail yards. While these modifications will result in an emissions benefit, and consequently no significant adverse impacts, they will also result in additional economic impacts to CHE fleets. Estimates of possible emissions and cost impacts are provided in this attachment. The resulting cost-effectiveness of the amendments, updated to include the impacts of these modifications, is also presented. Worksheets with the calculations for the emissions and costs impacts for these modifications are posted on ARB's web site at http://www.arb.ca.gov/ports/cargo/cheamd2011.htm (ARB, 2012).

Anticipated Compliance Methods

In order to estimate the possible economic and emissions impacts of requiring the purchase of electric or hybrid equipment, ARB staff made an assessment of electric and hybrid technologies currently, or imminently, available to CHE fleets. While the extension is only available for non-yard truck equipment, the modifications allow other equipment to be considered for replacement with electric or hybrid equipment, so both yard truck and non-yard truck equipment were evaluated. ARB staff determined that the electric and hybrid technologies currently, or imminently, available are confined to yard trucks, rubber-tired gantry (RTG) cranes, and forklifts capable of 7,000 pounds of lift or less. ARB staff estimates that a 65 horsepower (hp) forklift is comparable to an electric forklift capable of lifting 7,000 pounds. Staff determined that compliance with the proposed modifications will be primarily through the purchase of electric yard trucks and the purchase of a few small electric forklifts. Staff does not believe that hybrid or electric RTG cranes will be a significant avenue for compliance with the proposed modifications as there is a VDECS available for RTG cranes and nearly all RTG cranes will be brought into compliance through either retrofit, repower, or replacement by the final compliance date for non-yard truck equipment, the end of 2013. The purchase of

electric forklifts is also not expected to be a major avenue of compliance because very few of the port and rail yard forklifts are small enough to electrify.

For the updated analysis to determine the impacts of the modifications, ARB staff used data from its previous economic impact analysis that considered the initial proposal to provide fleets with an additional two-year extension for equipment for which no VDECS is available for compliance. Those data were set forth in Appendix C of the Initial Statement of Reasons Supporting the Proposed Amendments to the Regulation for Mobile Cargo Handling Equipment at Ports and Intermodal Rail Yards (ISOR). In the initial analysis, it was estimated that fleets would request an additional two-year extension for 312 pieces of non-yard truck equipment. The years in which these pieces of equipment would be required to comply with the regulation was also estimated, as shown in Table A2-1 below.

Table A2-1. Required Compliance Years for Non-Yard Truck Equipment with Third and Fourth Year "No VDECS Available" Extension

Year	Number of Equipment Required to Comply
2011	
2012	
2013	13
2014	42
2015	82
2016	88
2017	87
Total	312

Note: All numbers are rounded

The updated analysis assumes that fleets would request this extension for all eligible equipment regardless of the proposed additional terms added to the extension requirements. This is the most conservative assumption possible for this analysis, resulting in the highest possible cost, in that it is anticipated that some fleets will choose to bring equipment into compliance rather than purchase hybrid or electric equipment.

Staff estimated how many of the 312 extensions could potentially result in the purchase of electric or hybrid equipment. Fleets that do not have equipment that can feasibly be replaced with electric or hybrid equipment may still obtain the extension, provided they demonstrate that their fleet does not contain equipment that can be replaced by electric or hybrid models.

Based on the equipment distribution for the 312 pieces of equipment of the original "No VDECS Available" economic analysis (ARB,2011g), staff has determined that seven

would be fork lifts that are small enough to be replaced with electric at the end of the fourth extension year.

Staff then estimated how many of the remaining 305 pieces of equipment were potentially in fleets with noncompliant yard trucks that could potentially be replaced with electric models. Staff reviewed the most recent CHE reporting data (ARB, 2011m) to determine the number of noncompliant yard truck and non-yard truck equipment and concluded that fleets with both noncompliant non-yard truck equipment and noncompliant yard truck equipment[1] could potentially elect to comply by obtaining additional years of extension and ultimately purchasing an electric yard truck. Based on the reporting data, it was determined that approximately 62 percent of the noncompliant non-yard truck equipment resides in fleets with noncompliant yard trucks. Consequently it was assumed that 62 percent of the 305 pieces of equipment (189 pieces of equipment) would be in fleets with noncompliant yard trucks, and could potentially comply by replacing a noncompliant yard truck. Table A2-2 provides the maximum numbers of pieces of equipment required to come into compliance after third and fourth year "No VDECS Available" compliance extensions that also have noncompliant yard trucks in the same fleet, if all eligible fleets choose to apply for the additional years of extension.

Table A2-2. Noncompliant Non-Yard Truck Equipment Eligible for a "No VDECS Available" Compliance Extension with NonCompliant Yard Trucks in Fleet

Year	Number of Equipment Required to Comply
2011	
2012	
2013	8
2014	25
2015	50
2016	53
2017	53
Total	189

Note: All numbers are rounded

An analysis was made of the noncompliant yard trucks residing in fleets with noncompliant non-yard truck equipment to estimate the number of noncompliant yard trucks in fleets during the years when the equipment would be required to comply. Based on this analysis, the number of noncompliant yard trucks available for potential

[1] This extension is only applicable to non-yard truck equipment. Therefore, this option is not available to fleets containing only noncompliant yard truck equipment.

replacement with electric in the different compliance years was estimated and is shown in Table A2-3.

Table A2-3. Noncompliant, Yard Truck Engines Eligible to be Replaced with Electric or Hybrid Equipment

Year	Noncompliant, Yard Truck Equipment
2013	573
2014	360
2015	137
2016	40
2017	0

Note: All numbers are rounded

Staff compared the number of non-yard truck equipment in fleets that would be required to comply after the third and fourth years of extension with the number of noncompliant yard trucks in these same fleets that would be available for replacement with electric. Based on these comparisons, an estimate of the number of yard trucks which could potentially be replaced with electric was made and is shown in Table A2-4.

Table A2-4. Noncompliant Yard Truck Engines Potentially to be Replaced with Electric By Compliance Year

Compliance Year	Pieces of Equipment
2013	8
2014	25
2015	50
2016	40
2017	0
Total	123

Note: All numbers are rounded

In total, it was estimated that 123 noncompliant yard trucks could potentially be replaced with electric models. Consequently, of the 312 pieces of equipment that could obtain the additional years of extension, 7 could potentially result in small forklifts being replaced with electric models and 123 could potentially result in a different piece of equipment, a noncompliant yard truck, being replaced with electric models. The remaining equipment, in fleets without equipment that could feasibly be replaced with electric or hybrid models, could receive the additional years of extension and then be required to demonstrate that their fleet did not contain any noncompliant equipment that could be replaced with electric or hybrid models.

Economic Impacts

The proposed 15-day modifications to subsection 2479(f)(2) would require fleets that elect to receive an additional two-year extension for equipment for which no VDECS is available to determine if the equipment for which the extension is granted, or a different piece of equipment, may be replaced with electric or hybrid equipment. As previously discussed in the section "Anticipated Compliance Methods", staff believes that, in terms of the equipment for which the extension is granted, only small forklifts would be replaceable with electric or hybrid models. Consequently, for all other equipment in fleets that have elected to request the extension, fleets would need to evaluate if there is another piece of equipment in the fleet that could be replaced with either electric or hybrid models. However, if there is no equipment replaceable with either electric or hybrid models, the fleets may still be granted the extension.

It is anticipated that most fleets that elect to receive the third and fourth year extension will choose to wait until the end of the final extension period to replace equipment with electric or hybrid equipment. If, at that time, it is determined that the equipment for which the extension is granted cannot be replaced with electric or hybrid, an evaluation of other noncompliant equipment would be made. The proposed modifications allow the owner or operator to evaluate only noncompliant equipment for replacement with electric or hybrid equipment. It would not require compliant equipment to be replaced with electric or hybrid equipment. Staff anticipates that compliance will be achieved primarily through replacing noncompliant yard trucks with electric yard trucks along with replacing a few small forklifts with electric forklifts.

The costs and benefits of the initial proposal to allow an additional two years of "No VDECS Available" extension were previously evaluated and documented in the rulemaking documents for the amendments. The incremental cost for the modifications involves only the costs associated with the additional actions required by the modifications - that is, the optional requirement that fleets electing to receive a third and fourth year of extension must replace equipment with electric or hybrid models, if feasible. These costs were evaluated by comparing the cost to bring this noncompliant equipment into compliance with the regulation's performance standards to the costs associated with replacing this equipment with electric or hybrid equipment.

Under the regulation's performance requirement, noncompliant equipment is required to be brought into compliance by either retrofit, replacement, or retirement. Currently there are no VDECS available for yard trucks that would bring them into compliance with the performance requirements, so yard trucks would either be replaced with a yard truck with an engine certified to the current on-road engine emission standards or the off-road Tier 4 final emission standards or retired. While there are retrofit options for some

forklifts, the primary compliance method for forklifts has been replacement with new diesel equipment equipped with an off-road engine certified to the current off-road engine emissions standards. Consequently, the incremental cost for these modifications can be reasonably estimated based on the difference between the cost for new diesel equipment and the cost for electric equipment.

ARB staff contacted several equipment suppliers to obtain approximate costs for new diesel forklifts and yard trucks and new electric forklifts. The cost for new electric yard trucks was estimated based on information from the manufacturer of the electric truck being demonstrated at the Port of Los Angeles (Balqon, 2011). These costs are provided in Table A2-5.

Table A2-5. Equipment Costs for New Diesel and New Electric Equipment (2011 Dollars)

Equipment Type	New Diesel Cost($)	New Electric Cost($)	Cost Differential ($)
Yard Truck	$98,500	$204,000	$105,500
Forklift	$30,000	$45,000	$15,000

Note: All numbers are rounded

The estimated additional costs to CHE fleets applying for the third and fourth years of a "No VDECS Available" compliance extension are shown in Table A2-6 and Table A2-7. The estimated total additional cost is $10,774,000 spread over the period from 2013 to 2017. As set forth in Appendix C to the ISOR, the original proposal to provide a third and fourth year of "No VDECS Available Extension" without being tied to an electric/hybrid purchase was estimated to produce a cost savings. The cost savings associated with delaying the compliance costs for 312 pieces of equipment was estimated at approximately $4.3 million. The net cost for this amendment, including the modifications, is about $6,450,000, or approximately $6.5 million.

Table A2-6. Additional Cost for Replacing Noncompliant Yard Trucks with Electric (2011 Dollars)

Year	Number of Yard Trucks Available	Future Cost of Electric Yard Trucks (2011 $)	Future Cost of Diesel Yard Trucks (2011 $)	Present Value Cost of Electric Yard Trucks	Present Value Cost of Diesel Yard Trucks	Present Value Cost Differential
2013	8	$1,632,000	$788,000	$1,480,000	$715,000	$766,000
2014	25	$5,100,000	$2,463,000	$4,406,000	$2,127,000	$2,278,000
2015	50	$10,200,000	$4,925,000	$8,392,000	$4,052,000	$4,340,000
2016	40	$8,160,000	$3,940,000	$6,394,000	$3,087,000	$3,306,000
Total	123	$25,092,000	$12,116,000	$20,671,000	$9,981,000	$10,690,000

Note: All numbers are rounded

Table A2-7. Additional Cost for Replacing Noncompliant Forklifts with Electric (2011 Dollars)

Year	Number of Forklifts	Future Cost of Electric Forklifts (2011 $)	Future Cost of Diesel Forklifts (2011 $)	Present Value Cost of Electric Forklifts	Present Value Cost of Diesel Forklifts	Present Value Cost Differential
2014	2	$90,000	$60,000	$78,000	$52,000	$26,000
2015	1	$45,000	$30,000	$37,000	$25,000	$12,000
2016	2	$90,000	$60,000	$71,000	$47,000	$24,000
2017	2	$90,000	$60,000	$67,000	$45,000	$22,000
Total	7	$315,000	$210,000	$253,000	$169,000	$84,000

Note: All numbers are rounded

The cost of the initially proposed amendments to the regulation was summarized in Table V-1 of Chapter V of the ISOR. The amendments were estimated to result in a net savings of $1 million to $2 million, as shown in Chapter V of the ISOR. The costs attributed to the proposed 15-day modifications to the regulation have been added to the original estimated costs in Table A2-8 below. The 15-day modifications if fully utilized could result in an overall net cost of the amendments, as fully proposed, on the order of approximately $10 million over the 2011 through 2020 time period. This is the most conservative (highest possible) estimate of the amendment costs. Fleets may choose to bring their equipment into compliance instead of applying for the additional third and fourth year of "No VDECS Available" compliance and having to purchase electric or hybrid equipment. In that case, there would be neither a cost nor savings attributable to the additional two years of compliance extensions and the requirement to purchase hybrid or electric equipment (item 1 in Table A2-8 below). Without the additional costs that could be incurred with having to replace equipment with electric or hybrid models, the overall net cost of the amendments as proposed would be approximately $2.4 million over the 2011 through 2020 time period.

Table A2-8: Costs or Savings Associated With Proposed Amendments over Years 2011 through 2020 in 2011 Dollars

Amendment Description	Costs	Savings	Costs/(Savings) ($ millions)
1. Additional time for equipment with no VDECS available and modifications to require purchase of hybrid or electric equipment	X		0* to $6.5**
2. Add safety as provision for no VDECS available extension			0
3. Low-use compliance extension		X	($3.3)
4. Exempt equipment at low-throughput ports in NO_x-exempt areas not within 75 miles of an urban area		X	($1.0)
5. Require CHE opacity testing and set maximum allowable levels	X		$2.1 to $3.0
6. Allow demonstration of emissions equivalency		X	
7. Non-yard truck equipment transfers		X	($1.4)
8. Manufacturer delays for new equipment			0
9. Warranty engine replacement		X	
10. Treat Tier 4 engines certified to FEL Alt PM emissions standards as Tier 3 engines	X		$6.0
11. Add flexibility to extension for experimental diesel PM emissions control		X	0
12. Allow compliance schedule swapping	N/A***	N/A***	0
Net Costs/(Savings)*	X		$2.4 to $9.8

*No economic impact if fleets choose not to use this option.

** Estimated highest possible cost for item 1 – may be significantly less depending on choices made by fleets.

***N/A - Not applicable

Note: All numbers are rounded

Emissions Benefit

Benefits Associated with 15-Day Modifications

The emissions benefit resulting from the electrification of equipment was evaluated based on the compliance scenario described in the previous section “Anticipated Compliance Methods” and evaluated in the section “Economic Impacts.” In this scenario, of the 312 pieces of equipment which could potentially receive the third and fourth year compliance extension, only 7 small forklifts would be replaced with electric

forklifts at the end of the final extension period. Fleets with the remaining 305 pieces of equipment, would determine if there is another noncompliant piece of equipment in their fleet that could be replaced with electric or hybrid models. Staff estimated that in the case of 123 of this equipment, the fleets would have a noncompliant yard truck that could potentially be replaced with an electric yard truck. In the remainder of the cases, the fleets would demonstrate that their fleet does not contain any noncompliant equipment that could feasibly be replaced with electric or hybrid models. In summary, for this scenario, which is the most optimistic in terms of emissions reductions and most conservative in terms of cost, all equipment replaced with electric or hybrid equipment would be either small forklifts or noncompliant yard trucks and all would be replaced with electric models.

The emissions benefit was evaluated as the on-site emissions difference between the new diesel equipment which would have been purchased for compliance with the regulation and electric equipment purchased for compliance with the proposed modifications. Staff first estimated the emissions of yard trucks and small forklifts that would have complied with the regulation by meeting the regulation's performance standards. The diesel engine evaluated for the forklifts was assumed to be certified to off-road Tier 4 final emission standards with an 18 year equipment life. The diesel engine evaluated for the yard trucks was assumed to be certified to either the 2010 on-road emissions standards or the off-road Tier 4 final emission standards, both with an 8 year equipment life. It then compared those estimated lifetime emissions to the on-site zero emissions that would occur if fleets elected to replace the forklifts and yard trucks with electric equipment as part of the extension option. Staff found that the compliance-extension options if involving 123 electric yard trucks and 7 electric forklifts would result in reductions of approximately 4,299 pounds of PM and 53 tons of NO_x over the life of the replaced equipment. If hybrid equipment becomes available, the resulting costs and emission reductions would both be expected to be reduced.

Methodology for Determining Modifications' Emissions Benefits

Average load factor and annual hours of operation for yard trucks and forklifts were determined from Appendix B: Emissions Inventory Methodology, of the ISOR. The average horsepower for the forklifts were estimated from the original "No VDECS Available" Amendment economic analysis (ARB, 2011g). The average yard truck horsepower was estimated from the recent CHE reporting data (ARB, 2011m). The useful life for forklifts and yard trucks were estimated from the attrition table of the CHEI Model (ARB, 2011f). These values are summarized in Table A2-9 below. Emission factors and degradation were also determined from the CHEI Model (ARB, 2011f).

Table A2-9. Equipment Description for Determining Emission Benefits

	Yard Trucks	Forklifts
Average Horsepower	198	62.5
Average Annual Hours of Operation	2020	701
Average Load Factor	0.39	0.3
Useful Life (years)	8	18
Diesel Engine Emission Limit	2010 on-road or Tier 4 final	Tier 4 final

Note: All numbers are rounded

Emissions Benefits of Amendments

The emissions impacts of the amendment were provided in Table IV-9 of Chapter IV of the ISOR. As documented in Table IV-9 of the ISOR, an overall diesel PM benefit of approximately 31 tons or 62,000 pounds of diesel PM and a dis-benefit of 135 tons of NO_x were estimated for the initially proposed amendments. With the additional benefits of the modifications, discussed above, the emissions impacts of the fully implemented amendments would have an overall diesel PM benefit of 33 tons, or 66,000 pounds, and a reduced NO_x dis-benefit of 82 tons of NO_x.

Cost-Effectiveness

The cost-effectiveness of the amendments, including the proposed modifications, was estimated based on the total estimated cost of the amendments and total estimated emissions benefit of the amendments.

Since there was a PM emissions benefit but a NO_x disbenefit, cost-effectiveness was calculated attributing all costs associated with the amendments, as modified by the 15-day modifications, to the PM reduction. This value is provided in Table A2-10.

Table A2-10. Cost-Effectiveness of All Amendments with Modifications

Cost Attribution	Total Cost	Emissions Benefit	Cost-Effectiveness
All costs to PM	$8.9 million to 9.9 million	66,000 pounds PM	$135 to $150 per pound of diesel PM

Note: all numbers are rounded

The cost-effectiveness of these amendments is higher than that of the initially-adopted regulation, which had an estimated cost-effectiveness of $41 per pound of diesel PM reduced. Other diesel measures recently approved by the Board have cost-effectiveness values as high as $76 per pound (the recently amended in-use off-road equipment regulation). However, the optional-extension requirement is not mandatory and fleets may choose to bring their equipment for which no VDECS are available into compliance through either replacement or retirement. If fleets chose not to apply for the

two additional extension years for equipment without VDECS available, any costs or savings associated with the "No VDECS Available" amendment would not be realized and the overall cost of the amendments would be reduced, as shown in Table A2-8 above. Additionally, if technology advancements are made in the intervening years, costs for electric and hybrid models could be substantially reduced, also resulting in reduced costs. Both of these factors would result in improved cost-effectiveness.

Impact on Overall Cost of Amendments per Year

The costs per year for the initially proposed amendments impacting small and typical businesses were provided in Table V-12 of Chapter V of the original ISOR. This table is reproduced below with the costs of the 15-day modifications added.

Table A2-11: Summary of Annual Costs/(Savings) Resulting from Proposed Amendments (Present Value)

Year	Additional 2 Years for VDECS*		Low-Use Extension*	Small Rural Ports Off-Road*	Require Opacity Monitoring		Non-Yard Truck Transfers*	Allow Tier 4 FEL Engines*
	Original Proposal*	Modifications: Purchase Hybrid or Electric Equipment*			Minimum*	Maximum*		
2011	($257,000)		($1,468,000)	($303,000)				
2012	($603,000)		($1,094,000)	($560,000)	$231,000	$1,446,000	($190,000)	$1,019,000
2013	($1,169,000)	$766,000	($751,000)	($118,000)	$224,000	$186,000	($181,000)	$1,012,000
2014	($1,181,000)	$2,304,000			$226,000	$189,000	($173,000)	$1,521,000
2015	($1,109,000)	$4,352,000			$232,000	$193,000	($165,000)	$1,348,000
2016		$3,330,000	-		$236,000	$197,000	($157,000)	$1,142,000
2017		$22,000			$241,000	$201,000	($149,000)	
2018					$242,000	$202,000	($142,000)	
2019					$243,000	$202,000	($135,000)	
2020					$241,000	$200,000	($129,000)	
Total	($4,319,000)	$10,774,000	($3,313,000)	($981,000)	$2,116,000	$3,016,000	($1,421,000)	$6,042,000

* Values have been rounded

Impact on Small Business

The costs from the proposed 15-day modifications to the regulations would not significantly impact the costs for a typical small business subject to the regulation. ARB staff reviewed the types of equipment in smaller fleets (estimated as those fleets with less than 15 pieces of equipment) (ARB, 2011m) and found that the vast majority of these fleets, approximately 75 percent, do not have yard trucks. Therefore, these smaller fleets would generally not be in position to replace a noncompliant yard truck with an electric yard truck to meet the conditions required for the additional two-year extension under the proposed 15-day modifications. However, if the fleet does not have noncompliant equipment that could be replaced with electric or hybrid equipment, the proposed modifications do not prevent an extension for third and fourth years of "No VDECS Available" from being granted. Several small business fleets do have small forklifts and may elect to take advantage of the additional two-year extension if they have equipment for which no VDECS are available in exchange for agreeing to replace its forklifts with electric or hybrid models at the completion of the extension period. While the forklifts that are small enough to electrify are a small portion of the total forklift population, it was assumed that a typical small business could have one forklift to electrify.

The tables showing the capital and operating and maintenance (O&M) costs for small businesses from Appendix C of the ISOR have been updated to include the additional costs attributable to the 15-day modifications, which are presented below. The incremental cost for the purchase of one electric forklift was estimated as one-seventh of the total estimated cost differential for purchase of seven electric forklifts, provided in Table A2-7 above.

Table A2-12 provides the number of equipment impacted by each amendment, as provided in Table C-27 in Appendix C of the ISOR, updated to include the impacts attributable to the 15-day modifications. As discussed above, the purchase of one electric forklift is added to this table.

Table A2-12: Numbers of Equipment Affected by Proposed Amendments During 2011 through 2020 for a Typical Small Business

Typical Small Business	
Total Inventory	11
# of Equipment Affected by Amendment (2011 - 2020)	
# No VDECS	2
# Low Use	1
# Equipment Transfers	0
# FEL engines	1
Yard Truck Electrification	0
Forklift Electrification	1

Note: All numbers are rounded

Total capital costs due to the proposed amendments for a typical small business were estimated for both the situation where the fleet chose to obtain the two additional years of "No VDECS Available" extension, and consequently purchase a small electric forklift and the case where the fleet chose not to apply for the additional years of compliance extension. In the second situation, neither the benefits nor the costs associated with the additional extension years would be incurred. These costs are provided in Table A2-13 and summarized in Table A2-14. For the fleet analyzed, the choice of applying for the additional years of compliance extension results in a net cost savings of approximately $7,500 while the choice not to apply for these additional years of compliance results in a net cost of approximately $8,000.

Table A2-13: Capital and O&M Costs/(Savings) as a Result of Proposed Amendments During 2011 through 2020 for a Typical Small Business

Overall Capital Costs/(Savings) from 2011 to 2020	
No VDECS	($27,690)
Low Use	($18,824)
Equipment Transfers	$ -
FEL engine	$26,969
Yard Truck Electrification	$ -
Forklift Electrification	$12,000
Total	**($7,545)**
Total without costs or savings of additional "No VDECS Available" extension years	**$8,145**
Annual Operating and Maintenance: Opacity	**$660**

Note: All numbers are rounded

Note: Opacity costs provided in Table C-28 from Appendix C of the ISOR have been removed as these are not capital costs but a summation of the annual O&M costs. The annual O&M costs are reported in the last row of this table.

The overall economic impacts of the amendments, including the 15-day modifications, are summarized in Table A2-14 below.

Table A2-14: Summary Economic Impact on Small Business

Small Business	**11 CHE**
Equipment Population	11
Capital Cost – (2011-2020)	($7,545) to $8,145
Ongoing Annual Costs	$660

Note: All numbers are rounded

Impact on Typical Business

A typical business was approximated in the ISOR as a container terminal with 77 pieces of equipment. A review of typical container terminals indicated that approximately 60 percent of the equipment in these fleets are yard trucks. Consequently, it could be expected that a typical terminal would be able to comply with the modifications by purchasing electric yard trucks at about the same rate as the general fleet population. The tables showing the capital and O&M costs for typical businesses from Appendix C of the ISOR have been updated to include the additional costs that could be attributed to the proposed 15-day modifications and are presented below.

Table A2-15 provides the number of equipment impacted by each amendment, as provided in Table C-32 in Appendix C of the ISOR, updated to include the impacts attributable to the 15-day modifications. As discussed above, the number of electric yard trucks to be purchased is added to this table. No electric forklifts were assumed to be purchased.

Table A2-15: Numbers of Equipment Affected by Proposed Amendments During 2011 through 2020 for a Typical Container Terminal Business

Typical Container Terminal Business	
Total Inventory	77
#of Equipment Affected by Amendment (2011 - 2020)	
# No VDECS	4
# Low Use	2
# Equipment Transfers	1
# FEL engines	4
Yard Truck Electrification	4
Forklift Electrification	0

Note: All numbers are rounded

The costs or savings associated with each of the amendments, as modified by the 15-day modifications, are provided in Table A2-16. The incremental cost of the purchase of electric yard trucks was determined based on the estimated incremental cost for the purchase of 123 yard trucks in Table A2-6 above.

Total capital costs due to the proposed amendments for a typical container terminal business was estimated for both the situation where the fleet chose to obtain the two additional years of “No VDECS Available” extension, and consequently purchase electric yard trucks, and the case where the fleet chose not to apply for the additional years of compliance extension. In the second situation, neither the benefits nor the costs associated with the additional extension years would be incurred. These costs are provided in Table A2-16 and summarized in Table A2-17. For the fleet analyzed, the choice of applying for the additional years of compliance extension results in a net cost of approximately $293,000 while the choice not to apply for these additional years of compliance results in a net cost of approximately $750.

Table A2-16: Capital and O&M Costs/(Savings) During 2011 through 2020 as a Result of Proposed Amendments for a Typical Container Terminal Business

Overall Capital Costs/(Savings) from 2011 to 2020	
No VDECS	($55,379)
Low Use	($37,648)
Equipment Transfers	($78,976)
FEL engine	$107,875
Yard Truck Electrification	$347,642
Forklift Electrification	$ -
Opacity	$9,500
Total	**$293,014**
Total without costs or savings of additional "No VDECS Available" extension years	**$751**
Annual Operating and Maintenance: Opacity	**$3,850**

Note: All numbers are rounded

Note: Opacity costs provided in Table C-33 from Appendix C of the ISOR have been replaced with the capital costs related to opacity testing. The original costs on Table C-33 were a combination of the capital costs and a summation of the annual O&M costs. The annual O&M costs are reported in the last row of this table.

The overall economic impacts of the amendments, including the 15-day modifications, are summarized in Table A2-17 below.

Table A2-17: Summary Economic Impact on Typical Business

Typical Business	77 CHE
Equipment Population	77
Capital Cost – (2011-2020)	$751 to $293,014
Ongoing Annual Costs	$3,850

Note: All numbers are rounded

Impact on Local Government

It is not anticipated that the 15-day modifications would have any impact on local government agencies. While at least two local government agencies own and operate cargo handling equipment and may request additional years of "No VDECS Available" compliance extensions, neither of these agencies own yard trucks or small fork lifts that would be required to be replaced with electric or hybrid models. Nor is it expected that electrified models of the equipment for which the extension is granted would be technically feasible at the end of the two-year extension period.

References:

(ARB,2011f) California Air Resources Board, Cargo Handling Emissions Inventory Model, http://www.arb.ca.gov/ports/cargo/cheamd2011.htm July 2011.

(ARB, 2011g) California Air Resources Board, EconomicAnalysisWorksheets.xls, http://www.arb.ca.gov/ports/cargo/cheamd2011.htm July 2011.

(ARB, 2011m) California Air Resources Board, *CHE Equipment Reporting Data Updated as of September 2011*, 2011.

(ARB, 2012) California Air Resources Board, ModificationsEconomicAnalysisWorksheets.xls, http://www.arb.ca.gov/ports/cargo/cheamd2011.htm February 2012.

(Balqon, 2011) Personal Correspondence, Samra Balwinder, December 8, 2011.