Appendix N

Analysis of Regulatory Alternatives

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Throughout the regulatory development process, staff considered many different regulatory structures and elements. Some of these alternatives were developed internally to assess the benefits of regulatory options, and some were developed by stakeholder groups as counter-proposals. This document compares each alternative regulatory approach against the proposed regulation.

A. ARB January 2008 Regulatory Proposal

In January 2008, ARB staff proposed a regulatory structure that would have required truck and bus operators to replace pre-2007 trucks with 2007 engine model year equivalent vehicles between 2010 and 2013, and pre-2010 trucks and buses with 2010 engine model year equivalent vehicles between 2017 and 2021. The *January 2008* proposal was designed on the modernization program envisioned in the 2007 Statewide Implementation Plan, and would have required all trucks and buses operating in California to meet 2010 emission standards by 2023.

Figures 1 and 2 compare emissions benefits that would have been generated by the *January 2008* proposal, and compared those to emissions benefits that would have been generated by the proposed regulatory proposal. In this case we did not model the phase-in of the *January proposal*, and instead modeled a simple case that assumed compliance by 2014 and 2020. Figure 1 shows in 2014 and 2020 the *January proposal* would have generated more NOx reductions than the proposed rule. Figure 2 shows that the *January proposal* would have achieved essentially the same $PM_{2.5}$ emissions reductions as the proposed regulation.

Figure 1: NOx Emissions: January 2008 Proposal vs. Current ARB Proposal

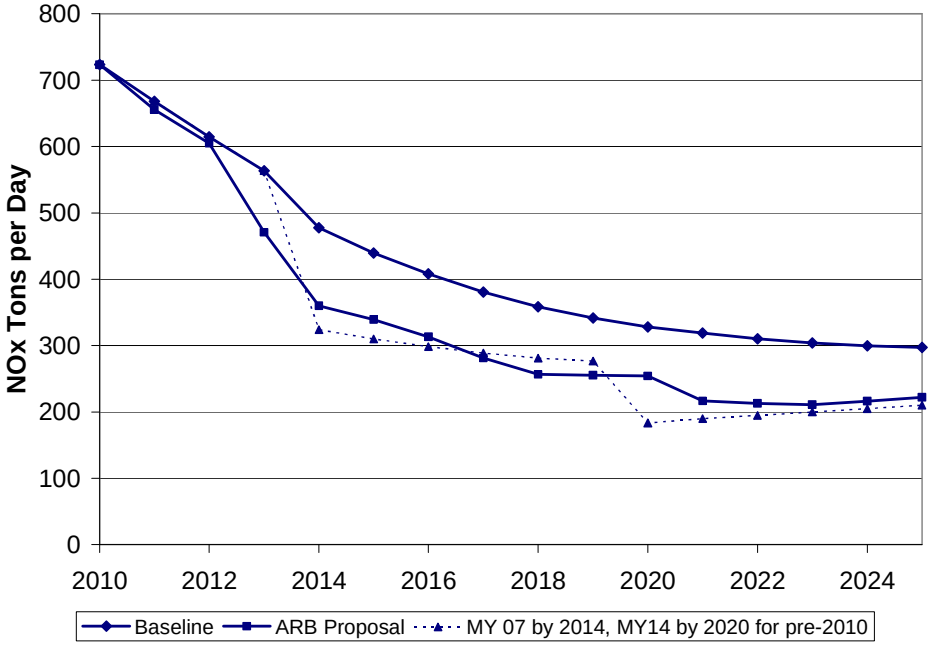
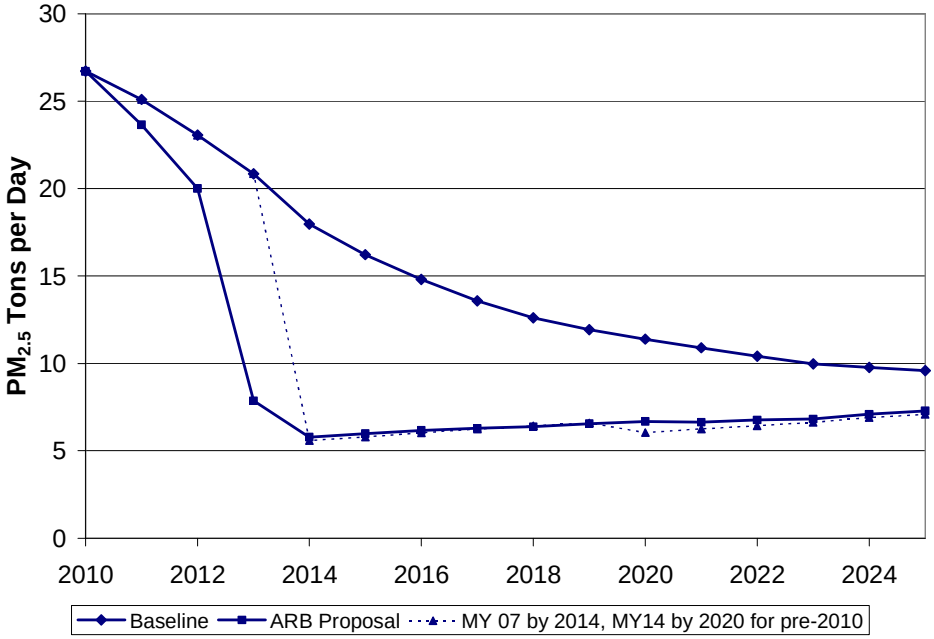


Figure 2: PM2.5 Emissions: January 2008 Proposal vs. Current ARB Proposal



B. Agricultural Stakeholders' Proposal

A group of more than 70 agricultural stakeholder groups submitted several alternative regulatory proposals to ARB. The most recent version was submitted to ARB staff on July 15, 2008. The alternative proposal contained several different regulatory structures and elements including elevated mileage exemption thresholds, exemptions for trucks used in field operations and to the point of first processing, a slower phase-in for BACT compliance than the ARB Rule, and truck trade down concepts.

To assess the impact of the agricultural stakeholders' proposal if applied to all trucks operating in California, we focused on the two most important elements of the proposal. The first element we focused on, as shown in Table 1, is the mileage exemption thresholds. Under this concept trucks and buses driving fewer than the mileage threshold would be exempt from retrofit or replacement requirements. The second element we focused on was the delayed BACT schedule, as shown in Table 2.

Table 1: Mileage exemption proposed by agricultural stakeholders

Model Year-Engine	Mileage Exemption Threshold*
Pre-1996	15,000
1996 – 2005	20,000
2005 and newer	25,000

* Note - Based upon three year average

Table 2: Compliance schedule proposed by agricultural stakeholders

Engine Model-Years	*Compliance Deadline, as of December 31*
Pre-1990	2012
1991-1994	2013
1995-1998	2015
1999-2004	2017
2005-2007	2019
2008	2021
2009	2022

Emissions calculations were developed in July and as a result are based on the June 2008 draft Statewide inventory, which is slightly higher than the final inventory developed to analyze the proposed regulation. Figure 3 and Figure 4 compare NOx and $PM_{2.5}$ emissions respectively for the June 2008 baseline, the current proposed regulation, and the agricultural stakeholders' proposed approach. Results show that due to enhanced mileage exemptions and delayed BACT implementation the stakeholders' proposal would achieve much fewer benefits than the ARB proposal. In particular, the stakeholders' proposed approach would reduce NOx emissions benefits in 2014 and 2017 by more than 75% relative to the proposed regulation, and would not meet SIP targets.

Figure 3: Statewide NOx Emissions: Agricultural Stakeholders' Proposal vs. ARB Proposed Approach (June 2008 Draft Inventory)

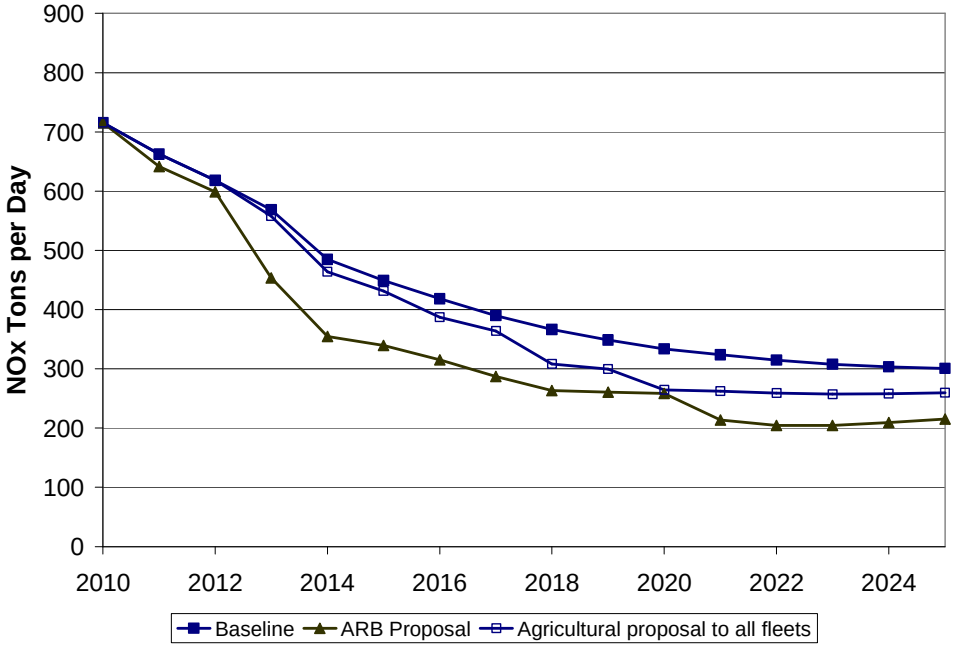
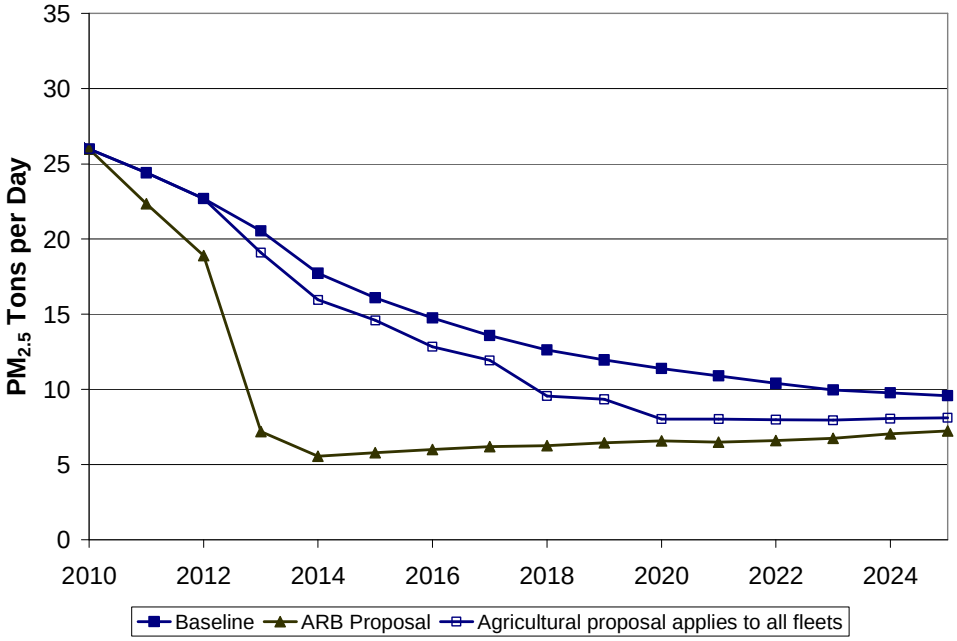


Figure 4: Statewide PM2.5 Emissions: Agricultural Stakeholders' Proposal vs. ARB Proposed Approach (June 2008 Draft Inventory)



C. Alternatives proposed by DTCC

Driving Toward A Cleaner California (DTCC) is a coalition representing the California Chamber of Commerce, the California Trucking Association, the Western States Petroleum Association, the Construction Industry Air Quality Coalition, and a number of other business and community organizations. In a letter dated August 21, 2008, DTCC proposed an alternative to the ARB proposed rule. The DTCC alternative contained many different regulatory elements and approaches, which differed significantly from the ARB proposed regulation. These elements included mileage thresholds, delayed BACT implementation relative to the ARB proposal, more lenient fleet average and percent limit targets, special provisions for small fleets using a trade down approach, certifications for compliance, special provisions for single-unit trucks, and other approaches.

To assess the impact of the DTCC proposal we modeled the four most important elements of the proposal: mileage exemptions, dedicated use and single-unit truck provisions, small fleet provisions, and revised BACT/fleet average/percent limit targets. These four elements were chosen for analysis because they would most significantly reduce the benefits of the proposed regulation. Each of these four elements is described specifically below:

1. Mileage Exemption Provisions

For most fleets, the ARB proposed regulation provides mileage exemptions for a variety of low-use vehicles but does not provide any exemptions for trucks driving more than 7,500 miles per year. Under the DTCC proposal, trucks driving less than 30,000 miles per year would be separated into three groups:

a) 15,000 – 30,000 miles per year

By the end of 2010, all trucks and buses driving between 15,000 and 30,000 miles per year would need to emit at less than or equal to a 2004 engine emission rate either through vehicle retrofit or replacement. By the end of 2020, these same vehicles would need to upgrade to meet 2010 engine emission rates.

b) 7,500 – 15,000 miles per year

By the end of 2010, all trucks and buses would be required to meet a minimum standard of a 1994 engine equivalent NOx emission rate and be equipped with a level 3 PM control device or better. By the end of 2020, these vehicles would be required to emit at less than or equal to a 2007 engine emission rate.

c) Under 7,500 miles per year

By the end of 2010 all trucks and buses would be equipped with a level 3 PM control device, and by the end of 2020 these vehicles would be required to meet a minimum standard of a 2004 engine equivalent emission rate.

2. *Dedicated Use and/or Single-Unit Vehicle Requirements*

Under the DTCC proposal, all single-unit trucks and dedicated use tractors would be required by the end of 2012 to at a minimum meet a 1994 engine emission rate with a level 3 PM control device and a 25% NOx control device. By the end of 2020 these vehicles would be required to at a minimum meet 2007 engine emission rates.

3. *Small Fleet Provisions (Fleets of 3 or Fewer Trucks)*

Under the DTCC proposal small fleets would have additional time to meet a more lenient emission standard than proposed by ARB staff. Owner operators, and first trucks in two or three truck fleets would be required to meet at a minimum 2004 engine emission rates by the end of 2012. Second trucks in a two or three truck fleet would be required to meet the minimum 2004 engine emission rate requirements by the end of 2015. Third trucks in three truck fleets would be required to meet the minimum 2004 engine equivalent emission rate by the end of 2016. All of these trucks would be required to meet 2010 engine emission rates by the end of 2020.

4. *Fleet Average / Percent Limit / BACT Provisions*

Under both the ARB and DTCC proposals, large fleets would be given the option of complying with fleet average, turnover percentage limitations, or BACT provisions. Under the DTCC proposal, compliance would be delayed by several years, a comparison to the ARB Proposal is shown in Table 3, Table 4, and Table 5 (Reprinted from DTCC Letter Dated 8/21/08).

Table 3: DTCC BACT Schedule (shaded where different from ARB proposal)

Compliance Deadline, as of December 31	*Engine Model-Years*	*BACT Requirements*
2010	Pre-1994	PM BACT
2011	1994 - 1997	PM BACT
2012	1998 - 2003	PM BACT
2013	2004 - 2006	PM BACT
2014	Pre - 1994	NOx and PM BACT
2015	1994 - 1997	NOx and PM BACT
2016	1998 - 2003	NOx and PM BACT
2017	2004 - 2006	NOX and PM BACT
2018	NA	NA
2019	NA	NA
2020	2007	NOx and PM BACT
2021	2008	NOx and PM BACT
2022	2009	NOx and PM BACT

Table 4: DTCC Percent Limits (shaded where different from ARB proposal)

Compliance Deadline, as of December 31	Percentage of Total Fleet Complying with BACT	
	PM BACT	NOx BACT
2010	25%	NA
2011	25%	NA
2012	50%	25%
2013	100%	25%
2014	100%	50%
2015	100%	50%
2016	100%	75%
2017	100%	75%
2018	100%	80%
2019	100%	90%
2020	100%	90%
2021	100%	90%
2022	100%	100%

Table 5: DTCC Fleet Average Proposal (NOx Targets) (shaded where different from ARB proposal)

Compliance Deadline, as of December 31	*Fleet NOx Targets for each compliance deadline*	
	MHD	**HHD**
2012	8.5	14.4
2013	8.5	14.4
2014	5.8	9.8
2015	5.8	9.8
2016	4.6	7.8
2017	4.6	7.8
2018	4.0	6.0
2019	4.0	6.0
2020	3.2	3.0
2021	1.6	3.0
2022	0.8	1.6

5. DTCC Emissions Impacts

To assess emissions impacts of the DTCC proposal, we first ran the complete scenario covering the four main provisions of the proposal together. Results, as displayed in Figure 5 and Figure 6, show that prior to 2021, the DTCC proposal falls far short of the reductions required by the SIP, providing roughly half of the emissions benefits provided by the ARB proposal. The delayed implementation to cleaner technologies that is embodied by the DTCC proposal would, if implemented, result in California not meeting the emissions reductions necessary to meet air quality attainment goals in 2014 for the South Coast and 2017 for the San Joaquin Valley.

Figure 5: Statewide NOx Emissions: DTCC vs. ARB Proposed Approach

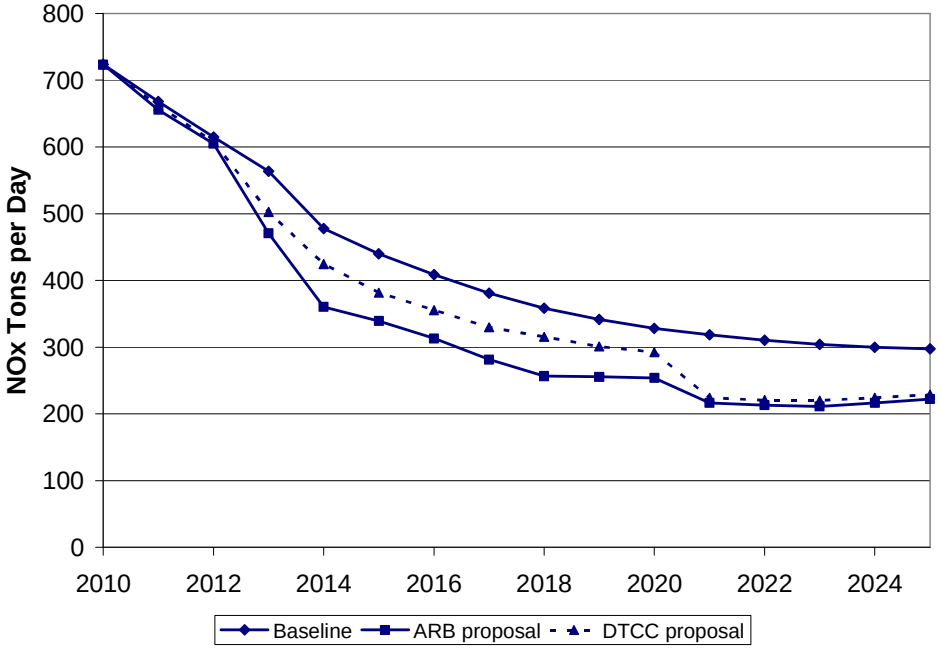
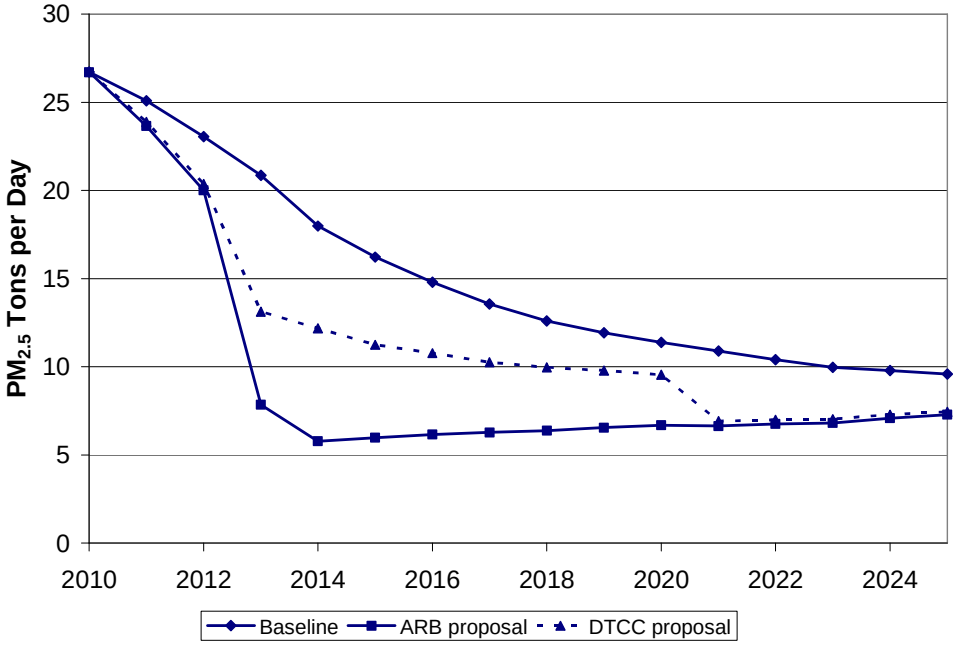


Figure 6: Statewide PM2.5 Emissions: DTCC vs. ARB Proposed Approach



In addition to running the four primary elements of the DTCC proposal at the same time, we also looked at the impact individual provisions would have on select groups of trucks, and how those provisions would compare to the ARB proposed regulation.

a) Provisions Applied to Trucks in Large Fleets (Four or More Trucks)

Under the DTCC proposal, large fleets would be subject to both mileage limitations and fleet average / BACT / BACT percentage limits requirements. To assess the impact of these provisions on large fleets, we first applied mileage thresholds to all large fleet trucks, and then layered mileage exemptions and fleet average / BACT / BACT percentage limits to large fleets excluding single unit trucks. In the second analysis, we excluded single unit trucks because they would be covered under separate provisions of the DTCC proposal.

First, we applied mileage exemption requirements to large fleet trucks only in order to isolate the impact elevated mileage exemptions proposed by DTCC would have in reducing emissions benefits relative to the proposed regulation. Figure 7 and Figure 8 compare NOx and $PM_{2.5}$ respectively to this category. Results show that in general NOx and $PM_{2.5}$ benefits would be reduced by 25%, although this fraction varies somewhat by calendar year.

Figure 7: Statewide NOx Emissions for Large Truck Fleets: DTCC Mileage Exemptions vs. ARB Proposed Regulation

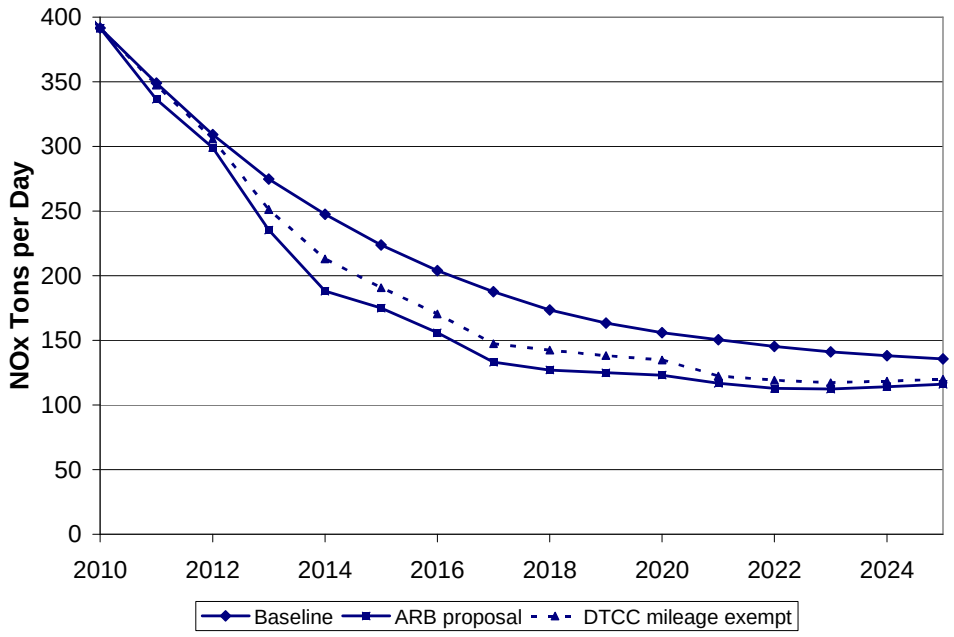
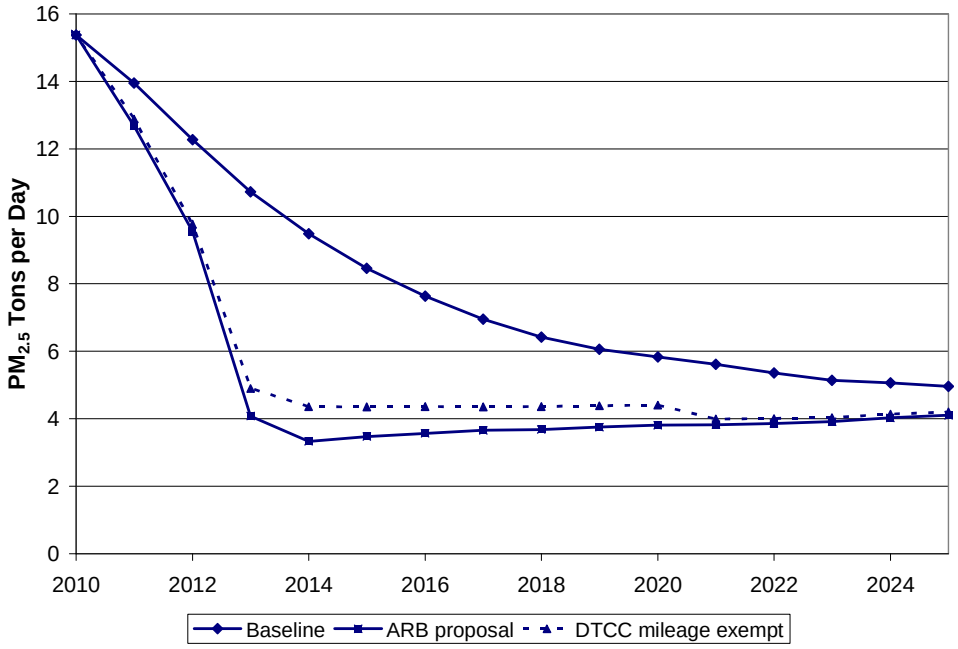


Figure 8: Statewide PM2.5 Emissions for Large truck Fleets: DTCC Mileage Exemptions vs. ARB Proposed Regulation.



Next, we removed single unit trucks from the analysis, and applied fleet average / BACT / BACT percentage limits requirements in the DTCC proposal, as shown in Figure 9 and Figure 10. Results show that NOx benefits in 2014 would be reduced by 42% due to mileage provisions alone, and by 55% due to mileage provisions and fleet average / BACT / BACT percentage limit requirements. In 2014 $PM_{2.5}$ benefits would be reduced by 16% due to mileage exemptions under the DTCC proposal, and by 21% due to the combination of mileage exemptions and fleet average / BACT / BACT percentage limit requirements in the DTCC proposal.

Figure 9: Statewide NOx Emissions for Large Truck Fleets: DTCC Mileage Exemptions and Fleet Average / BACT / BACT Percentage Limits vs. ARB Proposed Regulation

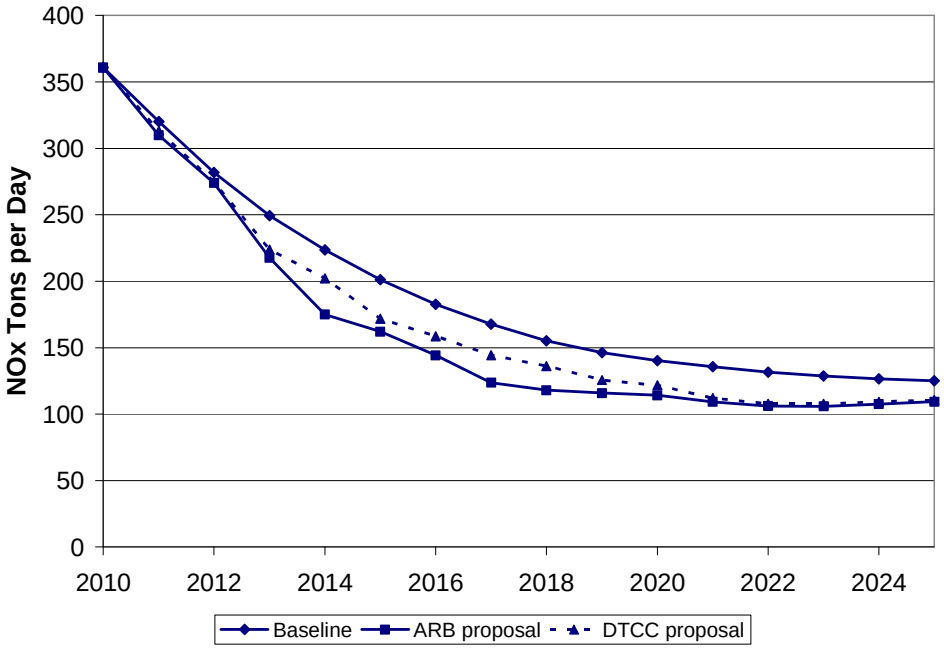
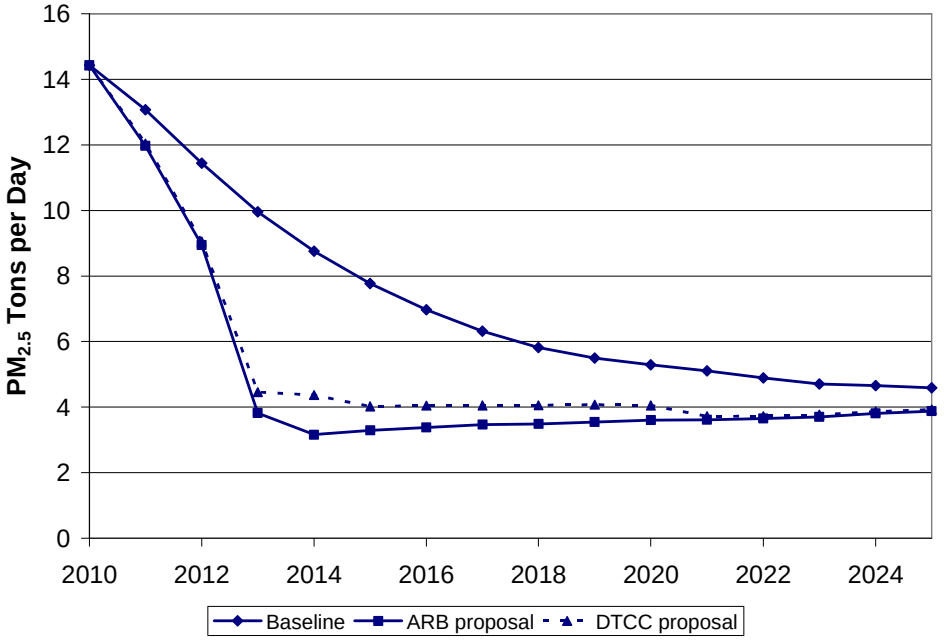


Figure 10: Statewide PM2.5 Emissions for Large Truck Fleets: DTCC Mileage Exemptions and Fleet Average / BACT / BACT Percentage Limits vs. ARB Proposed Regulation



b) Single-Unit Truck Requirements

As discussed above, DTCC proposed specific compliance requirements for dedicated use and single-unit trucks. To evaluate this option, we modeled the DTCC proposal as it would have applied to single-unit trucks. This evaluation accounts for the single-unit truck provisions, as well as mileage provisions that apply to single-unit trucks, and small fleet provisions that apply to single unit trucks under both the DTCC and ARB proposals. Results shown in Figure 11 and Figure 12 for NOx and PM2.5 respectively show that the DTCC proposal would achieve less than half of the benefits in this category than would be achieved by the ARB proposal.

Figure 11: Statewide NOx Emissions for Single-Unit Trucks: DTCC Provisions vs. ARB Proposed Regulation

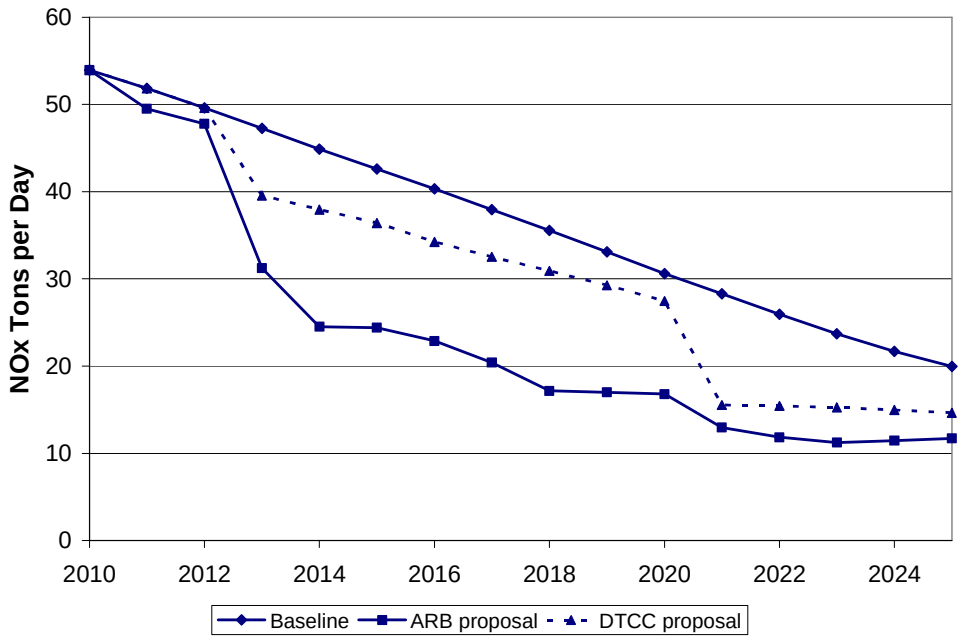
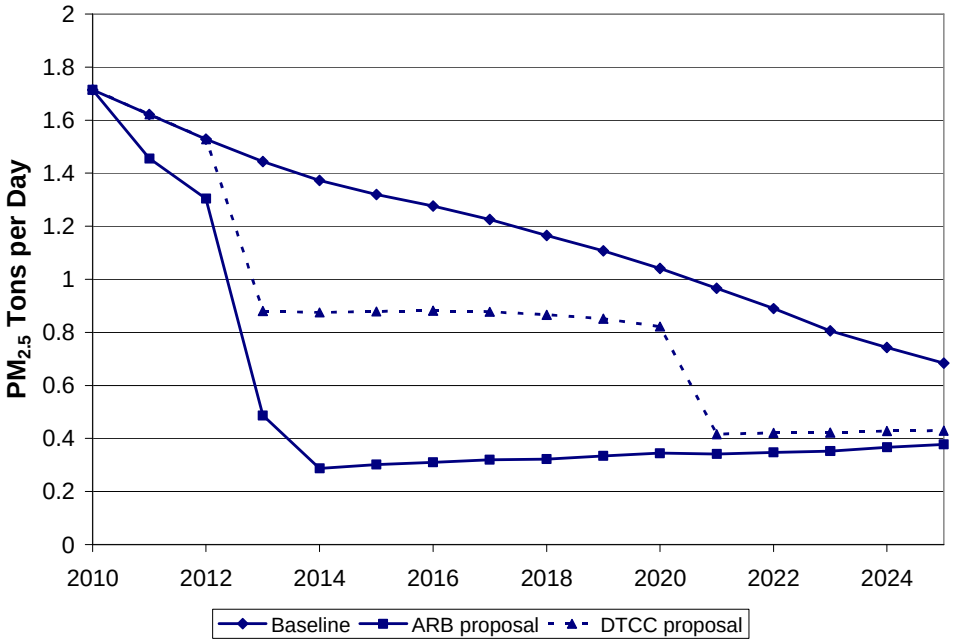


Figure 12: Statewide PM2.5 Emissions for Single-Unit Trucks: DTCC Provisions vs. ARB Proposed Regulation



c) Provisions Applied to Small Fleets

As described above, under the DTCC proposal, small fleet requirements are less stringent than in the proposed ARB regulation. The net impact of the DTCC small fleet provisions is to reduce emissions benefits until 2021, when those vehicles would meet the emissions levels envisioned by the proposed ARB regulation. In particular, the loss in PM benefits in this category under the DTCC proposal would be large; and small fleets account for roughly a third of emissions in the inventory. Results are shown in Figure 13 and Figure 14.

Figure 13: Statewide NOx Emissions for Small Fleet Trucks: DTCC Provisions vs. ARB Proposed Regulation

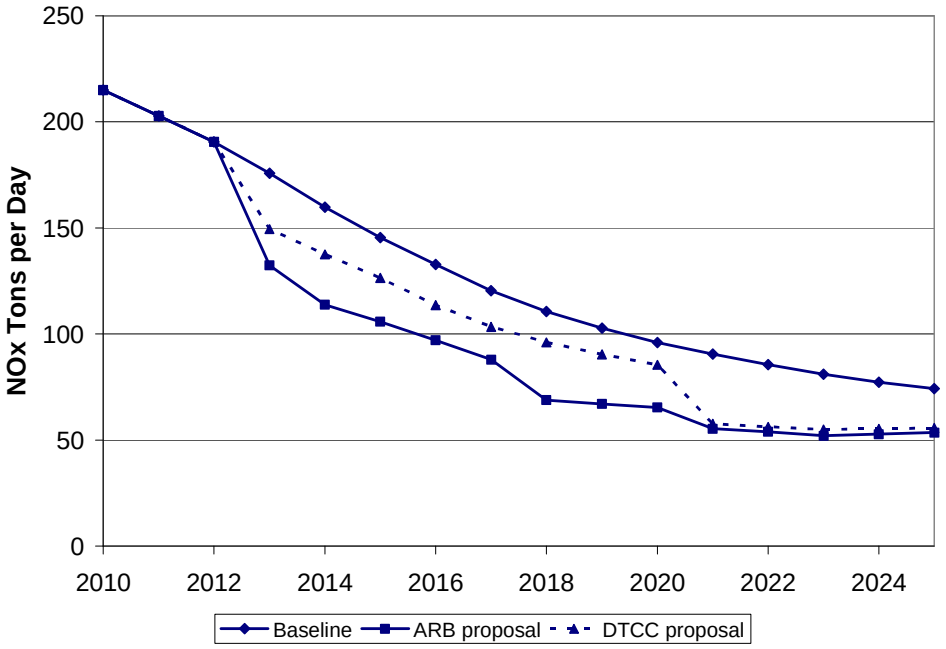
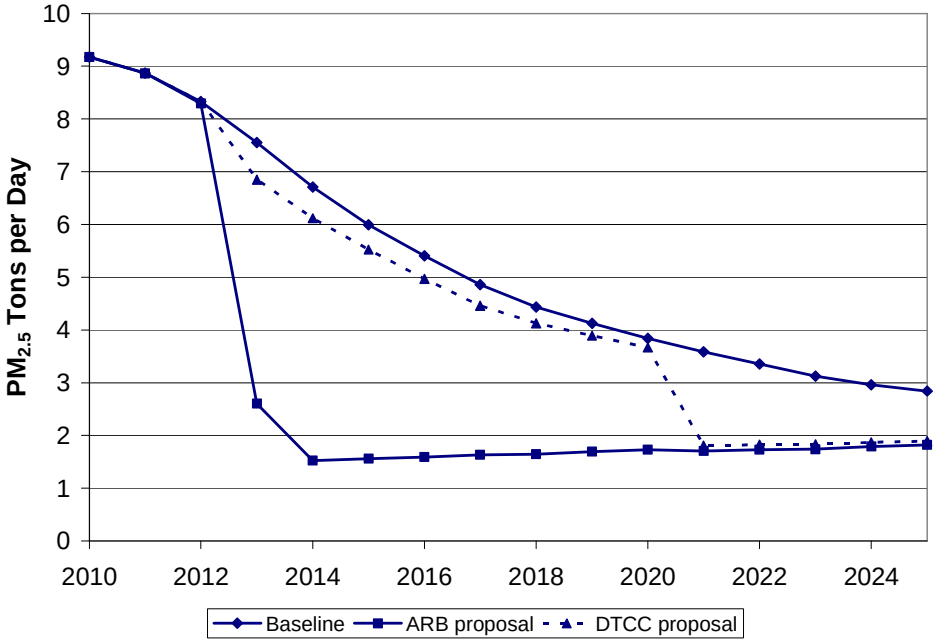



Figure 14: Statewide PM2.5 Emissions for Small Fleet Trucks: DTCC Provisions vs. ARB Proposed Regulation