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DATE: February 14, 2019

TO: Colorado Regional Planning and Environmental Managers

FROM: Rose Waldman, CDOT EPB Air Quality and Noise Program Manager

SUBJECT: Update to CDOT *NEPA Manual*, Appendix F – Standard Language (Global Climate Change Cumulative Effects Standard Language)

Background: Appendix F of the CDOT *National Environmental Policy Act (NEPA) Manual* contains a section that contains greenhouse gas (GHG) analysis standard language. The section is titled *Global Climate Change Cumulative Effects Standard Language*. The standard language in this section is copied into all air quality technical reports written for CDOT Environmental Assessments (EAs) and Environmental Impact Statements (EISs). It was most recently updated in August 2017.

Rationale for Update: Although Appendix F was updated in 2017, the text of the GHG analysis section had not been updated since 2014. Climate change is an evolving field and it was determined that the standard language should be updated.

CDOT is beginning the process of updating the CDOT *NEPA Manual*. However, because CDOT released a new air quality guidance document[1] on February 14, 2019 which refers to the updated GHG standard language and because the *NEPA Manual* update is not anticipated to be completed until the end of 2019, it was determined that the updated standard GHG language would be released via this memorandum in conjunction with the new air quality guidance document.

Update Applicability: This updated GHG standard language shall be used on projects that have a Scoping Date that is on or after February 14, 2019. It may be used on projects that have a Scoping Date prior to February 14, 2019. Scoping Date is defined as the earliest of the following:

- Scoping meeting
- Environmental kick-off meeting
- EPB Environmental Clearance Request

[1] The CDOT air quality guidance document is new and does not replace a previous document. It is titled Air Quality Project-Level Analysis Guidance (AQ-PLAG).

Update: The following information shall be copied into all air quality technical reports written for CDOT EAs and EISs:

Greenhouse Gases

Human activity is changing the earth's climate by causing the buildup of heat-trapping greenhouse gas (GHG) emissions through the burning of fossil fuels and other human activities. Carbon dioxide (CO_2) is the largest component of human-produced emissions; other prominent emissions include methane (CH_4), nitrous oxide (N_2O), and hydrofluorocarbons. These emissions are different from criteria air pollutants since their effects in the atmosphere are global rather than local, and also since they remain in the atmosphere for decades to centuries, depending on the species.

GHG emissions have accumulated rapidly as the world has industrialized, with concentration of atmospheric CO_2 increasing from roughly 300 parts per million (ppm) in 1900 to over 400 ppm today. Over this timeframe, global average temperatures have increased by roughly 1.5 degrees Fahrenheit (1 degree Celsius), and the most rapid increases have occurred over the past 50 years. Scientists have warned that significant and potentially dangerous shifts in climate and weather are possible without substantial reductions in GHG emissions. They have commonly cited 2 degrees Celsius (1 degree Celsius beyond warming that has already occurred) as the total amount of warming the earth can tolerate without serious and potentially irreversible climate effects. For warming to be limited to this level, atmospheric concentrations of CO_2 would need to stabilize at a maximum of 450 ppm, requiring annual global emissions to be reduced 40 to 70 percent below 2010 levels by 2050 (IPCC 2014).

State and national governments in many developed countries have set GHG emissions reduction targets of 80 percent below current levels by 2050, recognizing that post-industrial economies are primarily responsible for GHGs already in the atmosphere. As part of a 2014 bilateral agreement with China, the United States pledged to reduce GHG emissions 26 to 28 percent below 2005 levels by 2025; this emissions reduction pathway is intended to support economy-wide reductions of 80 percent or more by 2050 (The White House 2014).

GHG emissions from vehicles using roads are a function of distance traveled (expressed as VMT), vehicle speed, and road grade. A major factor in mitigating increases in VMT is EPA's GHG emissions standards, implemented in concert with national fuel economy standards. The U.S. Energy Information Administration projects that vehicle energy efficiency (and thus, GHG emissions) on a per-mile basis will improve by 28 percent between 2012 and 2040 (EIA 2016). This improvement in vehicle emissions rates is more than sufficient to offset the increase in VMT.

Construction and subsequent maintenance of the selected project alternative would generate GHG emissions. Preparing the roadway corridor (for example, by earth-moving activities) would involve a considerable amount of energy consumption and resulting GHG emissions; manufacturing of the materials used in construction and fuel used by construction equipment would also contribute GHG emissions. Typically, construction emissions associated with a new road account for about 5 percent of the total 20-year lifetime emissions from the road, although this can vary widely with the extent of construction activity and the number of vehicles that use the road.

The addition of new road-miles to the roadway network in the project study area would also increase the energy and GHG emissions associated with maintaining those new road-miles in the future. The increase in maintenance needs as a result of adding new roadway infrastructure would be partially offset by the reduced need for maintenance on existing routes (because of lower total traffic and truck volumes on those routes).

References:

[IPCC] Intergovernmental Panel of Climate Change
2014, Climate Change 2014: Synthesis Report Summary for Policymakers. Contribution of Working Groups I, II, and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.

The White House, Office of the Press Secretary
2014 "U.S.–China Joint Announcement on Climate Change." November 11.

[EIA] U.S. Energy Information Administration
2016 International Energy Outlook 2016.

In addition, the following information shall be copied into all air quality technical reports written for CDOT EISs (text in red is to be modified as appropriate for specific projects):

EPA's MOVES2014b model can be used to estimate vehicle exhaust emissions of CO_2 and other GHGs. CO_2 is frequently used as an indicator of overall transportation GHG emissions because the quantity of these emissions is much larger than that of all other transportation GHGs combined, and because CO_2 accounts for 90 to 95 percent of the overall climate impact from transportation sources. For informational purposes, the MOVES2014b model was run to estimate GHG emissions in the project study area with the No-Action Alternative and Alternatives A1 and B1. Input parameters for the model were the same as those used for other MOVES2014b analyses. Table F-1 shows the GHG emissions associated with the [name of project] project.

Table F-1. Emissions of Greenhouse Gases with Alternatives A1 and B1 in the [name of project] Study Area in 2040

Greenhouse Gas	2019	2040		
	Existing Conditions Emissions (tpy)	No-Action Alternative Emissions (tpy)	Emissions (tpy) and Percent Change from No-Action Alternative	
			Alternative A1	Alternative B1
Methane (CH_4)	10.208	7.528	7.645 (+1.55%)	7.684 (+2.07%)
Nitrous oxide (N_2O)	2.461	2.154	2.144 (-0.46%)	2.150 (-0.19%)
Atmospheric CO_2	519,121	489,027	498,140 (+1.86%)	500,884 (+2.42%)
Total	**519,134**	**489,037**	**498,150 (+1.86%)**	**500,894 (+2.42%)**

As shown in Table F-1, GHG emissions would decrease in 2040 due to improvements in vehicle emission rates, even with increased VMT in 2040. There are minor increases in the modeled GHG emissions for the [name of project] action alternatives compared to the No-Action Alternative. When comparing the 2040 No-Action and action alternatives, the GHG emissions would increase by about 1.5 to 2.5 percent, depending on the GHG.

To help address the global issue of climate change, the U.S. Department of Transportation (USDOT) is committed to reducing GHG emissions from vehicles traveling on highways. USDOT and EPA are working together to reduce these emissions by substantially improving vehicle efficiency standards and moving toward less-carbon-intensive fuels. The agencies have jointly established new, more-stringent fuel economy standards and the first-ever GHG emissions standards for cars and light trucks in model years 2012 to 2025, with an ultimate real-world fuel economy goal of 36 miles per gallon for cars and light trucks by model year 2025. In addition, on September 15, 2011, the agencies jointly published the first-ever fuel economy and GHG emissions standards for heavy-duty trucks and buses. Also, increasing use of technological innovations that can improve fuel economy, such as gasoline- and diesel-electric hybrid vehicles, will improve air quality and reduce CO_2 emissions in future years.

Finally, the construction best practices described in Section XX (Mitigation Measures for Construction-Related Impacts to Air Quality), are practicable project-level measures that could help reduce GHG emissions on an incremental basis and could contribute in the long term to meaningful cumulative reduction when considered across the federal-aid highway program.

Individuals/Entities Impacted by Procedural Directive: This memo applies to all divisions, Regions, offices and branches of CDOT. It also applies to consulting firms performing contracted work for CDOT as well as Local Agencies and quasi-governmental entities performing work under CDOT's authority.

Effective Date: Immediate

Please distribute this information to the appropriate individuals and offices in your Region. If there are questions or concerns regarding the guidance update, please contact me at (303) 757-9016 or rose.waldman@state.co.us.