



Off-cycle Emissions GTR – Report from the Editorial Committee

OCE Plenary Meeting

May 31, 2005

DRAFT – FOR REVIEW BY EDITORIAL COMMITTEE

Overview

- OCE GTR draft development
- OCE Editorial Committee members
- Draft OCE GTR Status
 - Table of Contents
 - Section-by-Section overview
- Priority issues for Plenary Group Direction

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OCE GTR draft development

- March 2004 OCE Plenary Meeting
 - Agreement to draft OCE GTR using the U.S. not-to-exceed approach as starting point
- June 2004 OCE Plenary Meeting
 - Editorial Committee formed
- September 2004 Plenary Meeting
 - Outline of GTR developed and discussed
- Nov. 2004
 - 1st meeting of OCE Editorial Committee
- Jan. 2005 OCE Plenary Meeting
 - 1st draft of GTR distributed to members but not discussed
- April 2005
 - 2nd Editorial Committee meeting
 - Draft GTR provided to Plenary members in advance of May 2005 OCE meeting

OCE Editorial Committee members

E. Crupi, Canada	J. Vardas, EMA
B. Charmley, U.S.	A., Rijinders, the Netherlands
K. Narasuwa, Japan	P. Good, E.C.
M. Signer, OICA	J. Stein, OICA
M. Stepper, EMA	S. Redman, Germany
W. Matatko, Germany	L. Gustavsson, OICA
N. Nakashima, JASIC	M. Idoguchi, JASIC
Y. Toba, JASIC	T. Kakegawa, JASIC

Draft OCE GTR Status

- Draft OCE GTR version provided to members on May 13, 2005
(OCE working Document No. 8)
 - Two versions available
 - Annotated version showing comments from the Editorial Committee
 - Clean version with no comments

Draft OCE GTR - Table of Contents

A. Statement of Technical Rationale and Justification

1. Introduction
2. Background on Off-cycle Emissions
3. Procedural Background and Development of GTR
4. Technical and Economic Feasibility
5. Anticipated Benefits
6. Potential Cost Effectiveness

B. Text of Regulations

1. Scope and Purpose
2. Application
3. Definitions
4. General Requirements
5. Performance Requirements
6. Applicable Ambient Conditions
7. WNTE Test Procedures
8. [combined w/ section B.7]
9. WNTE Deficiencies
10. WNTE Carve-Outs and Technology-based WNTE exclusions
11. Documentation for Application for Compliance

Draft OCE GTR – Section A.1 – A. 2

A. *Statement of Technical Rationale and Justification*

1. *Introduction*
2. *Background on Off-cycle Emissions*

○ Introduction Section

- GTR addresses OCE from HD diesel engines;
 - Provisions prohibiting the use of defeat strategies
 - World-harmonized Not-to-Exceed (WNTE)
 - OCE GTR compliments the WHDC GTR

○ Background on Off-cycle Emissions

- Broad overview of what off-cycle emissions are in the context of modern HD diesel engines

Draft OCE GTR – Section A.3 – A.6

A. *Statement of Technical Rationale and Justification*

3. *Procedural Background and Development of GTR*

4. *Technical and Economic Feasibility*

5. *Anticipated Benefits*

6. *Potential Cost Effectiveness*

- A.3. - overview of the work of the OCE informal working group
 - Provides reader with references to appropriate WP.29 & GRPE documents
 - Highlights any key issues discussed during the development of the GTR
- A.4. and A.6. yet to be drafted
- A.5 - highlights 3 benefits
 - Improved emissions control
 - Improved certification/type-approval reviews
 - Reduced costs for industry from global harmonization

Draft OCE GTR – Section B.1 – B.4

B. Text of Regulations

1. Scope and Purpose
2. Application
3. Definitions
4. General Requirements

- B.1. – GTR establishes performance based emission requirements (WNTE) and a prohibition on the use of defeat strategies
- B.2. – GTR applies to CI, natural gas, and LPG positive ignition engines used in highway vehicles
- B.3. – Definition section, terms included but definitions yet to be drafted
- B.4. – Engines must be designed, constructed and assembled to comply with the GTR; they must not be equipped with a defeat strategy; and must comply with the WNTE limits

Draft OCE GTR – Section B.5

B. Text of Regulations

5. Performance Requirements

- B.5. – WNTE Limits specified
- NO_x, CO, (NM)HC, PM
 - WNTE Emission Limit = WHDC Emission Limit x WNTE Factor
- Smoke limits also specified

Pollutant	WHDC Emission Limit*	WNTE Factor*
NO _x	≤ 2.0 g/kWh	1.5
	> 2.0 g/kWh	1.25
(NM)HC	≤ 0.6 g/kWh	1.5
	> 0.6 g/kWh	1.25
CO	≤ 1.0 g/kWh	1.5
	> 1.0 g/kWh	1.25
PM	≤ 0.05 g/kWh	1.5
	> 0.05 g/kWh	1.25

Suggested
WNTE
factors from
OICA

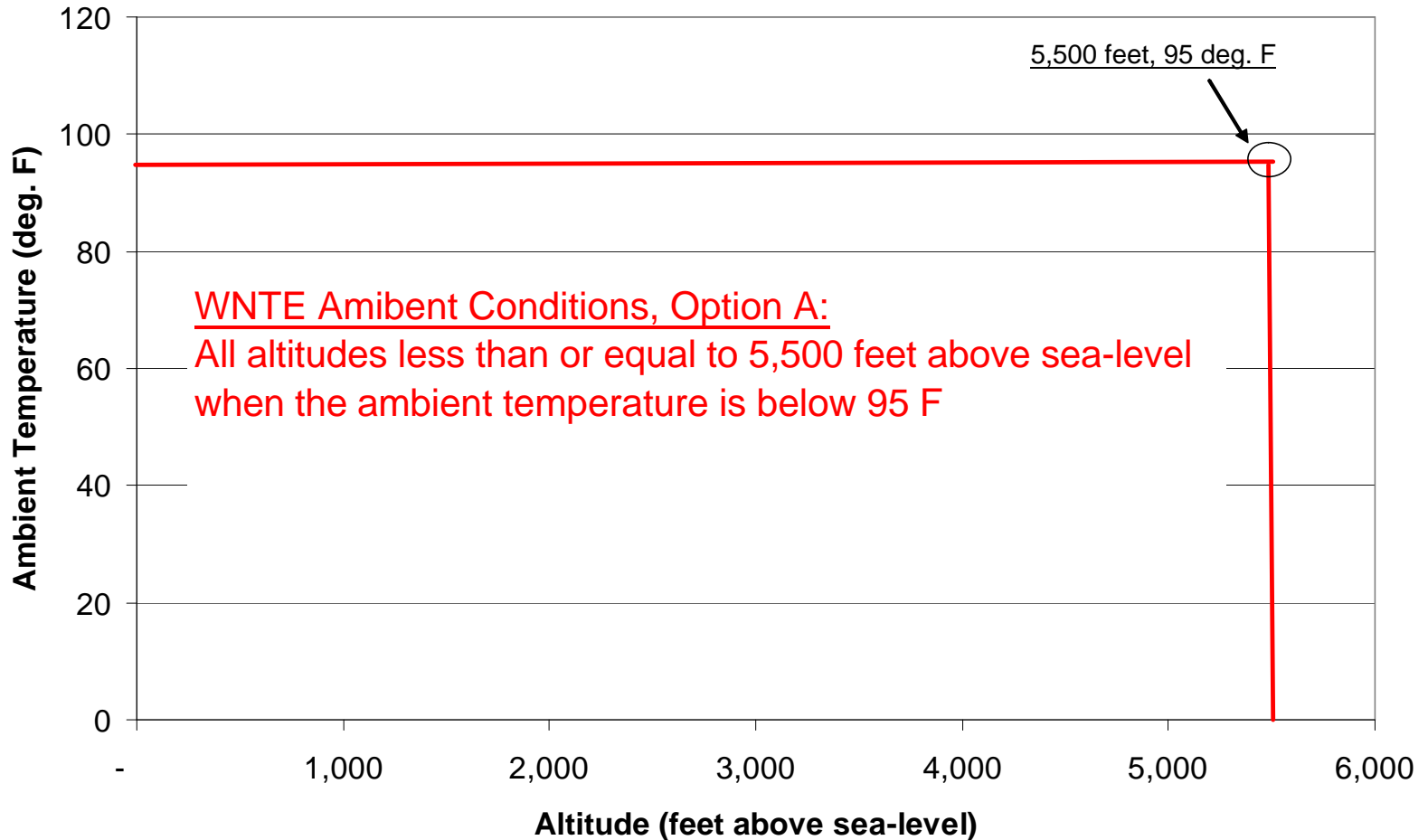
Draft OCE GTR – Section B.6

B. Text of Regulations

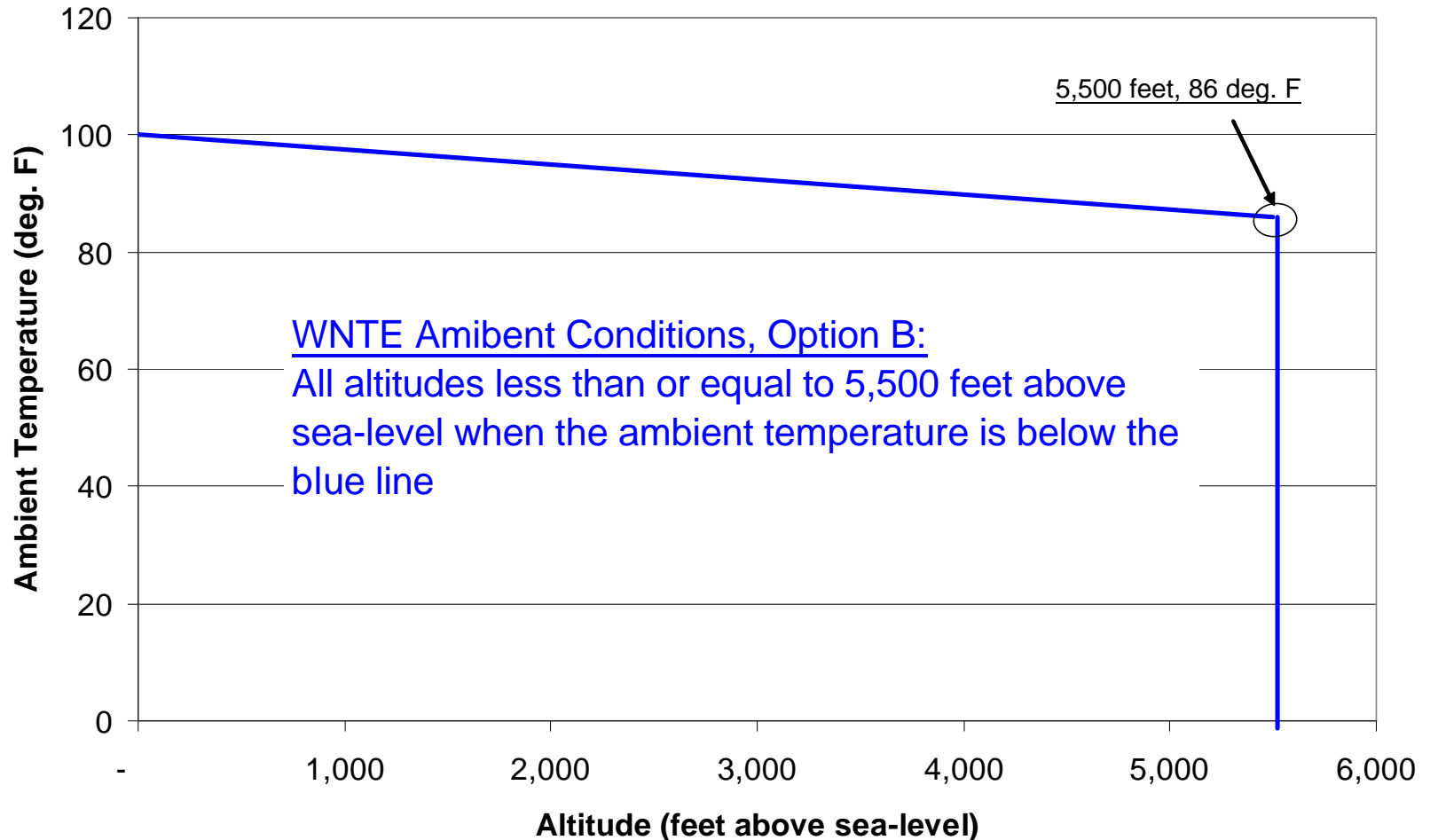
6. Applicable Ambient Conditions

- B.6. Two options for altitude/temperature ranges
 - Option A
 - Altitudes $\leq 5,500$ feet, and;
 - Temperatures ≤ 95 deg. F
 - Option B
 - Altitudes $\leq 5,500$ feet, and;
 - Temperatures ≤ 100 deg. F at sea-level and ≤ 86 F at 5,500 feet

Draft OCE GTR – Section B.6



Draft OCE GTR – Section B.6



Draft OCE GTR – Section 7

B. Text of Regulations

7. WNTE Test Procedures

- B.7.1 Defines WNTE control area
- B.7.2 Emissions sampling time period
- B.7.3 Ambient temperature & humidity correction procedures
- B.7.4 WNTE smoke measurement procedures
- B.7.5 WNTE emissions calculations
- B.7.6 Emissions rounding requirements

Draft OCE GTR – Section B.7.1



Draft OCE GTR – Section 9

B. Text of Regulations

9. WNTE Deficiencies

○ WNTE Deficiency

- Allowed for first 3 years after a new emission limit is implemented
- A deficiency allows an engine family to be approved, even if some WNTE requirements are not met
- Unmet provisions must be limited in scope, and due to feasibility or reasonability issues
- Approval is at the discretion of the type approval/certification authority
- No more than 3 WNTE deficiencies can be granted per engine family

Draft OCE GTR – Section 10

B. Text of Regulations

10. WNTe Carve-Outs and Technology-based WNTe exclusions

- B.10.1 EGR provisions
 - WNTe limits do not apply during “cold” operating conditions, as defined by specific intake manifold temperature and engine coolant temperature ranges

- B.10.2 NO_x and NMHC aftertreatment (catalyst) warm-up provisions
 - WNTe NO_x and/or NMHC limits don't apply for engines equipped with NO_x and/or NMHC catalyst when exhaust gas temperatures are less than 250 C on the outlet of the catalyst

Draft OCE GTR – Section 11

B. Text of Regulations

11. Documentation for Application for Compliance

- B.11 Documentation for OCE GTR
 - WNTE Compliance Statement
 - Basis for WNTE Compliance Statement
 - Technology exclusion descriptions
 - WNTE control area limited testing region description
 - WNTE control area exclusion description

Priority issues for Plenary Group Direction

- WNTE Compliance Statement
 - What is the wording of the statement?
 - Should a pre-defined set of data be required?
- AECS/BECS/Defeat Strategy definitions
- WNTE control zone – current definition or based on WHDC?
- Ambient conditions during which WNTE applies (altitude & temperature)
- WNTE Factors and Associated WHDC Emission Limits
- Smoke requirements
 - % opacity vs. light absorption coefficient