

# Discussion on Engineering Ethics

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ABE 290 – Sophomore Seminar  
Purdue University

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Return in class worksheet (homework) at end of class

# Code of Engineering Ethics

## I. Fundamental Canons

Engineers, in the fulfillment of their professional duties, shall:

1. Hold paramount the safety, health, and welfare of the public.
2. Perform services only in areas of their competence.
3. Issue public statements only in an objective and truthful manner.
4. Act for each employer or client as faithful agents or trustees.
5. Avoid deceptive acts.
6. Conduct themselves honorably, responsibly, ethically, and lawfully so as to enhance the honor, reputation, and usefulness of the profession.

National Society of Professional engineers, 2007

# Professional Obligations

Engineers shall be guided in all their relations by the highest standards of honesty and integrity.

At all times strive to serve the public interest.

Avoid all conduct or practice that deceives the public.

Accept personal responsibility for their professional activities, but may seek indemnification for services.

Give credit for work to those to whom credit is due.

Recognize proprietary interests of others.

National Society of Professional engineers, 2007

# “Clean Diesel Technology is not a Myth”

Jim parks, Oak Ridge National Laboratory, Oak Ridge, in CEN, June 6, 2016

System traps nitrogen oxides, reducing toxic emissions.

But engine must regularly use more fuel to allow trap to work.

The car's computer could save fuel by allowing more pollutants to pass through the exhaust system.

Saving fuel is one potential reason to change the software.

More pollution and more efficiency (gas mileage)

NY Times, 2015

NY times: [http://www.nytimes.com/2015/10/08/business/international/volkswagen-diesel-emissions-fix.html?\\_r=1](http://www.nytimes.com/2015/10/08/business/international/volkswagen-diesel-emissions-fix.html?_r=1)

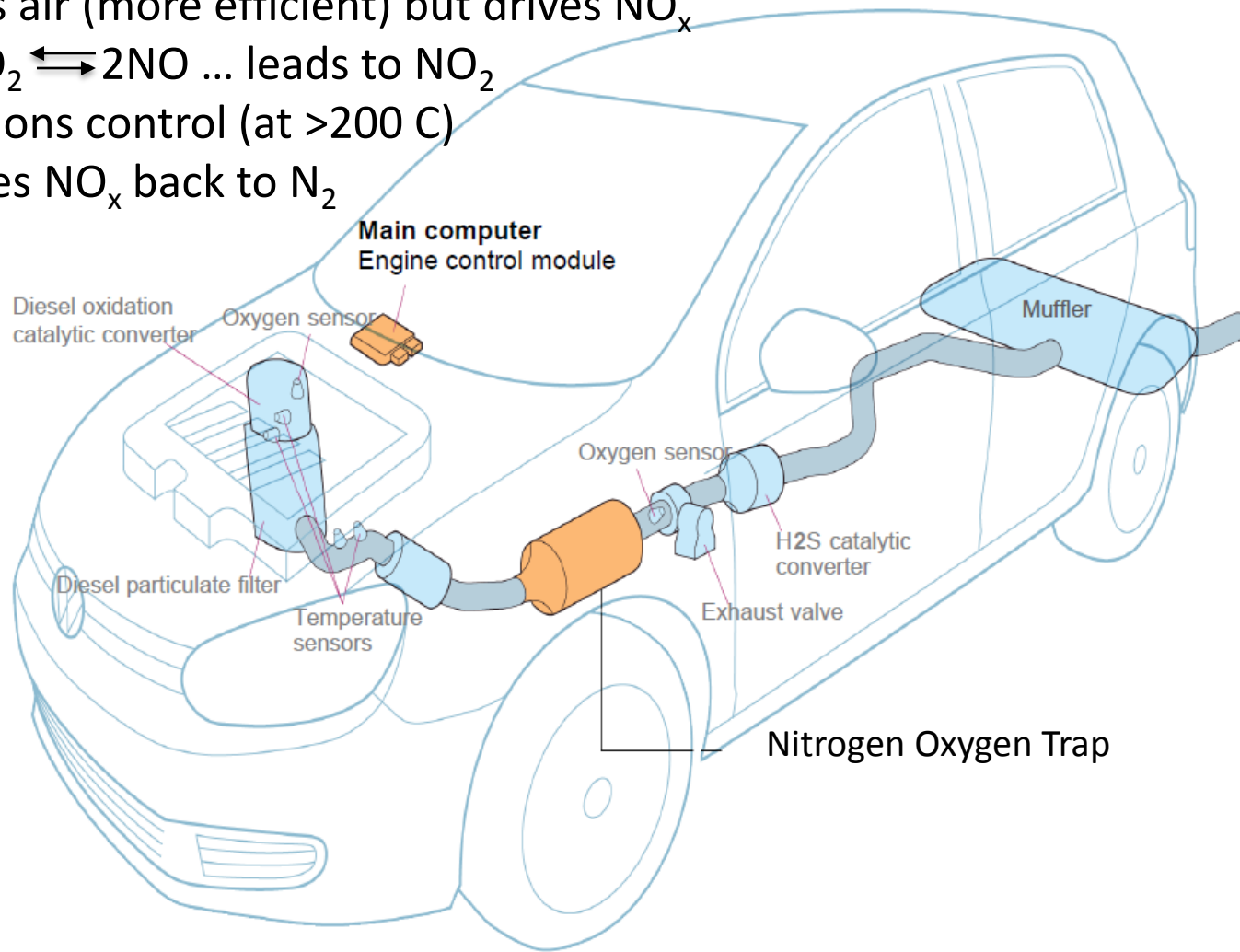
# Case Study: VolksWagon

Excess air (more efficient) but drives  $\text{NO}_x$

$\text{N}_2 + \text{O}_2 \rightleftharpoons 2\text{NO}$  ... leads to  $\text{NO}_2$

Emissions control (at  $>200^\circ\text{C}$ )

drives  $\text{NO}_x$  back to  $\text{N}_2$



# NITROGEN OXYGEN TRAP

The on-road testing in May 2014 that led the California Air Resources Board to investigate Volkswagen was conducted by researchers at West Virginia University. They tested emissions from two VW models equipped with the 2-liter turbocharged 4-cylinder diesel engine. The researchers found that when tested on the road some cars emitted almost **40 times** the permitted levels of nitrogen oxides.

NY Times

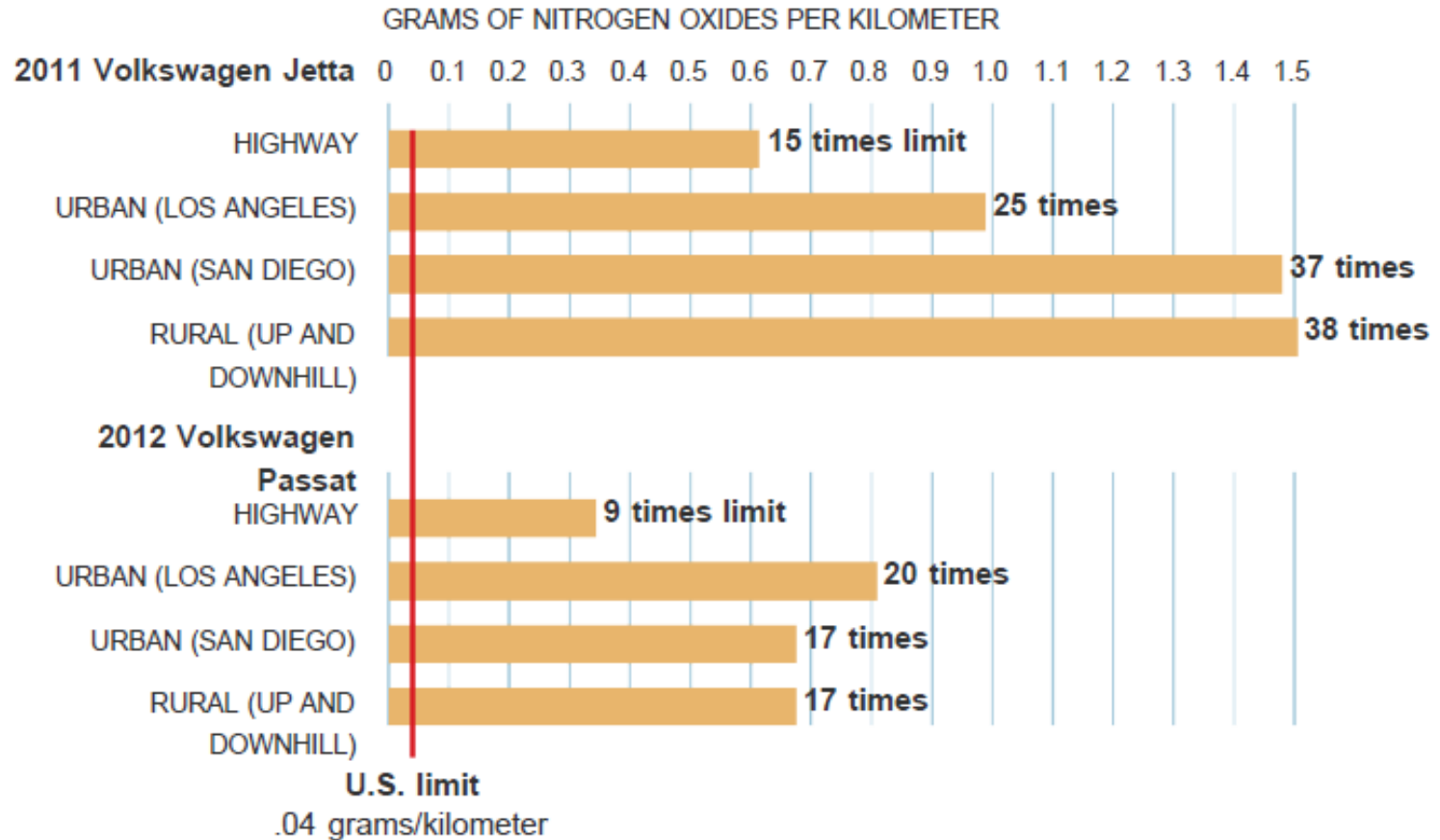
NY times: [http://www.nytimes.com/2015/10/08/business/international/volkswagen-diesel-emissions-fix.html?\\_r=1](http://www.nytimes.com/2015/10/08/business/international/volkswagen-diesel-emissions-fix.html?_r=1)

<https://www.youtube.com/watch?v=hOTKIZgppbs>

Sept 24, 2015

# West Virginia University Data

## Average emissions of nitrogen oxides in on-road testing



Source: Arvind Thiruvengadam, Center for Alternative Fuels, Engines and Emissions at West Virginia University

Sept 24, 2015

## Volkswagen Begins Firing Execs In The Wake Of Pollution Scandal

Automaker's top U.S. manager and R&D chiefs of Audi and Porsche are out. *(from Huffington Post, US edition)*

“One day after chief executive Martin Winterkorn quit, the source said the head of the company's U.S. operations and top engineers at premium VW brands Audi and Porsche would be dismissed, regardless of whether they knew about the cheating.

VW is under pressure to act decisively, with its shares plunging since the crisis broke and German Chancellor Angela Merkel urging it to quickly restore confidence in a company held up for generations as a paragon of German engineering prowess.



# A Number of Different Models Involved

The E.P.A. said on Nov. 2 that it had found the same emission test-cheating software on additional Volkswagen and Audi diesel models and on a Porsche model. The agency said it covered about 10,000 cars sold in the United States since the 2014 model year and an unspecified number of 2016 cars.



**November 17, 2015**

## Note on fuel consumption and CO<sub>2</sub> values

Dear Madam, Dear Sir,

As we informed you in the press releases entitled "[Internal investigations at Volkswagen identify irregularities in CO<sub>2</sub> levels](#)" issued on November 3, 2015, and "[Next step in clarifying the CO<sub>2</sub> issue](#)" issued on November 13, 2015, the CO<sub>2</sub> values and therefore the fuel consumption data published by Volkswagen for some models are incorrectly stated. We are currently reviewing which models are specifically affected. The list of affected models for model year 2016 compiled according to current knowledge is available [here](#).

Please take into consideration that the CO<sub>2</sub> values and therefore the fuel consumption data published on the [www.volkswagen-media-services.com](http://www.volkswagen-media-services.com) website are therefore subject to reservation until this issue has been resolved and may be incorrectly stated.

**November 17, 2015**

## Note on fuel consumption and CO2 values (continued)

In cooperation with the responsible authorities, Volkswagen is doing everything in its power to clarify the further course of action as quickly as possible and ensure the correct classification and presentation of the CO2 and fuel consumption values for the vehicles affected.

Thank you for your understanding

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**October 25, 2016**

## Judge Approves VW's \$14.7 Billion Settlement Over Emissions Scandal

“A federal judge has approved Volkswagen's \$14.7 billion settlement over the carmaker's vehicle emissions scandal.

The process of compensating affected U.S. car owners is beginning now, with the first buybacks expected to happen within the next few weeks.

Under the terms of the deal, Volkswagen agrees to either buy back or repair vehicles involved in the scandal. That means paying as much as \$10.033 billion to owners.

In addition, the carmaker has come to an agreement with the United States under which it will pay nearly \$5 billion in environmental remediation.”

<https://www.vwcourtsettlement.com/en/> and <http://www.npr.org/sections/thetwo-way/2016/10/25/499301280/judge-approves-vws-14-7-billion-settlement-over-emissions-scandal>

# Time machine... Nov 3, 2014 ... What would you do?

- A. Nothing
- B. Tell the inspector the true story
- C. Try to persuade management with more technical data
- D. Go over your supervisor's head and talk to group VP
- E. Look for another job
- F. Something else (explain)

Explain.

<https://www.youtube.com/watch?v=hOTKIZgppbs>

[http://www.nytimes.com/2015/10/08/business/international/volkswagen-diesel-emissions-fix.html?\\_r=0](http://www.nytimes.com/2015/10/08/business/international/volkswagen-diesel-emissions-fix.html?_r=0)

<http://www.bloomberg.com/news/articles/2015-11-03/volkswagen-emissions-woes-deepen-as-800-000-more-cars-affected>



# Case Studies (Situations that you may encounter)

## Situations (some examples)

- Gifts from a potential customer or existing customer;
- Suspected hazardous waste (how to handle)
- Analysis of equipment operation with safety concern
- A new invention
- Managing conflicts of interest

<http://www.nspe.org/resources/ethics/ethics-resources/board-of-ethical-review-cases>

<http://biodesign.stanford.edu/bdn/ethicscases/1ipownership.jsp>

<http://www.nspe.org/sites/default/files/BER%20Case%20No%202013-8-FINAL.pdf>

# Professional Obligations

Engineers shall *not*

disclose, without consent, confidential information of any present or former client or employer, or public body on which they serve.

be influenced by conflicting interests.

attempt to obtain employment or advancement or professional engagements by untruthfully criticizing other engineers, or by other improper or questionable methods.

attempt to injure, maliciously or falsely, directly or indirectly, the professional reputation, prospects, practice, or employment of other engineers.

Engineers who believe others are guilty of unethical or illegal practice shall present such information to the proper authority for action.

National Society of Professional engineers, 2007