**From:** Wojnowski, Gary
**To:** Aimee Wilson/R6/USEPA/US@EPA
**Cc:** Lundgren, Andrew A.
**Subject:** Furnace Decoking
**Date:** 08/07/2012 02:49 PM

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Aimee,

This writeup explains what we discussed about decoking emissions.

Let me know if you need anything else about decoking.

Thanks,

Equistar has estimated emissions from decoking operation on the basis of 20 decokes per year with worst case, maximum coke content in the furnace tubes. The total carbon dioxide equivalents (CO2e) emissions from decoking operations are a small fraction of the overall expansion facility CO2e emissions. In fact, the maximum case decoking emissions are estimated to be less than three ten-thousandths ($^{3}/_{10,000}$) of the overall expansion facility CO2e emissions.

GHG Emissions from the expansion facilities include:

| EPN | Type | TPY CO2 | TPY CH4 | TPY N2O | TPY CO2e | % Total |
|---|---|---|---|---|---|---|
| QE1010B | Furnace 10 | 281,507 | 5 | <1 | 281,944 | 46.7 |
| QE1011B | Furnace 11 | 281,507 | 5 | <1 | 281,944 | 46.7 |
| QEFUG | Fugitives | 0 | 8 | 0 | 161 | <0.03 |
| QE1416FB | Decoke | 524 | 0 | 0 | 524 | <0.09 |
| QE3050B | Flare | 6040 | 4 | <1 | 6124 | 1.0 |
| QE8050B | Flare | 32600 | 22 | <1 | 33062 | 5.5 |

The coke forms in the furnace tubes during cracking operations. Decoking is a process for removal of the coke buildup from the furnace tubes. Normal decokes must be performed when the furnace tubes become excessively obstructed, or when the insulating properties of the coke allow overheating of furnace tubes and reduced heat transfer into the process fluids. In addition, decokes must also be performed when a furnace is shutdown for some reason. A furnace may require a decoke associated with a shutdown if a feed supply is interrupted, or if a furnaces is being taken off-line as unit production rates are reduced. One of these decokes may occur after a relatively short run-length and as a result, the amount of coke being removed may be much less than during a routine decoke following a long run length. The GHG emissions, and emissions of criteria pollutants CO and PM, are directly proportional to the amount of coke being removed as opposed to the number of decokes that occur over a period of time.

Decoking operations are conducted at a lower furnace firing rate than when cracking feedstocks. The firing rate during normal cracking operations will be approximately 430 MMBtu/hour. During decoking the firing rate would be reduced to approximately 160 MMBtu/hour for a full furnace, 40 hour decoke. It is with absolute certainty that CO2e emissions from a decoke operations will be more than offset by reduced CO2e emissions from the furnace stack due to the decreased firing rate during the decoke. This is true even when firing with high hydrogen fuels when the effective CO2 reduction is decreased. It has been estimated that a full furnace decoke would decrease CO2 emissions by more than 170 tons over a 40 hour period, while the decoke vent CO2 emissions would be about 15 tons. Therefore, increased frequency and/or duration of decoking periods will not increase the overall unit CO2e emissions from the facility, but would result in a decrease of emissions. However, decoking is not what furnaces are for.

Equistar believes that no limit should be placed on the number or duration of decokes of the expansion facility furnaces because GHG emissions are reduced during decoking operations. However a limit of 20 decokes per year to account for both routine and event driven decokes is within reason. This is particularly true for the first year of operation as the furnaces are likely to be subject to more frequent startup ad shutdown, and late in service life as tubes have aged and more frequent decoking is necessary.

Gary Wojnowski, PE
Principal Environmental Engineer

LyondellBasell La Porte Complex
1515 Miller Cut-Off Rd
La Porte TX 77571

Office: 713.209.1320
Mobile: 409.330.1285

www.lyondellbasell.com

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