ENGINEERING EVALUATION REPORT
VALERO REFINING COMPANY – CALIFORNIA
PLANT NO. – 12626
APPLICATION NO. 11890

INTRODUCTION

This application is to bank Interchangeable Emission Reduction Credits (IERCs), in accordance with District Regulation 2, Rule 9, from the carbon monoxide furnaces listed below at the Valero Refining Company in Benicia, CA.

S-3 Crude Preheat Furnace, F-101
S-4 Reduced Crude Preheat Furnace, F-102

The emission reductions are the result of the Thermal De-NOx system (A-25). Sources S-3 and S-4 share a common stack with source S-7 (Jet Fuel Hydrofining Furnace). The Thermal De-NOx system is located downstream from S-3 and S-4, and upstream of S-7. Emissions from S-3 and S-4 are the difference between total emissions from the common stack and emissions from S-7.

Since December 1994, Valero has measured the NOx concentration from the common stack using a continuous emission monitor (CEM). Prior to that time, source tests were performed to determine the NOx concentration. In October 1999, Valero installed a flue gas flow meter to measure exhaust flow from the stack.

Under application numbers 19971 and 4398, the District has already approved IERCs from S-3 & S-4 for 5 credit generation periods (CGPs). This application is to bank IERCs from two additional credit generation periods that have elapsed since the prior banking applications. The credit generation periods for this application are calendar years 2002 and 2003 (CGP_6 & CGP_7).

IERC CALCULATIONS

The procedure for calculating IERCs is described in Regulation 2, Rule 9, Sections 602 and 603. This application relies on baseline data that was established in AN 19971. A copy of the engineering evaluation report for AN 19971 is included in this application file. The evaluation procedure that follows is the same procedure that was used in AN 19971.

Baseline Data:
The baseline data from AN 19971 is summarized below:

Baseline Period	**January 1, 1992 through December 31, 1996**
Baseline Throughput	**127,300 barrels/day**
Baseline Emissions	**12,622 lb NOx/day (2303.5 tons of NOx)**
Baseline Emission Rate	**0.09915 lb NOx / bbl of crude**

Determine the Baseline Adjusted Emission Rate:
S-3 and S-4 have been subject to the 300 ppm NOx limit (at 3% oxygen) in Regulation 9, Rule 10, Section 303.1 since May 31, 1995. On July 1, 2002, the 150 ppm limit in Reg. 9-10-304 became effective. Therefore, it is necessary to adjust the baseline emission rate to account for the 150 ppm limit. The baseline adjusted emission rates for CGP_6 and CGP_7 will be different because the 150 ppm limit was in effect for only the second half of the year 2002 (CGP_6), but all of 2003 (CGP_7).

From AN 11971, the baseline emission rate was 0.09915 lb/barrel. The average NOx concentration during the baseline period was 264 ppm @ 3% O_2. Therefore, the adjusted baseline emission rate that is equivalent to 150 ppm is:

For CGP_6:
[(181 days)(0.09915 lb/bbl) + (184 days)(150 ppm/264 ppm)(0.09915 lb/bbl)] / 365 days
= 0.0776 lb NOx/bbl

For CGP_7:
(150 ppm/264 ppm)(0.09915 lb/bbl)] = 0.0563 lb NOx/bbl

Determine the Baseline Adjusted Emissions (A):
Baseline adjusted emissions are calculated by multiplying the baseline throughput by the baseline adjusted emission rate for that particular CGP. The baseline adjusted emissions (A_x where x is the CGP number) are:

A_6 = (127,300 bbl/day) (365 days) (0.0776 lb NOx/bbl) (ton/2000 lb) = **1802.8 tons of NOx**

A_7 = (127,300 bbl/day) (365 days) (0.0563 lb NOx/bbl) (ton/2000 lb) = **1308.0 tons of NOx**

Determine the Actual Emissions (B) During each Credit Generation Period:
The two credit generation periods (CGPs) covered by this banking application are:

CGP_6 – Jan. 1 through Dec. 31, 2002
CGP_7 – Jan. 1 through Dec. 31, 2003

Emissions are calculated from data provided by Valero in this banking application, and included as attachments to this report. District staff audited the data provided by Valero by comparing hourly data with daily summary data for randomly selected dates. The NOx concentrations were measured by a continuous emission monitor (CEM). The exhaust flow rates were measured by a pitot tube flow meter.

As discussed above, sources S-3 and S-4 share a common stack (Main Stack) with source S-7. Valero measures NOx concentration and exhaust flow rate for the Main Stack. To calculate emissions from S-3 and S-4, first calculate emissions from the Main Stack, and then subtract emissions from S-7.

Main Stack Emissions:
Actual emissions are determined by multiplying the annual average NOx concentration (Attachment B-7) and exhaust flow rate (Attachment B-2). The actual exhaust flow rate is first adjusted to dry standard cubic feet per minute (dscfm) using the annual average temperature (Attachment B-3), and the exhaust water content of 13.3%.

There were 2 Field Accuracy Tests conducted by the District on 5/23/02 and 10/22/03. Valero's measured NOx concentrations were lower than the District's measurements by 15.4% on 10/22/03 and 14.7% on 5/23/02. To be most conservative, the NOx concentrations for each CGP will be adjusted (increased) by the respective percentages above, yielding fewer IERCs.

CGP_6
Standard flow = (850,300 acfm) ([(460+70)/(460+613)] (1.0 – 0.133)
= 364,140 dscfm

Emissions = (64 x 10^{-6}) (1.147) (364,140 cfm) (525600 min/yr) (lb-mol/387 cf) (46 lb/lb-mol)
= 1,669,990 lbs NOx (835.0 tons of NOx)

CGP_7
Standard flow = (908,600 acfm) ([(460+70)/(460+653)] (1.0 – 0.133)
= 375,122 dscfm

Emissions = (62 x 10^{-6}) (1.154) (375,122 cfm) (525600 min/yr) (lb-mol/387 cf) (46 lb/lb-mol)
= 1,676,765 lbs NOx (838.4 tons of NOx)

S-7 Emissions:
Emissions from S-7 are calculated from fuel usage (Attachment B-5), fuel heat content (Attachment B-6), and a NOx emission factor of 0.1728 lb/MM BTU (based on a previous source test).

CGP_6
(471,000 cf/d) (1143 BTU/cf) (0.1728 lb NOx/MM BTU) (MM/10^{-6}) (365 d) (ton/2000 lb)
= 17.0 tons NOx

CGP_7
(383,000 cf/d) (1178 BTU/cf) (0.1728 lb NOx/MM BTU) (MM/10^{-6}) (365 d) (ton/2000 lb)
= 14.2 tons NOx

Actual emissions from S-3 and S-4 (B_x where x represents the CGP number) are:

B_6 = 835.0 – 17.0 = **818.0 tons NOx**

B_7 = 838.4 – 14.2 = **824.2 tons NOx**

Determine Credit Generation Period Non-Curtailment Emissions (C):
The non-curtailment emission rate (C) for a given credit generation period (CGP) is calculated by multiplying the baseline throughput (127,300 bbl/day) by the emission rate for that CGP. The emission rates for the CGP_6 and CGP_7 are calculated by dividing annual emissions by annual crude throughput.

Emission rates:
CGP_6 Em. Rate = [(818.0 ton) (2000 lb/ton)] / [(122220 bbl/day) (365 days)] = 0.0367 lb / bbl
CGP_7 Em. Rate = [(824.2 ton) (2000 lb/ton)] / [(128300 bbl/day) (365 days)] = 0.0352 lb / bbl

C_6 = (127,300 bbl/day) (0.0367 lb/bbl) (365 day/y) (ton/2000 lb) = **852.6 tons**

C_7 = (127,300 bbl/day) (0.0352 lb/bbl) (365 day/y) (ton/2000 lb) = **817.7 tons**

Calculate IERCs for each Credit Generation Period:
IERCs are calculated by subtracting the greater of either the actual emissions (B) or the non-curtailment emissions (C) from the baseline emissions (A).

As indicated above, **A_6 = 1802.8 tons, and A_7 = 1308.0 tons**

For CGP_6, C_6 is greater than B_6. Therefore, the amount of IERCs is:

$$A_6 - C_6 = 1802.8 - 852.6 = \textbf{950.2 tons}$$

For CG_7, B_7 is greater than C_7. Therefore, the amount of IERCs is:

$$A_7 - B_7 = 1308.0 - 824.2 = \textbf{483.8 tons}$$

STATEMENT OF COMPLIANCE

For an emission reduction to be banked as an IERC, the reduction must be real, permanent, quantifiable, enforceable and surplus (Section 2-1-301.2).

Real: As defined in Section 2-9-214, real means that the emission reduction constitutes an actual decrease in air emissions. There was an actual decrease in emissions to the atmosphere, as is evident from source testing and continuous emission monitoring (CEM) data. The emission reductions evaluated in this application are real.

Permanent: As defined in Section 2-9-213, permanent means that the emission reduction exists for the duration of the credit generation period (CGP). Since both CGPs have already ended, the emission reductions are permanent.

Quantifiable: Quantifiable means that the emission reductions are based on data from emissions measurements. The emission calculations were performed using crude throughput records, source test data and continuous emission monitoring data. These emission reductions evaluated in this application are quantifiable.

Enforceable: As defined in Section 2-9-209, enforceable means that there is credible evidence during the credit generation periods to verify compliance with Regulation 2, Rule 9. The evaluation of this banking application is based on actual crude throughput records, source test data and CEM data. The emission reductions evaluated in this application are enforceable.

Surplus: As defined in Section 2-9-218, surplus means that the emission reductions are not required by Reasonably Available Control Technology (RACT), Best Available Retrofit Control Technology (BARCT), or any other rule in effect during the credit generation period. In addition, emissions reductions must exceed any reduction required by the most recent Clean Air Plan or Air Quality Management Plan.

Regulation 9, Rule 10, Section 304.1 contains a limit of 150 ppm, which became effective on July 1, 2002. The District considers this limit to constitute BARCT. The baseline emissions have been adjusted to reflect this BARCT limit.

The District's most recent plan is the 2005 Ozone Strategy, which was adopted January 4, 2006. This plan contains a base-year emission inventory for 2002, and projected emission inventories for subsequent years broken out by source category. To determine whether or not the IERCs requested by Valero are surplus to the most recent plan, staff compared the 2002 base inventory and 2003 inventory projections with actual emissions and IERC usage in 2002 and 2003. This was done for all facilities that have generated or used IERCs to date. The emission inventory exceeds the sum of actual emissions and ERC/IERC use/generation. Therefore, the IERCs requested in this application are surplus.

PUBLIC COMMENT

IERCs for CGP_6 and CGP_7 exceed 40 tons. Therefore, this application is subject to the public comment provisions of Section 2-9-405.

RECOMENDATION

Staff recommends the District issue a 30-day public notice regarding the preliminary decision to approve the following IERCs for Credit Generation Periods 6 and 7 for emission reductions that occurred at the Valero refinery.

Credit Generation Period #6: January 1 through December 31, 2002

IERCs = 950.2 Tons of Nitrogen Oxides

Effective Date: January 1, 2003

Expiration Date: December 31, 2007

Credit Generation Period #7: January 1 through December 31, 2003

IERCs = 483.8 Tons of Nitrogen Oxides

Effective Date: January 1, 2004

Expiration Date: December 31, 2008

By: Signed by Greg Stone
Supervising Air Quality Engineer
Date: February 21, 2006