

**ENGINEERING EVALUATION REPORT
MARTINEZ REFINING COMPANY LLC
PLANT NO. 24726
APPLICATION NO. 31806**

INTRODUCTION

This application is to bank Interchangeable Emission Reduction Credits (IERCs), in accordance with Air District Regulation 2, Rule 9, from the sources listed below at the Martinez Refining Company (MRC), formerly known as Shell Martinez Refinery, in Martinez, CA. The facility is located at 3485 Pacheco Boulevard, Martinez, CA 94553.

S-1507	CO Boiler #1
S-1509	CO Boiler #2
S-1512	CO Boiler #3

The emission reductions are the result of combustion modifications made to CO Boilers (COBs) No. 1, No. 2, and No. 3 that occurred on May 28, 1999, April 22, 1999, and October 30, 1998, respectively. MRC, under Shell's ownership, has already banked IERCs from these sources for the initial credit generation periods (CGP₁) immediately following the combustion modifications to each source. IERCs from CO Boilers 1, 2, and 3 have previously been banked under application numbers 27765, 439, 1820, 6979, 10368, 14858, 16772, 21415, 25198, 28247, and 30006.

This application is to bank IERCs from all three CO Boilers for the following credit generation periods:

July 1, 2018 through June 30, 2019 (365 days)
July 1, 2019 through June 30, 2020 (366 days)
July 1, 2020 through June 30, 2021 (365 days)

Per Regulation 2-9-603.2, IERCs for this application are calculated using the same baseline periods that were used in the previous IERC banking applications.

IERC CALCULATIONS

The procedure for calculating IERCs is described in Regulation 2, Rule 9, Sections 602 and 603. The IERC calculations to follow are based on daily NO_x CEM concentrations, NO_x emissions, and steam production rates provided by MRC. Baseline data used in this application is the same data used in previous IERC applications from MRC under Shell's ownership. The data for each CGP was provided by MRC in this banking application. Air District staff audited this data by comparing it with data previously submitted by MRC as part of emission reports for the CO Boilers, as required by Regulation 12 "Miscellaneous Standards of Performance", Rule 15 "Refining Emission Tracking".

Determine Baseline Period:

The baseline periods were determined in the original IERC banking applications for the CO Boilers. The baseline periods and credit generation periods (CGPs) for the CO Boilers are summarized in Table 1. **The credit generation periods for this current IERC banking application are highlighted in bold italics print.**

Table 1 – CO Boilers Baseline and Credit Generation Periods

	COB 1	COB 2	COB 3
Baseline	6/8/94 – 6/7/99	4/29/94 – 4/28/99	11/7/93 – 11/6/98
CGP₁	6/8/99 – 9/26/99	4/29/99 – 9/26/99	11/7/98 – 4/30/99
CGP₂	9/27/99 – 8/27/00	9/27/99 – 8/27/00	5/1/99 – 4/30/00
CGP₃	8/28/00 – 6/30/01	8/28/00 – 6/30/01	5/1/00 – 8/27/00
CGP₄	7/1/01 – 6/30/02	7/1/01 – 6/30/02	8/28/00 – 6/30/01
CGP₅	7/1/02 – 6/30/03	7/1/02 – 6/30/03	7/1/01 – 6/30/02
CGP₆	7/1/03 – 3/31/04	7/1/03 – 3/31/04	7/1/02 – 6/30/03
CGP₇	4/1/04 – 6/30/04	4/1/04 – 6/30/04	7/1/03 – 3/31/04
CGP₈	7/1/04 – 6/30/05	7/1/04 – 6/30/05	4/1/04 – 6/30/04
CGP₉	7/1/05 – 6/30/06	7/1/05 – 6/30/06	7/1/04 – 6/30/05
CGP₁₀	7/1/06 – 6/30/07	7/1/06 – 6/30/07	7/1/05 – 6/30/06
CGP₁₁	7/1/07 – 6/30/08	7/1/07 – 6/30/08	7/1/06 – 6/30/07
CGP₁₂	7/1/08 – 6/30/09	7/1/08 – 6/30/09	7/1/07 – 6/30/08
CGP₁₃	7/1/09 – 6/30/10	7/1/09 – 6/30/10	7/1/08 – 6/30/09
CGP₁₄	7/1/10 – 6/30/11	7/1/10 – 6/30/11	7/1/09 – 6/30/10
CGP₁₅	7/1/11 – 6/30/12	7/1/11 – 6/30/12	7/1/10 – 6/30/11
CGP₁₆	7/1/12 – 6/30/13	7/1/12 – 6/30/13	7/1/11 – 6/30/12
CGP₁₇	7/1/13 – 6/30/14	7/1/13 – 6/30/14	7/1/12 – 6/30/13
CGP₁₈	7/1/14 – 6/30/15	7/1/14 – 6/30/15	7/1/13 – 6/30/14
CGP₁₉	7/1/15 – 6/30/16	7/1/15 – 6/30/16	7/1/14 – 6/30/15
CGP₂₀	7/1/16 – 6/30/17	7/1/16 – 6/30/17	7/1/15 – 6/30/16
CGP₂₁	7/1/17 – 6/30/18	7/1/17 – 6/30/18	7/1/16 – 6/30/17
CGP₂₂	7/1/18 – 6/30/19	7/1/18 – 6/30/19	7/1/17 – 6/30/18
CGP₂₃	7/1/19 – 6/30/20	7/1/19 – 6/30/20	7/1/18 – 6/30/19
CGP₂₄	7/1/20 – 6/30/21	7/1/20 – 6/30/21	7/1/19 – 6/30/20
CGP₂₅			7/1/20 – 6/30/21

Per Regulation 2, Rule 9, Section 602 (Reg. 2-9-602), the baseline period for a source is the 5-year period immediately preceding the initial credit generation period. The initial credit generation period is determined by the completion date of the *first* IERC banking application. IERC banking applications 439 (CO Boilers 1 and 2) and 27765 (CO Boiler 3) were deemed complete on October 20, 1999, and September 3, 1999¹, respectively. Per Reg. 2-9-204, the initial credit generation period “shall not be more than 30 months prior to the submittal of the first complete IERC banking application for a particular emission reduction activity”. The baseline and initial credit generation periods in Table 1 satisfy the requirements of Section 2-9-204.

Baseline Information:

The original baseline data is summarized in Table 2. This is the same baseline data that was used for all previous IERC banking applications for the CO Boilers.

¹ Unlike information in the archived application folder that shows A# 27765 was deemed complete on September 3, 1999, there is no record in Databank that shows the date when A# 27765 was deemed complete.

**Table 2– Baseline Data at 300 ppm NOx
 (lb/ hr average)**

	Year 1	Year 2	Year 3	Year 4	Year 5	5-Year Ave.
COB 1	100.40	75.18	78.07	85.33	85.82	84.96
COB 2	100.60	79.59	77.79	70.58	92.99	84.31
COB 3	91.33	91.38	70.09	59.07	90.43	80.46
Average	97.45	82.05	75.32	71.66	89.75	

Table 3 – Original IERC 5-Year Baseline Data

		CO Boiler 1 6/8/94 –6/7/99	CO Boiler 2 4/29/94 – 4/28/99	CO Boiler 3 11/7/93 – 1/6/98
Ave. NOx Emissions	lb/hr	84.96	84.31	80.46
Ave. Steam Production	klb/hr	122.88	124.11	126.37
NOx/Steam ratio	lb/klb	0.691	0.679	0.637

Determine Baseline Throughputs:

Baseline throughput is the lesser of actual throughput or permitted throughput during the baseline period. Since none of the CO Boilers has a permit condition that limits throughput, the actual throughput is used. Average NOx emissions and throughput rates are summarized for the baselines in Table 3 above.

Determine Baseline Emissions:

From Table 3, the average hourly NOx emission rates over the respective baseline periods are:

- CO Boiler 1 84.96 lb/hr
- CO Boiler 2 84.31 lb/hr
- CO Boiler 3 80.46 lb/hr

Baseline emissions are calculated by multiplying the hourly NOx emission rate by 8,760 hr/year.

- CO Boiler 1 (84.96 lb/hr) (8,760 hr/yr) / (2,000 lb/ton) = 372.1 tons/yr
- CO Boiler 2 (84.31 lb/hr) (8,760 hr/yr) / (2,000 lb/ton) = 369.3 tons/yr
- CO Boiler 3 (80.46 lb/hr) (8,760 hr/yr) / (2,000 lb/ton) = 352.4 tons/yr

These are the baseline emissions used for the initial IERC banking application. However, these emissions must be reduced for this banking application, as discussed below.

Determine the Baseline-Adjusted Emissions (A):

Per Regulation 2-9-603.1, the Air District cannot approve IERCs for an emission reduction that is required by an Air District rule, RACT, BARCT, etc. during a given credit generation period. Therefore, the baseline emission rate must be adjusted (reduced) to reflect any rule or provision that is in effect during the credit generation period. Since requirements may change over time, it is possible to have different baseline adjusted emission rates for different credit generation periods.

The following rules, provisions, and limits were established after the CO Boilers were originally permitted:

- In June 1995 permit condition #12271, Part 85 was amended to limit total NOx emissions from all three boilers to 5,452 lb/day. This condition limit is equivalent to 75.72 lb NOx/hr for each boiler [(5,452 lb NOx/day / 24 hr/day)/3].

- On July 1, 2002 Regulation 9-10-304 became effective. This limits NOx from CO Boilers to 150 ppmv (dry at 3% O₂).
- On May 22, 2012 the Shell EPA Consent decree became effective as a minor revision to the facility's Title V Permit. Limits from the CD are specific to each CO Boiler, and there is a rolling 24-hour limit and a rolling 365 day limit on each boiler. The limits are expressed in ppmvd at 0% O₂ in the permit and are codified in Part 2 of permit condition 25247.
- MRC operates partial-burn CO boilers. Effective January 1, 2015, and except during startup or shutdown the operating day NOx limit in Section 307.2.1 of Regulation 9-10 of 125 ppmv (dry at 3% O₂) and the calendar year NOx limit in Section 307.2.2 of Regulation 9-10 of 85 ppmv (dry at 3% O₂) apply to S-1507, 1509, and 1512.
- On August 1, 2015 part 24 of permit condition 25134 issued under A# 22045 became effective. This condition limits total NOx emissions, as NO₂, from S-1507, 1509, and 1512 to 468 tons/yr = 2,564 lb/day, annual average. This condition limit is equivalent to 35.61 lb NOx/hr for each boiler [(2,564 lb NOx/day / 24 hr/day)/3].

Tables summarizing adjustments to the baseline data for reasons discussed above are included in Appendix A of this evaluation report.

Adjusting the baseline data to account for the Permit Condition 25134 (Effective August 1, 2015):

The most restrictive adjusted hourly emission rate, which is based on part 24 of Permit Condition 25134, will be used to calculate the Baseline-Adjusted Emissions (A) as discussed below.

Step 1: Determine the Adjusted Baseline Emission Rate

The combined NOx limit of 2,564 lb/day for all three COBs is equivalent to 35.61 lb/hr per COB i.e., $2,564 \div 3 \times 24$.

Average amount of steam produced by COBs during the baseline period:

COB 1 = 122.88 klb/hr; COB 2 = 124.11 klb/hr; and COB 3 = 126.37 klb/hr

The Adjusted Baseline Emission Rate for COBs are:

COB 1 = 0.2898 lb/klb (35.61 \div 122.88);

COB 2 = 0.2869 lb/klb (35.61 \div 124.11); and

COB 3 = 0.2818 lb/klb (35.61 \div 126.37)

Step 2: Determine the Adjusted Baseline Emissions

Product of the average amount of steam produced by COBs during the baseline period and the adjusted baseline emission rate for COBs

Baseline Adjusted Emissions (A):

A (COB1) =

$0.2898 \text{ lb/klb} \times 122.88 \text{ klb/hr} \times 8,760 \text{ hr/yr} \div 2,000 \text{ lb/ton} = 156.0 \text{ TPY}$

A (COB2) =

$0.2869 \text{ lb/klb} \times 124.11 \text{ klb/hr} \times 8,760 \text{ hr/yr} \div 2,000 \text{ lb/ton} = 156.0 \text{ TPY}$

A (COB3) =

$0.2818 \text{ lb/klb} \times 126.37 \text{ klb/hr} \times 8,760 \text{ hr/yr} \div 2,000 \text{ lb/ton} = 156.0 \text{ TPY}$

Determine the Actual Emissions (B) During the Credit Generation Period:

Actual emissions during each CGP are determined by multiplying the hourly average NOx emissions for the particular CGP summarized in Tables 4 through 6 by the duration of that CGP. Average NOx emission rates during each CGP were provided by MRC. Staff compared this data with MRC’s reports required by Regulation 12, Rule 15. The emissions in this application are consistent with the data previously submitted by MRC.

Table 4 - CO Boiler Data: (7/1/18 – 6/30/19)

	CGP #	NOx Emissions lb/hr	Steam Production klb/hr	Em. rate (NOx/steam) lb/klb
COB 1	22	30.92	116.45	0.266
COB 2	22	27.92	110.22	0.253
COB 3	23	28.64	112.91	0.254

Table 5 - CO Boiler Data: (7/1/19 – 6/30/20)

	CGP #	NOx Emissions lb/hr	Steam Production klb/hr	Em. rate (NOx/steam) lb/klb
COB 1	23	32.37	112.86	0.287
COB 2	23	30.19	122.66	0.246
COB 3	24	26.21	112.3	0.233

Table 6 - CO Boiler Data: (7/1/20 – 6/30/21)

	CGP #	NOx Emissions lb/hr	Steam Production klb/hr	Em. rate (NOx/steam) lb/klb
COB 1	24	36.41	129.93	0.280
COB 2	24	30.45	113.73	0.268
COB 3	25	33.94	131.04	0.259

Actual NOx emissions (B_x where x represents the CGP number) are:

7/1/18 – 6/30/19 (365 days = 8,760 hrs)

B₂₂ (COB 1) = (30.9 lb/hr) (8,760 hr/yr) / (2,000 lb/ton) = 135.3 tons of NOx

B₂₂ (COB 2) = (27.9 lb/hr) (8,760 hr/yr) / (2,000 lb/ton) = 122.2 tons of NOx

B₂₃ (COB 3) = (28.6 lb/hr) (8,760 hr/yr) / (2,000 lb/ton) = 125.3 tons of NOx

7/1/19 – 6/30/20 (366 days = 8,784 hrs)

B₂₃ (COB 1) = (32.4 lb/hr) (8,784 hr/yr) / (2,000 lb/ton) = 142.3 tons of NOx

B₂₃ (COB 2) = (30.2 lb/hr) (8,784 hr/yr) / (2,000 lb/ton) = 132.6 tons of NOx

$$B_{24} \text{ (COB 3)} = (26.2 \text{ lb/hr}) (8,784 \text{ hr/yr}) / (2,000 \text{ lb/ton}) = \mathbf{115.1 \text{ tons of NOx}}$$

7/1/20 – 6/30/21 (365 days = 8,760 hrs)

$$B_{24} \text{ (COB 1)} = (36.4 \text{ lb/hr}) (8,760 \text{ hr/yr}) / (2,000 \text{ lb/ton}) = \mathbf{159.4 \text{ tons of NOx}}$$

$$B_{24} \text{ (COB 2)} = (30.5 \text{ lb/hr}) (8,760 \text{ hr/yr}) / (2,000 \text{ lb/ton}) = \mathbf{133.6 \text{ tons of NOx}}$$

$$B_{25} \text{ (COB 3)} = (33.9 \text{ lb/hr}) (8,760 \text{ hr/yr}) / (2,000 \text{ lb/ton}) = \mathbf{148.5 \text{ tons of NOx}}$$

Determine Credit Generation Period Non-Curtailment Emissions (C):

For a given COB the non-curtailment emissions (C_x where x represents the CGP number) are calculated by multiplying the baseline throughput (steam production rate in klb steam/hr) summarized in Table 3 by the emission rate (lb NOx / klb steam) for that CGP summarized in Tables 4, 5, and 6.

7/1/18 – 6/30/19 (365 days = 8,760 hrs)

$$C_{22} \text{ (COB 1)} = (122.88 \text{ klb steam/hr})(0.266 \text{ lb NOx/klb steam})(8,760 \text{ hr}) / (2,000 \text{ lb/ton}) = \mathbf{143.2 \text{ tons of NOx}}$$

$$C_{22} \text{ (COB 2)} = (124.11 \text{ klb steam/hr})(0.253 \text{ lb NOx/klb steam})(8,760 \text{ hr}) / (2,000 \text{ lb/ton}) = \mathbf{137.5 \text{ tons of NOx}}$$

$$C_{23} \text{ (COB 3)} = (126.37 \text{ klb steam/hr})(0.254 \text{ lb NOx/klb steam})(8,760 \text{ hr}) / (2,000 \text{ lb/ton}) = \mathbf{140.6 \text{ tons of NOx}}$$

7/1/19 – 6/30/20 (366 days = 8,784 hrs)

$$C_{23} \text{ (COB 1)} = (122.88 \text{ klb steam/hr})(0.287 \text{ lb NOx/klb steam})(8,784 \text{ hr}) / (2,000 \text{ lb/ton}) = \mathbf{154.9 \text{ tons of NOx}}$$

$$C_{23} \text{ (COB 2)} = (124.11 \text{ klb steam/hr})(0.246 \text{ lb NOx/klb steam})(8,784 \text{ hr}) / (2,000 \text{ lb/ton}) = \mathbf{134.1 \text{ tons of NOx}}$$

$$C_{24} \text{ (COB 3)} = (126.37 \text{ klb steam/hr})(0.233 \text{ lb NOx/klb steam})(8,784 \text{ hr}) / (2,000 \text{ lb/ton}) = \mathbf{129.3 \text{ tons of NOx}}$$

7/1/20 – 6/30/21 (365 days = 8,760 hrs)

$$C_{24} \text{ (COB 1)} = (122.88 \text{ klb steam/hr})(0.280 \text{ lb NOx/klb steam})(8,760 \text{ hr}) / (2,000 \text{ lb/ton}) = \mathbf{150.7 \text{ tons of NOx}}$$

$$C_{24} \text{ (COB 2)} = (124.11 \text{ klb steam/hr})(0.268 \text{ lb NOx/klb steam})(8,760 \text{ hr}) / (2,000 \text{ lb/ton}) = \mathbf{145.7 \text{ tons of NOx}}$$

$$C_{25} \text{ (COB 3)} = (126.37 \text{ klb steam/hr})(0.259 \text{ lb NOx/klb steam})(8,760 \text{ hr}) / (2,000 \text{ lb/ton}) = \mathbf{143.4 \text{ tons of NOx}}$$

Calculate IERCs for the Credit Generation Period:

For a given source and credit generation period, IERCs are calculated by subtracting the greater of either the actual emissions (B) or the non-curtailement emissions (C) from the baseline-adjusted emissions (A).

7/1/18 – 6/30/19

COB 1 (CGP₂₂): IERCs = A – C₂₂ = 156.0 tons – 143.2 tons = **12.8 tons of NOx**

COB 2 (CGP₂₂): IERCs = A – C₂₂ = 156.0 tons – 137.5 tons = **18.5 tons of NOx**

COB 3 (CGP₂₃): IERCs = A – C₂₃ = 156.0 tons – 140.6 tons = **15.4 tons of NOx**
46.7 tons of NOx

7/1/19 – 6/30/20

COB 1 (CGP₂₃): IERCs = A – C₂₃ = 156.0 tons – 154.9 tons = **1.1 tons NOx**

COB 2 (CGP₂₃): IERCs = A – C₂₃ = 156.0 tons – 134.1 tons = **21.9 tons NOx**

COB 3 (CGP₂₄): IERCs = A – C₂₄ = 156.0 tons – 129.3 tons = **26.7 tons NOx**
49.7 tons NOx

7/1/20 – 6/30/21

COB 1 (CGP₂₄): IERCs = A – B₂₄ = 156.0 tons – 159.4 tons = **-3.4 (0) tons NOx**

COB 2 (CGP₂₄): IERCs = A – C₂₄ = 156.0 tons – 145.7 tons = **10.3 tons NOx**

COB 3 (CGP₂₅): IERCs = A – B₂₅ = 156.0 tons – 148.5 tons = **7.5 tons NOx**
17.8 tons NOx^A

^A Excludes “-3.5” per rationale provided in Regulation 2-9-605.3.

IERC Banking Certificate

IERCs are valid for 5 years following the end of the credit generation period. In this banking application there are three time periods during which credit is generated. The IERCs will be issued as follows.

IERC Banking Certificate #9-W (covers 7/1/18 – 6/30/19, effective ^A 7/1/19, expires ^B 6/30/24)
46.7 Tons of NOx

IERC Banking Certificate #9-X (covers 7/1/19 – 6/30/20, effective 7/1/20, expires 6/30/25)
49.7 Tons of NOx

IERC Banking Certificate #9-Y (covers 7/1/20 – 6/30/21, effective 7/1/21, expires 6/30/26)
17.8 Tons of NOx

^A Per Regulation 2-9-603.3

^B Per Regulation 2-9-603.4

STATEMENT OF COMPLIANCE

For an emission reduction to be banked as an IERC, the reduction must be real, permanent, quantifiable, enforceable and surplus (Section 2-9-301.2).

Real: The emission reductions evaluated in this application are real. There was an actual decrease in emissions to the atmosphere, as is evident from continuous emission monitoring (CEM) data.

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 the CGP in this application has already ended, the emission reductions have already occurred, and therefore, are permanent.

Quantifiable: These emission reductions are quantifiable. The emission calculations were performed using NOx CEM and emission data, and steam production data.

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 steam production data and NOx CEM and emission data.

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.

The Air District is not aware of any EPA guidance on RACT for CO Boilers. In the absence of such guidance, the Air District considers the 85 ppmv (dry at 3% O₂) NOx limit in Regulation 9, Rule 10, Section 307 to constitute RACT/BARCT for CO Boilers. However, on May 22, 2012 the Air District approved MRC's Application 22287 to add NOx concentration limits on each CO Boiler as required by Shell's EPA Consent Decree. These limits are more stringent than the 150 ppmv (dry at 3% O₂) NOx limit in Regulation 9, Rule 10, Section 304 effective at that time and are specific to each CO Boiler. In addition, on August 1, 2015 permit condition 25134 was imposed to limit total annual NOx emissions to 468 tons per year; which is equivalent to 35.6 lb/hr/COB and more stringent than both the MRC's EPA Consent Decree and 85 ppmv of Regulation 9-10-307. Since all three credit generation periods discussed in this application occurred after August 1, 2015, the limits in Condition 25134 are the most stringent. Therefore, emissions during the baseline period were reduced accordingly.

The amount of IERCs generated in each calendar year from 2018 through 2021 exceeds the amount of IERCs used in each respective year. For example, and in 2018, the sum amount of IERCs in emission inventories exceeds the sum of actual emissions, the IERCs used, and the IERCs generated. Therefore, the IERCs requested in this application are surplus.

PUBLIC COMMENT

The amount of IERCs exceeds 40 tons for two out of three of the credit generation periods in this application. Therefore, this application is subject to the public comment provisions of Section 2-9-405. Before approving this banking application, the Air District must publish a notification of our preliminary decision to approve the IERCs. **The Air District published a notification inviting written public comment in**

the Contra Costa Times on XXX. During the 30-day public comment period ending YYY, the Air District received zzz written comments.

CEQA

The Air District will issue a Notice of Exemption for this application. Pursuant to Regulation 2-1-312.10, review of this application to bank emission reductions pursuant to Regulation 2, Rule 9 is categorically exempt from CEQA review because it can be seen with clarity that review and approval of such applications have no potential for causing a significant environmental impact. MRC has submitted CEQA Appendix H “Environmental Information Form” in accordance with Regulation 2-1-426. The Air District has reviewed MRC’s Appendix H and agrees that no significant environmental impacts are expected from approval of this application.

RECOMMENDATION

The Air District has evaluated the permit application for the proposed project and has made a preliminary determination that the project is expected to comply with all applicable Air District, state, and federal air quality-related regulations, including the health risks resulting from toxic air contaminant emissions. The preliminary recommendation is to issue the IERCs for this application. After considering all comments received, the Air District will make a final determination.

Staff recommends the Air District issue a public notice for our preliminary decision to approve the following IERCs for emission reductions that occurred at MRC.

IERC Banking Certificate #9-W 46.7 Tons of Nitrogen Oxides		
<u>Source #</u>	<u>Baseline Period</u>	<u>Credit Generation Period</u>
S-1507 CO Boiler #1	6/8/94 – 6/7/99	7/1/18 – 6/30/19
S-1509 CO Boiler #2	4/29/94 – 4/28/99	7/1/18 – 6/30/19
S-1512 CO Boiler #3	11/7/93 – 11/6/98	7/1/18 – 6/30/19
Effective Date:	July 1, 2019	
Expiration Date:	June 30, 2024	

IERC Banking Certificate #9-X 49.7 Tons of Nitrogen Oxides		
<u>Source #</u>	<u>Baseline Period</u>	<u>Credit Generation Period</u>
S-1507 CO Boiler #1	6/8/94 – 6/7/99	7/1/19 – 6/30/20
S-1509 CO Boiler #2	4/29/94 – 4/28/99	7/1/19 – 6/30/20
S-1512 CO Boiler #3	11/7/93 – 11/6/98	7/1/19 – 6/30/20
Effective Date:	July 1, 2020	
Expiration Date:	June 30, 2025	

IERC Banking Certificate #9-Y 17.8 Tons of Nitrogen Oxides

<u>Source #</u>	<u>Baseline Period</u>	<u>Credit Generation Period</u>
S-1507 CO Boiler #1	6/8/94 – 6/7/99	7/1/20 – 6/30/21
S-1509 CO Boiler #2	4/29/94 – 4/28/99	7/1/20 – 6/30/21
S-1512 CO Boiler #3	11/7/93 – 11/6/98	7/1/20 – 6/30/21

Effective Date: July 1, 2021

Expiration Date: June 30, 2026

By: _____
Samuel Dennis, Air Quality Engineer

Date: _____

Appendix A – Baseline Data Adjustments

Adjusting the baseline data to account for NOx limit in Permit Condition 12271 (Effective June 1995):

The NOx limit of 5,452 lb/day is equivalent to 75.72 lb/hr per COB. The baseline data was reviewed and for any year in which the average emissions for all 3 boilers was greater than 75.72 lb/hr, staff substituted 75.72 lb/hr for each CO Boiler for that year. Years 1, 2 and 5 were adjusted accordingly. Table 1 summarizes the results of this adjustment.

Table 1 – Baseline Data Adjusted for 5,452 lb/day NOx Limit

	Baseline Adjusted NOx Emissions (lb/hr average)					5-Year Ave.
	Year 1	Year 2	Year 3	Year 4	Year 5	
COB 1	75.72	75.72	78.07	85.33	75.72	78.11
COB 2	75.72	75.72	77.79	70.58	75.72	75.11
COB 3	75.72	75.72	70.09	59.07	75.72	71.26
Average	75.72	75.72	75.32	71.66	75.72	

Adjusting the baseline data to account for the 150 ppmv (dry at 3% O₂) NOx Standard:

Because there is a subsequent more stringent 125 ppmv (dry at 3% O₂) and 85 ppmv (dry at 3% O₂) NOx standards covering the entire credit generating period for all three sources this adjustment is not necessary.

Adjusting the baseline data to account for the Consent Decree NOx limits (Effective May 22, 2012):

On May 22, 2012, the Shell EPA Consent decree became effective as a minor revision to the facility's Title V Permit. Limits from the CD are specific to each CO Boiler, and there is a rolling 24-hour limit and a rolling 365-day limit on each boiler. The limits are expressed in ppmvd at 0% O₂ in the permit as shown in Table 2 and are codified in Part 2 of permit condition 25247.

Table 2 – EPA Consent Decree Limits on CO Boilers in ppmvd at 0% O₂

CO Boiler	Rolling 24 hour NOx Limit (ppmvd at 0% O ₂)	Rolling 365 day NOx Limit (ppmvd at 0% O ₂)
COB 1	168.4	130.6
COB 2	156.9	127.4
COB 3	142.7	113.1

To convert these limits to the same measurement as the Air District limits of ppmv (dry at 3% O₂); multiply the concentration at 0% by $(20.95-3)/20.95 = 0.857$. The converted limits are shown in Table 3.

Table 3 – EPA Consent Decree Limits Converted to 3% O₂

CO Boiler	Rolling 24 hour NOx Limit (ppmvd at 3% O ₂)	Rolling 365 day NOx Limit (ppmvd at 3% O ₂)
COB 1	144.3	111.9
COB 2	134.4	109.2
COB 3	122.3	96.9

The baseline data was reviewed on a daily basis and lowered for any day the actual daily concentration was greater than the new daily limits outlined in Table 3 above. The annual average NOx for each year during the baseline was also reviewed and lowered to the new annual average NOx limits in Table 3.

Tables 4 and 5 summarize the results of this adjustment which show that the annual average NOx limits in the Consent Decree result in the most restrictive adjustments to the baseline to date.

Table 4– Baseline Data Adjusted for Rolling 24-hour NOx Limits in Consent Decree

	Baseline Adjusted NOx Emissions (lb/hr average)					
	Year 1	Year 2	Year 3	Year 4	Year 5	5-Yr Ave.
COB 1	85.22	72.14	74.96	70.69	68.78	74.36
COB 2	78.04	71.93	71.01	59.92	70.50	70.28
COB 3	66.73	67.75	64.22	54.05	65.07	63.56
Average	76.66	70.60	70.06	61.55	68.12	

Table 5 – Baseline Data Adjusted for Annual Average NOx Limits in Consent Decree

	Baseline Adjusted NOx Emissions (lb/hr average)					
	Year 1	Year 2	Year 3	Year 4	Year 5	5-Yr Ave.
COB 1	66.17	62.89	64.69	61.61	59.65	63.00
COB 2	63.44	61.62	65.02	56.82	62.78	61.93
COB 3	56.58	53.94	54.10	53.36	54.38	54.47
Average	62.06	59.48	61.27	57.26	58.93	

Adjusting the baseline data to account for the 125 ppmv (dry at 3% O2) NOx Standard (Effective January 2015):

The baseline data was reviewed on a daily basis and for any day during the 5-year period baseline period when the average NOx concentration was greater than 125 ppmv (dry at 3% O2) the daily NOx emission was lowered accordingly. This was done by multiplying the actual emissions (lb/hr) by the ratio of the NOx concentrations. For example, if the actual daily NOx concentration was 185 ppmv (dry at 3% O2) and the daily NOx emissions were 90 lb/hr, the adjusted NOx emissions were calculated as follows:

$$\text{Example NOx adjustment to 125 ppmvd: } (125 \text{ ppmvd}/185 \text{ ppmvd}) (90 \text{ lb/hr}) = 60.81 \text{ lb/hr}$$

This calculation was performed for each day during the baseline period that has a concentration greater than 125 ppmv (dry at 3% O2). Table 6 summarizes the results of this adjustment and shows that Consent Decree annual average NOx limits in Table 7 is the most restrictive adjustments to the baseline made to date.

Table 6 – Baseline Data Adjusted for 125 ppmv (dry at 3% O2) NOx Standard

	Baseline Adjusted NOx Emissions (lb/hr average)					
	Year 1	Year 2	Year 3	Year 4	Year 5	5-Yr Ave.
COB 1	73.89	65.46	68.71	62.39	61.01	66.29
COB 2	72.60	68.07	67.48	56.51	66.17	66.17
COB 3	68.18	69.23	65.08	54.63	66.31	64.69
Average	71.56	67.58	67.09	57.84	64.50	

Adjusting the baseline data to account for the Permit Condition 25134 (Effective August 1, 2015):

The NOx limit of 2,564 lb/day is equivalent to 35.61 lb/hr per COB. The baseline data in Table 2 of the evaluation report was reviewed and adjusted as shown in Table 7 below for any year in which the average emissions for all 3 boilers was greater than 35.6 lb/hr.

**Table 7 – Baseline Data Adjusted for 2,564 lb/day NOx Limit
 Baseline Adjusted NOx Emissions (lb/hr average)**

	Year 1	Year 2	Year 3	Year 4	Year 5	5-Year Ave.
COB 1	35.61	35.61	35.61	35.61	35.61	35.61
COB 2	35.61	35.61	35.61	35.61	35.61	35.61
COB 3	35.61	35.61	35.61	35.61	35.61	35.61
Average	35.61	35.61	35.61	35.61	35.61	

Adjusting the baseline data to account for the 85 ppmv (dry at 3% O2) NOx Standard (Effective December 1, 2015):

The baseline data was reviewed on a daily basis and for any day during the 5-year baseline period when the average NOx concentration was greater than 85 ppmv (dry at 3% O2), the daily NOx emission was lowered accordingly. This was done by multiplying the actual emissions (lb/hr) by the ratio of the NOx concentrations. For example, if the actual daily NOx concentration was 185 ppmv (dry at 3% O2) and the daily NOx emissions were 90 lb/hr, the adjusted NOx emissions were calculated as follows:

Example NOx adjustment to 85 ppmvd: $(85 \text{ ppmvd} / 185 \text{ ppmvd}) (90 \text{ lb/hr}) = 41.35 \text{ lb/hr}$

This calculation was performed for each day during the baseline period that has a concentration greater than 85 ppmv (dry at 3% O2). Table 8 summarizes the results of this adjustment and shows that the daily NOx limit in Permit Condition 25134 remains the most restrictive adjustment to the baseline to date.

Table 8 – Baseline Data Adjusted for 85 ppmv (dry at 3% O2) NOx Standard

	Baseline Adjusted NOx Emissions (lb/hr average)					
	Year 1	Year 2	Year 3	Year 4	Year 5	5-Yr Ave.
COB 1	50.25	46.35	49.14	46.80	42.25	46.96
COB 2	49.35	47.14	47.81	39.00	45.84	45.83
COB 3	46.60	47.12	47.29	40.98	45.91	45.58
Average	48.74	46.87	48.08	42.26	44.67	