AIR QUALITY SIGNIFICANT PERMIT REVISION NO. 66329
TO OPERATING PERMIT NO. 1000042
ASARCO – HAYDEN OPERATION

I. INTRODUCTION

This Significant Permit Revision No. 66329 to Operating Permit No. 1000042 is issued to the ASARCO LLC (Asarco) for installation and operation of a new acid plant preheater.

A. Company Information

Facility Name: ASARCO LLC –Hayden Operations

Mailing Address: P. O. Box 8, Hayden, AZ 85135

Facility Address: 6094 N. Asarco Road, Hayden, AZ 85135

B. Attainment Classification

The facility is located in an area classified as non-attainment for PM_{10}, SO_2 and lead, and attainment or unclassified for all other criteria pollutants.

II. REVISION DESCRIPTION

The acid plant preheater is used to heat all four catalyst beds in the acid plant to optimum conversion temperature prior to receiving process gas from the flash furnace and converters in order to minimize SO_2 emissions during the startup of the acid plant. It may also be used to provide supplemental heat to maintain catalyst bed temperature if there is insufficient SO_2 from process operations to maintain full bed temperature.

As part of the recent "Arizona State Implementation Plan (SIP) Revision: Hayden Sulfur Dioxide Nonattainment Area for the 2010 SO_2 NAAQS" dated March 9, 2017 ("2017 Hayden SO_2 SIP") process, Asarco agreed to upgrade the metallurgical acid plant preheater to reduce spikes in SO_2 emissions associated with Smelter start-up, and thus providing increased certainty for the demonstration of attainment contained in the 2017 Hayden SO_2 SIP.

The proposed new heater has a nominal capacity of 200 MMBtu/hour.

III. EMISSIONS EVALUATION

A. Emissions

Asarco has proposed a voluntary annual fuel usage limitation of 460 MMscf per year to keep the emissions from the new pre-heater below the major source significant threshold for Prevention of Significant Deterioration (PSD) or major Nonattainment Area New Source Review (NNSR) applicability. Emissions from the new pre-heater for 460 MMscf per year fuel consumption are provided in Table 1 below:

Table-1: Potential to Emit

Pollutant*	Emission tons/year
PM_{10}	1.75
$PM_{2.5}$	1.75
NOx	39.88
CO	19.32
SO_2	0.14
VOC	1.26
Lead	0.000115

*The emissions for NOx are based on the manufacturer's emission factor of 0.17 pound per million BTU (MMBtu). Emissions for all other pollutants are based on AP-42, Ch. 1, Table 1.4-1.

B. Minor New Source Review

An analysis of the applicability of the Minor NSR program was also conducted for this project. In accordance with R18-2-334, the determination of emission increases under this program is based on a pre-project PTE to post-project PTE analysis. Minor NSR is triggered if the increase in PTE is greater than the permitting exemption thresholds defined at R18-2-101(99). As the increase for NO_X is greater than the permit exemption threshold, the change is subject to minor NSR review. Accordingly, a modeling analysis was conducted to demonstrate compliance with 1-hour NO_2 standard. Please see Section VII for the modeling analysis.

IV. APPLICABLE REGULATIONS

There are no new applicable requirements for the acid plant pre-heater. The preheater is not subject to 40 CFR 60 Subpart Db as a process heater is not considered a steam generation unit under this subpart. The preheater is subject to existing requirements under A.A.C. R18-2-724. Also, process heaters are not subject to National Emission Standards for Hazardous Air Pollutants (NESHAP) under 40 CFR 63 Subpart JJJJJJ.

V. PERFORMANCE TEST REQUIREMENTS

Within 60 days of achieving the maximum throughput, but not later than 180 days of the startup of the acid plant preheater, the Permittee is required to conduct a performance test for nitrogen oxides in accordance with EPA reference Method 7. The performance test must be repeated annually (between 11 and 13 months of the previous performance test). If during any performance test, the nitrogen oxides emissions exceed 90% of the emission limit, the Permittee is required to conduct a subsequent performance test within six months.

VI. MONITORING REQUIREMENTS

A. For acid plant preheater, the Permittee is required to maintain a record of daily as well as 365-day rolling total fuel consumption to demonstrate compliance with the annual fuel

limitation.

B. The Permittee is required to conduct annual performance test for nitrogen oxide. If during a performance test, the nitrogen oxides are greater than 90% of the limitation specified in the permit, the Permittee is required to conduct a repeat performance test in not later than 6 months.

C. There is reasonable possibility, within the meaning of A.A.C. R18-2-402 (F)(6), that the project may result in a significant emissions increase of NOx. Therefore, in accordance with R18-2-402(F)(3) and (4), the facility is required to record and report actual emission increases resulting from this project on an annual basis for 5 years.

VII. AMBIENT AIR IMPACT ANALYSIS

Because the acid plant preheater project triggers the minor NSR review, ADEQ requested Asarco to perform a dispersion modeling to demonstrate that the facility's emissions of NOx after this project will not interfere with attainment and maintenance of the National Ambient Air Quality Standards (NAAQS) for NO_2.

A. Model Selection

The American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD) model is the EPA-preferred model for estimating impacts at receptors located in simple terrain and complex terrain (within 50 km of a source) due to emissions from industrial sources. AERMOD also includes a buoyant line source option, which is suitable to model fugitive emissions from the ridge vents of the smelter in Asarco. Therefore, the most recent version (v16126r) of AERMOD was used.

B. Source Inputs

This section provides a discussion on source characterization to develop appropriate source inputs, including the modeled emissions of acid plant preheater, source configuration and source types, Good Engineering Practice (GEP) stack heights, and urban/rural determination of the sources.

1. Modeled emissions of acid plant preheater

The purpose of the acid plant preheater is to heat catalyst beds to optimum conversion temperature prior to the acid plant receiving process gas from the flash furnace and converters. The acid plant preheater does not operate continuously nor does it operate on a set schedule; rather, its operation will be associated with planned or unplanned outages. Based on Asarco's estimation, the preheater is expected to operate approximately 500 hours per year. Due to the intermittent operating nature of the preheater, Asarco performed a modeling analysis using an annualized emission rate of the preheater and the modeled concentrations were well below the NAAQS for NO_2.

Due to inherent operational uncertainties, Asarco prefers not to limit the operation hours of the preheater. Asarco has thus proposed a fuel consumption limit of 460 mmscf per year to stay below the significant emission rate of 40 tpy for NOx. Based on ADEQ's estimation, this fuel consumption limit is equivalent to 2340 operating hours per year assuming the preheater runs at its full capacity of 200

mmBtu/hr. Theoretically, the preheater can be operated more hours if the preheater does not run at full capacity. The preheater operation, if permitted at the fuel consumption limit of 460 mmscf/yr, would be frequent enough to contribute significantly to the annual distribution of daily maximum 1-hour concentration. Due to this concern, ADEQ performed an additional 1-hour NO_2 NAAQS modeling by using the maximum hourly emission rate of the preheater. Detailed 1-hour NO_2 modeling methodology is presented in Section F. For annual NO_2 NAAQS modeling, the emission limit of 39.9 tpy for the preheater was used.

2. Source configurations and source types

All stacks were modeled as point sources. Since the stack of the preheater is a capped stack, an exit velocity of 0.001 m/s was used. Anode furnace fugitives were modeled as a buoyant line source due to relatively high gas temperature. ADEQ has validated that the average buoyance parameter Asarco provided was appropriate. All other fugitives within the facility were modeled as volume sources.

3. Good Engineering Practice (GEP) stack heights

The GEP height for Asarco's main stack was assessed in a fluid modeling study jointly conducted by North American Weather Consultants and Colorado State University, with that study concluding that the stack's 1,000-foot height meets GEP stack height requirements. For all other stacks, the stack heights are less than the corresponding calculated formula GEP heights. Therefore, all stacks were modeled with actual heights. Building downwash was evaluated using building and stack location and dimensions, and the EPA approved Building Profile Input Program Plume Rise Model Enhancements (BPIP-PRME).

4. Urban/rural determination

The Asarco facility area was determined as "Rural" based on the land use method.

C. Meteorological Data

A meteorological tower (Cameral Hill) located approximately 300 meters of the project site was selected as the most representative monitor. In spite of complex winds in the facility's surrounding areas, meteorological data collected from this tower during August 16, 2013 through August 15, 2014 was determined to be representative of transport and dispersion conditions between the sources of concern and areas where maximum design concentrations are anticipated to occur. Following the EPA's Meteorological Monitoring Guidance for Regulatory Modeling Applications, the site-specific data met QA/QC and completeness requirements.

One-year of site-specific data and concurrent upper air radiosonde data obtained from the Tucson NWS site, were processed with the more recent version of AERMET meteorological preprocessor (v16216). The EPA's AERSURFACE tool (v13016) was used to calculate surface characteristic parameters required by AERMET.

D. Ambient Air Boundary and Receptor Network

An ADEQ staff visited the Asarco facility and validated that the ambient air boundary

Asarco proposed can effectively preclude the public access by using a combination of fences and natural barriers. Receptors were placed throughout a modeling domain to determine areas of maximum predicted concentrations. The AERMAP terrain processor was used to process the National Elevation Data (NED) data to generate the receptor elevations and hill heights.

E. Background Concentration

There are currently 7 NO_2 monitors in Arizona, five of which are in Phoenix and two of which are in Tucson. ADEQ selected the Buckeye monitor for determining the background concentrations as it provides a reasonable but still conservative estimation for background NO_2 levels in Hayden. ADEQ calculated the background concentrations based on 98 percentile of the Seasonal Hour-Of-Day, taking diurnal and seasonal patterns of ambient air quality monitoring data into account.

F. One –Hour NO_2 Modeling Methodology

ADEQ selected Plume Volume Molar Ratio Method (PVMRM) for 1-hour NO_2 modeling. PVMRM is available as a regulatory option in AERMOD as preferred Tier 3 screening methods for NO_2 modeling. The California Air Pollution Control Officers Association (CAPCOA) recommended an in-stack ratio (ISR) of 0.32 for natural gas fired heaters. ADEQ used an ISR of 0.4 for the preheater. For all other sources, the default ISR of 0.5 was used. Moreover, ADEQ used an hourly ozone dataset from Tucson, which provides a reasonable but still conservative estimation for background ozone levels in Hayden.

G. Model Results

The model results presented in Table 2 below show that the predicted total concentrations for both the 1-hour and annual averaging periods are below the 1-hour and the annual NO_2 NAAQS. It may be noted that ADEQ has used a very conservative approach to model 1-hour NO_2, assuming continuous operations with the maximum hourly emission rate for the preheater. The results of the ambient air analysis indicate that the facility's emissions of NOx after the Acid Plant Preheater project will not interfere with attainment and maintenance of the NAAQS for NO_2.

Table-2

Averaging Period	Modeled Concentration ($\mu g/m^3$)[1]	Background Concentration ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	NO_2 NAAQS ($\mu g/m^3$)
1-hour	165	-	165	188
Annual	4.4	16.1	20.5	100

[1]*Background concentrations have been included in the model runs. Therefore, the reported concentrations reflect the total concentrations of modeled concentrations plus background concentration.*

VIII. LIST OF ABBREVIATIONS

A.A.C. ..... Arizona Administrative Code
ADEQ ..... Arizona Department of Environmental Quality
AQD ..... Air Quality Division
CFR ..... Code of Federal Regulations
CO ..... Carbon Monoxide
MMBtu ..... Million British Thermal Units
NAAQS ..... National Ambient Air Quality Standards
NESHAP ..... National Emission Standards for Hazardous Air Pollutants
NO_x ..... Nitrogen Oxide
NSPS ..... New Source Performance Standards
NSR ..... New Source Review
PM ..... Particulate Matter
$PM_{2.5}$ ..... Particulate Matter Nominally less than 2.5 Micrometers
PM_{10} ..... Particulate Matter Nominally less than 10 Micrometers
PSD ..... Prevention of Significant Deterioration
PTE ..... Potential-to-Emit
SIP ..... State Implementation Plan
SO_2 ..... Sulfur Dioxide
THC ..... Total hydrocarbons
VOC ..... Volatile Organic Compound
yr ..... Year