IMPERIAL COUNTY AIR POLLUTION CONTROL DISTRICT
Authority to Construct Review

Permit:	#4005A-8
Source Name:	Western Mesquite Mines, Inc.
Source Type:	Mining
Applied For:	Remove one (1) carbon adsorption scrubber
Mailing Address/ Project Location:	6502 E. Highway 78 Brawley, CA 92227
Responsible Person:	Bill Martinich, Mine Manager Office: (928) 341-4653 Cell: (928) 581-1813
Person in Charge at Location:	Ron Leiken, Environmental Manager Office: (928) 341-4653, ext. 3231 Cell: (928) 581-7178
Permit Reviewer:	Ramon Angulo, APC Engineer

Introduction

Michael Musey, Senior Environmental Coordinator for Western Mesquite Mines, Inc. (WMMI) has submitted a permit application for a proposed equipment modification to Air District Permit No. 4005A-7, which regulates the emissions units and emissions control systems of Mesquite Mine's process plant and refinery. Mesquite Mine, including its process plant and refinery, is located at 6502 E. Highway 78, Brawley, CA 92227. The permittee's proposed project consists in the removal of the Gold Induction Furnace (GIF) carbon adsorption scrubber.

Permit History

In June 2020, WMMI, was issued Permit to Operate No. 4005A-6 for the addition of the existing retort, which is subject to 40 CFR Part 63, Subpart EEEEEEE (7E) – *National*

Emission Standards for Hazardous Air Pollutants: Gold Mine Ore Processing and Production Area Source Category.

On August 21, 2020, the Imperial County Air Pollution Control District (ICAPCD) issued Authority to Construct (ATC) #4005A-7 which included the addition of three new carbon adsorption columns. WMMI's mercury retort had a single carbon adsorption column on the exhaust. A new carbon adsorption scrubber was installed in series with the existing adsorber pursuant to ATC 4005A-7. The retort is a distillation process targeting mercury. In the same fashion, a new carbon adsorption bed in series with the existing bed had been installed to further reduce mercury from the carbon regeneration kiln.

The gold mine facility, known as Mesquite Mine, resumed full-scale gold mining and processing operations in 2007. Over the past ten years, many additional emission units and control systems have been added to WMMI's Air District Permits, as the permittee has replaced stationary and portable combustion equipment and added various pieces of new equipment as specific operations at the facility have changed. Mesquite Mine has been classified as a discretionary source since the facility's daily Potential to Emit (PTE) is greater than 100 pounds per day for both PM10 and NOx emissions. Therefore, all new permits and modifications to existing permits which result in an increase to the Mine's PTE are subject to discretionary permit review requirements, including public noticing and review requirements per District Rule 206. Draft ATC 4005A-8, which includes this Air District Analysis of the proposed project, will be subject to a 30-day public review period with the public being noticed of the project on the Air District's website and in a local newspaper.

Source Description

Gold Induction Furnace (GIF) Carbon Adsorption Scrubber Removal

The retort is a distillation process that specifically targets mercury. The retort system is designed to remove most of the mercury from the concentrate, condense and collect as liquid mercury and the remaining will eventually make its way to the retort carbon adsorption columns.

The GIF takes concentrate that has gone through the retort process. The retort process is highly efficient, but a minimum amount will remain in the concentrate. As the concentrate is moved to the GIF, the remaining mercury will leave the concentrate as the gold melts off.

WMMI has to meet NESHAP subpart 7E mercury levels of 2.2lb/ton Hg. The GIF carbon adsorption column was recently permitted. WMMI recently determined that this unit was never required to reach with NESHAP standards and that there was an overestimation of the naturally occurring mercury content in the new Castle Mountain ore. WMMI has decided it is best to remove this unit and to modify permit #4005A-7 to remove the GIF carbon adsorption scrubber.

Three Carbon Adsorption Scrubbers

The facility's existing mercury retort has a single carbon adsorption column on the exhaust. WMMI added a carbon adsorption scrubber in series with the existing adsorber. The additional adsorber column size and carbon charge will be similar to the existing column. Because the airflow through the retort is very small, the vacuum pump currently installed will have sufficient static pressure for the additional adsorber.

The facility's existing furnace exhaust includes a baghouse to remove particulates. WMMI previously proposed to add a new carbon adsorption scrubber after the baghouse to remove any mercury from the exhaust gas before discharge to the atmosphere. Existing gas temperatures from the furnace baghouse are within the carbon adsorber's operating range. Based on theoretical models, source test data and 2018-2021 production data, WMMI has decided it is best to remove this unit while still meeting NESHAP Subpart 7E mercury levels of 2.2lb/ton Hg.

The facility's existing carbon regeneration kiln has a single carbon adsorption bed. WMMI added a new carbon adsorption bed in series with the existing bed. The airflow from the kiln is relatively low and the existing fan is expected to have sufficient static pressure to push air through the new carbon adsorption bed.

Retort System

The retort system reduces mercury content in the gold concentrate prior to furnace melting in order to reduce mercury air emissions at the mine's process refinery. The retort is a refurbished Summit Valley Equipment & Engineering mercury retort, Model 7.5MR1E, and has a control efficiency of 99%. The retort has a material capacity of 7.5 cubic feet and heat concentrate to 1,200 degrees Fahrenheit under vacuum to drive off the mercury. The retorting process generally takes 24 hours per batch run of gold concentrate, and in some instances a batch will need to be re-processed through the retort system. Therefore, WMMI has conservatively estimated that the mercury retort will operate 24 hours per day, for 8,760 hours per year, and that its potential to emit (PTE) is be based on this operating schedule.

Existing Plant Process

WMMI extracts gold from ore on the leach pads at Mesquite Mine by using a diluted cyanide solution within an irrigation system. This solution, referred to as the pregnant solution, is then collected and pumped to the absorption plant, where gold is removed from the solution via a carbon in column (CIC) circuit. The activated carbon used in the CIC circuit has the ability to absorb dissolved gold from the gold leaching solution. The activated carbon with the absorbed gold is removed from the CIC circuit and moved to the process plant where the gold is desorbed from the carbon in the desorption vessel via a caustic (NaOH) strip. Prior to entering the regeneration kiln for reactivation, the carbon

is washed with a hydrochloric acid (HCl) solution in order to remove carbonate scale and other impurities that could potentially be present.

WMMI uses 36% HCl for this treatment of the carbon, which is delivered to the site via tanker trucks and is pumped through the trans-loading system into a 9,000-gallon acid storage tank. Mesquite Mine has a maximum of 70,000 gallons of 36% HCl delivered per year, with each delivery not exceeding 6,500 gallons of HCl since that is the maximum carrying capacity of a tanker delivery truck. Approximately 100 gallons of the solution at a time is transferred from the storage tank to the HCl/water mix tank, with a capacity of 5,000 gallons, which holds approximately 3,000 gallons of water at any given time. The HCl trans-loading system incorporates the use of a mechanical pump, instead of utilizing the product delivery truck's pneumatic system.

The Superior Aztec Boiler at Mesquite's processing plant is used to heat the water which is used to treat the loaded carbon in the carbon desorption vessel. The unit is a Superior Aztec Boiler model number 5-5-1276, propane fired, which is equipped with a Cleaver Brooks Profire Model NTH105GX-15S-4 low-NOx burner. The rating of the Superior Boiler is 10.5 MMbtu/hr. The boiler has a fuel flow rate of 114.75 gallons/hr.

Carbon from the CIC circuit is introduced into the process plant from the carbon trailer into the desorption vessel where gold is desorbed. From there the carbon is treated in the carbon/hydrochloric (HCl) acid wash vessel to remove carbonates and other deleterious materials which have precipitated in the carbon before the carbon is sent to the carbon kiln for reactivation. To prepare the diluted HCl solution used in the carbon/acid wash tank, the acid mix tank in the plant is first filled with water. Next, 36% HCl from the HCl storage tank is added to the 5,000-gallon acid mix tank until the solution reaches a concentration of 1% HCl. Then, for approximately 1.5 hours, the 1% HCl is circulated from the acid mix tank through the carbon/acid wash tank. During this process, the majority of the HCl is consumed. After this wash takes place, the spent dilute acid is removed from the carbon/acid wash tank and a caustic (NaOH) solution is circulated through the wash tank to neutralize any residual acid. Finally, the carbon/acid wash tank is filled with water and drained to rinse the carbon. The rinsed carbon is then sent to the regeneration kiln.

The carbon regeneration kiln is a refurbished Rabbit Creek Mining Inc. unit, which is 36" in diameter and 17'-9" long, with a design processing rate of 450 pounds of carbon per hour. The fuel capacity of the kiln is 2.2 MMBtu/hr. The carbon kiln is heated from the outside, and it is propane-fired. The kiln combustion and kiln drum operating schedule is conservatively estimated to be 8,760 hours per year (24 hours per day). The maximum propane usage for the kiln on an annual basis is 210,600 gallons per year. The burner exhaust is vented through a stack to the atmosphere separate from the kiln drum stack. The exhaust from the kiln drum passes through a carbon adsorption bed, where any mercury is adsorbed onto iodine or sulfur impregnated activated carbon before being emitted through a stack into the atmosphere. WMMI installed an additional carbon adsorption bed after the existing carbon adsorption bed. The kiln carbon adsorption bed is manufactured by Kappes, Cassiday & Associates. The kiln carbon bed has a flow rate

of 206 CFM, an outlet temperature of 250°F, and 6 trays each with 400 pounds of iodine or sulfur impregnated activated carbon.

Refinery Process

Once the gold is desorbed from the carbon with the NaOH strip, the gold-bearing solution is sent to the electrowinning plating process. Electrowinning cells remove the gold from the solution, plating the metal onto cathodes consisting of stainless steel plates with steel wool. The gold is plated onto the cathodes, washed off, and then transferred to either the retort or electric oven for drying. The electrowinning cells system was manufactured by Kappes, Cassiday & Associates (KCA), Model No. EC-16SS-SLD. The daily hours of operation for the electrowinning cells are 24 hours per day, 8,760 hours per year.

The gold sludge is manually recovered from the electrowinning cells in the Reverse/Osmosis (R/O) Water Wash Bay. The Wash Bay is used to pressure wash the steel wool on the cathodes to loosen and remove the gold. The removed gold material is then place into a canvas bag which will be either transferred to the retort, or the existing electric oven for drying. The electric drying oven is a Lindberg Model 60-PR-1, which operates intermittently at the refinery. After the gold material goes through the drying oven, it may be packaged and sent off site for additional refining.

The wet gold concentrate from the R/O Water Wash Bay is retorted to remove mercury and then refined in the existing furnace. The gold concentrate is loaded into the retort, where it is heated under vacuum to drive off the mercury. The retort exhaust passes through a shell and tube condenser to cool the exhaust and condense the vapor mercury into a liquid, which is collected by the mercury trap. The exhaust passes through the existing carbon adsorption column, which is packed with 50 pounds of iodine or sulfur impregnated activated carbon to absorb any remaining vapor mercury, where any remaining vapor mercury is adsorbed onto the iodine or sulfur impregnated activated carbon before being emitted, through a stack, into the atmosphere. WMMI installed an additional carbon adsorption column after the existing carbon adsorption column. The carbon adsorption column was manufactured by Kappes, Cassiday & Associates. The retort carbon column will have a flow rate of 24 cubic feet per minute (CFM), an outlet temperature of 103°F, and be loaded with 151 pounds of iodine or sulfur impregnated activated carbon.

After retorting, the gold concentrate is transferred to the electric induction furnace. Only retorted concentrate may be melted in the furnace. The furnace is an Inducto Therm Corp gold electric induction furnace, Model No. 750, with a design capacity of 0.0533 tons of wet gold concentrate per hour. WMMI is proposing an operating schedule of 24 hours per day and 365 days per year. The gold furnace exhaust is routed through an existing baghouse system to abate particulate emissions, with an abatement capacity of 95 percent. The melt is then poured into a cascade mold, and after solidification sludge impurities are separated from the gold doré.

The carbon kiln, electrowinning cells, electric drying oven, and gold furnace remain subject to 40 CFR Part 63, Subpart 7E; however, with the installation of the mercury retort, the affected sources (including the existing and proposed carbon adsorption units) are now classified as "*existing carbon processes with mercury retorts*."

Air Emissions

Superior Aztec Boiler

Emissions from the existing Superior Aztec Boiler will remain unaffected in this proposed modification. The boiler has the potential to operate 24 hours per day, fueled with liquid propane gas, but is limited to an Annual Capacity Factor (ACF) of no greater than 30%. In complying with the 30% ACF limit, daily emissions are based on a potential capacity of 32%, and annual emissions are based on a capacity of 15.92% (hourly emissions based on 100% due to start-up).

The air emissions are calculated using emission factors from US EPA's AP-42, Section 1.5 - Liquid Petroleum Gas Combustion, except for the factors used for NOx and SO_2 emissions. The NOx emission factor is based on the highest emission rate result from the source test conducted in October 2014, whereas the SO_2 emission factor is based on the sulfur concentration supplied by the fuel supplier (185 ppmw). This source test was conducted after the installation of the Cleaver Brooks low-NOx burner. The boiler is rated at 10.5 MMbtu/hr on LPG fuel, and LPG fuel has a value of 91,500 btu/gal. Therefore, the boiler will consume 114.8 gal/hr of LPG fuel and 881.7 gal/day.

Table 1 : Superior Boiler Potential to Emit (PTE)

UNIT	VOC	CO	NOx	PM10 *	SO_2
Emission Factors (lb/10^3 gal)	0.8	7.5	5.45	0.7	1.79
Superior Boiler 10.5 MMBtu (lbs/hr)	0.092	0.861	0.625	0.080	0.205
Daily PTE, lb/day (@32% capacity)	0.705	6.61	4.80	0.617	1.58
Yearly PTE, tons/yr (@15.92% capacity)	0.064	0.600	0.436	0.056	0.143

*This factor is for Total PM emissions; therefore assumption is made that PM equals PM10.

Carbon Regeneration Kiln

Emissions from the Carbon Regeneration Kiln will remain unaffected in this proposed modification. WMMI utilizes a Carbon Regeneration Kiln unit that is propane fired, with a capacity of 2.2 MMBTU per hour. The usage rate of the unit is set at 24.04 gallons of propane per hour, based on an LPG heat input of 91,500 BTU per gallon. The operating schedule will remain unchanged at 24 hr/day for 8,760 hr/yr.

The combustion air emissions are calculated using emission factors from US EPA's AP-42, Section 1.5 - Liquid Petroleum Gas Combustion, except for the SO_2 emission factor. The SO_2 emission factor is based on the sulfur concentration supplied by the fuel supplier.

Table 2 : Carbon Kiln Combustion PTE

UNIT	VOC	CO	NOx	PM10 *	SO_2
Emission Factors (lb/10^3 gal)	0.8	7.5	13.0	0.7	1.79
Carbon Kiln - 2.2 MMBtu, lb/hr	0.019	0.180	0.313	0.017	0.043
Daily PTE, lb/day	0.462	4.33	7.50	0.404	1.03
Yearly PTE, tons/yr	0.084	0.790	1.367	0.074	0.188

*This factor is for Total PM emissions; therefore assumption is made that PM equals PM10.

The carbon regeneration kiln drum is heated from the outside. The PTE for the kiln drum is based on the drum with carbon only and results in PM10 emissions. The PTE is based on the results from the source test for the emissions unit, which was conducted in November 2014 using a throughput rate for this process of 232.6 lbs of carbon per hour, and resulting in a PM10 emission factor of 0.203 lbs/hr. In order to properly calculate the PTE for this emissions source, it is assumed that the maximum throughput rate is 450.0 lbs of carbon per hour, resulting in a maximum PM10 emission factor of 0.392 lb/hr. The kiln drum PTE will remain the same as what is currently permitted, with an operating schedule of 24 hr/day for 365 days/yr (8,760 hr/yr).

Table 3 : Carbon Kiln Drum PTE

Emissions Source	Lb/hr	Lb/day	Tons/yr
Kiln Drum, PM10 emissions	0.392	9.40	1.716

Carbon Regeneration Acid Wash Emissions (Now Exempt)

Air emissions from the carbon acid wash tank and the hydrochloric acid/water mix tank are exhausted to the atmosphere through one shared stack. The exhaust fan that used to be installed and operated in this process was previously removed from service as it was an obsolete device. The PTE for hydrogen chloride (HCl) emissions below is based on the emissions from both of these tanks. The concentrated 36% hydrochloric acid (HCl) solution is mixed with water to about 1% HCl. The HCl vapor pressure at a maximum ambient temperature of 122°F is estimated to be 0.0007 mm Hg, based on Perry's Chemical Engineers' Handbook, 8th Edition (Table 2-12). Ideal gas law at 122°F (50°C) is 424 ft^3/lb-mole. The air flow out of the atmospheric vent is assumed to be the same as the volume of the liquid recirculation rate of 120 gpm (16 cfm), and the maximum operating schedule for the vent is 6 hours per day and 1,095 hours per year. The HCl emissions are presented below, using the aforementioned potential air flow and operating schedule:

$$\frac{\text{HCl emissions lbs}}{\text{year}} = \frac{(0.0007 \text{ mm Hg})(16 \text{ cfm})(36.46 \text{ lbs HCl/lb-mole})(60 \text{ min/hr})(1{,}095 \text{ hrs/yr})}{(760 \text{ mm Hg})(424 \text{ ft}^3\text{/lb-mole})}$$

HCl emissions = 0.083 lbs/yr (0.000041628 tons/yr); 0.00045 lbs/day

Because of this reduced HCl PTE from the atmospheric vent/stack of the carbon/acid wash tank and the acid mix tank, the stack has been deemed exempt as an emission source of the process plant, and in turn exempted from permit requirements of the Air District. As a result, this minute quantity of emissions is not considered when looking at the overall PTE of the process plant and the entire WMMI gold mine facility.

HCl Trans-loading Emissions

Air emissions from the existing Hydrochloric Acid (HCl) storage tank system will remain unchanged and were calculated by Sherer Consulting Services, Inc. (SCS) and confirmed by Air District Staff in the ATC/PTO 4005A-5 permit review. The assumptions used in calculating the potential to emit are based on a conservative approach, as the ambient temperature selected is very high (122°F) and the tank is assumed to be empty, which results in a fill of up to 6,500 gallons. The below assumptions are used to calculate the maximum pounds per day (one complete fill) of hydrogen chloride (HCl) emissions from the filling operations using a pump to transfer 36% hydrochloric acid from the tanker truck to the tank. The 9,000 gallon 36% HCl tank is assumed to be filled a maximum of once per day from the 6,500 gallon tanker truck. The displaced volume of 6,500 gallons is at maximum HCl vapor pressure of 36% hydrochloric acid at 122°F.

Maximum volume filled into tank from truck: 6,500 gallons (869 ft^3)

Highest temperature: 122°F (50°C)

Vapor pressure of hydrogen chloride above 36% hydrochloric acid at 50°C: 535 mm Hg (Perry's Chemical Engineer's Handbook, 8th Edition, Table 2-12)

Ideal gas law at 50°C: 424 ft^3/lb-mole

$$\text{Daily HCl emissions} = \frac{(535 \text{ mm Hg})(869 \text{ ft}^3)(36.46 \text{ lbs HCl/lb-mole})}{(760 \text{ mmHg})(424 \text{ ft}^3\text{/lb-mole})}$$

Daily HCl PTE = **52.60 lbs**

Annual HCl emissions = (52.60 lbs HCl)(70,000 gallons/6,500 gallons)

Annual HCl PTE = 566.49 lbs/yr (0.283 tons/yr)

Gold Electric Induction Furnace

Last permit modification included a request by the applicant to remove the 6 hr/day operation limit on the furnace and re-permit it at its design capacity of 24 hours per day. The gold furnace at the mine's process refinery is electric, and therefore no fuel-burning emissions are produced. The measured amount of particulate collected in the baghouse during the 2011 operating year was estimated to be 30 pounds, with an estimated 8 tons per year of wet concentrate generated. The baghouse particulate removal efficiency is estimated to be 95%. Based on this, the PM10 emission factor is as follows:

Lbs of PM10/ton wet concentrate = ((30 lbs/yr / 0.95)(0.05) / (8 tons/yr wet concentrate)
Lbs of PM10/ton wet concentrate = 0.20

The design capacity of the furnace is 0.0533 tons of wet concentrate per hour. At an operating schedule of 24 hr/day for 365 day/yr, the gold furnace PTE is as follows;

Daily PM10 PTE = 0.0533 (ton wet concentrate/hr) X (0.20 lbs PM10/ton wet concentrate) x 24 (hr/day)
= 0.257 lbs PM10/day

Annual PM10 PTE = 0.257 lbs PM10/yr X 365 days/yr
= 93.81 lb PM10 / 2,000 lbs/ton
= 0.0469 tons PM10/yr.

Electrowinning Process

The electrowinning process uses hot caustic strip with sodium hydroxide solution to remove gold cyanide from carbon and run this solution through the electrowinning operation to remove the gold. Hydrogen cyanide (HCN) and ammonia (NH3) are potentially created as a result and emitted at very low mass rate, even though the solution has a high pH. The potential to emit for HCN and NH3 has been calculated in a previous permit review by SCS and was included in the existing Title V Permit for Mesquite Mine's process and refinery plant. The operating schedule for the electrowinning cells is 24 hours per day, for 365 days per year. A conservatively high emission rate of HCN of 2.03E-6 grams/liter/hour was used to project the annual HCN emissions based on the electrowinning solution flow at Mesquite Mine. The NH3 emission factor of 0.223 lbs/hr is based on a single stack source test that was conducted in 2012, and previously referenced in the submitted WMMI AB2588 Emission Inventory Plan Report, dated March 9, 2012 (revised edition). The process at Mesquite Mine currently operates a caustic solution flow of 90 to 105 gallons per minute (gpm). The theoretical maximum electrowinning caustic solution flow WMMI has proposed is 180 gpm, and this figure has been used to estimate the PTE for HCN and NH3 emissions below.

<u>HCN Emissions</u>

Annual HCN PTE (lbs/yr) = (0.000002025 g/l/hour)(180 gpm)(3.785 l/gal)(60 min/hr)(8,760hours/yr)(lb/453.592 g)

Annual HCN PTE = **1.60 lbs of HCN/yr (0.0008 tons/yr)**

Daily HCN PTE = (1.60 lbs of HCN/yr) / (365 days/yr)

Daily HCN PTE = **0.00438 lbs/day**

NH3 Emissions

Annual NH3 PTE = (0.223 lbs/hr)(8,760 hr/yr)

Annual NH3 PTE = **1,953.48 lbs/yr (0.977 tons/yr)**

Daily NH3 PTE = (0.223 lbs/hr)(24 hours)

Daily NH3 PTE = 5.352 lbs/day

Mercury Emissions

Mercury emissions for the existing carbon process with mercury retort from the NESHAP Subpart 7E – affected sources are limited to 2.2 pounds per ton of concentrate per 40 CFR 63.11645(b). WMMI began processing carbon from a sister mine, which was calculated to contain higher levels of mercury, therefore additional adsorption controls were added to control mercury emissions. Actual source test data shows WMMI operating without the GIF carbon adsorption column and meeting the 2.2lb/ton NESHAP mercury limit. The 2021 GIF test was conducted with Castle Mountain concentrate. Current operations showed no difference in facility-wide emissions whether running Castle Mountain or Mesquite Mine concentrate through the GIF. The potential to emit (PTE) was calculated in the previous permit review for criteria and non-criteria pollutants. The gold refinery plant will continue to comply with PTE described in the previous application. WMMI will continue to conduct annual mercury compliance emission tests to demonstrate compliance with the carbon process with mercury retorts emission standard of 2.2 pounds of mercury per ton concentrate processed.

Potential To Emit (PTE)

Process and Refinery Plant

Table 4: Daily Plant Emissions (lb/day)

Emission Source	PM10	VOC	CO	NOx	SO_2	HCl	HCN	NH3	Hg
Superior Aztec Boiler	0.617	0.705	6.61	4.80	1.58	0.00	0.00	0.00	0.00
Carbon Kiln – Combustion	0.404	0.462	4.33	7.50	1.03	0.00	0.00	0.00	0.00
Carbon Kiln – Drum	9.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.02E-4
36% HCl Storage Tank	0.00	0.00	0.00	0.00	0.00	52.60	0.00	0.00	0.00
Mercury Retort	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.53E-5
Gold Furnace	0.257	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.94E-4
Electrowinning Cells	0.00	0.00	0.00	0.00	0.00	0.00	0.0044	5.352	1.29E-3
Drying Oven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.9E-5
Total:	**10.80**	**1.167**	**10.94**	**12.30**	**2.61**	**52.60**	**0.0044**	**5.352**	**2.04E-3**

Table 5: Annual Plant Emissions (tons/yr)

Emission Source	PM10	VOC	CO	NOx	SO_2	HCl	HCN	NH3	Hg
Superior Aztec Boiler	0.056	0.064	0.600	0.436	0.143	0.00	0.00	0.00	0.00
Carbon Kiln – Combustion	0.074	0.084	0.790	1.367	0.188	0.00	0.00	0.00	0.00
Carbon Kiln – Drum	1.716	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.76E-3
36% HCl Storage Tank	0.00	0.00	0.00	0.00	0.00	0.283	0.00	0.00	0.00
Mercury Retort	0.0219	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.05E-5
Gold Furnace	0.0469	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.25E-5
Electrowinning Cells	0.00	0.00	0.00	0.00	0.00	0.00	0.0008	0.98	4.44E-3
Drying Oven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.6E-7
Total:	**1.91**	**0.15**	**1.39**	**1.80**	**0.33**	**0.28**	**0.001**	**0.98**	**6.26E-3**

Applicable Rules and Regulations

The following section summarizes the Air District Rules and Regulations which are applicable to the emissions units and emissions control systems of Mesquite Mine's process plant and refinery and the submitted permit application for the proposed equipment modification of Permit 4005.

Rule 201 Permits Required

Except as exempted within the Air District Rules and Regulations, new or modified sources which may emit or control air contaminants must obtain written authorization from the ICAPCD prior to construction. The various emissions sources of the mine's process plant and refinery emit air contaminants, and as such WMMI's proposed equipment modification requires the submittal of a permit application in order to obtain an Authority to Construct and Permit to Operate from the Air District for the project.

Rule 206 Processing of Applications

This Rule contains the guidelines established by the APCD for the processing of applications and issuance of permits. This proposed project is classified as a discretionary permit project, and will be processed according to the procedures of Rule 206. Due to the fact that the existing source's (Mesquite Mine's) daily PTE for NOx and PM10 emissions continues to be greater than 100 pounds per day, the Air District will fulfill the public notice and review requirements of Rule 206 for discretionary permits.

Rule 207 New and Modified Stationary Source Review

Rule 207 provides preconstruction review requirements for new and modified stationary sources to ensure that the operation of such sources do not interfere with the attainment or maintenance of ambient air quality standards.

Rule 207.C.1.a requires Best Available Control Technology (BACT) for equipment with the potential to emit 25 pounds per day or more of any nonattainment pollutant or their precursors. Based on a review of the permit application for the proposed project, BACT is not triggered since the emissions on the modified units are below 25 lbs/day.

Rule 207.C.2.a requires that any new or modified emission source with a potential to emit (PTE) greater than 137 lb/day for ROCs, PM_{10}, NO_x or SO_x emissions be offset by the permittee. The proposed modification to this permit will not result in an increase to the PTE for PM10 emissions at the Mesquite Mine facility, which is a permitted stationary source.

Rule 208 Permit to Operate

The ICAPCD may inspect and evaluate the new equipment prior to allowing the project to operate under its Permit to Operate. The permittee is aware of this requirement and is expected to fully comply so that a PTO may be issued upon confirmation of compliance.

Rule 400.2 Boilers, Process Heaters and Steam Generators

This rule applies to the process plant's Superior boiler, due to the fact that the emissions unit is an existing boiler with a heat input rating greater than or equal to 5 million British Thermal Units per hour (MMBtu/hr), establishing NOx emission limits for the unit. The facility's boiler is currently subject to the NOx emission limit concentration of 70 ppmv, since the permittee previously accepted an annual capacity factor (ACF) limit of 30% or less. WMMI has continuously demonstrated compliance with this emission limit in source tests in recent years since the permittee installed a low-NOx burner to the boiler. The most recent and successful source test of the emissions unit was completed in September 2019.

Rule 401 Opacity of Emissions

The opacity of the emissions for the emission units of the WMMI proposed project, other than uncombined water vapor, may not be as dark or darker as designated as No. 1 on the Ringlemann Chart (20% opacity) for a period or periods aggregating more than three minutes in any one hour. The Permittee will comply with this Rule by utilizing best operating and maintenance practices.

Rule 407 Nuisances

This rule prohibits the discharge from any source air contaminants which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, which endanger the comfort, repose, health or safety of any such persons or the public, or which cause or have a natural tendency to cause injury or damage to business or property. The permittee will be required to comply with this rule at all times that any of the emissions units at the process plant and refinery are operating.

Regulation VIII Fugitive Dust (PM10) Rules

The Air District Rules under Regulation VIII include requirements and Best Available Control Measures (BACM) which operators must implement in order to reduce fugitive dust emissions from construction and earthmoving activities, open areas, movement of bulk materials, carry out and track out activities, and paved and unpaved roads. The permittee will continue to comply with the applicable Regulation VIII rules for mitigating fugitive dust emissions.

CA Health & Safety Code 42301.6

Prior to approving an application for an ATC or modification of a source which emits hazardous air contaminants located within 1,000 feet from the outer boundary of a school site, the Air Pollution Control Officer (APCO) will prepare a public notice in which the proposed project or modification is fully described. The proposed project includes various emissions sources in the mine's process plant and refinery which emit pollutants identified as toxic air contaminants (TACs) by the Air Resources Board (ARB). Previous CA H&SC evaluations of the Mesquite Mine facility, which is where the proposed equipment

modification will be occurring, have been carried out by Air District Staff. Through the analysis of online maps of the County of Imperial, it was verified by Staff that the closest school site to Mesquite Mine is located within the city limits of Brawley, CA, which is over 20 miles away. Since no other school sites in the region have opened up since the last Air District evaluation, WMMI is deemed to be in compliance with CA H&SC Sec. 42301.6, and no further action is required by the permittee.

AB2588 Assessment

The Air Toxics "Hot Spots" Information and Assessment Act (AB 2588) requires toxic emissions from stationary sources be quantified and complied into an inventory according to criteria and guidelines developed by the California Air Resources Board (CARB), and that each facility be prioritized to determine whether a risk assessment must be conducted. In order to streamline the evaluation of stationary sources potentially subject to the AB 2588 "Hot Spots" Program, screening risk assessment tables have been developed to estimate overall facility risk.

Screening risk assessment for mercury emissions from the Process and Refinery Plant operation have been calculated using a Screening HRA tool provided by San Joaquin Valley APCD. The hourly and yearly potential Mercury emissions from tables 6 and 7 above were considered in the screening. The nearest receptor from the source of emissions is the commercial center located around Glamis Beach Store in Glamis, CA, which is over 6.0 miles southwest from Mesquite Mine. The resulting risk score from the mercury emissions from the Process and Refinery Plant is less than 1.0. Since the risk score is below 10.0, no further detailed risk analysis will be required of the applicant.

Authority to Construct and Permit to Operate Conditions

A. General Conditions

1. Operation of this equipment shall be in compliance with all data and specifications submitted with the application under which this permit is issued unless otherwise noted in this document.

2. Operation of the described equipment shall be in compliance with all applicable APCD Rules and Regulations.

3. This Permit does not authorize the emissions of air contaminants in excess of those allowed by U.S. EPA (Title 40 of the Code of Federal Regulations), the State of California Division 26, Part 4, Chapter 3 of the Health and Safety Code, or the APCD (Rules and Regulations).

4. This permit cannot be considered permission to violate applicable existing laws, regulations, rules, or statutes of other governmental agencies.

5. Emission sources, whether they are new or modified, will require the submittal of a permit application and amendment of this permit.

6. Opacity of emissions from any transfer or exhaust point, as well as any other area within the facility, shall not exceed 20% for a period or periods aggregating more than three minutes in any one hour, unless noted otherwise.

7. All listed units shall be maintained and kept in good working conditions at all times.

B. Hydrochloric Acid Trans-loading

1. No air contaminant shall be released into the atmosphere which causes a public nuisance.

2. All trans-loading equipment shall be maintained in good operating conditions and shall be operated in a manner to minimize emissions of air contaminants into the atmosphere.

3. The mechanical pump system, including the caustic bubbler, shall operate at all times during the transfer of hydrochloric acid from the delivery truck to the trans-loading tank.

4. The caustic bubbler must utilize a sparger system as hydrogen chloride (HCl) emissions are treated.

5. The pH of the caustic solution in the caustic bubbler unit shall be kept at a minimum of 8.0 at all times.

6. All hydrochloric acid receiving, storage and usage activities shall be limited to a maximum concentration of 36 wt% hydrochloric acid.

7. No more than 6,500 gallons of 36% hydrochloric acid per day shall be transferred to the listed hydrochloric acid storage tank.

8. No more than 70,000 gallons of 36% hydrochloric acid per year shall be transferred to the listed hydrochloric acid storage tank.

9. The 36% hydrochloric acid shall be diluted to a maximum concentration of 1% hydrochloric acid for use in the listed carbon acid wash tank.

C. Carbon Processes With Mercury Retorts

1. The carbon granules shall be batch washed before carbon kiln regeneration.

2. The maximum amount of wet concentrate processed shall be 26.8 tons per year.

3. The listed Carbon Regeneration Kiln shall not operate its burner for more than 8,760 hours per year.

4. The listed Gold Electric Induction Furnace is permitted to operate 24 hours per day.

5. The listed Gold Electric Induction Furnace is permitted to operate 8,760 hours per year.

6. The electrowinning solution flow at the facility shall not exceed 180 gallons per minute.

7. The permittee shall vent the carbon regeneration drum exhaust at all times to the listed activated carbon bed.

8. The listed Electrowinning Carbon Column shall operate at all times during which the electrowinning cells system is operating.

9. The listed Mercury Retort shall process all gold concentrate prior to that gold concentrate being melted in the listed gold induction furnace.

10. The permittee shall vent the Mercury Retort exhaust at all times to the listed Mercury Vapor Carbon Adsorption Column.

11. The permittee shall conduct an initial sampling of the carbon in each listed carbon abatement unit for mercury ninety (90) days after the replacement of the carbon. A representative sample must be collected from the inlet and outlet of each carbon unit and analyzed using SW–846 Method 7471B. After the initial sampling, each carbon abatement unit must be sampled and analyzed for mercury on a quarterly basis.

12. For each carbon abatement unit, once carbon loading reaches 50 percent of the design capacity, which is calculated by averaging the carbon loading from the inlet and outlet measurements of each abatement unit, monthly sampling must be performed until 90 percent of the carbon loading capacity is reached.

13. For each carbon abatement unit, carbon must be removed and replaced with fresh carbon no later than 30 days after reaching 90 percent of the carbon loading capacity. The permittee shall notify the Air District of the carbon replacement within 30 days after the date of installation.

D. Superior Aztec Boiler

1. The listed Superior Aztec boiler shall not exceed the total annual fuel usage rate of 160,000 gallons per year (14,640 MMBtu per year).

2. The listed Superior Aztec boiler stack shall not emit NOx emissions in excess of the following at 3% O2:

ACFcu ≤ 30%	ppmv
Gaseous Fuel	70
Liquid Fuel	70

3. The Superior Aztec boiler shall be exempt from the NOx emission limit stated in Condition D.2 only during periods of start-up, shutdown, or a change in load when bringing the combustion process up to operating levels.

4. Western Mesquite Mine shall conduct a source test on the Superior Aztec Boiler at 80% capacity to determine compliance with the NOx emission limitation of Condition D.2. If the permittee demonstrates to the satisfaction to the APCO that this equipment cannot operate at 80% capacity, then the emission source test shall be performed at the highest achievable continuing rating. The Permittee shall submit for approval a source test protocol 30 days before commencing stack testing. Compliance with the NOx emission limits shall be determined using United States Environmental Protection Agency (U.S. EPA) Method 7, 7A, 7C, 7E, California Air Resources Board (CARB) Method 100, or any other applicable U.S. EPA approved test method.

5. A fuel flow meter shall be installed to measure fuel consumption of the Superior Aztec Boiler. The fuel flow meter shall be kept in good working condition.

E. Recordkeeping & Reporting

1. An operations log shall be maintained showing the daily hours of operation and maintenance and repairs for the following emissions units and abatement systems:

   a. carbon regeneration kiln;
   b. activated carbon bed;
   c. gold electric induction furnace;
   d. electrowinning cells system;
   e. electrowinning carbon column.
   f. mercury retort system;
   g. mercury vapor carbon adsorption column
   h. three carbon adsorption scrubbers

2. An operations log shall be maintained on the premises showing the daily fuel consumption of the Superior Aztec Boiler. This log shall be made available to the ICAPCD upon request.

3. An operations log shall be maintained on the premises showing the daily throughput of 36% hydrochloric acid to the listed hydrochloric acid storage tank.

4. The pH of the caustic solution in the caustic bubbler shall be measured every day. A log shall be maintained which displays the daily pH readings of the caustic solution, with readings dating back to the preceding calendar year.

5. Permittee shall annually submit to the Air District a report containing the HCl monthly throughput from the preceding calendar year. This report shall be submitted to the ICAPCD by the end of February of each operating year

6. Permittee shall submit to the ICAPCD by the end of February of each operating year an annual report containing the monthly fuel consumption (if applicable) and hours operated per month for the following emissions units:

   a. gold electric induction furnace;
   b. electrowinning cells system;
   c. Superior Aztec boiler;
   d. carbon regeneration kiln.
   e. mercury retort system.

7. Permittee shall submit to the ICAPCD by the end of February of each operating year an annual report containing the following information:
   a. The total monthly amount of wet concentrate processed;
   b. The total monthly amount of electrowinning cells solution flow;

F. Offsets

1. Prior to the issuance of a Permit to Operate (PTO), Western Mesquite Mines, Inc. (WMMI) shall relinquish ICAPCD PM10 Stationary Emission Reduction Credits (ERCs) equal to the amount of 1.68 tons. WMMI shall have the option of satisfying this offset requirement by relinquishing 2.80 tons of ICAPCD Agricultural PM10 ERCs prior to the issuance of a PTO, and prior to the start of each subsequent operating year.

Equipment List

1. (1) 36% Hydrochloric Acid Storage Tank, with a 9,000 gallon capacity and 12 foot diameter. The tank's delivery system is driven by a 100 gpm HCl mechanical pump.

2. (1) Hydrochloric Acid/Water Mix Tank, with a 5,000 gallon capacity and 8 foot diameter.

3. (1) Carbon Acid Wash Tank, capable of containing up to 16,000 pounds of carbon and 1% hydrochloric acid.

4. (1) Superior Aztec Boiler Model No. 5-5-1276, propane fired, with a 10.5 MMBTU/hr capacity. The boiler has a Cleaver Brooks ProFire Model NTH105GX-15S-4 low NOx burner.

5. (1) Electrowinning cells system, manufactured by Kappes, Cassiday & Associates (KCA), Model No. EC-16SS-SLD.

6. (1) Electrowinning Carbon Column, serving the Electrowinning cells system, consisting of a column that is filled with an activated carbon/iodine impregnated-activated carbon blend.

7. (1) Carbon Regeneration Kiln, propane fired, with a 2.2 MMBTU/hour capacity (Refurbished Rabbit Creek Mining Inc.).

8. (1) 1st Mercury Carbon Adsorption Bed/Scrubber, processing the exhaust from the carbon regenerating kiln. The system consists of a single unit divided into a series of six iodine (or sulfur) impregnated activated carbon chambers.

9. (1) 2nd Mercury Carbon Adsorption Bed/Scrubber, manufactured by Kappes, Cassiday & Associates, processing the exhaust from the carbon regenerating kiln. The carbon adsorption bed/scrubber has six trays each with 400 lbs (2,400 lbs total) of iodine (or sulfur) impregnated activated carbon.

10. (1) Mercury Retort, manufactured by Summit Valley Equipment & Engineering, Model 7.5MR1E. The unit has a material capacity of 7.5 cubic feet.

11. (1) 1st Mercury Vapor Carbon Adsorption Column, processing the exhaust from two (2) shell and tube condensers which serve the mercury retort system. The column is filled with 50 lb. of an iodine (or sulfur) impregnated activated carbon.

12. (1) 2nd Mercury Vapor Carbon Adsorption Column/Scrubber, manufactured by Kappes, Cassiday & Associates, processing the exhaust from two (2) shell and tube condensers which serve the mercury retort system. The column is filled with 151 lbs. of an iodine (or sulfur) impregnated activated carbon.

13. (1) Inducto Therm Corp gold electric induction furnace, Model No. 750, with a serial number of 07J-224214-335-11.

14. (1) Gold Furnace Baghouse, manufactured by Eastern Control Systems, Inc., Model 360-10. The unit has an air capacity of 4,000 scfm.

15. (1) Wet Concentrate electric drying oven, manufactured by Lindberg, Model 60-PR-1, with an exhaust vent with a maximum flow rate of 50 scfm.

Insignificant/Other Sources

1. (1) Laboratory Vacuum System serving the following equipment: (1) Jaw Crusher, (1) Roll Crusher, and (1) Splitter.

2. (1) Laboratory Baghouse serving (2) Pulverizers.

3. (1) Donaldson Torit Filter, serving the Laboratory Flux Mix Table.

4. (1) Carbon Regeneration Acid Wash Vent, which serves the hydrochloric acid/water mix tank and the carbon acid wash tank.

Recommendations

Per the requirements of Air District Rule 206.C, this permit application is being processed as a Discretionary Permit since the current potential to emit (PTE) for PM10 and NOx emissions of the gold mine facility is each greater than 100 pounds per day. Once the public review period has been completed the Air District will issue an Authority to Construct (ATC) permit.

2023 Permit Fees

Rule 302, Schedule 2. Fuel Burning Equipment Schedule

Superior Aztec Boiler rated @ 10.5 MMBtu/hr
(5,000 or greater but less than 15,000 x 1000 BTU/hr) = $4,092.50

Carbon Kiln rated @ 2.2 MMBtu/hr
(1,500 or greater but less than 2,500 x 1000 BTU/hr) = $2,042.50

Rule 302, Schedule 4 – Stationary Container Schedule

HCl Storage Tank (9,000 gal. capacity)

Greater than 5,000 but less than 20,000 (gallons) = $358.00

Hydrochloric Acid/Water Mix Tank (5,000 gal. capacity)

Up to and including 5,000 (gallons) = $207.00

Rule 302, Schedule 9 – Miscellaneous Schedule

Electrowinning Carbon Column

($213.00 x 1 unit) = $213.00

Carbon Regeneration Kiln Carbon Bed

($213.00 x 1 unit) = $213.00

Mercury Retort

($213.00 x 1 unit) = $213.00

Mercury Retort Carbon Column

($213.00 x 1 unit) = $213.00

2nd Carbon Regeneration Kiln Carbon Adsorption Bed/Scrubber

($213.00 x 1 unit) = $213.00

2nd Retort Carbon Adsorption Column/Scrubber

($213.00 x 1 unit) = $213.00

Total Fees 2023 = $ 7,978.00