

<b>SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT</b>  <b>ENGINEERING AND COMPLIANCE DIVISION</b>  <b>PERMIT APPLICATION EVALUATION AND CALCULATIONS</b>	PAGES 5	PAGE 1
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**A/N 505349 PERMIT TO CONSTRUCT/OPERATE (New Construction)**

**A/N 505681 PERMIT TO OPERATE (Change of Condition)**

**Applicant's Name** Los Angeles County Sanitation Districts (LACSD)

**Mailing Address** 1955 Workman Mill Road  
Whittier, CA 90601

**Equipment Location** 24501 S. Figueroa Street  
Carson, CA 90745-6311

**Equipment Description**

**Application No. 505349, Facility ID 800236**

AIR POLLUTION CONTROL SYSTEM CONSISTING OF:

1. DOWN DRAFT TABLE, 5'-0" W. X 11'-8" L. X 2'-11" H.
2. TWO PORTABLE DUST COLLECTORS IN PARALLEL, MICRO AIR CLEAN AIR SYSTEMS, MODEL TM1000, EACH WITH TWO HEPA FILTERS AND TWO CARTRIDGE FILTERS, 1'-1" DIA. X 1'-4" L., WITH A REVERSE AIR CLEANING SYSTEM.
3. EXHAUST SYSTEM WITH A 1000 SCFM BLOWER FOR EACH DUST COLLECTOR VENTING STAINLESS STEEL PLASMA ARC CUTTING.

**Application No. 505681, Facility ID 800236**

PLASMA ARC CUTTER WITH POWER SUPPLY, MILLER, MODEL SPECTRUM 1250, SERIAL NO. KG123725, 20" L. X 22.5" W. X 38" H., 30-85 AMPERE INPUT, 200 - 575 VDC OUTPUT.

**Background/Process Description**

A/N 505349 was submitted on January 12, 2010 for a Permit to Construct/Operate for an air pollution control system to vent a plasma arc cutter under A/N 505681. A/N 505681 was submitted on January 22, 2010 as a Change of Condition (PO) application for a site specific plasma arc cutting system (A/N 479880, ID 800236) to include the use of the air pollution control system. The plasma arc cutter is to be used only for cutting stainless steel. The air pollution control system is to consist of a custom down draft table which is vented to two parallel dust collectors with HEPA filters.

The site is located at the Los Angeles County Sanitation Districts (LACSD) Joint Water Pollution Control Plant (JWPCP) at the address listed above. There is no school within 1000 feet of the equipment. The plasma arc cutter is used to make short cuts in only stainless steel for maintenance operations. Other types of metals will be cut with plasma arc cutters that are Rule 219 and therefore those plasma arc cutters will not be permitted. The air pollution control system consists of a downdraft table venting to two dust collectors/HEPA filters in parallel to vent the plasma arc cutter. The plasma arc process uses a high

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velocity ionized gas (air in this case) to cut the stainless steel. The plasma jet melts and blows out the metal in the cut generating metal fumes that contain alloy elements. Stainless steel alloys have high chromium and nickel content and the cutting fumes must be evaluated for risk under Rule 1401. The cuts are performed inside the west weld shop/maintenance building. The control equipment will operate a maximum of 24 hours/day, 7 days/week, 52 weeks/year.

Notice to Comply D25390 was issued on January 14, 2010 to show proof of valid permits for two ICEs (Permits D18850 & D18851) that were under facility ID 16576 and three APCs (Permits F92296, F92297, & F92298). Notice to Comply D25380 was issued on October 30, 2009 to monitor excavation as required by Section III of R1166 Plan #500428 and to sign Plan #500428.

### Calculations

The calculations are based on the process information provided by the applicant and summarized in the assumptions listed below. Risk is calculated from the emissions using current AQMD Toxics Unit methods. The weight of steel melted and displaced is estimated from the dimensions of the cut. Nickel and chromium in the resulting fumes are quantified using emission factors derived from source testing similar processes. The emission rates are calculated from the listed assumptions. An annual length cut limit will be determined that will be in compliance with all applicable rules.

#### Assumptions

Source	= material from applications 479880, 505349 & 505681
Process weight (PW)	= amount of material in cut
Stainless steel (ss)	= 15 wt% nickel, 20 wt% chromium, maximum
Operating time	= 6.5 hr/day, 7 day/week, 52 weeks/year (2,366 hours/year)
Max speed of cut (SOC)	= inches cut/hour
Max width of cut (WOC)	= 0.375 inch (ss)
Max thickness of cut (TOC)	= 1.75 inch (A/N 505682)
Steel density (P)	= 0.29 lbs/cubic inch (ci)

#### Emission Factors

Emission Factors and equations based on A/N 184446 by Marco Polo 5/1/91. Also see A/N 398253 for reference for calculations.

PM	= 0.12 (PW)
R1 (Cr)	= 0.33 (PW x wt%Cr)
R1 (Cr+6)	= 0.00022 (PW x wt%Cr)
R1 (Ni)	= PM x wt%Ni

PW (hourly)	= SOC x WOC x TOC x P
PW (annual)	= SOC x WOC x TOC x P x 2,366 hrs/year

The 2,366 hours per year operating schedule will be used for all yearly emission calculations.

#### Calculations

The following calculations will be used to determine that maximum potential cut length for stainless steel using the plasma arc cutter. Calculations will assume maximum toxic emissions to be in compliance. Rule 1303(b)(1) Modeling Requirement is the limiting PM10 emission rate:  $PM_{10} < 0.41$  lbs/hr. The Rule

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1401 emissions are the limiting requirement for this permit. Therefore maximum emissions to be in compliance will be evaluated.

### Emission Calculation

#### Hexavalent Chromium emissions

$$\begin{aligned}
 R2 &= 1.15E-5 \text{ lbs/hr} \\
 R1 &= 1.15E-5 \text{ lbs/hr} / [1 - (0.99_{\text{control}} \times 0.80_{\text{capture}})] \\
 &= 5.53E-5 \text{ lbs/hr} \\
 Cr+6 &= 0.00022 \times PW \times \text{wt\%Cr} \\
 PW &= 5.53E-5 \text{ lbs/hr} / 0.00022 / 0.20 \\
 &= 1.26 \text{ lbs/hr}
 \end{aligned}$$

#### Nickel emissions

$$\begin{aligned}
 Ni &= PM \times \text{wt\%Ni} \\
 PM &= PM10 \text{ emissions} \\
 PM_{(R1)} &= 0.12 \times PW \\
 &= 0.12 \times 1.26 \text{ lbs/hr} \\
 &= 0.15 \text{ lbs/hr} \\
 R1 &= 0.15 \text{ lb/hr} \times 0.15 \\
 &= 0.0225 \text{ lbs/hr} \\
 R2 &= 0.0225 \text{ lbs/hr} \times [1 - (0.99_{\text{control}} \times 0.80_{\text{capture}})] \\
 &= 0.00468 \text{ lbs/hr}
 \end{aligned}$$

#### PM/PM10 emissions

$$\begin{aligned}
 PM &= PM10 \text{ emissions} \\
 PM &= 0.12 \times PW \\
 R1 &= 0.12 \times 1.26 \text{ lbs/hr} \\
 &= 0.15 \text{ lbs/hr} && = 0.975 \text{ lbs/day} < 1.0 \text{ lb/day} \\
 R2 &= 0.15 \text{ lbs/hr} \times [1 - (0.99_{\text{control}} \times 0.80_{\text{capture}})] \\
 &= 0.03 \text{ lbs/hr} \\
 R2(\text{aver daily}) &= R2(PM) \text{ maximum monthly emission} / 30 \text{ days/month} \\
 &= 0.03 \text{ lbs/hr} \times 6.5 \text{ hr/day} \times 7 \text{ days/week} \times 4.33 \text{ weeks/month} / 30 \text{ days/month} \\
 NSR &= 0.20 \text{ lbs/day}
 \end{aligned}$$

#### PW(annual → hourly)

$$\begin{aligned}
 PW &= SOC \times WOC \times TOC \times P \\
 PW &= 1.26 \text{ lbs/hr} \\
 SOC &= 1.26 \text{ lbs/hr} / (0.375 \text{ in} \times 1.75 \text{ in} \times 0.29 \text{ lbs/ci}) \\
 &= 6.6 \text{ inches cut/hr} \\
 &= 6.6 \text{ inches cut/hr} \times 2,366 \text{ hours/year} = 15,615.6 \text{ inches cut/year} \sim \mathbf{1,301 \text{ feet cut/year}}
 \end{aligned}$$

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**Emissions Summary**

CONTAMINANT	LBS/HR		LBS/DAY	
	R1	R2	R1	R2
PM10	0.15	0.03	0.98	0.20
Nickel	0.0225	0.00468	0.18	0.0374
Hexavalent Chromium	5.53E-5	1.15E-5	4.42E-4	9.20E-5

**Toxic Risk Analysis**

Operating Schedule: 6.5hr/day, 7day/week, 52 weeks/year  
Source Type: Volume  
Area: 20,800 feet<sup>2</sup>  
Nearest Residential Receptor Distance: 1,550 ft. (473 m)  
Nearest Commercial Receptor Distance: 865 ft. (264 m)  
Building height: 41 feet (12.5 m)

Compound	Control Efficiency	MW (lbs/lbmole)	Outlet emission (lbs/hr)
Nickel	N/A	58.71	0.00468
Chromium, hexavalent	N/A	51.996	1.15E-5

Tier II analysis was used since the nearest receptor is greater than 25 meters in distance from the emission source. Tier II risk analysis was based on the outlet emissions listed in the above table. The MICR values are determined to be  $4.21 \times 10^{-7}$  for residential and  $7.55 \times 10^{-7}$  for commercial receptors. HIA and HIC were less than 1. Cancer Burden was less than 0.5.

**Ventilation calculations**

Q = air flow, 2000 cfm  
A = area of hood opening, 5 sq. feet (assume square opening)  
X = distance outward along the axis from hood, feet;  $x < [1.5 \times (A)^{1/2}] \rightarrow x < 3.35$  ft  
V = velocity at X distance from hood, 150 fpm  
X for a plain opening =  $\text{sqrt}[(Q/V - A) / 10]$  (Industrial Ventilation, 19<sup>th</sup> Edition)  
= 0.9 feet ~ 11 inches

Assume the distance of the cut from the hood is less than 11 inches.

**Rules Evaluation**

Rule 212: Rule 212 (c)(1)- There is no school within 1000 feet of the facility.  
Rule 212 (c)(2)- On-site emission increases do not exceed the following:  
Volatile Organic Compounds 30 lbs/day  
Nitrogen Oxides 40 lbs/day  
PM10 30 lbs/day

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Sulfur Dioxide 60 lbs/day  
Carbon Monoxide 220 lbs/day  
Lead 3 lbs/day  
Rule 212 (c)(3)(A)( i)- MICR is below 1 in a million.  
**Public Notice is not required.**

- Rule 401: Visible Emissions  
No violations are expected, limits are listed under Rule 401(b)(1).
- Rule 402: Nuisance  
Nuisance is not expected.
- Rule 404: Particulate Matter  
No violations are expected limits are listed under Rule 404 Table 404(a).
- Reg XIII: Rule 1303(a)(1)- Emission increases are less than one pound per day. BACT is not required.  
Rule 1303(b)(1)- PM10 is less than the allowable emission in Table A-1, no further analysis is required (1303 Appendix A).  
Rule 1303(b)(2)- Since the facility is an essential public service, any required offsets shall be provided through priority reserve.
- Rule 1401: Toxic Air Contaminants  
Rule 1401(d)(1)(A)- MICR less than  $1.0 \times 10^{-6}$  limit.  
Rule 1401(d)(1)(C)- Cancer burden is less than 0.5.  
Rule 1401(d)(2) and Rule 1401(d)(3)- HIC and HIA values are estimated to be less than 1 respectively.
- Rule 1401.1: Requirements for New and Relocated Facilities Near Schools  
Rule 1401.1(b)- Not applicable, since the facility is an existing facility.
- Reg. XXX: The modification of a plasma arc cutter and installation of an air pollution control system for the plasma arc cutter is considered a Title V De Minimis Significant permit revision under Rule 3000(b)(6), since the cumulative emission increases of non-RECLAIM pollutants or HAPs do not exceed the emissions in Table 5-4 of the Draft Title V TDG March 2005 and does not result in new or additional NSPS or NESHAP requirements and will be subject to an EPA review (Rule 3003(j)). A public notice is not required. Compliance is expected.

### **Conclusions & Recommendations**

The equipment is in compliance with the Rules and Regulations of the AQMD. A Permit to Construct/Operate is recommended for the air pollution control system dust collector A/N 505349 and Permit to Operate is recommended for the plasma cutter A/N 505682. For Permit Conditions please see Sample Permit. A revised Title V permit is recommended after EPA review.