City of Tucson - Operations Department
201 N. Stone Ave.
Tucson AZ 85701

Technical Support Document
Air Quality Permit Application
Permit Application 1845

March 19, 2002

1. Permit to be issued to

City of Tucson - Operations Department

201 N. Stone Ave
Tucson AZ 85701

2. Facility Location

4004 S. Park Avenue
Tucson AZ 85701

3. Completed

The Permit Application was completed on 4/13/95, and was deemed complete by default. A second Permit, #19, for the Suntran Facility adjacent was merged into this permit, and the entire facility was operating under the #1845 permit since 1995.

4. Main Equipment List

1. Diesel Generator, Model 3406, 500 HP
2. Natural Gas Boiler, 5.5MM BTU/Hr
3. Natural Gas Boiler, 5.5MM BTU/Hr
4. 10,000 Gal Unleaded Gas Tank

5. Description

This facility is the Operations Center for the City of Tucson. There are machine and carpentry shops, paintwork and printing facilities, but all are very small capacity. The bulk

of the auto body painting is sent out to contractors. The largest emitting units are a 500 HP Diesel Electric Emergency Generator, 2 Natural Gas fired boilers of 5.5 MM BTU input capacity, both on thermostat control, and a fuel filling station, throughput of 503,367 gallons per year. The only unit requiring a permit is the Diesel Generator set, with capacity greater than the 325 HP threshold value.

6.0 Emergency Generator Potential to Emit

Emission Factors are from Table 3.3-1 and Table 3.3-2 of AP-42.

PM-10 (.0022 lb/hp-hr)(8760/2000)(500hp) = 4.81 Tons
NOx (.031 lb/hp-hr)(8760/2000)(500hp) = 67.89 Tons
SOx (.00205 lb/hp-hr)(8760/2000)(500hp) = 4.49 Tons
CO (.00668 lb/hp-hr)(8760/2000)(500hp) = 14.63 Tons
VOC (.00251 lb/hp-hr)(8760/2000)(500hp) = 5.50 Tons
HAPS (2.438E-06 lb/hp-hr)(8760/2000)(500hp) = .0053 Tons

Potential Emissions from the two 5.5 MM BTU/Hr AJAX Boilers are very low, as shown on the calculation sheet. Each boiler can generate a maximum of 2.36 tons per year of NO_x. The 10,000 gallon Unleaded Fuel Storage Tank can generate 2.62 Tons per year of VOC emissions, and .29 Tons per year of HAPS. These emissions are all well below Permit Threshold Values.

From the results of the calculations above, this Emergency Generator Facility is classified as a True Minor Source.

7. Soil Vapor Extraction Project

Below ground at this facility there are several plumes of VOC and HAPS left over from leaking fuel storage tanks, and there is an ongoing program to extract the chemicals and clean up the ground water contamination. A portable unit is being used to pump recovered vapors from extraction wells, but the chemical concentrations are very low and do not require a permit. There is a project planned to begin another Vapor Extraction program in the next few months, but testing has not been completed to predict the chemical concentration of the contaminants that may be produced. The proposed extraction facility will be located on City of Tucson property across the street from the Tom Price Center. It has been determined that this is contiguous property, controlled by one owner, and so the new facility must be permitted under this same permit. At this point, the new soil extraction program will not be permitted. The Control Officer will await results from the testing to determine if threshold values of significant pollutants are exceeded. If so, a permit revision will be required for this permit, including both the existing SVR and the new SVR.

8. SO_2 Emissions

PCC 17.16.340.F limits the emission of SO_2 to 1.0 pounds per million BTU heat input, when burning low sulfur fuel. The definition of low sulfur fuel (17.04.340.A.118) is fuel oil

containing less than 0.90 percent by weight of sulfur. In the AP-42 Appendix A, page A-5, the heating value of Diesel Fuel is 137,000 BTU per gallon. So it takes 7.3 gallons of diesel to make 1 million BTU of heat input. Diesel weighs 7.05 lbs per gallon, so (7.05 lbs/gal X 7.3 gal =) 51.47 lbs of diesel will produce 1 million BTU. At 0.9% Sulfur, this 51.47 lbs of Diesel will contain (51.47 X .009 =) 0.46 lbs of Sulfur. This Sulfur will combine with Oxygen to form SO_2 in the following chemical equation:

$$S + O_2 = SO_2$$

$$0.46 \text{ lbs S} \times \frac{1 \text{lb Mole } SO_2}{1 \text{lb Mole S}} \times \frac{64 \text{ lbs } SO_2}{1 \text{ lb Mole } SO_2} \times \frac{1 \text{ lb Mole S}}{32 \text{ lbs S}} = 0.92 \text{ lbs } SO_2$$

Interpreting the above, a low sulfur fuel oil containing just less than 0.9% sulfur by weight, with a heating value of 137,000 BTU per gallon, will produce 0.92 lbs of SO_2 per million BTU of heat input. This is roughly 8% lower than the prescribed 1.0 pound SO_2 per million BTU (17.16.340.F). These values will range, in accordance with the tables in AP-42 from .84 lbs of SO_2 to .94 lbs of SO_2 per million BTU, if other similar fuels are used such as distillate or residual fuel oils.

9. Particulate Emissions. (17.16.340.C.1.)

Maximum allowable particulate emissions are regulated by the following formula:

$E = 1.02Q^{0.769}$

Where Q is the heat input in MM BTU and E is the maximum allowable particulate Emission in pounds-mass per hour.

For this emergency generator, output is 500 hp, equivalent to (500 X 2543.5) = 1.271 MM BTU. At 50% efficiency, the heat input would be 2.543 MM BTU.

The allowable Emissions would be:

$E = 1.02 \times (2.543)^{0.769}$

= 2.09 lbs-mass per hour.

The Potential to Emit for PM-10 is $\frac{4.18 Tons/Year \times 2000 lbs/Ton}{8760 Hours/Year}$ = 1.098 lbs/Hr

The Potential to Emit is significantly lower than the allowable emissions, so that testing for particulate emissions is really not necessary for this source.

At lower efficiency, the heat input would be a little higher, and the allowable emission

might then be higher. At 30% efficiency, the allowable emissions will be 3.10 lbs-mass per hour.

Efficiency may be monitored by fuel consumption. At 50% efficiency, the fuel consumption is about 18 gallons per hour. At 30% efficiency the fuel consumption will be about 30 gallons per hour.