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Technical Support Document
Cowley Management, LLC

Technical Support Document
Title V Permit
Silver Bar Mine Regional Landfill, Permit #V20682.000

1. BACKGROUND

A. Applicant

Cowley Management, LLC
Silver Bar Mine Regional Landfill
1243 East Jackson Street
Phoenix, AZ 85034

B. Project Location

This application was submitted by Cowley Management, LLC to permit a municipal solid waste landfill located on Sections 7, 8, 17 and 18, Township 3 South and Range 11 East, Florence, Arizona.

C. Attainment Classification

The landfill is located in an area designated non-attainment for PM_{10}.

2. AGENCY AUTHORITY

The Arizona Legislature granted the Pinal County Board of Supervisors authority to establish a program to permit certain sources of regulated air pollutants. Generally, see ARS §§49-470 *et seq.* (ARS Title 49, Chapter 3, Article 3.)

The Pinal County Board of Supervisors adopted a Code of Regulations, which among other things establishes such a program for permitting stationary sources. Generally, see the Pinal County Air Quality District Code of Regulations, as amended January 12, 2009.

In accord with A.R.S. §49-480, Pinal County's permit program constitutes a "unitary" program, with a permit conferring both authority to construct and authority to operate.

Under authority of CAA §110, the EPA has approved relevant portions of the Pinal County permitting program as an element of the Arizona SIP. In particular, see 61 Fed. Reg. 15717 (4/9/96). Among other things, that SIP-approval approved Pinal County minor new source review program. A separate EPA SIP-approval allows Pinal County to define federally enforceable permit limitations. See 60 Fed. Reg. 21440 (5/2/95).

Under authority of CAA §§501 *et seq.*, the EPA has conferred interim and final approval upon Pinal County's Title V permitting program. See 61 Fed. Reg. 55910 (10/30/96), 66 Fed. Reg. 48402 (9/20/01).

3. PROCESS DESCRIPTION

A. General Process

The Silver Bar Mine Regional Landfill will be operated solely as municipal solid waste landfill. The proposed landfill compromises approximately 758 acres of privately owned land. Of the total acres, approximately 448.3 acres will be zoned for development as a landfill. The remaining 222 acres will be used for setbacks, buffers, ancillary facilities and open space.

The landfill is primarily operated under the area fill method of disposal. During the landfill operations, waste will be evenly spread in layers and compacted. A layer of soil or approved alternate material will then be spread in a layer of at least 6 inches over the waste as daily cover. The refuse will be covered at the end of each operating day. Intermediate cover will be added to any area that will be idle for more than 180 days. Alternate daily cover (ADC) material for use at this site will include, but is not limited to, petroleum contaminated soil, shredded tires, and tarps.

B. Waste Acceptance Capacity

The maximum daily refuse capacity that the facility can handle on a continuous basis during the period of this permit, with existing operational systems, is 4,000 tons per day maximum. The average daily waste inflow projected at start up is approximately 300-1500 tpd and is expected to increase to approximately 2,000 tons per day.

C. Waste for Disposal

1. Approved Waste

The landfill will accept the following materials for disposal:

- o Non-hazardous residential, commercial, industrial and inert waste;
- o Municipal refuse and commercial/industrial: Including solid waste generated by residences, commercial accounts such as retail stores, restaurants, bars, offices;
- ï Vegetative (green) waste: Including plant matter, tree limbs and branches, stumps, grass clippings and other plant material;
- o Construction and demolition: Including construction and demolition materials such as wood, metal, glass, concrete and asphalt;
- o Inert Materials: Material that is not flammable, will not decompose and will not leach substances that are harmful to the environment;
- ï [1]White goods: Appliances that have been certified to be chlorinated fluorocarbon free;
- ï Sewage sludge and animal carcasses;
- o Pesticide and other empty containers from conditionally exempt small quantity generators ;
- o Non-hazardous biomedical wastes;
- o Special wastes: Non-hazardous wastes that require special handling and management;
- o Regulated asbestos-containing material;

[1]Prior to disposal and recycle, any refrigeration gas shall be removed from the appliance by a certified technician.

- o Shredded, sliced or quartered tires;
- o Other non-hazardous wastes;

2. Dis-approved Waste

- o [2]Improperly packed materials containing friable asbestos;
- o Hazardous waste (ARS 49-921) except for CESQG amounts;
- o Bio-hazardous medical waste (AACR18-13-1401);
- o Liquid waste (40 CFR §258.28);
- o Special waste (ARS §49-852);
- o Tires;
- o Automobiles;
- o Petroleum contaminated soils;
- o Liquid waste (including septage waste)

3. Alternate Daily Cover (ADC)

The landfill is primarily operated in accordance with the operational requirements in the Solid Waste Facility Permit (SWFP) which include;

- o Use of petroleum contaminated soil, shredded tires and tarps for alternate daily cover;
- o Daily covering of solid waste with six inches of earthen material;

4. EMISSION CALCULATIONS

Two sources of emissions are associated with the landfill surface. The first is fugitive organic pollutants from the uncontrolled landfill gas. The second is fugitive dust from the landfill surface due to truck and heavy equipment operations.

A. Calculating Landfill Gas Emissions

Methane (CH_4) and CO_2 are the primary constituents of landfill gas, and are produced by microorganisms within the landfill under anaerobic conditions. The landfill gas generation rate was estimated using the EPA Landfill Gas Model. The EPA model estimates the total methane generated from the landfill based on the amount of waste in the landfill, the landfill age, and other variables. The annual tons degradable mass values were entered into the LandGEM model. This model calculates the annual emissions of Total Landfill Gas, Methane and NMOC.

B. Calculating Methane Emissions (First-Order Decomposition Rate Equation)

[2]The loads shall be inspected by trained gate house attendants and equipment operators for friable asbestos.

Uncontrolled methane (CH_4) emissions were estimated by using a theoretical first-order kinetic model of methane production developed by the EPA. This model is known as the Landfill Gas Emissions Model and is represented by the following equation

$$Q_{CH4} = \sum_{i=1}^{n} \sum_{j=0.1}^{1} kL_o [M_i/10] e^{\wedge}(-kt_{ij})$$

Where Q_{CH4} = Annual methane generation in the year of the calculation (m^3/yr)

i = 1-year time increment

n = (Year of calculation) - (Initial year of waste acceptance)

j = 0.1-year time increment

[3]k = Methane generation rate ($year^{-1}$)

[4]L_o = Potential methane generation capacity (m^3/Mg)

M_i = Mass of waste accepted in the i^{th} year (Mg)

t_{ij} = Age of the j_{th} section of waste mass M_i accepted in the i^{th} year

C. Calculating Non-methane Organic Compounds (NMOCs)

Typically, landfill gas emission (LFG) contains a small amount of non-methane organic compounds (NMOC). This NMOC fraction often contains various VOCs, HAPs and greenhouse gases (GHG). This NMOC[5] rate was estimated using EPA's LandGem model which uses the equation listed under Subpart WWW, §60.754.(a).(i) if the actual year-to-year solid acceptance rate is known:

$$M_{NMOC} = \sum_{I=1}^{n} 2\ k\ L_o\ M_i\ e^{-ki}t\ C_{NMOC}\ (3.6x10^{-9})$$

Where M_{NMOC} = Total NMOC emission rate from the landfill mega grams per year

k = methane generation rate constant, $year^{-1}$

L_o = methane generation potential, cubic meters per mega gram solid waste

M_I = mass of solid waste in the i^{tch} section, mega grams

[3]Default methane generation rate of 0.02 was used.

[4]Default potential methane generation capacity 170 was used.

[5]The current version of the Landfill Air Emissions Estimation model contains a proposed regulatory default value for total NMOC concentration of 4,000 ppmv.

It = age of the i^{tch} section, years

C_{NMOC} = concentration of NMOC, parts per million by volume as hexane

3.6 x 10-9 = conversion factor

D. Calculating Volatile Organic Compounds (VOCs)

The NMOC is also used to express the annual estimated emission of VOC. To determine estimates of VOC emissions for inventory purposes, the emission of VOC is determined as a percentage of NMOC. These concentrations of VOCs in landfill gas were derived from AP-42 and the total volume of landfill gas determined by Land GEM model were multiplied and converted to annual tons.

E. Calculating Hazardous Air Pollutants (HAPs)

The percentage of fugitive HAPs was determined from the summation of default concentrations for HAPs in landfill gas as listed in AP-42, Table 2.4-1. These concentrations of HAPs in landfill gas were derived from AP-42 and the total volume of landfill gas determined by Land GEM model were multiplied and converted to annual tons per listed HAP. The annual amounts for each HAP were then summed for an annual total of tons of combination of HAPs.

F. Calculating Fugitive Emissions

1. Calculating Wet Suppression Control Efficiency

Dust suppression control efficiency for unpaved roads was calculated from Emission Control Technologies and Emission Factors for Unpaved Road Fugitive Emissions (EPA/625/5-87/022). The values are derived from the field data tests run in New Mexico (Appendix E of the revised application).

c = 100 - ((0.8 xpedx)/I)

Where c = average control efficiency (%)

[6]p = potential average hourly daytime evaporation rate (mm/hr.)

[7]d = average hourly daytime traffic rate ($hour^{-1}$)

[8]i = application intensity ($liter/m^2$)

[9]t = time between applications (hour)

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[6]p = 0.23 mm/hr

[7]d=5.2 hr^{-1}

[8]i=0.2 $liter/m^2$

[9]t=4 hours

2. Calculating PM_{10} and $PM_{2.5}$ Public Unpaved Roads Emissions - Cottonwood Canyon Road (CCR) and Sandman Road (SR)

On December 19, 2007, a development agreement was entered between Pinal County's Board of Supervisors and Cowley Management, LLC for the development of Silver Bar Mine Regional Landfill. Under this agreement, owner at its own cost shall purchase the right-of-way for approximately six miles of the Cottonwood Canyon Road from the Arizona State Land Department. The agreement further stated that the owner at its own cost and expense shall be responsible for the improvements and maintenance of the road for the operating life of the project.

At PCAQCD's request and for informational purposes only, Cowley Management provided the emissions from the traffic on the unpaved CCR and SR roads in a separate memo. Using a water abatement control efficiency of 82%, the total PM10 emissions from the unpaved roads were calculated to be approximately 10 tons per year.

Both the roads, CCR and SR provide access to the landfill. They are Pinal County roads used by the public. They are also the access roads for the surrounding Arizona State Lands and BLM Lands.

Fugitive PM_{10} and $PM_{2.5}$ dust emissions from vehicle operations on the CCR and SR unpaved roads were calculated using the following equation for vehicles traveling on publicly accessible roads, dominated by light duty vehicles from AP-42, Section 13.2.2-1, Equation (1b):

$$E = [k (s/12)^{a} * (S/30)^{d} / (M/0.5)^{c}] - C$$

Where E = size-specific emission factor (lb. /VMT)

K, a, d, c, =empirical constants (AP-42, Table 13.2.2-2)

s = surface material silt content (AP-42, Table 13.2.2-1)

S = mean vehicle speed (mph) (AP-42, Table 13.2.2-3)

M = surface moisture content (%) (AP-42, Table 13.2.2-3)

C = emission factor for 1980's vehicle fleet exhaust, brake wear and tire wear (AP-42, Table 13.2.2-4)

Public Unpaved Road Factors	**PM_{10}**	**PM2.5**	**Value**
k (constant)	1.8	0.18	-
a (constant)	1	1	-
d (constant)	0.5	0.5	-
c (constant)	0.2	0.2	-
s (%)			6.4
S (mph)	-	-	25

M (%)	-	-	6.5
C	0.00047	0.00036	-

The Cottonwood Canyon road landfill surface emissions result from the round-trip movement of vehicles from the intersection of SR79 to the entrance of landfill. It is estimated that an average of 48 vehicles per day will travel a round trip distance of 12.8. miles from the entrance to the landfill to the working face under maximum waste transport conditions. In addition, up to two scraper will operate, bringing cover soil to the working face for daily cover.

3. Calculating PM10 and PM2.5 Industrial Unpaved Roads Emissions

Fugitive PM_{10} and $PM_{2.5}$ dust emissions from vehicle operations on unpaved roads from the entrance of the landfill and within the landfill was calculated using the following equation from AP-42, Section 13.2.2, Unpaved Roads, Equation 1(a):

$E = k\ (s/12)^a\ (W/3)^b$

Where E = size-specific emission factor (lb/VMT)

k, a, b =empirical constants (AP-42, Table 13.2.2-2)

s = surface material silt content (AP-42, Table 13.2.2-1)

W = mean vehicle weight (tons)

Industrial Unpaved Road Factors	**PM_{10}**	**PM2.5**	**Value**
k (constant)	1.5	0.15	-
a (constant)	0.9	0.9	-
b (constant)	0.45	0.45	-
s (%)	-	-	6.4
W	-	-	21.2

4. Calculating PM10 and PM2.5 Industrial and Public Unpaved Roads Emissions with Mitigation

$E_{ext} = E\ [(365-P)/365]$ AP-42, Table 13.2.2-4, Equation (2)

Where E_{ext} = annual size specific emission factor extrapolated for natural mitigation, lb/VMT

E = size-specific emission factor (lb/VMT)

P = number of days in a year with at least 0.254 mm (0.01 in) of precipitation

It is estimated that an average of 52 vehicles per day will travel a round trip distance of 1.52 miles from the entrance to the landfill to the working face under maximum waste transport conditions. In addition, up to two scrapers will operate, bringing cover soil to the working face for daily cover. A 81% control efficiency was assumed for watering of the haul roads and other surfaces.

5. Calculating PM_{10} and $PM_{2.5}$ Emissions from Stockpiling

Landfill stockpile emissions was calculated using the following equation:

$E = k(0.0032) [(U/5)^{1.3}/(M/2)^{1.4}]$ AP-42, Section 13.2.4, Equation (1)

Where E = emission factor (lb/ton)

k = particle size multiplier (dimensionless)

U = mean wind speed (mph)

M = material moisture content (%)

Industrial Unpaved Road Factors	**PM_{10}**	**PM2.5**	**Value**
k (constant)	0.35	0.053	-
U (mph)	-	-	2
M (%)	-	-	12

6. Calculating PM10 and PM2.5 Emissions from Wind Erosion

Fugitive dust emissions due to wind erosion of cover stockpiles were estimated using emission factors published in the EPA's Factor Information and Retrieval System database. To insure a control efficiency of 50%, a moisture ratio of 1.8 or greater will be maintained.

E (tpy) = daily cover stockpile area (acres)*emission factor (lb/acre) / 2000

7. Calculating Diesel Engines Emissions

Facility will install and operate seven (7) diesel engines at the site. Emissions from the engines were calculated using AP-42, Table 3.3-2.

8. Calculating Greenhouse Gases Emissions

Greenhouse gas emissions were calculated using LandGem Model.

G. Dust Activities and Control Methods

1. Dust Activities

There are several types of sources of dust and PM_{10} at the landfill site which are as follows:

- o Light, medium and heavy vehicle traffic on paved and unpaved internal roads;
- o The unloading of waste at the working face of the landfill and the compaction of waste and placement of daily cover;
- o The wind borne emissions from disturbed areas and stockpiles

- o Construction activities (e.g. berms, roads, retention, barriers)

2. Control Measures

The above dust generating sources are subject to the following control measures:

- o Watering and maintenance of haul roads and or application of chemical dust suppressant;
- o Maintaining a 10 mph speed limit;
- o Water spraying of soil cover areas during fugitive dust conditions;
- o Applying water or planting temporary vegetation on intermediate soil cover, as needed;
- o Planting and maintaining a vegetative cover on completed fill and excavation slopes;
- o Suspension of landfill activities when wind-borne dust is leaving the property boundary.

5. LANDFILL EMISSIONS

Using the equations and model described in Section 4 of this TSD, following emissions were calculated based on the total acceptance mass of 84.5 million cubic yards (65 million cubic meter) up until the year 2019 (5 year permit term). The table also includes the emissions from the operation of the seven diesel engines.

Pollutant	Emissions (tpy)
NMOC	166 tpy (150 Mg)
VOC	9.8
HAP	1.4
[10]PM_{10}	18.9
$PM_{2.5}$	1.1
NO_X	86.1
CO	18.5
SO_X	5.7
CO_2	10,600
CH_4	3,863

[10]Includes fugitive emissions from vehicle travel on unpaved roads**,** landfill activities and diesel engines. An average of 80% control efficiency is used for watering as a control measure on unpaved surfaces.

Landfill Gas	14,460

6. REGULATORY REQUIREMENTS AND MONITORING

A. Title V/PSD Review

In accordance with 40 CFR 60.752(b), any landfill with a design capacity over 2.5 million megagrams by mass or 2.5 million cubic meters by volume is subject to Part 70 permitting (Title V). Potential emissions of all criteria pollutants are below PSD review thresholds for the five year permit term.

B Applicable Requirements

1. NSPS WWW and Control System Requirements

This facility is subject to the requirements of 40 CFR 60 Subpart WWW, Standards of Performance for Municipal Solid Waste Landfills. This standard requires that a calculation of NMOC emissions be made annually. The application indicates that the NMOC annual emissions rate would be approximately 150 megagrams for the year 2019. Therefore, either a collection and control system is required in accordance with Section §60752.(b).(A) of the Subpart WWW or Permittee has an option to determine a site-specific NMOC concentration and recalculate the NMOC emission rate using either the Tier 2 methodology as listed in Section §60.754.(a).(3) or Tier 3 methodology listed in Section §60.754.(a).(4). The revised NMOC emission rate report, with the recalculated emission rate based on NMOC sampling and analysis, shall be submitted within 12 months of the issuance of this permit and annually thereafter within thirty (30) days of the start of each calendar year.

2. NESHAP, AAAA Requirements

This facility is subject to the requirements of 40 CFR Part 63 Subpart AAAA, National Emission Standards for Hazardous Air Pollutants for Municipal Solid Waste Landfills. This subpart requires landfills to meet the startup, shutdown, and malfunction (SSM) requirements and also includes additional reporting requirements. The SSM plan is effective upon the installation of collection and control system.

3. NSPS, IIII Requirements

The facility is subject to the requirements of 40 CFR Part 60, Subpart IIII, Standards of Performance for Stationary Compression Ignition Internal Combustion Engines. The facility has seven diesel fuel engines which are manufactured after April 2006.

C Other Regulatory Emissions Limitations

1 Opacity and Reasonable Precautions

The facility must meet the federally enforceable 40% opacity limitation. For this purpose the permit also requires that reasonable precautions be taken, and it includes a list of the methods to employ.

While PCAQCD has a locally enforceable 20% opacity standard (§2-8-300), it does not apply to fugitive sources, sources which already have another opacity standard under

PCAQCD rules, or have an applicable NSPS. Therefore, 20% does not apply to the fugitive emissions from the landfill surface.

In line with other permits issued by PCAQCD, a semi-annual opacity screening requirement has been added to the permit. If such opacity screening shows there are visible emissions, a full Method 9 test is required.

2 Soil Moisture Content

Since the soil moisture content used for emission calculations is from AP-42 and not site specific, PCAQCD requires that a sampling program be conducted when the tipping rate exceeds 750 tons per day. The soil moisture content obtained will be used for determining the emissions under AP-42 Section 13.2.4

7. COMPLIANCE ASSURANCE MONITORING (CAM)

The requirements of 40 CFR 64 do not apply to this facility. Even though, this facility is a major source, no single emission unit satisfies the criterial of §64.2(a)(3). No single unit has pre-control device emissions of 100 tpy or more of any regulated pollutant.

8. CONCLUSION AND PROPOSED ACTION

Based on the information supplied by the applicant, analyses conducted by the PCAQCD it is determined that the proposed project will not cause or contribute to a violation of any federal ambient air quality standards. Therefore, PCAQCD intends to issue to the applicant a unitary permit, including both approval to construct/modify pursuant to CAA Title I, and authority to operate, pursuant to CAA Title V, subject to the conditions set forth in the accompanying draft permit.