Appendix 4 Air Quality Baseline and Model

A4.1 Monitoring Result of Air Quality Baseline

Air quality monitoring has been conducted twice in Xinxiu Village (at the water supply sluice of Dongshen Bureau) and Qiaoshe (near Lo Wu Border Crossing), respectively, on the Shenzhen side. Locations of the monitoring points are shown at Figure 4.1. Monitored parameters include wind speed, wind direction, RSP, TSP and NO_x. The results are listed in Table 4.1, and also stored in the *Environmental Information System*, an attachment of this report.

Table A4.1 Monitoring Result of the Air Quality Baseline (1999)

Sampling Time	Xinxiu Village		Qiaoshe	
	RSP ($\mu g/m^3$)	TSP ($\mu g/m^3$)	RSP ($\mu g/m^3$)	TSP ($\mu g/m^3$)
99.01.04	29	156	35	173
99.01.07	22	191	44	189
99.01.10	39	200	51	194
99.01.13	30	92	39	73
99.01.16	31	118	43	109
99.01.19	36	152	46	147

Table A4.1 Monitoring Result of the Air Quality Baseline (1999) (cont'd)

Sampling Time	Xinxiu Village	Qiaoshe
	NO_x ($\mu g/m^3$)	NO_x ($\mu g/m^3$)
99.01.04	131	43
99.01.06	97	36
99.01.08	74	121
99.01.10	217	355
99.01.12	78	180
99.01.14	36	162
99.01.16	164	99
99.01.18	404	96

A4.2 Air Quality Model

A4.2.1 *Introduction*

Air quality is to be predicted and assessed by using Industrial Sources Complex Model (ISC) and Fugitive Dust Model (FDM) in the Project. ISCST and FDM are commonly used inside and outside USEPA, and have been widely verified and modified for many times to reform their technical character.

A4.2.2 *Introduction to the Model*

ISC model is an advanced Gauss Dispersing Model. It includes many options to deal with air turbulence、gravitational settling (dry deposition)、complex pollution sources conformation and some special air effect. This model is applied to all sorts of pollution sources such as point source, linear source, non-point source, and volume source. It also includes some other options such as locally special wind velocity profile, vertical air temperature gradient, and smoke descending from the top of the chimney. FDM model, as a supplement to ISC, is designed to assess the concentration and the deposition of fugitive dust source. It can be used to deal with the mechanisms of turbulence and gravity clear of particulates. The concentration is calculated based on the standard Gauss distribution plume formulas. Towards the settling, the advanced gradient transformation algorithm on the basis of the Ermak equation is used in the model. It can analyze more than 20 grain-size grades. For each grade, the gravitational settling speed and the deposition speed, worked out by modeling or determined by user, must be provided for FDM model. This methodology needs to input the friction velocity (the function of wind speed) and the roughness and the altitude of the earth surface.

A4.2.3 *Requirements for the Data*

ISC model needs the location, discharge velocity, gas discharge velocity and temperature of the chimney. The input parameters are height of the pollution sources, size of the building, grade and corresponding settling speed of partical, and ground reflection coefficient of the particulate. FDM model needs the hourly surface weather data, including hourly degree of stability, wind direction, air temperature, the mixing height, and the coordinates and the proper elevations of each receivers.

Data of pollution sources: The emission factors got from concerned literature can be cited in the analyses. Generally speaking, the reference information of USEPA on emission factors is believable. Also included is the summary of the information needed for calculation of emission data.

Table A4. 2 Basic Data Needed in Dust Emission Probing Calculation

No.	Item	Note
	Total area of working site Area for material storage Area for barge loading Total length of permanent road Yearly maximum calling back quantity (mg/a)	
	Description	Source of the data
1	Dust emission from bulldozer loading Material content(%) Falling height during dumping(m) Material humidity(%) Volume of bulldozer(m^3)	From AP—42 From engineer From engineer From engineer
2	Dust emission from trailer running on unpaved offset line Dust content in material for paving road(%) Average vehicle velocity (km/h) Average vehicle weight(t) Average round Days when rainfall is not less than 0. 254 mm Average round trip (km) Yearly vehicle volume	From AP—42 From engineer From engineer From engineer From RO data From engineer From engineer
3	Erosion in construction site Fine sand content Days when rainfall is not less than 0. 254 mm Time when the wind speed is more than 5. 4 m/s Percentage of active construction area	From AP—42 From AP—42 From RO data in 1990 From engineer

A4. 2. 4 *Output Result and Model Validation*

The average concentration or the total settling quantity of the pollutant, which is mixed optionally by the pollution sources of each receiver, can be work out. And the highest and second highest concentration at each receiver on each special period of time can also be worked out.

The validation demonstrates that in the analyses of the dust concentration near the fugitive dust source, FDM model is excellent. ISC model is also excellent in analyzing large number of samples except that the highest and the second highest concentration are a little highly estimated.

A4. 2. 5 *Limitation of the Model*

The pollution source in the model is assumed to be continuous. It is not fitted for complex area.

A4. 2. 6 *Technical Description*

FDM model, which has been ratified by USA and Hong Kong Environmental Protection Department, is adopted to assess the potential effect of construction activity. ISC model is not adopted, since FDM model is specially designed for estimation of short-term effect of dust source. The pollution source can be point source, linear source and non-point source. FDM does not consider the impact of pollution buoyancy, and therefore, not include the equation of smoke rising. FDM is based on Gauss Smoke Flow Model, however, it introduces an improved gradient transfer settling algorithm. Pollution sources are divided into a series particles with different radius, then. FDM is used to calculate the gravity descending velocity and deposit velocity of each group of particles, as well as the concentration and deposit amount for each receiver.

FDM model is an air quality analysis model specially designed to analyze the fugitive dust diffusion. The model integrates a group of settling calculation formula based on Ermak(1977) equation. The elementary equation given by Ermak will also be mentioned later in this section. The transfers and diffusion of the pollutant in the air can be described by the following general equation when the pollutant is made up of particles of the same size.

$$\frac{\partial x}{\partial t}=\frac{\partial}{\partial x}K_x\frac{\partial x}{\partial x}+U\frac{\partial x}{\partial x}+\frac{\partial}{\partial y}K_y\frac{\partial x}{\partial y}+\frac{\partial}{\partial x}K_z\frac{\partial x}{\partial z}+V_g\frac{\partial x}{\partial z} \qquad (A4-1)$$

Where:

x—Concentration (g/m^3)

K_x, K_y, K_z—air turbulence momentum diffusivity on the direction (m^2/s)

t— Time (s)

x, y, z — Three-dimensional coordinate. The x-axis parallels the wind direction. The y-axis is perpendicular with the x-axis and parallels the ground. The z-axis is perpendicular with the x axes and ground (m)

U — Wind speed (m/s)

V_g — Gravity settling velocity (m/s), the positive direction is downward

To work out the equation, some simple assumptions is given. Firstly, we suppose that diffusion in x direction is much less than the advection component of wind speed in the same direction. Based on the assumption, we needn't consider the other instance except for the stabilization condition. Secondly, we suppose the air turbulence momentum diffusivity is only the function of distance in the downwind direction (In the following description, the farther restricted condition on the air turbulence momentum diffusivity is added in order to settle the transfers' gradient). The diffuse equation worked out with above assumption is much simpler than the equation (A4—1):

$$U\frac{\partial x}{\partial x}=K_y\frac{\partial^2 x}{\partial y^2}+K_z\frac{\partial^2 x}{\partial z^2}+V_g\frac{\partial x}{\partial z} \qquad (A4-2)$$

The farther assumption is that the air turbulence momentum diffusivity is constant in any place and time. In fact, only if the air turbulence momentum diffusivity possesses the same function independence on the downwind direction as the Vg, the result can be worked out. Generally, Vg is a constant, and the air turbulence momentum diffusivity on any direction can be expressed by a simple parameter K. The relation between K and more familiar diffusion parameters are: The standard deviation of concentrations in y and z directions is as follows:

$$\sigma^2(x)=\frac{2}{U}\int_0^x K dx \qquad (A4-3)$$

K is supposed to be a constant which is independent of x, when σ is regarded as the function of the distance on the downwind direction as half power, the summation result is strict and effective. So we can get the following equation:

$$X=\frac{Q}{2\pi\sigma_y\sigma_z U}e^{-\frac{y^2}{2\sigma_y^2}}e^{[-\frac{V_g(z-h)}{2k}-\frac{V_g^2\sigma^2 y}{8k^2}]}[e^{[-\frac{(z+h)^2}{2\sigma_z^2}]}+e^{-\frac{(z+h)^2}{2\sigma_z^2}}$$

$$-\sqrt{2\pi}\frac{V_i\sigma_z}{K}e^{[\frac{V_i(z+h)}{K}]+[\frac{V_i\sigma_z^2}{2k^2}]}erfc[\frac{V_i\sigma_z}{\sqrt{2k}}+\frac{z+h}{\sqrt{2\sigma_z}}] \quad (A4-4)$$

Where:

X—Concentrate (g/m^3)

Q—Emission velocity (g/s)

U—Wind speed (m/s)

σ_y, σ_z—Standard deviation of the concentration on the direction of y, z axes (m)

x、y、z—Coordinate of the receiver (m)

V_g—Gravity settling velocity (m/s)

h— Plume height at the central line (m)

k— Air turbulence momentum diffusivity (m^2/s)

$\nu_1 = Ud \cdot V\ g/2$

U_d= Settling velocity. For work out the equation, the elementary assumption is that the settling on the surface is directly proportional to the concentration. The settling velocity is a proportionality constant [see equation(A4—9)].

[Note: there are some misprints in the equation in Ermak's original text, but they have been corrected here]

With the assumption that K is a constant and the assumptions of equation (A4—2), we can suppose:

$$K=\frac{\sigma_z^2 u}{2x} \quad (A4-5)$$

For convenience, we made the following two replacements:

$$\gamma=\frac{V_i\sqrt{2x}}{\sigma_z u}+\frac{z+h}{\sqrt{2}\sigma_z} \quad (A4-6)$$

$$\beta=\frac{x}{\sqrt{2}\sigma_z} \quad (A4-7)$$

After the replacements, the equation(A4—3)can be changed into the following form:

$$X=\frac{Q}{2\pi\sigma_y\sigma_z U}e^{[-\frac{V_g(z-h)\sqrt{2}\beta}{\sigma_z}-V_g{}^2\beta^2]}\{e^{[-\frac{(z-h)^2}{2\sigma_z^2}]}+e^{[-\frac{(z+h)^2}{2\sigma_z^2}]}$$

$$-4\sqrt{\pi}V_i\beta e^{[-\frac{(z+h)^2}{2\sigma_z{}^2}]}e^{r^2}erfc(r)\} \quad (A4-8)$$

When equation(A4—3)uses curves together with the σy and σz in standard Tumer, the former assumption that performance of K is concerned with X will lead to some conflicts, i. e. , showing non-conservation of mass when the plume moves downwind. A correction term is calculated by the infinite integration to correct the predicted concentration in equation (1—6) to ensure the conservation of mass.

The basic equation to define the diffusion algorithm is:

$$D=U_d x|_{x=0} \quad (A4-9)$$

Where,

D—Deposition velocity

U_d—Settling velocity

x—Concentration (See equation A4—7)

We define the above concentration as corrected concentration, and multiply it with a function of X, here we call the function $q(x)$:

$$C=xq(x) \quad (A4-10)$$

$$D=U_d q(x)C|_{z=0} \quad (A4-11)$$

The following equation meets the requirements for conservation of mass:

$$\int_0^x\int_{-\infty}^{\infty}Ddydx+u\int_0^{\infty}\int_{-\infty}^{\infty}cdydz=Q \quad (A4-12)$$

Afteı replacement, obtained:

$$\int_o^x u_d q(x)C_{cwi|z=0}dx+uq(x)\int_0^{\infty}c_{cwi}dz=Q \quad (A4-13)$$

Where,

$$C_{cwi}=\int cdy \qquad (A4-14)$$

After differentiate with X at both sides of the equation (A4—14), obtained:

$$u_d q(x)C_{cwi}+u\frac{\partial}{\partial x}[q(x)\int_0^{\infty} c_{cwi}dz]=0 \qquad (A4-15)$$

After transfiguration, we can get the first-order difference equation of X:

$$\frac{\partial q(x)}{\partial x}u\int_0^{\infty} C_{cwi}dz+q(x)[udC_{cwi|z=0}+u\frac{\partial}{\partial x}(\int_0^{\infty} C_{cwi}dz)]=0 \qquad (A4-16)$$

The radix is worked out with three-dimension Runge-Kutta integral:

$$LecA(x)=\int_0^{\infty} C_{cwi}dz \qquad (A4-17)$$

$$\frac{\partial q(x)}{\partial x}uA(x)+q(x)[u_dC_{cwi|z=0}+u\frac{\partial A(x)}{\partial x}]=0 \qquad (A4-18)$$

$$\frac{\partial q(x)}{\partial x}=\frac{-q(x)[u_dC_{cwi|z=0}+u\frac{\partial A(x)}{\partial x}]}{uA(x)} \qquad (A4-19)$$

$$dq(x)=\frac{-q(x)[u_dc_{cwi|z=0}+u\frac{\partial A(x)}{\partial x}]}{uA(x)}dx \qquad (A4-20)$$

$$k_1=\frac{-q_{x=x_i}[u_dC_{cwi|x=x_i,z=0}+u\frac{A|_{x=x_i+\frac{dx}{2}}-A|_{x=x_i-\frac{dx}{2}}}{dx}]}{uA|_{x=x_i}}dx \qquad (A4-21)$$

$$K_2=\frac{-(q|_{x=x_i}+\frac{k_i}{2})[u_dC_{cwi|x=x_i+0.5dx,z=0}+u\frac{A|_{x=x_i+dx}-A|_{x=x_i}}{dx}]}{uA|_{x=x_i+\frac{dx}{2}}}dx$$

(A4—22)

$$K_3=\frac{-(q|_{x=x_i}+2K_2-K_1)[u_dC_{cwi|x-x_i+dx}+u\frac{A|_{x=x_i+1.5dx}-A|_{x=x_i+\frac{dx}{2}}}{dx}]}{uA|_{x=x_i+\frac{dx}{2}}}dx$$

(A4—23)

$$k_3=x_1+dx=q_x=x_1+\frac{1}{6}(k_1+4k_2+k_3) \qquad (A4-24)$$

The q(x) can be defined by variable step size(dx)through using the above numeric value integrated table. 100 step sizes are divided from 1m to 50000m to make the numeric value integrated. The 100 downwind distances and q(x) are calculated by using least square method based on following equation:

$$log(q(x)=b_0+b_1log(x)+b_2(log(x))^2+b_3(log(x))^3+b_4(log(x))^4 \quad (A4-25)$$

The $b_0 \cdots b_4$ are calculated based on the relationship among 6 grades of wind speed, 6 grades of stability, 6 grades of particulate size, and 6 different release heights. More than 1000 values of $b_0 \cdots b_4$ are calculated and input into the coding of FDM.

A4.3 Caculation on Pollutant Emission

A4.3.1 *Equation for Pollutant Emission*

(1) Main pollutant sources on road for material transportation

Main pollutant sources on road for material transportation are:

1) The working tires may cause dust when the vehicles are traveling, especially, heavy vehicles can bring about more. The higher speed the vehicle travels at, the more dust it can produce. At the same time, the dust quantity will be affected by roadway condition and its clearance condition;

2) Leakage from traveling vehicles will increase dust.

There is no calculation method for dust caused by traveling vehicles in China. Based on Reference AP-42 of American EPA, the dust quantity can be calculated on the basis of paved road and unpaved road respectively.

The equation for the calculation of emission parameter on paved road is:

$$E=k(sL/2)^{0.65}(W/3)^{1.5} \quad (A4-26)$$

Where:

E = Pollutant emission parameter in unit distance for traveling vehicle, unit: g/VKT (vehicle kilometers traveled)(the unit is as same as k)

k = Base emission parameter for particles within certain constant, unit g/VKT means emission from a vehicle in one kilometers (g), the value of K refers to the following table.

Value of k

Constant	**K (*g/VKT*)**
PM-2.5	1.1
PM-10	4.6
PM-15	5.5
PM-30	24

sL = Sediment load for roadway(g/m^2)

W = Average weight for traveling vehicles (*Tons*)

For the roadway hygiene will be worsened with construction material transport, the sL value of 3.0 g/m^2 which is recommended in Reference AP-42 of American EPA will be applied (the worst condition of with large quantity of soil on roadway of relative small traffic volume), 10t-tripper weighs 20t with full load , when the vehicle travels full-load from the construction site ,and returns no-load , the average weight is $W=15$ t, hence $E=349.3\ g/VKT$

The equation for the calculation of emission parameter on unpaved road is :

$$E=\frac{k(s/12)^a(W/3)^b}{(M/0.2)^c} \qquad (A4-27)$$

Where;

E = Pollutant emission parameter in unit distance for traveling vehicle , unit: (1b/VMT)

1 1b/VMT = 281.9 g/VKT

k = Base emission parameter for particles within certain constant, the value of k refers to the following table .

Value of k

Constant	PM-2.5	PM-10	PM-30
K (1*b*/*VMT*)	0.38	2.6	10
A	0.8	0.8	0.8
B	0.4	0.4	0.5
C	0.3	0.3	0.4
Quality Rating	C	B	B

s=Sediment content of roadway, 8.4%

W=Average weight for vehicles traveling on road (*Tons*) 15 t

M=Water content of roadway material, 13.5%

$E=1.0137^{kg/VKT}$

(2) Dust caused by earth unloading

$$E=k(0.0016)\frac{\left(\frac{U}{2.2}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}(kg/megagram)$$

$k=0.74, U=2.6, M=7.9$

$E=2.15\times10^{-4}$kg/Mg

(3) Dust caused by tractor-road packer

$$E=\frac{2.6(s)^{1.2}}{(M)^{1.3}}=\frac{2.6(6.9)^{1.2}}{7.9^{1.3}}=1.8kg/hr$$

From references of Western American Mining, $s=6.9$, $M=7.9$

A4.3.2 *Project Description*

For the Stage III Project , the channel excavation is 201.95×10^4 m^3, with 20.18×10^4 m^3 contaminated soil, 181.77×10^4 m^3 uncontaminated soil, 24.58×10^4 m^3 earthwork for dike-building, 28.33×10^4 m^3 earth refilling.

A4.3.3 *Calculation of Pollutant Resources*

Scheme Six is selected the evaluation objective

(1) Dust from material-carrying vehicles traveling on no-roadway line in dyke construction area

Based on the project design, the river channel is 4,049 m long, the average travelling distance for one vehicle is 4,049/2 m and traffic volume in dyke construction area is $2 \times 138 = 276$ vehicles/day.

Hence the dust quantity is

$$2.0245 \times 276 \times 1.0137 = 566.4 \text{ kg/day}$$

(2) Dust caused by material-carrying vehicles traveling on no-roadway line from earth pit to dyke construction area

Scheme Six: section from Lu Wu to Man Kam To and section from Man Kam To to Pingyuan River Mouth involve the largest emission during superimposed construction.

Based on the project design, the river channel excavation is of 2,019,500 m^3 with 500,000 m^3 spoil disposed on the riversides. Comprehensive maximum excavation of 90,500 m^3 per month, hence the comprehensive maximum spoil on both riversides is 22,400 m^3. Traffic volume is 213 vehicles per day on the condition of $2.24 \times 104/30 = 747$ m^3 spoil transportation with 10 t-trucks.

According to Equation 2, the emission from every vehicle is

$$E = 1.0137 \text{kg}/VKT \text{ per hour in one kilometer}$$

In line with the project design, spoil shall be transported to spoil yard with backhoe tripper in a distance of 2 km, hence the total emission of above two projects is $2 \times 213 \times 1.0137 = 431.9$ kg/day

(3) Dust from material-carrying vehicles traveling on no-roadway line in spoil disposal area

Based on Project design, District B, C, D in South District are designated as spoil yard with a total coverage of 82,000 m^2, the average width of the central line is 143 m, and the total emission is $0.143 \times 213 \times 1.0137 = 30.88$ kg/day

(4) Dust from earth loading

Based on project design, the maximum monthly dry excavation is 69,400 m^3 with daily maximum excavation of 2,300 m^3. When $E=2.15\times10^{-4}$ kg/Mg, the dry density of the earth is 1.5 g/cm^3, hence dust emission of earth loading is $E=2.15\times10^{-4}\times2300\times1.5=0.75$ kg/day

(5) Dust from working bulldozers

Based on Project design, there are 5 bulldozers with a total emission of $5\times1.8\times10=$ 90 kg/day

(6) Aeolian erosion in spoil disposal area

According to the reference of Western American Mining, emission parameter of aeolian erosion is 1.8 U kg/(hectare hr), suppose the active coverage ratio of the construction is 5%, the aeolian erosion emission in spoil disposal area will reach $1.8\times2.6\times8.2\times0.05\times24=46.1$ kg/day.

(7) Dust caused by aeolian erosion and dyke construction

For Stage III Project shares the similar commencement condition, construction machines, construction equipment, construction methodology, natural environment and meteorological conditions with Stage I and Stage II, the analogical method will be applied to calculate the dust emission.

The river channel excavation for Stage I is 170×10^4 m^3, and the volume for Stage II is 304×10^4 m^3, 201.95×10^4 m^3 for Stage III which is 42.6% of that of Stage I and Stage II.

Emission caused by aeolian erosion and dyke construction in Stage III project site can be obtained through Multiplying 42.6% by fly ash volume of Stage I and Stage II respectively,

A4.3.4 *Calculation of Pollutant Resources in Material Yard*

Based on Project design, the borrow yard locates in Daliang Village, Shuijing, Buji Town with a coverage of 65,000 m^2 and macasphalt pavement. Daily maximum excavation will reach 1,500 m^3, with10 t-trucks in combination of 2 m^3-backhoe and 3 m^3-wheel loader, and 180 HP bulldozers.

Based on Reference AP—42 of American EPA, dust emission shall be calculated on the basis of paved road and unpaved road separately.

From the Stocking Yard to Xiaoguan, for the roadway hygiene shall be worsened with construction material transport, the sL value of 3. 0 g/m^2 which is recommended in reference of American EPA AP—42 will be applied (the worst condition of with large quantity of soil on roadway of relative small traffic volume),

When

$W=15$ t,

Hence $E=349.1$ g/VKT.

From Honggang Road to Yanfang Road, for a better roadway hygiene

The value of 0. 1 g/m^2 recommended by American EPA shall be applied, $W=15$ t, hence $E=38.2$ g/VKT.

Equation for calculation of emission parameter on unpaved road is:

$$E=\frac{k(s/12)^a(W/3)^b}{(M/0.2)^c} \qquad (2)$$

Where:

E = Pollutant emission parameter in unit distance for traveling vehicle , unit: (1b/VMT)

1 *lb*/VMT = 281. 9 g/VKT

k = Base emission parameter for particles within certain constant, the value of k refers to the following table.

Value of k

Constant	**PM**-2. 5	**PM**-10	**PM**-30
K(1*b*/*VKT*)	0. 38	2. 6	10
A	0. 8	0. 8	0. 8
B	0. 4	0. 4	0. 5
C	0. 3	0. 3	0. 4
Quality Rating	C	B	B

s = Sediment quantity on roadway, 8. 4%

W = Average weight for traveling vehicles (*Tons*) is 15 t

M=Water content of roadway material is 3.4%

E=1.5258 kg/VKT

(1) Dust from material-carrying vehicles traveling on no-roadway line in stocking yard.

For stocking yard, the length-width ratio is 2:1 with 180 m of width (65000/2)0.5, 360 m of length, and a coverage of 65,000 m^2. the traveling distance within the yard is 180 m, hence the fly ash emission from material-carrying truck on no-roadway line is $1.5258 \times 18 \times 10 \times 0.18 = 49.4$ kg/day

(2) Dust emission from material-carrying vehicles traveling on no-roadway line from Stocking Yard to Xiaoguan

let E=0.3493 Kg/VKT, the total distance from stocking yard to Xiaoguan is 3.4 Km, and the emission is 213.8 kg/day

(3) Dust caused by earth loading

Let $E = 2.15 \times 10^{-4}$ kg/Mg, 1,500 m^3 of daily maximum excavation, 1.5 g/cm^3 of earth dry density, the emission reaches $E = 2.15 \times 10^{-4} \times 1500 \times 1.5 = 0.48$ kg/day

(4) Dust emission by working bulldozers

$$E=\frac{2.6(s)^{1.2}}{(M)^{1.3}}=\frac{2.6(6.9)^{1.2}}{7.9^{1.3}}=1.8\ kg/hr$$

The total emission for two bulldozers is $2 \times 1.8 \times 10 = 36$ kg/day

(5) Aeolian erosion in construction site

According to the reference of Western American Mining, emission parameter of aeolian erosion is 1.8 U kg/(hectare hr), suppose the active coverage ratio of the construction is 5%, the aeolian erosion emission of spoil disposal area will reach $1.8 \times 2.6 \times 8.2 \times 0.05 \times 24 = 46.1$ kg/day.

A4.3.5 *Pollutant Resources Calculation after Adopting Mitigation Measures*

Based on Reference AP-42, mitigation efficiency will increase by 50% by watering twice a day all the access roads and construction site. Mitigation efficiency of 50%

will achieve when vehicle speed reduces from 15 MPH (15×1. 609=24. 1KPH) to 12 MPH. Referring to Stage I and Stage II, after adopting mitigation measures, emission form material-carrying vehicle shall be obtained by multiplying emission under no mitigation measures by 0. 25, emission for bulldozer is to multiply emission without mitigation measures and 0. 5 together, emission from aeolian erosion in construction site shall be obtained by multiplying emission without mitigation measures and 0. 5 together, emission from dyke construction shall be obtained by multiplying emission without mitigation measures by 0. 5. The others remain unchanged .