4 AIR QUALITY

4.1 Environmental Legislation

4.1.1 Air Quality Objectives

4.1.1.1 Air quality is regulated through Annex 4 of the Technical Memorandum on EIA Process (TMEIA) which specifies compliance with the Air Quality Objectives (AQO) and other standards established under the Air Pollution Control Ordinance (APCO). The APCO and all regulations specified by this Ordinance, for example the Air Pollution Control (Construction Dust) Regulation, should be complied with. The associated Air Quality Objectives are provided in Table 4.1.

Table 4.1 Hong Kong Air Quality Objectives

Pollutant	Concentration(i) $\mu g/m^3$ Averaging Time				
	1 Hour (ii)	8 Hours (iii)	24 Hours (iii)	3 Months (iv)	1 Year (iv)
Sulphur Dioxide	800		350		80
Total Suspended Particulates			260		80
Respirable Suspended Particulates (v)			180		55
Nitrogen Dioxide	300		150		80
Carbon Monoxide	30,000	10,000			
Photochemical Oxidants (as ozone (vi))	240				
Lead				1.5	

(i) Measured at 298°K (25°C) and 101.325 KPa (one atmosphere).
(ii) Not to be exceeded more than three times per year.
(iii) Not to be exceeded more than once per year.
(iv) Arithmetic means.
(v) Respirable Suspended Particulates means suspended particulates in air with a nominal aerodynamic diameter of 10 micrometers and smaller.
(vi) Photochemical oxidants are determined by measurements of ozone only.

4.1.1.2 In addition to the Air Quality Objectives, the TMEIA stipulates a criteria to meet the hourly Total Suspended Particulates (TSP) concentration of 500 $\mu g/m^3$ measured at 298°K (25°C) and 101.325 kPa (1 atmosphere) for construction dust impact assessment.

4.1.2 Air Pollution Control (Construction Dust) Regulation

4.1.2.1 The Regulation defines notifiable and regulatory works for achieving the purpose of dust control for a number of activities. The Regulation requires any notifiable work shall require advance notice to EPD. It also requires the contractor to ensure that the notifiable work and regulatory work will be carried out in accordance to the Schedule of the Regulation. Dust control and suppression measures are provided in the Schedule. Notifiable works are site formation; reclamation; demolition, foundation and superstructure construction for buildings; and road construction. Regulatory works are building renovation, road opening and resurfacing, slope stabilisation, and other activities including stockpiling, dusty material handling, excavation, concrete production, etc. This project is expected to include both notifiable and regulatory works.

4.1.3 Specified Process

4.1.3.1 The proposed PAFF is classed as a specified process under Part IV of the APCO and falls within the category "Organic Chemical Works" described in Schedule 1 of the Ordinance. The following relevant clause relates to the tank farm of the proposed PAFF:

> "Works, not being a chemical process described in any other process of the following kinds in which:
>
> (b) any organic liquids, including liquid fuel are stored in tanks having an installed capacity exceeding $100m^3$."

4.1.4 Odour

4.1.4.1 There is the potential for odour from fugitive emissions associated with the operation of the PAFF. Odour is regulated through Annex 4 of the TMEIA which stipulates that odour must meet 5 odour units based upon an averaging time of 5 seconds. For the purposes of this assessment, as the tank farm is a specified process and in accordance with "A guidance note on the best practicable means for organic chemical works (bulk storage of organic liquids)" (BPM 25/2) by EPD, the odour limit at the site boundary shall not exceed 2 odour units.

4.2 Air Sensitive Receivers

4.2.1 In accordance with criteria set out in the Environmental Impact Assessment Ordinance (EIAO) and Technical Memorandum on the Environmental Impact Assessment Process (TMEIA), Air Sensitive Receivers (ASRs) identified near the project site are shown in Table 4.2. All of them are industrial premises. In addition, the site to the east is currently being developed into an EcoPark for recycling material. As only land lots have been set out for the Phase I EcoPark development, a range of sensitive receiver locations on the boundary adjacent to the PAFF site have been assigned for the purposes of this assessment. Receiver height is assigned as 1.5m above the local ground unless specified.

4.2.2 Other domestic premises such as low rise residential properties at Lung Kwu Tan and high rise residential blocks at Butterfly Beach in Tuen Mun, are both some 2 and 3km away respectively from the proposed PAFF. In addition, these sensitive receivers are shielded from the PAFF site by topography. There is also a planned Holiday Camp to the east along Lung Man Road but this is about 550m away and as such not within the study area. The relative locations of the industrial properties to the PAFF are shown in Figure 4.1.

Table 4.2 Air Sensitive Receivers

SR Ref.	Name of Receiver	Distance (m)	Nature
SR1	Shiu Wing Steel Works	60	Industrial
SR2	Cement Plant	381	Industrial
SR3a to d	Proposed EcoPark at Tuen Mun Area 38	24-54	Industrial

4.3 Background Air Quality

4.3.1 The Study area for the project is situated in an undeveloped newly reclaimed shoreline site at Tuen Mun Area 38. Some industrial premises near the study area include Castle Peak Power Station, China Cement plant and Shiu Wing Steel Mill, directly adjacent to the site. Lung Mun Road is the main access to the area. Therefore, the existing air quality is affected by vehicular exhaust emissions from the road and fugitive dust and stack emissions from nearby premises. The background TSP level of 88 µg/m3 has been assumed for the purposes of the construction phase air quality assessment as calculated from the annual average of EPD data (2001-2005) from Yuen Long and Tsuen Wan Stations meterological stations. There is currently no major petroleum-based odour source in the vicinity of the study area and, therefore, minimal background odour levels within the area are expected.

4.4 Key Issues

4.4.1 During the construction phase, it is expected that dust arising from the construction of the land facilities, together with the potential for SO_2, NO_2 and smoke emitted from the diesel-powered equipment, could affect the air quality of the study area.

4.4.2 During the operational phase, the potential sources of air emissions relate largely to fugitive emissions from valves, pumps and from the passive vents in fuel storage tanks. Besides the air quality issue, fugitive emissions from the tanks also have the potential to create an odour nuisance. In addition, there will also be emissions from the tankers delivering the fuel to the facility.

4.5 Construction Phase Impact Assessment

4.5.1 *Assessment Methodology*

4.5.1.1 There is potential for SO_2, NO_2 and smoke to be emitted from the diesel-powered equipment being used during the construction phase. However, as detailed in the assumed plant inventory shown in Table 5.4 in Section 5, the number of such plant required on-site will be limited and under normal operation, equipment with proper maintenance is unlikely to cause significant dark smoke emissions and gaseous emissions are expected to be minor. Thus, the Air Quality Objectives (AQOs) are not expected to be exceeded. Notwithstanding, plant should be regularly maintained to minimise emissions.

4.5.1.2 The principal source of air pollution during the construction phase will be dust from exposed site areas, stockpiling, movement of vehicles along unpaved roads, excavation for the tank foundations and handling of construction materials, all of which will be particularly relevant during the dry season. However, it should be noted that the foundations for the 6 tanks within the bund closest to the seafront have already been constructed and as such future dusty activities will be largely associated with works for the remaining tanks in the second bunded area.

4.5.1.3 The Fugitive Dust Model (FDM) has been adopted to predict dust emissions from the construction activities. This model is based on a Gaussian dispersion formulation, which incorporates an improved gradient-transfer deposition algorithm. Particulate emission rates for the identified potential dust sources would be determined as “heavy construction operations” in accordance with the Compilation of Air Pollution Emission Factors (AP-42) (USEPA, 5th edition, 1995). Based upon a 26 day working month, the emission factor is calculated to be 2.69 Mg/hectare/month of activity (AP-42, Section 13.2.3.3), the dust emission rate is calculated as shown by the following equation:

$$2.69\ E+6\ /\ (10000*2500*26day*12hours*3600s) = 0.5987\ g/s = 0.000239\ g/m^2/s$$

4.5.1.4 Dust emissions from a maximum active construction area of 50m x 50m at any time has been assumed. As mentioned above, the foundations for the 6 tanks in the bund closest to the sea front have already been constructed. As such, the works for the tanks in the remaining area will create the key dusty activities. In order to assess the worst case scenarios for the adjacent sensitive receivers, dust emissions from two active work areas in this second bund have been modelled. The first 50m x 50m construction area is located at the site of the top left-hand tank closest to Shiu Wing Steel. It should be noted that while this tank will not be constructed in Phase I of the tank farm development and is only programmed for construction in Phase II after 2030, this location represents the worst case location for predicting impacts at Shiu Wing Steel. The second 50 x 50m works area is located at the site of the largest tank in the bottom left hand corner of the second bund which is the worst case location for any impacts on the EcoPark. Table 4.3 shows the particle size distribution used for this assessment based on AP-42 with an average dust density of 1600 kg/m^3:

Table 4.3 Particle Size Distribution

Particle diameter (μm)	Mass fraction (in %)
0-1	4
1-2	7
2-2.5	4
2.5-3	3
3-4	7
4-5	5
5-6	4
6-10	17
10-30	49

4.5.1.5 Owing to the relative complex terrain of the study area, micro-meteorological conditions (e.g. local wind direction and speed) are not likely followed by the conditions measured in the nearest meteorological station. In view of this, the worst case wind direction, based upon 10 degree increment, and assumed to be blowing the direction of the sensitive receivers has been adopted. Low wind speed will reduce the source strength and the ability of atmospheric dilution of the wind-blown dust. However, the opposite case holds during high wind speed situation. Therefore, a wind speed of 1 m/s is used. Atmospheric stability class D is used only since daytime construction activity only is assumed.

4.5.1.6 Both 1-hour and 24-hour TSP concentrations at representative ASRs within the study area have been determined, based upon the worst case scenario that construction activities would be carried out continuously for 12 hours per day. 1-hour concentration levels are read directly from the model output and 24-hour average dust levels are calculated by multiplying a factor of 0.6 [8] from the 1-hour dust levels. The concentration at 1.5m above ground of each ASR has been determined. The modelling results are shown in Appendix C1.

4.5.2 *Construction Air Quality Assessment*

4.5.2.1 The maximum predicted unmitigated 1-hour and 24-hour TSP concentrations at representative ASRs in the study area is shown in Table 4.4. Table 4.4 includes 2 numbers for each assessment, the first representing the impact from the active area closest to Shiu Wing Steel and the second from the active area closest to the EcoPark. The predicted TSP levels in Table 4.4 show that an exceedance of the 24-hour (260 $\mu g/m^3$) criteria will occur at SR3d and exceedances of both the 1-hour (500 $\mu g/m^3$) and 24-hour (260 $\mu g/m^3$) criteria will occur at SR1, SR3b and SR3c without mitigation. Thus, mitigation measures will be required. Mitigated dust contours for 1-hour TSP predictions are presented in Figures 4.2a and 4.2b for the active areas closest to Shiu Wing Steel and the EcoPark respectively and in Figures 4.3a and 4.3b for 24 hour TSP predictions for the active areas closest to Shiu Wing Steel and the EcoPark respectively. Mitigated dust impacts are within acceptable criteria at all locations.

Table 4.4 1-hour and 24-hour maximum TSP concentrations ($\mu g/m^3$) at ASRs (including background level)

Receiver Reference	Maximum (1-hour) Concentration (Standard 500 $\mu g/m^3$)		Maximum (24-hour) Concentration (Standard 260 $\mu g/m^3$)	
	Unmitigated	Mitigated*	Unmitigated	Mitigated*
SR1	577 / 233	210 / 125	381 / 175	161 / 110
SR2	129 / 116	99 / 95	112 / 104	94 / 92
SR3a	290 / 243	139 / 127	209 / 181	118 / 111
SR3b	305 / 603	142 / 217	218 / 397	121 / 165
SR3c	308 / 1065	143 / 333	220 / 674	121 / 235
SR3d	293 / 461	139 / 182	211 / 311	119 / 144

Note: * Adopted 75% dust reduction.

4.5.3 *Mitigation Measures During Construction*

4.5.3.1 In accordance with the Air Pollution Control (Construction Dust) Regulation, the Contractor will be required to ensure that dust control measures stipulated in the Regulation should be implemented to control dust emissions. Based upon this, the following dust control measures are recommended for inclusion into the Contract Specification as good construction practice. These measures are also summarised in the Environmental Mitigation Implementation Schedules in Appendix B.

(i) all unpaved roads/exposed area shall be watered which results in dust suppression by forming moist cohesive films among the discrete grains of road surface material. An effective watering programme of once every 1.5 hours is estimated to reduce the dust emission by 75% and shall be undertaken during site formation, stock piling, dusty material handling and excavation works in the vicinity of SR1, SR3b, SR3c and SR3d. This is recommended to reduce dust levels to a minimum. This measure has been included in the predicted values given in Table 4.4;

(ii) The Contractor shall, to the satisfaction of the Authority's Representative, install effective dust suppression measures and take such other measures as may be necessary to ensure that at the site boundary, dust levels are kept to acceptable levels;

(iii) The Contractor shall not burn debris or other materials on the works areas;

(iv) provide site hoarding not less than 2.4m at site boundary;

(v) in hot, dry or windy weather, a watering programme shall maintain all exposed road surfaces and dust sources wet;

(vi) dust creating activities shall be reprogrammed to avoid periods of high winds;

(vii) where breaking of oversize rock/concrete is required, watering shall be implemented to control dust. Water spray shall be used in dry conditions during the handling of fill material at the site and at active cuts, excavation and fill sites where dust is likely to be created;

(viii) open dropping heights for excavated materials shall be controlled to a maximum height of 2m to minimise the fugitive dust arising from unloading;

(ix) during transportation by truck, materials shall not be loaded to a level higher than the side and tail boards, and shall be dampened or covered before transport. Materials having the potential to create dust shall not be loaded to a level higher than the side and tail boards, and shall be covered by a clean tarpaulin. The tarpaulin shall be properly secured and shall extend at least 300mm over the edges of the side and tail boards;

(x) no earth, mud, debris, dust and the like shall be deposited on public roads. Wheel washing facility shall be usable prior to any earthworks excavation activity on the site;

(xi) areas of exposed soil shall be minimised to areas in which works have been completed shall be restored as soon as is practicable;

(xii) all stockpiles of aggregate or spoil shall be enclosed or covered and water applied in dry or windy conditions; and

(xiii) provide awareness training in the need to minimise dust.

4.6 Operational Air Quality Impact Assessment

4.6.1 *General*

4.6.1.1 Fugitive emissions are possible from valves, including pressure release valves, and pumps within the PAFF distribution system. Emissions from valves occur mostly as a result of vapours passing through the valve stem seals, stuffing box and packing, while emissions from pumps occur largely through the pump shaft. Emissions from relief valves will be directed to the storage tanks and will discharge directly to atmosphere.

4.6.1.2 In the case of the valves and pumps, such emissions can be controlled by the use of appropriate seals. In both cases, low emission valve packings for valves and pump seals, when properly installed and maintained, can achieve a high degree of emissions control and their use will minimse any fugitive emissions to atmosphere when combined with a programme of regular maintenance. In respect of pressure release valves, it will be necessary to instigate an inspection programme to ensure that the relief valve has properly closed after each release.

4.6.1.3 Based upon the integration of low emission seals and the visual inspection programme, no significant impacts are predicted.

4.6.1.4 Emissions from the fuel storage tanks occur during the normal passive venting of the tanks as a result of temperature changes and also more rapidly when the tank is being filled, forcing the headspace vapour out of the vent. Vapour formed by the evaporation of the fuel will be diluted in the head space of the tank, and further diluted in the open air when it is forced out of the free vents of the tank. Thus, the concentration of the vapour when reaching the open air would be very low and not considered as having any significant impact on air quality. Aviation fuel is a mixture of aliphatic hydrocarbons and some aromatic hydrocarbons and naphthalene derivatives. However, there are no applicable ambient air quality standards relating to the components of aviation fuel and as such significant air quality impacts are not anticipated. Benzene emissions will not occur as this substance does not form part of the Jet A1 aviation fuel composition.

4.6.1.5 However, the Jet A1 aviation fuel being stored in the tanks is a potential source of odour and could, therefore, represent an odour nuisance. The odour from the tanks escapes to atmosphere by a process of evaporative loss of aviation fuel through three open vents in the tank roof. The tanks for the PAFF will comprise a Fixed Roof (FR) design. The total height of the tanks is 24.7m but it should be noted that part of the tank will be positioned in the ground and as such only 23m will protrude above ground level. As such while the tank height of 24.7m has been used in calculating the emission volume, a tank height of 23m has been used as a conservative assumption for the emission height for the modelling.

4.6.1.6 Emissions from organic liquids in storage occur because of evaporative loss of the liquid during its storage (known as breathing losses or standing storage losses) and filling and emptying operations (known as working losses). Storage loss is the explusion of vapour from a tank through vapour expansion and contraction, which are the results of changes in temperature and barometric pressure. This loss occurs without any liquid level change in the tank. For the working loss, evaporation during filling operations is a result of an increase in the liquid level in the tank. As the liquid level increases, the pressure inside the tank exceeds the relief pressure inside and vapours are expelled from the tank. Loss during emptying occurs when air drawn into the tank during liquid removal becomes saturated with organic vapour and expands, thus exceeding the capacity of the vapour space. [5]

4.6.1.7 All emissions have the potential to release fuel vapour into the surrounding environment and have odour implications. Thus, odour modelling of the fuel emissions from the tank farm has been undertaken to determine the concentrations at the boundary of the site and the identified ASRs.

4.6.1.8 During the operational stage, tankers delivering the fuel will also release emissions into the atmosphere. As shown in Table 3.3 in Section 3, the maximum delivery rate in 2040 will be an average of 3.6 tankers per week, rising from about 3 vessels per week at the commissioning of the PAFF. In comparison, the existing marine traffic in this area is about 35 vessels per hour, or 1680 vessels per week, based upon a conservative 8 hours per day, and this rate would be expected to significantly rise over the next 35 years. The PAFF vessels at the commissioning date will form only about 0.2% of the total marine traffic. While some of these vessels are small and would not be expected to generate the same emission levels, the volume of existing traffic in comparison to that projected for the PAFF is so much higher that the PAFF vessels would not yield any significant marine traffic emission impacts in this area.

4.6.2 *Odour Modelling Methodology*

4.6.2.1 The odour threshold value for Jet A1 fuel has been reported as 5.4 mg/m^3 [3, 4] and based upon this, the 2 odour unit equivalent corresponds to a concentration of 10.7 mg/m^3. An odour unit is the measuring unit of odour level and is analogous to pollutant concentration. In this context, the odour level is defined as the ratio of the volume which the sample would occupy when diluted with air to the odour threshold, to the volume of the sample. In other words, one odour unit is the concentration of the odorant which just induces an odour sensation [2].

4.6.2.2 The methodologies presented in American Petroleum Institute (API) Publication 2518, which is equivalent to the methodology in AP-42 [5], Chapter 7, has been applied in order to determine the evaporative losses from the tank farm. In this respect, the worst case scenario based upon the ultimate capacity of the tank farm of 12 tanks by 2040 has been assumed, together with the corresponding annual fuel throughput, as shown by the demand figures in Table 3.1.

4.6.2.3 Odour dispersion is modelled by the Industrial Source Complex Short Term model (ISCST3). Owing to the relative complex terrain of the study area, micro-meteorological conditions (e.g. local wind direction and speed) are not likely followed by the conditions measured in the nearest meteorological station. In view of this, the worst case wind direction (based upon 10 degree increment), wind speed (i.e. 1m/s) and stability classes D (for daytime) and F (for nighttime) have been adopted in the model. The outlet vents will be positioned on the top of the tanks and the layout of the tanks within the site is shown in Figure 3.2c.

4.6.2.4 The evaporative losses from each of the 12 tanks has been calculated to be 0.122 g/s. The fugitive emissions of fuel vapour are modelled as volume sources with length 250 mm as the diameter of the vent. Thus, each volume source has an initial lateral dimension (σ_{yo}) of 58 mm (250mm/4.3) and an initial vertical dimension (σ_{zo}) of 11.5m (24.7m/2.15). Assumptions on the physical properties of the tanks required for the calculation of evaporative losses are detailed in Appendix C2, together with a sample calculation.

4.6.2.5 In order to calculate the 5-second average concentration, the hourly averaged concentrations predicted by ISCST3 are first converted to 3-minute average concentrations using the formula below [6]:

$$C_L / C_S = (t_S / t_L)^n$$

where
- C_L and C_S are the time averaged odour concentrations in longer and shorter periods respectively;
- t_L and t_S are the longer and shorter time averaging periods respectively; and
- n is an exponential value which depends upon the stability class (i.e. 0.2 for class D and 0.167 for class F).

4.6.2.6 The 3-minute average concentrations can be converted to 5-second average concentrations by multiplying by a factor of 5 [7].

4.6.3 *Odour Modelling Results and Assessment*

4.6.3.1 The odour modelling input and output files are provided in Appendix C and summarised in Table 4.5 below. Figures 4.4 to 4.7 show the predicted maximum 5-second odour level plots in the proposed site area at 1.5m, 23m and 30m above local ground. Although the heights of 23m and 30m above the ground may not be realistic for all receivers, it can show the maximum odour levels vertically. The maximum odour level, based upon the worst case scenario of maximum throughput of fuel and 12 tanks (the ultimate storage capacity), is 0.42 OU during the daytime at SR3b which is far less than the required limit of 5 OU. Therefore, no significant odour impacts on the surrounding environment from the operation of the PAFF are predicted and no mitigation measures are required.

Table 4.5 Maximum (5-second) concentrations (OU) at ASRs

Receiver Reference	Maximum (5 second) Concentration (Standard 5 OU)					
	Day-time, at 1.5m	Day-time, at 23m	Day-time, at 30m	Night-time, at 1.5m	Night-time, at 23m	Night-time, at 30m
SR1	0.24	0.28	0.24	0.22	0.39	0.32
SR2	0.19	0.16	0.14	0.16	0.19	0.17
SR3a	0.27	0.32	0.27	0.14	0.26	0.21
SR3b	0.28	0.42	0.34	0.20	0.40	0.32
SR3c	0.25	0.33	0.28	0.17	0.33	0.26
SR3d	0.30	0.36	0.30	0.19	0.36	0.29

4.7 Operational Mitigation Measures

4.7.1 No adverse odour impacts are predicted during the operational phase and as such, no mitigation measures are required. Notwithstanding, as the tank farm represents a specified process under Part IV of the APCO, the corresponding requirements of the APCO should be adhered to during the operation of the tank farm.

4.8 Cumulative Impacts

4.8.1 It should be noted that construction works for Phase I of the EcoPark is scheduled for completion in mid 2007 and Phase II of the EcoPark is likely to be constructed between the end of 2008 and the end of 2009. However, while commencement of construction of Phase I for PAFF is scheduled for about March 2007, the initial works will relate to superstructure works for the tanks in the bund closest to the seafront, for which the foundations have already been constructed, because of the need to gain Buildings Department approval for the new tanks foundations. As such, foundation works for the remaining 4 tanks in the second bunded area, which are likely to be the key dusty activity, are not likely to commence until late 2007 and will last for approximately 2 months. As such these works are unlikely to coincide with any construction works for the EcoPark and, therefore, cumulative impacts are not predicted.

4.8.2 As detailed in the Expansion and Extension of the Fill Bank at Tuen Mun Area 38 Project Profile, December 2004, quantitative assessment of worst case dust impacts from the Fill bank, EcoPark and PAFF determined that with the implementation of dust mitigation measures in accordance with the Air Pollution Control (Construction Dust) Regulation at the Fill Bank, both 1 hour and 24 hour TSP concentrations would be controlled to within the relevant criteria. In addition to this, it should be noted that, as detailed in Section 4.5.3 above and in the EcoPark EIA, dust measures in accordance with the Air Pollution Control (Construction Dust) Regulation will also be implemented by both the PAFF and EcoPark during construction. As such, no significant cumulative impacts are predicted should any concurrent activities occur.

4.8.3 In terms of cumulative operational odour impacts, the operational odour from the PAFF is related to the emission of aviation fuel being vented from the storage tanks. Aviation fuel will not be used on the EcoPark or any other adjacent land use and as such cumulative odour impacts are not predicted for the operational phase.

4.9 Residual Impacts

4.9.1 Adverse residual impacts are not predicted during the construction and operational phases provided that the recommended mitigation measures are implemented.

4.10 Environmental Monitoring and Audit

4.10.1 The assessment has concluded that no sensitive receivers will be affected by construction dust, although mitigation measures have been proposed to reduce dust levels to a practical minimum. Based upon this, no dust monitoring is considered necessary during the construction phase. However, in order to ensure dust is kept to a minimum, audit of the construction activities is recommended during the construction phase. Fugitive emissions during the operational stage will be controlled by integrated measures and regular inspections and are not predicted to yield concentrations that would lead to significant air quality impacts. In addition, odour impacts from tank venting are not predicted to give rise to adverse effects. Thus, EM&A during the operational phase is not considered to be required. EM&A requirements during the construction phase are described in more detail in Section 15 of this report and in the EM&A Manual.

4.11 References

[1] Hydrocarbon Emissions for Gasoline Storage and Distribution Systems. CONCAWE Report No. 85/54, 1986.

[2] Operational Phase Key Issues Assessment of CRPC South East TsingYi – Petroleum Terminal Tsing Yi Island – Hong Kong – Final Report. (EIA-043/BC)

[3] Compilation of Odour Threshold Values in Air and Water. Central Institute for Water Supply and Central Institute for Nutrition and Food, Netherlands, June 1977.

[4] Chemical Hazard Response Information (CHRIS) – Hazardous Chemical Data. U.S. Dept. of Transportation. (1984)

[5] Compilation of Air Pollutant Emission Factors – Volume 1: Stationary, Point and Area Sources (AP-42) 5th Edition. USEPA.

[6] Duffee, R.A., O'Brien, M.A., Ostojic, N., 1991, Odour Modelling: Why and How, Transactions -Air & Waste Management Association, Pittsburgh, Pennsylvania, 1991. In recent Developments and Current Practices in Odour Regulations, Control and Technology. Edited by D.R. Derenzo and A. Gnyp.

[7] Ontario Ministry of Environment (OME), 1996, Odour Impacts - An Overview. Science and Technology Branch, Environmental Engineering Services, STB Technical Bulletin No. EES-1, February 1996.

[8] Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised, USEPA, EPA-454/R-92-019.