



SUPARCO

**AMBIENT AIR QUALITY MONITORING
FOR LNG TERMINAL AND JETTY
KORANGI FISH HARBOUR**

ANNEX VI

**PAKISTAN SPACE & UPPER ATMOSPHERE RESEARCH
COMMISSION**

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1. INTRODUCTION:

Proposed Plant Site is located near Karachi Fish Harbour, in East Karachi. The environmental parameters at the Project site were measured by Pakistan Space and Upper Atmosphere research Commission (SUPARCO).

Man-made Pollution sources cover a wide spectrum of chemical and physical activities and the major contributors to urban air pollution. Also a threat to the clean air is posed by the petrol and diesel fired machinery including generators, engines etc. The burning of these fossil fuels in these machinery results in emission of a wide variety of pollutants, principally carbon monoxide (CO), oxides of nitrogen (NOx), oxides of sulphur and particulates (TSP/PM10). The presence of these pollutants in ambient air has an adverse impact on the air quality and health of human beings. The met. Conditions (Wind speed, Wind Direction, Temperature, Relative Humidity) affect the dispersion of the emitted pollutants. The expected health impacts associated with the air pollution are asthma, chronic lungs diseases and respiratory problems.

2. METHODOLOGY:

SUPARCO collected the data on ambient air at Proposed site near **Karachi Harbour** by using USEPA designated monitoring equipment.

2.1 Data Acquisition

- a) Criteria pollutants CO, , NOx, SO2, TSP & PM10 as well as CO2 along with meteorological parameters and noise level at the site.
- b) The measurements were within the following detection limit;

Table: 2.1; Concentration limits of different Equipment.

Pollutants	Concentration Limits
SO2	~1 ug/m3
CO	< 0.5 ug.m3
Nox	~ 1 ug/m3
CO2	<1 %
Ozone (O3)	~ 2 ug/m3
TSP/PM10	~ 5 ug/m3

- c) Interval of measurement was of 15 minute and duration of measurement of each pollutants (CO, CO2, NOx, SO2) was 24 hours. The samples of TSP & PM10 were collected on Whatman 41 filter for 24 hrs at the site.
- d) Units of measurement for air pollutants were ug/m³ for TSP & PM10 and ppm & ppb for gaseous pollutants.
- e) USEPA Methods/procedures for monitoring the air quality were used (Table 2.2).

2.2 Ambient Air Monitoring Methods:

Table: 2.2; Ambient Air Monitoring Methods.

Pollutants	Methods	Title of US EPA 40 CFR
NO _x	Reference Method in Appendix F of 40 CFR Part 50	Chemiluminescence
SO ₂	Ambient Monitoring Reference & Equivalent Method of 40CFR Part 52	Fluorescence Method
CO	Method in Appendix C of 40 CFR Part 50	IR Gas Filter Correlation
O ₃	Method in Appendix D of 40 CFR Part 50	UV Photometry
CO ₂	Method in Appendix C of 40 CFR Part 50	IR Gas Filter Correlation
TSP	Reference Method in Appendix B of 40 CFR Part 50	Gravimetric Method
PM10	Reference Method in Appendix J of 40 CFR Part 50	Gravimetric Method

2.3 Work Program

The work plan followed for data acquisition was as under;

Traveling date	:	12-09-2007
Commencing Date	:	12-09-2007
Completion Date	:	13-09-2007
Duration	:	24 hrs
Monitoring Sites	:	01 (Proposed Site Near Karachi Harbour)
Monitoring Officers	:	Muhammad Khalid (P.S.A-I)
	:	Abdul Mannan (Sub Eng -I)

2.4 Data Acquisition Plan

Starting Date	:	12-09-2007
Starting Time	:	11:00
Completion Date	:	13-09-2007
Completion Time	:	11:00
Sampling Duration	:	24Hrs

2.5 Site Selection Criteria:

Following considerations were taken into for site selection;

- Site representative of major contributors of air pollutants.
- Projected area for future development.

3. AMBIENT AIR QUALITY STANDARDS:

Table: 3; Ambient Air quality Standards

Pollutants	USEPA		WHO		World Bank		NEQS (Proposed 1999)	
	Averaging Time	Standard	Averaging Time	Standard	Averaging Time	Standard	Averaging Time	Standard
SO2	24 HRS	365ug/m ³ (140 ppb)	24 HRS 1 HR	90 ug/m ³ (34 ppb) 350 ug/m ³	ANNUAL MEAN 24 HRS	100 ug/m ³ (38 ppb) 500 ug/m ³	ANNUAL MEAN 24 HRS	100 ug/m ³ (38 ppb) 400 ug/m ³
CO	8 HRS 1 HR	10 mg/m ³ (9 ppm) 40 mg/m ³	8 - HRS	10 mg/m ³ (8.7 ppm)	-	-	-	-
NOx	ANNUAL MEAN	100 ug/m ³ (53 ppb)	1 HR	190-320 ug/m ³	ANNUAL MEAN	100 ug/m ³ (50 ppb)	ANNUAL MEAN	100 ug/m ³ (53 ppb)
O3	1 HRS	235ug/m ³	8 HRS 1 HR	120 ug/m ³ 200 ug/m ³	-	-	-	-
TSP	24 HRS	260 ug/m ³	24 HRS	150-230 ug/m ³	ANNUAL MEAN 24 HRS	100 ug/m ³ 500 ug/m ³	-	-
PM10	24 HRS	150 ug/m ³	-	-	-	-	-	-

4. AMBIENT AIR QUALITY MONITORING INSTRUMENTS:

S.N	Name of equipment	Principle of Operation
1.	Ozone Analyzer with Calibrator	Ozone Analyzer determines the amount of ozone in a gas sample by measuring the amount of UV light absorbed by the sample. The measuring range is 0-0.5ppm, 0-1.00ppm & 0-5.00ppm.
2.	CO Analyzer with Calibrator	Gas Filter Correlation- sources using infrared radiation. measuring range is 01,2,5,10,20,50,100,200, 500, 1000 ppm.
3.	CO2 Analyzer with Calibrator	Gas Filter Correlation-source using infrared radiation The measuring range is 0-1,2,5,10,20,50,100, 200,500, 1000 ppm

4.	NO, NO2 (NOx) Analyzer with Calibrator	Chemiluminescent Method. The Measuring rang is 0-0.05,0-0.10, 0-0.20, 0-0.50, 0-1.00, 0-2.00,0-0.500 ppm,
5.	SO2 Analyzer with Calibrator	Employs the ultraviolet(UV) fluorescent measurement Technique.
6.	Sound Level Meter	Preamplifier detects sound level with the help of microphone. The measuring range is 30 -130 dB.
8.	High Volume Samplers with PM10 and PM2.5 Size Inlet	Gravimetric of SPM monitoring

4A. Calibration: All the equipments were calibrated before starting of monitoring as per USEPA guidelines

5. SITE PLAN:

Please see Site Plan Map of the plant at Annexure-1

6. AMBIENT AIR QUALITY DATA:

Site Name : Proposed Site Near Karachi Harbour

City Name : Karachi (Sindh)

6.1 GASEOUS POLLUTANTS (MINI-MAX, AVR FOR 24 HRS)

	SO2 (ppb)	NOx (ppb)	CO2 (ppm)	CO (ppm)	Noise (dB)	W. Speed (m/s)	Humidity (%)
Mini.	5	9	282	0.71	51	4.3	50
Max.	11	17	317	1.8	61	6.8	95
Avr.	8.1	11.9	300.8	0.9	54	5.8	74

6.2 AMBIENT AIR QUALITY DATA (See Annexure-II)

6.3 PARTICULATE MATTER (TSP)

Date	Filter Paper No	Time Duration	Time		Air Volume (m3)	Weight (gm)			Conc. (µg/m³)
			Start	Stop		Before	After	Net	
12-09-07	S-003	24 hrs	11:00	11:00	1008	3.941	4.116	0.175	173.6

6.4 PARTICULATE MATTER (PM10)

Date	Filter Paper No	Time Duration	Time		Air Volume (m3)	Weight (gm)			Conc. (µg/m3)
			Start	Stop		Before	After	Net	
12-09-07	S-002	24 hrs	11:00	11:00	1008	4.018	4.112	0.094	93.3

7. GENERAL COMMENTS:

Proposed site was located near the Karachi Harbour, in East Karachi. The average observed levels of Total Suspended Particulate (TSP) and PM10 were 173.6 ug/m3 & 93.3 ug/m3 respectively. These concentrations were well with in the prescribed limits for TSP (260 ug/m3 for 24 hrs) & PM10 (150 ug/m3 for 24 hrs) of USEPA. The measured mean concentrations of gaseous pollutants were, 0.9 ppm for CO, 8.1 ppb for SO₂, 11.9 ppb for NO_x and 300.8 ppm CO₂. All these levels of gaseous pollutants were well also within limits of USEPA and the prescribed limits of International Standards (see Table 3 for reference) for ambient air quality like USEPA, WHO and World Bank. The major source of contribution to these levels of pollutants were emissions from long distance transport of urban air pollution of nearby population as the monitoring site was in the down wind of the population, etc. The mean noise level at the site was 54 dB. These data also show the absence of a immediate source close to the proposed site further substantially strong winds had diluting and dispersive effect on pervading pollution levels.

8. CONCLUSION:

The levels of the pollutants CO, SO₂, NO_x, CO₂, TSP & PM10 were within prescribed limits of International Standards for ambient air quality like USEPA, WHO and World Bank.

Annexure-II

**Pakistan Space and Upper Atmosphere Research Commission
Ambient Air Monitoring Data Sheet**

**SITE: Proposed Site Near Karachi Harbour
CITY: Karachi**

DATE : 12-09-2007

Date	TIME	SO2 (ppb)	NOx (ppb)	CO2 (ppm)	CO (ppm)	N. Level (dB)	Temp. (deg. C)	W. Speed (m/s)	W. Dir (degree)	Humidity (%)
12/9/2007	11:00	11	14	305	1.1	59	33	6.3	295	50
	11:15	11	12	313	1.2	59	32	5.3	286	50
	11:30	10	14	311	1	57	33	5.2	325	50
	11:45	11	14	310	1.1	59	33	5.9	342	51
	12:00	11	12	310	1.1	56	32	5.6	298	51
	12:15	11	13	307	0.98	58	32	5.7	296	51
	12:30	11	12	304	0.99	57	32	5.3	278	51
	12:45	11	14	302	0.97	55	32	5.9	285	53
	13:00	10	14	302	0.97	55	31	5.8	278	53
	13:15	10	14	300	0.98	52	31	5.6	285	53
	13:30	10	12	304	0.98	51	31	5.5	287	54
	13:45	9	14	299	0.98	55	32	5.4	278	55
	14:00	10	13	301	0.96	53	31	5.9	298	55
	14:15	9	14	300	0.96	51	31	6.2	296	55
	14:30	9	12	305	0.98	55	31	6.3	295	56
	14:45	9	12	305	0.95	52	31	6.2	278	58
	15:00	9	12	304	0.95	56	31	6.1	285	59
	15:15	9	13	302	0.95	58	32	6.3	287	60
	15:30	9	12	304	0.95	57	30	6.2	285	60
	15:45	9	12	304	0.95	55	31	6.6	286	62
	16:00	8	11	311	0.94	53	30	6.3	279	63
	16:15	8	12	300	0.95	51	28	6.5	285	62
	16:30	8	12	300	0.94	55	28	6.2	284	65
	16:45	8	11	299	0.96	57	24	6.6	285	65
	17:00	8	11	301	0.96	56	22	5.6	278	67
	17:15	8	11	299	0.95	52	20	5.8	274	69
	17:30	8	11	299	0.94	51	18	6.2	275	70
	17:45	8	11	300	0.96	55	17	6.2	285	78
	18:00	9	10	301	0.92	53	17	6.1	278	79
	18:15	8	12	300	0.91	55	17	5.9	274	80
	18:30	8	11	297	0.89	57	16	5.2	279	80
	18:45	8	11	297	0.95	55	16	5.3	285	84
	19:00	8	10	295	0.91	56	16	5.6	278	86
	19:15	8	10	295	0.89	51	15	5.4	285	86
	19:30	8	10	297	0.84	52	15	4.6	287	89
	19:45	8	11	296	0.89	57	15	6.8	285	89
	20:00	7	10	297	0.89	53	15	6.7	278	89
	20:15	7	10	296	0.87	55	15	6.2	285	89
	20:30	7	10	296	0.86	51	15	6.5	278	90
	20:45	8	10	296	0.86	56	15	5.3	285	90
	21:00	7	10	294	0.86	51	15	5.2	278	91
	21:15	8	10	304	0.84	55	15	5.9	287	91
	21:30	7	10	296	0.84	52	15	5.3	285	93
	21:45	7	9	301	0.85	51	15	5.1	289	93

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Annexure-II

**Pakistan Space and Upper Atmosphere Research Commission
Ambient Air Monitoring Data Sheet**

SITE: Proposed Site Near Karachi Harbour

DATE : 12-09-2007

CITY: Karachi

Date	TIME	SO2 (ppb)	NOx (ppb)	CO2 (ppm)	CO (ppm)	N. Level (dB)	Temp. (deg. C)	W. Speed (m/s)	W. Dir (degree)	Humidity (%)
12/9/2007	22:00	7	9	294	0.82	53	15	5.3	295	93
	22:15	7	9	289	0.82	51	15	5.2	296	93
	22:30	8	9	300	0.82	52	15	5.3	287	94
	22:45	7	9	294	0.83	51	15	5.2	285	94
	23:00	7	9	300	0.81	52	14	5.1	278	94
	23:15	7	9	299	0.79	51	14	5.4	285	94
	23:30	7	9	301	0.79	55	14	5.3	287	95
	23:45	6	9	293	0.81	51	14	5.1	285	95
13/9/2007	0:00	6	9	294	0.79	53	14	5.3	289	95
	0:15	6	9	296	0.8	51	14	5.1	285	95
	0:30	6	9	290	0.78	61	14	5.3	287	95
	0:45	6	9	297	0.74	52	14	5.1	285	95
	1:00	6	9	297	0.79	53	14	5.3	278	95
	1:15	6	9	289	0.78	51	14	5.6	274	95
	1:30	6	9	294	0.74	52	14	5.2	275	95
	1:45	6	10	289	0.75	55	14	5.3	278	95
	2:00	6	9	294	0.74	56	13	5.9	278	94
	2:15	5	9	290	0.75	51	13	5.1	274	94
	2:30	6	9	293	0.73	55	13	6.1	275	94
	2:45	6	9	289	0.74	57	13	5.4	279	95
	3:00	6	10	286	0.78	55	13	6.2	289	93
	3:15	6	11	282	0.74	52	13	6.5	285	91
	3:30	6	10	293	0.72	51	14	6.1	287	89
	3:45	6	11	294	0.71	57	13	5.1	285	89
	4:00	6	11	297	0.78	56	13	5.3	289	85
	4:15	7	12	296	0.72	52	14	5.4	286	84
	4:30	7	11	299	0.78	51	13	4.3	287	85
	4:45	8	13	295	0.81	55	13	5.6	285	85
	5:00	7	13	296	0.85	53	13	5.2	285	81
	5:15	8	13	301	0.84	51	13	5.6	289	79
	5:30	7	12	301	0.85	55	13	5.2	285	75
	5:45	7	14	304	0.85	52	14	5.3	289	75
	6:00	7	14	305	0.89	56	14	6.3	287	74
	6:15	7	14	306	0.85	52	16	6.2	285	73
	6:30	8	15	310	0.87	51	15	6.1	286	71
	6:45	8	14	304	0.85	55	17	6.2	285	69
7:00	8	14	304	0.89	56	17	6.3	285	69	
7:15	8	15	311	0.91	52	17	6.2	285	68	
7:30	8	15	302	0.92	51	19	6.2	287	65	
7:45	8	15	304	0.95	55	19	6	285	61	

ANNEX VI

Annexure-II

**Pakistan Space and Upper Atmosphere Research Commission
Ambient Air Monitoring Data Sheet**

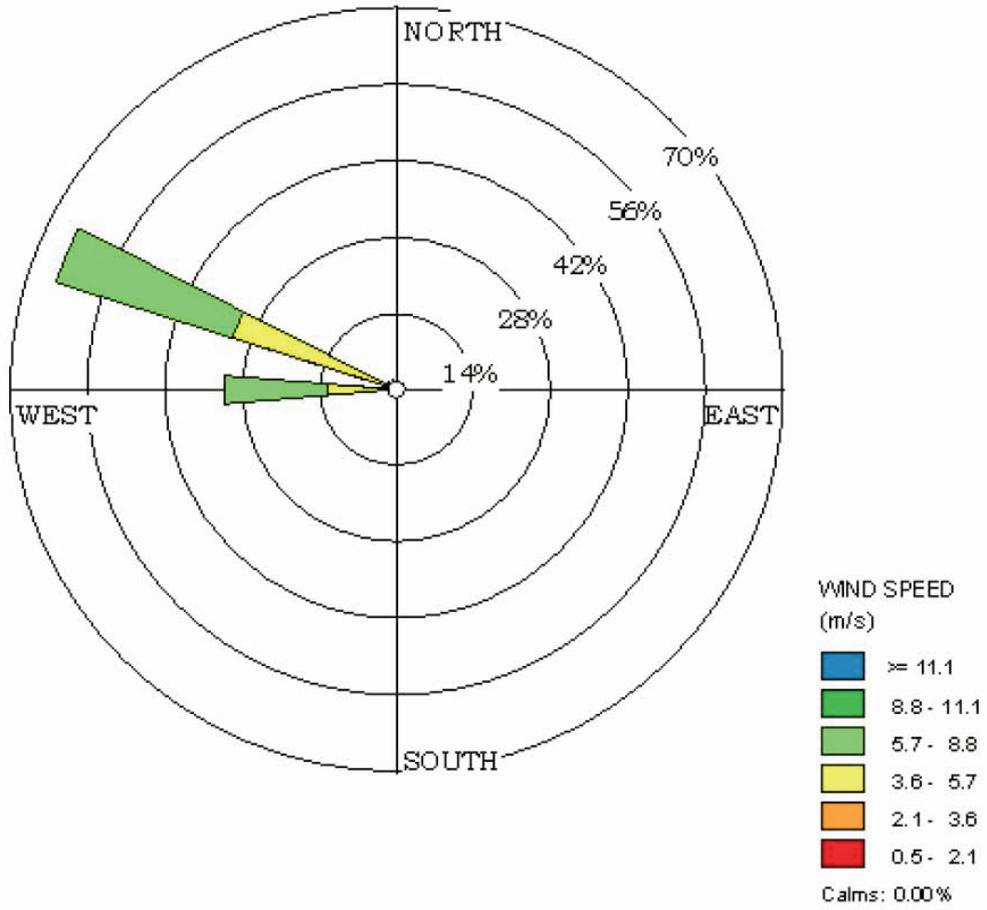
**SITE: Proposed Site Near Karachi Harbour
CITY: Karachi**

ATE : 12-09-2007

Date	TIME	SO2 (ppb)	NOx (ppb)	CO2 (ppm)	CO (ppm)	N. Level (dB)	Temp. (deg. C)	W. Speed (m/s)	W. Dir (degree)	Humidity (%)
13/9/2007	8:00	9	16	311	0.98	56	19	6.3	286	59
	8:15	10	15	313	0.96	52	21	6.5	285	57
	8:30	9	16	306	0.98	57	21	6	287	54
	8:45	9	16	304	0.98	55	22	6.2	285	54
	9:00	10	16	311	1.1	52	22	6.2	289	53
	9:15	10	17	305	1.2	55	25	6.3	285	52
	9:30	10	17	314	1.1	51	27	6.2	284	52
	9:45	10	16	315	1.1	57	28	6.3	289	53
	10:00	11	16	315	1.1	56	30	6.2	289	52
	10:15	10	16	317	1.8	52	31	6.2	289	52
	10:30	10	16	316	1.1	55	30	5.9	287	51
	10:45	11	16	315	1.5	51	32	5.8	285	51

ANNEX VI

Proposed Site Near Karachi Harbour



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