[Data sheet] Instruction manual for general purpose gas analyzer unit [Item 3.4.2(4)]

# [Data Sheet] Analyzed data sheet for first field survey [Table 3.4.2-10(1)]

- 1. Sofal Jadid
- 2. Besat power plant
- 3. Tehran refinery 2H-101
- 4. Tehran refinery 2H-151
- 5. Tehran refinery 2H-181
- 6. Tehran refinery steam boiler
- 7. Tehran cement No.4
- 8. Tehran cement No.5
- 9. Tehran cement No.6
- 10. Tehran cement No.7

0

# Analyzed Data Sheet for Stationary Buission Sources

Analyzer: Messrs A. Ishizaka (JICA)

T. Nambu (JICA)

M. Agir (AQCC)

F. Goodaz (AQCC)

S. Hossini (AQCC)

M. Magidi (ORUSUITO)

Factory / Facility Name: Sofal Jadid

Address / Location : Ismaicl abad-savehring waySofal Jadid Co

Measuring Date : 22 , Sep . 1996

Item:	Heasuring Result	
Flow rate of wet flue gas	19600	m³n/h
Flow rate of dry flue gas	18200	m³ N/h
Temperature of flue gas	97	t
CO <sub>2</sub> Concentration	1.5	*
O <sub>2</sub> Concentration	19. 4	<b>%</b>
CO Concentration	60	ppm
Dust Concentration	0.005 >	g/m³N
NOx Concentration	22	bba
SOx Concentration	2	рÞш

#### Measurement of water content in flue gas

Measuring time		12:01 ~	12:05	12:08 ~ 12:13				
Gas volume	(Vm, L)	10.	0	10.0				
Gas meter temp.	(1m, t)	31.	8					
	m.1	107. 523	108. 881	109, 142	107. 785			
Moisture absorption	m.2	107. 013	108, 881	108, 622	107, 785			
tube	m.1-m.2	0.	510	0. 520				
Moisture content	(Xw, %)	7.	35	7. 48				
Kean	(Xw, %)		7.	4				

## Ressurement of component in flue gas

Measuring time	11:55
CO2 concentration (%)	1.5
O <sub>2</sub> concentration (%)	19. 4
CO concentration (ppm)	60
ro (kgf/m³)	1.26
Air ratio	12.8

Pa= 680 malig

#### Measurement of velocity

Measurin	ig time 14:50	~ 15:20	Pitot tube c	oefficient = 0.	850		
Point	h (mmAq)	Ps (mmAq)	r (kgf/m3)	Dt (t)	V (R/s)		
1	17.7	-4	0.831	97	17, 3		
2	17.7	-4	0. 831	97	17. 2		
<del></del>							
. :							
•	-						
				1			
	Mean	-4	0.831	97	17. 3		

# Measurement of dust concentration

Keasuri	ng time	14:50 ~ 15:20	15:28 ~ 16:58
Gas mete	er temp. (t)	31. 2	31.5
Gas volu	ume (Ym,L)	664, 0	663. 1
Gas volu	ume (Ym²,Ln)	533. 1	531.9
	Sampled (md2,g)	0. 0936	0.0952
weight	Unsampled (mdl,g)	0. 0931	0.0947
Collecte	ed dust (mad, g)	0.0005	0,0005
Dust co	ncentration(g/m³x)	0.0009	0.0009
Mean	(C <sub>N</sub> , g/m <sup>3</sup> <sub>N</sub> )	0.	0009

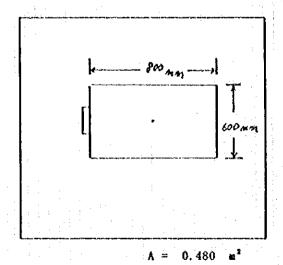
# Plow rate of equal velocity aspiration

No	Point	Flow rate (L/min)	No	Point	Flow rate (L/min)
1	1	22. 4	7	<u> </u>	
2	2	22.3	8		
3			9		
4			10		
5			11		
6			12		

Ressurement of NOx, SOx and O

Sampling Time	NOx (ppm)	SOx (рры)	02 (%)
16:15	23	2.0	16, 4
16:25	24	2. 2	16. 4
16:35	24	3. 0	16. 4
16:45	24	3. 4	16, 4
16:55	20	38.0	16.4
17:05	24	5. 0	16. 4
17:15	24	4. 0	16. 4
Mean	23	8. 2	16. 4

# Measuring point



Comment

# Fuel Combustion Analysis Fork Sheet

1.0	General information				· .	Rema	ark			
1.1	Date / Time	Day 2	22	Month 9	Year	96	Tipe	From	To	
1. 2	Weather	Clou	ıdy							1 1:
1.3	Pactory name	Sofe	al J	ladid						
1.4	Location	Isma	aiel	abad-s	aveh	rin	gway So	fal Jadi	d Co	:
1.5	Person in charge									
	- Name	Mr.	Abł	as Nade	ri					
	- Department									
	- Position									.:
<del></del>	- Tel No.						:			
					:			1		

2.0	Special information	Remark
2. 1	Fuel type	Netural gas
2. 2	Flow rate	4600 m <sup>3</sup> /day
2. 3	Combustion quantity	
2.4	Exhaust Temperature	
2.5	Height of stack	5m (Diameter of stack = 800mm * 600mm)
2.6	Others	

8

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# Analyzed Data Sheet for Stationary Emission Sources

Analyzer: Messrs A. Ishizaka (JICA)

T. Nambu (JICA)

F. Goodarz (AQCC)

S. Hossini (AQCC)

M. Magidi (ORUSUITO)

Factory / Facility Name: Besat power plant (No2)

Address / Location : Besat highway-against terminal-

district 16

Measuring Date : 24 . Sep . 1996

Item	Measuring Result	
Flow rate of wet flue gas	•	m³×/h
Flow rate of dry flue gas		m³n/h
Temperature of flue gas		t
CO <sub>2</sub> Concentration	5. 0	%
O <sub>2</sub> Concentration	12. 5	*
CO Concentration	N D	ppm
Dust Concentration	_	g/m³n
NOx Concentration	66	ppm
SOx Concentration	2	ppm
		iden og skalande og kansken for år skalande og for år skalande og for år skalande og for år skalande og for år

## Wensurement of water content in flue ges

Measuring time		~				•	~ ;	
Gas volume	(Vm, L)							
Gas meter temp.	(fn, T)					3		<u>, i</u>
	m • 1							
Moisture absorption	m.2			.!				
tube	m.1-m.2	 :			:			
Moisture content	(Xw,%)		:					
Kean	(Xw,%)	: .		. !				

# Measurement of component in flue gas

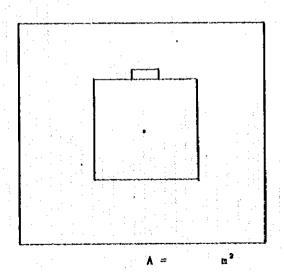
Measuring time	11:20
CO2 concentration (%)	5. 0
O2 concentration (%)	12.5
CO concentration (ppm)	N D
ro (kgf/m³)	
Air ratio	2. 32

Pa= - anHg

# Measurement of NOx, SOx and O:

Sampling Time	КОх (рри)	SOx (ppm)	02 (%)
11:34	66	1.9	12.4
11:44	66	2. 2	12. 3
11:54	64	2.0	12. 1
12:04	67	2. 0	12. i
12:14	66	2. 1	12. 4
12:24	65	2. 1	12. 4
12:34	65	2, 1	12. 3
Mean	66	2. 0	12. 3

# Measuring point



# Comment

Measurements of flow and dust concentration could not be conducted because sampling hole was too small to input sampling probe.

# Fuel Combustion Analysis Work Sheet

1.0	General information	Remark					
1.1	Date / Time	Day 24	Nonth 9	Year 96	Time	Prom	То
1.2	Weather	Pine					
1.3	Factory name	Besat	power pla	ant (No2)	<b>)</b>		
1.4	Location	Besat 1	highway-	against	terminal	-distric	t 16
1. 5	Person in charge						
	- Name	Mr. Hos:	sein Zom	orrodian			
: :	- Department		,	,			
	- Position	Kanage	r				
	- Tel No.	554014	-11				
				·	3 1 1		

2.0	Special information	Remark
2. 1	Fuel: type	Netural gas
2.2	Flow rate	265000 m³/day
2.3	Combustion quantity	
2.4	Exhaust Temperature	700 °P
2.5	Height of stack	30 m (Diameter of stack = )
2.6	Others	Electrical production 50 MWh Gas consumption 800000 m <sup>3</sup> /day

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# Analyzed Data Sheet for Stationary Emission Sources

Analyzer: Messrs A. Yukawa (JICA)

T. Nambu (JICA)

M. Agir (AQCC)

F. Goodaz (AQCC)

S. Hossini (AQCC)

M. Magidi (ORUSUITO)

Factory	/ Facility Name:	Tehran refinery 2H-101
Address	/ Location :	Qom road-Tehran refinery
		District Boundary No20
		1000

Item	Keasuring Result	
Flow rate of wet flue gas	364000	в <sup>‡</sup> и/h
Flow rate of dry flue gas	319000	m³ א/h
Temperature of flue gas	429	t in the second
CO2 Concentration	6.5	*
O <sub>2</sub> Concentration	7.8	%
CO Concentration	20	ppa
Dust Concentration	0. 025	g/m³ <sub>N</sub>
NOx Concentration	136	рра
SOx Concentration	675	рра

# Measurement of water content in flue gas

Measuring time		12:30 ~	12:35	12:36 ~ 12:41	
Gas volume (Vm, L)  Gas meter temp. (4m, T)		10. 0 36. 9		10. 0 36. 9	
ta 2	107. 468	112. 329	106, 114	108.656	
tube	m.1-m.2	0.975		0. 782	
Moisture content (Xw, %)		13. 46		11.09	
Wean	(Xw, %)		12.	3	• 1

# Measurement of component in flue gas

Measuring time	12:22
CO; concentration (%)	6. 5
O2 concentration (%)	7.8
CO concentration (ppm)	20
ro (kgf/m³)	1. 25
Air ratio	1. 52

8

Pa= 672 mmHg

# Measurement of velocity

Measuri	ng time 15:08	~ 15:33	Pitot tube o	coefficient = 0.	850
Point	h (mmAq)	Ps (madq)	r (kgf/m3)	Dt (t)	V (m/s)
1	25. 1	-15	0.429	429	28.8
2	33.8	-15	0. 429	429	33.4
3	22.5	-16	0. 429	429	27. 3
4	20.8	-15	0. 429	429	26. 2
• • • • • • • • • • • • • • • • • • •					
		:			
	Kean	-15	0. 429	429	28. 9

## Measurement of dust concentration

Measuring time		15:11 ~ 15:23	15:45 ~ 16:07		
Cas ≝ete	er temp. (t)	35. 4	35. 5 191. 8		
Gas volu	ıme (Ym, L)	266. 1			
Gas volu	ime (Vm',Ln)	207. 8	149.6		
	Sampled (md2,g)	0. 0982	0.0998		
weight	Unsampled (mdl,g)	0.0924	0. 0965		
Collecte	ed dust (md,g)	0. 0058	0. 0033		
Dust coi	ncentration(g/ש <sup>3</sup> א)	0. 028	0. 022		
Mean	(Cn, g/m³n)	0,0	025		

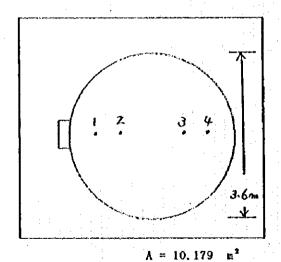
# Plow rate of equal velocity aspiration

No	Point	Flow rate (L/min)	No	Point	Flow rate (L/min)
1	<b>i</b>	15.8	7		
S	2	10. 4	8		
3			9		
4			10		
5			11		4.476
6			12		

Messurement of NOx, SOx and Os

Sampling Time	ΝΟπ (μάμ)	SOx (ppm)	02 (%)
14:08	134	545	7.8
14:18	136	565	7. 5
14:28	136	575	7. 7
14:38	135	582	7. 7
14:48	136	580	7. 8
14:58	138	591	7. 8
15:08	136	590	8. 0
Mean	136	576	7.8

# Measuring point



Commant

### Fuel Combustion Analysis Work Sheet

1.0	General information	Remark									
1.1	Date / Time	Day 28 Nonth 9 Year 96 Time From To									
1.2	Weather	Pine									
1.3	Fectory name	Tehran refinery 2H-101									
1.4	Location	Qom road-Tehran refinery District Boundry 20									
1. 6	Person in charge										
<del></del>	Name	Mr. Mohammad Zali									
	- Department										
	- Position	Kanager of Tehran refinery									
	- Tel No.	591021-9 591031-9 591041-9									

2.0	Special information	Remark
2. 1	Fuel type	Mixture of natural gas & heavy oil
2. 2	Plow rate	284HN Btu/hr
2.3	Combustion quantity	
2.4	Exhaust Temperature	762° fahrenhite
2. 5	Height of stack	250 ft Diameter of stack = 12ft
2.6	Others	2H-101 1168372 lb/hr

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# Analyzed Data Sheet for Stationary Emission Sources

Analyzer: Messrs Y. Myoken (JICA)

T. Nambu (JICA)

F. Goodarz (AQCC)

S. Hossini (AQCC)

M. Magidi (ORUSUITO)

Factory / Facility Name: Tehran refinery 2H-151

Address / Location : Qom road-Tehran refinery

District Boundary No20

Measuring Date : 29 . Sep . 1996

Item	Measuring Result		
Flow rate of wat flue gas		в <sup>з</sup> и/h	
Flow rate of dry flue gas		m³n/h	
Temperature of flue gas		r	
CO <sub>2</sub> Concentration	9. 5	%	
O <sub>2</sub> Concentration	5. 5	%	
CO Concentration	5	pp∎	
Dust Concentration	-	8/m³n	
NOx Concentration	129	aqq	
SOx Concentration	396	bbш	

### Measurement of water content in flue gas

Measuring time		11:36 ~	11:39	11:46 ~ 11:52				
Gas volume	10. 0	1	10. 0					
Gas meter temp.	(1m, E)	33. 5		33. 5				
<b>Moisture</b>	m.1	110. 442	109. 196	108. 439	106, 319			
absorption tube	m . 2	109. 611	109. 196	107. 612	106. 319			
tuue	m.1-m.2	0. 83	1	0. 827				
Moisture content	(Xw, %)	12. 21	*	12. 1	6			
Kean	(Xw, %)		12.	2				

#### Measurement of component in flue gas

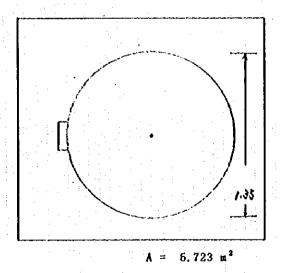
Keasuring time			1	1:30	
CO2 concentration (	X)			9. 5	
O <sub>2</sub> concentration (	<b>(6)</b>			5. 5	
CO concentration (	ррв)	:		5	
ro (k	gf/m³)			1, 26	
Air ratio	:			1.32	

Pa= 672 mmHg

Measurement of NOx, SOx and O:

Sampling Time	NOx (ppm)	SOx (ppm)	02 (%)
13:22	129	367	5.8
13:32	129	387	5. 5
13:42	129	390	5. 6
13:52	130	400	5. 5
14:02	128	410	5. 3
14:12	128	410	5. 5
14:22	129	410	5, 4
Kean	129	396	5, 5

## Measuring point



# Commont

### Fuel Combustion Analysis Work Sheet

1.0	General information	Remark										
1.1	Date / Time	Day 29 Month 9 Year 96 Time From To										
1.2	Weather	Fine										
1.3	Factory name	Tehran refinery 2H-161										
1.4	Location	Qom road-Tehran refinery-District Bound No20										
1.5	Person in charge											
	- Name	Mr. Mohammad Zali										
	- Department											
	- Position	Wanager										
: 12	- Tel No.	591021-9 591031-9 591041-9										

2.0	Special information	Remark	
2.1	Fuel type	Wixtur of natural gas & heavy oil	
2. 2	Flow rate	160 NNBtu/hr	
2. 3	Combustion quantity		
2. 4	Exhaust Temperature	857 °P	
2.5	Height of stack	173 ft Diameter of stack = 9 ft	
2.6	Others	2H-151 726962 lb/hr	

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# Analyzed Data Sheet for Stationary Emission Sources

Analyzer: Messrs T. Nambu (JICA)

F. Goodaz (AQCC)

S. Hossini (AQCC)

M. Magidi (ORUSUITO)

Factory / Facility	Name:	Tehran refinery 2H-181
Address / Location	:	Qom road-Tehran refinery
		District Boundary No20
Measuring Date		1 . Oct . 1996

Item	Measuring Result	
Flow rate of wet flue gas	66400	ъ <sup>8</sup> и∕h
Flow rate of dry flue gas	59500	ש <sup>3</sup> א/h
Temperature of flue gas	446	r
CO <sub>2</sub> Concentration	8.0	<b>*</b>
O2 Concentration	7.9	<b>%</b>
CO Concentration	30	ppn
Dust Concentration	0, 021	g/m³×
NOx Concentration	145	ppm
SOx Concentration	572	рра

## Measurement of water content in flue gas

Measuring time		11:44 ~	11:49	11:51 ^	11:56					
Gas volume	(Ym, L)	10.	0	10. 0						
Gas meter temp.	(fm, t)	33.	9	33. 9						
	a.1	116, 881	107. 351	104, 434	110. 982					
Moisture absorption	m.2	116. 142	107, 351	103. 694	110.982					
tube	m.1-m.2	0.	739	0. 741						
Moisture content	(Xw, %)	10.	43	10. 43						
Mean	(Xw, %)	10. 4								

#### Measurement of component in flue gas

Measuring time	11:35
CO2 concentration (%)	8. 0
02 concentration (%)	7. 9
CO concentration (ppm)	30
ro (kgf/m³)	1, 27
Air ratio	1, 55

Pa= 679 mulig

# Measurement of velocity

Measurin	g time 14:59	~ 15:30	Pitot tube c	oofficient = 0.	850
Point	h (mmAq)	Ps (mmAq)	r (kgf/m3)	Dt (T)	Y (m/s)
1	0	-7	0. 429	446	0
2	0.5	-7	0. 429	446	4. 1
3	2.2	-7	0. 429	446	8. 5
4	3. 2	-7	0. 429	446	10.3
5	1. 2	-7	0. 429	446	6.3
6	1.4	-7	0. 429	446	6.8
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guere. AFCE SAFORMY. AFEC. LE	Mean	-7	0. 429	446	6.0

## Measurement of dust concentration

Measuri	ng time	14:19 ~ 14:49	14:59 ~ 15:30			
Gas met	er temp. (t)	32. 6	33.7			
Measuring time  Gas meter temp. (T)  Gas volume (Vm, L)  Gas volume (Vm', Ln)  Filter Sampled (md2, g)  weight Unsampled (md1, g)  Collected dust (md, g)  Dust concentration(g/m³n)	261. 5	214.6				
Gas volu	ime (Ym², Ln)	208. 2	170. 2			
	Sampled (md2, g)	0. 0976	0. 1007			
	Unsampled (md1, g)	0. 0930	0.0974			
Collect	ed dust (md,g)	0.0046	0.0033			
Dust coi	ncentration(g/m³n)	0. 022	0, 019			
Mean	(C <sub>N</sub> , g/m <sup>3</sup> N)	0.02	<b>31</b>			

# Plow rate of equal velocity aspiration

No	Point	Flow rate (L/min)	No	Point	Flow rate (L/min)
1	2	4, 5	7	:	
2	3	9.6	8		
3			9		
4			10		
5			11		
6			12		

0

# Messurement of NOx, SOx and O1

Sampling Time	NOx (ррш)	SOx (ppm)	02 (%)
11:54	144	565	8, 6
12:04	144	565	8, 9
12:14	145	570	8.8
12:24	144	570	9. 0
12:34	147	580	8. 6
12:44	146	583	8.6
12:54	146	570	9. 0
Mean	145	572	8.8

# Measuring point

# 1 2 3 4 5 6 3.4m

Conment

# Fuel Combustion Analysis Fork Sheet

1.0	General information	Remark
1.1	Date / Time	Day 1 Month10 Year 96 Time From To
1.2	Weather	Fine
1.3	Pactory name	Tehran refinery 2H-181
1.4	Location	Qom road-Tehran refinery District Boundry 20
1. 5	Person in charge	
	- Name	Mr. Nohammad Zali
	- Department	
:	- Position	Manager of Tehran refinery
	~ Tel No.	591021-9 591031-9 591041-9

2. 0	Special information	Remark
2. 1	Fuel type	Mixture of natural gas & heavy oil
2. 2	Flow rate	42.8N Btu/hr
2. 3	Combustion quantity	
2.4	Exhaust Temperature	853° fahrenhite
2. 5	Height of stack	150 ft Diameter of stack = 1.61m
2.6	Others	2H-181 309162·lb/hr 17500 BPSD furnace current

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# Analyzed Data Sheet for Stationary Emission Sources

Analyzer: Messrs A. Yukawa (JICA)

T. Nambu (JICA)

M. Agir (AQCC)

F. Goodaz (AQCC)

S. Hossini (AQCC)

M. Magidi (ORUSUITO)

Factory / Facility Name	<u>;</u>	Tehran refinery Steam boiler
	•	Qom road-Tehran refinery
Address / Location	_ <del>.</del>	District Boundary No20
Measuring Date	:	2. Oct. 1996

Item	Measuring Result	
Flow rate of wet flue gas	118200	m³n/h
Flow rate of dry flue gas	105000	m³n/h
Temperature of flue gas	426	t
CO <sub>2</sub> Concentration	12.0	%
O <sub>2</sub> Concentration	4.3	%
CO Concentration	N D	рри
Dust Concentr∉lion	0.023	g/m³n
NOx Concentration	208	ppm -
SOx Concentration	> 1000	ppm

# Measurement of water content in flue gas

Reasuring time  Gas volume (Vm, L)  Gas meter temp. (fm, t)		10:25 ~ 10:29 10.0 30.9		10:31 ~ 10:35 10.0 30.9							
							<b>3.1</b>	108. 473	108, 491	114, 105	108. 263
						Moisture absorption tube	m.2	107.650	108, 491	113. 325	108. 263
m a 1 - m a 2	0.843		0. 788								
Moisture content (Xw,%)		11. 47		10. 80							
Hean	(Xw,%)	11.1									

### Measurement of component in flue gas

Measuring time	10:22
CO <sub>2</sub> concentration (%)	12.0
O <sub>2</sub> concentration (%)	4.3
CO concentration (ppm)	N D
ro (kgf/m³)	1, 28
Air ratio	1. 24

Pa= 683 mmHg

### Measurement of velocity

Measuring time 14:46 ~ 15:17			Pitot tube coefficient = 0.850		
Point	h (mmAq)	Ps (mmAq)	r (kgf/m3)	Dt (T)	V (m/s)
1	O	-29	0, 448	426	0
2	4, 5	-29	0.448	426	11.9
3	2.5	-29	0. 448	426	8. 9
4	6.4	-29	0. 448	426	14. 2
5	1.6	~29	0. 448	426	7, 1
6	7.2	-29	0. 448	426	15. 1
7	7. 2	-29	0. 448	426	15. 1
8	10.8	-29	0. 448	426	18. 5
	Kean	-29	0.448	426	11.4

### Measurement of dust concentration

Measurin	ng time	14:40 ~ 14:55	15:02 ~ 15:18
Gas meter temp. (t)		37. 0	39. 2
Gas volume (Vm, L)		169.8	234. 4
Cas volu	ume (Ym', Ln)	133. 7	183. 1
	Sampled (md2,g)	0. 1011	0.0989
weight	Unsampled (mdl,g)	0. 0975	0, 0955
Collecte	ed dust (md,g)	0.0036	0.0034
Dust co	ncentration(g/m³N)	0.027	0.019
Mean	(C <sub>N</sub> , g/m <sup>3</sup> <sub>N</sub> )	0.	023

### Flow rate of equal velocity aspiration

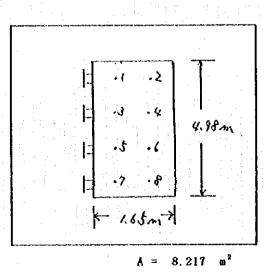
No	Point	Flow rate (L/min)	No	Point	Flow rate (L/min)
1	5	17. 8	7		
2	6	8. 6	8		
3			9	,	
4			10		
5			11		
6			12		

### Measurement of NOx, SOx and Ox

Sampling Time	NOx (ppm)	SOx (ppm)	02 (%)
12:03	205	> 1000	5. 8
12:13	205	> 1000	5, 9
12:23	206	> 1000	Б. 9
12:33	207	> 1000	5. 8
12:43	210	> 1000	5. 3
12:53	210	> 1000	5. 1
13:03	210	> 1000	5. 3
Mean	208	> 1000	5. 6

### Measuring point

### Comment



Concentration of SOx was exceeded a upper limit (1000ppm) of the anlyzer.

# Fuel Combustion Analysis Work Sheet

1.0	General information		Remark				
1.1	Date / Time	Day 2	Day 2 Month10 Year 96 Time From To				
1.2	Weather	Fine	Fine				
1.3	Factory name	Tehran	refinery	Steam b	oiler		
1.4	Location	Qom roa	d-Tehran	refiner	y Distr	let Bour	dry 20
1.5	Person in charge						
	- Name	Mr. Moha	wwad Zal	i			:
	- Department						
	- Position	Manager	of Tehr	an refin	ery		
	- Tel No.	691021-	9 59103	1-9 591	041-9		
				<del></del>			

2.0	Special information	Remark
2.1	Fuel type	Mixture of natural gas & heavy oil
2. 2	Flow rate	25160 lb/hr Design based on oil
2. 3	Combustion quantity	665-700°F
2, 4	Exhaust Temperature	752° fahrenhite
2.5	Height of stack	250 ft Inner diameter of stack 10 ft
2.6	Others	fuel oil : LHU 17000 Btu/lb

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# Analyzed Data Sheet for Stationary Emission Sources

Analyzer: Messrs T. Nambu (JICA)

F. Goodaz (AQCC)

S. Hossini (AQCC)

M. Magidi (ORUSUITO)

Factory / Facility !	Name: Cement factory No. 4
Address / Location	: Khavaran road-Tehran Cement factory
	district 15
Measuring Date	: 8 . Oct . 1996

Item	Measuring Result	
Flow rate of wet flue gas	258000	m <sup>8</sup> n/h
Flow rate of dry flue gas	214000	m³ <sub>N</sub> /h
Temperature of flue gas	148	t
CO <sub>2</sub> Concentration	10.6	*
O <sub>2</sub> Concentration	11.3	<b>%</b>
CO Concentration	0.4	%
Dust Concentration	0, 49	g/m³n
NOx Concentration	274	ppm
SOx Concentration	5.4	ppm

### Measurement of vater content in flue gas

Measuring time		10:37 ~ 10:41		10:43 ~ 10:48	
Gas volume (Ym, L)  Gas meter temp. (Im, C)		10. 0		10. 0 22. 2	
Moisture absorption	m.2	107. 965	109,054	108. 537	114. 400
tube	m.1-m.2	1.	248		1, 472
Moisture content	(Xw, %)	15.	92	1:	8. 26
Mean (Xw,%)			17.	1	

# Measurement of component in flue gas

	The state of the s
Measuring time	10:30
CO2 concentration (%)	10.6
O <sub>2</sub> concentration (%)	11.3
CO concentration (%)	0. 4
ro (kgf/m³)	1. 25
Air ratio	2. 19

Pa= 671 mmHg

### Measurement of velocity

Measurin	ng time 13:22	~ 13:45	Pitot tube	coefficient = 0.	850
Point	h (mmAq)	Ps (mmAq)	r (kgf/m3)	Dt (T)	V (m/s)
1	12.4	-8	0.715	148	15. 6
2	12.7	-8	0.715	148	15. 9
3	13, 8	-8	0.715	148	19. 4
4	15. 2	-8	0.715	148	17. 4
5	16 8	-8	0.715	148	18. 2
6	10.0	-8	0. 715	148	19. 4
	:				
The second second second second second second second second second second second second second second second se	Vean	-8	0.715	148	17, 7

### Measurement of dust concentration

Measurin	g time	13:22 ~ 13:48	13:49 ~ 14:03	
Gas meter temp. (T)  Gas volume (Ym, L)		32. 7	36.5	
		330. 5	150. 1	
Gas volu	ime (Ym', Ln)	259.6	116.3	
	Sampled (md2,g)	0. 2176	0, 1582	
weight	Unsampled (mdl,g)	0.0982	0.0985	
Collecte	ed dust (#d,g)	0.1194	0.0597	
Dust cor	ncentration(g/m³x)	0.46	0.51	
Жеал	(C <sub>N</sub> , g/m <sup>3</sup> <sub>N</sub> )	o.	49	

# Flow rate of equal velocity aspiration

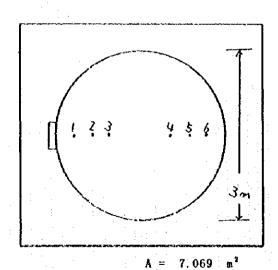
No	Point	Flow rate (L/min)	No	Point	Flow rate (L/min)
1		16.0	7		
2	2	16.3	8		
3	3	16.9	9		
4			10		
5			11		
6			12		

8

# Messurement of NOx, SOx and Os

Sampling Time	NOx (ppm)	SOx (ppm)	02 (%)
11:05	235	4	12. 1
11:15	235	5	11.3
11:25	243	5	11.8
11:35	270	5	11.8
11:45	330	6	10.3
11:55	318	6	10. 4
12:05	290	<b>5</b>	12. 0
Mean	274	5	11.4

# Measuring point



### Conment

### Fuel Combustion Analysis Work Sheet

1.0	General information		Remark						
1.1	Date / Time	Day	8	Month10	Year	96	Time	From	To
1.2	Weather	Fine	:						
1.3	Factory name	Ceme	nt	factory !	No4				
1. 4	Location	Khav	ara	n road-Te	ehran	Cei	ent fac	tory dis	trict 1
1, 5	Person in charge	:	· .						
	- Name	Mr.	He i	dari					
	- Department								
	- Position	Mana	ger						
	- Tel No.	5920	21-	9				:	
11 1						. :	1	· .	÷.

2. 0	Special information	Remark
2. 1	Fuel type	Netural gas or Mixture of NG & heavyoil
2. 2	Flow rate	NG:166203m3/d & RO:384000L/d
2.3	Combustion quantity	130°C (Dry)
2. 4	Exhaust Temperaturo	
2. 5	Height of stack	45m (Diameter of stack = 3m)
2.6	Others	No of personnel in total 2000

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# Analyzed Data Sheet for Stationary Emission Sources

Analyzer: Messrs T. Nambu (JICA)

F. Goodaz (AQCC)

S. Hossini (AQCC)

M. Magidi (ORUSUITO)

Factory /	Facility	Name:	Cement fa	ctory No5			
					_		
Address /	Location	<u>:</u>	Khavaran	road-Tehra	n Cement	factory	
			distr	ict 15			
		٠ .					
Massiring	Dato	•	6 A	+ 1996			

Item	Measuring Result	
flow rate of wet flue gas	74200	m³n/h
Flow rate of dry flue gas	67200	m³n/h
Temperature of flue gas	188	r
CO <sub>2</sub> Concentration	10. 0	%
O <sub>2</sub> Concentration	10, 4	%
CO Concentration	N D	ppm
Dust Concentration	0. 009	g/m³n
NOx Concentration	192	ppm
SOx Concentration	1 >	ppm

### Measurement of water content in flue gas

Measuring time		11:08 ~	11:11	11:14 ~ 11:19		
Gas volume (Ym, L)		10. (	· · · · · · · · · · · · · · · · · · ·	10. 0 25. 2		
Gas meter temp.	(1m, t)	25.0				
	m . 1	108. 631	109. 046	109. 332	108. 537	
Moisture absorption	<b>m</b> 2	107. 965	109. 046	108, 628	108. 537	
tube	m . 1-m . 2	0.666		0. 704		
Moisture content	(Xw,%)	9. :	28	9	. 76	
Mean	(Xw, %)		9.	5		

### Measurement of component in flue gas

Measuring time	11:03	
CO2 concentration (%)	10.0	
02 concentration (%)	10. 4	
CO concentration (ppm)	N D	
ro (kgf/m³)	1. 29	
Air ratio	1. 97	

Pa= 669 mmHg

### Measurement of velocity

Measurin	g time 13:20	~ 13:38	Pitot tube coefficient = 0.850				
Point	h (manAq)	Ps (mmAq)	r (kgf/m3)	Dt (C)	V (m/s)		
1	7. 2	-8	0. 672	188	12.3		
2	5.9	-8	0. 672	188	11.2		
3	7. 6	-8	0. 672	188	12.7		
4	9, 3	-8	0. 672	188	14.0		
					:		
	1						
	Nean	-8	0.672	188	12.6		

### Measurement of dust concentration

Measuring time		13:20 ~ 13:38	13:59 ~ 14:30
Gas meter temp. (T)		27. 3	24.8
Gas volu	ıme (Vm,L)	342.3	364. 1
Gas volu	ime (Ym',Ln)	274.5	293.6
	Sampled (md2,g)	0.0943	0. 1002
weight	Unsampled (mdl,g)	0.0917	0.0977
Collecte	ed dust (md,g)	0.0026	0.0025
Dust co	ncentration(g/m³n)	0.009	0.009
Mean	(Cn, g/m³ n)	0.0	09

### Flow rate of equal velocity aspiration

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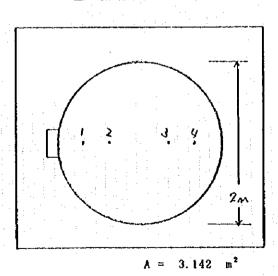
No	Point	Flow rate (L/min)	No	Point	Flow rate (L/min)
1	1	12.3	7		
2	2	11.1	8		
3			9		
4			10		
5			11		
6			12		

### Measurement of NOx, SOx and Ox

Sampling Time	NOx (ppm)	SOx (ppm)	02 (%)
11:50	215	0	11.3
11:44	193	0	11.3
11:54	173	0	11.3
12:04	175	C	11.3
12:14	185	0	11.5
12:24	200	0	11.5
12:34	205	0	11.3
Mean	192	1 >	11, 4

### Measuring point

0



### Comment

# Fuel Combustion Analysis Work Sheet

1.0	General information	Remark								
1.1	Date / Time	Day 6	Month10	Year 96	Time	From	То			
1. 2	Weather	Fine								
1.3	Factory name	Cement	factory	No5						
1.4	Location	Khavara	n road-To	ehran Ce	ment fa	ctory di	strict 15			
1.5	Person in charge									
<u> </u>	- Nahe	Mr. Hei	dari							
	- Department									
	- Position	Manager								
	- Tel No.	592021-	9							
			· · · · · · · · · · · · · · · · · · ·							

2.0	Special information	Remark
2. 1	Fuel type	Netural gas or Mixture of NG & heavyoil
2. 2	Flow rate	NG:58500m3/d & HO:5400L/d
2. 3	Combustion quantity	
2. 4	Exhaust Temperature	180-200 (wet)
2. 5	Height of stack	Diameter of stack = 2.0 m
2.6	Others	

# Analyzed Data Sheet for Stationary Emission Sources

Analyzer: Messrs T. Nambu (JICA)

F. Goodaz (AQCC)

S. Hossini (AQCC)

M. Magidi (ORUSUITO)

Factory / Facility Name: Cement factory No.6

Address / Location : Khavaran road-Tehran Cement factory district 15

Measuring Date : 9. Oct . 1996

		The state of the s	
Item	Measuring Result		
Flow rate of wet flue gas	577000	m <sup>3</sup> N/h	
Flow rate of dry flue gas	505000	m³v/h	
Temperature of flue gas	128	t	
CO <sub>2</sub> Concentration	11.0	%	
O <sub>2</sub> Concentration	12.6	%	
CO Concentration	10	ppm	
Dust Concentration	0. 51	g/m³n	
NOx Concentration	319	ррв	
SOx Concentration	1 >	mqq	
			,

### Measurement of water content in flue gas

Measuring time		10:22	10:25	10:26 ~ 10:31				
Gas volume	(Vm, L)	10.	0	10.0				
Gas meter temp.	(fm, T)	23.	23. 4		1. 7			
	m 4 1	113. 023	109. 054	109. 505	110.621			
Moisture absorption	m . 2	112, 014	109. 054	108. 654	110. 621			
tube	m s 1 - m s 2	1.	009	0.851				
Koisture content	(Xw, %)	13.	28	1	1.56			
Mean	(Xw, %)		12.	4				

### Measurement of component in flue gas

	<u> , , , , , , , , , , , , , , , , , , ,</u>	
Measuring time		10:18
CO2 concentration (%)		11.0
02 concentration (%)		10.6
CO concentration (ppm)	:	10
ro (kgf/m³)		1. 28
Àir ratio		2. 03

Pa= 671 mmHg

### Measurement of velocity

Measurin	g time 13:22	~ 13:45	Pitot tube c	oefficient = 0.	850
Point	h (mmAq)	Ps (mmAq)	r (kgf/m3)	Dt ( <b>t</b> )	V (m/s)
i	9. 4	-15	0. 768	128	13. 2
2	10. 1	-15	0. 768	128	13. 6
3	9.4	-15	0. 768	128	13. 2
4	10. 3	-15	0. 768	128	14.4
5	11 4	-15	0.768	128	14. 5
6	14. 4	-15	0. 768	128	16.3
7	6.4	-15	0. 768	128	10. 9
8	7. 2	-15	0. 768	128	11.5
9	8.0	-15	0. 768	128	12. 1
10	9. 7	-15	0. 768	128	13. 4
11	10. 4	-15	0.768	128	13. 8
12	14.2	-15	0. 768	128	16. 2
					. :
	Nean	-15	0. 768	128	13. 6

### Measurement of dust concentration

Measurin	ng time	10:57 ~ 11:05	11:16 ~ 11:23
Gas mete	er temp. (C)	27. 1	27.7
Gas volu	ine (Vm, L)	79. 7	88.8
Gas volu	ime (Ym², Ln)	64. 0	71.1
	Sampled (md2,g)	0.1283	0. 1367
weight	Unsampled (mdl,g)	0.0982	0.0984
Collecte	ed dust (md,g)	0.0301	0.0383
Dust cor	ncentration(g/m³n)	0.47	0.54
Mean	(Cn, g/B <sup>3</sup> n)	0.5	

### Flow rate of equal velocity aspiration

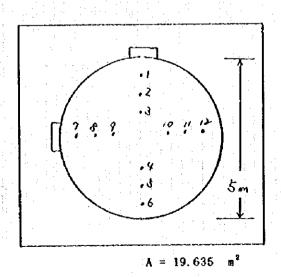
No :	Point	Flow rate (L/min)	No	Point	Flow rate (L/min)
i	1	14, 6	7		
2	2	15. 2	8		
3	3	14.6	9		
4			10		
5			11		
6			12		

### Measurement of NOx, SOx and Ox

Sampling Time	NOx (ppm)	SOx (ppm)	02 (%)
11:46	325	0	13. 0
11:56	340	0	13. 3
12:06	365	0	13, 3
12:16	300	0	13.0
12:26	325	0 4	13. 3
12:36	245	0	13. 0
12:46	335	0	13.3
Mean	319	0	13. 2

### Measuring point

0



# Comment

# Fuel Combustion Analysis Fork Sheet

1.0	General information				1	Rema	erk					
1.1	Date / Time	Day	9	Month10	Year	96	Time		From	1	Го	
1.2	Weather	Fine										:
1.3	Factory name	Cemer	ıt	factory	No6							:
1.4	Location	Khava	ira	n road-T	ehran	Cei	ment i	ac	tory di	st	rict	15
1. 5	Person in charge											
· · · ·	- Name	Mr. 1	le i	dari							٠	
	- Department											
	- Position	Mana	ger									
	- Tel No.	5920	21-	9			:					
•			:			1 1 2 1 2						

2.0	Special information	Remark
2. 1	Fuel type	Netural gas or Wixture of NG & heavyoil
2. 2	Flow rate	NG:352161m3/d & HO:216000L/d
2, 3	Combustion quantity	130°C (Dry)
2. 4	Exhaust Temperature	
2. 5	Height of stack	80m (Diameter of stack = 5m)
2. 6	Others	No of personnel in total 2000

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# Analyzed Data Sheet for Stationary Emission Sources

Analyzer: Messrs T. Nambu (JICA)

M. Agir (AQCC)

F. Goodaz (AQCC)

S. Hossini (AQCC)

M. Magidi (ORUSUITO)

Factory / Facility Nam	<u>e:</u>	Cement factory No. 7
Address / Location	<u>:</u>	Moshirieh-Cement Co-District15
Measuring Date	<u>:</u>	5 . Oct . 1996

Item	Measuring Result	
Flow rate of wet flue gas	369000	m³n/h
Flow rate of dry flue gas	330000	n³₁/h
Temperature of flue gas	115	<b>t</b>
CO <sub>2</sub> Concentration	6. 1	<b>%</b>
O: Concentration	14.6	**************************************
CO Concentration	30	ppm
Dust Concentration	0. 026	g/m³ N
NOx Concentration	300	ppm
SOx Concentration	1 >	ppm

# Measurement of water content in flue gas

Measuring time		10:58 ~	11:03	11:06 ~ 11:11			
Cas volume (Ym, L)		10.	0	10.0			
Gas meter temp.	(fm, C)	21.	0	21. 1			
	m.1	108. 278	108. 851	110.018	107. 793		
Moisture absorption	n 2	107. 540	108.851	109. 255	107. 793		
tube	m.1-m.2	0.	738	0	. 763		
Moisture content	(Xw, %)	10.	07	10	. 38		
Mean	(Xw, %)		10.	2			

### Measurement of component in flue gas

Measuring time	10:53
CO <sub>2</sub> concentration (%)	6. 1
O <sub>2</sub> concentration (%)	14.6
CO concentration (ppm)	30
ro (kgf/m³)	1. 27
Air ratio	3. 25

Pa= 666 mmlig

### Measurement of velocity

Measuri	ng time 13:55	~ 14:18	Pitot tube	coefficient = 0.	850
Point	h (mmAq)	Ps (wwAq)	r (kgf/m3)	Dt (t)	V (m/s)
1	38.4	-23	0. 784	115	26. 3
2	44.2	-23	0.784	115	28. 3
3	43.1	-23	0. 784	115	27. 9
4	5.0	-23	0.784	115	9.5
5	1.2	-23	0.784	115	4.7
6	1.4	-23	0.784	115	5.0
7	12.6	-23	0. 784	115	15. 1
8	15.0	-23	0.784	115	16.5
9	15.0	-23	0.784	115	16.5
10	15.5	-23	0.784	115	16. 7
11	22.0	-23	0.784	115	19. 9
12	25.5	-23	0.784	115	21.5
THE RESERVE OF THE PERSON	Kean	-23	0.784	115	17. 3

### Measurement of dust concentration

Measurin	g time	13:55 ~ 14:18		14:38 ~ 14:48
Gas mete	er temp. (t)	22.6		33.1
Gas volu	ime (Vm, L)	206.2	-	159.4
Gas volt	ime (Ym', L <sub>N</sub> )	106.7		128.6
Filter	Sampled (md2, g)	0. 1013		0.0966
weight	Unsampled (mdi,g)	0. 0981	-	0.0925
Collecte	ed dust (md, g)	0.0032		0.0041
Dust co	ncentration(g/m³ N)	0.019		0.032
Mean	(C <sub>N</sub> , g/m <sup>3</sup> N)		0.	026

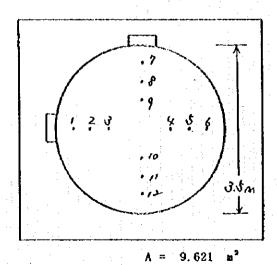
### Flow rate of equal velocity aspiration

No	Point	Flow rate (L/min)	No	Point	Flow rate	(L/min)
1	1	13.7	7			
2	2	14.6	8			
3	: 3	14.4	9			
4			10			
5			11			<u> </u>
6			12			1

### Measurement of NOz, SOz and On

Sampling Time	NOx (ppm)	SOx (ppm)	02 (%)
11:34	300	0	14. 3
11:44	315	0	14. 3
11:54	318	0	14. 3
12:04	310	0	14. 1
12:14	285	0	14. 1
12:24	280	0	14. 3
12:34	290	0	14.3
Nean	300	1 >	14. 2

### Measuring point



### Comment

# Fuel Combustion Analysis Work Sheet

1.0	General information	,				Rena	ark			
1. 1	Date / Time	Day	5	Month10	Year	96	Time	From	То	
1.2	Teather	Pine								
1.3	Factory name	Cene	nt	factory l	No7					
1.4	Location	Kosh	iri	eh-Cemen	t Co-	Dis	trict 15			; ; ;
1.5	Person in charge									
	- Name	Mr.	llei	dari			:			
:	- Department				·					
	- Position	Mana	ger							:
	- Tel No.	3705	164						:	
		1	• :							

2.0	Special information	Remark					
2. 1	Fuel type	Netural gas or Mixture of NG & heavyoil					
2.2	Flow rate	8000 m³/day or 8000 L/day					
2. 3	Combustion quantity						
2. 4	Exhaust Temperature	150 ~ 180 t					
2.5	Height of stack	80m (Diameter of stack = 3.5m)					
2.6	Others						

