Yokkaichi Oil Refinery

Address: 1-1 Daikyo-cho, Yokkaichi-shi, Mie-ken

Start of operations: July 1943

Area: 1,192,039 m^2

Employees: 341

Crude oil processing capacity: 155,000 barrels/day

(as of March 2002)

■ Regulated Pollutants

	Pollutant	Regulation	Type of control	Standard	Performance	
					Maximum	Average
Air Pollutants	NOx (m^3_N/hour)	Pollution control agreement	Areawide total pollutant load control	78.4	68.3	41.4
	SOx (m^3_N/hour)	Pollution control agreement	Areawide total pollutant load control	108.21	61.0	30.2
	Particulate (boiler) (g/m^3_N)	Pollution control agreement	Concentration control	0.049	0.047	0.024

	Pollutant	Regulation	Type of control	Standard	Performance	
					Maximum	Average
Water Pollutants	COD (kg/hour)	Pollution control agreement	Areawide total pollutant load control	535	436.3	188.3
	COD (mg/L)	Water Pollution Control Law	Concentration control	160(120)	15.0	7.0
	SS (mg/L)	Water Pollution Control Law	Concentration control	200(150)	13.0	5.1
	Oil content (mg/L)	Prefectural ordinance	Concentration control	1	Below measurement threshold	
	Nitrogen (mg/L)	Municipal guidance	Concentration control	15	2.0 Below measurement threshold	
	Phosphorus (mg/L)	Municipal guidance	Concentration control	1.5	0.09	0.05
	Phenol (mg/L)	Prefectural ordinance	Concentration control	1	Below measurement threshold	

Figures in parentheses = daily average

■ Environmental Performance

	Amount	Amount per unit of production
Energy	430,087 (L-crude oil/year)	10.63 (L-crude oil/thousand kL)
CO_2	1,147,014 (-CO_2/year)	28.36 (kg-CO_2/kL)
SOx	756 (/year)	18.7 (g/kL)
NOx	745 (/year)	18.4 (g/kL)
COD	68.7 (/year)	1.70 (g/kL)
Industrial wastes generated	8,741 (/year)	
Industrial wastes recycled	2,363 (/year)	
Industrial wastes disposed of	623 (/year)	

PRTR Law designated chemical substance	Release/transfer
Ethyl benzene (atmospheric release)	0.4 (t/year)
Xylene (atmospheric release)	1.5 (t/year)
1,3,5-trimethylbenzene (atmospheric release)	34 (kg/year)
Toluene (atmospheric release)	4.5 (t/year)
Benzene (atmospheric release)	1.5 (t/year)
Cobalt and its compounds (transfer)	0.0 (t/year)
Nickel compounds (transfer)	1.7 (t/year)
Molybdenum and its compounds (transfer)	7.7 (t/year)

■ Environmental Accounting

Item	Environmental cost (million yen)	
	Investment amount	Expenditure amount
1 Business area costs	74	3,143
Pollution prevention costs	74	920
Global environmental conservation costs	0	1,989
Resource circulation costs	0	234
2 Upstream/downstream costs	317	4,607
Product environmental impact reduction costs	317	4,607
Product sulfur reduction costs	169	2,636
Gasoline	48	754
Naphtha	12	188
Jet fuel oil	2	26
Kerosene	28	431
Diesel fuel	38	593
Heavy fuel oil A	34	535
Heavy fuel oil C	0	0
LPG	7	109
Costs of substituting toxic substances in gasoline	148	1,971
Costs of aromatics reduction in petrochemical products	0	0
Green procurement costs	0	0
3 Management activity costs	0	90
4 Research and development costs	0	0
5 Social activity costs	0	361
Total	391	8,201

Item	Benefits of environmental protection	
	Reduction of environmental impacts (2000 value minus 2001 value)	
	Concentrations/unit value	Environmental impacts
1 Business area benefits		
Benefits of reduction in resource input	(kL-crude oil/thousand kL)	(TJ)
Energy input	0.18	– 198
	(kg/kL)	(thousand t)
Water input	– 45	– 2,185
Benefits of reduction in emissions and waste generation		
Release to atmosphere	(kg-CO 2/kL)	(thousand t-CO_2)
CO_2	0.52	– 12
	(g/kL)	(t)
SOx	– 2.2	– 109
NOx	– 2.0	– 100
Benzene	0.01	0.3
Release to water	(g/kL)	(t)
COD	0.36	12.3
Wastes	(g/kL)	(t)
Industrial wastes generated	47	1,609
Industrial wastes recycled	14	487
Industrial wastes disposed of	8	276
2 Upstream/downstream benefits		
Benefits of product environmental impact reduction		
Product sulfur reduction	(sulfur weight %)	(potential SOx emissions: t)
Total	0.0181	1,050
Gasoline	0.0000	5
Naphtha	– 0.0005	– 39
Jet fuel oil	0.0005	1
Kerosene	– 0.0003	– 5
Diesel fuel	0.0013	44
Heavy fuel oil A	0.0074	– 566
Heavy fuel oil C	0.0619	1,611
LPG	– 0.0006	– 1
Benefits of substituting toxic substances in gasoline	(volume %)	(t)
	0.1080	1,869
CO_2 emissions from product use	(t-CO 2/kL)	(thousand t-CO_2)
	0.0055	– 166

■ Economic Benefit (424 million yen)

Savings through energy reductions (savings through cogeneration): 423

Saving through catalyst recycling (reduction of waste management cost, etc.): 1

Benefits from research and development (income from royalties, etc.): 0