Sakaide Oil Refinery

Address: 1-1 Bannosu Midori-machi, Sakaide-shi, Kagawa-ken
Start of operations: October 1972
Area: 847,943 m^2
Employees: 234
Crude oil processing capacity: 120,000 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 memorandum	Areawide total pollutant load control	190	52	33
	SOx (m^3_N/hour)	Pollution control memorandum	Areawide total pollutant load control	164	107.9	45.1
	Particulate (boiler) (g/m^3_N)	Pollution control memorandum	Concentration control	0.05	0.007	0.006

	Pollutant	Regulation	Type of control	Standard	Performance	
					Maximum	Average
Water Pollutants	COD (kg/hour)	Prefectural ordinance	Areawide total pollutant load control	120	49.1	29.2
	COD (mg/L)	Prefectural ordinance	Concentration control	15 (10)	5.0	3.4
	SS (mg/L)	Prefectural ordinance	Concentration control	15 (10)	10.0	4.5
	Oil content (mg/L)	Prefectural ordinance	Concentration control	2	Below measurement threshold	
	Nitrogen (mg/L)	Water Pollution Control Law	Concentration control	120 (60)	2.1	1.3
	Phosphorus (mg/L)	Water Pollution Control Law	Concentration control	16 (8)	0.05	0.03
	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	330,012 (kL-crude oil/year)	9.52 (kL-crude oil/thousand kL)
CO_2	959,376 (t-CO_2/year)	27.67 (kg-CO_2/kL)
SOx	1,128 (t/year)	32.5 (g/kL)
NOx	594 (t/year)	17.1 (g/kL)
COD	10.7 (t/year)	0.31 (g/kL)
Industrial wastes generated	15,021 (t/year)	
Industrial wastes recycled	2,352 (t/year)	
Industrial wastes disposed of	334 (t/year)	

PRTR Law designated chemical substance	Release/transfer
Ethyl benzene (atmospheric release)	0.5 (t/year)
Xylene (atmospheric release)	2.1 (t/year)
1,3,5-trimethylbenzene (atmospheric release)	42 (kg/year)
Toluene (atmospheric release)	8.1 (t/year)
Benzene (atmospheric release)	2.2 (t/year)
Cobalt and its compounds (transfer)	7.4 (t/year)
Nickel compounds (transfer)	37.0 (t/year)
Molybdenum and its compounds (transfer)	60.0 (t/year)

■ Environmental Accounting

Item	Environmental cost (million yen)	
	Investment amount	Expenditure amount
1 Business area costs	47	909
Pollution prevention costs	47	820
Global environmental conservation costs	0	0
Resource circulation costs	0	89
2 Upstream/downstream costs	378	9,543
Product environmental impact reduction costs	378	9,543
Product sulfur reduction costs	166	6,711
Gasoline	51	2,071
Naphtha	6	245
Jet fuel oil	5	212
Kerosene	32	1,290
Diesel fuel	46	1,838
Heavy fuel oil A	18	739
Heavy fuel oil C	1	41
LPG	7	275
Costs of substituting toxic substances in gasoline	212	2,832
Costs of aromatics reduction in petrochemical products	0	0
Green procurement costs	0	0
3 Management activity costs	0	49
4 Research and development costs	0	0
5 Social activity costs	0	153
Total	425	10,654

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	0.04	1,737
	(kg/kL)	(thousand t)
Water input	−3	210
Benefits of reduction in emissions and waste generation		
Release to atmosphere	(kg-CO_2/kL)	(thousand t-CO_2)
CO_2	0.30	137
	(g/kL)	(t)
SOx	5.4	358
NOx	3.2	200
Benzene	0.01	0.40
Release to water	(g/kL)	(t)
COD	0.06	4.0
Wastes	(g/kL)	(t)
Industrial wastes generated	−47	99
Industrial wastes recycled	−22	−530
Industrial wastes disposed of	−5	−144
2 Upstream/downstream benefits		
Benefits of product environmental impact reduction		
Product sulfur reduction	(sulfur weight %)	(potential SOx emissions: t)
Total	0.0703	12,168
Gasoline	0.0004	10
Naphtha	−0.0191	−21
Jet fuel oil	0.0001	3
Kerosene	−0.0009	−3
Diesel fuel	−0.0014	45
Heavy fuel oil A	0.2764	1,208
Heavy fuel oil C	0.0524	10,926
LPG	−0.0001	0
Benefits of substituting toxic substances in gasoline	(volume %)	(t)
	0.0896	1,255
CO_2 emissions from product use	(t-CO_2/kL)	(thousand t-CO_2)
	0.0078	1,981

■ Economic Benefit (21 million yen)

Savings through energy reductions (savings through cogeneration): 0
Saving through catalyst recycling (reduction of waste management cost, etc.): 21
Benefits from research and development (income from royalties, etc.): 0