

Total volume of downstream from Puerto Ordaz is forecast as 21,300 thousand tons in 2003, which is not a sharp increase from 1997. This is due to the decrease of iron ore exportation by Ferrominera, however COMSIGUA, ORINOCO IRON and Veneston have started operations.

Total volume in 2020 is 23,400 thousand tons in the low growth case, 25,600 thousand tons in the medium growth case and 27,900 thousand tons in the high growth case respectively. The cargo throughput trend is characterized by its non-linear increase in volume. This is the frequent tendency in case of typical industrial port handling for several enterprises like Puerto Ordaz.

4.8 Ship Traffic Volume Forecast

4.8.1 Present Ship Traffic Volume

Ministry of Transport and Communication (MTC) - National Canalization Institute (INC) classified cargo into five categories; Iron ore, Petroleum, General Cargo, Aluminum and Bauxite by cargo toll type. Ship traffic volume of Orinoco River Canal from 1988 to 1997 is given in Table 4.8.1. Total ship traffic volume was 1,093 vessels in 1997.

Table 4.8.1 Traffic volume of the Orinoco River Canal

(Unit: Vessels)

Year	Iron Ore *1)	Petroleum	General Cargo *2)	Aluminum	Bauxite *3)	(Total)
1988	324	63	520	37		944
1989	366	47	563	42		1,018
1990	386	38	525	46		995
1991	386	19	503	55		963
1992	324	29	432	43		828
1993	308	44	444	53		849
1994	293	59	391	65		808
1995	279	64	462	55	65	925
1996	299	86	389	55	51	880
1997	282	101	468	47	195	1,093

Note: Traffic record in each direction

Downstream from Puerto Ordaz

*1) Including direct reduced iron

*2) Industrial products and raw materials (Steel, Coke, etc.)

*3) Excluding from El Jobal Port to Puerto Ordaz

Source: MTC-INC

4.8.2 Ship Size (Average Laden Volume)

Average laden volume of ship by commodity at present is given in Table 4.8.2, which is estimated based on port statistics of SIDOR Port, San Felix Port, INTERALUMINA Port, ALCASA Port, VENALUM Port and MTC-INC.

Exportation volume of steel products was 1,439 thousand tons (see Table 4.7.4) and average laden volume was 8 thousand tons in 1997. It is estimated to increase sharply with improvement/expansion of SIDOR's plant and the start of operations of the concentration/slab plant. Referring to the high growth case, it is estimated to be 2,030 thousand tons in 2003, 3,000 thousand tons in 2005, 4,800 thousand tons in 2010 and 6,600 thousand tons in 2020. Future average laden volume is assumed to be 12 thousand tons in case of the year 2003/2005 and 20 thousand tons in case of the year 2010/2020 considering the transportation lot, destination and market condition of vessel.

Average laden volume of other commodity is assumed to remain the same as at present, because transportation volume and destination will not conspicuously change in the future. Ship size of iron ore transporting at present and in the future is minutely examined in section 5.2.1.

Table 4.8.2 Present Average Laden Volume by Commodity

	Commodity	Cargo Type	Volume (Tons/ship)
Export	Iron Ore	Dry Bulk	45,000
	Direct Reduced Iron	Dry Bulk	30,000
	Steel Products	General	8,000
	Bauxite	Dry Bulk	25,000
	Alumina	Dry Bulk	20,000
	Aluminum Ingot	General	8,000
	Crude Oil	Liquid	35,000
	Wood Chip	Dry Bulk	35,000
	Steel Bar	General	8,000
	Aluminum Products	General	3,000
	Silicon	General	3,000
	Anode	General	3,000
	Others	General	3,000
Import	Coke, Tar, Carbon	Dry Bulk	20,000
	Raw Materials	Dry Bulk	12,000
	Caustic Soda	Dry Bulk	25,000
	Others	General	3,000
Domestic (Out)	Steel Products	General	12,000
Domestic (In)	Clinker	Dry Bulk	12,000
	Bauxite (from El Jobal Port)	Dry Bulk	40,000

4.8.3 Future Ship Traffic Volume

Based on above mentioned average laden volume and cargo throughput projection, future ship traffic volume could be estimated. Traffic volume by industry and by growth case (downstream from Puerto Ordaz) is given in Table 4.8.3 and Fig. 4-8-1.

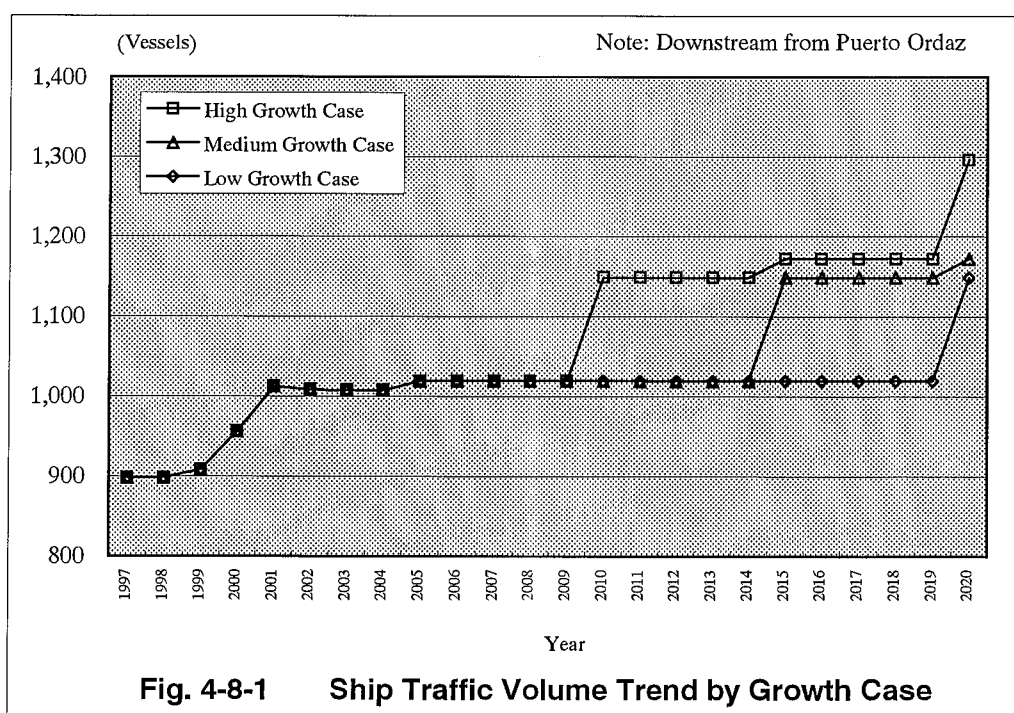
Table 4.8.3 Ship Traffic Volume Forecast by Industry

(Unit; Vessels)

Low Growth Case	1997	1999	2000	2001	2002	2003	2005	2020		
Medium Growth Case	1997	1999	2000	2001	2002	2003	2005	2015	2020	
High Growth Case	1997	1999	2000	2001	2002	2003	2005	2010	2015	2020
Iron Ore	220	165	151	121	105	89	89	89	89	89
Direct Reduced Iron	62	90	140	214	214	211	211	211	211	211
Steel Products/Materials	306	305	305	305	305	318	320	440	463	587
Aluminum ^{*1)} /Materials	146	155	160	166	171	176	176	185	185	185
Crude Oil	101	101	101	101	101	101	101	101	101	101
Wood Chip	0	13	20	27	34	34	34	34	34	34
Clinker/Silicon/Others	63	78	78	78	78	78	89	89	89	89
(Total)	898	908	956	1,012	1,008	1,007	1,019	1,148	1,172	1,296
Bauxite ^{*2)}	n.a.	132	136	141	145	150	150	150	150	150

Note; ^{*1)} Including bauxite, alumina, aluminum products and anode

^{*2)} From El Jobal Port to Puerto Ordaz



Total volume in 2020 is 1,300 vessels in the high growth case, 1,170 vessels in the medium growth case and 1,150 vessels in the low growth case respectively. The increase in ship traffic volume generally corresponds to cargo volume. But in this instance, there are only 20 more vessels in the medium growth case compared to the low growth case due to the shift in ship size to transport steel products (Slab). The average laden volume increases to 20,000 tons from 12,000 tons as referred in section 4.8.2.

Production volume of concentration plant and slab plant influence the total cargo volume, that is total the ship traffic volume. In this study, future seaborne cargo is forecast on the assumption of three growth cases because both plant projects include some indefinite factors at the moment. Moreover, the cargo to/from Colombia and Brazil which is estimated to be generated by two big projects, namely “Integrated Development Plan of the Orinoco/Meta River Basin” and “Free Trade Zone Program (provisional name)” is not included in the forecast because both projects are in a preliminary stage. Thus, it is hoped that the forecast will be updated and reviewed as occasion may demand, the above mentioned projects begin to be implemented.

Finally, Orinoco River and its basin have a huge development potential from the viewpoint of natural, mineral and agriculture resources and it is a principal prerequisite for development to use the Orinoco River channel effectively. The Orinoco River channel is expected to serve as the transportation axis for not only Venezuela but also Colombia and Brazil.