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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

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THE POTENTIAL FOR CO-OPERATION IN THE NITROGEN FERTILIZER INDUSTRY IN LATIN AMERICA *

by

Ing. Eduardo Gutierres-Salgado **
UNIDO Consultant

* The views and opinions expressed in this paper are those of the author and do not necessarily reflect the views of the Secretariat of UNIDO. This document has been produced without formal editing.

** Ing. Eduardo Gutierres-Salgado is Technical Secretary, ADIFAL, Association for the Development of the Fertilizer Industry in Latin America.

CONTENT

i. Introduction

In accordance with the recommendations of the Second General Conference of UNIDO held in Lima, Peru, in March 1975 and the First Consultation Meeting on the Fertilizer Industry in Vienna, during January 1977, the purpose of this paper is to present facts and figures of the world nitrogen fertilizer industry, with particular reference to the Latin American region, in order to identify opportunities for co-operation and assist the Region in achieving its industrialization goals.

Nitrogen is fundamental to develop agriculture, and its source is anhydrous ammonia.

ii. Conclusions and Recommendations

1. Important producers of nitrogen are emerging in countries and regions with developing market economies, such as the Latin American area — due to their reserves of natural gas and oil — and will play an increasingly important role in the world nitrogen supply.

Recommendation:

To observe around the world the development of all nitrogen plants in operation — expansions and de-bottlenecking, under construction and contracted, as well as closures — in order to avoid overproduction and consequently declining prices and dumping, which will be to the detriment of the world nitrogen fertilizer industry as a whole, especially in countries and regions with an, as yet, important emerging production capacity.

2. Emerging nitrogen producers in the developing countries are currently exporting the bulk of this nitrogen as anhydrous ammonia and urea, while they, nevertheless, remain net importers of nitrogen fertilizer products. Latin America imports approximately 800,000 tons of nitrogen fertilizer products yearly.

Recommendation:

Countries with a considerable exporting nitrogen capacity should encourage domestic usage such as direct NH_3 application, nitrogen solutions and liquid fertilizers, also transformation into complex fertilizers. Mexico, in order to reduce its dependence of nitrogeneous products, is encouraging the consumption of nitrogen solutions and liquid fertilizers and is also in the process of building a fertilizer complex.

3. Regrettably, within the developing countries, due to assorted infrastructure problems, production capacity utilization may often be as low as 60 percent. This has its economic significance. It is estimated that during 1977-78, the developing countries' production capacity will amount to 14.5 million tons of nitrogen, whilst their supply capability will only be 7.55 million tons; consequently, they are given up to their economies a potential income of approximately 625 million dollars, at current world prices.

Recommendation:

It is becoming increasingly obvious that many of the developing countries have common infraestructure problems; therefore, it is of vital

importance to greatly increase regional cooperation at all levels, by exchanging experiences in all fields related to the industry.

4. Many countries of the Region and others with developing economies which are not endowed with natural resources such as natural gas and oil, are net importers of anhydrous ammonia or nitrogen fertilizers and have been exposed to pricing and supply speculation by producers located in countries with developed econom

Recommendation:

Information on surplus and/or requirements must be a diligent exchanged among countries of the region; preference to regional producers, including duty advantage, should be given; multinational projects and industrial complementation should be carried out.

5. It is a fact that countries with developing market economies are emerging as important producers of nitrogen; that the bulk of this nitrogen is exported as anhydrous ammonia and urea; that production capacity utilization may often be as low as 60 percent; that these countries are net importers of nitrogen-base fertilizers and that the largest program of plants under construction, due to their reserves of natural gas and oil, is located in regions and countries with developing market economies.

Recommendation:

All regional associations, federations, systems and industries located in countries with developing market economies should organize at world level the "DEVELOPING COUNTRIES' PRODUCERS ASSOCIATION" to enforce, with the assistance of UNIDO, the World Bank, FAO and any other international agency, all

isolated efforts in exchange of marketing information, experiences and technicel assistance in all fields to solve infrastructure problems.

1. Raw Materials and Feedstocks

Research is currently being done on genetics, physiology, and physicel chemistry in developing commercial processes to fix biologicelly the nitrogen on plants. Eventually, it will be a success; however, present technology to produce nitrogen as anhydrous ammonia depends basically on natural gas and petroleum derivatives, such as naphta and fuel oil, coal and organic waetes. Approximately 70 percent of the world's ammonia production depends on natural gas because of its availability, price and its environmental acceptebility of ell fuels. It is reported that some ammonia plants are being adapted to use coal instead of natural gae.

2. Until recently, regions not endowed with netural resources, naphts and other derivatives of petroleum, were able to supply large quantities of nitrogen at reasonebly low prices, but all this changed after the oil crisie, which caused an increment of prices for petroleum-based raw materials. As a result, many ammonia producing complexes located in countries with developed market economies are being driven into a corner.

3. Traditionally, countries with important natural gas resources have been, by far, the largest producers of nitrogen such as the United States and the USSR. However, countries end regions with developing market producere of nitrogen due to their reserves of natural gas and oil, will play an important role in the world's nitrogen supply.

4. In Latin America, it is reported that the largest reserves of natural gas and oil are located in Mexico and Venezuela.

2. World Anhydrous Ammonia Situation

5. Currently, about 415 complexes have a production capacity of approximately 86 million tons of nitrogen; more than 215 complexes accounting for 55 percent of the world's capacity are located in the USSR, the United States and Western Europe.

6. By 1982, about 600 complexes shall have a production capacity of approximately 107 million tons of nitrogen as anhydrous ammonia (Table 1). During the period 1975-82, the total estimated increment of production capacity amounts to 38 million tons, equivalent to 140 new plants of 1,000 metric tons of NH_3 per day. The world fertilizer industry will gain approximately 6.3 million tons of nitrogen every year.

TABLE 1

World Production Capacity of Anhydrous Ammonia
(10^6 metric tons of Nitrogen)

YEAR	PRODUCTION CAPACITY	INCREMENT
1975-76	69.86	--
1976-77	77.40	7.54
1977-78	86.87	9.47
1978-79	93.11	6.24
1979-80	99.41	6.30
1980-81	103.69	4.28
1981-82	107.97	4.28

Source: FAO/ UNIDO/ World Bank Working Group on Fertilizers.

7. At present (1977-78), only 16.47 million tons, or about 20 percent of the world production capacity, are located in developing countries and, by 1981-82, this tonnage should be doubled up to 21.53 million tons.

2.1. Expansion Capacity

8. Around the middle of the present decade, in different countries and regions of the world, a program of capacity expansion and de-bottlenecking was initiated in many anhydrous ammonia plants. The United States, with 3.2 million tons of nitrogen in 21 plants, has the biggest known expansion capacity program, followed by Western Europe with 2.7 million tons.

9. The world's total expansion capacity amounts to 10.2 million tons of nitrogen, equivalent to approximately 37 new plants of NH_3, with a capacity of 1,000 tons each per day. This expansion capacity is to be completed by 1979-80.

10. It should be pointed out that in the developing countries very little activity is observed in expanding plants capacity.

2.2. Capacity under Construction and Contracted Plants

11. Commencing in 1976 with 1.5 million tons of nitrogen, an ambitious program was started around the world to construct and contract new capacity; by the end of this decade, approximately 108 new plants will be on stream adding to the present capacity about 29.7 million tons of nitrogen as anhydrous ammonia.

12. Outstanding is the USSR, with a total of 15 plants being built and

contracted, designed to produce 5.5 million tons of nitrogen, followed by China with 3.6 million tons from 14 plants. The United States has 10 under construction, with a capacity of 2.5 million tons of nitrogen.

13. The developing countries, however, account for 60 percent of the world program, with 69 plants under construction and contracted, to produce about 18.1 million tons.

2.3. Planning Capacity

14. There are, approximately, 30 plants in the planning stage, designed to produce 5.6 million tons of nitrogen. Most of the planning is being undertaken in the developing countries and its realization shall depend on many factors such as:

-- Having adequate infrastructure, including communication and transport; public services; supply of raw materials or feedstocks; marketing, technical and administrative capacity among others, and

-- Proper financing.

2.4. Supply Capability

15. Applying a sliding scale adjustment to capacity figures for new plants and to expansion is necessary; since capacity utilization is initially low and generally improving over a period of three years, the FAO/UNIDO/World Bank Working Group on Fertilizers considered 70 percent as average capacity utilization of new nitrogen plants and also considered deductions from production to account for nitrogen used for non-fertilizer purposes, for process

losses and for losses in transport, storage and handling. In accordance with previous considerations, Table 2 shows the world supply capability compared to world production capacity.

TABLE 2

World Nitrogen Fertilizer Supply Capability

(10^6 metric tons of nitrogen)

YEAR	SUPPLY CAPABILITY	PRODUCTION CAPACITY	DIFFERENCE
1975-76	43.87	69.86	25.99
1976-77	46.01	77.40	31.39
1977-78	51.01	86.87	35.86
1978-79	55.36	93.11	37.75
1979-80	59.51	99.41	39.90
1980-81	63.74	103.69	39.95
1981-82	67.45	107.97	40.52

The distribution of the nitrogen supply capability among regions, in accordance with the FAO classification of market economies, is presented in Table 3.

TABLE 3

World Supply Capability

(10^6 metric tons of nitrogen)

YEAR	MARKET ECONOMIES		CENTRALLY PLANNED	TOTAL
	DEVELOPED	DEVELOPING		
1975-76	21.55	5.25	17.07	43.17
1976-77	22.40	6.26	17.35	46.01
1977-78	23.40	7.55	20.06	51.01
1978-79	24.49	9.00	21.87	55.36
1979-80	25.51	10.45	23.55	59.51
1980-81	26.24	12.15	25.35	63.74
1981-82	26.54	13.16	27.75	67.45

17. It should be pointed out that during the period 1975-1982 the developing countries will participate with, approximately, 16 percent (average) of

the total world supply capability and that many plants located in developing countries due to infrastructure problems operate at 60 percent, or even less, of their constructed capacity.

18. Many investments, financing and imports of fertilizers could be economized in countries with developing market economies, if only plants could operate at their production capacity. This statement is confirmed with the figures presented in Table 4, prepared by the FAO/UNIDO/World Bank Working Group on Fertilizers.

TABLE 4

Countries with Developing Market Economies: Production-Supply Capability

(10^6 metric tons of nitrogen)

YEAR	PRODUCTION CAPACITY	SUPPLY CAPABILITY	DIFFERENCE
1975-76	9.23	5.25	3.98
1976-77	11.32	6.26	5.06
1977-78	14.50	7.55	6.95
1978-79	16.47	9.00	7.47
1979-80	18.98	10.45	8.53
1980-81	21.28	12.15	9.13
1981-82	21.53	13.16	8.37

19. During the period 1976-77, countries with developing market economies could only utilize 55 percent of their production capacity and it is estimated that only 52 percent for the period 1977-78. The difference or fruitless capacity of 6.95 million tons of nitrogen indicated for 1977-78, has its economic significance; considering the price for anhydrous ammonia at US$ 95.00 per metric ton, f.o.b., countries with developing market economies are giving up an income to their economies of, approximately, 805 million dollars.

2.5. Consumption and Demand

20. During 1976-77, the world nitrogen fertilizer consumption amounted to 45.85 million tons, a gain of 2.55 million tons or 5.8 percent over the previous period. About 44 percent of the world nitrogen consumption is located in countries with developed market economies, 37 percent in those centrally planned and the balance of 19 percent, in developing market economies.

21. Starting in 1975-76 and over a period of seven years, the world nitrogen fertilizer demand is estimated to grow at a yearly rate of 3.3 million tons of nitrogen, or 6.5 percent (Table 5).

TABLE 5

World Nitrogen Fertilizer Demand
(10^6 metric tons of nitrogen)

YEAR	DEMAND	INCREMENT	%
1975-76	43.30	--	--
1976-77	45.85	2.55	5.9
1977-78	49 57	3.72	8.1
1978-79	52.54	2.97	6.0
1979-80	55.88	3.34	6.4
1980-81	59.53	3.65	6.4
1981-82	63.09	3.56	6.0

22. Through the period 1975/76 - 1981/82, nitrogen demand in countries with developed market and centrally planned economies will remain almost static; developing market economy countries will increase slightly their participation from the observed 19 percent during 1976-77 to 23 percent of the world demand by 1981-82. Table 6 presents the world nitrogen fertilizer demand by market economies.

TABLE 6

World Nitrogen Fertilizer Demand
(10^6 metric tons of nitrogen)

YEAR	MARKET ECONOMIES DEVELOPED	DEVELOPING	CENTRALLY PLANNED	TOTAL
1975-76	19.18	7.58	16.54	43.30
1976-77	20.01	8.87	16.97	45.85
1977-78	20.92	10.02	18.63	49.57
1978-79	21.58	11.11	19.85	52.54
1979-80	22.47	12.13	21.28	55.88
1980-81	23.52	13.16	22.85	59.53
1981-82	24.51	14.30	24.28	63.09

23. According to the FAO/UNIDO/World Bank Working Group on Fertilizers, through the period 1975-82 countries with developed market and centrally planned economies will have a surplus of nitrogen fertilizer; during the same period, countries with developing market economies show a deficiency. Table 7 presents, by economic region, the world nitrogen fertilizer balance between supply and demand.

TABLE 7

World Nitrogen Fertilizer Demand and Supply Balance
(10^6 metric tons of nitrogen)

YEAR	MARKET ECONOMIES DEVELOPED	DEVELOPING	CENTRALLY PLANNED	TOTAL
1975-76	+2.37	-2.33	+0.53	+0.57
1976-77	+2.39	-2.61	+0.38	+0.16
1977-78	+2.48	-2.47	+1.43	+1.44
1978-79	+2.91	-2.11	+2.02	+2.82
1979-80	+3.04	-1.68	+2.27	+3.63
1980-81	+2.72	-1.01	+2.50	+4.21
1981-82	+2.03	-1.14	+3.47	+4.36

24. Throughout the period 1975-82, countries with developing market economies will be giving up production or income to their home economy by approximately 805 million dollars and, additionally, must import an average of nearly two million tons per year of different fertilizer formulas in terms of nitrogen.

3. Present and Future Situation in Latin America

25. Currently, the Latin American region has a capacity to produce 4.03 million tons of nitrogen as anhydrous ammonia from about 25 fertilizer complexes mainly located in Mexico, Venezuela, Trinidad-Tobago, Cuba and Brazil.

There has been an increment in operating capacity of, approximately, 900,000 tons of nitrogen during the period 1977-78 with respect to 1976-77 and an additional 860,000 tons will be available by 1980-81, due largely to new capacity being built in Mexico and Brazil.

26. By the end of this decade, Latin America will have 4.89 million tons of nitrogen as production capacity, representing 4.5 percent of the world nitrogen production capacity (Table 8) and 25 percent of that is located in countries with developing market economies (Table 9).

TABLE 8

Latin America Production Capacity of Anhydrous Ammonia

(10^6 metric tons of nitrogen)

YEAR	LATIN AMERICA	OTHER REGIONS	WORLD TOTAL
1975-76	2.52 (3.6 %)	67.34 (96.4%)	69.86 (100%)
1976-77	3.12 (4.0 %)	74.28 (96.0%)	77.40 (100%)
1977-78	4.03 (4.6 %)	82.84 (95.4%)	86.87 (100%)
1978-79	4.07 (4.4 %)	89.04 (95.6%)	93.11 (100%)
1979-80	4.40 (4.4 %)	95.01 (95.6%)	99.41 (100%)
1980-81	4.89 (4.7 %)	98.80 (95.3%)	103.69 (100%)
1981-82	4.89 (4.5 %)	103.08 (95.5%)	107.97 (100%)

Source: FAO/UNIDO/World Bank Working Group on Fertilizers. Fert/77/3, August 19..

TABLE 9

Production Capacity of Anhydrous Ammonia
in Countries with Developing Market Economies

YEAR	LATIN AMERICA	OTHER REGIONS	WORLD TOTAL
1975-76	2.52 (27.3%)	6.71 (72.7%)	9.23 (100%)
1976-77	3.12 (27.6%)	8.20 (72.4%)	11.32 (100%)
1977-78	4.03 (27.8%)	10.47 (72.2%)	14.50 (100%)
1978-79	4.07 (24.7%)	12.40 (75.3%)	16.47 (100%)
1979-80	4.40 (23.2%)	14.58 (76.8%)	18.98 (100%)
1980-81	4.89 (23.0%)	16.39 (77.0%)	21.28 (100%)
1981-82	4.89 (22.7%)	16.64 (77.3%)	21.53 (100%)

3.1. Expansion Capacity

27. For practical purposes, no expansion capacity is registered in the Latin American region.

3.2. Capacity under Construction and Contracted Plants

28. At the present time, within the Latin American region, there are approximately 1.5 million tons of nitrogen capacity under construction due on stream before 1979.

29. The biggest capacity under construction is located in Mexico with 610,000 tons of nitrogen and will come on stream during 1978. Currently, Brazil has 572,600 tons of new capacity under construction and approximately half of this will enter into production in late 1977, and the remainder until 1979. Trinidad-Tobago has 300,000 tons which will also come on stream during the second half of 1977.

30. Furthermore, nearly 1.15 million tons of nitrogen capacity have been

contracted largely to enter into production during 1980. The largest tonnage contracted is to be found in Brazil with 784,000 tons of new capacity programmed to be on stream during 1980. It is reported that Chile has contracted 365,000 tons of nitrogen capacity, which are probably due to commence production in 1980.

3.3. Planning Capacity

31. In the Latin American region, there are approximately two million additional tons of nitrogen in the planning stage, and the bulk of this is projected to enter into production during the period 1980-85. By far, the largest planned capacity is located in Mexico with 1.46 million tons of nitrogen to be produced in four complexes; three of them are projected to start production in 1981 and the fourth plant in 1982. Planned capacity is also located in Trinidad-Tobago, Argentina and Bolivia.

3.4. Exporting Capacity

32. Until this time, Venezuela — who built a nitrogen complex largely oriented to the export market — has been Latin America's principal exporter. During 1978, Mexico's surplus production is estimated at nearly half a million tons of nitrogen which, in all probability, will be released to the world market. However, it is estimated that, after 1978, the surpluses will sharply be reduced to approximately 300,000 tons, as Mexican domestic consumption increases.

3.5 Consumption and Demand

33. Consumption in Latin America during 1976-77 amounted to 2.32 million

tons of nitrogen; an increase of 300,000 tons over the period 1975-76. Latin American consumption is, therefore, 5 percent of the total world nitrogen consumption which was 45.85 million tons and represents 26 percent of the consumption of nitrogen in countries with developing market economies.

34. Starting in 1977-78, the demand is estimated at 2.52 million tons of nitrogen, increasing to 3.49 million tons by 1981-82; this represents an annual average demand increase of 240,000 tons, or 8.5 percent.

35. In the Latin American region, the following situation is found: It has a production capacity of approximately four million tons of nitrogen, a supply capability of nearly half of its capacity to cover consumption and demand, and is still a net importer of, approximately, 800,000 tons of nitrogen as nitrogenous products per year, independently of becoming one of the largest regions in the world, exporters of nitrogen as anhydrous ammonia (Table 10).

36. The largest consumers of nitrogen in Latin America are, by far, Mexico and Brazil; these two countries account for more than 70 percent of the region's consumption.

TABLE 10

Latin America: Nitrogen Supply and Demand Balance

(10^6 metric tons of nitrogen)

YEAR	PRODUCTION CAPACITY	SUPPLY CAPABILITY	CONSUMPTION DEMAND	BALANCE
1975-76	2.52	1.25	2.03	-0.78
1976-77	3.12	1.49	2.32	-0.83
1977-78	4.03	1.72	2.52	-0.80
1978-79	4.07	2.04	2.72	-0.68
1979-80	4.40	2.20	2.96	-0.76
1980-81	4.89	2.37	3.22	-0.85
1981-82	4.89	2.56	4.49	-0.93

Source: FAO/UNIDO/World Bank Working Group on Fertilizers.

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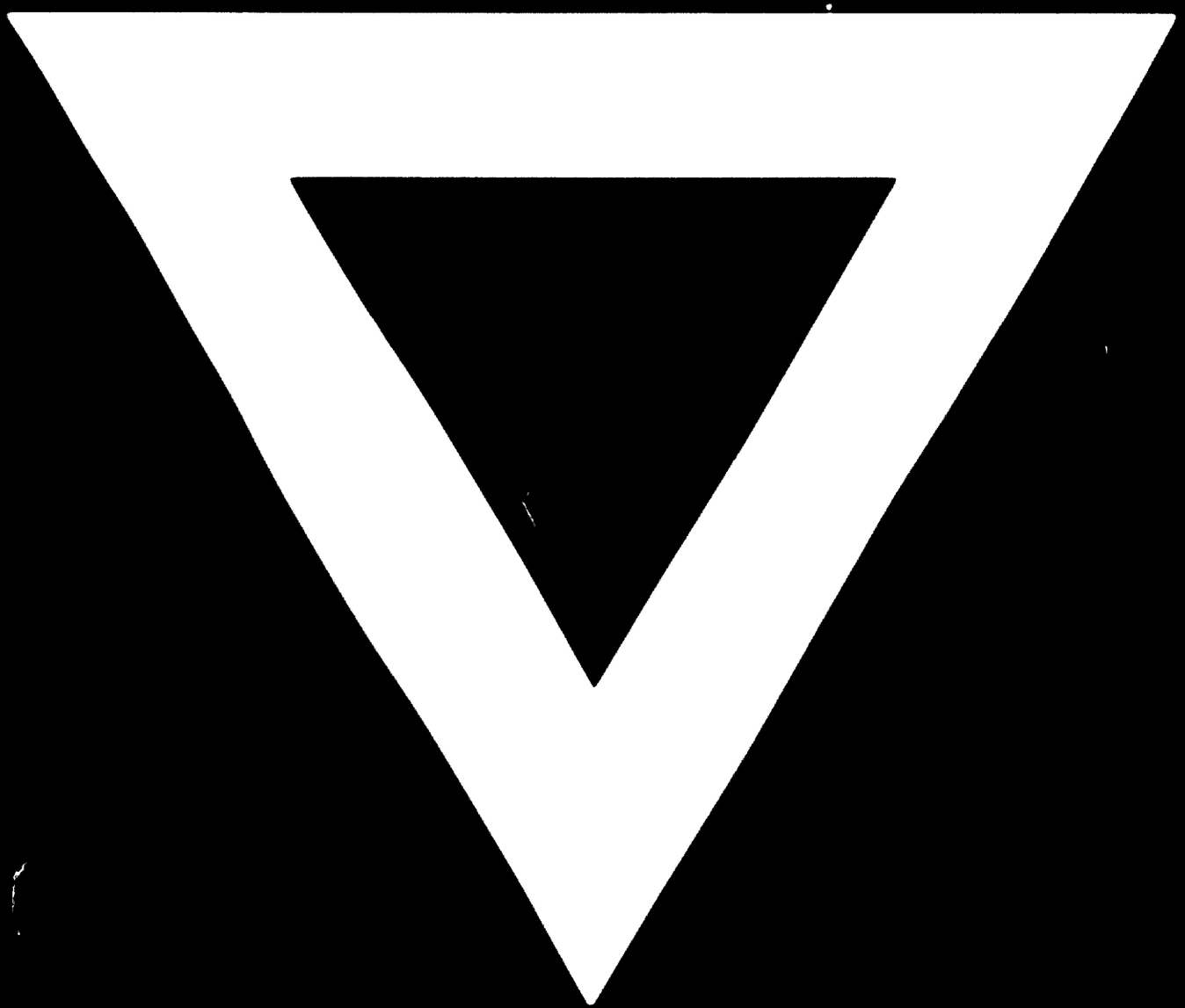

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