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PROSPECTS FOR BAGASSE NEWSPRINT IN INDIA

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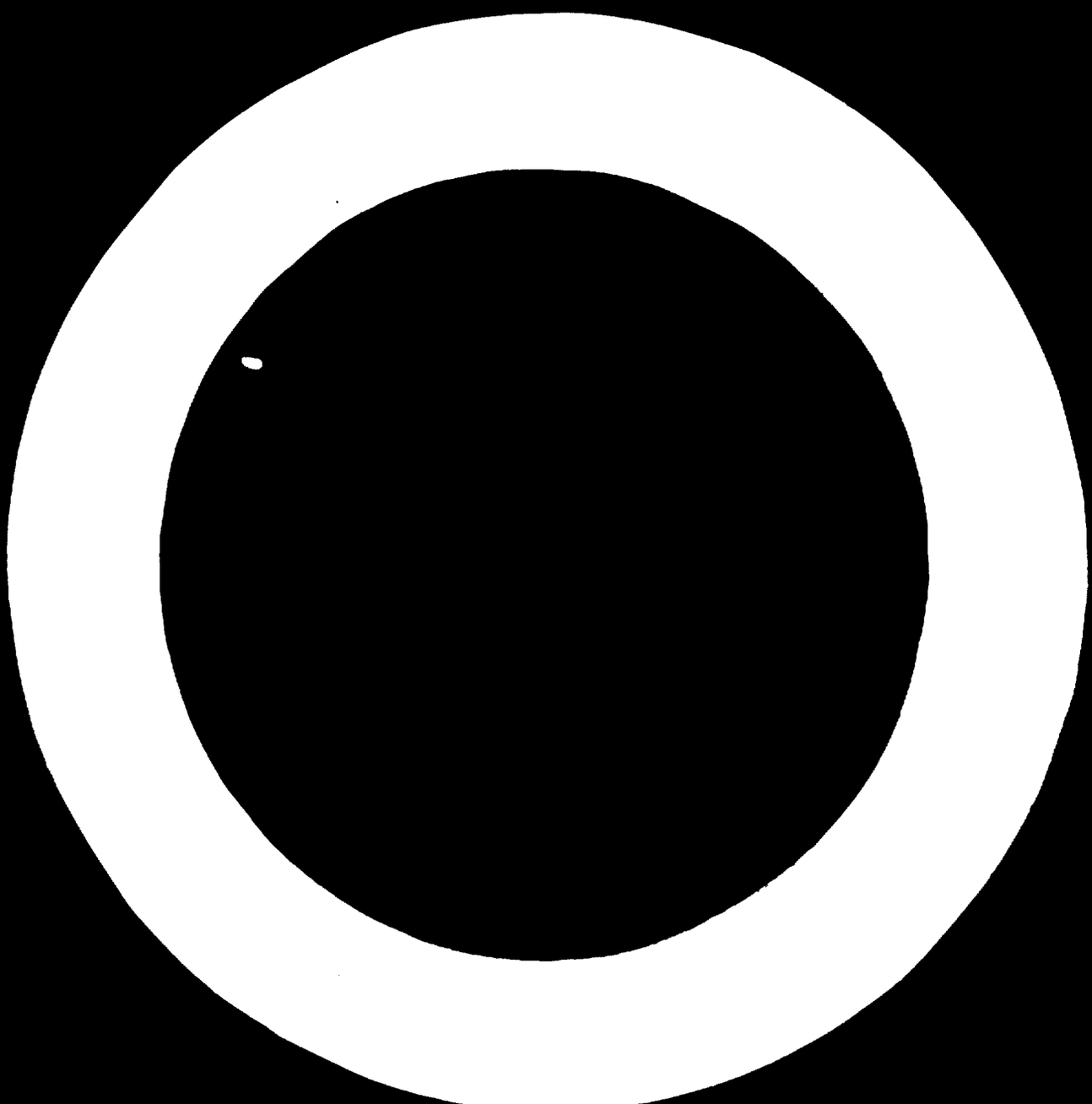

SUMMARY

The paper first gives a picture of the demand for newsprint in India and the potential availability of bagasse to meet this demand. The industrial experience with bagasse in the Indian paper industry is then described. The research work done at the Cellulose and Paper Branch, Forest Research Institute, Dehra Dun on a pilot plant scale to demonstrate the feasibility of production of bagasse newsprint by various processes is detailed. The paper concludes with suggestions for steps to be taken for implementing bagasse newsprint projects.

INTRODUCTION

The Indian paper industry has no doubt succeeded in meeting substantially the country's requirements of different grades of woodfree papers and boards. A time, however, has come when serious attention needs to be given to the development of newsprint manufacture in order to meet the demands of newsprint.

NEWSPRINT

Newprint is generally made from 80 per cent mechanical pulp and 20 per cent chemical pulp. In foreign

countries the raw material for both mechanical and chemical pulps is softwood. As these were not available in India easily and cheaply, there was no production of newsprint in India till recently. The National Newsprint and Paper Mills, Nowanagar, Madhya Pradesh, however, are now producing newsprint from 60 per cent mechanical pulp from salai wood (Boswellia serrata) and 40 per cent bleached sulphate bamboo pulp. The present production of the mill is 30,000 tons, but the capacity has been now expanded to 75,000 tons. The controlled selling price is Rs. 1,100 per ton only. The present restricted demand of newsprint is 1,85,000 tons. This is met by the additional use of 30,000 tons of ordinary printing paper (made mainly from bleached sulphate bamboo pulp) and the import of 1,25,000 tons of newsprint. To meet the shortage of newsprint, there is a proposal to set up a newsprint mill in Kerala in the public sector based on plantation grown Eucalyptus grandis, and another proposal to set up a newsprint mill in Himachal Pradesh in the private sector based on softwood growing in the Himalayas. As newsprint is an essential raw material for a developing country, India is intensely interested in expanding domestic production. Newsprint consumption is much below the level which may be considered appropriate to the stage of political, economic and cultural development which India has reached, simply because India is unable to devote to the purchase of newsprint

the amounts of foreign exchange required. If India had the foreign exchange, the traditional producing centres, Canada and, to a lesser extent, Scandinavia, would have the incentive, as they undoubtedly have the resources, to produce all the newsprint required by India. Newsprint production is one of the most specialized paper-making processes, governed by strict product specifications and low margins of profit. The economics of the process favour the installation of relatively large mills with high capital investment. A price revision to a realistic level is essential if at all newsprint manufacture is to develop. The international selling price of newsprint has been set by large mills utilising coniferous softwoods from the forests of Scandinavia and North America. Due to plentiful supplies of raw material, cheap hydroelectric power and high production capacity such mills naturally achieve low production costs. Before the devaluation of the Indian rupee, the indigeneous newsprint was costlier than imported paper. The situation has, however, now changed and the indigeneous paper is about Rs. 200 per ton cheaper. As in other countries having bagasse, attention has also been devoted in India to the production of paper from bagasse. Theoretically, the large quantities of bagasse available in India could meet the entire unrestricted demand of newsprint of the country several times over.

AVAILABILITY OF BAGASSE

Countries producing over a million tons of cane sugar in 1961-62 were (1) :

Cuba	4,815,000
Brazil	3,386,000
India	3,004,000
Mexico	1,548,000
Philippines	1,468,000
Australia	1,380,000
South Africa	1,085,000
Hawaii	1,015,000

Although India ranks only third in cane sugar production, it has the highest total production of sugar cane and consequently of bagasse. The figures for 1961-62 are (1) :

Area under sugar cane	5,942,000 acres
Sugar cane production	93,021,000 tons
Percentage cane utilised for :	
White sugar	28.49
Khandsari	6.20
Gur	46.59
Chewing, etc.	18.79

For reasons of economics of collection etc., bagasse for papermaking could be made available only from white sugar producing factories and not from the cane used in gur and khandsari industries. The States with a crushing

capacity of over a million tons of cane in 1961-62 were (1) :

	Cane crushed thousand tons.	No. of Factories
U.P.	12,707	71
Maharashtra	4,163	27
Bihar	3,872	28
Andhra Pradesh	1,865	14
Madras	1,322	9
Mysore	1,279	8
Punjab	1,084	6

The bagasse production is dependent on the fibre content of sugar cane. This varies from 10-15% in Maharashtra and South and from 14-18% in the North. The bagasse production accordingly varies from 24-30% in the low fibre region and from 30-36% in the high fibre region. A sugar factory with a crushing capacity of 2000 tonnes per day of cane having an average bagasse content of 32.5% would yield 97,5000 tonnes of wet bagasse in 150 working days. As the individual factories have too small a capacity to feed a paper mill of economic size, the mills have to be grouped together and a mill site so chosen that the transport of bagasse from sugar mill to paper mill is reduced to a minimum.

At present the bulk of the bagasse is burnt for process steam and power generation by the factories. In some of the regions, considerable quantities of extra fuel are used in addition to bagasse. (2)

INDUSTRIAL EXPERIENCE WITH BAGASSE IN INDIAN PAPER INDUSTRY

Rohtas Industries

Pulping of bagasse in a 30 ton per day plant using Celdecor - Pomilio process had been carried out for several years since 1962 in the Rohtas Industries, Dalmianagar, but recently the mill has discontinued the use of bagasse. The bleached bagasse pulp was used alongwith bamboo chemical pulp in various varieties of papers and boards.

Anil Hardboards

The Anil Hardboards, Bombay uses the Asplund Defiltrator process for the production from various materials including bagasse of insulation board in a plant of 80 tons per day capacity. They obtain bagasse at 90 Rs. per ton (80% moisture content).

Mandya National Paper Mills

The only mill in India which uses mainly bagasse for production of writing and printing papers is the Mandya National Paper Mills, Belagula (Mysore State) (2). This went into production in 1962. Initially planned to use 80% bagasse pulp and 20% rag fibre in the paper furnish, it has settled down to a furnish of bagasse pulp and balance wood or bamboo pulp as the long fibre component. Papers in the basis weight range of 47 to 75 g.s.m. are made with 75 to 80% bagasse and typewriting qualities in the range 30 to 40 g.s.m. are made with 60 to 70% bagasse. The plant can make 30 tons of 56 g.s.m. paper but only 18 tons of 33 g.s.m. paper. Originally the plant

was expected to use only the bagasse produced by a nearby sugar mill, viz Mysore Sugar Company, Mandya who were supposed to supply bagasse in exchange for coal or furnace oil. However, this was not found to be feasible and now the Mills purchase surplus bagasse from the Mysore Sugar Company and from other mills situated in the neighbouring States of Maharashtra and Tamil Nadu. From the handling cost point of view, it is economical to directly consume as much bagasse from the incoming stocks as possible during the bagasse collecting period in order to save the cost of stacking and destacking. However the mill experience has been that bagasse stored for two months or more behaves better in depithing process and consequently there is no " press picking " on the paper machine. Stacking of the baled bagasse at the sugar mill for sometime before despatching the same to paper mills can have the additional advantage of reducing the moisture and hence the weight to be transported. The bagasse as received at the mill site is wet-depithed in two stages. The mill's experience in making cultural papers with a high percentage of bagasse pulp clearly shows the feasibility of commercial utilisation of bagasse as raw material for paper making.

Other Paper Mills

In order to encourage the use of unconventional raw materials for manufacture of paper, excise duty concession of Rs. 50 per ton has been given in the case of paper containing more than 40% of pulp derived from bagasse, cereal

straw and jute sticks. Some paper mills have started using appreciable quantities of bagasse to take advantage of this concession. The Shree Gopal Paper Mills, Yamunanagar use about 3000 tons of bagasse a year and the Delhi Pulp Mills Faridabad about 10,000 tons.

Straw Board Mills

The lime process of pulping is applied to whole bagasse in production of strawboard by several mills. The Meerut Strawboard Mills used in 1968-69, 7804 tons of bagasse obtained at a price of Rs. 62 per ton. The bagasse is cooked in rotary digesters at 70 p.s.i. for 5 to 6 hours with 10% lime giving an yield of 60%. Bagasse is the main furnish used (80%) the rest being wheat straw. The mills have no difficulty in making 100% bagasse board. The normal basis weights are 25-600 g.s.m. Other mills using bagasse for straw boards include Patel Paper Mills, Ganghara, Straw Products, Bhopal, and Cellulose Products of India, Ramol.

Consumption

The Indian paper industry has so far been based primarily on bamboo which constituted about 67% of the total fibrous raw material in 1967. Woods constituted 18%, bagasse 3%, and various other materials 10%. It can thus be seen that the impact of bagasse on paper manufacture so far has been small. But sufficient industrial

experience has been gained to show that this is a promising material and that problems of collection, transport, storage and processing are not insurmountable.

F.R.I. RESEARCH ON BAGASSE NEWSPRINT

First attempt (4)

Bagasse consits mainly of fibres and pith cells. The former forms about 65% and the latter about 35% of bagasse. Bagasse pith has no value as a papermaking material. The pith can be removed from dry bagasse (containing about 10% moisture) by treating in a rod mill and screening on a 12-mesh screen. From the portion remaining on the screen when digested with 18% NaOH, using a material liquor ratio of 1:6, a maximum temperature of 153°C and a cooking time of 4 hours, an easy bleaching pulp was obtained. The bleach consumption was 4.4% bleaching powder on depithed bagasse and the bleached yield 54.7% on depithed bagasse. Since the fibre length of depithed bagasse was found to be only 1.38 mm the bagasse pulp was mixed with bamboo pulp (30%). The paper made on the pilot plant after beating and addition of 7.5% china clay and 2.1% titanium dioxide had a breaking length of 4070 metres M.D. and 2150 metres C.D. In order to study the performance of the bagasse pulp on a commercial Fourdrinier machine, a trial was carried out in the Shree Gowal Paper Mills. Paper could be made at a speed of 312 f.p.m. from a blend of 70% bleached soda pulp from depithed bagasse and 30% bleached sulphate pulp from bamboo. This

paper was used by The Statesman in publishing an edition of July 22, 1953.

Pretreatment (5)

Whole bagasse was used. The bagasse was first treated with water pressure for 1 hour at 110°C. The material was then cooked with 18% NaOH, using a material - liquor ratio of 1:6 for 6 hours at 133°C. Easy bleaching pulp was obtained. The bleach consumption was 1.6% bleaching powder on whole bagasse and the bleached yield 48.2% on whole bagasse. The paper made on the pilot plant after beating and addition of 20% china clay had a breaking length of 4610 metres M.D. and 2610 metres C.D.

Hot Caustic Soda Process (6)

The hot caustic soda process is a two stage process developed by the F.R.I.I. In the first stage, the raw material is treated with a solution of caustic soda at near boiling temperature under atmospheric pressure for a short period. The time of treatment is so adjusted that the reaction is stopped at a point where a considerable part of the lignin is removed with a maximum retention of hemicelluloses and a minimum degradation of the cellulose. After the period of caustic treatment, the spent liquor is withdrawn and the material washed. The material is now sufficiently soft and is mechanically fiberised into pulp in the second stage of the process. The colour of the pulp is much lighter than soda or sulphate pulps and the pulp can be used as such for several end uses.

The colour can be improved by bleaching with calcium hypochlorite in single stage.

Whole bagasse was used. The bagasse was first treated with 6% NaOH at 94°C for 30 minutes using a material-liquor ratio of 1:35. After fiberising the pulp was bleached with calcium hypochlorite for 4 hours (5%available chlorine on pulp dosage). The bleached pulp yield was 75.3%. The bagasse pulp was mixed with 20% bamboo pulp. The paper made on the pilot plant after beating and addition of 5% china clay had a breaking length of 3590 metres M.D. and 2710 metres C.D.

Mixture of bagasse and wood (7)

Large scale plantations of Eucalyptus hybrid are being raised in various parts of the country. In some States, bagasse is also available side by side. It was thought useful to carry out an investigation on the manufacture of newsprint from a mixture of mechanical pulp from eucalyptus and soda semi-chemical pulp from depithed bagasse.

Eucalyptus was ground using a stone sharpness of 30 (time of grinding in seconds per centimetre of Deodar wood) and a pressure of 1 Kg/Sq cm of wood on stone. The energy consumption was 936 K.W.H. per ton. The depithed bagasse was cooked with 8% NaOH for 2 hours at 162°C and the unbleached pulp was bleached in two stages (with intermediate water wash) using 14% available chlorine. The bleached pulp yield was 56.5%. The two pulps - 60 parts bagasse

pulp and 40 parts eucalyptus pulp - were mixed and run on the Fourdrinier without beating and addition of filler. The paper had a breaking length of 3690 metres M.D. and 2730 metres C.D.

STEPS TO BE TAKEN FOR IMPLEMENTING BAGASSE NEWSPRINT PROJECTS

The old idea that newsprint could be made only from mechanical pulp from wood has now been replaced by a new definition of newsprint, "Any kind of paper capable of being run through modern printing presses and of producing an acceptable sheet of newsprint at a reasonable cost." Runnability, opacity and lower cost are the most important qualities. It has been shown from the several F.R.I. pilot plant trials that runnability of bagasse newsprint and opacity is good. To convert those results into commercial practice it is necessary to assure the industrialist of sustained supplies of bagasse from the sugar mills at economic prices. No sugar mill is keen to part with its bagasse, which is a readily available fuel. The mill would consider improving the thermal efficiency of its boilers, so that some of its bagasse could be rendered surplus, provided it was given a guarantee that the paper mill would bear the cost of modernisation and would take away all the supply of bagasse which would otherwise cause a serious disposal problem. However the bagasse thus rendered surplus would only be about 20% of the total available if alternate fuel could be provided to the sugar mill. Thus a number of mills will have to be tapped if a newsprint mill of economic size has to be set up. This is

not an economically viable proposition as the cost of transport of bagasse from several sugar mills to one large newsprint mill would be very high. It is only possible for small paper or straw mills. Therefore, certain norms should be laid down for procuring the whole of the bagasse produced by a group of nearby paper mills which could together support a bagasse newsprint mill. A pattern covering the policy in respect of the price to be paid for the bagasse has to be evolved in order that it might be adopted uniformly in all cases. Likewise a common policy in the matter of replacement or modification of existing boilers in sugar factories at the cost of the paper mill has to be evolved. A condition is already being imposed on all licences for the expansion of existing sugar factories and establishment of newsugar factories to the effect that bagasse should be released by them for papermaking whenever asked for. This automatically involves the setting up of multifuel boilers capable of handling bagasse, pith, coal or furnace oil. At the present time, there is a high excise duty on furnace oil. Rebate on excise duty on furnace oil used by sugar factories releasing bagasse for papermaking should be granted as a matter of course. No agreement has so far been reached between the sugar factories and the existing paper mills on the question of releasing substitute (as opposed to surplus) bagasse for manufacture of pulp and paper. The main reasons for this deadlock are the cost involved in replacing the existing bagasse fired boilers of the sugar

factories by those capable of burning bagasse/coal/furnace oil and the regular and timely supply of coal/furnace oil to sugar factories at economic prices. The Government should invite entrepreneurs to undertake early promotion of a bagasse newsprint mill and persuade sugar mills to part with their bagasse in the national interest for newsprint manufacture, in exchange for an equivalent quantity of coal or furnace oil plus a small incentive. This will provide the sugar factories with a small margin of profit and also enable them to take advantage of the high operational efficiency of boilers when using coal or furnace oil as a fuel instead of bagasse. The incentive method of getting bagasse released for paper making is to be preferred to statutory control in view of the difficulties involved in imposing such a control. Necessary assistance should also be given by the Government to these new projects, which call for a very large capital outlay, in securing underwriting agreements for rupee financing and in obtaining foreign exchange for imported items of equipment. In 1954 (8) it was said, " The production of newsprint from bagasse has long been technically possible, but so far no one has succeeded in making, at a competetive price, an acceptable newsprint capable of being run on high speed machinery." It is hoped that India will soon show the world that production of bagasse newsprint is commercially practicable as it showed half a century ago that production of bamboo paper is commercially practicable.

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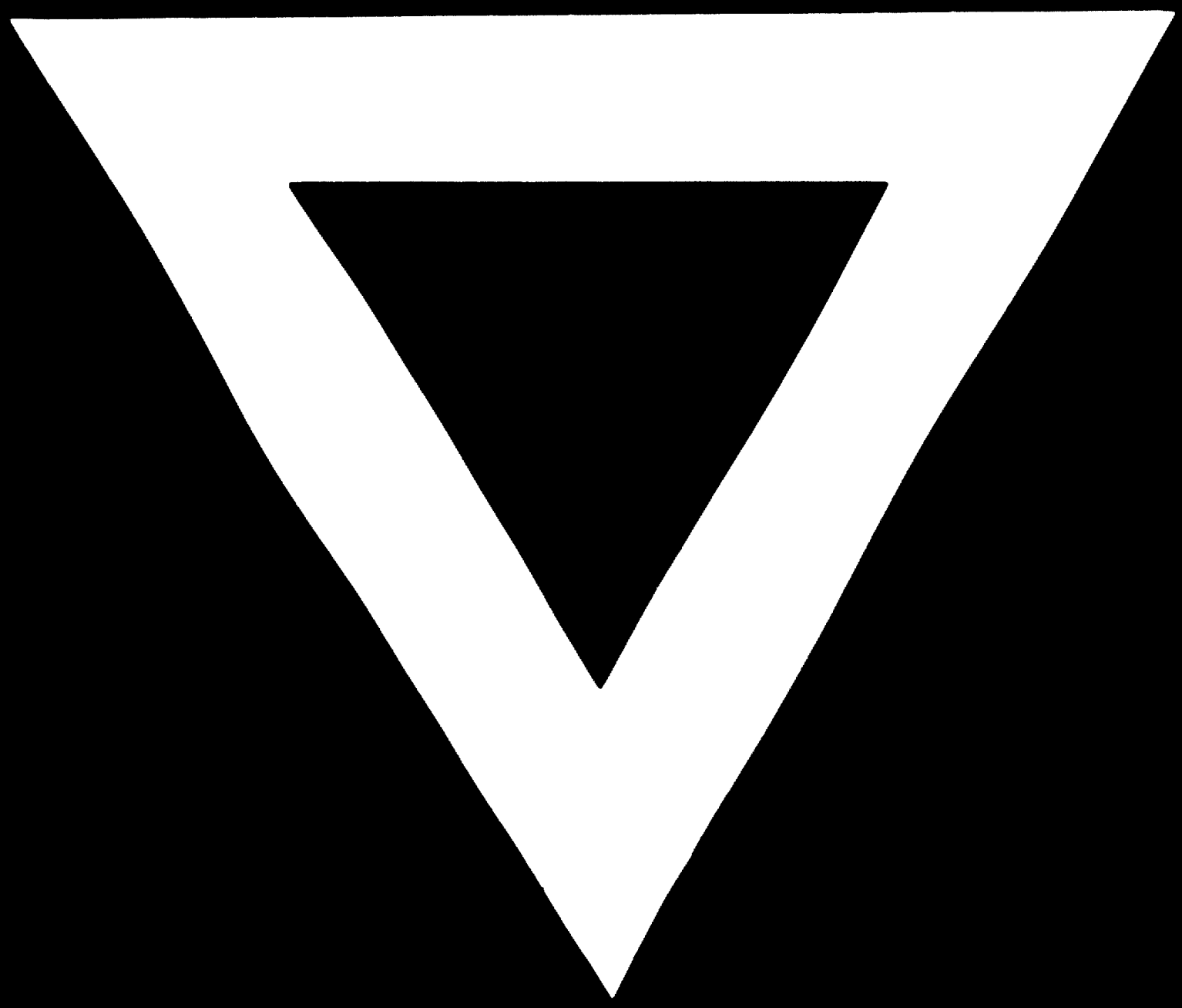

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