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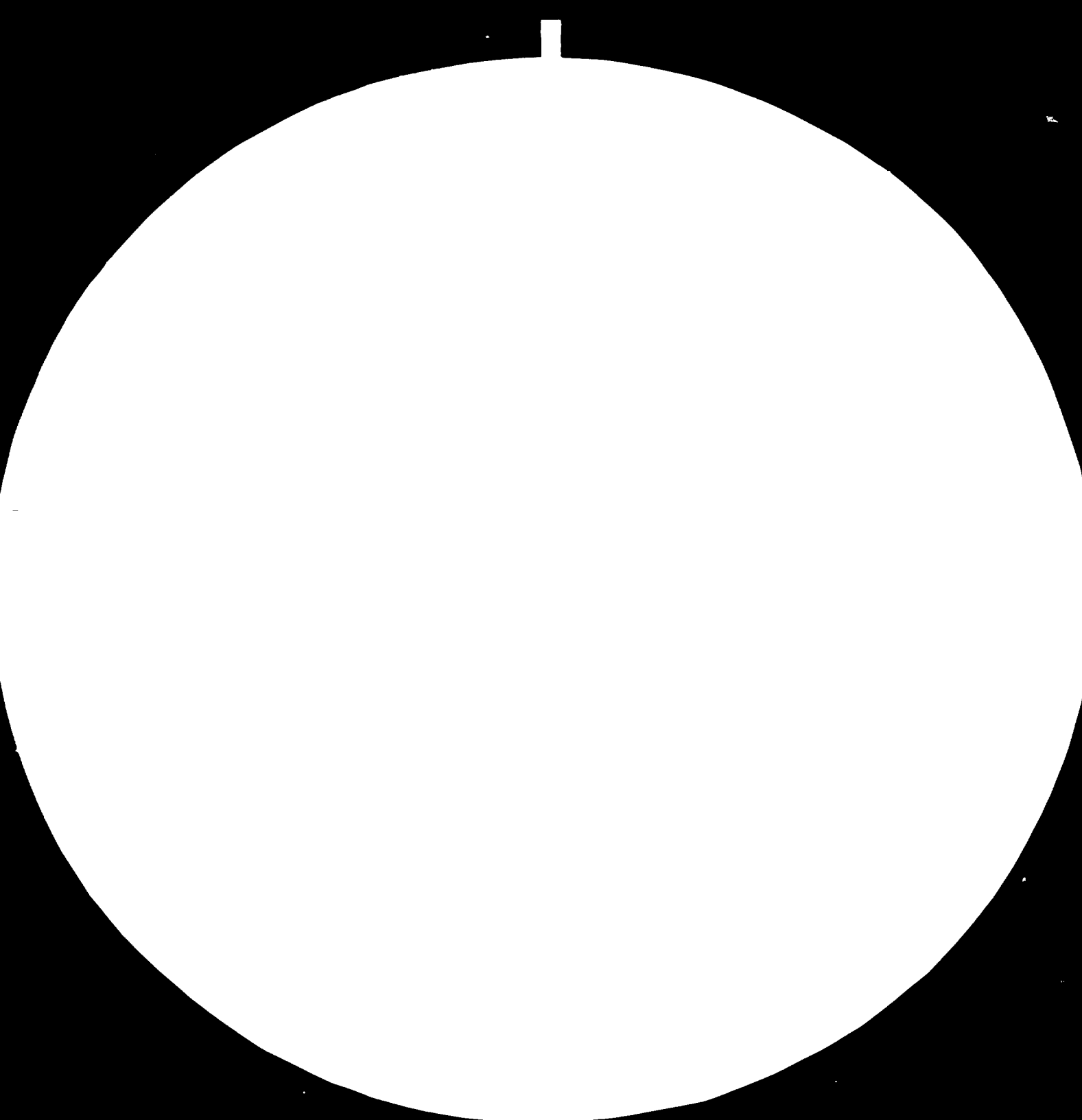

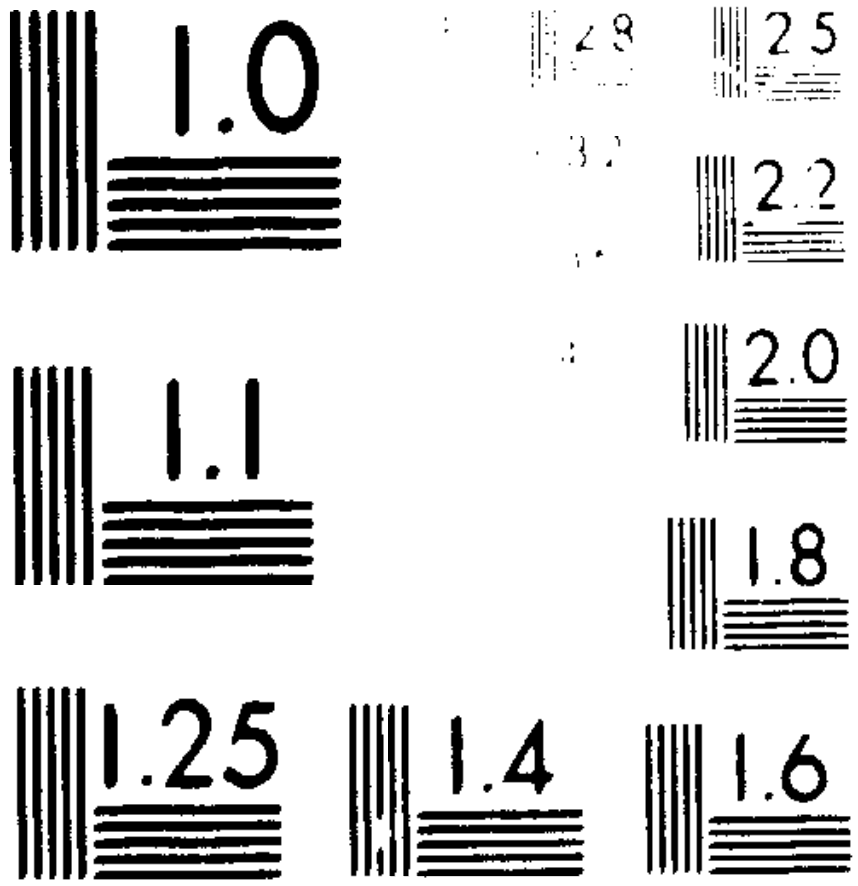
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CONSOLIDATION OF THE MEXICAN INSTITUTE FOR ASSISTANCE TO THE INDUSTRY

DP/MEX/78/011

MEXICO

Technical report: Production of Metal Packages *

Prepared for the Government of Mexico
by the United Nations Industrial Development Organization,
executing agency for the United Nations Development Programme

Based on the work of Warren Parkinson, Consultant in the Production of Metal Packages

United Nations Industrial Development Organization
Vienna

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CONTENTS

INTRODUCTION

The attached assignment was carried out in five months from October 1980 to March 1981.

I would like to thank IMAI for those facilities provided and express my appreciation for the unfailing courtesy of all in the organisation.

A dearth of statistical background meant that the information had to be obtained from visits to the can - manufacturers, their suppliers and customers and trade associations. In all cases the help and information given was most generous and I would like to record my thanks for this cooperation. A not necessarily complete list of organisations and individuals is attached.

It is hoped that IMAI will arrange that most of the information contained in this survey is passed back to members of the industries concerned, who may wish to make use of it and for whom it may be some recompense for their help in its compilation.

The information given by each organisation has, of course, been confidential and only total product figures have been given.

Can sizes throughout are given in international standard description i. e. in inches and sixteenths of an inch expressed as three figures so that 401 x 411 refer to the A 2 1/2 can of diameter 4 1/6 x height 4"11/16. Also to save space and repetitiousness, quantities of cans have throughout been given in millions, denoted by m.

1. BACKGROUND TO PROJECT & BRIEF ASSIGNMENT

DP/MEX/78/011/11-09/31.7.E

From January 1974 to December 1976 the project DP/MEX/72/007 has been implemented. Aiming at the establishment of a technological institution capable to carry out its specialized functions in the broad fields of information, training, standardization, applied research and quality control the present Government of the country, when entering into functions, has requested the Government policy for the six-period of its mandate.

The Mexican Institute of Assistance to Industry has been created later by decree of the Government, integrating the Mexican Packaging Institute and departments of design and industrial information from other institutions. The packaging sector has, however, been kept as main field of application for the new Institute which directed its activities of design and industrial information, for the time being, exclusively towards the packaging field.

The present project DP/MEX/78/011 has been requested for the main purpose of consolidating the Mexican Institute of Assistance to Industry, as described above in the pertinent paragraph of this job description.

It includes, however, a general study on the national demands and production capacities at present installed in the country and also a study on complementary capabilities to be installed locally for the satisfaction of the national needs on the basis of locally available raw materials, manpower and appropriate technologies.

The present assignment DP/MEX/78/011/11.09/31.7.E called for a consultant in the Production of Metal Packaging to be assigned to IMAI and coordinated by the Project Manager in the field with the specific brief to:

1. Make a general evaluation of the metal packages which are being used in the country, with regard to appropriateness and coverage of their present uses.

2. Make an appraisal of raw materials, techniques and equipment utilized in the country for the manufacture of metal packages, both from the technological and economic points of view.

3. Make a quantitative study of the present national capacity of production of metal packages in comparison to the demands which can be foreseen for the next ten years.

4. Elaborate a summary tentative plan on the enlargement of existing metal packaging materials and packages manufacturing plants and/or the establishment of new ones in order to meet the national demands along the next ten years and organize related pre-feasibility studies for opportune execution.

5. Elaborate the basis for a tentative programme of metal packages recycling in the country and for the substitution of imported raw materials to the possible extent.

6. Give ad hoc advice on other matters of the metal packaging technology according to eventual requests by the counterparts.

The expert will also be expected to prepare a final report, setting out the findings of his mission and his recommendations to the Government on further action which might be taken.

In addition to the investigations needed to survey the metal-packaging industry as described in points 1 to 5 of the above, a series of 14 1 1/2 hr. discussions on metal packaging technology were held with five members of the Institute assigned by IMAI. Also the consultant contributed to a course on metal packaging on February 25/27 attended by some 50 outside members of the industry.

Advice on particular matters has been given on a number of occasions when sought by manufacturers. Also advice of a general nature has been given to organisations considering the introduction or expansion of self-manufacture.

In particular all canners and can-manufacturers visited have been alerted to the hazard of lead contamination, the need to monitor

its incidence and where appropriate the need to bear the problem in mind in considering new installations.

Draft Regulations on the canning of low-acid food have been passed to those canners affected and to the relevant trade association.

2. SUMMARY

In 1980 the number of cans manufactured in Mexico was approximately 4, 500 m. Of these, 1, 700 m were for beer and soft drinks which is the largest outlet. By 1985 it is expected the quantity will rise to 7, 000 m of which 3, 000 m will be for beer and soft drinks. By 1990 the total could be 10, 000 m - a figure to be considered only as the broadest indication, being subject to so many unknown factors coming into play in the meanwhile.

It is not considered likely that these figures will be materially affected by alternative methods of packaging up to 1985. From 1985 to 1990 there could be an effect from competitive packaging methods as far as the A 10 can is concerned, but in numbers of cans, this effect will be small.

In no way is the can-manufacturing industry of Mexico that of a developing country. Rather is it that a medium - sized industrial country. It has access to U. S. technology, picking out the parts appropriate and modifying them to the needs of Mexico. It has expanded rapidly over the last few years with many new first - class manufacturing plants being fitted with the most modern equipment.

The machinery used is at worst appropriate and adequate, at best the most modern available. Expansion is planned by all manufacturers to keep ahead of the rapidly growing market arising from the high rate of growth of the economy.

This programme of expansion will provide the necessary capacity to meet rising demand subject to a possible short-term problem in the supply of fish - cans during 1981, at the end of which year large amounts of new capacity will be in operation. The programme of 2 - piece installations will release a vast amount of 3 - piece manufacturing capacity over the next 4/5 years, amply providing for any expansion in requirements for round built - up cans for fruit, vegetables and fish.

One of the chief problems of the industry is the poor quality and limited supply position of Mexican tin-plate. The indigenous metal supplied has to be specially inspected for pin-holes and gauge, thus adding to cost whilst the poor supply position causes a dependence on imported tin-plate.

In 1980 some 300,000 tons of tin-plate and T.F.S. were imported This figure is likely to drop for a year or two, partly because it probably reflected a build-up of stocks to service higher activity and partly because local production should increase to some extent in 1981. Also longer term the effect of the use of aluminium for 2 piece cans will have an effect. Consequently even by 1985 the forecast figure for imported plate is only some 325,000 tons in spite of the high rate of overall increase.

Any draconian steps to limit the growing requirements for tin-plate will lead to the severest dislocation in supplies of the products concerned, the possibility of the wastage of food in unsuitable packaging and serious unemployment.

Abolition of price-control on indigenous tin-plate and the use of better hot rolled coil would encourage AHMSA to manufacture the maximum quantities possible of acceptable material and thus limit imports.

Also, both to damp down demand and to allow AHMSA to compete, a higher tariff on imported plate might be considered.

Inevitably the effect of these two steps would be to raise can prices. As the ultimate consumption of these cans by the really poor must be insignificant, this may not be a serious outcome. Subsidising supplies of necessary food (e.g. condensed milk) to the really poor parts of the population can be direct through Govt. agencies.

Ancillary raw material supply is satisfactory but the can-making industry could be helped with access to a wider choice of lacquers and varnishes through indigenous manufacturers extending their range of licensors - particularly among European varnish manufacturers, whose experience and problems are similar to those found in Mexico.

Both can manufacturers and varnish and lining compound manufacturers would benefit from simplification or cancellation of import control requirements on spares and certain small volume crucial materials.

The canners of fruit and vegetables seem generally well served by the can-manufacturers. There could well be opportunities for expansion of fruit-canning activity for developing an export market for some of the tropical fruits grown in Mexico.

The fish-canners are not so happy both from a quality and quantity point of view and could benefit from technical help in the canning field.

Modern requirements for the packing of low-acid foods, typified by the draft regulations referred to elsewhere, are not yet fully appreciated in the fish canning industry.

Lead contamination hazards are rapidly becoming better appreciated by canners and can-makers and monitoring is already being carried out or introduced by many of them.

The recycling of tin-plate is already taking place on a big scale, at the same time providing employment for large numbers of people. In such circumstances it is not reasonable to recommend the introduction of expensive machinery, not yet fully proven economically, which would result in loss of jobs and would not necessarily increase recovery. Arrangements for the recovery of aluminium need to be initiated.

In the whole of the report it has been assumed that Art. 24 of draft "Reglamento de la Ley para Prevenir la Contaminación" by which the use of non-returnable containers would be banned after 10 years will not become operative.

The can-manufacturing industry has no exclusive association to represent its interests. The companies are members of the Camara Nacional de la Industria del Hierro y de Acero, whose interests are quite different from those of the can-makers. A separate Camara would be desirable to cover purely can-making problems such as tinplate quality, labour problems, industry training of mechanics and machine-minders, import problems and representations to Government of Mexico on the industry's problems. It should also address itself to the question of Recommended Industry Standards for those cans where interchangeability of supplier could otherwise lead to problems for the canners.

3. RECOMMENDATIONS

1. That the can-manufacturing members of the Camara Nacional de la Industria del Hierro y del Acero should be approached by Government of Mexico with a view to reconstituting themselves into a separate Camara to represent the interests of the can-manufacturers and to collect statistical information on the industry.

2. That Government of Mexico should issue regulations for maximum lead contamination in food and drink covering metal containers, under standard NOM-EE-11-S. To avoid dislocation of industry the initial level should be set at perhaps 3 or 4 parts per million to be successively reduced to 1 ppm over the next few years.

3. That IMAI should monitor lead levels in packaged food and provide Government with basic information for the formulation of policy, paying particular attention to the soft drink and fruit juice packs.

4. That can-manufacturers should avoid installing new manufacturing lines incorporating lead based solder for fruit juice cans unless they are confident that their product will not exceed a limit of 1 ppm lead contamination.

5. That IMAI approach the can-manufacturers and the brewers with a view to drawing up Recommended Industry Specifications for beer cans. IMAI should also make enquires to find out if a similar set of specifications would be helpful to the Fish Canning Industry.

6. With a view to encouraging a dynamic approach to Quality Control in can-manufacturing and canning plants, that IMAI run a series of 2/3 day courses, some aimed at Quality Controllers, others at Production Personnel.

7. That can-manufacturers review their field engineer service with a view to helping the canning industry to an even greater extent in the fields of Quality Control, seam control, processing procedures, etc.

8. That Government of Mexico consider the implications of de-controlling the price of Mexican tinplate and increasing the import duty on tinplate to dampen down the rate of growth of demand. Suitable arrangements for tax recovery for canned exports would be needed.

9. That Government of Mexico issue can-manufacturers and canners with annual open import licenses to cover the import of genuine spare parts for machinery up to a total maximum value depending on the sales of each company (the amounts need not be large in peso value).

10. That following the last point AHMSA be asked to consider using bought - in Hot Rolled Coil to help increase their efficiency and production and to improve the quality of the product.

11. That Government of Mexico pursue with the relevant industries the installation of increased aluminium rolling capacity both to reduce the present amount of imports of aluminium and to supply suitable sheet to the beer can manufacturers.

12. That the brewers be asked to encourage the distribution of beer by the draught method in the large conurbations, which avoids the use of small containers and provides a less expensive drink for outlets within a certain radius of the brewery.

13. That Government of Mexico should review its policy of controlling the price of canned fruit and vegetables with a view to encouraging the production of these products for the Mexican and especially the export market.

14. That the Asociación Nacional de Empacadores de Productos Alimenticios should be asked to form a working committee to investigate means of developing an export trade in canned tropical fruits; and also a similar committee aimed at export - ing canned fish to Pacific Basin countries and to Europe as well as U.S.A. (when trade conditions become normal).

15. That any new canneries should be designed to standards indicated in the Draft Regulations for the canning of low-acid foods.

16. That no action is taken by Government in connection with recycling but that a standing committee with representatives from the packaging material manufacturers, packaging manufacturers and packers together with environmental interests and a Government nominee should be set up to:

Organise an authoritative investigation into the percentage of tin-plate now being recovered by the present methods at the waste - dumps.

Overlook the arrangements by the industries concerned to recycle aluminium cans.

Advise Government on steps to fight the litter problem.

4. FINDINGS

a) CAN MANUFACTURING INDUSTRY

Of the five really large can-makers in Mexico, Nueva Modelo, Envases Generales and Crown Cork have technical links with their American Associates, who are the three largest can-makers in the U.S.A. The Zapata group is an international can-maker in its own right with technical know-how on a world-wide scale. FAMOSA is Mexican owned but calls on foreign know-how as needed. In addition there are a number of smaller firms. There is thus plenty of competition among the manufacturers themselves and the market seems very healthy.

There are also the canner/makers who make their own cans for their own products and in some cases also sell to outside customers. Some are associated with international organisations which manufacture cans in many countries and have excellent technological back-up. Some are quite independent. About 20% of the total can-making market is in the hands of these canner/makers and they provide a competitive challenge to the can-manufacturing industry.

As discussed elsewhere, self-manufacture has advantages and disadvantages but it should be stressed that can- making is not a simple business to be entered into lightly. It calls for high engineering skills and know-how. It adds considerably to the investment required for the canning project - additional capital which may well be better spent in improving or enlarging the main sphere of activity.

As mentioned elsewhere, at least four organisations are presently considering self-manufacture of cans. This position has evidently been triggered off by difficulty in obtaining supplies over the last year when demand has been rising at an exceptional rate. Looking at industry plans to increase can-making capacity for all products, there should not be any problems in that direction and additional installations by the canners themselves could lead to over-capacity should there be a down-turn in demand.

The can-manufacturing industry has been investing at a fast pace in recent years. The complex of new factories in North Mexico City and the Toluca plant bear comparison with any modern can-manufacturing unit in any country. Investment in machinery has been heavy and plans for new factories and additional lines are plentiful as described in the next section.

Over the years, material consumption per can has been reduced by lower weight of tin-plate, lower tin-coatings, the use of T.F.S. and D.R. plate and by high investment in coil cut-up lines.

As far as the cans themselves are concerned, all are of the types used universally for their products. Much has been made in this report of the lead hazard and quite rightly. This has been done to alert both the can-makers and the canners to the problem as in some cases there was considerable ignorance and complacency. Nevertheless, the types of cans now used in Mexico for products which might present a lead risk are still being used for similar products in most countries and have been so used for decades.

Until monitoring tests are in progress it is not possible to say which cans for which products will need reconsideration but it is certainly recommended that nectar packers should not install further orthodox soldered side seam equipment unless they are quite sure of lead levels being well within 1 part per million for all their products.

Hopefully, if the sardine packers can develope an export market, demand might appear for an aluminium sardine can. For market test purposes these can be imported and the can manufacturers would certainly install equipment to meet a genuine demand.

During visits to canners and packers, direct invitations to discuss problems on can supplies and can quality have been offered. With the exception of the fish-canning industry there has been, in general, satisfaction expressed with supplies by these customers.

Quality control by can-manufacturers is satisfactory, but in some cases a change in emphasis towards using the information on the line to prevent problems rather than as historical records could be beneficial.

b) THE TOTAL CAN MARKET

The figures for the total can market in Mexico have been built up from interviews and visits to the can-manufacturers and to the canners. This has inevitably been difficult. One of the problems is the lack of reliable statistical data. In one or two instances there has understandably been some reluctance to reveal figures but it must be emphasised that in general, particularly among the can-manufacturers the response has been most helpful. The figures must therefore be regarded as estimates but they have been largely reconciled with tinplate consumption and have been checked against can-manufacturers who have built up a comprehensive picture over the years. They are given with reasonable confidence.

The figures, made up from those for the various products are attached together with forecast figures for 1985. Between 1979 and 1980 total production has increased by close to 20% and in such conditions there is an understandable optimism in trade circles. On the theory that growth comes in fits and starts, it has been felt prudent to modify some of the more euphoric estimates of future growth.

Figures are also given for likely tinplate consumption figures for 1985 together with the expected effect of the move over to aluminium for beer cans.

It must be emphasised that demand figures for 1990 cannot be anything but utterly tentative. They are given because they were asked for in the brief, but only with considerable misgivings.

Buoyed up by strong demand, all the can-manufacturers have plans for the installation of further capacity. In various stages of planning, the following lines are expected to be added to capacity over the next few years:

10	2 piece beer/soft drink lines
6	Drawn fish can lines
8	Round lines (conventional and soudronic)

Cap equipment
Printing equipment

These figures do not include the tentative plans for manufacture by P. P. M. and I. P. N. Also a new manufacturer has recently entered the market.

With these additions to equipment there should be no possibility of a lack of capacity to 1985. Future installation plans beyond 1985 will obviously depend on the expansion which actually takes place meanwhile.

The one field where any doubt could lie would be in the market for fish cans, but the steady release of 3-piece equipment from beer-can manufacturer (say 1, 250 m cans capacity) over the next few years and the dramatic increase in irregular and oval fish can capacity should assure plentiful supplies of cans even allowing for seasonal factors.

TOTAL MARKET FOR CANS AND FORECAST INCREASES

	1980	1981	1985	1990
Sanitary cans (other than fish)	900 m	976 m	1215 m	1455 m
Fish (round)	191 m	220 m	370 m	550 m
Fish (irregulars)	100 m	140 m	245 m	390 m
Beer and soft drinks	1718 m	1900 m	3000 m	4420 m
Nectars and fruit juice cans	560 m	625 m	915 m	1460 m
Milk cans	607 m	631 m	739 m	895 m
Aerosols	67 m	75 m	110 m	190 m
Other general line cans	375 m	391 m	467 m	558 m
Total	4518 m	4958 m	7061 m	9918 m

PROJECT CONSUMPTION OF TIN PLATE
AND ALUMINIUM IN TONS

TINPLATE	1980	1981	1985	1990
Cans	336, 500	359, 300	389, 000	419, 000
Crowns and caps	80, 000	86, 000	114, 000	158, 000
Total Packaging	416, 500	445, 300	503, 000	577, 000
Other uses	10, 600	11, 500	15, 000	20, 000
Total tinplate usage	427, 100	456, 800	518, 000	597, 000
Mexican production	142, 000	180, 000	195, 000	195, 000
Imported tinplate and T. F. S.	300, 000	277, 000	323, 000	402, 000
	* 442, 000	457, 000	518, 000	597, 000
ALUMINIUM CONSUMPTION				
Beer can bodies	-	1, 400	35, 000	80, 000
Quantity aluminium beer cans	-	70	1, 750	4, 000

* This figure could reflect some stock - building.

SANITARY CANS FOR PROCESSED FOOD

This section covers Round Built - up cans supplied for processing food other than fish and amounting to some 900 m cans.

For analysis purposes this large total market has been divided into the following categories which have different problems, different markets and different potential for growth:

a) Chiles and chile based specialities
b) Tomatoes and tomato products
c) Fruits
d) Vegetables
e) Soups and meat products

The total market for these products is estimated at 900 m cans in 1980. The split - up between the five categories cannot be made for lack of reliable information but the following tonnages are included in the pack:

Chiles	100,000 tons
Tomato	125,000 tons
Peas	30,000 tons
Corn	24,000 tons

On account of the large amount of tomato packed in the large A 10 cans, in number of cans the chili pack is the largest, followed by tomato, vegetables and lastly fruit . For forecasting purposes (with the different rates of growth for each category) the split -up used has been:

Chile	375 m
Vegetables	170 m
Tomato	260 m
Fruit	75 m
Soups & meat	20 m
	900 m

But these figures cannot be relied on.

There is a large preserve market packed in glass jars but this is not treated here as being outside the brief except for the use of the metal cap which is dealt with elsewhere.

One difficulty experienced by a number of canners has been the presence of pin-holes in the can. The causes are firstly pin-holes in the tinplate itself, particularly indigenous plate. This is serious enough with acid products in loss of reputation but for low-acid products it is positively dangerous. The incidence of this problem appear to have fallen recently, perhaps due to the introduction of pin-hole detection facilities in a number of can-making plants. However, the presence of one pin-hole in a fish or meat can is a hazard and the use of indigenous plate for these products could with advantage be avoided. The second possible cause is the use of internal varnish with acid products, where any varnish irregularity can be a focus for attack by the product leading eventually to a pin-hole. This is rare as the corrosion often seals the hole and the early action of the acid starts to strip the lacquer, thus lowering the concentration on the original point of the irregularity. From a public health point of view, the acid of the product prevents the ingress of dangerous bacteria.

To consider these markets in more detail.

CHILE AND CHILE SPECIALITIES

This is a huge market and is the principal product of many of the canners. Very little of the product is exported.

The chief problem reported is that of the stripping of the lacquer after a year or so. In many ways these products are best packed in cans with plain internal bodies to avoid corrosion being concentrated on lacquer irregularities. The product is packed typically in a vinegar/saline licor which is regarded by many can-makers as too searching for a can. However, the quantities packed show how popular this canned product is and the incidence of corrosion is less than might be, due no doubt to quick turn-over.

This is a field worthy of study by IMAI, firstly on the desirability of lacquering the bodies and secondly on methods to ensure a reasonable shelf-life for the cans if lacquer is used.

All canners report a healthy rate of increase in this market, reflected in the forecasts shown.

The canning of chiles throughout the seasonal lull in availability of other products is general and helps to give good capacity-usage to the canneries.

TOMATOES AND TOMATO PRODUCTS.

The tomatoe concentrate and puree trade is to some extent concentrated in Sinaloa following irrigation shemes in this area. It is a flourishing industry with a high rate of growth and with a large and expanding export trade to the U.S.A.

Large tonnages of the product are aseptically packed in drums and canned in A 10 size cans for reconstituing by other canners.

The canneries are generally modern and efficient and are expanding their tomato facilities to meet the growing market.

In general the can-makers appear to be giving satisfaction in can supplies to this trade although the largest user of cans is considering self-manufacture.

The rate of growth of the market has been extremely high and it is difficult judging how long these high rates will continue. The export market in particular is increasing, but much of this market uses drums. The indigenous use of the concentrate for the sardine pack should increase in the future but aseptic packing could limit the growth in off-take of the A 10 can. The vast majority of the cans are in the smaller sizes for the direct consumer market and these numbers may not increase as fast as the total tonnage processed. All these factors may indicate a 12% growth rate in can requirements a figure rather lower than the overall growth of the market at perhaps 15% per annum.

FRUITS

Considering the apparent abundance of all fruits, temperate and tropical in Mexico, the figures for the total fruit - pack are disappointingly low:

	Number of cans
Pineapple	30 m
Peaches	18 m
Mango	5 m
Guava	5 m
Others (approx.)	12 m
Total (approx.)	70 m

One reason is undoubtedly the availability of a plentful supply of a fresh fruit in Mexico all the year round. There is little virtue to be sought in preferring canned fruit - inevitably expensive - to the fresh variety.

Secondly, the general availibility of domestic help means that the convenience aspect of canned fruit is not as evident as in countries where the house-wife herself has to do all the preparation.

Thirdly, price-control of canned fruit may make the canners less enthusiastic about packing them. Shortage of supply of fruit offered to the canneries is one of the reasons given by the Camara for the low figure of the total pack and its failure to grow.

The wisdom of controlling the price of such products, presumably too expensive for the really poor to purchase and essentially used by the middle-classes might be considered by the Government of Mexico.

Fourthly, most of the fruit packed is bought in by the canner on contract over the short harvest season and there appear to be few canners growing their own fruit with a long harvesting season concentrating on a limited product range and marketing world-wide.

Lastly, the export of fresh fruit (e.g. strawberries) may be a better market than putting the fruit into a can.

On the other hand, some of the tropical fruits should be capable of finding export markets in the non-tropical zones and a high incidence of waste of fruit is reported. Developing these bald facts into an export market is a long and difficult task and is considered separately.

Growth rates in this sector are not high.

VEGETABLES

The general remarks on fruit apply also to vegetables Finding export markets for vegetables is probably more difficult than for fruits, as the range of products is not very different from those grown in Northern climates.

Canned maize (included under vegetables) is imported into European markets but the fact that Mexico is obliged to import food

grains and the dependence of the local population on maize would indicate that this is not a product for consideration of high-volume canning.

The one exception to the above is asparagus. A ready export market exists for high-quality canned asparagus and parts of Mexico appear ideally suited to this product. It is good to report that the canning of this product is being developed by two or three of the canners on a large specialised scale with exports in mind.

SOUPS

This market is quite small. Its expansion in established lines is not great and higher consumption will depend on the introduction of new lines.

MEAT

The canning of meat products is limited to a few specialities and the quantities insignificant. These appears little scope for noticeable growth.

SIZE OF MARKET FOR CANS FOR PROCESSED FOOD OTHER THAN FISH
(Estimated)

	1980	1981	1985	1990
Chilis and Chilis specialities	375 m	400 m	480 m	550 m
Tomato products	260 m	300 m	400 m	500 m
Fruit	75 m	75 m	90 m	105 m
Vegetables	170 m	180 m	220 m	270 m
Soups and meats	20 m	21 m	25 m	30 m
	900 m	976 m	1,215 m	1,455 m

FISH CANS

The market for fish cans is one of the most crucial for the can-manufacturing industry because:

a) The importance of fish in improving the food supply of Mexico is recognised by the System Alimentos Mexicanos.

b) Of the immense sums of money being spent by Government and the consequential rapid increase in tonnages available, particularly with more emphasis coming on the use of fish for human food rather than fish meal.

c) The use of the can may be the only convenient way to bring food to the villages where refrigeration arrangements may be lacking.

From the attached schedule for the tonnages of fish canned in 1979, it will be seen that the vast bulk of canning activities relate to sardines and tuna. These will be discussed separately.

The inconvenient habit of the sardine of migrating makes it difficult to predict the amount of the catch each year and where the fish will be harvested. At the moment they seem to have migrated to the Guaymas area and many canneries in Baja California, and Sinaloa are taking supplies of fish caught in the Guaymas area.

The total number of cans used for sardines in 1980 was approximately 240 m. Reports from the canners confirmed by the Camara indicate that the pack could have been 20% greater with ample supplies of cans. The reason for this failure to supply is not entirely clear. Shortages of tinplate at crucial times played a part; also the learning curve of local labour taken in to meet the seasonal nature of the business and other demands on the Mexico City manufacturers of round built - up cans may have contributed.

There are other factors limiting the amount canned. The economics of bringing fish by road from other parts, canning machinery faults and irregularity in the landings of fish have all been mentioned. With the private sector, price control on the final product may also be a

factor. Nevertheless the amount of fish canned in 1980 showed a large increase over 1979 - for some cans 40%.

Shown at the end of this section is the forecast requirements of cans for 1981. These are based on last year's figures, the rate of increase of the market expected by the canners and reflect the likely increases of canning capacity. Also shown are the corresponding can-manufacturing capacities. These capacity figures are very elastic, depending in some cases on the intensity of demand for cans for other products. They show a tight situation but it must be realised that the rectangulars and the ovals are to some extent inter-changeable and so are the round built up cans for tuna and sardines. Much extra equipment is planned for these can-manufacturing factories, some new and some lines to come into operation when they become redundant with the change - over to 2 piece beer cans.

Looking to future requirements, this must depend ultimately on the market. The canners reckon to double production in 5 years say at 14% per year. Whether the market can absorb such a rate of increase could be doubtful as stocks in the distribution pipe-line are already said to be high. The development of export markets appears to be outside the brief of Productos Pesqueros Mexicanos, who will soon be the largest canner on present plans. Consequently there may be some doubt about the achievement of this target growth rate.

The development of the market for canned tuna is tied up with the negotiations with the U.S.A. The assumption made in the forecasts is that Mexico will land 50% of the tuna catch in her territorial waters and normal trade with the U.S.A. will be resumed. This would result in an increase in requirements of cans of some 50%. Some canners report an over-supply of canned tuna in Mexico at present and these forecasts must be subject to normal exports being resumed and expanded.

In this connexion and looking further ahead, it could be worth-while for the trade to be looking to other export markets, which might mean interesting international fish canners in canning and exporting from Mexico to their markets. Canned tuna is a popular pack in many countries.

There have been complaints about the quality of cans supplied: where appropriate these have been mentioned to the can-makers.

With problems on quantity and quality it is understandable that three of the fish canners are considering manufacturing their own cans. Advice on suitability of equipment has been offered to the canners concerned.

However, in all discussions, I have been impressed with the steps being taken by the can manufacturers, to increase capacity in spite of the fickleness of the fish shoals. Also the figures for extra capacity from released beer can lines is not reflected in the 1985 capacity figures shown. At present some 1,250,000 3 piece beer cans are being made each year and to a great extent this capacity will became available for fish and food products in the 1980's.

It is understood that categoric assurances as to fish - can supply have been given to P.P.M., the canner with the highest potential growth, by the can-manufacturers.

It is also pertinent to draw attention to the remarks elsewhere on self-manufacture of cans.

The standard of canning varies, as is to be expected. Quality Control and Hygiene standards in some fish canneries leave a lot to be desired and many of the premises would not be acceptable under the new regulations now being discussed in the U.S.A. and European countries. Copies of the draft regulations have been supplied to many of the canners. The regulations should be mandatory for new fish canneries now being planned.

Some canners are considering the use of retort pouches. It is difficult to see this making any appreciable difference to the market for cans in the current decade.

CANS USED 1980

Sardines	Oval 42.5 gm	79 m
Specialities	Other Irregulars	20 m
	Cylindrical	141 m
		240 m
Tuna	Cylindrical	50 m

Association Nacional de Empacadores de Productos Alimenticios A.C.)

COMPARISON OF CAN REQUIREMENTS AND CAN-MAKING CAPACITIES

	S A R D I N E S			TUNA
	Rectangular	Oval	Round Built-up	Round Built-up or two piece
Packed in 1980	20 m	80 m	141 m	50 m
Requirements 1981	30 m	110 m	160 m	60 m
*Capacity 1981	50 m	220 m	200 m **	75 m **
Requirements 1985	45 m	200 m	280 m	90 m
* Capacity 1985	80 m	345 m	400 m **	165 m **
Requirements 1990	70 m	320 m	430 m	120 m

* These are annual capacities and should be reduced by say 25/30% to reflect the seasonality of the catch.

** This capacity can be increased by capacity being freed by installation of 2 piece beer cans and by flexibility of supply from fruit and vegetable can lines.

TONNAGE OF FISH CANNED 1979

(In Tons)

	TOTAL	SARDINES	TUNA	OTHERS
Private sector	25,630	15,791	6,569	3,270
Parastatal sector	38,899	28,816	8,112	1,971
Mixed	1,009	110	-	899
Total Federal Plants	65,538	44,717	14,681	6,140

(Anuario Estadístico Pesquero 1979)

BEER AND SOFT DRINK CANS

Beer and soft drinks use similar containers. Their markets are similar Both are carbonated and can therefore support the body of the can and use minimal thicknesses for the wall. They are therefore being covered in this one section.

Traditionally the can used has been made up of three pieces with a soldered side seam However, in the last 10/15 years these three piece containers have been steadily replaced by the 2 piece type. This latter can has the advantages of using less metal and less labour per can. The investment however is very high and the equipment not versatile. The can is made from either tinplate or aluminium, is lighter than the 3 piece and has the advantage of having no side-seam and therefore no possibility of lead contamination (especially with certain soft drinks ; beer is considered not to pick up lead). The 2 piece can however calls for high engineering standards and due to the high cost of the equipment must be run continuously to be economic.

Consequently, in the U.S.A. approximately 90% of the beverage can market uses 2 piece containers. In Britain there will be virtually no three piece containers made by the largest manufacturer from 1983 The metal used for the 2 piece can be either tinplate or aluminium. In the U.S.A. due at least in part to good used can recovery, aluminium is the favoured metal. In Europe due to a slightly different cost structure, tinplate is more popular.

In many countries the can has made fast inroads into the bottle market for these two products Its lightness, high- speed filling, customer convenience in handling, purchasing and using and the inability of super-markets to collect empty returnables have all contributed to this trend, but it must be remembered that for certain markets the returnable bottle continues to dominate the market

In Mexico the position is the same with the can now commanding 21. 6% of the beer market. This figure is rising steadily by some 1% each year. For soft drinks the percentage is still very small. However, the development of the can-market has been limited by the supply position. Some breweries would expand their canning activities if the containers were available. The soft drinks trade has to some extent been held up by the danger of lead contamination in 3 piece cans but is equally anxious to expand the use of cans. The reason is said to be that the public demand

cans in spite of the higher price, although the experience of one soft drink packer does not seem to bear this out.

Thus the can market in 1980 for beer and beverage was approximately 1,700 cans, limited by supplies. In 1981 capacity will be a little higher, but still insufficient for the market. The great majority of the beverage cans made is still in 3 piece form but the excellent 2 piece line at Toluca is expected to make 430 m. cans this year. But all the can-manufacturers are urgently expediting the provision of 2 piece lines. Some ten 2 piece lines are in various stages of planning and at capacities of 250 m cans per line per year, the availibility of beverage cans generally and 2 piece cans in particular, will increase dramatically over the next few years. In forecasting capacity ahead, account has been taken of the long learning curve for these lines

The forecast requirements shown for beer cans (with annual increases of 10% 1981/1985 and 8% 1986/1990) is lower than some industry sources indicate. The reason is that expansion can be limited by the speed of installation of filling lines and that the present rate of economic expansion is unlikely to last indefinitely. For soft drink cans, where price is more important than for beer and returnable bottles present less of a problem to the consumer, the percentage packed in cans is expected to remain relatively low, but nevertheless present plans indicate a large expansion in numbers even though the proportion of the market will remain minute

It will be seen that with the advent of the large capacity increases for 2 piece cans now planned, there is shown an excess of total capacity over demand of some 600 m cans by 1985. This capacity will be available for food can production, particularly for round built-up fish cans and should amply cover the increase in demand for these cans. The capacity figures for 1990 only show the effect of capacity increases already planned. If the market increases in the way shown, further capacity will be planned by the can-makers, and installed long before 1990.

At present the two 2 piece lines in production use tinplate. But breweries and soft-drink packers seem to favour aluminium, which has the advantage of lightness, a less demanding specification than for tin-plate and a need for one spray application instead of two. On the other hand, it is more expensive, even allowing for the recovery of factory scrap. Whichever metal gains the market, the raw material

will have to be imported (Mexican tinplate from Altos Hornos is not suitable for 2 piece can-making). However, large consumption of aluminium for beer cans could stimulate tentative plans to install a new large aluminium smelting and rolling facility in Mexico.

Recycling factors must not be lost sight of with these developments. The collection of used aluminium cans in the U. S. A. has been successfully introduced and a similar industry scheme should be initiated in Mexico by the interested parties.

In connection with methods of packaging beer, it is noted that only some 1% of the product is distributed by means of the large returnable keg This method is limited to a certain radius around the brewery but in that area can supply a drink of beer to the consumer a lot cheaper than in a bottle or can. Encouragement of this method of distribution in city areas by the breweries would seem desirable.

BEER CONSUMPTION IN MEXICO

	1979 (hectolitres)	1980 (hectolitres)	Percentage Increase
Packed by brewers	25.7 m	27.3 m	6.2%
Consumption in Mexico	24.6 m	26.0 m	5.3%
Exports	.345 m	.386 m	11.8%
Packed in cans	5.14 m	5.57 m	8.4%
No of cans	Units 1,512 m	Units 1,638 m	8.4%

(Asociación Nacional de Fabricantes de Cerveza).

SOFT DRINK CONSUMPTION 1980

Total soft drink market in Mexico	26, 500 m packages
Packed in cans	80 m cans

(Trade source)

BEER AND SOFT DRINK CAN MANUFACTURING CAPACITY

COMPARED WITH FORECAST DEMAND

FORECAST CAPACITY	1980	1981	1985	1990
3 piece	1430 m	1610 m	1630 m *	1630 m *
2 piece	400 m	500 m	2200 m	3250 m **
	1830 m	2110 m	3830 m	4880 m
FORECAST DEMAND				
Beer	1638 m	1770 m	2600 m	3820 m
Soft drinks	80 m	130 m	400 m	600 m
	1718 m	1900 m	3000 m	4420 m

* Part of this capacity will be used for food cans

** This figure only reflects presently planned capacity. On these demand figures many more lines will be installed by 1990.

U.S. MALT BEVERAGE IMPORTS UP 4% IN 1ST 9 MONTH

(a comparison of beer gallonage in 1980/79/78)

		FIRST NINE MONTHS			12-MONTH PERIOD				
		1980	1979	1979-1980 % Change	1978	10/1/79 to 9/30/80	10/1/78 to 9/30/79	% Change	10/1/77 to 9/30/78
United Kingdom	Total	2,352,801	1,855,311	+27	1,756,242	3,334,037	2,407,705	+38	2,052,463
Bottled	(72%)	1,705,493	1,387,065	+23	1,212,480	2,493,539	1,794,213	+39	1,404,136
Keg	(28%)	647,308	468,246	+38	543,762	840,501	613,492	+37	648,327
Ireland	Total	1,495,056	1,444,268	+4	1,394,451	1,982,031	1,903,502	+4	1,611,503
Bottled	(85%)	1,276,779	1,235,701	+3	1,201,439	1,695,234	1,632,478	+4	1,380,599
Keg	(15%)	218,277	208,567	+5	193,012	286,797	271,024	+6	230,904
Netherlands	Total	41,096,293	47,957,324	-14	36,953,233	54,799,272	58,515,412	-6	43,140,669
Bottled	(93%)	38,325,727	44,688,132	-14	34,345,422	51,053,145	54,459,028	-6	40,029,647
Keg	(7%)	2,770,566	3,269,192	-15	2,607,811	3,746,127	4,056,384	-8	3,111,022
Germany	Total	10,775,854	10,151,978	+6	9,405,032	14,832,875	12,736,017	+16	11,019,439
Bottled	(85%)	9,194,089	8,742,957	+5	8,150,468	12,748,111	10,958,879	+16	9,495,804
Keg	(15%)	1,581,765	1,409,021	+12	1,254,564	2,084,764	1,777,138	+17	1,523,635
Canada	Total	36,299,040	29,119,439	+25	22,580,987	47,522,894	37,414,580	+27	28,231,545
Bottled	(90%)	32,763,501	25,334,375	+29	19,309,177	42,884,769	32,459,961	+32	24,095,770
Keg	(10%)	3,535,539	3,785,064	-7	3,271,810	4,638,125	4,954,619	-6	4,135,775
Mexico	Total	8,540,923	7,110,385	+21	4,893,639	10,524,843	8,561,562	+23	6,445,611
X Bottled	(100%)	8,540,383	7,066,699	+21	4,795,312	10,524,303	8,503,616	+24	6,329,304
Keg	-	540	43,686	-99	98,327	540	57,946	-	116,307
Denmark	Total	596,043	429,992	+39	541,592	787,052	602,109	+31	660,888
Bottled	(99%)	589,387	426,089	+38	537,947	774,893	594,508	+30	653,915
Keg	(1%)	6,656	3,903	+71	3,645	12,159	7,601	+60	6,973
Norway	Total	382,579	422,322	-9	523,293	559,793	558,014	+0.3	671,716
Bottled	(99%)	377,644	422,322	-11	521,575	554,858	557,602	-0.5	669,598
Keg	(1%)	4,935	-	-	1,718	4,935	412	-	2,118
Japan	Total	901,797	860,420	+5	719,679	1,213,298	1,065,071	+14	905,480
Bottled	(100%)	901,797	851,796	+6	706,209	1,213,298	1,056,447	+15	892,010
Keg	-	-	8,624	-	13,470	-	8,624	-	13,470
Philippines	Total	393,410	645,922	-39	637,319	625,363	886,708	-29	862,590
Bottled	(100%)	393,410	645,922	-39	637,319	625,363	886,708	-29	862,590
Australia	Total	1,481,942	1,472,671	+0.6	1,276,564	2,232,949	1,791,927	+25	1,556,625
Bottled	(99%)	1,471,412	1,468,877	+0.2	1,276,564	2,222,419	1,777,211	+25	1,556,625
Keg	(1%)	10,530	3,794	+178	-	10,530	14,716	-28	-
France	Total	720,249	361,734	+99	177,858	776,214	448,563	+73	206,153
Bottled	(100%)	720,249	361,734	+99	175,527	776,214	393,123	+97	203,822
Keg	-	-	-	-	2,331	-	55,440	-	2,331
All Countries		106,598,756	102,911,320	+4%	81,935,760	141,417,076	128,330,209	+10%	98,689,898

Compiled by The National Association of Beverage Importers, Inc.

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NECTAR AND FRUIT JUICE CANS

This market is distinguished from that of soft drinks by the fact that these are genuine fruit juices and are packed without carbonisation.

Consequently they require a can which has sufficient strength for distribution without the aid of the internal pressure of carbonated drinks

The small but expanding milk shake container market is included in this survey as the type of container required and the type of market are the same as for the fruit juice can. However, the quantities are minute compared with the total market

The present survey covers only the use of cans but some of these products are also packed in glass and plastics

The two largest packers, Jumex and Jugos del Valle make their own containers through sister can- making firms. Both are knowledgeable can - makers and at Botomex, the sister company of Jumex the facilities are first - class both as to factory premises and equipment. Both have plans to cover the expected increase of the market

The can used is essentially the same as the three piece beer can except that in some cases it is not spray-lacquered inside (on top of the coated lacquer). Instead of the traditional easy - open end used for beer, a flat aluminium top is used with an adhesive tab based on the Fleetwood system. This seems perfectly adequate both according to the industry and from observation at point of sale

The one problem with this can is the possibility of lead pick-up from the side-seam. The packers are well aware of the difficulty and have taken steps to limit possible ingress. Also they are monitoring lead levels or are about to do so. This is most necessary, particularly if the export market is to be developed.

In prudence, any new lines installed for the packing of these juices should be of the welded side-seam type and this point has been mentioned to the firms concerned.

This market should continue to expand. Already the industry is exporting its products to the U.S.A. The more exotic juices, coconut

and pineapple, guava, etc should find a ready market in Northern countries where these fruits do not grow. The companies concerned appear to be developing export markets of their own accord and can safely be left to do so

Bearing these export possibilities in mind and the entry of new packers into the market a healthy rate of expansion is expected. Trade assessment of rates of growth up to 15% could well continue for a year or so, but for a prolonged period 10% seems a safer estimate and is the figure used in the projections A sustained growth rate of 10% especially in the present difficult world economic conditions can be regarded as high.

FORECAST DEMAND FOR NECTAR AND FRUIT JUICE CANS

	1980	1981	1985	1990
202 diameter	310 m	340 m	500 m	800 m
211 diameter	250 m	285 m	415 m	660 m
	560 m	625 m	915 m	1, 460 m

MILK CANS

The use of cans in the packing of milk products separate into three markets which will be considered separately.

EVAPORATED MILK.

This is in the hands of a single packer who makes his own cans and the following is necessarily based on such information as it was possible to obtain from him.

The can is mostly of the vent - hole type. This depends to quite an extent on the less demanding nature of the product and has in many countries been replaced by the orthodox three piece sanitary can. It uses much solder at the ends as well as at the side - seam.

One sanitary can line has already been installed and the introduction of an alternative pack to the vent - hole is under consideration.

Monitoring for lead content is carried out and stringent standards are applied.

The rate of increase of the market depends on factors such as the availibility of fresh milk and is not spectacular.

There is a small market for canned cream which has been included in these figures.

MILK POWDER.

Sales of this product also depend very much on the availibility of fresh milk.

The container used for full cream milk powder is of either the sanitary can type or fitted with aluminium diaphragm (the latter is more expensive and caters for the top end of the market). Side seams are cemented or soldered. These are the normal containers used in the trade world - wide and perfectly satisfactory for the gassing process

needed for the product. The sanitary can is for the baby market in which the product is used quickly after opening. Provision of a proportion of plastic re-seal caps would help to keep the product fresh after opening the can.

Some can - manufacturers are evidently having difficulty maintaining the gas-proof property of the aluminium diaphragm. This problem has arisen before in other countries and the provision of diadinch machines for fitting diaphragm to ring should solve it.

The main supplier manufactures his own cans in strategically placed plants throughout Mexico. Capacity is being expanded to keep time with the market. One other supplier is considering installing his own plant. Can - making capacity is unlikely to be a problem.

The rate of increase in demand must vary with the fresh milk supply and a figure of 7% has been taken as indicated by Sistema Alimentario Mexicano (S.A.M.).

CONDENSED MILK.

For this product also there is one supplier and the market is growing very slowly. The product is self-preserving and the container used - a sanitary can with dry side-seam - is the usual container for this product. It is safe enough but leakage at the side seam is possible. A sealed side-seam would be more sightly and more hygienic, but it must be remembered that this is an inexpensive pack and cannot command the use of a container more elaborate than is strictly necessary.

Some countries with a portion of the population under - nourished have a far greater off take of condensed milk. It is used for children after weaning. It is not a complete food, but a most valuable component of a child's diet and has been one of the factors in improving general standards of health among children in some Eastern Countries. Most importantly, it is inexpensive.

To what extent price control limits supply is difficult to say, but an investigation to see if the use of condensed milk among the poorer people could be expanded might be worth while. A considerable proportion of the population of Mexico is said never to use milk in their diet.

SIZE OF MARKET FOR CONTAINERS FOR MILK PRODUCTS

	1980	1981	1985	1990
Evaporated Milk	315 m	320 m	360 m	410 m
Cream	8 m	8 m	9 m	10 m
Milk Powder	174 m	190 m	240 m	335 m
Condensed Milk	110 m	113 m	130 m	140 m
	607 m	631 m	739 m	895 m

AEROSOLS

The feature of the aerosol market is its remarkable rate of growth. As recently as 1975 production was some 43 m. cans. For 1980 it is estimated at 67 m. - a rate of increase of approximately 10% sustained over a considerable period. With living standards rising there seems no reason why this rate should not continue particularly bearing in mind the luxury nature of the products packed - hair lacquer, deodorants, air cleansers, insecticides, etc.

Most of the cans are of the welded side seam soundronic type and new faster machinery is being installed continously by the manufacturers concerned with this market. Capacity is expected to rise from 70 m. cans in 1980 to some 90 m. in 1981.

This welded can is ideal for aerosols and is used universally. In addition there is a market for some 3 m. extruded aluminium aerosols. There are some glass aerosols made but their use is limited by the danger from breakage and metal is likely to hold this expanding market.

SIZE OF MARKET FOR AEROSOL CONTAINERS

1980	1981	1985	1990
67 m	75 m	110 m	190 m

OTHER GENERAL LINE CANS AND CAPS

It has proved particularly difficult to obtain a picture of the general line business which can be presented with confidence due to the enormous variety, both in product and usage, of the general line business. However, it is an important sector of the market for metal containers as it is difficult to use any alternative for many of the products packaged. The over all figure for containers is given with some confidence but the break-down into markets with some reservations.

PAINT AND ALLIED PRODUCTS

This appears to be one of the largest outlets for general line. 108 million litres of paint were sold in 1980 for the decorative market. This market covers all paints and varnishes destined for domestic use and divides into supplies to the professional decorator, who will use containers of sizes from 4 litre to 200 litres and supplies through shops to the man who does his own decorating - the Do - it - Yourself or D.I.Y. market. The D.I.Y. paint user will require the product in containers sized 125 ml to 4 litres. In Mexico, some 80% by volume of paint is supplied in containers of size 4 litres and above indicating that the D.I.Y. market is less developed than in some countries.

Of the various sizes the smaller ones up to and including four litres are made from tin-plate and the larger containers of 19/20 litres are mostly black steel welded drums. There is a separate market for these drums covering many products. It has not been possible to explore it in depth in this survey but it is worthy of a special study. The intermediate 9/10 litre size is supplied in tin-plate containers, welded drums and some plastic containers.

The performance expected of a paint can is very demanding and in its own way the paint can is quite a developed sophisticated container.

Great benefits have been obtained by the paint manufacturers in many countries by the standardisation of sizes and styles of paint cans, leading to longer runs and lower costs for the cans, to say nothing of advantages in filling speeds and packaging of the finished

product. Standard sizes are used in Mexico for the main paint range up to and including the 4 litre size but the volume held by the bigger sizes of drums varies and an investigation into the possibility and desirability of standardisation might be worth while.

The total domestic paint market has been increasing only slowly - say some 2% p.a.- since 1976. The estimate to 1985 allows for an improvement.

Cans - mostly rectangular and square, are also used for varnishes, solvents, car re - touching materials and for some industrial uses. The size of the market is indicated. Its rate of growth may be larger than for domestic paint.

Allied to the paint market is that for inks. Little ink is packed in tins and the market is not significant.

There are also many other allied products for the building trade which are included in these figures.

The total market for these containers is supplied by two of the larger can - makers and a number of the smaller ones. There is plenty of capacity and much competition among the can makers.

The quantities shown here have been estimated from can- manufacturers' assessments and paint trade sources. They must be treated with some reserve.

MOTOR OIL

This market is in competition with composites and plastic containers. The overall market is expanding rapidly but can requirements could be limited by these alternative containers.

OTHER END USES

There is a host of other products packed in general line cans - Dried food products, Ground Coffee, Metal Polishes, Edible oil, Talcum powder (but a large part of this market has been lost to plastics), agricultural and chemical products, etc. The market is extremely difficult to assess but overall small compared with the market for other types of cans.

In addition there is a considerable market for seamless containers for boot polish, household polishes and creams, cosmetic and medical products, etc. Tonnages of plate are small although the market is an important one from the point of view of the diversity of needs it satisfies. In most of these areas there is competition with plastic containers.

Also there is a speciality trade for trays and other fancy household articles depending on fine metal printing and using can-manufacturing techniques.

CAPS AND CROWNS

The market for crown corks in Mexico reflects the Mexican reputation for the highest consumption of soft drinks per capita in the world. The manufacture of the crowns is in the hands of three supplies. The main one, Zapata, is perhaps the largest manufacturer of these crowns in the world.

This market uses some 70,000 tons of tin-plate per year and is increasing steadily.

Other caps made include twist - off and baby - food types for steam - injection vacuum filled jars; diaphragm screw caps for powdered foods, particularly powdered coffee; screw caps for pharmaceutical and cosmetic products and many others. Tinplate consumption for all these is estimated at 10,000 tons per annum. In addition aluminium sheet is used for R.O. bottle closures. This market is not increasing fast.

SIZE OF MARKET FOR CANS FOR PAINT, VARNISHES, INKS AND ALLIED PRODUCTS

	1980	1981	1985	1990
Round built up 1/8 to 9/10 litre	100 m	102 m	112 m	125 m
Round and irregular 4 litre cans for liquids	12 m	12 m	14 m	17 m
18/19 litre squares	8 m	8 m	10 m	12 m
Total Tinplate Containers	120 m	122 m	136 m	154 m
* Pails 18/19 litre and larger	11 m	11 m	14 m	17 m

* Pails made mostly from black-steel.

SIZE OF GENERAL LINE CAN MARKET AND FORECAST INCREASES

	1980	1981	1985	1990
Paint, etc.	120 m	122 m	136 m	154 m
Motor oil cans	160 m	170 m	220 m	280 m
Other end uses Built - up containers	35 m	36 m	43 m	51 m
Seam less containers	60 m	63 m	68 m	73 m
T O T A L	375 m	391 m	467 m	558 m

TINPLATE TONNAGES USED FOR CROWNS AND CAPS

	1980	1981	1985	1990
Crowns	70,000	76,000	103,000	145,000
Caps	10,000	10,000	11,000	13,000

RAW MATERIALS

TINPLATE

Recent figures for the consumption of tinplate and the equivalent tin free steel (TFS) areas follows:

	1978 Tons	1979 Tons	1980 Tons
Tinplate made in Mexico	183, 000	175, 000	142, 000
Tinplate and TFS imported	138, 000	164, 000	300, 000*
Total Supply	321, 000	339, 000	442, 000*

* Estimated from import figures, January/September 1980.

The Mexican tinplate is made by AHMSA and HYLSA. However, the latter's contribution is minute and used only at Toluca for beer cans. Some 98% is made by AHMSA. The imported plate comes from Japan, U.S.A., Canada and a number of European countries.

The price of Mexican tin-plate is controlled whilst imported plate is subject to a tariff of 5%. Until the end of 1980, the local plate was some 20/30% cheaper than imported plate. An increase in the AHMSA controlled price of 35% in January compared with small increases in imported prices has resulted in the price of indigenous and imported plate being about the same for 1981.

Thus at present we have a position whereby the total consumption of plate is rising rapidly but Mexico's production has been falling causing a huge increase in the tonnage imported. The value of the 300, 000 tons of plate imported in 1980 is of the order of U.S. $270m.

For techno-economical reasons AHMSA manufactures tin-plate only to 0.25 tin-coating and to 0.22 mm minimum thickness. This severely limits its applications.

The quality of Mexican tinplate is poor and a major source of difficulties for the can-manufacturers. The variation in gauge is excessive leading to poor production on body-makers, the risk of broken tools and the need for hand or machine sorting. There are excessive pin-holes in the plate. This can be dangerous for processed food cans. Surface blemishes are above average.

Consequently for many products this plate is not suitable and many can-manufacturers claim that sorting costs and higher spoilage with AHMSA plate cancelled out the price-saving of 20/30% which obtained up to the end of 1980.

This poor quality is recognised by AHMSA.

The causes go far back. Good tinplate can only be made from good hot rolled coil. The hot rolled coil at Monclova, Coahuila is not scarfed, leading to excessive oxidation, the analysis is not ideal for tinplate, and the geometry of the coils, which is so important for fast cold rolling is bad.

The cold rolling equipment consists of a second hand Mesta 5 stand cold rolling mill. It is probably 40 years old. There are also 2 rather ancient reversing mills.

With these problems it is not possible to produce a steel base which can give a satisfactory quality of tinplate.

The poor state of this equipment is blamed on the price control of tinplate which has made it only marginally profitable to produce and un-economic to invest in to keep equipment up-to-date.

Further, there is high demand for other forms of steel particularly connected with the oil industry and cold-reduced steel can be profitably sold to the consumer -durable industries.

To enable Monclova to produce tinplate up to modern standards would call for scarfing, probably better controls at the hot mill to give uniform wound coils, one or perhaps two new 5 stand cold-rolling mills, coil preparation lines and an expansion in tinning capacity. Without tackling the problem at the source, satisfactory tin-plate is unlikely to be forthcoming.

The expenditure would be in the hundreds of millions of dollars.

This is a matter of priorities as far as AHMSA is concerned and with Mexico's need for other forms of steel, particularly for oil, something has to be sacrificed. If this has to be tin-plate, then higher imports must be expected as total consumption is likely to rise sharply with the high economic growth rate expected.

The question of price control must be one for Government of Mexico, but there can be little doubt that it has contributed to the present unsatisfactory state of affairs. Lifting of price controls on tin-plate would allow AHMSA to act in a totally commercial manner would almost certainly cause an increase in production and might induce HYLSA to expand its tin-plate activities.

One point to be made is that better hot rolled coil either imported or provided from other Mexican steel mills would without doubt materially improve the efficiency in cold-rolling and tinning at Monclova. It would also give a higher quality tin-plate and perhaps avoid the need for sorting. Monclova claim it is too expensive to bring in hot roll coil from outside. The lifting of price-control might enable them to try this out commercially, charging a higher price, which could well be to everyone's advantage. But this is not to say that really suitable tin-plate could be made on the present cold-rolling equipment.

ALUMINIUM

The total market for aluminium in Mexico is 150, 000 tons per year. Some 40, 000 is smelted in Veracruz and the balance imported in ingot or finished form. The rolling mills are kept busy on outlets other than packaging.

In the packaging field, only aluminium foil, diaphragm material for General Line Cans and sheet for R.O. closures are manufactured. The aluminium strip for beer can ends and tabs is imported. It is a very specialised material.

As discussed elsewhere, the majority of the two piece beer can market is expected to use aluminium for the wall-ironed body as well

as the end. The tonnages involved will be formidable and all will have to be imported. Over the next ten years the annual production of two piece beer cans is likely to rise to 3, 000 m to 4, 000 m cans. If 75% were made from aluminium the consumption would be some 50, 000 tons per year of body-plate. Together with other requirements this could be a significant factor in justifying the installation of more rolling mill and aluminium smelting capacity in Mexico. It is understood that this possibility is under consideration.

It will be appreciated that the import of aluminium should limit the rate of increase in tinplate consumption and the amount imported.

OTHER RAW MATERIALS

The importance to the can-makers and canners of access to the best possible internal finishes cannot be overstressed. An error in the varnish, due either to imperfect or inconsistent raw materials or in the preparation of the varnish can lead to the rejection of food or drink worth many thousands times the original cost of the varnish. The varnish manufacturer has therefore an onerous responsibility. Also there is a high degree of technology in this field as development of new formulations for new or improved methods of manufacture, cheaper products, new products or reductions of film weight are never-ending. There are also completely new resins coming on the market and major developments like water-based finishes, high solid lacquers, U. V. printing all aiming at improvements in various directions.

In this market access of the most modern know-how is essential and this know-how is largely concentrated in the U. S. A. and Europe. Some of the leaders in the industry are represented directly in Mexico and some by means of licenses to Mexican manufacturers. In general the more manufacturers whose know-how is available in Mexico the better, subject only to the market not becoming too fragmented for any varnish - manufacturer to have a viable manufacturing business. This would point to the present indigenous varnish manufacturers extending their list of licensors.

In general can-manufacturers consider they are satisfactorily served by the lacquer manufacturers but the latter consider that at

times the consistency of the resins they are supplied by Mexican chemical firms are not consistent enough or not to the standards laid down by the licensors. They state that they are restrained from obtaining these crucial materials from outside Mexico sometimes by price considerations and sometimes by inability to obtain import licenses. Anything that can be done to help ensure that their raw materials are up to the standard demanded by this small but critical market would be worth while.

Some local varnish manufacturers would like to extend their licensing agreements to other international foreign manufacturers and suggestions have been offered where requested.

Lining compounds are manufactured locally. This again is a critical product but there appear few problems in this field. Some can-manufacturers make their own compounds.

EQUIPMENT

The equipment installed in can-manufacturers' plants is generally typical of that in the U.S.A. and European countries.

Printing machines are generally Crabtree double-colour/or single colour with follow-on varnishers; the varnish machines Wagners.Littell coil cutting machines have been installed by FAMOSA and Zapata. These machines reduce the price of tin-plate a little, but more importantly save tin-plate by scrolling at the cut. For long running jobs such as beer can bottom or food can ends they give worth-while material savings. The investment is high as apart from the machinery expensive coil-handling equipment is called for.

Press equipment consists of either Karges-hammer or Cameron secondary scrollers and Bliss or Karges - Hammer strip-feed presses the former perhaps the more robust.

The typical food or beer can line is based on United Can body makers (or some times Bliss), Angelus seamers and Borden testers. They give a robust line running at 400 plus per minute and are capable of many years use. Such a line cannot be faulted. Some manufacturers have second - hand machinery imported from associates. In all these cases the basic machinery is equally good and with periodic reconditioning will last many years.

All this machinery is well up to world standards. However, for future installations of machinery new factors are coming into play. The final development of the soudronic welded side-seam system with the W.I.M.A. crush welded seam and suitable internal side striping equipment has provided a container with a welded side-seam which can be manufactured at up to 400 cans per minute. Further it is more flexible for size changes than the orthodox side-seam soldered line. Also there is no lead present in the seam to present a health hazard. Cans made on orthodox body-makers are going to continue to be made in all countries for many years to come, but for new installations, manufacturers will be well advised to ponder the wisdom of installing soudronic lines to last to the end of the century.

There are many soudronic lines already installed, used mostly for making aerosols. Their use is likely to spread to cans for those products where lead can be a hazard.

The other important development in can-making over the last few years has been the two piece can for beer and soft drinks. Already there are two of these lines at Toluca based on Ball Manufacturing Technology. They are up to the best modern 2 piece technology. Many more such lines are in various stages of planning for most of the large can-manufacturers in Mexico.

A feature of the industry in Mexico is the large number of packers who make their own cans.

This may be partly due to history. From the point of view of the user of the cans this has some advantages. He can use slack periods in the canning season to make cans. Overall costs may be lower even taking into account the extra investment in buildings and equipment and stocks. With can-manufacturing lines tailored to his need, he can probably run on lower made-up can stocks. There are however, considerable disadvantages. The quality of the can made is typically poorer than that from the can-maker. The packer will put up with a lower quality made by himself than he would demand from an outside supplier. Changes in technique may leave the canner with out dated equipment.

Another problem is that the canner installing his own can-manufacturing machinery does not have access to up-to-date technology and know-how. He will often install the cheapest line available and omit testing machines. This has happened to some extent in Mexico where some of the lines installed in canneries are to a standard below that of the typical can-maker. There is dissatisfaction with some slow Italian equipment which is not capable of producing cans to a sustained quality level or at acceptable speeds.

The remarks in the last paragraph do not of course apply to large international companies who manufacture cans in many countries and have abundant technical back-up.

It must also be added that some packers making their own cans have installed first - class equipment and maintain a high standard of can-making.

RECYCLING

In can-making there is an unavoidable loss of some 20% of the prime product in the form of factory scrap. This material is valuable and the sales value of the scrap is an important element in the economics of the industry. With tinplate, the scrap is sold to companies specialising in de-tining the metal and selling the resultant prime tin and scrap steel for re-use (the de-tinned scrap commands a higher value from the steel mills than the original tin plate scrap). With aluminium the metal is typically used in the aluminium foundry business. In both cases there is a complete recovery of all the metal. This cycle has been in existence many years and the de-tinning of waste tin-plate is a highly developed process.

Over the last decade environmental factors and the increasing cost of energy have focussed attention on the recovery of used metal containers, before or when they have found their way to the waste dump. Also the nuisance of litter from packaging in the form of plastic film and containers, paper and board, broken and unbroken glass bottles and beer and food cans has received even more attention as people have realised the threat to the environment from this litter particularly from products like plastic materials and glass which are non-degradable. It is necessary to distinguish between these two aspects of litter and recovery as the remedies are essentially different.

To deal first with the litter aspect, any type of litter is unsightly, damaging to our environmental and often a health hazard, whether the litter is metallic, paper, plastic, board or whatever. The remedy lies in education, particularly through the schools and in many countries there are national organisations, some times charitable, often receiving moral and/or financial assistance from governments, devoted to the task of eliminating the cause of the trouble - a lazy indifference by the individual towards the results of his thoughtlessness. Support for such organisations, perhaps financially but certainly organisationally to ensure efficient use of their resources, is something which packaging manufacturers and packers should be encouraged to provide. In many countries this is being done,

Returning to the recycling and energy - saving part of the problem, great success has been achieved in some European countries and in the U.S.A. in persuading the public to dispose of used containers to

"collecting banks" rather than with the rest of household waste to the waste dump. This has been particularly successful with used aluminium beer cans, whose intinsic worth as scrap makes the collection of them an economic proposition, but the same approach is also used for tin-cans, glass bottles and paper and plastic products.

In other countries where the tin-plate container is more dominant (the economic value of an old tin-can is considerably less than that of a similar aluminium can) the emphasis has been on the recovery of the used can from the waste dumps. In the U.S.A. there are a number of operations covering the recovery of virtually all these materials by sophisticated methods of separation.

In Britain there is a company Material Recovery Limited working on the separation of tin-plate canisters by magnetic methods. A brief survey of the activities of this plant are attacned.

However, it must be admitted that while these extraction schemes have been initiated with the intention of running a commercially profitable organisation, it is doubtful if any of them are truly profitable at this point in time. Also the investment cost can be high, and the Material Recovery Ltd. method involves expenditure on equipment of some pounds 450,000 (say pesos 25 million) for an annual rate of through - put of 100/125,000 tons of waste per year yielding 6/8,000 tons of tin-plate scrap. Some of the more comprehensive recovery schemes in the U.S.A. involve investment many times as high as this.

In Mexico, the problems are similar, the solutions may be different. As far as litter is concerned, a strong anti-litter movement with organisational and financial support from all sectors of the packaging industry, and from local government, aimed at education and the provision of anti-litter receptacles throughout the urban areas and at popular rural points should improve the position.

As far as recycling of used packaging material is concerned, there is already a system which goes a long way in the right direction. At the major rubbish dumps there is the highly self-organised system of scrap collection whereby the used tin-cans (among other valuable scrap) are separated by hand and find their way to the tinplate scrap operators.

This solution may not be the most elegant one but it has the advantages of recovering a high percentage of waste-dump timplate scrap, providing employment (1200 families of "pepenadores" live off these waste-dumps in Mexico City) at remuneration rates above the national minimum wage according to a recent television investigation, avoiding costly separation methods and providing suitable waste tinplate (and aluminium) for the de-tinning industry.

The percentage of original metal regained by the pepenadores is estimated at figures between 60 and 89%. A visit to the Mexico City Waste dump laid to rest any doubts I had about these remarkably high figures.

In these circumstances it seems unnecessary and indeed unrealistic to suggest the introduction of costly separation methods which will essentially remove the livelihood of the workers concerned and may well be less efficient in extraction. In years to come, when living standards rise so that workers no longer choose to do this most unpleasant work, a reappraisal will be necessary. By then separation techniques will have improved. Until then the present method should be allowed to continue and action should be confined to helping the workers concerned to improve their performance if such help is acceptable to this very independent community.

With the likely advent of aluminium beer cans, efforts should be made to collect these for recycling before they reach the waste-dump by the introduction of collecting centres where the cans can be delivered and paid for against delivery. This system has been successful in the U.S.A. and similar arrangements by the industries concerned in Mexico are being initiated at this early stage in the introduction of the 2 piece aluminium can.

Comment is called for on the proposal in Article 24 of draft "Reglamento de la Ley para Prevenir la Contaminación" whereby the sale of beer and soft drinks in non-returnable containers would be banned ten years after the date of introduction. The implications of such a step on investment by industry, on employment in Mexico and on consumer choice both in Mexico and in the growing export market for canned Mexican beer to the U.S.A. are being brought to the attention of Government by the industries concerned. It may be of interest to quote the findings of the "Waste Management Advisory Council" set up in Britain to investigate the implications of such a step

and composed of environmentalists as well as industrialists and the British Government. They are attached and attention is particularly drawn to point 4 and point 18. This report followed an exhaustive investigation lasting some years into all the factors concerned.

Also attached for reference is an excerpt from a pamphlet issued by the National Association of Recycling Industries of the U.S.A. showing the energy value of recycled materials in the U.S.A. in 1979, and the conversion rates.

Chapter 2

SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

1. Packaged beer, cider and carbonated soft drinks are available to the consumer at a large number and variety of retail outlets. In most shopping areas and indeed in many shops there is a fair measure of choice between the different pack types (returnable bottles, non-returnable bottles and cans). Most supermarkets, however, stock only non-returnables. (chapter 3c)

2. The proportion of sales in non-returnables has increased substantially over the last decade and this trend is expected to continue, though at a slower rate. This reflects the growth of supermarkets and the relative convenience of non-returnables for the consumer. (chapter 3b)

3. The resource costs of returnable systems are generally lower than for non-returnable systems. (chapter 3g)

4. The price of the beverages to the consumer is lower in returnable bottles (net of the deposit) where they and non-returnables are sold side by side. Non-returnables in supermarkets, however, can be as cheap as returnables elsewhere. (chapter 3i)

5. Returnable bottle systems, provided they achieve a certain minimum trippage rate, consume less energy per litre sold than the corresponding non-returnable systems. However, the total energy used by all the beverage systems in 1977 represented only 0.6% of national consumption. (chapter 3e)

6. With present trippage rates (estimated at 4 for off-premise sales and between 10 and 20 for on-premise sales) an all-returnable system would save some 2% of the total energy consumed by the present mixed system, representing about 0.[illegible]% of national consumption. This proportionate saving could be increased to a maximum of about 0.2% improved trippage. (chapter 5b)

7. Conversion to an all-refillable system would save the materials at present used for can-making. With an all-refillable system a slight increase in the amount of glass used would be necessary, given present trippage rates, to maintain current sales volumes but there would be a considerable decrease if trippage could be improved.

(chapter 5b)

8. The external costs associated with waste disposal, litter, pollution, road congestion and health and hygiene taken together are slightly lower, on balance, for returnable than for non-returnable systems. However, these costs per container are extremely low.

(chapter 3h, 5d)

9. Conversion to an all-refillable system would result in the closure of beverage can-making and canning lines and facilities for making the metal sheet. It would also involve the conversion of non-returnable bottling lines to handle returnable bottles. (chapter 5c)

10. The industries concerned take the view that a move to an all-refillable system is likely to result, at least initially, in a significant drop in forecast sales of packaged beverages, through some retailers, particularly supermarkets, ceasing to stock the products and some consumers ceasing to buy them in the less convenient pack. (chapter 5c)

11. The financial and employment effects of a change to an all-refillable system have to be set against those that would occur with the forecast development of the existing systems (increased investment in canning lines, closure of RB bottling lines) but the implications for the can-making industry would be particularly serious. Overall, there would be an estimated loss of about 7,000 - 9,000 jobs, a substantial number of them in South Wales though additional employment in the distribution and retail sectors to handle returnables might offset this.

(chapter 5c)

12. If it is desired to influence a move in the market towards returnables, exemption of beverages in returnable bottles from VAT might so increase the price differential between them and non-returnables that more consumers would buy returnables, and this possibility should be considered. (chapter 6f)

13. The one certain method of achieving a significant movement in the market would be a complete ban on non-refillable containers. The relatively small benefits that even such a ban would achieve are insufficient justification for a measure which would have adverse effects on the industries concerned, particularly in the short term, and which would seriously restrict consumer choice. (chapter 6b)

14. We consider that mandatory deposits on all beverage containers, to influence a move towards refillables, would have unpredictable effects. If the deposit was lower than or equal to that on refillable bottles at the time, we would not expect consumers to be influenced in favour of refillables and the system could lead to various problems depending on where the deposit was initiated. If the deposit was higher than that on refillable bottles, we would expect some move towards refillables but we do not expect that the advantages would offset the disadvantages inherent in the system. (chapter 6c)

15. A tax on beverage containers, designed to internalise the external costs that they entail, should only be considered if it were decided to adopt a general policy of product charges for that purpose. In any case such charges would be so low that they would be expected to have an imperceptible effect on the division of the market between returnables and non-returnables. A tax could, however, be imposed specifically on non-returnables and set at such a level that their share of the market was reduced while leaving consumer choice open. Such action would raise prices, to the extent that the market did not change or during any change, and would incur administrative costs. To the extent that the market did shift, the disadvantages of a complete ban would apply in proportion. (chapter 6d)

16. We do not consider that a compulsory dual stocking requirement would be justified or workable. (chapter 6g)

17. We do not therefore recommend the adoption of any of the measures to influence the market discussed in the preceding four paragraphs. Steps should however be taken to improve the existing systems so as to make more efficient use of energy and raw materials. This involves (a) continuing effort on the part of the packaging manufacturers and beverage manufacturers to develop energy- and resource-efficient packs, filling systems and distribution systems (b) the development of recycling systems where they can be viable and (c) a positive effort on the part of those manufacturers and retailers operating returnable systems to make consumers more aware of where they can buy beverages in returnable packs, which bottles are returnable and where they can return the bottles. (chapters 5b,6a, h)

18. We recommend, therefore, that schemes for the recovery and recycling of used beverage containers and other waste be developed and expanded by collaboration between industry, local authorities, consumers and voluntary organisations. (chapter 6n)

19. We recommend that all returnable bottles should bear a clear indication of returnability. We are impressed by NASDM's efforts to secure the adoption of a standard returnability symbol. We recommend that the symbol be moulded into all new bottles containing ½ litre or more and that all returnable bottles should carry the symbol on the label or on the closure. (chapter 6a, Appendix ix)

20 We recommend that manufacturers of beverages in returnable bottles and their retail customers collaborate to ensure that consumers are informed of the net cost of buying beverages in returnable packs, by a clear indication of the amount of the deposit. This information should be clearly displayed on each individual container or at point of sale. (chapter 6a, Appendix ix)

21. We recommend that the beverage industries should maintain a contiuous campaign to promote bottle returns, as well as an efficient collection system. (chapter 6a, Appendix ix)

22. We recommend that efforts should continue within the beverage industries to reach agreement on a greater measure of standardisation of returnable bottles. (chapter 6e)

Ferrous Metal Recycling

by Sylvia Robinson

WHEN the new plant now being built for Material Recovery Limited at Stoke-on-Trent's incinerator is commissioned at the end of 1979, it is likely to be the most efficient system in the UK for separating unburned used tins and cans from domestic refuse for recycling. From the 120,000 tonnes of refuse passing through the incinerator each year it is estimated that 9,000 tonnes of ferrous metal will be recovered — nearly all the tins and cans in the waste.

By removing this otherwise discarded material before the refuse is finally disposed of, benefits come to a diversity of interests:

Environmentally it must obviously be beneficial to reduce the amount of space required for landfill and at the same time lessen the use of world resources of tin and iron ore.

The steel industry gains an increased supply of high quality scrap with subsequent reduction in imports and savings to the balance of payments.

For the County Councils who become MRL's partners the advantages are varied. Financially they receive a share in the profits arising from the metal extraction process and also a 17% reduction by volume in the quantity of waste for disposal with subsequent lower costs to the ratepayers. For authorities who incinerate refuse the removal of ferrous metal promotes an easier flow of refuse through the incinerator.

MRL was formed in 1975 — its three partners, Metal Box, British Steel and Batchelor Robinson all having an obvious natural interest in increasing the amount of scrap tinplate available for recycling. The new company was given two aims — to develop an efficient and economic method of extraction and then to prepare the recovered metal so that it could be upgraded into new steel and tin, to complete a total recycling chain.

The Market

1.1 million tonnes of tinplate are used in the UK each year to manufacture the tins and cans for food, beer and soft drinks, paint, oil cans, aerosols, etc. This tinplate consists of sheet steel with a very thin tin coating — in all the tin content of a can averages around 0.5%.

The complete recycling of tinplate scrap has long been practised in the tin and box making industry, where reject cans, press shred and offcuts are all passed to Batchelor Robinson, Britain's largest detinners. Material arriving at their works is processed by their continuous detinning method to yield high grade steel and tin for tinplate manufacture. Around 140,000 tonnes per annum of tinplate are recovered and reused in this way. The opportunity to increase tinplate recovery therefore lay in the area of domestic refuse, in the tins and cans discarded by housewives after use.

Initially consideration was given to encouraging voluntary separation of this metal by charitable organisations, Boy Scouts, etc. It was found that whilst paper, being normally clean, dense and a major constituent of waste, does lend itself to voluntary collection and can yield a profit, used cans are dirty, bulky, lightweight and a minor constituent of refuse and cannot be considered in the same light. All previous schemes for voluntary collection involving this kind of waste had been unsuccessful.

MRL decided that any project the company launched must be on a commercial basis. It would be wrong to rely on free labour, petrol and transport. To give a real resource recovery to the nation the extraction operation should be truly economic and commercially sound.

Some separation was already being carried out by local authorities, mainly after refuse had been through an incinerator and the metal burned. Unfortunately the heat in incinerators causes tin to alloy to the steel and renders the tinplate unsuitable for detinning and separation of the two metals. The 150,000 tonnes of tinplate being recovered in this way, therefore, was being sold to the foundry industry for use as low grade pig iron. The aim of Material Recovery was to extract the metal unburned, reasonably clean and at an efficient extraction rate, and then prepare it in such a way that it was suitable to pass through a similar detinning method to that used on clean, industrial scrap. An interim target was set of 100,000 tpa to be recycled in this way with a long term target of 400,000 tonnes, i.e. half the ferrous metal now being incinerated or landfilled.

MRL Extraction Systems

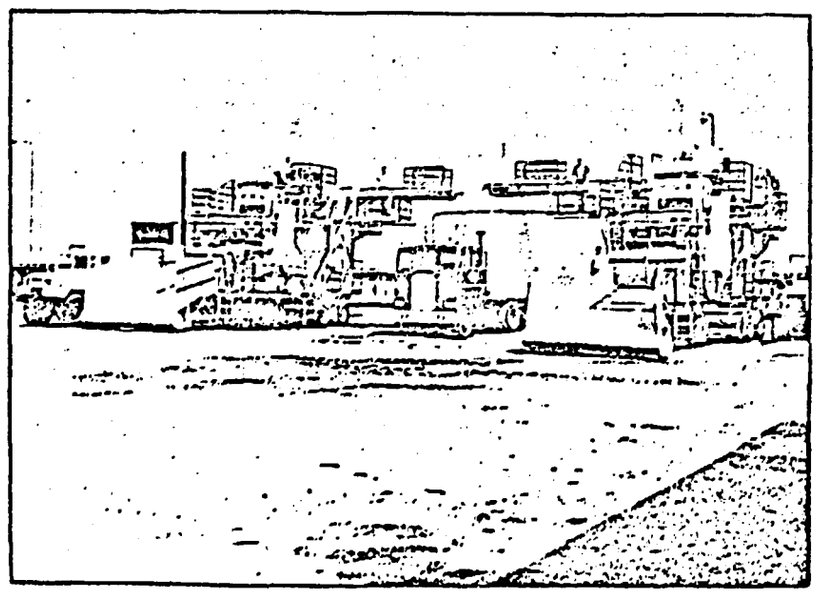
Since 1975 considerable progress has been made by the MRL team, both in stationary equipment suitable for installation at Transfer Stations and Incinerators where refuse is already being handled by County Councils prior to ultimate landfill, and mobile equipment which can be used on large landfill sites to which refuse is brought without prior treatment.

Stationary Equipment

The original MRL pilot separation plant was built four years ago at a Tyne and Wear County Council transfer station in Benwell, Newcastle-on-Tyne. The equipment was erected on the transfer deck, where local collection vehicles dump the waste for loading onto larger compactor lorries before untimate transportation to more distant landfill sites. Before loading in the compactors the refuse was passed through the MRL plant and the ferrous metal extracted.

Operating conditions at Benwell were not ideal — the plant was out of doors in an elevated position and subject to the rigours of weather in the North East of England. Nevertheless, considerable development work took place and the equipment proved its capability of handling the design throughput of 100,000 tonnes of domestic refuse per annum, from which it could extract 6,000 tonnes of ferrous metal that would otherwise be buried in the ground and lost.

Mobile Shredder Sorter



One of the more unusual features of the Benwell operation was the close harmony needed between a public authority and private enterprise. A high degree of co-operation was achieved between the MRL extraction operators and the County Council transfer station employees, to ensure the smooth running of the transfer station at all times.

Due to the commissioning of Tyne and Wear's new Byker resource recovery plant in Newcastle-on-Tyne, insufficient material will flow through Benwell transfer station in future to make the MRL operation economic and this pilot extraction plant is now being dismantled and refurbished prior to installation on an alternative County Council site.

Having designed, operated and proved their novel and efficient method of removing cans at Benwell, MRL have now developed a new and improved version of their equipment for integration into the normal operation of a modern incinerator station at Stoke-on-Trent, owned by Staffordshire County Council.

The layout of the new plant is designed so that all domestic refuse entering the incinerator station will pass through an MRL installed Saturn shredder which will effectively open plastic bags, and reduce large objects to a maximum 8in diameter. The shredded material will fall onto a high speed belt, the final pulley of which is a differential magnetic drum. Refuse is projected off the belt at speed, and the carefully adjusted magnet pulls back the ferrous metal through the air, whilst the residue of waste is conveyed onwards to the normal incinerator process route. This new plant will also be operated by MRL engineers, working in co-operation with the Staffordshire County Council plant operators.

Because unlike the usual overband ferrous extraction systems, metal removed by the MRL method does not have to be drawn from an uneven depth of refuse, a high degree of efficiency can be achieved. Systems used in the past by Councils would remove an average 20-55% ferrous but the MRL system increases recovery to 80-85%.

After extraction two alternative routes for the tinplate are built into the equipment. Either it may be fed directly to the existing Staffordshire County Council baler, or alternatively, in line with MRL's ultimate aim of total recycling, the material will be passed through an initial cleaning system. In this event the metal is shredded through a second, smaller, Saturn shredder and reduced to 1in pieces before being passed under a conventional overband magnet to release entrained paper and plastic. The final shred also densifies the metal before despatch to enable efficient use of transport with a reduction in costs.

Mobile Equipment

Thorough investigation of all possible methods of ferrous metal extraction led MRL to examine recovery equipment in various parts of the world, and as a result an association has been built up with Los Angeles By Products Company of California and MRL now hold a distributorship agreement with this company for the sale of their machinery in all parts of the world except USA and Canada.

The extraction magnet snatches the ferrous waste from the air and allows the residue to fall onto another conveyor which takes it to the loading station. Here it is tipped into container trucks which dispose of it as landfill.

LABP are a long-standing refuse disposal company operating in California and for their own use they have designed and built the Series 30 shredder sorter now being sold by MRL. The unit consists of a mobile flail mill and magnetic extraction system, with initial cleaning similar in many ways to the MRL stationary unit, but the Series 30 can be used on large landfill sites, where it is moved across the tip face as refuse is processed. Serviced by a support vehicle it can handle 80 tonnes of refuse per hour, discharging the extracted metal into an adjacent lorry.

A further advantage to this equipment is that when a landfill site is completed the shredder sorter can be disassembled and towed to another new site.

Preparation for Detinning

During the experimental period of the Benwell operation some extracted metal was used for detinning experiments, but the balance was passed to the foundry industry for the manufacture of pig iron, for specifications where a certain quantity of tin is required in the metal to act as a pearlite stabiliser and enhance casting characteristics. However, this is a limited market and therefore for the past two years MRL have been pursuing considerable research into methods of cleaning and preparing the tinplate, to achieve their second aim of detinning the tinplate and obtaining pure tin and steel — complete recycling.

Metal extracted by the MRL method has always been recognised as containing far less contraries than is normally found in used can scrap from domestic refuse. Nonetheless, this cleanliness is only comparative and before tinplate can be put through a detinning plant a second, far more intensive cleaning must be carried out to remove paper labels, adhering food and a certain amount of lacquer and to break open the seams of the cans to expose the solder to the detinning liquor.

Over the past two years several methods of carrying out this process have been carefully investigated, using material extracted at Benwell, and MRL now believe they will be in a position by mid-1980 to clean and prepare used dirty tin cans so that they can be detinned in the same way as clean, industrial tinplate. When this is fully operational then all the metal passing through the Stoke separation system will follow the route where it is given an initial clean and shred.

The Future

MRL has now achieved its initial aim of extracting used tins and cans from domestic refuse and can offer a range of efficient equipment to carry out this process. It is anticipated that a preparation and cleaning system will shortly be established so that the material can be detinned and completely recycled, giving MRL the opportunity to gradually increase ferrous metal extraction to its goal of recovering 400,000 tonnes of this useful, recyclable metal, which ten years ago would have been buried in the ground and lost to the nation for ever. □

MATERIAL RECOVERY LTD

Stoke-on-Trent Recovery Plant

Energy Savings

1. The Stoke-on-Trent facility of Material Recovery Ltd has recently been examined to determine its potential for saving energy and materials. The work, carried out by Dr I. Boustead and Dr G.F. Hancock of the Open University, has been reported to the National Anti-Waste Programme* and the data given below are extracted from this report.

2. If the Stoke-on-Trent plant is operated for 50 weeks per year with three 8 hour shifts working five days per week, an average throughput of 20 tonne of refuse per hour will yield 8,400 tonne per year of untreated ferrous scrap.

3. After detinning at the Hartlepool Plant of Batchelor Robinson Ltd. this is expected to yield 7,373 tonne per year of high grade steel scrap and 39.1 tonne per year of high purity metallic tin.

4. When this high grade scrap is used to replace ferrous metal produced by the primary route from ore, the annual savings in raw materials are expected to be

18,420	tonne of iron ore
1,650	tonne of limestone
150	tonne of manganese

5. The recovery of high grade steel scrap requires less energy than the primary production of the corresponding amount of pig iron. Hence the annual recovery of 7,373 tonne of high grade steel scrap would result in an overall annual energy saving of 139 million megajoules which is equivalent to 3,270 tonne of oil or 4,960 tonne of coal.

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* "Beverage containers and recycling" by I. Boustead and G.F. Hancock. Draft report submitted to the National Anti-Waste Programme, January 1980. Final report due February 1980.

Energy savings through paper recycling are also substantial: for example, a pound of newsprint produced with virgin fiber requires about 26,650 BTU's, while the same pound of newsprint made from recycled fiber requires only 9,850 BTU's. Similar large energy savings are achieved through the utilization of recycled paper for boxes and containers, insulation, construction materials and molded products.

Turning to rubber, we find that it takes half a barrel of crude oil to produce the rubber in one large truck tire. The utilization of that tire to make a new recycled product requires only 25% of the energy needed to manufacture that same product with "virgin" material.

• • • • •

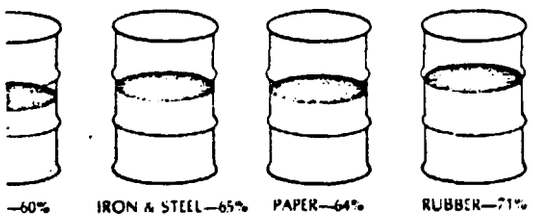
What kind of potential exists? The Citizens' Advisory Committee on Environmental Quality has translated the materials recovery potential in the urban waste flow to an equivalent "savings of 226.5 trillion BTU's or 1.8 billion gallons of gasoline—enough to make nearly 7 million car trips a year from New York to San Francisco on a basis of 13.3 miles a gallon."

The U.S. Environmental Protection Agency has acknowledged energy savings in both the metals and paper recycling processes. Beyond this, the EPA states: "The quantity of energy potentially available from the waste stream of more densely populated areas is significant." The EPA estimated not long ago that the amount of energy that can be recovered from municipal waste is "equivalent to 10% of all coal used by electric utilities . . . and is enough to light every home and office in the nation."

The recyclables in America's solid waste stream represent the potentials for substantial additional energy savings. Not presently being recycled, for instance, are about 40 million tons of recyclable paper; over 2 billion pounds of aluminum, copper, lead and zinc; and millions of tons of iron and steel. Nearly half of the volume of material found in post-consumer and industrial waste currently finds its way to landfills. Much of this volume could be recovered and recycled for energy savings. The remaining waste—after maximum recovery of usable materials is attained—could be recycled in the form of energy production.

POLICIES NEEDED TO MEET NATIONAL ENERGY REQUIREMENTS

As recycling represents a substantive source of achieving energy conservation, policies to maximize recycling are vitally needed. These policies are in two principal areas:



(a) measures to assure continuation of existing and potential recycling activities on a priority basis in the face of any energy curtailments and allocations resulting from such shortages; and (b) measures which will provide opportunities for expanded recycling as a means of fulfilling the nation's raw material and product needs with a minimum expenditure of energy.

1. Recycling As a Priority Economic Activity

Recycled commodities represent a significant portion of the raw material supply of American industry. About half of the nation's copper and lead supplies are derived from recycled sources. About a third of the country's iron and steel comes from recycled scrap. Recycled aluminum accounts for over 25% of that commodity. Recycled zinc sources provide 14% of the supply of that metal. Recycled paper supplies approximately 20% of the paper and paperboard market.

Unfortunately, the absence of established, long-range economic incentives to stimulate expanded recycling and the continued presence of regressive procurement and transportation policies have inhibited the growth of the recycling industry.

2. Policies to Expand Recycling Opportunities

NARI has long called for constructive national recycling policies. It has repeatedly emphasized that the nation's long-term resource posture, with its increased dependence on virgin and overseas sources of raw materials, demands new policies to encourage expanded industrial recycling in the United States. So does the nation's solid waste problem—critical in virtually every urban area—demand new thrusts toward enabling industry to increase recycling . . . to transform more of this waste into a national asset, instead of a nightmarish liability.

The country's energy position mandates a new recycling ethic. Present technologies can enable billions of pounds of recyclable raw materials to actively be recycled . . . to be utilized as an energy conservation source.

Government and private industry estimates indicate that a 50% increase in the level of paper, aluminum, and rubber recycling is realistically possible within a five-year period. Similarly, significant increases in the recycling levels of other metals, textiles, plastics and glass are possible.

Reports for the Maryland Energy Office and the U.S. EPA have found that the reutilization of a ton of waste paper as raw material rather than for use as combustion for fuel purposes results in significant energy savings. Calculations indicate that this ranges as high as 23.6 million BTU's, or more than twice the energy savings. Yet, even if we were to increase the present rate of wastepaper recycling as much as 50%, there would still be 35 million to 40 million tons left for burning for direct energy use.

Well over 90% of this country's post-consumer wastes are *not* presently being recycled. This vast supply of potential new resources—with its inherent energy savings—can be recaptured by industry with the introduction of a broad range of stimulative Federal policies.

RECYCLING SAVES ENERGY

The fact that recycling saves energy has been thoroughly documented by studies of numerous government agencies and private organizations.

The National Energy Conservation Act, in recognition of the energy-saving values of recycled materials, provides two important measures to stimulate recycling in the U.S.

These two initiatives are:

- THE RECYCLING INVESTMENT TAX CREDIT. The first incentive of its kind, providing an additional 10% tax credit for companies that purchase equipment for recycling purposes. It applies to those who recover and process scrap metals, paper, textiles and rubber and the industrial consumers of most of these raw materials.

- RECYCLING TARGETS PROVISION. This calls upon the nation's major energy-consuming industries, in cooperation with the Department of Energy, to voluntarily maximize their use of recycled raw materials as an energy conservation step in this decade. In response to the Congressional mandate, the DOE has established critical targets in the various raw material areas.

While these are important legislative actions that demonstrate the awareness of Congress of recycling's energy-saving potentials, they are only the beginning. Much more must be done and much more can be done to harness the tremendous amounts of valuable energy savings inherent in the millions of tons of waste materials that are not being recovered . . . and in the millions more that could be recycled . . . if the recycling industry was provided with the comprehensive economic incentives and policies that it sorely needs.

A MATTER OF URGENCY

While the National Energy Conservation Act set the stage for sweeping changes in viable energy policy actions, the incessant energy demands of a growing nation continue to frustrate the energy conservation steps which have been taken.

The reality is that while America still talks about "energy shortages" and "energy conservation," it continues to flounder with largely ineffective long-term policies and a continuing drain on its available energy reserves. At the same time, foreign sources of supply become the instrument of diplomatic counterplays with the threat of serious upheaval in the U.S. economy.

American industry is deeply involved in the energy issue. Industry uses approximately 40% of all the energy consumed in the U.S. The growth and progress of industry is vital in so many ways—producing the country's products, employing its labor, and providing Americans with the essentials of life and the things that have made our civilization the most advanced.

The United States, with the most sophisticated economic capacity in the world, now faces the stark reality of being unable to have enough energy supplies with which to sustain both the needed production of goods and employment opportunities for millions of Americans. The issue clearly is one of utilizing the most economic and least wasteful forms of energy. Energy units must be used wisely and industrial production oriented to adopting practices, including changes in raw material policies, which are geared to energy effectiveness.

SAVING ENERGY THROUGH RECYCLING—THE WAYS ARE MANY

The ways in which energy conservation is achieved through recycling are many. It is a proven fact that the recycling process, and the resulting manufacture of products with recycled materials, substantially reduce the amount of energy needed compared with the manufacture of the same products with virgin materials (See Chart).

Recycling enables us to "reuse" much of the energy expenditures already made in the original natural resource extraction—such as through mining and timber harvesting—rather than to duplicate the same energy requirements for all new raw materials and products. Recycling is energy-efficient in that there is a "pay back"—a return on a large portion of the original energy commitments involved in manufacturing the product available for recycling.

As examples, recycling enables our old newspapers to be processed and manufactured into newsprint . . . aluminum scrap recovered and processed into new containers, appliances, and building and automotive products . . . old copper wire and pipe remelted and made into countless copper, brass and bronze products . . . scrap batteries recycled into lead for new batteries . . . scrap iron melted and recaptured for new uses in buildings and vehicles . . . *all at minimal energy usage.*

While current energy savings achieved through recycling are dramatic, the projected energy benefits attainable through expanded recycling are overwhelming.

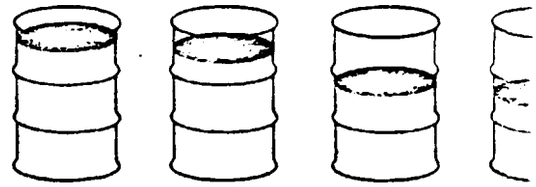
For instance, in recycling aluminum—where it requires about 8% of the energy compared with producing primary aluminum—the current savings of almost 120 billion KWH or 70 million barrels of oil could well be doubled.

A study by the Midwest Research Institute—limited to the recovery of ferrous metals, aluminum and copper solely from urban wastes—concludes that: "The energy savings possible exceeds 86% in all cases and is as high as 96% for aluminum." Based on the net energy saved annually through such recycling, MRI states: "This savings is equivalent to the heat content of 3.22 billion gallons of gasoline."

In studies conducted for the U.S. Bureau of Mines, the Arthur D. Little research organization found that the energy savings achieved through the use of various scrap metals were highly impressive. If old aluminum cans are melted in a reverberatory furnace, for instance, the energy required is only 8.72 million BTU's per ton—less than 4% of the energy needed to make a new aluminum product from virgin ore.

Similar energy savings were found in the various industrial manufacturing processes for recycled copper, lead, zinc, iron and steel and other scrap metallic materials.

ENERGY SAVINGS (Based on Latest Available Data)



ALUMINUM—92% COPPER—85% LEAD—65% ZIN

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ENERGY CONSERVATION THROUGH RECYCLING

NATIONAL ASSOCIATION OF RECYCLING INDUSTRIES
330 Madison Avenue, New York, N.Y. 10017

(Printed on Recycled Paper)

WHAT MUST BE DONE?

In order to capture the energy resources available through recycling, the Federal government—with the support of state and municipal officials and a concerned public—should act to:

1. **Establish truly reasonable and non-discriminatory transportation rates** for the shipment of recycled materials. Under no circumstances should freight rates for transporting recycled materials yield the nation's carriers far more than their profit on competitive virgin commodities and products, as is now the case. Recycled materials are so obviously "national interest" commodities that they should be transported at the lowest rates possible. Legislative and Court actions already have been directed at the carriers to help bring about that result.

2. **Create broadened tax incentives** to enable recycling companies to expand the market competitiveness of recycled materials and products made from them. Such incentives would enable them to achieve greater economic viability as business entities, and have the ability to make long-range commitments to the collection and recovery of the recyclables now lost in the waste stream. The Recycling Tax Credit was only one tentative step in the right direction. More must be done—particularly since the competitive virgin commodities benefit from favorable depletion allowances and capital gains benefits.

3. **Provide improved leadership** to the states and municipalities in the development of solid waste resource recovery programs, maximizing the role of the private sector. It is essential that policies be established to prevent state and local subsidization of so-called recycling centers which are not oriented to *new* sources of recyclable waste and to *new* operations not already available through existing private industry.

4. **Expand Federal research commitments**, including assistance to private industry, to help expand the recycling of complex materials and to develop new techniques for dealing with industrial and post-consumer waste materials now lost to the economy and the energy conservation effort.

5. **Initiate a comprehensive national education program**, oriented to developing a better public understanding of the role of recycling to the nation and stimulating interest in maximizing the recovery and reutilization of materials. As the markets for the utilization of recycled materials and products are expanded, it will be possible to call on Americans to increase the collection of recyclables through proven source separation techniques and resource recovery technology.

The enactment of these policy directives is essential to the development of a constructive energy conservation program—one that will enable the nation to harness the full values of recycling's vital, untapped energy potentials.

TYPICAL ENERGY SAVINGS IN RECYCLING COMPARED WITH VIRGIN MATERIAL USE

	Tons Recycled in 1979	Energy Required To Manufacture One Ton From Virgin Material in KWH/Ton	Energy Required To Manufacture One Ton From Recycled Material in KWH/Ton	Energy Saving Per Ton By Recycling in KWH/Ton	Energy Savings %	Total Annual Energy Saving in KWH (Based on 1979)	Savings in 1979 Equivalent Barrels of Crude Oil
ALUMINUM	1,817,000[1]	71,491[4]	5,742[4]	65,749	92%	119,465,930,000	72,801,000
COPPER	2,168,900[1]	32,815[4]	5,057[4]	27,758	85%	60,204,326,000	36,688,000
IRON & STEEL	43,912,600[1]	7,032[4]	2,496[4]	4,536	65%	199,187,550,000	121,382,000
LEAD	789,300[1]	7,911[4]	2,798[4]	5,113	65%	4,035,690,000	2,459,000
PAPER	12,905,000[2]	16,320[5]	5,919[5]	10,401	64%	134,224,900,000	81,795,000
RUBBER	120,500[3]	9,150[3]	2,680[3]	6,470	71%	779,635,000	475,000
ZINC	173,800[1]**	19,045[4]	7,533[4]	11,512	60%	2,000,785,000	1,219,000
TOTAL						519,898,816,000	316,819,000

**Zinc Content

SOURCES OF DATA

(1) Bureau of Mines/U.S. Department of the Interior

(2) U.S. Department of Commerce Bureau of the Census

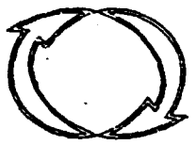
(3) Industry Estimates

(4) Battelle Memorial Institute Report PB-245759 "Energy Use Patterns in Metallurgical and Non-Metallic Mineral Processing"

(5) Richard Keller, "How to Establish a Recycled Paper Purchasing Program: A Manual for State and Local Governments," Maryland Department of Natural Resources, Baltimore, January, 1980.

(6) Bureau of Mines I.C. 8781 "Energy Use Patterns for Metal Recycling"

News Release



Material Recovery Limited

Registered Office: 1206821
Perrywood Walk Worcester WR5 1EQ
Registered in England

February 29, 1980

SUPER EFFICIENT CAN RECOVERY

The new £450,000 Material Recovery extraction plant at Stoke-on-Trent, officially opened today by Marcus Fox, Parliamentary Under-Secretary of State at the Department of the Environment, removes up to 90 per cent of all ferrous metal from domestic refuse before incineration.

This is the first time in the U.K. and possibly in the world, that metal - chiefly tin cans - has been extracted at such a high rate of efficiency before the remaining refuse is burnt in the incinerator.

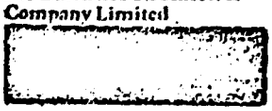
The process greatly enhances the value of the metal recovered since it can be recycled into high grade steel scrap and virtually pure tin whereas incinerated metal provides a very low grade scrap.

The extraction unit, built at Staffordshire County Council's incinerator plant at Hanford, is the first major commercial plant in the U.K. to extract cans from refuse for detinning and represents a novel partnership between industry and local government.

Other plants which extract cans compress them into bales which makes them unsuitable for detinning. The principal market for baled scrap metal is the foundries and prices for this material are relatively low and subject to wide fluctuations.

Material Recovery Limited is a company set up by Metal Box Limited, the British Steel Corporation and Batchelor Robinson Limited in 1975 to recycle tin cans from domestic refuse.

For Batchelor Robinson & Company Limited



The British Steel Corporation
The Press Office
33 Grosvenor Place London SW1
Telephone 01-235 1212

Metal Box Limited
The Press Division
Queens House Forbury Road
Reading RG1 3JH
Telephone 0734 581177

A pilot plant was sited at Benwell, Newcastle-Upon-Tyne in 1976 and proved that the economic extraction of ferrous scrap was possible. However, when Tyne and Wear's refuse-derived fuel plant at Byker came on stream last year, there was insufficient refuse for processing at the M.R.L. plant which will be resited later this year.

Many of the lessons learnt at Benwell are incorporated in the new plant at the Hanford incinerator which can handle 120,000 tonnes of domestic refuse a year. (The M.R.L. process needs a minimum 100,000 tonnes of refuse annually to operate economically.)

THE PROCESS

Refuse vehicles from Stoke-on-Trent and Newcastle-Under-Lyme discharge their loads into two large hoppers at the incinerator. A mechanical grab then lifts the refuse into another hopper - the start of the M.R.L. process - which feeds onto a conveyor belt.

This carries the refuse into a six foot wide shredder capable of exerting pressure of 3,000 lbs. per square inch and which chews it into particles of less than eight inches at a rate of up to 30 tonnes an hour.

The shredder can demolish such bulky items as household furniture - things that used to cause blockages in the incinerator feed chute.

The shredded refuse then cascades over a magnetic separator drum which snatches the ferrous material out of the air as it falls and allows the rest of the refuse to fall onto another conveyor which feeds into the two hoppers that fuel the incinerators.

From the magnet, the ferrous scrap passes along a high speed conveyor and under another magnetic separator which picks up the lighter scrap. This goes through a finer shredder to open up the seams of the cans and to free some of the debris trapped in them.

The finely shredded cans are discharged into the conveyor carrying the heavy ferrous material which has by-passed the second shredder. It passes under yet another overhead magnet to clean it still further before it empties into a skip for transporting to Batchelor Robinson's detinning works.

At this stage the material contains 10 per cent or less by weight of dirt or contraries (paper, plastic, etc.).

It is estimated that the plant which is built to run 24 hours a day, seven days a week, will extract a minimum of 9,000 tonnes of metal a year.

The plant is expected to operate at a profit and Staffordshire County Council will benefit. An annual fee indexed to the price of the recovered metal will be paid to the Council.

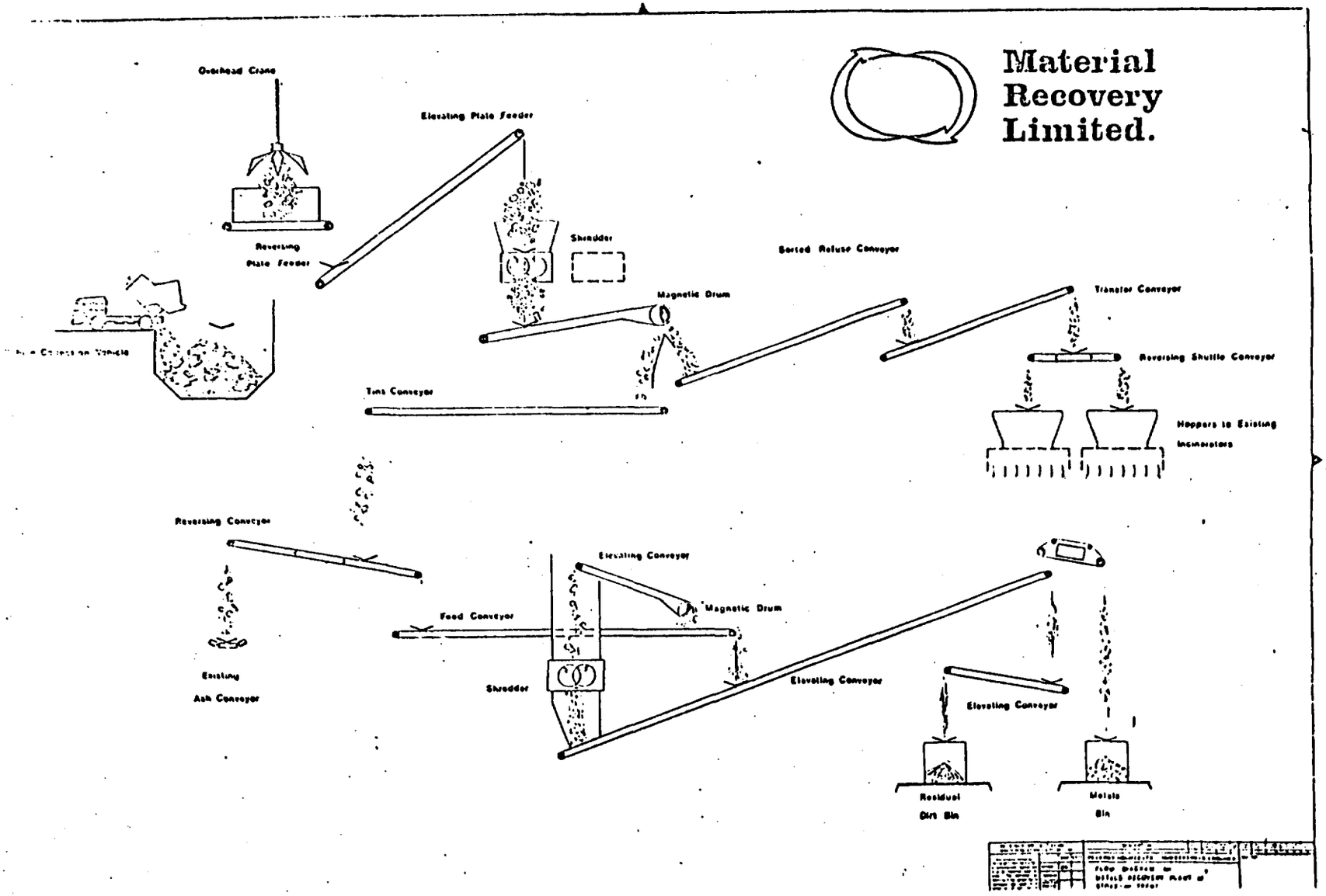
The shredding of all refuse by Material Recovery also improves the efficiency of the operation of the incinerator. It cuts down on blockages in the feed chutes and the shredded material should burn more consistently. Removal of the tin cans also reduces the volume of rubbish by 17 per cent.

At Batchelor Robinson's detinning plant at Hartlepool, the metal scrap is washed to remove any remaining dirt or contraries and then goes into their unique continuous detinning process. Every 560 tonnes of scrap will yield about 500 tonnes of high grade steel scrap and 2½ tonnes of virtually pure tin.

According to an independent study carried out for the National Anti-Waste Programme, each 500 tonnes of steel scrap recovered in this way will save 9.2 million megajoules of energy equivalent to 216 tonnes of oil.

The present design of the Stoke plant does not permit the separation of the aluminium ends found on tinplate cans but Material Recovery is experimenting with a very promising system to separate the aluminium. If successful, the aluminium separation can be easily added to the Stoke plant.

Full production at the plant is scheduled for April this year.


Material
Recovery
Limited.
Overhead Crane
Elevating Plate Feeder
Reversing
Plate Feeder
Shredder
Sorted Refuse Conveyor
Magnetic Drum
Transfer Conveyor
Reversing Shuttle Conveyor
Hoppers to Existing
Incinerators
Tunt Conveyor
Reversing Conveyor
Elevating Conveyor
Magnetic Drum
Feed Conveyor
Existing
Ash Conveyor
Shredder
Elevating Conveyor
Elevating Conveyor
Residual
Dirt Bin
Metals
Bin

5. THE EFFECT OF COMPETITIVE PACKS ON THE REQUIREMENTS OF CANS OVER THE NEXT TEN YEARS.

In considering the growth of requirements for metal containers over the next ten years, it is necessary to bear in mind the likely effect of competitive materials in so far as they may replace metal containers or limit their growth in some markets.

In evaluating such movements it is possible only to do so on the assumption of a free competitive market for the various types of materials and ignore possible market distortions such as the application of a ban on non-returnable containers for beer and soft drinks or any tendency for Government to encourage one material at the expense of another for non-market reasons.

The following remarks are therefore based on free market factors.

The vast majority of the tinplate presently used in Mexico is for beer, soft drinks, fish, fruit, vegetables, tomatoes, chiles and milk products and it is the effect on these markets with wich we are chiefly concerned.

GLASS

The main competition between glass and metal containers is in the beer and soft drinks field. For both these packs metal is gaining at the expense of glass and there remains a pent-up demand for cans held up by lack of can-making equipment and filling lines. Nevertheless the proportion of canned beer to the total market is still small (less than 22%) and of canned soft drinks to the total market, negligible. Glass is expected to maintain its dominance in both markets with the returnable bottle but metal containers will continue to grow at its expense.

In food products there is an area covering gherkins, olives, preserves and specialities already packed in glass. The glass jar is more expensive than the can and its integrity not as good. It is unlikely to gain appreciably at the expense of the can in the areas already covered by the can for cheap basic foods such as soups, beans, vegetables, etc.

BOARD

There is already an increasing market for soft drinks in the tetrapac and similar containers. This is popular as a one-shot pack for immediate consumption. Its convenience is similar to that of the can. Nevertheless in its particular corner of the market, the consumption of cans is also increasing. This cheap convenient alternative to the can could well limit the can's growth in metropolitan outlets where turnover is fast and the mechanical weakness of the container is not a factor due to the simplicity of distribution.

The market for milk in cartons is already developed. It seems unlikely to penetrate the traditional can markets for condensed and evaporated milk due to distribution and shelf-life problems.

PLASTIC CONTAINERS (Soft drinks)

In the soft drink market, both in the U.S.A. and in European countries there is a growing demand for the large 1 1/2 litre PET bottle for cola drinks. Its price per litre is lower than that for the can, and perhaps for the bottle, it can provide a few days' supply of the drink for a family and fits in well with modern super-market shopping habits. On the other hand its main impact for home consumption is more in competition with the bottle market rather than the impulse buying which is to some extent the main advantage of the can over the bottle.

In the present difficult economic situation in some countries, the savings made in using this large family size container are quite seriously affecting soft drink can sales.

In Mexico there is as yet no equivalent container and the largest pack is the 26 oz bottle. It is understood that the bottling trade wish to limit the maximum pack to this size. This is unfortunate as there appears to be an opening in Mexico for the supply of soft drinks in a large, economical, glass or PET bottle.

To measure the possible effect on the metal can if a 1 1/2 litre container is introduced is difficult. At present the can market is very small so that its only effect can be on the growth rate. The availability of such a large pack would, it is believed, have that effect and in the belief that such containers will become available, the growth of cans for soft drinks in the period 1985-1990 could be affected.

PLASTIC CONTAINERS (General line)

Plastic containers have already made big inroads into the market for General Line metal containers. The talcum powder market has been virtually lost some years ago. The market for paint cans has been under attack but so far the robustness of the can has enable it to resist the challenge for containers up to and including 4 litres. Many specialist products have changed to a plastic container. With some products these changes have not been particularly logical and a certain stability in the pattern is emerging. Indeed some containers have moved back from plastic to metal.

For motor oil, the plastic container is used in competition with metal. It is not particularly attractive and seems unlikely to displace the metal container.

While there will be swings and roundabouts, taking into account the extent of the changes that have already taken place in Mexico further significant losses of General Line Containers to plastic equivalents is unlikely.

PLASTIC FILM

Already plastic film has reached a state of stability vis-a-vis the metal container. It has established itself in some markets where its properties make it suitable - for example for limited life milk powder.

The large milk powder market served by Productos de Leche, Nestle and Liconsa, demanding a long shelf-life, gas packing, good reseal properties and good presentation seem likely to remain in metal containers and indeed more can-making equipment is being planned for these markets.

RETORT POUCH

Some plastic laminates can provide a complete barrier for processed foods. The typical laminate is polyester film/adhesive/aluminium foil/adhesive/poly propylene film.

The development of the pouches has been held back for some years by the inability of manufacturers to find an adhesive acceptable to the F.D.A. authorities. Finally an adhesive was accepted in February 1980 and we can expect a fast increase in the use of these pouches.

It should be mentioned that these pouches have been used extensively in Japan for many years and have a market of 500,000,000 pouches a year. In England in 1972 a retort pouch pack was introduced for speciality ready - to - serve meals. It was not successful, probably due to the high price. The product was excellent.

The pouch has a number of disadvantages compared with the can:

a) For small sizes up to the A 2 1/2 size (401 x 411) it is expensive.

b) It requires specialised retorting equipment to hold the pack firm under heating and cooling.

c) The pouch needs the protection of a carton for handling purposes and even then is not as robust as the can.

d) Closing speeds are slow compared with the can.

e) There are risks of contamination in the sealing process where most severe control is necessary.

f) There are risks of contamination through any puncturing of the laminate.

Against these disadvantages:

a) Less processing is needed, giving a final product closer to the fresh equivalent.

b) It is lighter than the can

c) Storage of the pouches before filling occupies little space compared with the empty can.

d) It can be opened at least as easily as a can, with no special implement

e) There are no risks of lead contamination

It is difficult to see the retort pouch attacking the traditional can market for processed vegetables and fruits. Its main impact is likely to be on the complete meal, ready-to-serve trade. This market may be less in Mexico, where domestic help is still available in middle - class homes than in some other countries. Also the abundance of fresh fruit and vegetables in Mexico already limits the scope of preserved food.

For fish products there is already some interest in the development. The expense of the retort pouch is likely to limit the amount of fish to be packed this way for the mass market but it could affect the rate of expansion of the requirement for fish cans in the longer term.

At present cans are not used in Mexico to any extent for complete meals, ready-to-serve. The availability of the pouch could well develop this market. Its effect is likely to be to limit severely any scope the can might have had for developing this market but the pouch is unlikely to be a threat to the market the can already has in Mexico, with the exception of the A 10 size.

At the A 10 size - say 3 Kgs. - the retort pouch becomes economic and for these catering packs one may expect the retort pouch to affect the market for A 10 cans in the period 1985-1990. It is under evaluation for use in the armed forces in the U.S.A. and in Britain.

ASEPTIC PACKING

Already some tomato packer including Alimentos del Fuerte are using aseptic packing for tomato products for export. For the bulk trade this method using 40 gallon drums is far cheaper than using the corresponding number of A 10 cans. This system seems certain to increase at the expense of the A 10 in the present decade both for the developing export trade and for the internal bulk trade for re-packing.

Between the effects of the retort pouch and aseptic packing the market for A 10 cans can be expected to remain static rather than rise during the second half of the decade.

6. DYNAMIC QUALITY CONTROL

Inevitably standards of quality control vary between can manufacturers and between canners. Many are very good. Some are too mechanical and are designed to indicate the quality of the cans or the canner's seam made yesterday rather than the quality of what is being made now.

The hazards from imperfectly made cans for processed food, cannot be emphasised too much nor the difficulty in ensuring that among the billions of cans made in a year, none can be a risk to the ultimate customer due to faulty manufacture of the can or faulty closing.

The following are features of a good overall quality control system:

a) OBSERVATION

Trained and observant operators who can and are encouraged to use initiative within their competence. No statistical quality control system can see and reject a damaged can which may cause a further hundred damaged cans at the next operation.

b) MANUFACTURING PROCESS CHECKS

Regular checks of all attributes of the can being manufactured and of the performance of each machine. It is not sufficient to ensure that the body blank is within the correct tolerance for dimensions, rectangularity, thickness and surface shape at the start of a run. After a few thousand cans, variation will creep in and all engineering measurements of the can throughout the manufacturing process must be checked regularly. Go and No-go gauges on the line for each operation help supervision to carry out this responsibility.

The bursting of bodies on an expanding mandrel to check solder penetration and visual inspecting of the double seam should be almost continuous.

c) STATISTIC CONTROL

All the crucial measurements (particularly in the double seam) must be controlled by Statistical methods. The frequency of the tests, the attributes to be measured, the statistical danger limits appropriate to the frequency and quantities of the cans tested must all be laid down by management, perhaps through the Quality Controller. Extra attributes to be measured may become necessary from time to time to meet particular problems.

The results of these tests can be conveniently represented on graphs showing danger limits.

These graphs or tables are needed urgently by line supervision and should be placed on or near the relevant machines immediately on completion. They are of no use to the quality control staff or indeed to the manager who may not see them before the following day. They are of immediate concern to supervision, who want to know what is happening on their line now - not what happened yesterday or a few hours ago.

Further, when represented in graph form, the supervisor can see not only the latest figure but also the trend of the particular measurement. He may well be able to act to prevent trouble before it occurs. He will also know that a pattern which is not random around the median line may be cause for concern.

This approach to quality may be regarded as dynamic rather than static, reflecting as it does the present position and even future movements rather than sets of historical figures.

d) SUPERVISION TRAINED IN STATISTICAL METHODS

Every supervisor need not be a statistician, but a knowledge of the meaning of statistical methods employed is essential and this calls for training for all supervision if they are to be capable of discharging their responsibility.

e) BATCHING

For long runs of a critical container the cans should be batched, each batch numbered and an appropriate number of samples in each batch inspected by the supplier. The inspection report may accompany the batch.

This enables any future problem with the filling and seaming of the tins to be traced to the quality conditions on the line at the time of manufacture. It is not inappropriate for the supplier to draw attention to any doubtful batches so that the customer may be alerted.

f) MANAGEMENT

The interest shown by the manager in the whole quality control system and his insistence on high standards will ensure concentration on quality standards throughout the organisation.

7. STANDARDS

In the metal packaging industry, standards have been prepared as follows:

NOM - D - 53	Corrosion standards
NOM - EE - 9	Sheet metal standards
NOM - EE - 18 - S	Standard terminology
NOM - EE - 64 - S	Dimensions
NOM - EE - 11 - S	Round Sanitary Can Standards

These standards follow closely those of the ISO. They are legal requirements under the "Ley de Normas de Pesas y Medidas" and are formulated primarily with the protection of the consumer in mind. They have the force of law and are essential for public health and protection.

As far as the can-manufacturing and canning industries and concerned, they consitute a minimum performance.

In the industrial chain however, there are other considerations. It is the duty of the can-manufacturing industry to enable the canners to conduct their filling operations to maximum efficiency and minimum dislocation in technical matters connected with the handling and the closing of the container, and its subsequent distribution.

Further the canner may reasonably claim that one can-manufactuers' product is sufficiently like anothers' to enable him to avoid complications in changing from one supplier's product to anothers' or even in mixing ends from different suppliers

The present standards do not and should not cover this point.

To overcome this problem an advisory set of Recommended Industry Standards should be prepared to cover those containers where customer service demands such rigidity in specifications. At this time the industry most likely to require such a set of specifications is the brewing industry, due to the state of flux it now finds itself in, with straight - sided and necked - 3 piece cans, welded side seam cans, and 2 piece tinplate and aluminium cans likely to be competing any time now.

These Recommended Industry Specifications should be agreed between the beer-can suppliers and the breweries, should be entirely

voluntary and therefore outside the scope of the law, should aim at enabling the brewers to run their can supplies on the fast lines now used with a minimum of technical problems from containers from one supplier or from one to the other, and should cover the following attributes:

1 Seaming chuck dimensions
2. End contours, sizes
3. Compound placement specifications
4. Precise can dimensions
5. Double seam operating standards
6 Metal exposure tests

To agree on recomendations on these attributes will prove to be tedious and long as they will almost certainly involve engineering modifications by the can-makers. They should not be hurried as it is essential to obtain real agreement on them but the sooner discussions start, the less will be the necessary modifications to obtain standardization.

Later, should it prove necessary, a similar set of recomendations might be found helpful for the processed food industry, but such complicated and demanding standards should not be worked on unless there is a real need for them. For the brewing industry filling and handling cans at perhaps 1,000 / 1,200 per minute in the future and with an assortment of slightly different containers to cater for, there certainly will be such a need.

It is suggested that IMAI should initiate discussions aiming at Recommended Industry Standards for cans for the brewing industry, and the most appropriate starting point would be discussions with the brewers to identify their present and future problems in this field. A set of such standards used elsewhere has been passed to IMAI and could serve as a starting point for these discussions.

8. LEAD CONTAMINATION IN PACKAGED FOOD AND DRINKS

For the last 10-15 years attention has been focussed on the health hazard posed by the presence of traces of lead in packaged foods and drinks.

There are two sources for this metal. Some foods can have traces in them before packaging. Apple appears particularly to have the ability to pick up lead. The other source is the solder used in the side-seam of the typical can for processed food, beer and soft drinks. Some products can dissolve the lead from the side seam much more easily than others whilst the risk for dry products is negligible. For example beer appears not to be affected by lead pick-up but some acid drinks are. Some liquid fruit packs are also apt to pick up lead.

In Western Europe the hazard has caused Governments to lay down stricter and stricter levels for the maximum allowable amount of lead in food stuffs and drinks and the figure has been down to 1 part per million for a number of years. In the United States the permissible amount was brought down to this same figure fairly recently. In the United Kingdom there is a further limitation of the figure to .4 parts per million for baby foods.

It could well be that as a lead mining and lead refining country and with the excessive smog in Mexico City from motor-car fumes, the levels of ambient lead could be higher than in some other countries. Lead levels for food stuffs are not at the moment laid down in Mexico but there is provision in the Normalisation Law for these to be introduced without further legislation.

Among can-makers and canners there was, with some exceptions, a remarkable disregard of the problem during early interviews in connection with this assignment on the grounds that as there was no legislation in Mexico, the problem did not exist. In all these interviews, emphasis has been laid on this problem and in the last month or so, there appears to be greater awareness of the hazard. It has been suggested to all canners that they should be monitoring their products to obtain information on how much lead is contained in their packs and further how much of the contamination arises from the raw food and how much from the can, so that at least they will have some factual knowledge of the problem if Government should consider the introduction of limits.

It must be said that some companies exporting canned products are more aware of the problem and one foreign company has delayed introducing their product in cans due to tests showing unsatisfactory lead levels in the cans available. Others are working to the levels laid down in the U.S.A.

With three piece conventionally soldered food and beverages cans the amount of lead pick-up can be limited by the tightness of the side-seam, by special attention to internal side striping and by clean splash-free manufacturing. It can be eliminated by the use of pure tin solder- an impossibly expensive procedure, but one that has been used in some countries as a temporary palliative pending the introduction of 2 piece containers. With 2 piece containers, lead contamination from the can cannot occur. Similarly any alternative method of sealing the seam such as cementing or welding also eliminates the hazard. It is for this and other reasons that the soudronic welding of side-seams has become so popular in many countries in recent years.

Self - monitoring by the canners of the incidence of this contaminant is necessary and should be carried out for their own satisfaction. However, in addition independent testing programmes need to be carried out. I.M.A.I. is ideally suited for this task and is starting a programme to this end. The initial emphasis should be laid on soft drinks and fruit juices followed by acid fruits and liquid milk packs.

This background information will give Government some background information on which regulations can be based.

The introduction of an immediate low maximum level for lead in canned food and drinks could well result in the extensive dislocation of whole industries. But the limitation of these levels is nevertheless an urgent matter which should be tackled by Government, firstly because of the undoubted health hazards, particularly for the young, from this metal and secondly because any possibility of expanding exports of canned goods is going to be extremely difficult if allowable lead levels for export trade do not apply to Mexico itself.

It is felt therefore that a not very demanding limit (say 4 ppm) should be introduced urgently (say from 1/1/82) and that at the same time Government will declare its intention to reduce this level successively over the next 5 years to 2 parts per million and 1 part per million.

The introduction of 2 piece beer and soft - drink cans will avoid much of the problem for these two industries. The fresh juice and nectar industries will have to consider their practices critically. It would certainly be undesirable for this industry not to be giving the closest consideration to this problem and the installation of further conventional side- seam equipment for these fruit juices without most careful monitoring of the lead levels is most undesirable. The major packers who make their own cans have been advised accordingly.

9. THE CANNING OF LOW - ACID FOOD

Following some deaths from botulism in Britain emanating from imported cans of fish and some less advertised cases of a number of milder infections from the same source, Western European and the U.S. Governments have been formulating more stringent rules for the canning of low - acid foods (fish, meat and some vegetables). These rules and an accompanying guide to good canning practice are still in draft form but it is likely that they will be introduced in the not - too - distant future.

Once introduced in the countries involved, it seems certain that any canned foods imported into these countries will be subject to the same criteria.

It has to be said that no fish cannery seen in Mexico during the assignment has practices even approaching the standards laid down in these regulations. In the case of meat canning plants, the two visited have good practices which could well meet these regulations with comparatively minor adjustments.

Returning to fish - canning, it therefore seems that for the export of canned tuna and other fish to flourish with markets in the U.S.A. and European countries, considerable changes in practice will became necessary. In fact it seems doubtful if some of these canneries could be modified to comply.

What does seem essential is that no further canneries should be planned or installed which do not meet these requirements. This point has been discussed with Productos Pesqueros Mexicanos, Industrias Paraestatales Nacionales and the other fish canners visited, and the latest copy of these draft regulations provided whenever this has been needed. Other copies remain available at IMAI. They are too bulky to be added to this report.

Meanwhile, until the new regulations are introduced, interin guidance has been given to the industries concerned and a copy of the draft circular under discussion with British Canners is attached.

DHSS MEMORANDUM ON LOW ACID CANNED FOOD

DHSS MEMORANDUM ON LOW ACID CANNED FOOD

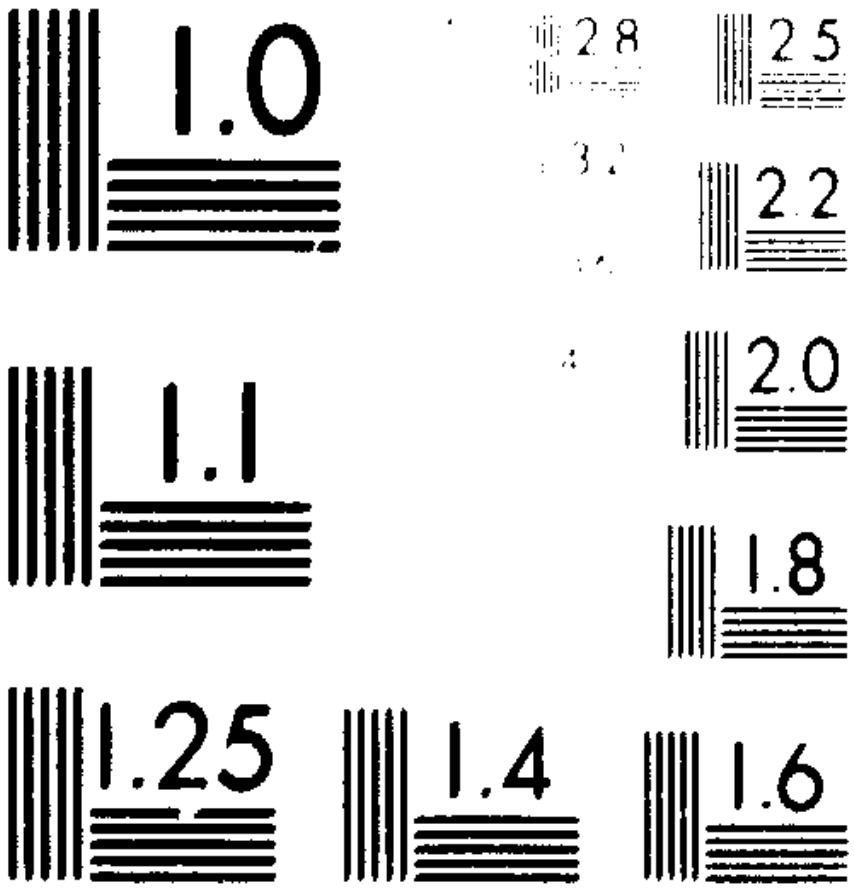
1. All canned foods that are intended to be shelf stable must be subjected to a heat process which will ensure destruction of Clostridium botulinum unless they are so formulated that the growth of Clostridium botulinum is prevented. All heat treatment given to such cans should be related to scheduled processes which are supported with adequate heat penetration data prepared by canning technologists. The details of the scheduled processes and the heat penetration data must be kept and be readily available for inspection for a minimum period of three years from the date of the last production to which they relate.

2. The Fo value (heat treatment used) of any scheduled process involving hot filling of cans does, to a large extent, depend on the maintenance of the temperature of the fill at the levels specified in the scheduled process. The fill temperature should be checked at regular intervals during production and the record should be kept and should be readily available.

3. If cans are not given a full botulinum cook or are not otherwise shelf stable at ambient temperature, conditions of storage must be clearly marked on each can and on any packaging that is used. The maximum temperature of storage should be given precisely.

4. All cans must be marked with a code enabling the identification, at least, of the place and date of production. The symbol used for this code should be embossed or otherwise indelibly marked on the metal of the can.

C-646



5. Empty cans must be stored and handled so as to prevent their becoming contaminated or damaged in a manner which may affect proper seam formation.

6. Before filling, cans must be cleaned mechanically in an inverted position by a suitable air jet or water jet.

7. Can seaming processes must be kept under constant supervision. The efficiency of can seaming should be checked before processing begins and at intervals during production, depending on the output and the can manufacturer's recommendations. During production, the cans for seam checking should be filled cans taken from the actual production line and the examination should be carried out on the cannery site. Seam checks should be carried out on the manufacturer's end and on the canner's end of the can. They should include the following measurements:

Seam width, seam depth, countersink depth, percentage overlap and free space.

The manufacturer's recommendations should be observed as to the points on the can where measurements should be made and as to the limits to be observed. Seams should be stripped and examined visually for other abnormalities such as wrinkling of the cover hook. Records of measurements must be kept and must be readily available for inspection for a minimum period of three years from the date of production.

8 All retorts must be fitted with direct reading (indicating) thermometers and with automatic time and temperature recording devices. These should all be checked for accuracy at least twice a year. Time and temperature records must be kept, and must be regularly available for inspection for a period of three years

from the date of production.

9. A satisfactory system, such as heat sensitive tape or a colour-change device, should be used with baskets of cans to indicate when they have undergone heat processing.

10. Water used for general purposes in the plant, including that used in the making up of products or likely to come into contact with the product should be of the following quality:
Coliforms must not be detectable in 100ml in 95% of samples nor in any consecutive samples. If coliforms are detected immediate investigations must be undertaken. The water should be sampled at different points in the distribution system within the plant at least once every month. Total aerobic colony counts should also be performed and under most circumstances these should not give values of more than 100 organisms per millilitre after incubation for five days at 20-22°C. However, too much importance should not be attached to an absolute value; it is essential that a normal value should be established for water in the plant and any changes in this should be investigated immediately. Samples for total aerobic colony counts should be taken at least once a week at different points in the plant.

If this standard cannot be maintained in any other way the water must be chlorinated or otherwise adequately treated.

The water should not contain toxic chemicals in quantities likely to cause harm to health.

It is essential that water used for can cooling should be free from harmful organisms. Even though the can seams are satisfactory, small quantities of water can enter the can during this cooling period. For this reason the can cooling water must be tested at monthly intervals and it should never be possible to detect coliforms in any samples of 100ml. It must be shown that the water supply is capable of maintaining this standard consistently, before the water is put into use for can cooling. The total aerobic colony count should be performed at at least weekly intervals. A colony count of less than 100 organisms per millilitre after incubation for 5 days at 20-22°C is satisfactory, but any change in the count should be investigated immediately. This count cannot be totally relied on to ensure the absence of harmful intestinal organisms so it is essential that coliform tests be performed at least once a month.

If it is not certain that the standard can be maintained, cooling water must be chlorinated. The chlorine should be in contact with the water for at least 20 minutes before the cooling water enters the retort. Sufficient chlorine should be added to give a residual free chlorine content of 0.5 ppm in samples of water taken at the exit from the retort. If the cooling water is re-circulated it is essential to screen or filter the water to remove organic debris for chlorination. Monthly coliform counts must be performed, even if the water is chlorinated.

11. After heat processing, until the cans are both cool and dry, organisms deposited on the outside may gain access to the interior of the can through the double seam, even though this is satisfactorily formed. Therefore after heat processing the can must not be touched by the bare hand

until it is cool and dry. Any mechanical handling equipment must be constructed so as to permit easy cleaning. Any can runways in the post processing area which are wet or likely to become wet should be disinfected regularly during production runs by mist spraying with appropriate disinfectants. Can seams should not come into contact with the runways. It is advisable that regular microbiological monitoring should be performed in the post processing areas on cans, runways and other can handling equipment.. It is important that cross contamination from raw food areas should be avoided; processed cans must be dealt with in an area that is structurally separated from areas where the raw food is stored or prepared and all precautions must be taken to protect processed cans from contact with any raw food, equipment, clothing or staff who have been in contect with raw food.

12. Cans may be cooled with water sprays outside the retort. The spraying areas must be protected from contamination and the water must be of the same standard as water used for cooling cans within the retort.

13 After heat processing, cans must not be washed with brushing machines with or without sawdust. They may, however, be washed with a water spray containing detergent. This water must be of the standard of can cooling water and the spraying area should be protected from contamination. If cans have to be wiped, this should not be done until they are both cool and dry; disposable paper tissues should be used, one for each can.

14. At all times, cans must be handled with care so that they are not damaged. Mechanical handling equipment must be contructed so as not to cause damage to cans.

15. After cooling processed cans must show no evidence of internal positive pressure.

16. A representative sample of heat processed cans with a minimum of one can from each retort load should be subjected to an appropriate incubation test. The time and temperature of the incubation will depend on the type of process that the can has received. After incubation, all unblown incubated cans must be opened and the contents subject to appropriate organoleptic and pH examination. Microbiological examination should, at the very least, be performed on the contents of all cans showing any organoleptic or pH changes, not just on the contents of blown cans.

17. Processed cans must not be stored in direct contact with the floor. Pallets, packing material and other material in direct contact with the cans should be clean, dry, of good quality and not liable to transmit contamination to the cans. It is preferable that cans should not come into direct contact with wooden pallets or shelves.

10. TYPICAL COST OF A SINGLE HIGH WELDED FOOD CAN LINE TO RUN AT 400 CANS PER MINUTE

	£
Slitter and accessories	85,000
Welding machine	130,000
Accessories	20,000
Side stripe and care machine	53,000
Spin flanger	39,000
Seamer 10-6 type	38,000
Tester	53,000
Palletiser	45,000
Run ways and controls	78,000
	541,000
Spares 10%	54,000
	595,000
Training (operating and care & maintenance), Q.C. & installation	149,000
	£ 744,000
	(say U.S.$1,736,000.00)

This estimate excludes end-making.
It is for one size of unbeaded un-necked can.

11. DEVELOPMENT OF EXPORTS OF MEXICAN CANNED FOOD

Mexico should be able to develope export markets for specialised canned tropical fruits: guavas, mangoes, etc. but this should only be attempted subject to:

1. A detailed survey of export markets to be served as to prices, competition, suitability of pack to local tastes, methods of marketing, etc.

2. An intention to develope specialised, dedicated supplies of the fruit to the right quantity and quality standards with canning facilities in the area of the orchards with high volume potential.

3. An export marketing organisation with distributive outlets in the export countries concerned.

To meet these requirements a joint venture with an international distributive net-work would be ideal, but there are indigenous canners who have built up export markets in some products, who work to the required standards and who could be asked to explore these possibilities.

For fish products the same principles obtain and would lead to the marketing of canned tuna directly from Mexico to the consuming countries. Tentative initial approaches have been started with the Camara.

12. LIST OF CONTACTS AND ORGANISATIONS

CAMARAS

Asociación Nacional de Fabricantes de Cerveza	Ing. Quim. Jaime Cortina B
ANAFAPYT (Paint and inks)	Lic. Luis Torres Torija
British Chamber of Commerce	Sr. Toby King
CANACERO (Iron and steel)	Sr. Enrique Ayala M.
CAADES (Agriculture, Sinaloa)	Ing. José López Portillo
Instituto de Aluminio, A.C.	Lic. José Lastra Jimenez

CAN - MANUFACTURERS

Botomex	Sr. Horst Spitzke
Carnation de México, S.A.	Ing. Carlos Corona
La Costeña	Sr. Cesar Fernández
Compañía Nestlé	Sr. Walter Bergs
Crown Cork de México	Ing. Alfredo Meaney
Envases Cilíndricos Nacionales	Sr. Carlos Vasconcelos
Envases de Ensenada	Ing. Oscar García
Envases de Sinaloa	Sr. Arturo Niembro
Envases Generales Continental	Sr. C. Webb
FAMOSA, Monterrey	Sr. Manuel Sama
	Ing. Luis Recéndez
Ensenada	Sr. Ernesto Garza
Toluca	Sr. Mariano Sánchez
Grupo Sabesa	Sr. William Buenfil
Grupo Visa	Lic. José Hinojosa
Grupo Zapata Envases	Sr. Jorge Suñol
	Lic. Francisco Benejam
Induvalle	Ing. Manaf Bin Mamat
Mexicana de Envases	Ing. Claudio Fernández
Nueva Modelo	Sr. David L. Wann
	Sr. Brice Mc Donald
	Sr. Javier Valderrabano
	Ing. Anselmo Ortiz
Zapata Hnos. Sucs.	Lic. Francisco Riveroll
	Sr. Alfredo Hernández

CANNERS

Alimentos del Fuerte	Ing. Alberto Arce

Alimentos Hers		Sr. Jaime Olvera
Campbell's de México		Sr. Antonio Castillo
Clemente Jacques		Ing. Wilebaldo Sánchez
Coca Cola		Sr. Carlos López
Empacadora Cevallos		Sr. Alberto Valencia
Formex Ybarra		Ing. Horacio Fernández
Herdez, S.A.		Sr. Héctor Galán
Industrias Pesqueras Paraestatales		Ing. Luis Basabe
Liconsa		Quim. Marta Iglesias
Organización Pando		Ing. Gustavo Vigueras
Paisa, S.A.		Sr. Joel Ley
Pepsi Cola		Ing. Leopoldo Bonilla
Productos de Leche		Sr. David Craft
Productos del Monte		Sr. Rocco Costanza
Productos Pesqueros Mexicanos, México		Lic. Guillermo Fernández
		Dr. Jaime Eskauriatza
		Lic. Filiberto Alonso
	Mazatlán	Ing. Jorge González
	La Reforma	Ing. Ronaldo Almeida
Refrescos Pascual		Ing. Raphael Chavez

SUPPLIES TO CAN-MANUFACTURERS

A.H.M.S.A.	Ing. Manuel Magallo
	Ing. Hugo Martín del Campo
	Sr. José del Campo
Alcán Aluminium	Sr. Ian Rugeroni
	Sr. Carlos León
Alcoa	Sr. Paul Benner
Glidden Coatings and Resins	Sr. Raymond Meyers
ICI de México	Sr. Trevor Lingwood
Productos Aurolín	Ing. Guillermo Rodríguez
Reynolds International	Sr. Leslie Inman