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MARKETING SUDANESE GUM ARABIC
IN THE U.S.A.
FACTS AND OPTIONS

Submitted under the
Agricultural Planning and Statistics Project

By:

Checchi and Company
1730 Rhode Island Avenue, N.W.
Washington, D.C. 20036-3193

To:

The U.S. Agency for International Development
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Prepared by:
Paul M. Flowerman

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MARKETING SUDANESE GUM ARABIC IN THE U.S.A.

EXECUTIVE SUMMARY

The U.S.A. gum arabic industry was surveyed by the study team during the June-September, 1985, period. Almost two-thirds of the forty-six users contacted returned questionnaires, and seven of the remaining survey group were among the users interviewed. The total respondents account for over 80 percent of U.S.A. gum arabic usage. Half the importers also greatly assisted the study, and some data from the others should be received by the end of 1985. Appropriate statistics were also reviewed and summarized in the report.

Users were divided into six applications segments which were often further subdivided for more detailed description. The halving of usage after the 1973-1974 crisis and the very slow growth of product consumption during the succeeding decade provide the historic background for the hopeful 1984 growth trend but also for the crisis of late 1984-1986. Gum Arabic Company ("GAC") selling policies, the distribution network, applications, and costing for the different gum arabic grades are presented.

A description is given of the gum arabic industry's competitors, competing products, and competitive activities. Details of the often sophisticated and aggressive efforts to replace gum arabic with more available and cost-effective products are presented as is a review of related events at a major convention attended by the study team. Survey responses strongly suggest that the 1984-1986 crisis stimulated widespread reevaluation of usage and usually permanent reformulation to substitutes of at least one third of the market. Although shortage not prices initiated the strong interest in substitutes, respondents advised the study team that pricing and, to a lesser degree, other factors, will influence the decisions now being made about whether to continue using gum arabic. Lack of accurate and timely information about the supply situation kept importers and users from rationing supplies and otherwise better preparing to minimize the harmful effects of the shortage.

By September, 1985, at least one-third the 1984 market had switched from gum arabic. The potential for further defections was great, especially if there was not prompt restoration of supplies and a renewed market confidence in the GAC. Speculative quantitative estimates of the market's responses to different "scenarios" and pricing situations is presented.

To achieve increased tonnage sold and more constructive GAC influence in the U.S.A., a range of marketing options are developed, and productive topics for further study are identified.

CHAPTER ONE: TERMS OF REFERENCE AND METHODOLOGY

OVERVIEW AND OBJECTIVES - 1 A

"Hashab" is the Sudanese word for the gummy exudate tapped from the stems and branches of acacia senegal and related species. Collection of the gum principally occurs in the Darfur and Kordofan regions with some additional tonnages from other areas. The gum is collected through two main tappings, the first beginning in October and the second getting under way in March of the following year. Collection takes place between November and the onset of rains around July with the greatest export tonnage available between February and June. The rest of the world knows hashab as "gum acacia" or "gum arabic". Some people consider the gum from certain other acacia species or areas of Africa to be gum arabic. However, "hashab" is what people in the U.S.A market are usually speaking of when they make reference to gum arabic.

The Gum Arabic Company Limited of the Sudan ("GAC") has had since its 1970 formation the exclusive rights to purchase and export harvested gum. In recent years, gum arabic exports have frequently been the Sudan's second largest earner of foreign exchange. Gum arabic also has major importance within the Sudan as a very important cash crop in the so-called "Gum Belt" stretching from Gedaref in the east to Geneina in the west. The gum-bearing tree may also form the productive nucleus around which subsistence and other cash-generating agriculture can take place.

The U.S. Agency for International Development (U.S.A.I.D.) maintains a mission in the Sudan to support a wide range of development projects. In 1983, U.S.A.I.D. engaged Checchi & Company, a Washington D.C. consulting company, to conduct an "Agricultural Planning and Statistics Project" in Sudan. This

project is covered by Contract Number Sudan 650-0047-00-2006-00 dated January 15, 1983. As part of this project, a study team was commissioned at the beginning of June, 1985, to evaluate the U.S.A. Gum Arabic market. The United States in recent years has been the final destination for one-quarter to one-third of all Sudan gum arabic exports. The specific tasks assigned to the Gum Arabic study are:

- "A. To develop an accurate assessment of the current market of gum arabic and to determine the effect of the current supply crisis on future demand.
- B. To formulate a series of strategic options which will enable The Gum Arabic Company (GAC) to realize its own strategic objective."

Appendix 1A presents the official outline of the subjects to be covered by the study team. Comments and recommendations were solicited from many individuals involved in or knowledgeable about the gum arabic business. Sudanese active in the gum arabic trade provided guidance on commercial matters and nomenclature of the gum arabic trade. Fulltime Checchi and company staff advised the study team on the mechanics of the research and production effort; The Project Coordinator also generously reviewed study team ideas, data, and even drafts of parts of the report.

An in-depth survey of participants at all levels of the gum arabic distribution and usage network was conducted between June and September, 1985. Purchasing and scientific personnel answered study team questionnaires and participated in the telephone and in-person interviews. The information thereby obtained was supplemented by statistical and other data obtained from published sources. Finally, a two day gathering of Sudanese and American experts reviewed the data and developed a set of options for consideration by the GAC and the

Government of the Sudan ("GOS").

Chapter One describes the study team's research effort. Chapter Two describes the U.S.A. gum arabic business and develops the conceptual framework within which the dynamics of the market will be considered. The third chapter describes the competitive environment within which the gum arabic business is conducted. Chapter Four chronicles the market's experiences and reactions during the 1984-1986 Sudanese gum arabic crisis. In Chapter Five, a quantitative assessment of the market's future under different price and other factor conditions is presented. Chapter Six presents marketing options and topics for further research and evaluation.

The study team designed a research program that responded to extraordinary conditions prevailing in the U.S.A. gum arabic market during the period of the team's investigations. A crisis of supply and credibility began during 1984, and important issues of longterm opportunities and problems for gum arabic suddenly became issues of urgency for most market participants. To properly explain the research program, it is necessary to first concisely describe the "mood" of the market.

1984 was the best year since 1972 for the importation of gum arabic from all sources into the United States. Memories of the shortages and temporary fourfold price increases during the 1973-1974 period had been largely superseded by a general complacency about gum arabic supplies. After five years of fluctuating import levels and no sustained increase in the volumes used by the total U.S.A. market, importations jumped almost two thousand metric tons("MT") in 1984 over 1983 levels. Some of this increase was inventory building, but the actual product usage increased to between 10 and 10.5 thousand metric tons. Years of stable prices and apparently abundant supplies had reestablished gum arabic as a reliable ingredient.

American gum arabic users and distributors were startled in October, 1984, by a suddenly apparent acute shortage of Sudan-origin product. The disclosure of the failure of the second 1983 - 1984 tapping panicked many market participants who began a scramble for supplies that accelerated price increases for spot goods. Perceived inequities in the distribution of what little gum was still available further disheartened many importers and users. Lack of

supplies and adequate information engendered a desperate atmosphere in which many users became determined to take steps to no longer be dependent upon gum arabic in their formulations.

1985 has been characterized by a desperate scramble for gum arabic of virtually any quality to meet pressing requirements. Active reformulation efforts are going on in all the industries where companies use gum arabic. It is anticipated that 1986 consumption will be markedly less than 1985 usage even under the most optimistic conditions. Actions taken by the GAC and its distribution network in the coming months will have a major influence on the longterm usage of the product.

The study team was fortunate to encounter a market obsessed with and eager to talk about gum arabic, but it could not become involved with specific efforts to procure scarce product. The study team often was able to get a cherished interview because of the topicality of the subject. It was sometimes necessary to share general information about Sudan and gum arabic as the "quid pro quo" for obtaining corporate data for report use. Lack of accurate information about the crop was a major criticism, and the study team identified itself as part of an ongoing U.S.A.I.D. effort to hasten thorough information exchanges and better understanding between the market and the GAC .

IDENTIFICATION OF USERS: Fifty-two users of gum arabic were identified by name and addresses. They account for about 95 per cent of total U.S.A. consumption. The remaining 5 per cent is accounted for by mostly very small (10 metric tons or less) users whose businesses are mostly in the beverage and lithographic solution industries.

QUESTIONNAIRES TO USERS: Questionnaires were mailed to forty-seven companies that process gum arabic with other products ("Users"). Thirty filled out and returned the questionnaire, a 64 per cent response. A copy of the user questionnaire and the covering letters from the study team and Checchi are provided in Appendix 1B. The questionnaires were usually preceded by a telephone introduction to the potential respondent.

The questionnaire had a multiple choice format providing answer ranges. This enabled respondents to indicate the approximate value of the often-confidential data requested. The format was designed to encourage participation while still eliciting responses with an accuracy meaningful for the study. Confidentiality of specific company data was clearly promised. This pledge was accepted by numerous parties whose detailed guidance greatly improved the accuracy of the report.

A preliminary version of the user questionnaire was administered in person by the study team to five end-users during late June/early July. Improvements in expression and layout were made, but the basic questions and answers remained the same - and the five questionnaire responses are part of the tabulations presented.

Five potential respondents told us company policy forbade answering questionnaires, but several agreed to be generally interviewed, usually by telephone. Such responses were not included in questionnaire tabulations, but the data provided did contribute to the industry profiles and study of the market's reactions to recent events.

INTERVIEWS OF USERS: Purchasing or scientific personnel involved in the gum arabic business of 17 companies representing more than 50 per cent of total U.S.A. usage were interviewed by the team. Ten interview visits each lasting at least one hour and seven telephone interviews of twenty to thirty+ minutes each were conducted. The data provided has been extensively blended into the industry profiles presented in this report.

Each interview covered 1/gum arabic usage, 2/response to the current crisis, 3/comparative merits of gum arabic and substitutes plus company intentions, and 4/user's suggestions for improvements in gum arabic marketing. An interview report was prepared which also included the interviewer's observations.

TOTAL SURVEY RESPONSE OF USERS: Thirty-seven users representing more than 80 per cent of gum arabic usage helped the research effort by returning questionnaires and/or being interviewed. It is hoped that this report will tangibly demonstrate the study team's gratitude by helping to improve the marketing of Sudanese gum arabic in the U.S.A.

QUESTIONNAIRES TO IMPORTERS: Ten questionnaires were submitted of which five were returned (several from the largest importers). In response to the request of the Importers' section of the Water Soluble Gum Association, the study team submitted a special questionnaire to them. A copy of this questionnaire and the covering letter are provided in Appendix 1B. The promised return of the questionnaire had not yet occurred when this report was written, but if returned, the responses will be included in an appendix. The identical extensive questionnaire was also submitted at the same time to an active non-WSGA importer who promptly returned it. As best it can tell, the study team

has sent questionnaires to all gum arabic importers as well as to several non-importing but reselling dealers.

Several importers were extensively interviewed. Several others, while not agreeable to formal interviews, did provide helpful guidance. Some of the participants in this category preferred that the study team not directly survey the user market, which they considered their proprietary domain. The study team reassured them of the constructive objectives and commitment to confidentiality of the research program.

QUESTIONNAIRES TO AGENTS: Questionnaires were sent to each of the six agents belonging to the Agents' Section of the Water Soluble Gum Association. Four questionnaires were returned, but two of the three agents actively involved in the gum arabic trade did not return the questionnaire. One interview was conducted, and nonconfidential information from one agent's files was made available to the study team.

STATISTICAL DATA: The record of gum arabic imports for the last seventeen years was obtained from the U.S. Department of Commerce Listing of Imports by Commodity (Schedule A). Statistical information on the industries using gum arabic was obtained principally from the Department of Commerce 1972, 1976, and 1980 Census of Manufacturers, as well as several interim statistical annuals.

ANALYSIS: The study team tried several frameworks for describing and analyzing the U.S.A. gum arabic market. By dividing it into segments each unified by a common application, useful statements about groups of companies could be most meaningfully made. When further precision was both necessary and possible, a

given segment was divided into subsegments . Precise values and also estimates are presented in pounds, because this is the common unit in which all estimates were received. Throughout this report, these number are combined and otherwise processed without being rounded off until final numerical conclusions are reached which are restated to the nearest 100 MT. The study team believes that some of its results have more accuracy and some of the very largest numbers perhaps a little less accuracy than to the nearest 100 MT.

The study team has in every case tried to use its best judgment in making estimates and projections. It tested and refined its preliminary estimates by asking the reaction of specific industry experts to those estimates. Nobody knows the exact numbers, but the estimates in this report are consistent with every piece of credible information shared with the study team.

The raw data and analysis upon which this report is based were reviewed at the September gathering of experts mentioned in Section 1A. The information combined with the expertise of the group provided the framework within which the marketing options were developed.

POSITION OF THE STUDY TEAM LEADER IN THE GUM ARABIC BUSINESS: 1 C

The study team leader is president of J.L. Thomas & Co., Inc. ("PLT"), a New Jersey-based U.S.A. agent representing foreign shippers for the importation of natural ingredients, including gum arabic and other hydrocolloids. PLT and a direct predecessor company have represented Sudanese gum arabic suppliers for nearly 35 years. PLT refrains from selling products that compete with GAC products. Since the 1970 inception of the GAC, much more than half of its U.S.A. sales have been transacted by PLT. Access to its commercial contacts very much aided the study team, but no client confidences or other proprietary data were shared without explicit permission.

PLT's future is linked to the fortunes of the GAC, whose U.S.A. activities are a very important part of PLT's total business. Active participation in this study have been consistent with PLT's goals of promoting and building the U.S.A. business of the GAC and its clients, the gum arabic importers (notably members of the WSGA). However, all research was conducted independently of corporate affiliation.

The study team leader has an M.B.A. (New York University School of Business) in international business and marketing, as well as undergraduate (Princeton University) and graduate (Harvard University) degrees involving research and report preparation.

CHAPTER TWO: PAST AND PRESENT FACTS ABOUT THE U.S.A. GUM ARABIC MARKET

EXPLANATORY NOTE: GUM ARABIC GRADES - 2EN

The National Formulary (NF) and also the Food Chemicals Codex (FCC), both of the U.S.A. define gum acacia as the dried gummy exudate from the stems and branches of acacia senegal, willdenow and other related species (NF XVI and FCC Third Edition). Other definitions are more restrictive, such as those in several European countries which use the optical rotation of the plane of a beam of polarized light to distinguish acceptable from unacceptable gum arabic (often called gum acacia). Appendix 2EN provides a copy of the Merck Index description of "Acacia" or "Gum Arabic" that provides facts about the physical and chemical properties of the product. More detailed information may be obtained from the M. Glicksman and R.E. Sand monograph "Gum Arabic" (Industrial Gums, Second Edition, Whistler, R. Editor, Academic Press, N.Y. and London, 1973, pp. 197-265).

For the purposes of this study, we define gum arabic as "hashab", leaving for botanists the question of what precisely may be called gum arabic. The Gum Arabic Company Ltd. of the Republic of the Sudan (to be abbreviated throughout this study as the "GAC") and the merchant exporters who preceded it have for many decades collected from well-defined regions, cleaned, and graded hashab. Hashab has always been over 95 percent of imported U.S.A. "gum arabic" (U.S. Department of Commerce Schedule A imports titled "Gum Arabic" - number 2922030). This study will examine other acacia gums to the extent that they are used as substitutes for hashab (which we shall refer to as "gum arabic").

Throughout this study, quantities of gum shall be expressed as metric tons which shall be abbreviated as "MT". Questionnaire and interview information was obtained in pounds, the common U.S.A. weight unit, but in this report we shall try to always make the conversion to MT for all summary quantity results.

NATURAL GUM: Sudanese gum arabic freshly collected from the trees is called "Wet" gum. The Wet gum is allowed to dry for about three weeks and is then delivered to the collection centers in the semidried form known as "Natural" gum. The GAC measures a harvest in terms of the approximate tonnage of "Natural" gum delivered to the collection centers.

CLEANED AMBER SORTS ("CAS"): at the collection centers, the "Natural" gum dries further and foreign organic matter is removed by hand at the facilities of the merchants who sell their output to the GAC. The principal resulting product is called "Cleaned Amber Sorts" . Other grades, such as "Handpicked Selected" ("HPS") and "Cleaned and Sifted" are also produced. The GAC monitors the quality of the delivered material at Port Sudan, recleans where necessary, and transports the finished product to Port Sudan for storage and export.

Note: One MT of Natural Gum yields an average of about 0.91 MT of gum arabic exports of all grades (predominantly CAS) . Therefore, we shall estimate a harvest of 10,000 MT of Natural gum to yield 9,100 MT of exports and 10,000 MT of gum arabic exports to be derived from 10,989 MT of the Natural gum harvest. There is some further very small weight loss after exportation, but one importer questioned advised that the landed U.S.A. weights received are almost always within "a percent or two" of the invoiced tonnage.

CAS EQUIVALENT UNIT ("CEU"): The CEU of a given quantity of any grade of gum arabic is equal to the number of kilos of CEU's necessary to be produced (or, in the case of natural gum, derived from) to produce one kilo of that grade of gum. The definitions of the various gum arabic qualities and their CAS equivalents will be very important in linking the consumption of various qualities in the U.S.A. to first imports and then the harvest. In this way, we

can properly compare the supply at the source to enduser demand.

GRANULAR:

Granular, also known as kibbles is obtained from Cleaned Amber Sorts or Hand Picked Selected grade by mechanically breaking up the CAS or HPS and sifting out smaller pieces by passing the material over a screen of desired size. The fines or siftings typically contain a high percentage of foreign matter, especially sand and some bark. One MT of CAS yields about 0.95 - 0.97 MT of granular. We shall estimate one kilo of CAS to yield 0.96 kilos of granular.

U.S.P. POWDER NO. 1:

This standard grade of gum arabic powder meets the U.S. Pharmacopeia standards for gum arabic use in foods. Actual powder supplied may be in different granulations and exceed the basic U.S.P. specifications to varying degrees. U.S.P. #1 powder is prepared from CAS. 1 MT of CAS yields about 0.92 to 0.95 MT of U.S.P. #1 powder. We will, therefore, estimate that 1 kilo of CAS or HPS yields 0.94 kilo of U.S.P. powder.

SPRAYDRIED GUM ARABIC:

This grade is obtained by putting CAS, HPS, or granular into solution, purifying the solution through filtration, and forcing the solution under high pressure through spray nozzles to create a spray of very fine droplets that form a uniform powder upon solidification. The details of spray drying gum arabic are proprietary. Both the yields and qualities of spray dried products depend upon the facility doing the processing. Eighteen to twenty-five percent loss is reported when CAS is converted into spray dried product. We believe that twenty

percent loss is a realistic average. We therefore estimate that 1 MT of CAS or HPS yields about 0.80 MT of spray dried gum arabic.

SIFTINGS:

In the process of granulation and also in powdering, a byproduct known as siftings is created. It may be supplied "as is" or "purified". The primary product production that yielded the siftings (as well as moisture loss) has almost always been conducted in the U.S.A. . Little if any siftings exports in recent years have been from Sudan. Therefore siftings probably should not be counted in the conversion back to CEU's AND NEU's since it probably is accounted for already in the losses of other grades. This, however, would understate the importance of several segments that use a lot of siftings. We therefore convert kilo for kilo, siftings into CEU's, possibly inflating total CEU's by no more than 5 percent.

NATURAL EQUIVALENT UNIT ("NEU"): To determine how many MT of harvested semidried gum brought to collection centers yield a given number of MT of a more processed grade of gum arabic, the term natural equivalent unit (NEU) is introduced. For example, 100 MT of spraydried gum arabic equals $100/0.8$ equals 125 CEU's equals $125/0.91$ equals 137.4 NEU's. Therefore, about 137.4 MT of natural gum (the unit in which The GAC expresses the harvest) yields about 100 MT of spraydried gum.

CHAPTER TWO: PAST AND PRESENT FACTS ABOUT THE U.S.A. GUM ARABIC MARKET

SUPPLY HISTORY - 2A

Tables 2A1, 2A2, and 2A3 represent gum arabic importations by pounds and dollars as listed in official U.S. government statistics. The Appendix to 2A presents the raw data from the U.S.A. gum arabic imports from 1967 through 1984 as presented in Schedule A from which Table 2A1 is derived. The data graphically presents some salient features of the history of gum arabic supplies to the U.S.A.. There was a steady increase in importations for 1968 to 1972. Importation levels may have varied over these years enough to disguise the degree of actual real growth in usage, but gum arabic consumption during 1972 had almost certainly reached a level of about 13,000 mt per year. Dramatic reductions in the importations from 1973 to 1976 represent the major decline in gum arabic usage following the supply crisis of 1973-1974.

In 1973, the continued severe drought created crop and infrastructure problems in the Sudan which severely limited gum collections. The dramatic increase in oil prices during this period created a foreign exchange crisis for the Sudan and the GOS responded with a program to auction off available gum supplies to the highest bidder. The consequences of the combination of shortage and dramatic price increase (from about \$900.00 per metric ton to about \$3,500.00 per metric ton F.O.B. Port Sudan) are reflected in the post-1974 period. Gum became available in 1974 at very high prices, but the U.S.A. market responded with substantial if historically low purchases (10,600+ MT). However, the following year, importations were only 2,750 MT. The surge of imports probably reflects the precautionary and excessive restocking in inventories by

TABLE 2A1: GUM ARABIC IMPORTS BY POUNDS AND DOLLARS

<u>Year</u>	<u>Total lbs</u>	<u>Lbs from Sudan</u>	<u>Percent of lbs from Sudan</u>	<u>Total in \$</u>	<u>Total \$ from Sudan</u>	<u>Percent of \$ from Sudan</u>
1968	25591889	24528117	95.8	5682484	5436773	95.7
1969	26748986	25883251	96.8	6677815	6460497	96.7
1970	27080374	26641798	98.4	7404331	7302754	98.6
1971	27795826	27379708	98.5	7841654	7731426	98.6
1972	31955726	30502373	95.4	9674526	9270028	95.8
1973	16780288	15991363	95.3	5205685	5008734	96.2
1974	23446356	22933896	97.8	20886014	20182291	96.7
1975	6058195	5829902	96.2	4034819	3748681	93.0
1976	14712951	14494642	98.5	8799763	8189369	98.7
1977	21974741	20880052	95.0	12171372	11899602	97.8
1978	16810953	15360534	97.3	10466560	10204733	97.5
1979	21785507	19922867	91.5	13473000	12389000	92.0
1980	21874096	19768157	90.4	14198650	12944426	91.2
1981	19058914	17659122	92.7	14409000	13585000	94.3
1982	14678958	11594154	79.0	11085000	8559000	77.2
1983	19063675	14757274	77.4	13955000	10644000	76.2
1984	25515371	17755402	69.5	17794636	12053866	67.7
1985*	4603670	2444037	53.0	3828748	1720443	44.9

*The 1985 figures represent from January 1985 through June 1985

REPORT IDENTIFICATION AND STATISTICAL PERIOD

TABBE 2A2

TSUSA COMMODITY NUMBER, DESCRIPTION AND UNIT OF QUANTITY

(DASH (-) SHOWN IN NET QUANTITY FIELD INDICATES THAT NET QUANTITY IS NOT REQUIRED, IN BOTH THE NET QUANTITY AND VALUE FIELDS INDICATES NO TRANSACTIONS FOR THE STATISTICAL PERIOD)

COUNTRY OF ORIGIN		CUSTOMS DISTRICT AND PORT		CURRENT MONTH		CUMULATIVE, JANUARY TO DATE		
TSUSA NUMBER	CODE	DESCRIPTION	CODE	DESCRIPTION	NET QUANTITY	CUSTOMS VALUE (DOLLARS)	NET QUANTITY	CUSTOMS VALUE (DOLLARS)
188.3600		GUMARABIC.....					LB	
188.3600	122	CANADA	07-08	ALEXANDRIA BAY, N.Y.	15200	17853	15200	17853
188.3600	122	CANADA			15200	17853	15200	17853
188.3600	201	MEXICO	20-06	MEMPHIS, TENN.	-	-	529	1758
188.3600	201	MEXICO			-	-	529	1758
188.3600	401	SWEDEN	10-01	NEW YORK, N.Y.	-	-	44092	29560
188.3600	401	SWEDEN			-	-	44092	29560
188.3600	412	U KING	10-01	NEW YORK, N.Y.	220926	158688	3792990	2671976
188.3600	412	U KING	10-12	J.F.K. INT. AIRPORT, N.Y.	-	-	70320	72453
188.3600	412	U KING	11-01	PHILADELPHIA, PA.	-	-	183397	133449
188.3600	412	U KING	39-01	CHICAGO, ILLINOIS	15741	10663	15741	10663
188.3600	412	U KING			236667	169351	4062448	2888541
188.3600	427	FRANCE	04-01	BOSTON, MASS.	-	-	541200	373601
188.3600	427	FRANCE	10-01	NEW YORK, N.Y.	-	-	394755	381123
188.3600	427	FRANCE	13-03	BALTIMORE, MD.	-	-	39600	34888
188.3600	427	FRANCE	17-03	SAVANNAH, GA.	-	-	39600	34056
188.3600	427	FRANCE	18-03	JACKSONVILLE, FLA.	40080	31201	238560	194969
188.3600	427	FRANCE	27-04	LOS ANGELES, CALIF.	-	-	63800	68882
188.3600	427	FRANCE	39-01	CHICAGO, ILLINOIS	39600	30492	736060	729104
188.3600	427	FRANCE	41-10	INDIANAPOLIS, IND.	-	-	35200	41888
188.3600	427	FRANCE	52-03	PT. EVERGLADES, FLORIDA	-	-	79200	61776
188.3600	427	FRANCE	53-01	HOUSTON, TEXAS	-	-	60060	38138
188.3600	427	FRANCE			79680	61693	2228035	1958385
188.3600	428	FR GERM	10-01	NEW YORK, N.Y.	6614	7923	112248	53689
188.3600	428	FR GERM	10-03	NEWARK, N.J.	-	-	223	497
188.3600	428	FR GERM	10-12	J.F.K. INT. AIRPORT, N.Y.	-	-	110	714
188.3600	428	FR GERM	39-01	CHICAGO, ILLINOIS	-	-	1050	288
188.3600	428	FR GERM	53-01	HOUSTON, TEXAS	-	-	61729	60518
188.3600	428	FR GERM			6614	7923	175360	115706
188.3600	533	INDIA	10-01	NEW YORK, N.Y.	-	-	793656	517968
188.3600	533	INDIA			-	-	793656	517968
188.3600	570	CHINA M	27-04	LOS ANGELES, CALIF.	-	-	290	600
188.3600	570	CHINA M			-	-	290	600
188.3600	583	CHINA T	27-04	LOS ANGELES, CALIF.	-	-	1551	3060
188.3600	583	CHINA T			-	-	1551	3060
188.3600	714	MOROC	07-12	CHAMPLAIN-ROUSES PT., N.Y.	-	-	5000	5541
188.3600	714	MOROC			-	-	5000	5541
188.3600	723	TUNISIA	10-01	NEW YORK, N.Y.	-	-	44092	32789
188.3600	723	TUNISIA			-	-	44092	32789
188.3600	732	SUDAN	05-02	PROVIDENCE, R.I.	-	-	398828	258984
188.3600	732	SUDAN	07-12	CHAMPLAIN-ROUSES PT., N.Y.	-	-	162023	182122
188.3600	732	SUDAN	10-01	NEW YORK, N.Y.	1146300	781099	15551330	10447293
188.3600	732	SUDAN	10-03	NEWARK, N.J.	-	-	407851	277195
188.3600	732	SUDAN	10-12	J.F.K. INT. AIRPORT, N.Y.	-	-	1014705	713774
188.3600	732	SUDAN	13-03	BALTIMORE, MD.	-	-	88184	61662
188.3600	732	SUDAN	30-04	BLAINE, WASH.	-	-	55115	36338
188.3600	732	SUDAN	53-01	HOUSTON, TEXAS	39683	37978	79366	76498
188.3600	732	SUDAN			1185983	819077	17755402	12053869
188.3600	753	NIGERIA	10-01	NEW YORK, N.Y.	-	-	374724	151626
188.3600	753	NIGERIA			-	-	374724	151626
188.3600	788	MALAGAS	07-12	CHAMPLAIN-ROUSES PT., N.Y.	14992	17383	14992	17383
188.3600	788	MALAGAS			14992	17383	14992	17383
TOTAL		188.3600			1570174	1093280	25515771	17706474

TABLE 2A2

1984 GUM

ARABIC

IMPORTS

SPECIAL FOREIGN TRADE STATISTICS REPORT
 U.S. GENERAL IMPORTS: TSUSA COMMODITY BY COUNTRY OF ORIGIN
 BY CUSTOMS DISTRICT AND PORT OF ENTRY

TABLE 2A3: JANUARY - JUNE, 1985, GUM ARABIC IMPORT STATISTICS

FT 8083 JUNE 1985

PAGE 1

SPECIAL FOREIGN TRADE STATISTICS REPORT
 U.S. GENERAL IMPORTS: TSUSA COMMODITY BY COUNTRY OF ORIGIN
 BY CUSTOMS DISTRICT AND PORT OF ENTRY
 (DASH (-) SHOWN IN NET QUANTITY FIELD INDICATES THAT NET QUANTITY IS NOT REQUIRED, IN BOTH THE NET
 QUANTITY AND VALUE FIELDS INDICATES NO TRANSACTIONS FOR THE STATISTICAL PERIOD)

REPORT IDENTIFICATION AND STATISTICAL PERIOD

TSUSA COMMODITY NUMBER, DESCRIPTION AND UNIT OF QUANTITY

COUNTRY OF ORIGIN		CUSTOMS DISTRICT AND PORT		CURRENT MONTH		CUMULATIVE, JANUARY TO DATE			
TSUSA NUMBER	CODE	DESCRIPTION	CODE	DESCRIPTION	NET QUANTITY	CUSTOMS VALUE (DOLLARS)	NET QUANTITY	CUSTOMS VALUE (DOLLARS)	
188.3600	GUMARABIC.....LB							
188.3600	122	CANADA	09-01	BUFFALO-NIAGARA FALLS, N.Y.	-	-	16000	31599	
188.3600	122	CANADA	38-01	DETROIT, MICHIGAN	5000	8981	5000	8981	
188.3600	122	CANADA			5000	8981	21000	40580	
188.3600	219	NICARAG	10-01	NEW YORK, N.Y.	-	-	11680	10137	
188.3600	219	NICARAG			-	-	11680	10137	
188.3600	403	NORWAY	10-01	NEW YORK, N.Y.	-	-	150050	53245	
188.3600	403	NORWAY			-	-	150050	53245	
188.3600	412	U KING	10-01	NEW YORK, N.Y.	158291	199049	220537	288441	
188.3600	412	U KING	39-01	CHICAGO, ILLINOIS	-	-	11023	7329	
188.3600	412	U KING			158291	199049	231560	295770	
188.3600	421	NETHLD	04-01	BOSTON, MASS.	44092	28776	44092	28776	
188.3600	421	NETHLD			44092	28776	44092	28776	
188.3600	427	FRANCE	04-01	BOSTON, MASS.	-	-	231000	275455	
188.3600	427	FRANCE	10-01	NEW YORK, N.Y.	-	-	439395	505096	
188.3600	427	FRANCE	10-12	J.F.K. INT. AIRPORT, N.Y.	68750	79265	54670	61353	
188.3600	427	FRANCE	14-01	NORFOLK, VA.	3410	7348	35200	49440	
188.3600	427	FRANCE	18-03	JACKSONVILLE, FLA.	-	-	79200	60092	
188.3600	427	FRANCE	20-02	NEW ORLEANS, LA.	-	-	7040	2957	
188.3600	427	FRANCE	27-04	LOS ANGELES, CALIF.	-	-	84150	61300	
188.3600	427	FRANCE	39-01	CHICAGO, ILLINOIS	44660	56744	155909	150629	
188.3600	427	FRANCE	41-10	INDIANAPOLIS, IND.	4400	9680	4400	9680	
188.3600	427	FRANCE	53-01	HOUSTON, TEXAS	39600	28409	79200	57713	
188.3600	427	FRANCE			160820	181446	1170164	1233715	
188.3600	428	FR GERM	10-01	NEW YORK, N.Y.	36376	21332	36376	21332	
188.3600	428	FR GERM			36376	21332	36376	21332	
188.3600	441	SWITZLD	10-01	NEW YORK, N.Y.	-	-	6971	11368	
188.3600	441	SWITZLD			-	-	6971	11368	
188.3600	521	YEMEN S	10-01	NEW YORK, N.Y.	11023	12350	14881	18003	
188.3600	521	YEMEN S			11023	12350	14881	18003	
188.3600	522	YEMEN A	10-01	NEW YORK, N.Y.	-	-	11023	11970	
188.3600	522	YEMEN A			-	-	11023	11970	
188.3600	533	INDIA	10-01	NEW YORK, N.Y.	-	-	40124	62408	
188.3600	533	INDIA			-	-	40124	62408	
188.3600	732	SUDAN	07-12	CHAMPLAIN-ROUSES PT., N.Y.	-	-	30000	28570	
188.3600	732	SUDAN	10-01	NEW YORK, N.Y.	575400	331801	2312625	1544257	
188.3600	732	SUDAN	39-01	CHICAGO, ILLINOIS	22046	69662	22046	69662	
188.3600	732	SUDAN	53-01	HOUSTON, TEXAS	-	-	79366	77954	
188.3600	732	SUDAN			597446	401463	2444037	1720443	
188.3600	753	NIGERIA	10-01	NEW YORK, N.Y.	224362	210971	421712	321001	
TOTAL 188.3600					1037410	1064368	4603670	3828748	

those parties who chose to remain in the gum arabic business. The dramatic fall-off reflects both a reduction of inventory levels once normal supply conditions became evident as well as the permanent drop-off resulting from the reformulation with gum substitutes by a significant part of the market. The 1972-1976 period will be most instructive as a possible model for 1984-1988.

The volume of importations during 1977 were not equaled until 1984. During this period of eight years, total gum arabic importations fluctuated between 6,600 and 11,600 MT, averaging out to a little less than 8,900 MT. Although the study team has not yet received The GAC's worldwide export statistics, it is reported that the U.S.A.'s share of GAC exports declined during the 1972-1984 period from more than one third to about one quarter.

1984 was a most hopeful improvement over the previous seven years. The 11,600 MT million pound level is explained partly by precautionary inventory building on the part of companies that anticipated supply problems. Lower interest rates also made inventory build-up much less costly than during the previous several years. However, the figures also represent gum arabic's increased usage in traditional application areas insofar as those areas shared in the significant U.S.A. 1984 economic expansion. User questionnaire data presented in Chapter Four will provide a detailed picture of where the principal U.S.A. growth areas for gum arabic usage existed in 1984-1985.

Until 1979, importations of gum arabic directly from the Sudan to the United States accounted for 95 percent or more of all U.S.A. gum arabic importations. Since there is no U.S.A. production, this 95 + percentage also represents 95 + percent usage of Sudanese gum arabic by the U.S.A. market. The

1979 to 1981 period shows a reduction to 90 to 93 percent of total importations reflecting a growth in importations into the United States from France. The 1982 to 1984 period shows a further reduction to the 70 to 80 percent range, reflecting a further increase in importations from France and the start of major importations from the United Kingdom of gum arabic. Most of the gum arabic imported from the United Kingdom is reportedly of Sudanese origin and a major part of the importations from France are also of Sudanese origin. Therefore, the percentage of Sudanese gum arabic coming to the United States has remained over 90 percent. For example in 1984, Sudan, France, and the United Kingdom together accounted for more than 94 percent of total U.S. gum arabic imports.

As shown by the import statistics of Table 2A3, during 1985, traditional importation patterns have been disrupted by the crisis. A little more than half of all gum arabic importations are direct from the Sudan, and almost 10 percent of importations for the first half of 1985 are of non-Sudanese African acacia gum (Nigeria is the principal source). The percentage of importations from the United Kingdom is down to only 5 percent from about 16 percent in 1984. The French contribution has increased to more than 25 percent of importations, a nearly three-fold increase from the less than 9 percent level of 1984. Sudan is still the largest exporter, but a very substantial percentage of the listed exportations are of gum talha rather than hashab.

The data presented in this section will be again referred to in Chapter Three where the competition Sudanese gum arabic encounters from other products is discussed.

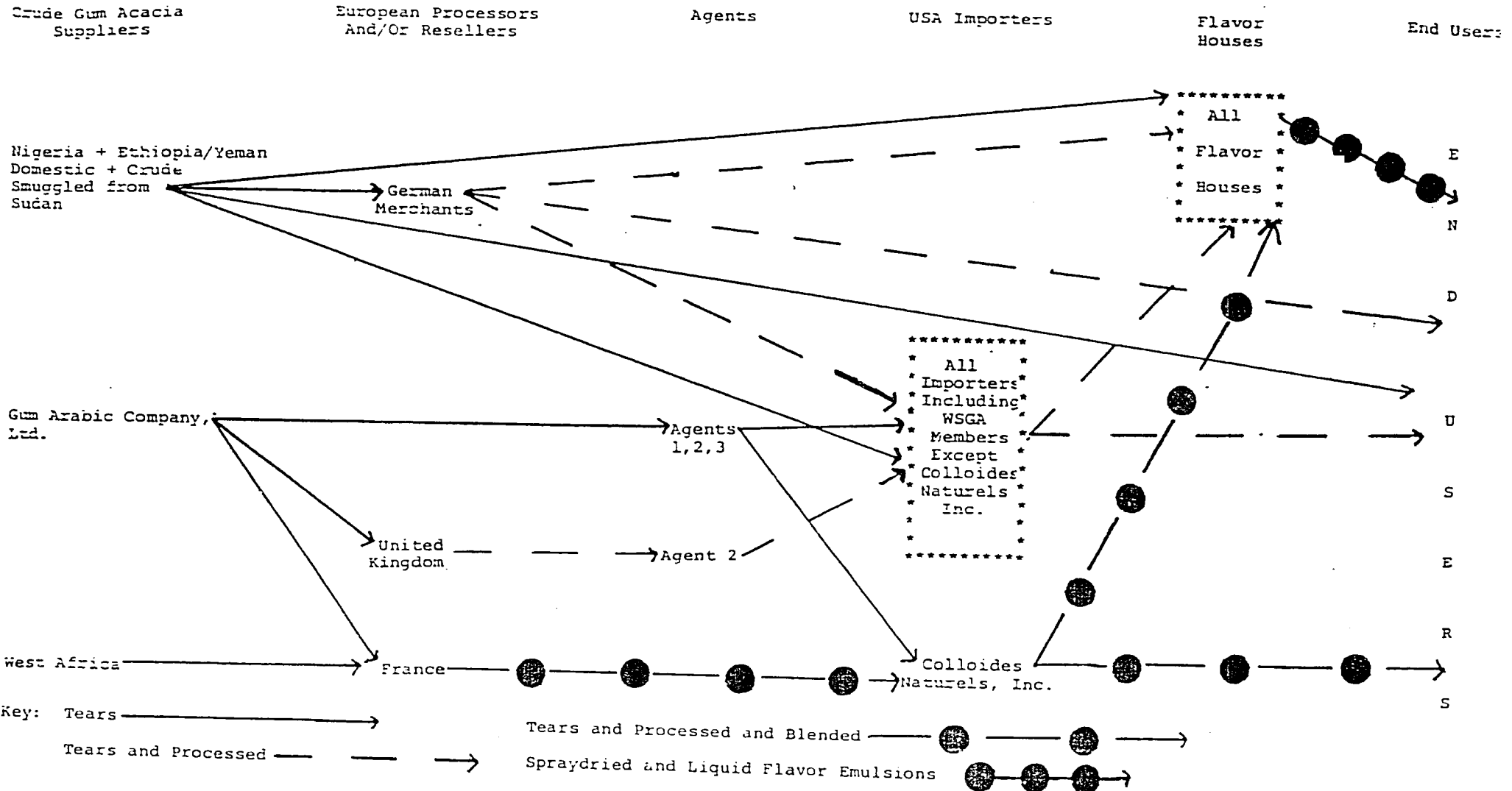
DISTRIBUTION NETWORK - 2B

Table 2B illustrates the 1984 movement of crude and processed gum arabic from origin to U.S.A. and users. In Section 2A, we used importation statistics to establish that historically all but less than five percent of gum arabic has been of Sudan origin. The report pointed out, however, that during 1985 other African gum notably from Nigeria and West Africa (via France) had become more significant contributors to gum arabic exports to the United States. The directed lines in Table 2 C point out the channels of distribution for gum arabic as it makes its way to the United States. As has been established, by far the most important channel is from the Sudan via agents to a group of U.S.A importers who in turn resell - or else process and then resell - the imported grades to users.

The GAC's agents obtain orders on the basis of FOB Port Sudan. The goods are usually shipped via ocean carriers designated by the buyers. Until two years ago, almost all goods were shipped "break bulk", that is, in non-containerized loads stowed in the holds of the ship. The Waterman Steamship Lines was the leading and, for a few years, the only regular carrier from Port Sudan. During the last two years, containerized service was introduced by several lines, notably a group of carriers put together by Ocean World Lines and also P & O Strath (now OCL Overseas Containership Line).

Almost all the cargo from the Sudan has been historically delivered to New York, but with the advent of containerization, deliveries are also being made by the steamship companies to several East Coast ports, notably Boston and Philadelphia. Shipment quantities are currently in units of 20 metric tons net consisting of 400 bags of 50 kilos net each. Product delivered to ports other

TABLE 2B: THE MOVEMENT OF CRUDE AND PROCESSED GUM ARABIC FOR ORIGIN TO U.S.A. END-USER (1984)



than New York are for flavor house, or users that purchase CAS or HPS. Grades obtained through further processing are derived from product imported into the New York area, where the in-house and contract processing facilities are located.

There are about eight U.S.A. companies that import gum arabic directly from the Sudan. Four belong to the Importers' Section of the Water Soluble Gum Association of America, and these four are four of the five leading importers of gum arabic into the United States.

Two of the importers perform their own granulation and powdering, and one of those two also has a spray drying capability that during 1985 has been dramatically increased with the completion of a new large spraydrier. The other six direct importers contract out their processing work to New Jersey processors who specialize in the water soluble gums. Gum arabic processing work is the major part of the businesses for each of these contract processing firms. The completed, standardized grades are usually packed in fiber drums and delivered either directly to industrial end users or to "flavor houses" who formulate and manufacture spraydried, powdered, or liquid flavors for their end user clients. The flavor houses have customized products manufactured according to their clients' specifications and also standard flavors.

Sudanese gum arabic also reaches the United States via the United Kingdom. The product is for the most part delivered in tear form, but some gum arabic spraydried in the UK is also being imported into the U.S.A.. One of the agents for the GAC also handles this sales channel.

Some Sudanese gum arabic is also imported into the United States via

France. This material is sold exclusively under the auspices of the U.S.A. affiliate of the leading French gum arabic importer. During 1985, most importations via this channel are reportedly of processed products that are only partly Sudanese gum arabic. The actual percentage of Sudan gum arabic or the precise makeup of the formulated application-specific, "second-generation acacia gums" is a guarded secret. The French manufacturer maintains that many of these products are 100 percent "acacia gums" of "African" origin.

Non Sudan-origin acacia gums are reaching the U.S.A. from West Africa via the French company and also directly from Nigeria. In 1985, the Nigerians have been offering some product to American importers at prices lower than the present inflated market levels. Product quality is guaranteed, that is, "no approval of goods, no sale". The Nigerian business is taking place mostly on a direct sales basis to U.S.A. importers. Some Nigerian product is stocked in the United States and delivered to the buyers, mostly traditional importers, who pay for the goods after receipt and quality approval.

Almost all crude acacia gums imported from origin or Europe are packed in jute or paper bags of 50 or 80 kilos net each. The bags must be new and so-certified by the exporter to avoid also certain quarantine by U.S. quarantine authorities and fumigation upon arrival.

The U.S.A. gum arabic market can be best understood as the sum of six market segments. For each segment, the special properties of the natural polymer enable it to perform an important function when included as an ingredient in the product formulation.

U.S.A. GUM ARABIC MARKET SEGMENTS

- A. Flavor Oil Carrier
- B. Candy Ingredient
- C. Vitamin/Food Supplement Ingredient
- D. Fountain and Other Solution Ingredient for Lithography
- E. Carbonless Paper Ingredient
- F. Ingredient in Miscellaneous Nonfood Industrial Applications

These market segments will be discussed throughout this study and will be referred to as "Segment A" (Flavor Oil Carrier) and so on. Some segments are divided into subsegments so that important distinctions concerning precise applications may be made. For example, the Segment B is subsegmented as follows:

- B. CANDY INGREDIENT
 - 1. Dietetic Hard and Gummy Candy
 - 2. Nondietetic Hard and Gummy Candy
 - 3. Candy-Coated Confections

These market subsegments will be referred to as "Subsegment B-1" (Dietetic Hard and Gummy Candy) or simply as "Segment B-1", and so on. The percentage of

gum arabic for a representative product in each subsegment as well as the history and outlook for future subsegment usage may differ from that data for other market subsegments.

Segment A users formulate flavors in liquid or spraydried form. Gum arabic serves as an emulsifying or encapsulating agent that protects the flavor oil from degradation through oxidation and assists in the ready dispersement of the flavor oil in a beverage or food mix. Gum arabic greatly improves emulsion stability and generally helps preserve the desired ingredient mixture characteristics. Gum arabic properly used is said to protect a flavor without "masking" its "character" with a "filmy" or "gummy" taste sensation. Gum arabic is a very small percent of the finished product formulation (certainly always under 5 percent and usually much less than 1 percent).

In Segment B, gum arabic is used as a major bulking ingredient or as a critical ingredient in a candy coating. Gum arabic influences the texture of the candy and can be formed into transparent and therefore visually attractive candy masses. It is generally believed but not undisputed that gum arabic is not metabolized by people, and therefore it may not contribute to the caloric content of the confection.

There is no legislated minimum on the percentage by weight of gum arabic that may be used in foods, and the caloric content of a confection may therefore be reduced by increasing the percentage of gum arabic until the texture changes created by that higher percentage reduce the candy's appeal. Several products use up to 30 percent gum arabic and would contain even more if viscosity buildup could be reduced. When used in small percentages in candy coatings, gum

arabic's film-forming and stability-inducing properties improve the coatings. Gum arabic also imparts a "jewel-like" shine to the confectionary coatings that has been found to be attractive to the consumer.

Segment C users incorporate gum arabic into their vitamin premixes and food supplements to improve the stability and other performance characteristics. For example, magnesium hydroxide can be co-spraydried with gum arabic to form a uniform powder for use in an acid-neutralizing formulation. Small percentages of gum arabic are used, and the technical details are similar to those described for Segment A. Gum arabic may also still be used to place certain insoluble ingredients into "colloidal suspension".

"Fountain solutions" to moisten or otherwise condition lithographic plates, "sensitizers" to prepare the plates, and "desensitizers" to protect the plates from unwanted exposure are all formulated by the members of Segment D using large percentages of gum arabic. The ingredient's film-forming properties, extraordinary solubility, stability, and compatibility with other compounds (such as dichromates) have made it a preferred ingredient in "neutral" and "acid-based" fountain solutions which are used for the higher resolution and better color quality printing jobs. "Alkaline" fountain solutions, which are phosphate-based, do not contain gum arabic in the gelatin wall that encapsulate tiny droplets of ink, keeping the ink from being absorbed by the paper fibers just outside the wall. Pressure from a writing or printing implement breaks the wall and liberates the ink, which becomes visible as it spreads to the paper fibers.

Gum arabic has a diverse number of smaller industrial uses which are grouped under Segment F. It is a carrier for an insecticide and also enable the

formulation to stick to vegetation to which it is applied. Some gum arabic is used in pet food - probably in a shiny glaze for seeds. It is a minor ingredient in some tobacco blends, probably as a flavor oil carrier. It is reportedly used in the mining or processing of phosphate ores, possibly aiding in the separation of desirable and undesirable fractions. Some small usage is also reported in the manufacture of "high technology" ceramics, where gum arabic's capabilities may be used to advantage.

The above segments encompass all the current uses the study team know of for gum arabic in the U.S.A.. To the best of our information, gum arabic is rarely used in cosmetics, adhesives, paints, or textiles, all industries in which the product was formerly extensively used. The scope of applications in the food, pharmaceutical, candy, and printing industries has been dramatically reduced during the last thirty years, especially since the supply crisis of 1973-1974.

USAGE HISTORY - 2 D

The importation statistics presented in Section 2A are an important starting point for evaluating U.S.A. consumption of gum arabic. Table 2D presents the study team's best estimates of 1972, 1980, and 1984 gum arabic usage expressed in terms of CEU's. In section 2F the 1984 market will be presented detail, showing how the CEU's for that year correspond to actual quantities used in each market segment. Most of the estimations obtained were in pounds; to avoid further approximation, the statistics are given in pounds also presenting key results rounded off to the nearest 100 MT.

1972, 1980 and 1984 are informative years to assess gum arabic usage. 1972 was the last year before the major price and supply crisis of 1973-1974. Gum arabic usage, which had been growing more or less steadily for the previous two decades, reached its highest levels in 1972 which therefore is an excellent base year for estimating what gum arabic usage could have become had supply growth not been truncated by the supply crisis of 1973-1974. Extensive U.S. Department of Commerce, Bureau of the Census data exists for 1972, which will be used as a base level to extrapolate to what gum arabic usage might have been had the supply crisis not intervened. 1972 usage data is very approximately estimated based upon the recollections of industry veterans.

1980 was chosen as a typical year for the 1977-1983 period during which gum arabic consumption did not demonstratively increase. It is also a year for which extensive census data is becoming available. 1984 consumption data is presented in the most detail and is based on questionnaire, interview, and trade information.

CONSUMPTION OF GUM ARABIC BY MARKET SEGMENT FOR 1972, 1980, AND 1984

T A B L E 2 D

(U.S.A. Consumption Not Including Product Imported, Possibly Processed, and Then Exported)	1972 ----	1980 ----	1984 ----
	Quantities in millions of pounds of CEU's (1000's MT in parentheses)		
A. FLAVOR OIL CARRIER	12.5 ---	8.5 ---	13.5 (6.1) ----
1. OWN-USE LIQUID BEVERAGE EMULSION)	5.0	5.5	6.5
2. OTHER OWN-USE LIQUID AND SPRAYDRIED) EMULSION FOR FOOD AND BEVERAGES)	7.5	3.0	1.8
3. CUSTOM EMULSION MANUFACTURE)			5.2
B. CANDY INGREDIENT	8.0 ---	2.0 ---	3.0 (1.35) ---
1. DIETETIC HARD AND GUMMY CANDY	0.0	0.2	0.4
2. NONDIETETIC HARD AND GUMMY CANDY	6.0	0.3	0.3
3. COATINGS/GLAZES	2.0	1.5	2.3
C. HEALTHCARE PRODUCT INGREDIENTS	1.5 ---	1.0 ---	1.0 (.45) ----
1. VITAMIN/FOOD SUPPLEMENT INGREDIENT)	0.5	0.75	1.0
2. OTHER PHARMACEUTICAL USES AND COSMETIC CREAMS AND POWDERS)	1.0	0.25	0
D. INK INGREDIENT	2.5 ---	3.0 ---	3.5 (1.6) ----
(OFFSET/FLEXO/LITHO ACID AND NEUTRAL FOUNTAIN AND SENSITIZING SOLUTIONS)			
E. INK ENCAPSULATOR FOR CARBONLESS PAPER	1.5 ---	2.0 ---	0.8 (0.4) ----
F. MISCELLANEOUS-INDUSTRIAL	2.5 ---	1.5 ---	1.2 (0.5) ----
1. INSECTICIDE	0		0.7
2. PETFOOD (BIRDSEED)			0.2
3. TOBACCO	2.5	1.5	0.2
4. MINING, HIGH-TECH CERAMIC/ OTHER			0.1

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TOTALS:	28.0 (12.7)	18.0 (8.2)	23.0 (10.5)
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The study team developed estimates of real industrial segment growth for the period 1972 - 1980 by using Census data for Cost of Materials and also Value of Product Shipments for those years (or sometimes 1981) and "deflating" the increases obtained by using the appropriate commodity price or industry-specific cost of living inflation index. The study team assumed that the potential increase in actual gum arabic usage from 1972 to 1980 would be roughly proportional to the real increase in tonnages of finished products produced by a given industry which in turn would be roughly equal to the real growth in the cost of materials and, as another measure, the value of product shipments.

The study team guesses that the eight or nine year trends, which could be determined from the Census data, more or less gave the total real growth for the 1972 - end-1983 period also. The 1981-1983 period encompasses the greatest recession in U.S.A. economic activity since World War II, and then the first part of a strong recovery. Given the lack of industry data, the study team guessed that consumption in various industries using gum arabic probably did not increase or decrease markedly in the aggregate. This is also suggested by the gum arabic import statistics for the period, which fluctuate and show no overall clear increase until 1981. Therefore, trends in gum arabic usage after 1972 up until 1984 are roughly compared to the available real growth rates in material usage for about the same period; the conclusion reached for most of the market segments is that the growth in gum arabic usage lagged behind the growth in the usage of products which could have used gum arabic. In other words, market share was lost. -----

The 1972 consumption estimates show that there were two leading Segments

for gum arabic usage: Flavor Oil Carrier and Candy Ingredient. Other sectors accounted for under 30 per cent total of 1972 usage.

During and after the 1973-1974 crisis, an organized competition between suppliers of gum arabic and suppliers of gum arabic substitutes ensued which has been since then continuously waged on the battlefield of price and product performance. Segment A-1 users' consumption increased slowly, not keeping up with the 40 - 50 percent real growth of overall product usage in the industry during that period (Standard Industrial Classification Number SIC 2086).

Losses in Segments A-2 , A-3, and B were dramatic and permanent. Substitutes took over the bulk of the applications, and consumption in these two segments declined from perhaps a little more than 7,000 MT in 1972 to perhaps between 2,000 and 2,500 MT in 1980. This decline is particularly sharp in the context of the significant real growth in product shipments for Flavoring Extracts (41-47 percent, SIC 2087) . The flavor houses especially turned to malto-dextrins and other encapsulating agents. Their renewed gum arabic usage by 1980 was quite small given the 1972 usage of over 2,000 - 3,000 MT (the balance being in Segment A-2, whose biggest users did not much reformulate). The flavor houses are dynamic centers of new product formulations, and gum arabic's poor recovery in this segment possible reflects the lack of strong promotion of new uses.

Non-dietetic hard and gummy candy makers, who used gum arabic in high percentages, nearly completely eliminated the use of this ingredient in favor of much less costly, readily available, and in performance only slightly inferior starches. The only part of the U.S.A. candy business that found

continued gum arabic usage necessary was in confectionary, fruit, and nut coatings. The largest participant reformulated to starches about 1978, but returned to gum arabic when the latter's superior contribution to quality was demonstrated. The Census data suggests that the confectionary (non-chocolate bar including cough drops) industry, SIC 2065, had real growth between 1972 and 1980 of somewhere between 58 and 79 percent. With the exception of dietetic candy's increased usage and also the recovery of the usage of one major coated confection maker, gum arabic's performance in this sector was very weak and overall far less than industry real growth. The waxy maize starches were quite adequate for former major users such as the Henry Heidi Candy Company.

The 1973-1974 crisis ended a number of marginal uses for the product, notably in the pharmaceutical, cosmetic, and miscellaneous industrial application areas. For these applications the shock of the supply crisis and the permanent significant price increases focused attention on gum arabic as an ingredient to be replaced. The gum's advantages were not significant as compared to the price savings available through the use of alternatives, and gum arabic usage in these categories was greatly diminished. By the more reliable measure, pharmaceutical preparations (SIC 2834) increased 94 percent between 1972 and 1981 and cosmetic preparations (SIC 2844) between 18 and 24 percent.

Substitutions were attempted for fountain solutions (Segment D), where gum arabic is a major raw material cost. The performance advantages of the natural gum kept the industry using it after several years of trial usage of substitutes. Moderate but steady growth in the lithographic ink industry (SIC 3293) seems to have been roughly matched by the increased usage of gum arabic. The high percentage by volume of gum arabic used in fountain and sensitizing

solutions pushed this industrial segment into second position by 1984 for total gum arabic consumption. Industry participants presented a picture of strong recent growth (10+ percent) for Segment D, suggesting that usage may have been increasing at a faster pace during the last several years.

SIC category 3955 (Carbon Paper, Stencil Paper, etc), increased about 50 percent from 1972 to 1981. Changes in volumes are closely linked to the discontinuance of gum arabic by the largest maker of carbonless papers in about 1982 when it changed its encapsulation system.

1984 USAGE - 2 E

Table 2E1 summarizes the number of questionnaire and interview responses that provided the principal data for the study team's estimate of 1984 gum arabic usage by industry segment and grade. Information obtained was checked against and supplemented by data from other industry sources.

Segment	#of Users Identified by Name	# Returning Questionnaire or Interviewed	Percentage of	Percentage by
			TONNAGE USED BY:	NUMBER OF:
			Respondents Interviewed Returning Questionnaires	
---	-----	-----	-----	-----
A1	10	5	76%	50%
A2	3	2	96%	67%
A3	15	10	89%	67%
B1	1	1	100%	67%
B2	3	2	85%	100%
B3	4	3	61%	75%
C	2	1	30%	50%
D	9	6	69%	67%
E	2	1	85%	50%
F	3	3	91%	100%
=====				
TOTAL:	52	37	80+ %	71%

TABLE 2E1: QUESTIONNAIRE AND INTERVIEW RESPONSE PERCENTAGES

Table 2E2 estimates 1984 gum arabic usage by industry segment and grade. Actual 1984 usage was about 9,300 MT of which about 47 percent was spraydried, 22 percent was CAS or HPS, 13 percent was powdered gum arabic, about 12 percent was granular, and about 5 percent was siftings. This usage is the equivalent of 10,500 MT CEU's or imported gum arabic which in turn is the equivalent of about 11,500 NEU's. The 10,500 MT CEU's compares to about 11,600 MT of 1984 importations, clearly suggesting a buildup inventories to either anticipate shortages in 1985 or to simply carry higher inventory levels.

Spraydried gum arabic accounts for half or more of the consumption in Segments A-1, B-2, C, E, and F-2. U.S.P. #1 Powder accounts for more than half of the usage in segment B-3. CAS accounts for more than half the usage in segments A-2, B-1, and D. Siftings account for more than half of the consumption in segment F-1.

While not indicated in this chart, which provides blended industry totals, the study team found generally that smaller users were willing to pay a bit more to have spraydried gum arabic while the larger users often had the grinding, sifting, filtration, and/or spraydrying equipment necessary for them to use a less-processed and, therefore, less expensive grade of gum arabic. The greatest gum arabic processing capabilities are in Segments A-2, A-3, B-1, D, and F-1. Some of the participants in each of these sectors have filtration equipment, and the Segment A-2 and A-3 parties with their own filtration equipment conduct the additional step of spray drying.

TABLE 2E2: 1984 GUM ARABIC USAGE BY INDUSTRY SEGMENT AND GRADE

NOTE: Raw data tabulations are here presented which are based on the estimates received. Accuracy to no more than the nearest 10 percent is presumed for most segments.

ABBREVIATIONS:

CAS = CLEANED AMBER SORTS GR = GRANULAR PDR = POWDER SPDR = SPRAYDRIED
 SFTG = SIFTINGS CEU'S = CAS EQUIVALENT UNITS NEU'S = NATURAL EQUIVALENT UNITS

INDUSTRY SEGMENT	USAGE	CAS	GR	PDR	SPDR	SFTG	CEU'S	NEU'S
SEGMENT A-1: OWN-USE LIQUID BEVERAGE EMULSION	5,435	0	313	0	5122	0	6,533 (3.0)	7,179 (3.3)
SEGMENT A-2: OTHER OWN-USE LIQUID AND SPRAYDRIED EMULSION FOR FOOD AND BEVERAGES	1,738	1500	0	25	213	0	1,793 (0.8)	1,970 (0.9)
SEGMENT A-3: CUSTOM EMULSION MANUFACTURE	4,591	775	1326	213	2277	0	5,225 (2.4)	5,712 (2.6)
SEGMENT A TOTALS:	11,764	2275	1639	238	7612	0	13,551 (6.2)	14,861 (6.8)
SEGMENT B-1: DIETETIC HARD AND GUMMY CANDY	375	300	0	0	75	0	394 (0.2)	433 (0.2)
SEGMENT B-2: NONDIETETIC HARD AND GUMMY CANDY	250	100	0	0	150	0	288 (0.1)	316 (0.1)
SEGMENT B-3: MAKERS OF COATED CANDIES, FRUITS, AND NUTS	2,128	0	94	1744	290	0	2,347 (1.1)	2,579 (1.2)
SEGMENT B TOTALS:	2,753	400	94	1744	515	0	3,029 (1.4)	3,329 (1.5)

(CONTINUED ON NEXT PAGE)

TABLE 232 CONTINUED: 1984 GUM ARABIC USAGE BY INDUSTRY AND GRADE

INDUSTRY SEGMENT	USAGE	CAS	GR	PDR	SPDR	SFTG	CEU'S	NEU'S
SEGMENT C: VITAMIN AND NUTRITIONAL SUPPLEMENT MAKERS								
	825		0 0	375	450	0	960	1,055
							(0.4)	(0.5)
SEGMENT D: INGREDIENT FOR LITHOGRAPHIC FOUNTAIN AND SENSITIZING SOLUTIONS								
	3,384	1877	596	455	221	235	3,490	3,835
							(1.6)	(1.7)
SEGMENT E: INK ENCAPSULATOR FOR CARBONLESS PAPER								
	660	0	0	0	660	0	825	907
							(0.4)	(0.4)
SEGMENT F-1: INSECTICIDE CARRIER								
	700	0	0	0	0	700	700	769
							(0.3)	(0.3)
SEGMENT F-2: PETFOOD (PROBABLY FOR BIRDSEED)								
	188	0	0	0	188	0	235	258
							(0.1)	(0.1)
SEGMENT F-3: TOBACCO FLAVOR CARRIER								
	188	0	188	0	0	0	196	215
							(0.1)	(0.1)
SEGMENT F-4: MISCELLANEOUS USES (PHOSPHATE MINING, HIGH-TECH CERAMICS)								
	100	0	0	0	0	100	100	110
							(0.1)	(0.1)
SEGMENT F TOTALS:	1,176	0	188	0	188	800	1,231	1,352
							(0.6)	(0.6)

ALL SEGMENTS:

1984 USAGE	CRUDE	GRAN.	POWDER	SPRYDR.	SFTG.	C.E.U.'S	N.E.U.'S
20,562	4,552	2,517	2,812	9,746	935	23,086	25,369
(9.3)	(2.1)	(1.1)	(1.3)	(4.4)	(0.4)	(10.5)	(11.5)
100%	22.1%	12.2%	13.7%	47.4%	4.0%		

All but one of the users with whom the study team communicated during this study have been using gum arabic for more than 10 years. This has been demonstrated in their response to question 1 of the questionnaire and also in the interview notes. With the exception of participants in Segments A-3, D, and G-4, the U.S.A users manufacture consumer products and are often among the leading and most well-known companies in their particular market segments. Many of the beverage, candy, and processed food companies are household names as are their brands. Most of the companies are publicly held and employ professional and experienced purchasing managers and technical staff.

In most cases, gum arabic is one of minor ingredients used in a given company's formulations. The purchasing manager will be typically buying hundreds or thousands of times as much sugar, cocoa powder, flour, medicinal, or chemical ingredients as he will gum arabic. Consistent quality, reliability of supply, and relative supply stability are the key factors for the buying organizations and the companies whose processing lines they feed. The purchasing manager's greatest concern is that he avoid supply disruptions that will cost his company money in factory downtime. A supply "shock" is more damaging to the manager's corporate and professional wellbeing than price increases or problems where temporary discomforts (such as paying more than budgeted) can be tolerated while longterm solutions are calmly considered.

Most of the companies in Segments A-2 and D are service companies who formulate flavors and fountain solutions used by processed food, and beverage or magazine or newspaper printing companies. These firms are typically, with

several notable exceptions, much smaller and more typically privately held than the companies in the other segments. The four largest flavor houses are publically held and multi-national in scope, but the other participants and most of the fountain solution makers are privately held. The individuals responsible for purchasing and even technical details often are among the top officers of the company or even owners. To the extent that gum arabic is a critical ingredient in their products, their futures and possibly also their capital are jeopardized by supply shortages. Price increases, which may be very hard to pass on to their customers, often "go directly to the bottom line"; that is, when raw material increases cannot be matched with finished product price increases, the company owners and buyers are usually acutely aware of the profits lost.

The manufacturers and marketers of consumer products using gum arabic substantial sums of money in establishing the appeal, safety, and consistency of their products. In some cases, such as for vitamins, food supplements, and insecticides, government approval of product performance and safety may be required. For most of the consumer products, careful attention must be paid to labelling procedures, and any relabelling required by a change in ingredients is a costly major step.

For the above reasons, manufacturers of successful consumer products are often reluctant to change a successful product's ingredients. Any reformulation is a major and difficult decision that will not be readily reversed. Companies forced to reformulate may become almost resentful of the suppliers and even of the offending ingredient that "forced" them to undertake the costly steps to reformulate and relabel.

The "flavor houses" of Segment A-3 provide flavors to their larger processed food and beverage clientele on a customized basis. They usually handle most of the labelling and safety requirements and are greatly inconvenienced if forced by a supply shortage to reformulate. As professional formulators, these companies are typically at the forefront of new technologies and ingredient innovations, and they are therefore best-prepared to quickly make ingredient changes should there be a supply crisis. This segment switched to gum arabic substitutes in a dramatic way during and after the 1973-1974 gum arabic supply/price crisis.

Makers of fountain, sensitizing, and desensitizing solutions for the lithography industry do not have the same problems with reformulations as the other gum arabic users. They are, of course, applications-oriented, and gum arabic has many properties that make it the product of choice. However, the industry participants can opt for substitutes without worrying about relabelling, repackaging, or government approval. Some small deterioration in quality may even be acceptable for certain applications if there is little alternative. Price is key in this highly competitive industry, and gum arabic represents a major ingredient cost.

The users in Segments E and F are large industrial companies producing finished goods used by consumers. The exceptions to this are the users in Segment F-4, who are large companies using gum arabic in industrial processes. None of the Segment F uses are for human ingestion, and the regulatory requirements as well as taste, texture, and appearance characteristics of their products are much less important than for most of the other segments. These users can readily reformulate in response to a supply crisis or price inducement

if a substitute can perform the function acceptably.

In this section, some general statements have been made about the nature and buying behavior of the companies that use gum arabic. In Chapter Four, the reactions of the gum arabic buyers to the 1984-1985 supply crisis shall be examined in detail.

Table 2G presents the price history for CAS from 1960 until 1984. The prices presented for the pre-1975 period give indicative rather than comprehensive sales prices during that period. The 1973-1974 crisis had a marked longterm influence on the price policy of the GAC. An initial price level of about USD 900 per MT soared to prices as high as \$4000 per MT as Sudanese gum was auctioned off to the highest bidders. The highest recorded sales price to the U.S.A. was \$3500 per MT. The supply shortages and the fourfold increase in prices were key factors in the reformulation decisions of more than half of the U.S.A. gum arabic market.

After inventory replenishment in the latter part of 1974, purchases dramatically declined in 1975. The response of the GAC was a policy designed to restore the confidence of their customers. Prices fixed for a full year were announced at the start of each crop year. A buffer stock of up to twenty thousand MT was accumulated in Port Sudan, thereby protecting the supply channels from a six month disruption in gum arrivals from the interior. A policy of only very gradually increased prices was established and adhered to during the succeeding ten years.

Between 1975 and 1985, the price of CAS in U.S. dollars increased from \$1200 to \$1600 per MT. The increase was much more substantial when calculated in Sudanese pounds because of that currency's decline against the dollar. During the last several years, the effective price increases to non-American buyers also has been substantial because their currencies have also weakened overall against the dollar, especially during 1984 and the first quarter of 1985.

TABLE 2G: PRICE HISTORY FOR CLEANED AMBER SORTS

YEAR	PRICE	All prices basis F.O.B. Port Sudan per metric ton
1960	£130	
1965	160	
1966	230	1960 - 1972 prices quoted in British pounds sterling
1969	250	
1970 (Jan)	260	
1970 (Aug)	277	all 1973 and subsequent sales made in U.S. dollars
1970 (Dec)	266	
1971	262	
1972 (July-Nov)	280	
1973 (Jan)	\$650	
1973 (Dec)	2400	
1974 (May)	4100	
1975-1979	1200	
1980 (Oct)-1981(Sept)	1410 (with volume discounts)	
1981 (Oct)-1984(Sept)	1500 (with volume discounts)	
1984 (Oct)	1600 (no discounts)	

The GAC has maintained a "passive" marketing policy. It concentrates on the essential tasks of providing reliable supplies of consistent quality at prices kept stable for yearlong intervals. However, it leaves the selling activities to users entirely in the hands of the traditional importers. The GAC's U.S.A. agents have the jobs of monitoring and transmitting communications on the crop and transactions as well as taking orders from importers. Promotion, product development, finding new customers, and other innovative or servicing functions seem to be left entirely in the hands of the GAC's U.S.A. buyers, who do not share much information about the user market with the GAC. The U.S.A. user market has apparently remained for the GAC a "black box" whose contents are not known. The GAC has received comments from one of its American representatives that its sales in the U.S.A. are less than they might be with more a more active marketing program.

During the 1975-1984 period, the policy of restoring confidence had positive results for the GAC. Revenues and profits reportedly increased significantly, and revenues denominated in dollars certainly gradually increased also. Demand worldwide increased sufficiently for the GAC to continue to honor its promise to purchase all available natural gum at the season price. However, as noted in Section 2D, important markets were permanently lost after 1974. The GAC's overall market share of potential gum arabic business in the U.S.A. declined during this period as the growth rate of industries making products containing gum arabic grew overall faster than did their gum arabic usage. Gum arabic production also reportedly declined in the 1980's as compared to average 1970's crops. Increased worldwide demand but smaller crops seem to have gradually depleted and then eliminated the buffer stocks which so effectively had insured reliable supplies.

In this section , gum arabic costing from point of exportation to delivery to the user is estimated. This information is developed from publicly available information as well as information volunteered industry participants. The delivered price for each grade to users has a large spread between the lowest and highest reported prices, reflecting variations in mark-ups and transportation costs. 1985 prices, which will be mentioned periodically in Chapter Four, are spot prices in a period of shortage and vary widely. Therefore, the prevailing 1984 prices are analyzed as more indicative of the usual arabic pricing structure

NOTE:the announced 1985 price structure never really went into effect because of the shortage, and therefore the 1984 F.O.B. Port Sudan price is used. Some of the calculations are made to the nearest tenth of a cent, but are then rounded off to the nearest cent when carried on to further costs.

 *F.O.B. Port Sudan price for Cleaned Amber Sorts (CAS): USD 1,460 per metric ton net (Price is inclusive of 2 percent agent's commission)

Fumigation Charges: USD 8/MT net

Ocean Freight Charges to New York and other East Coast U.S.A. ports (USD 2050-2950/MT -AVERAGE 2500): USD 125/MT net

Insurance, clearance and dock charges, and shipment to N.Y.Warehouse (About USD 7.00 + USD 10.00 + USD 15.00) USD 32/MT net

*Cost for CAS delivered to N.Y. warehouse: USD 1,625/MT net

(73.7 cents per lb. net)

Warehouse costs, inventory carrying cost, delivery charges to customer (note:some goods delivered straight from the docks to the customer - in this minimum cost case we estimate an additional one cent per lb. cost above the base level given above. Other goods may be warehoused for for long periods of time and then delivered cost country in fairly small volumes): (1.00 -10.00 cents per lb. net)

***Cost for CAS delivered to U.S.A. end-user:(75-84 cents per lb. net)

(No seller administrative or facility overhead or profit margin factored into the above cost)

Estimated cost for processing CAS into uniformly sized pieces with impurities sifted out (Gum Arabic "Kibbles" or "Granules"):

- Processing total cost often including transport to and from contract processor (used by some importers -about 2 cents per lb., rebagging -about 2 cents per lb., and crushing and sifting costs -unconfirmed estimate: about 3 cents per lb.): About 5 to 7 cents per lb. net

- Material lost from crushing, sizing, and sifting (unconfirmed estimate of 3-5 percent weight loss) $0.04 \times (74 \text{ cents FOB warehouse} + 8 \text{ cents processing})$: About 3.3 cents per lb. net

Note: it is believed sifting are retained by contract processor but when granulation done in-house by importer, this material lost cost may be largely recovered (perhaps only one cent per lb. lost) through the sale of these siftings.

Estimated total granulation cost: 6 - 10.3 cents per lb. net

*F.O.B. N.Y. warehouse cost of Granules: 80 - 84 cents per lb. net

***Delivered cost to users of Granules: 81- 94 cents per lb. net

(Note: no seller administrative or facility overhead or profit margins factored into the above costs. Freight estimated at 1.00 - 10.00 cents per lb.)

Cost of producing USP Number 1 Powder from CAS:

- Processing Cost: Crushing, Sifting, Grinding, Rebagging, Transport to and possibly from contract processor. It is estimated (unconfirmed estimate) to be a cost of one cent per pound more than the cost for the kibbling. About 6 - 8 cents per lb. net

- Material Loss: Estimated at between 5 and 7 percent $.06 \times (74 \text{ cents base cost} + \text{about } 7 \text{ cents processing})$ About 5 cents per lb. net

(Note: It is believed that contract processors keep the siftings but that importers who do their own processing can recover some of their costs -perhaps all but two cents per lb- by reselling the siftings)

Estimated Total Powdering Cost: About 8 - 13.00 cents per lb. net

* F.O.B. warehouse cost for USP Powder No. 1 :
 About 82 - 87 cents per lb.

***Delivered cost to Users of USP Powder No. 1:
 About USD 0.83 to 0.97 per lb. net

(Note: no seller administrative or facility overhead or profit margins factored into the above costs. Freight estimated at 1.00 - 10.00 cents per lb.)

Cost of Producing Spraydried Powder First Quality from CAS

- Processing Costs: Done mostly by contract processors but increasing percentage of one major importer now done in-house with recent assembly of a large spraydrier. Estimated cost of putting into solution, filtering, and spraydrying (unconfirmed estimate): About 13 - 15 cents per lb. net

- Material loss: About 20 pct. We do not believe this material is readily recoverable because of being wetted in the processing.
0.20 x (74 cents + 14 cents -almost all is contract processed)=
 About 17.6 cents per lb. net

Total Spraydrying Cost: About 30.6 - 32.6 cents per lb. net

* F.O.B. N.Y. Warehouse cost for Spraydried Gum Arabic First Quality:
 About USD 1.04 - 1.06 per lb. net

*** Delivered to User cost for Spraydried Gum Arabic First Quality:
 About USD 1.05 - 1.16 per lb. net

(Note: no seller administrative or facility overhead or profit margins factored into the above costs. Freight estimated at 1 - 10 cents per lb.)

* F.O.B. N.Y. Warehouse cost for Gum Arabic Siftings: 0 cents per lb.

The overhead for this byproduct is assumed to be assigned to the primary product with which it is produced.

***Delivered to User Cost of Gum Arabic Siftings: 1 to 10 cents per lb.

IMPORTER SELLING PRICES:

Importer Mark-ups on the F.O.B. N.Y. warehouse costs are estimated during the period of normal supplies (first three quarters of 1984) as well as against honored contracts during the shortage period to be as follows (rough estimates only based upon limited data from end-users and trade estimates. MARKUPS ARE CALCULATED ON THE DIRECT COST ONLY WITHOUT ANY ADJUSTMENT FOR GENERAL AND ADMINISTRATIVE COSTS.

CAS : 4 - 10 percent

GRANULES : 7 - 20 percent

USP POWDER NO. 1 : 7 - 20 percent

SPRAYDRIED FIRST QUALITY POWDER: 20 - 30 percent .

The resulting Delivered Prices to customers are:

CAS : Minimum 1.04 X 73.7 cents + 1 cent = 77 cents per lb. net
Maximum 1.10 X 73.7 cents + 10 cents = 91 cents per lb. net

GRANULES: Minimum 1.07 X 80 cents + 1 cent = 87 cents per lb. net
Maximum: 1.15 X 84 cents + 10 cents = USD 1.07 per lb. net

USP POWDER NO. 1 :
Minimum 1.10 X 82 cents + 1 cent = 93 cents per lb. net
Maximum: 1.20 X 87 cents + 10 cents = USD 1.14 per lb. net

SPRAYDRIED FIRST QUALITY:
Minimum 1.20 X USD 1.04 + 1 cent = USD 1.26 per lb. net
Maximum 1.30 X USD 1.06 + 10 cents = USD 1.48 Per lb. net

NOTE: Only the very largest buyers located close to N.Y. will be able to obtain the minimum prices. We believe that the margins for spraydried gum arabic may be reduced in the future because of new stronger competition from one of the new in-house spraydrying capacity.

CHAPTER THREE: THE COMPETITIVE ENVIRONMENT IN THE UNITED STATES

THE COMPETITIVE ENVIRONMENT SAMPLED: THE JUNE ,1985, "IFT" - 3A

The annual convention of the Institute of Food Technologists (IFT) is the largest gathering of vendors and customers for the processed food and beverage industries. It therefore attracts all the major participants in U.S.A. gum arabic market Segments A and B and probably some of Segment C accounting for more than three-quarters of gum arabic usage. The IFT therefore provided an excellent opportunity to experience in concentrated form the prevailing competition between sellers of Sudanese gum arabic and sellers of substitutes.

The June 9-12, 1985, convention in Atlanta brought together as usual the principal companies that compete with each other to supply additives that influence the physical characteristics of processed foods and beverages. Within this group of competitors were all the principal sellers of Sudanese gum arabic and the gum arabic substitutes.

Gelanese Corporation, Colloides Naturels, Colony Import and Export Corporation, Meer Corporation, and TIC Gums, Inc. all had booths at the exhibition at which gum arabic was among the products promoted. Promotional literature on gum arabic was made available, mostly as a part of packages of general information distributed. Gum arabic was given prominence only at the Colloides Naturels booth, where a flier captioned "GUM ARABIC AVAILABLE" (see Illustration 3A1) seemed to attract considerable interest from attendees usually aware of the acute Sudanese gum arabic shortage and apparently interested in discussing the subject at the booths. The Colloides Naturels appeal was

Gum Arabic Available

Not
Affected
by
Present
Shortages

Second Generation Gum Arabic Products from our Long-Term Agro-Industrial Development:

EmulGum— For Emulsions & Spray Dry
Applications

CoatingGum—For Film Forming and
Coating Applications

SprayGum C—For Pharmaceutical and Other
Applications where Total
Solids is a consideration.

Other Specialty Gums also available—
ThixoGum, StarCacia, StarGel and others.

Call, write or telex:



**COLLOIDES
NATURELS INC**

Route 202 & Dumont Road Box 561
Far Hills, NJ 07931 Phone: (201) 234-9494 Telex: 833-725

apparently principally on behalf of their line of so-called "Second Generation Acacia Gums" not entirely composed of Sudanese gum arabic. The literature from all the above parties as well as photographs of most of the booths are on file with U.S.A.I.D. as part of the database for this study.

The leading vendors of modified food starches and related products were among the most visible of the exhibitors at the IFT. National Starch & Chemicals Inc., A.E. Staley, CPC International, Grain Processing Corporation, American Maize Products, Avebe, Toyomenka USA (distributing Emsland starches), and several parties who might become competitors with Sudanese gum arabic vendors within several years as their product lines and applications broaden (Rochet, FMC Corp., GenEncor, and Enzyme Development Corporation). The above suppliers booths were generally larger, often in probably higher traffic areas, and more elaborate than those of the gum distributors.

Nearly all the companies listed in the preceding paragraph offered products specifically identified as gum arabic substitutes. Illustration 3A2 is a flier sent to all IFT attendees by National Starch and Chemical Corporation, the most influential and biggest of the starch companies. The flier specifically targets gum arabic replacement as one of its important capabilities. All the applicable literature obtained as well as photographs of the booths are included in the U.S.A.I.D. database assembled by this study. In conversations with the study team many of the individuals manning the well-attended booths were forthright in identifying which of their numerous grades would be suitable substitutes for gum arabic in particular applications and promised additional literature and samples. The individuals in several cases acknowledged that they were being approached by numerous other parties about assistance in obtaining gum arabic

Finderne Avenue
P.O. Box 6500
Bridgewater, New Jersey 08807
201-685-5000
Cable Address: NASPROD, BRIDGEWATERNEWJERSEY
TWX 710-480-9240

Writer's Direct Dial Number:

May 28, 1985

CHEESE CURLS made by Pace Foods, Inc., Chicago with one of our new high quality cheddar cheese flavor powders. These flavors are great in sauces, canned foods as well as on snacks.

MINIATURE DANISH PASTRIES and PRINCESS TARTS featuring Baka Snak to aid in extending shelf life and prevention of staling in baked goods along with high quality fillings made from dry mixes. Great additive for making a soft, moist cookie or cake.

~~We will also have the latest information on GUM ARABIC REPLACERS at the booth. National is the world's leader in developing functional, economical and available replacers for gum arabic, shortening and other food ingredients. Stop in and let us help YOU.~~

In addition to our staff members from Bridgewater, we will have representatives from our various WORLDWIDE operations such as Mexico, United Kingdom, Europe and the Far East. Also this year we will have representatives from our Microlife Technics, Inc. subsidiary in Sarasota, Florida. They will have information on their various fermentation cultures available for use in meats, cheese, yogurts and other food systems.

It appears that it is going to be a GREAT TIME in Atiantal

Sincerely,



Glenn R. Ekman
National Sales Manager

GRE/mgs

Illustration 3A2

equivalents. The exhibitors were, however, not featuring gum arabic substitution in their actual displays.

The study team observed that the modified starch vendors, as well as sellers of substitutes containing acacia gums, considered the IFT an excellent forum to exploit the Sudanese gum arabic shortage and win new customers. It is not known what specific successes were achieved, but Sudanese gum arabic sellers appeared, perhaps understandably, entirely on the defensive. No literature touting gum arabic's technical superiority over starches or other acacia gums was encountered. No presentations of new - or even of old - products containing gum arabic were observed. No literature on the above subjects was encountered at any time by the study team. Such printed data may exist or strong technical/sales efforts to promote new gum arabic applications may occur, but they were not in evidence at the I.F.T. convention.

Illustration 3A3 is an article written for Food Engineering, a leading food and beverage industry journal, about timely subjects related to gums presented at the IFT. More than half of the pagelong article is devoted to Sudanese gum arabic substitutes, which clearly commanded even the attention of an observer not conducting a study of the gum arabic business.

GUMS

"People have to turn to substitutes and different grades of arabic. No one knows exactly how long the shortage will last."

Some people say the gum arabic shortage was caused by near civil war conditions in the Sudan. Others say it was the drought suffered throughout Africa. No matter how it started, gum arabic is in tight supply, and attendees at IFT '85 in Atlanta were seeking alternatives both for the short and long term.

Colloides Naturels Inc., Far Hills, N.J., drew people inside its booth with a large sign reading, "Gum Arabic Available: not affected by present shortages." William Balke explained how that was possible.

"We began a long-term identification program years ago to categorize different species by functionality. Fortunately, we have 60 species profiled to date, and are always adding more. Food processors come to us with a particular arabic attribute in mind, and we find the proper species and grade to do the job."

For example, EmulGum is a second generation gum arabic recommended for emulsifying and spray drying. CoatingGum is better suited for film forming and coating. And SprayGum C is specified where the percent total solids are an important consideration.

These gums are not overwhelmingly expensive as one might expect during a shortage. EmulGum sells for between \$4.20 and \$4.40 a pound, and replaces up to six pounds of gum arabic, according to the company. "On a cost/performance basis, our gums are less expensive than arabic right now," says Balke.

Another company with a close substitute for arabic was Gum Technology Corp. President Allen Freed described its Arabic #2 as, "Functionally the same as arabic but slightly darker. The litmus test is orange—our arabic #2 can be substituted for regular arabic in any product darker than orange without any noticeable difference."

Confectionery processors are feeling the pinch more than most. Toyomenka Inc., New York, N.Y., offered relief in the form of a modified potato starch, Emgum 100. Sold with "great success" in Europe, Emgum can be used as a substitute or in combination with gum arabic. It can also be used in combination with gelatin.

Emgum will produce clear gum sweets, has good stability, and helps prevent hardening and deformation of confectionery products over time. Physically, Emgum is a white powder with maximum moisture content of 21%,

INGREDIENTS/IFT

0.13% D.S. protein, almost no fat, and pH between 4.8 and 6.0. To illustrate usage levels, the company provides this typical candy formulation for a clear fruit confection: Emgum 100 (32%); sugar (27%); 42 DE glucose syrup or equivalent (18%); water (22%); and citric acid/sodium citrate/flower/color (1%).

COMPETING SOURCES AND DISTRIBUTION NETWORKS FOR SUBSTITUTES - 3B

The competition for Sudanese gum arabic may be divided into three groups:

OTHER ACACIA GUMS

NON-ACACIA SUBSTITUTES, BOTH NATURAL AND SYNTHETIC

PROCESSING CHANGES THAT ELIMINATE GUM ARABIC

OTHER ACACIA GUMS:

The former French African colonies have for many years been supplying gum acacia, principally to Europe. The U.S.A. market has relatively little experience buying this product, and in recent years, drought and other local socioeconomic and political conditions have contributed to a reportedly dramatic reduction in acacia gum supplies coming from this region. The only presumed on-going supply of gum from this source reaching the United States is coming from the leading French gum acacia merchant who reported mixes this gum in unknown percentages with hashab, which is then processed to yield the so-called "second generation acacia gums", to be discussed in the next section.

Particularly during times of shortage, offers of gum from French-speaking African countries are received only sporadically by U.S.A. buyers. Gum combretum and gum friable from Mali as well as occasional offerings from Chad, Mauritania, and Senegal have been reported. Several German merchants have also tried to sell this gum in the U.S.A. The gums made available to this market have had more insolubles, color, and viscosity development in solution than hashab. During 1984/1985, there are reports of several hundred tons being made available to this market with several importations of 20 tons or less from Tunisia and Morocco. During all of 1984 and the first six months of 1985, these importations have accounted for under 50 MT. Therefore, with the important

exception of supplies from France, these sources are not significant. Similarly, several small importations from South Yemen and Malagasy have been noted but do not seem to be of importance. Several offers of gum arabic from Ethiopia, most probably of product somehow obtained from Sudan sources, have reportedly been made to this market, but no sales or importations have been noted.

Nigeria acacia gum is the one direct competitive African supply source of any importance. During the first six months of 1985, a little more than 9 per cent of the 4.6 million pounds of imported gum acacia came from Nigeria. The product is well-known in the United States, having been widely offered to this market during the 1973-1974 crisis. Although generally considered inferior in quality to Sudanese gum arabic, very constructive steps have been taken to more effectively market the product, in the United States. Customers are now given the opportunity to test the material from local stocks before taking delivery and making payment. This has reportedly increased the credibility of the Nigerian vendors and their products. However, only 362 tons of Nigerian gum arabic have been imported into the United States during the 1984 and first six months of 1985, and therefore this product cannot be considered as yet important competition. The potential available Nigerian crop should be carefully determined, because this product has reportedly been successfully used in the U.S.A. market. Although it has been priced during this crisis year at about \$2,000 per MT, it may impose some price competition on Sudanese product pricing in the future, particularly for technical applications. Certainly, more evaluation work on Nigerian gum arabic has been done in 1985 by gum arabic buyers than during the ten previous years combined.

Gum talha from the Sudan has emerged as the most important non-hashab acacia gum during 1985. It is estimated that between two and three thousand MT of gum talha were imported into the United States during the first eight months of 1985, more than a tenfold increase over importations to this country in previous years. Gum talha is a wellknown, much darker and dirtier product than CAS. However, major progress has been made in the U.S.A. and elsewhere in "cleaning-up" this product, thereby rendering it useful in several traditional gum arabic applications. There is some uncertainty of ongoing gum talha supplies. Gum talha, along with usage that of the other principal gum arabic substitutes, will be examined in more detail in the rest of this chapter.

In section 2A the significant increase from 1979 onward of third country shipments to the U.S.A. of Sudanese gum arabic was pointed out. The French importer of gum arabic and (after 1981) the United Kingdom importer have been supplying the U.S.A. with increasing volumes of product. "Third country" supply channels further separate the GAC from its market, and, at least in the case of the French supplier, challenge the traditional channels of product distribution. Gum arabic loses its Sudanese identity when it is processed and possibly blended with other acacia gums in France or the U.K., and then reexported to the U.S.A.

Some of the French supplier's "second generation acacia gums" mix hashab only with gum from other acacia species. Improved performance is reportedly obtained through using gum only from selected species or using innovative processing techniques. Other grades are the results of cold spraydrying or otherwise mixing gum acacia with corn syrups solids, starches, or solubilized vegetable proteins.

Several of the leading U.S.A. gum arabic importers are presently advertising a range of application-specific blends of gum arabic and starches. These products are advertised as offering equivalent functionality to gum arabic for specific applications. Promotional literature on these items first became widely available when Sudanese gum arabic supplies became scarce at the end of 1984.

NONACACIA SUBSTITUTES FOR GUM ARABIC:

Modified starches, dextrans, and malto-dextrans are major competition for gum arabic in all usage areas. The basic starches come from vegetable food stuffs that are in plentiful supply, notably domestic corn and sorghum as well as imported potato and tapioca starches. The amylopectin fraction ("waxy starch") of corn starch may be "pre-gelatinized" to make it cold water soluble. The pre-gelatinizing process involves putting the starch into hot water solution and then specially drying it to preserve cold water solubility.

Waxy varieties of maize and sorghum which have particularly high amylopectin content are regularly cultivated. The crop supply is more than adequate to produce the many thousands of MT of modified amylopectin starches sold annually. There are no commercial impediments to expanding the area under cultivation with the exception of segregating from unwaxy varieties to prevent "cross pollenization". Commercial isolation processes for amylopectins (and also amylose starches which may also be modified) from crude starch mixtures are well-developed and economically feasible. Products of the needed purity and uniformity are readily obtained.

Potato starches in pure and modified form are imported principally from the Netherlands and also from Germany. The main origin of tapioca starch is Thailand. Supplies of these starches have been consistently available well in excess of U.S.A demand and have not been subject to drought conditions or any other problems affecting supply. Tapioca and potato are cultivated crops, and supplies can be increased or decreased every year to accomodate international demand.

Dextrins and malto-dextrins are also starch products which in their cold soluble modified forms have become major substitutes for gum arabic. The comparative performance and pricing of these products will be discussed in Sections 3C, 3D, and Chapter Four.

Polydextrose as a bulking agent, propylene glycol as an emulsifying agent, sorbitol as a co-spraydrying agent, and other gums as emulsifying, thickening, or film-forming agents have also over the years been used as substitutes in products formerly using gum arabic. Most of the substitutions by these products for gum arabic took place during and just after the last crisis.

PROCESSING CHANGES THAT ELIMINATE GUM ARABIC:

In addition to substitution by competing products, gum arabic may be eliminated from usage in a particular industry segment through the elimination of particular products or changes in product manufacturing methods. For example flavor oils may in some cases be "homogenized" directly into a food coloring medium or other ingredient rather than being "carried" by gum arabic. There are competing ingredient systems for encapsulating inks, only one of which uses gum arabic; one major gum arabic user in the carbonless ink paper

coincidentally eliminated its gum arabic usage when it opted for a new encapsulation system. New technologies are constantly being developed to more efficiently manufacture products. There is certainly resistance to changing a successful process, but technology upgrades will periodically occur in competitive businesses.

One important factor in the longterm future of any ingredient will be the degree to which the developers of new processes are willing to consider that ingredient for inclusion in the new process or new application. This is an important issue for gum arabic's future. An ingredient may need to be promoted to RED people. Its technical advantages as well as the reliability of supply need to be stressed if it is to be included in the set of ingredients allowed for use in new product development.

In Section 2C the U.S.A. gum arabic market is described in terms of application market segments as well as the function of gum arabic in each of the market segments. In this section, the segment-by-segment competitive environment for gum arabic is examined.

Table 3C presents the range of brandname gum arabic substitutes. The first notable fact is the bewildering number of competitive products. The products are in many cases application-specific. That is to say, that they are formulated for particular market segments. The full richness of this substitute product group is not even presented in this chart, because products are even promoted as performing specific functions within a particular market segment or subsegment. For example, A.E. Staley's Sta-Mist 741 is especially suited for introducing a "cloudy" appearance to beverage emulsions. It is offered in pre-gelatinized form at about \$1.60 per kilo F.O.B. U.S.A. warehouse and is a kilo for kilo gum arabic replacer.

Colloides Naturels ("CN") offers five or six gums with applications in the liquid beverage emulsion field. The applications attributed to each gum are not based upon any objective tests of product performance by the study team but rather on the claims of the manufacturers and vendors. The evaluations of performance and cost effectiveness are currently being carried out or already are completed in the research and development laboratories of the gum arabic users.

The study team assembled promotional literature, and, in many cases,

BRANDNAME GUM ARABIC SUBSTITUTES

PRODUCT (VENDOR)	ADVERTISED APPLICABILITY BY MARKET SEGMENT													
	ALL	A1	A2	A3	B1	B2	B3	C	D	E	F1	F2	F3	F4
ACASOL (Iranex-Colloides Naturels)			x				x	x						
AMYLOGUM (Avebe)														x
ARABASAN R (Amino Products Inc.)		x	x	x	x	x	x	x						
ARABIC #2	x													
ARAGUM 2000 (TIC)							x							
ARAGUM 3000 (TIC)		x	x	x										
ARAGUM LITHO 4000 (TIC)										x				
ARD 2326 (American Maze Prod.)	x													
BORDEN CAPS (Borden)			x	x										
CAPSUL (National Starch)		x	x	x	x	x				x				
COATINGUM (Iranex/Colloides Naturels)							x	x						
CRYSTAL GUM, K4484 (Nat'l Starch)	x													
ELECTROGUM (Iranex/Colloides Naturels)			x				x	x						
EMGUM 100 (Emsland/Tokomenka)					x	x								
EMULGUM (Iranex/Colloides Naturels)		x	x	x						x				
INSTANTGUM (Iranex/Colloides Naturels)		x	x	x	x	x				x				
LITHOGUM (Iranex/Colloides Naturels)													x	
M100			x	x	x	x				x				
MIRACAP (A.E. Staley)		x	x	x	x		x	x						
N-LOK (Nat'l Starch)			x		x	x	x							
POLYDEXTROSE (Pfizer)					x									
PURITY GUM 539, BE, 1773 (Nat'l Starch)		x	x	x										
SEALGUM (Iranex/Colloides Naturels)		x		x										
SPRAYGUM C (Iranex/Colloides Naturels)					x	x				x	x			
SPRAYGUM (Iranex/Colloides Naturels)	x													
STA-MIST 17415 (A.E. Staley)		x		x					x					
STARCACIA (Iranex/Colloides Naturels)					x	x								
STARGEL (Iranex/Colloides Naturels)					x	x								
STERABIC (A.E. Staley)										x				
TECHNOGUM (Iranex/Colloides Naturels)													x	
THIXOGUM (Iranex/Colloides Naturels)		x		x	x	x								
THIXOTROL (Iranex/Colloides Naturels)										x				

T A B L E 3 C : BRANDNAME GUM ARABIC SUBSTITUTES

specification sheets for almost all of the products listed. It would be needlessly tedious to go over every product. Several products only will be reviewed in detail as examples. The promotional literature is part of the U.S.A.I.D. gum arabic database assembled by the study team.

Many of the gum arabic substitutes are marketed with claims of superior cost effectiveness to Sudanese gum arabic. For example, CN "second generation acacia gums" perform the job of one pound of gum arabic using a much smaller quantity of the higher-priced substitute. For example "Emulgum" is reportedly offered at between \$9.24 and \$9.68 per kilo f.o.b. U.S.A. warehouse. However, it is designed to replace up to six pounds of gum arabic in beverage emulsions, and other applications. Spraydried gum arabic selling at more than \$2.55 per kilo during 1984 is, therefore, challenged by a product offered at \$1.58 - \$1.63 per kilo.

The attractive price comparison is supplemented by extensive literature touting the equal or better performance of Emulgum as compared with traditional spraydried gum arabic. Illustration 3C1 is three pages of technical information on Emulgum and Illustration 3C2 is a pamphlet from CN which shows the very extensive applications-specific product formulation and promotion for the second generation acacia gums. The study team reprints the Iranex/Colloides Naturels pamphlet in its entirety because it is the most complete listing of all potential gum arabic applications yet found. Many of the applications mentioned are not applications for which gum arabic is presently used in the U.S.A., and there is the one U.S.A. reseller found by the study team that has literature encouraging applications for gum arabic for which it is presently not used in the U.S.A.



Box 561, Route 202 & Dumont Road, Far Hills, N.J. 07931, (201) 234-9494

BULLETIN Q 21

PRODUCT EMULGUM BV IRX 29000

APPEARANCEwhite powder

MESH SIZE Through US mesh 6095%

VISCOSITY (Aqueous) Brookfield LVF 60 rpm, Sp. 2:
 (measure after 30 mn stirring 20°C

Concentration of solution		
5%	10%	25%
10-12cps	15-20cps	60-65cps

MOISTURE Maximum.....12%

pH In water at 5% solution.....4.0-5.0

PURITY Minimum.....99.9%

Illustration 3C1-1

Specifications herein are based upon our own laboratory test procedures and experiences. However, no guarantee expressed or implied is made regarding the accuracy of the data as we cannot foresee all variations which might be encountered in equipment, processes and conditions beyond our control.



**COLLOIDES
NATURELS INC**
Second Generation Acacia

Box 561, Route 202 & Dumont Road, Far Hills, N.J. 07931, (201) 234-9494

BULLETIN Q212

PRODUCT EMULGUM BV IRX 29000
APPLICATION Encapsulation and co-drying of flavors, fats and oils or oil-soluble vitamins.

ADVANTAGES

- . no impurities and rapid hydration
- . homogenization made easier by the low viscosity of the solution: oil globules are more uniform when observed under the microscope. The solution can be spray dried at higher total solids. Therefore; the cost of drying is reduced along with better encapsulation of the liposolubles phase and a longer shelf-life of the finished product.
- . The process used to manufacture EMULGUM BV allows good bacteriological control and eliminates enzyme activity, therefore resulting in better protection of the aromas.

USE LEVELS 3 to 4 times less than regular gum arabic or modified starches.

SUGGESTED USE A) Spraydrying of Essential Oil

	<u>Traditional Fomulation T.S. 35%</u>	<u>Formulation T.S. 35%</u>	<u>Formulation T.S. 50%</u>
		<u>20 oil/100 powder</u>	
Essential oil	70g	70g	100g
Gum Arabic	240g	--	--
EMULGUM BV	--	90g	140g
Maltodextrins	40g	190g	260g
Water	q.s. 1,000	q.s. 1,000	q.s. 1,000
Viscosity before spraydrying*	100 cps	35 cps	70cps
Percentage of absorbed oil**	92%	95%	95%
Percentage of oil in surface+	2%	2%	2%

B) Spraydrying of Clouding Agent

Percentage of oil in the powder: 40%

Spraydrying of 35% T.X. solution.

Vegetable oil	140g
EMULGUM BV	70g
Maltodextrins	140g
Water	q.s. 1,000

Diluted at 1 g/liter, optical density (by spectroscopy) is:

0.49 at 550 nm
0.79 at 400 nm

- * Brookfield 60 t/mn
- ** Steam distillation
- + Pentane extraction

Illustration 3C1-2

Information and suggestions herein are based upon our experience. We do not guarantee the applicability or the accuracy and we assume no liability express or implied in connection with their use or with respect to patents and local food regulations.



PRODUCT ELULGUM BV IRX 29000

COMPOSITION A blend of purified and spray dried acacia gums

APPLICATION Emulsifying and stabilizing colloid used for soft drink concentrates containing cloud and natural colors.

ADVANTAGES

- Free from impurities
- Controlled bacteriology
- Rapid hydration in water
- No enzymatic activating
- Ease of homogenisation (improve output due to low viscosity of the emulsion)
- More uniform particle size distribution.

USE LEVEL Similar to EMULGUM IRX 25631 and 3 to 5 times less than spray dry gum arabic.

FORMULA

For 1% concentration RESINO GUM DD IRX 29130

Essential oil:	6.5%
RESINO GUM DD:	3 %
EMULGUM BV:	5 %
Water:	qs 100

Esterified Colophany

Essential oil:	6.5%
Esterified colophany:	3 %
EMULGUM BV:	4 %
Water:	qs 100

SAIB

Essential oil:	11 %
SAIB:	18 %
EMULGUM BV:	12 %
Water:	qs 100

Carotenoids (coloring)

Essential oil:	8 %
RESINO GUM DD:	4 %
Carotene and Apocarotenal:	0.44%
EMULGUM BV:	4 %
Water:	qs 100

Illustration 3C1-3

Specifications herein are based upon our own laboratory test procedures and experiences. However, no guarantee expressed or implied is made regarding the accuracy of the data as we cannot foresee all variations which might be encountered in equipment, processes and conditions beyond our control.

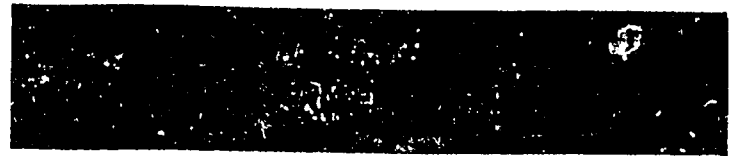
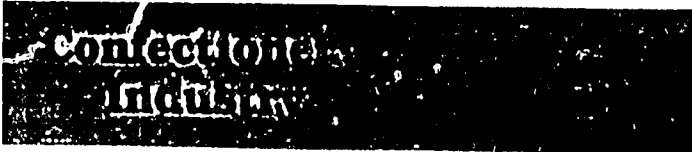
**PRODUCT
DIRECTORY**



IRANEX

**COLLOIDES
NATURELS INC**
Second Generation Acacia

Illustration 3C2-1



APPLICATION	FUNCTION
Gum Candles (Starch & Starchless Moulded) Gum Drops—Gum Pastilles—Jujubes Sugared & Sugarless	Source of fiber, Main Ingredient, Binding sugar, Anticrystallizing
Gum Candles—Starch Gums	Gum Arabic Substitute, Gelling Agent
Chewy Caramel	Improves chewability, Binding
Sugarless Chewing Gum	Softening, Water and Flavor Retention Bodying
Coated Candles "Dragees" Chewing Gum Chicklets Bubble Gum Chocolate Center, Nut Center Jordan Almonds Liquor Eggs	Coating, Filmforming Protecting (oil & water) Engrossing (sugar) Glazing
Jellied Candles—Sugared & Sugarless—Gummy Bears, Jelly Beans	Gelatin-Pectin Substitute Gelling w/or without sugar
Jelly Candles Fruit Gellies and Pastes— Fruit Slices	Gelling Independently of Sugar and pH
Aerated Candles Marshmallows Angel Kisses	Whipping and Stabilizing Agent
Continuous Flavoring of High-Total-Solids Confections	Emulsification Homogenization

GUM	USE LEVEL	DESCRIPTION
SPRAYGUM INSTANTGUM	30-50%	Purified Spray Gum Acacia Purified Spray & Instantized Gum Acacia
STARCACIA	20-30%	Starch—Gum Acacia, co-processed
SPRAYGUM INSTANTGUM	4-8%	Purified Spray Gum Acacia Purified Spray & Instantized Gum Acacia
SPRAYGUM INSTANTGUM	3-5%	Purified Spray Gum Acacia Purified Spray & Instantized Gum Acacia
COATINGUM ACASOL	1-2% 3-4%	High Viscosity Acacia Acacia & Corn Syrup Solids
STARGEL	8-12%	Acacia gum— Starch—Gelatin
FRUCTOGEL	1-1.5%	Specialty Agar
WHIPGUM	1-1.5%	Solubilized Vegetable Proteins Co-spraydried with Gum Acacia
EMULGUM	3-5%	Synergistic Association of Various Acacias

Please note that all products are not available in all countries.

Contact your local broker or sales agent for availability.

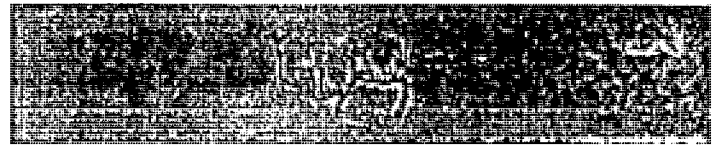


APPLICATION	FUNCTION
Essential Oil Emulsion For Carbonated & Non Carbonated Beverage "Soft Drinks"	O/W Emulsion Stabilization
Clouding Emulsion For Soft Drinks	Emulsion Stability Turbidity, Cloud
Encapsulated Flavor in Powder Form	Oil Entrapping Encapsulation
Instant Beverage In Powder Form Instant Cloud	Flavor & Juice Encapsulation Clouding
Flavored Beverage With Pulp	Oil Stabilization Pulp Suspension
Bakery & Confectionery Flavoring Emulsions	Emulsification and Thickening
Encapsulated Oleoresin	Oleoresin Entrapping & Encapsulation
Winology—Oenology— Wine Fining	Tanin Suspension Colloidal Stabilization
Beer	Beer Foam Stabilization

GUM	USE LEVEL	DESCRIPTION
EMULGUM	2-5	Synergistic Association of Various Acacia Gums
SPRAYGUM	10-20	Purified Spray Gum Acacia
EMULGUM	2-5	Synergistic Association of Various Acacia Gums
RESINOGUM	5-6	Oil Soluble Gum Resin (Granulated Form)
SEALGUM	4 x oil	Synergistic Association of Acacia Gum and Corn Syrup Solids
SPRAYGUM	4 x oil	Spray Gum Acacia
SPRAYGUM RESINOSPRAY	3 x oil 4 x oil 5-10	Synergistic Association of Acacia Gum and Corn Syrup Solids (co-spray dried) Purified & Solubilized Gum Resin (water dispersible)
THIXOGUM	0.5-1.5	Synergistic Association of Acacia and Gum
THIXOGUM	0.5-0.8	Synergistic Association of Acacia and Gum
SEALGUM	4-5 x Resin	Acacia Gum & Corn Syrup solids (co-dried)
INSTANTGUM	30-40g/hl	Purified and Instantized Acacia Gum
SPRAYGUM ED	6-10g/hl	Enzyme Deactivated Spray Acacia Gum

Illustration 3C2-3

Processed & Specialty Gums
Principal Uses In The . . .



APPLICATION	FUNCTION
Bakery & Sweet Roll Glazing	Filmforming, Improves Sugar Adhesion
Bakery & Pastry Sugar Icings Fat & Sugar Icings	Improves Flexibility Cohesion and Shelf Life Emulsification Adhesion
Aerated Bakery Mallow Biscuit Angel Cakes Meringues	Aerating and Foam Stabilization
Soft Cakes Marble Cakes Sponge Cakes English Cakes	Softening and Water Retention
Instant Pudding Hot Processed Instant Mousses Cold Processed Instant Ice Cream Cold Processed Instant Milk Beverage Hot Or Cold Processed	Hot Milk Gelling, Cold Milk Thickening Whipping Stabilization Thickening
Dried Foods Instant Noodles, Pastes Mashed Vegetables	Bodying and Mouthfilling at Reconstitution
Salted Snacks, Nuts	Surfacing, Glazing, Adhesivity of Spices

GUM	USE LEVEL	DESCRIPTION
INSTANTGUM	2-5%	Refined Spray & Instantized Gum Acacia
FRUCTOGEL EMULGUM	0.5-1% 2-3%	Special Agar Synergistic Association of Various Acacia Gums
WHIPGUM EM	1-3%	Vegetable Solubilized Proteins Cosprayed with Gum Acacia
SORBGEL	3-5%	Sorbitol & Seaweed Gums (co-dried)
FLANALGUE SECOLACTA MW IRAMOUSSE	0.1-0.3% 0.5-1%	Lambda & Kappa Carrageenan Carrageenan & Edible Phosphates
WHIPGUM EM STABGEL CD STABGEL CD	0.5-1.5% 0.1-0.2%	Solubilized Vegetable Protein & Tree Gums Instant Viscous Carrageenan Instant Viscous Carrageenan
INSTANTGUM	1-3%	Refined Spray & Instantized Gum Acacia
COATINGUM ACASOL	1-2% 2-3%	High Viscous Acacia Acacia & Corn Syrup Solids

Illustration 3C2-4

Processed & Specialty Gums
Principal Uses In The . . .

Dairy & Ice Cream Industries



APPLICATION	FUNCTION
Sterilized Cream Pressure Whipped Cream	Fat Retention Anti Exudation Whipping, Foam Stabilization
Sterilized Cocoa Milk Beverage	Cocoa Suspension Fat Retention
Dairy Pudding (turnable)	Milk Gelling, Water Retention, Body, Mouthfilling
Dairy Dessert Cream	Milk Thickening Creamy Texture Non Gelling
Dairy Cream Pudding with Copping	Soft Milk Gelling Texturizing
Dairy "Blancmange" With Caramel Topping	Gelling, Texturizing Filmforming
Water Fruit Jelly Desserts	Water Gelling Texturizing
Dairy Mousses	Whipping Stability
Ice Cream	Stabilizing
Fruit Ice, Lollies, Popsicles	Stabilizing

GUM	USE LEVEL	DESCRIPTION
IRGEL SF SECOLACTA L	1-2g/l	Cold Dispersible Viscous Carrageenan
THIXOTROL	0.5-1g/l	Thixotropic Carrageenan and Acacia Gum
CAOMIX SECOLACTA CM	0.25g- 0.60g/l	Thickening and Suspending Carrageenan
GELAMIX P	4-5g/l	High Gelling Carrageenan
GELAMIX HV	5-8g/l	Gelling and Thickening Carrageenan
GELAMIX CD	8-10g/l	Non-Gelling, High- Thickening Carrageenan
GELAMIX TX THIXOGEL	6-8g/l	Soft Gelling and Thickening Thixotropic Carrageenans
GELAMIX C	4-5g/l	Fine Texture Waterproof Gel Binding Carrageenan
GELAMIX W	8-12g/l	High-Water Gelling and Thickening Transparent Gel Carrageenan
WHIPGUM EM	2-3%	Solubilized Vegetable Protein and Tree Gums
STABMIX	2-3g/l	Thickening Gums and High-Viscosity Carrageenan
STABOR	2-4g/l	Water Thickening and Viscosity Carrageenan

Illustration 3C2-5

Processed & Specialty Gums
Principal Uses In The . . .

Pharmaceutical & Cosmetic Industries

APPLICATION	FUNCTION
Medicated Cough Drops	Main Ingredient Non Caloric and Non Carlogenic Source of Fiber
Diabetic Sugarless Candies	Main Ingredient Non Caloric and Non Carlogenic Source of Fiber
Coated Pills "Dragees"	Coating Filmforming
Compressed Tablets	Tableting & Disintegrating
O/W Emulsion	Oil Emulsions & Stabilization
SYRUPS	Suspension
Lipidic Vitamins In Powder Form	Oil Entrapping Encapsulation
Creams & Lotions	Emulsification Suspension Filmforming

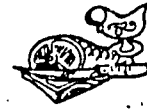


GUM	USE LEVEL	DESCRIPTION
INSTANTGUM SPRAYGUM	30 to 50%	Purified and Instantized Gum Acacia Purified Spray Gum Acacia
INSTANTGUM SPRAYGUM	40 to 60%	Purified and Instantized Gum Acacia Purified Spray Gum Acacia
COATINGUM ACASOL	1-2% 2-4%	High Viscosity Special Gum Acacia Acacia Gum & Corn Syrup Solids (Co- spray dried)
INSTANTGUM THIXOTROL	1-1.5% 0.5-1%	Purified and Instantized Gum Acacia Synergistic Association of Carrageenan & Gum Arabic
EMULGUM SPRAYGUM	2-5% 10-15%	Synergistic Association of Various Acacia Gums Purified Spray Gum Acacia
THIXOTROL SPRAYGUM	0.5-0.8% 1%-25%	Synergistic Association of Carrageenan and Gum Acacia Purified Spray Gum Acacia
EMULGUM SPRAYGUM	1-3 oil 4- oil	Synergistic Association of Various Acacia Gums Purified Spray Gum Acacia
EMULGUM THIXOTROL SPRAYGUM	1-5% 0.2-0.3% 5-15%	Synergistic Association of Various Acacia Gums Synergistic Association of Carrageenan and Gum Acacia Purified Spray Gum Acacia

Illustration 3C2-6

Processed & Specialty Gums
Principal Uses In . . .

**Meat Preparation, Meat
Canning, Dressings &
Preserved Sauces**



APPLICATION	FUNCTION
Corned Beef, Luncheon Meat Canned Frankfurters Baby Foods	Gelling Water & Fat Retention
Pet Foods	Gelling Water & Fat Retention
Salad Dressings Salad Cream Mayonnaise	Emulsifying Stabilizing
Deep Freezes Cream Sauces Gravies For Catering	Freeze Thaw Stability Emulsifying
Sterilized Dressings & Mayonnaise	Fat Retention Heat Stable Emulsification

GUM	USE LEVEL	DESCRIPTION
LIANGEL	4-5g/kg 8-10g/kg	Carrageenan (heat resistant)
LIANGEL PF	3-5g/kg masse	Carrageenan & Gums
THIXOGUM	1% 2-3% 0.1-0.3%	Xanthan & Gum Acacia
FREEZGEL	0.5-0.8%	Gums & Carrageenan
THIXOGUM X	1-3%	Monogalactans & Xanthan

Illustration 3C2-7

Processed & Specialty Gums
Principal Uses In The . . .

Technical & Non-Food Industries



APPLICATION	FUNCTION
Lithographic Arts Offset Plate Protection Sensitizing With Dichromate Etching Solutions Printing Roll "Fountains" Lacquer Developers	Filmforming, Flexible Film Preserves Plate Against Oxidation Improves Printing Of Inks
Non Carbon Duplicate Paper	Encapsulating
Electronic Porcelains (Isolators) Electro-Technical Ceramics, Spark Plugs "Ferrites" Electronic Components Refractory Bricks	Binding Shape Retention Before Furnace
Ore Flootation to obtain phosphate, potash	Depressing
Liquid Office Glue Stamping Paper, Envelopes	Transparent Food Adhesive
Water Paints & Inks Children's Water Paints	Binder (edible grade)
Cement and Concrete Sand "Moulding" For Foundry	Negative Charges Water Absorption Non-Polluting Atoxic Binder
Firing Paste For Matches, Fireworks, Explosives, Cartridge Powder	Binding—Adhesive Non-Polluting Binder When Burning
Agricultural Sprays: Pesticides, Insecticides, Fertilizers, Fire Fighting	Suspending Drift Control & "Cling"

GUM	USE LEVEL	DESCRIPTION
SPRAYGUM	25% sol. at 14" B	Purified Spray Gum Acacia
LITHOGUM	20% sol. at 14" B	Specially Processed Acacia
SEALGUM	¼ part gum for 1 part Ink	Purified Spray Gum Acacia
ELECTROGUM	1-6%	Extra Purified Spray Gum Acacia— lower ash content - 0.2%
TECHNOGUM	1-5%	Purified Spray Gum Acacia, Technical
TECHNOGUM	120g T	Purified Spray Gum Acacia, technical
SEALGUM	25-30%	Purified Spray Gum Acacia
ACASOL	30-35%	Acacia & Corn Syrup Solids
TECHNOGUM	25-30% sol.	Purified Spray Gum Acacia, technical
TECHNOGUM	0.5% 0.5-0.8%	Purified Spray Gum Acacia, technical
TECHNOGUM	3-5% 2-4% 1-3%	Purified Spray Gum Acacia, technical
TECHNOGUM	20-40% sol.	Purified Spray Gum Acacia, technical

Illustration 3C2-8

Many of the CN products contain Sudanese gum arabic, and to that extent, usage is promoted whenever the second generation acacia gums are used in a new application that did not previously employ gum arabic. However, to the extent that these gums are not pure Sudanese gum arabic, they must be characterized as competitive products when replacing pure processed hashab. C.N. also sells CAS and other basic gum arabic grades.

The TIC Aragum series of gum arabic and (it seems) starch blends supplements the company's extensive offerings of regular Sudanese gum arabic grades. These products may be designed to help customers during periods of shortage when adequate supplies of Sudanese gum arabic are not available. One user considering reformulation was offered Aragum for replacing spraydried in candy coatings at about \$3.00 per kilo.

National Starch, A.E. Staley, Borden's, American Maize Products, Emsland, Grain Processing Corporation, and Avebe offer modified starches, dextrans, and/or malto-dextrans designed to compete with gum arabic for specific applications. As an example, Illustration 3C3 presents the application-specific product selection guide widely distributed by National Starch. National Starch is by far the leading marketer of dextrans and modified food starch gum arabic replacements. Its grades sell for between \$1.32 and \$2.53 per kilo. The substitutes are kilo-for-kilo replacements.

As an example, one company that applies a candy coating to fruits and nuts found that 60 kilos of K4484 from National Starch was the equivalent of one hundred pounds of spraydried first quality gum arabic. Illustration 3C4 gives detailed specifications for K4484.

Food Starches... by end product

Canned Foods

APPLICATIONS	STARCH RECOMMENDED	STARCH FUNCTION	SPECIFIC BENEFITS
Puddings	National® Frigex, Pure-Flo® Purity® W	Stabilize, thicken.	Cutable, but creamy body.
Pie fillings Fruit Lemon	Colflo® 67, Clearjel®-A, Purity® 69-A, Therm-Flo	Stabilize, thicken.	Highly resistant to breakdown under low pH conditions.
Soups, chowders	Clearjel-A	Stabilize, thicken.	Impart body, texture and mouthfeel.
Cream style corn	Colflo 67, Purity CSC Clearjel S-A	Thicken, stabilize (counteracts curdling tendency during continuous retorting). Thicken and stabilize in standard retorting.	Smooth and creamy non-curdled corn. Smooth and creamy or pulpy texture, good shelf life.
Sauces, gravies	Clearjel-A, Textaid®-A	Thicken, texturize.	Provides texture, cling.

Frozen Foods

APPLICATIONS	STARCH RECOMMENDED	STARCH FUNCTION	SPECIFIC BENEFITS
Fruit pies	Colflo 67, Therm-Flo	Stabilize, thicken, provide cuttability.	Good freeze-thaw stability, low pH resistance, better clarity and texture.
Pot pies, sauces, and gravies	Hi Flo® Textaid-A	Stabilize, thicken.	High filling viscosity, reduced usage, unique texture.
Breaded fish, onion rings, chicken	Batter Bind® S, Crisp Film® Micro Crisp, Micro Crisp D	Good cohesion and adhesion.	Firm, crisp, uniform coating.
Desserts	Pure-Flo, Purity W, National Frigex	Stabilize and thicken.	Improved shelf life.

Glassed Foods

APPLICATIONS	STARCH RECOMMENDED	STARCH FUNCTION	SPECIFIC BENEFITS
Salad dressing	Purity 270-A, 420-A, 550-A, Purity Gum 539	Stabilize, thicken.	Heavy or light creamy texture, low-hot viscosity, easier handling. 539 for pourables.
Baby foods	Purity 69-A, Colflo 67, Purity 4, VO Starch	Stabilize, thicken, provides short texture.	Provides excellent freeze-thaw stability, resists high temperature and low pH, enhances flavor.

Beverages

APPLICATIONS	STARCH RECOMMENDED	STARCH FUNCTION	SPECIFIC BENEFITS
Beverages	Capsul® Purity Gum BE, Purity Gum 1773, National 46, Film-Set® N-Lok	Encapsulation Agent, Emulsion, Stabilization.	More stable products. Replaces expensive gums

Baked Foods

APPLICATIONS	STARCH RECOMMENDED	STARCH FUNCTION	SPECIFIC BENEFITS
Pies, tarts, filled cakes	Instant Pure-Flo, Clearjel-A, Instant Clearjel®	Stabilize, thicken. Provides smooth moist texture.	Easy to handle. Excellent resistance to weeping. Increase bake tolerance, more attractive fillings.
Glazes	Crystal Gum, Film-Set, K-4484, National 78-0059	Provide attractive coating. Moisture barrier.	Clarity, sheen. Low viscosity.

Dry Foods

APPLICATIONS	STARCH RECOMMENDED	STARCH FUNCTION	SPECIFIC BENEFITS
Instant puddings and desserts	H-50, Instant Pure-Flo F, National POB	Provide instant thickening.	Creamy texture. Fast meltaway.
Soup mixes	Instant Pure-Flo, IF 131, National 711, Instant Textaid, Quick Sperse, National 78-0104	Thicken without lumping.	Impart body and mouthfeel.
Cake mixes	Instant Clearjel, Instant Pure-Flo F	Thickening, water absorption.	Texture, longer shelf life, moister cake.
Gravy and sauce bases	Instant Pure-Flo, Colflo 67, Purity 825	Thickening without lumping. Thickening without lumping. Very low moisture starch.	Texture, cling. More natural homemade appearance. Increased shelf life.

Confections

APPLICATIONS	STARCH RECOMMENDED	STARCH FUNCTION	SPECIFIC BENEFITS
Jelly gums	Flojel® Hi-Set® Hylon® Hylon VII	Setting agent and gelling agent. Rapid gelling agent.	Clarity, easier processing, controlled texture. Reduced time in starch. Improved shelf life.
Panned items	Crystal Gum, K-4484	Coat food product with a clear appetizing film	Clarity sheen, reduced cracking.

Potato Products

APPLICATIONS	STARCH RECOMMENDED	STARCH FUNCTION	SPECIFIC BENEFITS
Extruded potato products	Textaid-A	Binder and stabilizer. Short, dry texture. Less oil pick up.	Better shaped pieces, excellent storage stability. Smoother, less sticky on extrusion. Golden brown color without greasiness.
French fries, extruded french fries	Crisp Film, Textaid-A	Form crisp coating, internal binder.	Crisper, more appetizing products after frying.

Pet Foods

APPLICATIONS	STARCH RECOMMENDED	STARCH FUNCTION	SPECIFIC BENEFITS
Meat products	Textaid-A, Batter Bind® S, Firm-Tex®	Binding	Firmer bite, reduced shrinkage.
Gravies (canned or dry)	Purity W, Clearjel S-A, Instant Clearjel, Instant Pure-Flo	Thickening	Improved stability and texture. Non-gelling upon cooling.

Food Starches... by starch type

Waxy Maize Starches

PRODUCT TYPE AND NAME	FEATURES	BENEFITS
National 150, Can-Fil [®] National 1545	Clarity and stability, with high initial viscosity.	Good filling viscosity for canned foods, low residual viscosity.
Clearjel-A, Clearjel S-A	High viscosity, stability, short texture, clarity, sheen; no cereal-like taste (Clearjel S-A slightly more viscous).	More uniform product, good shelf life, attractive smooth, creamy products, enhanced natural flavors.
Colflo 67, Hi Flo	Low temperature stability, does not set to gel on storage, lack of cereal taste, short texture, clarity and gloss.	Prolonged shelf life, attractive creamy appearance, true color, flavor not masked. High production rates without splashing on line.
National 1333-A	Extremely resistant to low pH, high temperatures and mechanical shear. Heavy, creamy, short body.	Tolerant to wide range of production conditions. Improved finished product texture. Low-temperature Stable.
Purity W, National 465	High hot viscosity, excellent low temperature stability, good clarity, non-gelling, heavy-bodied when cold.	Stable at varying storage temperatures. Short texture. Long shelf life.
Pure-Flo, Therm-Flo	Low hot viscosity. Excellent low temperature stability. Shear resistant. Non-pH sensitive, non-gelling.	Faster heat penetration. Can be high heat processed without breakdown. Stable to varying storage conditions.
Capsul	Encapsulation of flavors and clouds, high oil retention, good dispersibility, low viscosity in high solids mix.	More flavor locked in. Quicker release of oils. Less water to spray dry. Replaces expensive gums.

Tapioca Starches

PRODUCT TYPE AND NAME	FEATURES	BENEFITS
Purity D-A	Smooth, short texture, soft, tender set, and bland flavors. Resistant to retorting temperatures.	Food products have an attractive, creamy appearance. Excellent eating qualities, smooth mouthfeel. Attractive appearance retained after retorting. Bland flavor.
Purity 69-A	Freeze-thaw stable, does not set to a gel on aging, bland taste, clear, smooth, short texture.	Extended shelf life, attractive appearance, does not mask product color or flavor.
National Frigex	Excellent low temperature stability. Shear resistant. Excellent clarity. Non-gelling.	Long shelf life stability. Smooth soft texture. Good mouthfeel.
Purity 4	Low temperature stable. Good heat, acid, shear stability. Good clarity, bland flavor.	Economical, does not mask flavors, versatile usage, heavy smooth body, good processing tolerance, use in retorted and frozen foods. Easy to cook.

Dextrins

PRODUCT TYPE AND NAME	FEATURES	BENEFITS
Crystal Gum, K-4484	Good film former. Controlled low viscosity, high solubility, good clarity. Some properties of natural gums.	True color and flavor not masked. Controlled quality. Produces high quality pastry glazes, pan coatings. Good replacement or extender for costly gum encapsulation agents.
N-Oil	Tapioca Dextrin, bland flavor, low viscosity. Readily dispersible low temperature stable. Smooth bodied. Sets to a gel.	Enhances fat mouth feel. Fast meltaway, non-flavor masking. Calorie savings.

Pregelatinized Starches

PRODUCT TYPE AND NAME	FEATURES	BENEFITS
Instant Clearjel, Instant Pure-Flo	Clarity, sheen, requires no cooking, minimum mixing, low temperature stability.	No cooking required. Instant Pure-Flo requires no pre-blending with sugar.
Instant Pure-Flo F, H-50	Swells instantly in cold liquids, no starchy taste.	No cooking required. Produce excellent tasting short textured instant puddings.
Instant Pure-Flo, National 711, IF 131	Easy dispersibility without lumping.	High quality instant soups or gravies.
Quick Sperse	Pregelatinized, rapid dispersibility, smooth texture. Good heat, acid, shear and low temperature stability. Bland flavor.	No cooking required. High viscosity without lumping. Does not mask flavors of food.
National 78-0099	Natural corn starch. Excellent heat and acid stability. Slightly pulpy texture. Pregelatinized. Bland flavor short texture. Heavy bodied good dispersibility.	Excellent use in retorted foods. Does not require cooking. Does not affect flavor of foods. No lumping. No gel formation.
National 78-0101	Pregelatinized. More heat stable. Requires high temperature to cook, bland flavor. Natural corn starch.	Cold water swellable. Easily dispersed. Heat stable. Does not mask other flavors.
National 78-0104	Pregelatinized, easily dispersed, slightly grainy texture. Excellent heat, acid, low temperature and shear stability. Bland flavor.	Ready to use (no cooking required). No lumping. Has good processing stability. Does not mask flavors of product.
National 1215	Thickens without cooking. Pregelatinized. Natural starch. Low viscosity.	Readily dispersible. Bland flavored, clear.

Corn Starches

PRODUCT TYPE AND NAME	FEATURES	BENEFITS
Melojel®	Refined, premium corn starch with firm gel.	Produces high quality puddings and cream fillings.
Flojel 60, 65	Thin boiling starches (Flojel 65 is slightly lower in viscosity). Disperses rapidly.	Facilitates processing of high solids systems (no tailing and faster depositing). Faster production.
Dry-Flo®	Water repellency.	Improves flowability of hygroscopic materials.
Hoosier 5, Purity 825	Low moisture.	Less caking, better flow.
Purity 21 NF	Extra white corn starch.	Produces white end products.
Batter Bind S	Produces a batter mix with excellent adhesion. Firm uniform coatings.	Good eating qualities. Consistently high quality end products.

Other Specialties

Starches

PRODUCT TYPE AND NAME	FEATURES	BENEFITS
Textaid-A	Produces a very desirable "pulpy" or natural solids texture. Retains texture under high temperature processing.	More natural homemade appearance. Better mouthfeel. New textured food products are possible.
Instant Textaid-A	Produces pulpy or natural solids texture without cooking. "Swells" in cold water.	Unique texture for sauces and gravies. Heating not required.
Crisp Film	Binder or protective coating.	Crisper fried products.
Hylon, Hylon VII	Sets rapidly to a firm gel after cooling and cooling.	Increases production rate of jelly gums and extruded snacks.
Purity 270-A, 420-A, 550-A	Full range of starch pastes possible from low initial viscosity with a soft set to heavy-bodied pastes with creamy, short texture.	Faster cooking, easier pumping, reduced starch usage levels and full range of salad dressing textures with excellent shelf-life stability possible.
<i>Liquid Revenue Emulsion</i> Purity Gum 539, Purity Gum BE, Purity Gum 1773	<u>Replacement of or adjunct to natural gums in pourable dressings and bottlers' emulsions.</u>	<u>Improved stability, domestic source of supply.</u>
-Baka-Snak*	Excellent expansion, quick set, no hold time.	No frying required, faster production.
• Film-Set, N-Lok	Low hot viscosity, good film former, bland.	<u>Produces excellent confections and bakery glazes.</u>
N-Zorbit* <i>(Soy gelatin replacer)</i>	Low density, high fat holding, bland flavored tapioca dextrin.	Bulking agent, good flow agent, prevents free oil separation.
VO Starch	Natural stabilized starch. Low gelatinization temperature. Low temperature stable. Bland flavor. Short, heavy bodies	Improves shelf life of products. Natural thickener in retorted foods.

Flours

PRODUCT TYPE AND NAME	FEATURES	BENEFITS
VO Flour	Specialty flour. Short body. Good dispersibility. Good low temperature stability.	Longer shelf life than wheat flour in bakery goods. Anti-firming agent. Reduced retrogradations.
Micro Crisp	Specialty flour, good film former, heat and low temperature stable. Good dispersibility in water.	Enhances crispiness of fried foods, gives golden color to coating. Yields crispiness to baked or microwaveable battered foods. Reduces oil pick up. Entraps product juices.
Micro Crisp D	Specialty corn dextrin yields good adhesion. Frying temperature stable. Holds products juices.	Enhances adhesion of batter, improves natural color. Yields increased crispiness. Reduces oil absorption. Excellent film former.

Jeff Lambert

National STARCHES

FOOD
DIVISION



NATIONAL STARCH AND CHEMICAL CORPORATION • 10 FINDERNE AVENUE BRIDGEWATER N. J. 08807

Bulletin #422

K-4484

unique tapioca dextrin with high solubility, good clarity and bland flavor.

PHYSICAL AND CHEMICAL PROPERTIES

Color: White to Off-white
Form: Powder
pH: 3.0 approximately
Moisture: 7.0% approximately

COOKED PROPERTIES

K-4484 has a low hot viscosity with little or no tendency to set to a gel on cooling. This characteristic makes K-4484 very attractive for those applications in which the product is cooked and cooled and not used immediately. K-4484 is easily dispersed and relatively soluble in cold water. Heating, however, is recommended to achieve optimum solubility.

APPLICATIONS

Glazes: Clear, non-tacky glazes for cakes, pastry, doughnuts, fruits, nuts and candies.

Pan Coating: K-4484 is very effective in pan coating formulas where its consistent quality allows for a uniform and reproducible product at a lower cost than conventional natural gums.

Candies: Used as a replacement for natural gums ordinarily used in some hard gum candies at levels from 20% to 50% of the formulated product.

Spray Drying: K-4484 can be used for spray drying as a replacement or an extender for more costly carriers.

27976
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The information given and the recommendations made herein are based on our research and are believed to be accurate but no guaranty of their accuracy is made. In every case we urge and recommend that purchasers before using any product in full scale production make their own tests to determine to their own satisfaction whether the product is of acceptable quality and is suitable for their particular purposes under their own operating conditions. The products discussed herein are sold without any warranty as to merchantability or fitness for a particular purpose or any other warranty, express or implied. No representative of ours has any authority to waive or change the foregoing provisions but, subject to such provisions, our engineers are available to assist purchasers in adapting our products to their needs and to the circumstances prevailing in their business. Nothing contained herein shall be construed to imply the non-existence of any relevant patents or to constitute an offer of insurance or any other financial product.

K-4484
Specifications

<i>Ingredient designation:</i>	<i>Dextrin</i>
<i>Source:</i>	<i>Tapioca</i>
<i>Form:</i>	<i>Powder</i>
<i>Color:</i>	<i>White to off-white</i>
<i>Taste:</i>	<i>Bland</i>
<i>pH:</i>	<i>2.2 - 3.0</i>
<i>Viscosity:</i>	
<i>50% Solution (cooked/ Brookfield, (RVF @ 20 rpm)</i>	<i>75 - 350 cps</i>
<i>Solubility:</i>	<i>90% min.</i>
<i>Microbiological:</i>	
<i>Total plate count:</i>	<i>10,000/g max.</i>
<i>Yeast:</i>	<i>200/g max.</i>
<i>Mold:</i>	<i>200/g max.</i>
<i>E. coli:</i>	<i>Negative to test</i>
<i>Salmonella:</i>	<i>Negative to test</i>
<i>Packaging:</i>	<i>Kraft multi-walled bag, 100 lbs. net weight</i>
<i>Storage Conditions:</i>	<i>Recommended as in a clean, dry area at ambient temp. Preferably away from heavily aromatic material.</i>
<i>Storage Life:</i>	<i>Recommended usage within 6 months from date of receipt.</i>

Illustration 3C5 is a Food Engineering article entitled "has special

starches to replace gum arabic".

As demonstrated by Illustration 3C3, which has been in print for years, even during periods of abundant gum arabic supplies, many of the substitutes are targeted directly at replacing gum arabic ("gum" in the brochure usually refers to "gum arabic" or, sometimes, gelatin).

As another example, the literature for ARD 2326, American Maize Products' all-purpose gum arabic substitute, is presented. This brochure, Illustration 3C6, was sent with another "Amaizo" brochure in response to an inquiry for a suitable emulsifying agent for non-carbonated citrus beverages, a product area with considerable growth potential for gum arabic, according to one industry source. References to gum arabic are indicated by the study team by underlining or other marks. ARD 2326 is meant to be directly competitive with gum arabic and dextrin substitutes for gum arabic.

Even the dictionary (The American College Dictionary, C.L. Burnhardt, Editor, Random House, N Y., 1966) is involved in the campaign to replace gum arabic. "dextrin is defined as "n. Chem. a soluble gummy substance formed from starch by the action of heat, acids, or ferments, occurring in various forms and having dextrorotatory properties, used as a substitute for gum arabic, as a

mucilage, etc. Also, dextrine.

The above examples illustrate several facts about gum arabic substitutes here summarized:

INGREDIENTS

A thrifty replacement for gum tragacanth

Relief from the high cost of gum tragacanth is offered in a substitute product developed and offered by by Dominion Products, Inc., Brooklyn, N.Y., a basic manufacturer of Brominated Vegetable Oil and other flavor materials.

Gum tragacanth is an emulsifying agent used in the production of various food flavors. It has become highly priced and Dominion's new product, a substitute blend, can be used to create similar results at a much lower production cost.

Dominion Products, Inc., Brooklyn, NY
Circle 209

White and yellow masa for corn-based products

Quaker Oats now offers a full line of both white and yellow *Masa Harina* products for use in Mexican foods, corn based snacks and other applications. These products are milled from scientifically cleaned corn that has been lime-steeped, ground, and dried to produce a stable flour that mixes instantly with

water. They're ideal for tortillas, tacos, corn chips, other corn-based snacks, or any product with a unique flavor.

The Quaker Oats Co., Chicago, IL
Circle 210

Has special starches to replace gum arabic

The African drought has drastically curtailed the gum arabic supply. And that which is available has become highly priced. To ease the situation, The Food Products Division of National Starch & Chemical Corp. is offering a line of modified food starches and dextrans to replace gum arabic in various food products. In many cases, says the firm, these starches are used at lower levels than gum arabic and have longer shelf life.

"Starches are grown in many areas of the world and their availability is less likely to be affected by climate," explains a National Starch spokesman. These special starches function as emulsifiers, thickening and encapsulating agents, carriers for flavors, film formers, adhesion aids and natural gum extenders in food systems such as spray-dried flavors, bev-

erage clouds, beverages, dressings and sauces, pan coating of confections, butter sauces, retorted foods, bakery glazes, processed foods and pet foods.

National Starch & Chemical Corp., Food Products Division, Bridgewater, NJ
Circle 212

Italian Cheese Seminar will be bigger than ever

Eleven technical and semi-technical papers will be presented at the 22nd Annual Marschall Invitational Italian Cheese Seminar, to be held September 11-12 in the Forum Building of the Dane County Exposition Center, Madison, Wis. The seminar is sponsored by Marschall Products in collaboration with 70 exhibitors who will act as co-hosts.

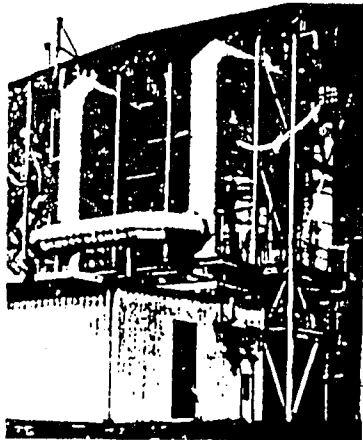
This is the largest number of exhibitors participating since the seminar began in 1964. Those who pre-register will pay no admission fee; the fee at the door will be \$10.00. For information: Mrs. Donna Decker, ICS Chairperson, Marschall Products, a Division of Miles Laboratories, Inc., P.O. Box 592, Madison, WI 53701. Or, phone: (608) 258-7200.

DEDERT

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Dedert evaporators are custom designed for each installation, with expertise especially applicable to...

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 - Food
 - Food related
 - Chemical
 - Pharmaceutical



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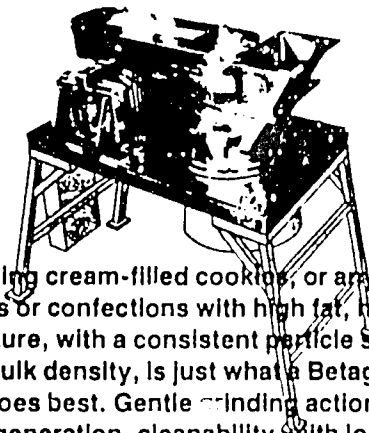
To discuss your specific requirements, contact...

DEDERT

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Size reduction with low velocity Betagrind MILL

for sticky, moist, fatty heat-sensitive products



Grinding cream-filled cookies, or any sticky goods or confections with high fat, high moisture, with a consistent particle size and bulk density, is just what a Betagrind Mill does best. Gentle grinding action, low heat generation, cleanability, with low dust levels and safe operation, are some of the features available with this new approach to size reduction of difficult materials. Test your own product and see for yourself.

KEK

KEK Inc.
130 Wharton F
Bristol, PA 191
(215) 788-801

Product Data

AMAIZO



ARD 2326

ARD 2326 is a modified food starch which has a low DE, is soluble in water, has bland flavor and low viscosity. This product is derivatized to provide additional functionality, such as emulsification, encapsulation and coacervation.

Table I lists the properties of the modified starch and the related functionality. In general, the product is an excellent spray drying aid for a variety of food products. It has the ability to form stable emulsions of low viscosity which makes it ideal for spray drying flavors and essences.

Table II shows typical data for ARD 2326, along with data for gum arabic and a commercial dextrin used to replace gum arabic in some applications. Flavor scores are based on a scale of 7 and ARD 2326 is superior to dextrans like Dextrin A and more consistent than gum arabic. It is also much less expensive than the gum arabic, especially the better grades used in food. The color of the modified starch is also better on the average than the other products. The emulsion stability is also superior to Dextrin A and comparable to gum arabic. The modified starch encapsulates orange oil as efficiently as Dextrin A and much better than gum arabic. The coating formed also protects the product from oxidation because of the reducing power available in the carbohydrate, which is about five fold that found in gum arabic. The modified starch is superior to gum arabic and Dextrin A in the formation of coconut oil cloud. This is evident in the O.D. index which sums the O.D.'s at 700, 550 and 350 nm of a 0.05% solution of the spray dried cloud initially. The stability of the cloud is dramatically superior to the others, one sample is still completely stable after four (4) months. Properties related to molecular weight (estimated at about 50,000 for the modified starch), such as water capacity, caking tendency and freezing point lowering, also present advantages over the 10 DE malto-dextrans. Whereas Fro-Dex 10 will cake at 9.7% moisture, the modified starch cakes at about 17% moisture. The equilibrium relative humidity is about 75% for ARD 2326 and 50% for Fro-Dex 10. Since the molecular weight of the modified starch is about 20 times that of Fro-Dex 10, it has proportionally less effect on osmolality and freezing point depression.

The modified starch is much lower in cost, more uniform in quality and not limited in supply when compared to gum arabic. It is felt that this starch may be an advantageous substitute for gum arabic in a good portion of its many and varied industrial and food applications.

6/81

Illustration 3C6-1

American Maize-Products Company CORN PROCESSING DIVISION
1100 Indianapolis Boulevard • Hammond, Indiana 46320 • (219) 659-2000
Toll Free Number 800 - 348-9896

TABLE I

<u>ARD 2326 PROPERTIES</u>	<u>Related Functionality</u>
A. <i>Low DE, high molecular weight</i>	<ol style="list-style-type: none">1. Bland flavor2. Low browning susceptibility3. High water holding capacity and low caking tendency4. Film forming5. Effective encapsulation6. Aid to dispersibility7. Effective adsorption and complexation of oil and other substances8. Little effect on freezing point lowering, boiling point elevation, and osmotic pressure
B. <i>High solubility</i>	<ol style="list-style-type: none">1. May be used up to 40% solids2. Function as carriers and bulking agents
C. <i>Bland flavor</i>	Protects and encapsulates flavors and essences without masking or contributing to them.
D. <i>Low viscosity</i>	<ol style="list-style-type: none">1. At 20% solids there is little contribution to viscosity2. This facilitates formulation handling (filtration, pumping and spray drying)
E. <i>Derivatized</i>	<ol style="list-style-type: none">1. Emulsification2. Encapsulation3. Coacervation4. Coating5. Complexation

TABLE II ✖
TYPICAL DATA

	<u>ARD 2326</u>	<u>DEXTRIN A</u>	<u>GUM ARABIC</u>
% H ₂ O	6% max.	6% Max.	
pH	5.5	3.0	
% Ash	0.5	0.2	
% Derivative	2.5	2.5	None
Flavor	4-5	1.0	Varies
Brookfield Viscosity	550 cps	150 cps	200 cps
30% Solids, 77°F. See Figures 1-4			
Solubility	96%	96%	To 100%
Color	White	Yellow	White to Brown-Varies
Clarity	Translucent	Translucent	Usually Clear
Emulsion Stability (Figure 5)			
Method 1A Ambient 40 days	1909 NTU/Day	2762 NTU/Day	
Method 1C 35 Min. @ 580 g.			
Final NTU	38,000	10,000	61,750
Orange Oil Encapsulation:			
Method 3A	91%	91%	84.6
Method 3B 1 Part Starch: 9 Parts Fro-Dex 10	87%	84.5%	62.1
Coconut Oil Encapsulation Cloud Test:			
Method 2A	2.57 O.D. Inde.	2.25 O.D. Index	1.59 O.D. Index
O.D. Index Method 2B	330 NTU		

1. Most gum arabic substitutes are marketed as more cost effective than gum arabic. Modified food starches and dextrans are priced from \$1.30 to \$2.50 per kilo. More costly products, such as the "second generation acacia gums" may be used in small concentrations than gum arabic and are consequently marketed as more cost effective.

2. Gum arabic substitutes are designed to compete with gum arabic in specific applications. They typically compete with all-purpose grades such as spraydried or U.S.P. Number 1 powder. The U.S.A. gum arabic sellers may offer several varieties of each of the basic grades, but there are very few application-specific Sudanese gum arabic grades.

3. Gum arabic substitutes are marketed aggressively. The objective is to increase substitute sales at the expense of gum arabic usage. As pointed out in Section 2H. GAC selling efforts are not aggressive, and the importers carrying out U.S.A. gum arabic sales efforts, for the most part, are competing with each other for the business of existing users. The marketing competition between gum arabic sellers and substitute sellers will represent defensive efforts on the part of the gum arabic sellers to maintain old accounts.

Illustration 3C7 is the first joint Water Soluble Gum Association advertisement for gum arabic. It appeared at a time when the supply crisis was already evident. It therefore may have focused attention on the very shortcomings it had been developed to refute. See also Appendix 3C.

The product performance claims of sales organizations are not always accurate. In Chapter Four, the judgment of the market place will be reviewed.



Your future is planted in gum arabic.

Forget your reservations about gum arabic. A new era's begun that means unwavering stability for the most reliable natural stabilizer (and emulsifier, and extender) of all—stability in supply, stability in price, stability in quality. It provides unprecedented opportunities in the development of new products and new applications.

Large New Plantings

Under the aegis of the Government of Sudan, increased production of gum arabic is assured through extensive plantings of acacia trees, the source of this proven ingredient.

6-months' Reserve Supply

To assure availability, a reserve has been built up in Port Sudan warehouses. These very large stocks

are enough to provide six months' supply to meet worldwide demand.

Proven Price Stability

The combination of a vastly increased source of the new material and maintenance of a long-term reserve provide the support for a continuation of a stable price-situation, as has been evident for the past four or five years.

In short, there is every reason for depending on historically-proven gum arabic as *the* natural stabilizer, emulsifier and extender in your formulations.

Members of the Water Soluble Gum Association of America are prepared to assist you with new applications—for old products or new. Please write today.

Water Soluble Gum Association of America, Inc.
P.O. Box 95, New Dorp Station
Staten Island, NY 10306

For information circle 102



Illustration 3C7

ECONOMICS OF SUBSTITUTES AND PRICING OUTLOOK - 3D

The raw materials that make up gum arabic substitutes are: Hashab (Sudanese gum arabic), other acacia gums, processed corn, potato, tapioca, and sorghum starches, and processed dextrans. Other acacia gums in tear form are either comparable in price to Hashab or else inferior in quality. Talha emerged during 1985 as the most significant acacia gum substitute for gum arabic. During this period, the cost for gum talha delivered to New York warehouse was \$715 per metric ton, well under fifty percent of the delivered gum arabic price. The price and availability of gum talha, which is supplied only by the Sudan, is under the control of The Gum Arabic Company. In August, 1985, the GAC stopped offering talha pending a review of the supply and pricing policy. A buffer stock of approximately ten thousand metric tons had been built up over many years; it is reported that this buffer stock has been almost totally depleted during 1985. The annual supplies of gum talha are limited by the extent of the natural resource, the availability and willingness of people to pick up the gum, in the long term, by the destruction of trees to clear land for cultivation. A full costing for gum talha, from FOB Port Sudan to end user (all grades) is presented in the Appendix to 3D.

Other acacia gums from outside the Sudan are harvested, collected, and processed in ways comparable to Sudanese gum arabic. Crop size is smaller, labor rates equal or higher, transport costs probably about the same, and gum quality inferior to hashab. Therefore, except when Sudanese gum arabic is in short supply, the other-origin gums can be sold only at prices lower than CAS with profit margins to the sellers consequently lower than for the GAC.

Starches are among the least costly ingredients. Probably the most expensive of the basic starches that are used to produce modified food starches to replace gum arabic is tapioca starch. In August, 1985, twenty metric tons of highest quality food grade Thai-origin tapioca starch was sold to a U.S.A. buyer for \$245 per metric ton Cost and Freight New York; the price includes over \$100/MT for ocean freight. Domestically produced starches are comparably priced. The raw material cost even for the purest most finely powdered food grade starches is therefore negligible as compared to the gum arabic price. Costs of modification of starches is not publicly available. The processes usually involve "pre-cooking" and other energy-intensive steps that add cost to the product. There is also product loss and consignment of overhead for costly processing equipment. In the opinion of several parties whom we have asked to speculate on the subject, the total FOB U.S.A. warehouse cost for packaged modified starches, dextrans, and malto dextrans should not exceed sixty cents per pound and in most cases should be considerably less than that. Supplies are plentiful; shortages highly unlikely. If there was some extraordinary disaster involving one grain (such as corn), modified starch products obtained from other starches might readily be substituted during the period of shortage without any marked price increase.

From a quick review of raw material costs and prices at which the modified starches are offered to gum arabic users, it is apparent that the finished product cost of starch-based gum arabic substitutes are almost always lower than the costs of comparable arabic grades. This puts marketers of the starch-based products in a strong position to aggressively promote their products, even selectively reducing prices should that be necessary. However, lower prices have long been a key in the introduction of starch-based substitutes to gum

arabic users. The performance of one kilo of substitute is very often equal to the results requiring more than one kilo of gum arabic, and the cost effectiveness advantage of the modified starch substitutes is therefore often even more pronounced than the basic price advantage.

CHAPTER FOUR: THE 1984-1985 GUM ARABIC CRISIS:

DESCRIPTION OF THE CRISIS: 4A

The October, 1983, announcement of new crop year (1983/84) sales policies was a routine event for the American market. Prices for all grades were announced with the usual discount policies. No mention was made of available quantities, and no questions appear to have been raised by the U.S.A. buyers or agents as to the on-going availability of product. There had been no shortages since 1973-1974. The only complaints about supply disruptions concerned either steamship delays or the failure of the GAC to deliver goods on time to be loaded aboard a waiting vessel in Port Sudan. The entire U.S.A. market was lulled into complacency about supplies by years of apparent abundance.

Interest rates in the United States had reached record levels in the preceding years, and one response made by most participants in the Gum Arabic industry was inventory reduction to lower financing costs. One major importer had reduced his inventory from over six months to ninety to one hundred twenty days. The introduction of more frequent sailings and containerized service from Port Sudan to New York enabled importers to be somewhat more daring in making purchases to meet firm supply commitments.

The first indications of problems with supplies came during the second quarter of 1984. There were reports from a major European gum arabic buyer that the GAC buffer stocks of gum arabic supplies in Port Sudan were almost entirely depleted; many in the American market had been assuming that buffer stock levels were being maintained in conformance with official GAC policy. A multi-national user of gum arabic advised the study team that by June of 1984 they were aware of an impending gum arabic supply crisis, and were already beginning to take the

necessary measures to weather the crisis. They substantially increased inventories and by the end of the year were already well-launched into a major reformulation program. The Gum Arabic Company denied rumors of buffer stock depletion or of impending crisis. It was subsequently (March 1985) admitted that the second tapping, normally accounting for nearly half of the annual crop, had been a total disaster, and that buffer stocks were at very low levels. However, the GAC, perhaps under strong government pressure, made the calculation that a normal first tapping from the 1984-1985 crop would enable gum arabic supplies to continue to flow smoothly without interruption after using the buffer stocks to make up the short-fall of the 1984 second tapplings. Total 1983-1984 tapplings were only half of normal levels.

The first official acknowledgment to the U.S.A. market of the supply crisis occurred during September, 1984, when the Gum Arabic Company suspended all new sales to the market for either additional old-crop purchases or new crop purchases. This was a marked deviation from recent years when the GAC would commit itself to the quantities of large new orders even though the price of new-crop shipments might be adjusted to reflect the new-crop price levels. Abrupt deviation from well-established practices took the market by great surprise. Purchasing and selling practices had been based upon the presumption of abundant supplies. Most buyers had uncompleted contracts in October, 1984, but these parties had not bothered to increase their bookings or set up new long term contracts during the third quarter. One major importer adhered to the corporate policy of placing purchase orders only for product to be shipped within several months. This very large buyer suddenly found itself without any backlog of undelivered supplies for the entire 1984-1985 crop year.

The 1984-1985 new-crop year price announcement was made

uncharacteristically very late in October. The failure of the second tapping was acknowledged and explained, but the official market report did not predict that 1984-1985 deliveries would be much less than even 1983-1984. The total disappearance of the buffer stocks was not acknowledged, and the marketing policy announcement was descriptive of current problems in the Sudan but uncertain and ambiguous as to the implications for the gum arabic crop. In retrospect, a major crop disaster resulting from the cumulative effects of drought and forced migration of starving populations could have been predicted. The market was still to a considerable extent being kept uninformed by the GAC of the harsh realities of the situation. High level government pressure may have been exerted to keep the news of disaster from coming out of the Sudan. It must also be remembered that definitive information from remote regions of a country with inadequate communications and transportation infra-structure is hard to obtain.

The second market report of the 1984-1985 season, issued January 15, 1985, acknowledged very poor results from the first tapping in the Western Sudan, but still expressed hope that tappings for the entire year would turn out satisfactorily because of the smaller but significant Eastern Sudan harvest as well as a hoped-for unusually large second tapping.

A top official of the GAC visited the U.S.A. market in early March, 1985, and made optimistic predictions about second tapping and described measures the GAC had taken to ensure the success of the tapping. The third market report he presented left listeners hopeful that the 1984-1985 harvest could reach 23 to 25 thousand MT. This official returned to the Sudan promising to inform the market promptly about the second tapping. Finally, in the middle of April, the GAC acknowledged the virtual total failure of the second tapping.

The GAC's fourth market report, issued May 1, finally acknowledged the failure of the 1984-1985 tappings, attributed the unpredicted disaster to unseasonal climate effects throughout the tapping periods, and suggested that the potential existed for a record-breaking collection in 1985-1986.

The bleak realities of the 1984-1985 season were as follows:

1. The gum arabic agents and distributors did not know of the existence or the severity of the supply crisis until it was too late for them to take measures to lessen the impact of the crisis on the end-user market. They were unable to build their inventories. They did not advise their clients to ration gum arabic usage to struggle through the crisis; had they been well-informed they might also have allocated the remaining supplies in such a way as to lessen the negative impact of the supply crisis on all users. Most end-users experienced a significant gum arabic shortfall during 1985. The shortages were experienced to differing degrees, and some parties even had more than enough inventory.

2. Gross perceived inequities in receiving scarce gum arabic supplies occurred. The largest U.S.A. importer of gum arabic actually received less product than three other importers. Other buyers also felt that they did not get their just share of supplies, which were allocated based on outstanding contracts rather than by averages of previous years of gum importations. Much of the gum arabic distribution network in the U.S.A. is therefore unhappy with the actions the GAC took after the crisis became apparent.

3. The U.S.A. market is generally most sympathetic to the great hardships that are being endured by the people of Sudan, but there is great doubt in the marketplace as to the reliability of the GAC as a supplier and of the Sudan as a major ingredient source.

This section reviews in detail the tabulated responses and comments of the gum arabic survey respondents to questions designed to measure the pre-1984-1985 crisis outlook and also the influence of 1984-1985 developments on actual purchases and future buying behavior. "Usage, Needs, and Projections", the first part of Section 4B, explores the quantitative details of the respondents' gum arabic business outlook. "Reasons for Considering Substitutes", the second part, evaluates the market's response to competitive offerings. "Reasons for Increased or Renewed Interest in Gum Arabic" asks the market to suggest ways the marketing of gum arabic could be improved to make the buyers happy and GAC sales bigger.

USAGE, NEEDS, AND PROJECTIONS: 30 Gum arabic users returned the "Gum Arabic Questionnaire" between late June and early September, 1985. Question 5 inquired:

"What is the projected annual shipment growth rate for your company's main products traditionally containing gum arabic (in cases, or pounds or other physical units) ... for 1984-1986? ... for 1990?"

For the 1984-1986 period, 19 replied "up 5 pct or more", 5 replied "up 5 pct or less", 3 replied "static", 1 replied "down 5 pct or less", and 1 replied "down 5 pct or more". As a group, the respondents felt their companies' products using gum arabic were growing in real terms, suggesting continued increased usage for gum arabic. Some of the increases anticipated were quite substantial. For 1990, 19 answered "up 5 pct or more", 5 answered "up 5 pct or less", 2 answered "static", 1 answered "down 5 pct or less", and 1 answered "down 5 pct or more".

***NOTE: This section uses actual answers from the questionnaires. However, not all parties answered every question, and therefore the totals do not always add up to 30.

The pre-supply crisis anticipation of general growth overall in gum arabic usage is further supported by the answers to Question 6:

"Before your company learned of the supply shortages, what was its 1985 gum arabic usage forecast as compared to 1984?"

17 answered "up 5 pct or more", 5 answered "up 5 pct or less", 6 answered "static", 1 answered "down 5 pct or less" , 0 answered "down 5 pct or more".

All the importers of gum arabic who responded to the importer's questionnaire anticipated increases of 5 pct or more. The respondents included two of the very largest importers. Several of the smaller importers suggested they expected very large increases. Some of the increases projected, especially for the smaller importers, might be their expectations of increased market share taken from importer competitors rather than actual increased tonnage to their existing customers or new users. However, the importers clearly expected good growth in their gum arabic tonnages during 1985.

One large importer made a "best guess" estimate that 11.4 thousand metric tons of gum arabic would have been imported from all origins during 1985 had supplies been abundant. For him, this represented real growth because the high level of 1984 buying was in his opinion strongly influenced by inventory building. He estimates that, had supplies been abundant, real U.S.A. gum arabic consumption in 1985 would have reached 9.5 thousand tons (lower than the study teams' 10.5 thousand ton estimate for 1984 usage).

The effects of the 1984-1985 supply crisis begin to become evident in the respondents' reply to Question 4:

"What percentage of your company's gum arabic requirements were filled by gum arabic purchases ... in 1984 ... in 1985?"

Nearly all respondents indicated that "95-100 pct" of their 1984 needs had been met with purchases, but for 1985, 6 answered "0-25 pct", 6 answered "25-50 pct", 5 answered "50-75 pct", 7 answered "75-95 pct", and 5 answered "95-100 pct".

When a buyer is unable to obtain enough of a basic ingredient for his product, he is not able to meet his essential responsibility of keeping the production lines moving. The problem becomes a company-wide issue, because issues broader than routine purchasing issues must be considered: "Is reformulation necessary and possible?", "Can scarce product somehow be found using extraordinary means such as paying very high prices?", "What is the effect of the ingredient supply shortage on the comprehensive marketing program for the finished product?" For example, must plans for product promotion be altered?" The preceding questions are examples of questions interviewed endusers told the study team had been raised in company meetings on the crisis.

One large importer of gum arabic believes that "25-30 pct" of all U.S.A. gum arabic needs will not be met during 1985. He comments that "I think a lot of customers had large inventories". However, this importer calls all acacia gums "gum arabic" or "gum acacia", and his estimate of the shortfall in Sudanese gum arabic supplies would be much greater. The other gum arabic importers reported being able to obtain (with one exception) under half of their gum arabic requirements; the import statistics presented in Chapter 2 suggest that probably under 25 pct of importer gum arabic needs were met by Sudanese gum arabic.

Question 7 further reveals the effect of the supply crisis both on 1985 usage and anticipated future usage:

"Based upon the information you presently have, how much gum arabic will your company use in 1985 as compared to 1984? ... in 1986 as compared to 1984?"

For 1985, 4 answered "up 5 pct or more", 3 answered "up 5 pct or less", 2

answered "static", 1 answered "down 5 pct or less", 20 answered "down 5 pct or more". For 1986, 6 answered "up 5 pct or more", 2 answered "up 5 pct or less", 2 answered "static", 1 answered "down 5 pct or less", and 18 answered down 5 pct or more".

Even when presented with the near-optimal scenario of abundantly available gum arabic supplies and near-1984 price levels, the outlook of the respondents as a group toward the future of gum arabic in their product's composition was not very positive. Question 8 asks:

"If by the first quarter of 1986 your company can obtain as much gum arabic as required at prices close to 1984 levels, would your 1986 usage (as compared to 1984) be... 1987 usage ..."

For 1986, 11 answered "up 5 pct or more", 2 answered "up 5 pct or less", 4 answered "static", 2 answered "down 5 pct or less", and 10 answered "down 5 pct or more". For 1987, 12 answered "up 5 pct or more", 2 answered "up 5 pct or less", 2 answered "static", 1 answered "down 5 pct or less", and 8 answered "down 5 pct or more".

One of the largest importers is very pessimistic about the future of gum arabic, especially as a product to be handled by his company. Even under the near-optimal scenario, he estimates his company's 1986 usage at "25 percent" of 1984 and 1987 usage at "20 percent". The other much smaller respondents replied quite bullishly to this question, but their replies probably refer to their hoped-for increased share of business rather than expected growth in gum arabic usage.

REASONS FOR CONSIDERING SUBSTITUTES: The study team was most interested to know the reasons gum arabic users have for switching or considering switching from gum arabic to gum arabic substitutes. Question 9 asked:

"If your company presently uses or plans to use an alternative product to gum arabic, what were the reasons for the change or for the initial decision not to use gum arabic?"

- The alternative results in a better product. (1)
- The alternative is more cost effective. (2)
- The alternative is a more assured supply source. (3)
- The alternative is provided by a more helpful or reliable vendor. (4)
- The alternative is the traditional ingredient and there is insufficient incentive to reformulate. (5)
- The alternative is more consistent in quality. (6)
- Other: (7)

As of September 30, 1985, 30 gum arabic users had responded.

The percentage giving a particular reason was as follows:

REASON :	ANSWERS							NUMBER OF RESPONDENTS
	1	2	3	4	5	6	7	
Percent of all segments:	10	57	80	27	7	13	10	30
=====								
Percent by Segment:	Answers							
	1	2	3	4	5	6	7	
Segment A:	7	57	93	21	7	21	21	14
Segment B:	0	80	80	20	0	0	0	5
Segment C:	100	100	100	0	0	100	0	1
Segment D:	17	33	67	33	0	0	0	6
Segment E:	0	100	100	0	0	0	0	1
Segment F:	0	33	67	0	0	0	0	3

To obtain greater insight into the motivation for substitutes, Question 11 of the Gum Arabic Questionnaire asked respondents to rank the reasons for substitution in order of interest. Not all parties ranked their responses. Unranked circled answers were equally ranked for inclusion in the ranking table. For example, if a respondent circled two answers, but did not rank them, he

would be tabulated as having ranked each reason first 0.5 times and second 0.5 times. Results are rounded to the nearest tenth:

RANKING OF REASON -----	NUMEER OF TIMES A REASON RECEIVED A RANKING						
	1	2	3	4	5	6	7
First	.5	5.1	17.1	1.3	0	0	3
Second	.5	7.8	4.1	1.3	0	1	0
Third	1.5	2.8	.8	1.8	0	1	0
Fourth	.5	1.5	.3	.5	0	2	0
Fifth	0	0	0	1	1	0	0
Sixth	0	0	0	1	1	0	0
Total	3	17	25	7	2	4	3

It was not surprising to the study team that the overwhelming stimulus to reformulation was the supply shortage. However, it does appear that in quite a few cases that stimulus presented an opportunity for gum arabic substitutes to demonstrate greater cost effectiveness for a given application. More than half of all the questionnaire respondents (17 out of 30 respondents) were of the opinion that the substitutes were indeed more cost effective. This advantage is in comparison to the 1984 price levels for gum arabic, not the inflated levels at which some spot sales were made during 1985. Less than a quarter of the respondents listed any of the other reasons for reformulation, thereby adding strongly to the impression that greater cost effectiveness is the key second factor in gum arabic's loss of U.S.A. market share.

The following written comments were also received in answer to questions 9 and 11:

A. FLAVOR OIL CARRIER

Major User: Lack of availability

500+ MT User: Going to substitute is strictly a fall back position in case Sudan can't meet minimum requirements. Those that do must do so because of import problems.

100 MT User: Gum Acacia is the product of choice. There are cleanliness problems; due to regular shortages it is prudent not to be dependent on it and constantly change formulations.

500+ MT User: Inability to get gum arabic at reasonable prices

B. CANDY INGREDIENT

200+ MT User: With fast-growing usage: N/A (meaning "not applicable", his company has no plans to switch away from gum arabic.

C. VITAMIN/FOOD SUPPLEMENT

100 MT USER: "Possible"(to the statement:The alternative results in a better product). "Not necessarily so" (to the statement:The alternative is provided by a more helpful or reliable vendor)
"Note: At this time we do not have final approval for an alternate material, so therefore my answers to #9 are speculative"

D. LITHOGRAPHY SOLUTIONS

200+ MT User: Did not fill out the questionnaire, indicating he had no intention of substituting for gum arabic

G. MISCELLANEOUS-INDUSTRIAL

250 MT User: An alternative acacia species, e.g. Talha, to since there is greater assurance of supply

100 MT User: Testing stage

IMPORTERS

1000+ MT Importer: I feel at this point that the flavor business losses are almost non-recoverable primarily due to the problems associated with label changes. Also lost will be carbonless paper. There might be a slight recovery in the printing industry.

100+ MT Importer: "in some applications" (to the statement: The alternative is more cost effective)

50+ MT Importer: "N.A." (no plans to buy a gum arabic substitute)

AGENTS

1000+ MT Agent: Talha also any other combination of gums or starches lower in price than arabic currently (this in response to a question about the switch by agent's clients to substitutes)

REASONS FOR INCREASED OR RENEWED INTEREST IN GUM ARABIC: Question 10 from the questionnaire challenged endusers to advise the study team on the steps which could be taken to rebuild the Sudanese gum arabic business:

- "Which of the following actions would increase your company's interest in using more gum arabic than is presently planned? The development of improved grades or mixes of gum arabic blend specialties for specific or new applications (what improvements would you like to see...for what applications?) (1)
 Lower price(s) for the gum arabic grade(s) your company is already familiar with (what price would make increased or renewed usage worth considering?) (2)
 Improved service from the gum arabic vendors (what improvements would you most like to see?) (3)
 Better information (what data has been lacking that you need?)(4)
 Guaranteed availability of goods (what form should such a guarantee take to be the most useful to you and your company?)(5)
 Other: " (6)

The percentage of the 30 responding gum arabic users suggesting a particular action was as follows:

ACTION :	(1)	(2)	(3)	(4)	(5)	(6)	Total respondents
Percentage:	27	73	30	30	73	13	30
(Endusers Only)							
=====							
Percentage by Segment:	1	2	3	4	5	6	Total respondents
Segment A:	21	64	43	36	79	7	14
Segment B:	20	100	20	20	80	20	5
Segment C:	100	100	0	0	100	0	1
Segment D:	33	83	17	33	67	0	6
Segment E:	0	100	0	0	100	0	1
Segment F:	33	33	33	33	33	67	3
Importers:	20	60	40	60	60	20	5
Agents:	25	25	25	25	50	25	4*

*Two agents returned the questionnaire advising they no longer deal in gum arabic.

One of the two most important positive actions to be taken, according to the respondents, is the "guaranteed availability of goods". Repeatedly during the interviews, purchasing agents, their superiors, and also technical personnel

stressed the great disruption encountered when material became unavailable, especially without sufficient warning.

Lower prices was given about as much importance as guaranteed availability of goods as a stimulant to increased interest. Much lower prices, rather than 5 to 15 percent reductions, were suggested by the respondents to the questionnaire and by many of the interviewed parties (this subject will be discussed in greater detail in Chapter 5).

Segment A respondents gave guaranteed availability some extra emphasis as compared to the group as a whole while Segment B and D users gave lower prices some relatively extra emphasis in the responses as compared to the group as a whole. The companies using gum arabic as a flavor oil carrier use a small percentage of gum arabic in their products while candy and lithography solution makers use much higher percentages; the study team found that other questionnaire and interview comments also revealed greater concern with price on the part of endusers with a higher percentage of their raw material costs from gum arabic.

The following written comments were also received in answer to question 10. (NOTE: the numbers in parentheses represent the question answer number to which the reply refers.):

A. Flavor Oil Carrier

Major User(2)50% reduction

(4) More reliable, timely & credible market information and reports.

(5) Guarantee 100% of annual requirement at the beginning of each year.

Major User:(3) 90+% of crude into USA destined for Buyers who have no spray drying equipment goes through ONE spray drying Co. Need more than just "(already subcontractor for spraydried gum arabic)".
(6) We'll use Sudan gum as long as available and only sales will increase our usage.

100 MT User:

(6) More consistent availability and lower prices. The shortages are becoming too common and therefore are forcing users to seek alternatives which are more readily available and cheaper.

100 MT User: (6) Low in mold or bacteria
1.Guaranteed goods 2.Development improved grades
3.Lower prices

100 MT User: (4) Accurate crop information
(5) Guaranteed minimum inventories in U.S. Brokers' hands
Binding purchase contracts on quantity and pricing.

100 MT User: (2) \$.85-\$.95/lb (for spraydried)
(3) Improved & continuous supply of high quality, reasonably priced, spraydried material

250 MT+ User: (2) Lower prices

500 MT+ User: (5) Larger inventory position

Leading scientist for 500 MT+ User: (3) Reliability of supply and dependable price consistency

B. CANDY INGREDIENT

200 MT User with very fast-growing usage:
(1) Better quality, detailed specifications
(2) 15-20% lower price compared to 1984.
(4) Detailed analysis of shipments
(5) Contract

250 MT UserB:(2) 65-85 cents/lb
(3) Warehouse situation capable of circumventing the loss of a full or partial crop year.
(6) Better control of allocations to sales agents by the GAC.

100 MT User: (2) \$1 per lb (for powdered gum arabic)

C. VITAMIN/FOOD SUPPLEMENT

100 MT USER: (5) Spraydried

D. LITHOGRAPHIC SOLUTIONS

100 MT User: (5) Supply very unreliable. We are eliminating gum as fast as possible.

100 MT User:(6) Assured availability at lower price & better quality.

E. Carbonless Papers

250 MT User: (2) One dollar or less firm ((for spraydried))

F. Miscellaneous-Industrial

100 MT User: (6) None, only increased sales of finished product.

300 MT User:(1) Higher quality (less sand and bark) in siftings with a stable price structure.
(2) 60-70 cents/lb delivered for purified siftings.
(3) Adequate supplies from several domestic processors to develop a competitive business climate.
(4) Accurate market prices for various forms offered by the Sudanese Gum Arabic Company, Ltd. to foreign buyers/processors.
(5) A monetary penalty by the supplier to the purchaser if the supplier fails to live up to a negotiated supply/price arrangement.
(6) An alternative acacia species, e.g. Talha to gum arabic since there is greater assurance of supply

IMPORTERS:

100 MT+ Importer: Better and more reliable shipping. More careful paper handling
(3) Exact & precise information on shipments.
(4) More accurate information on future availability. Warnings when supplies are questionable.
(5) Inventory of raw material outside the Sudan-preferably in U.S.
(6) Reduction of preferential treatment of certain importers. All should be treated equally & given equal chance to compete.
(6) Above plus a longterm campaign designed to rebuild (or create credibility between customers and the Sudan.

50 MT Importer: (5) A real guarantee!

25 MT Importer: (3) Confirmed contracts. I would like to be sure the shipper will ship if I already have a contract

1000 MT+ Importer:

- (1) spraydried flavors and new uses
- (2) 75 cents per pound for spray dried arabic
- (3) stability of supply and price
- (4) a good public relations program stressing the technical advantages of gum arabic
- (5) warehouse stocks in U.S. or reduced shipping time from Sudan to U.S.

AGENTS

1000 MT+ Agent:

- (1) Lots without "stringiness" for customers for whom that is a problem. More careful grading for less viscosity development in heavy concentrations.
- (2) 10-15% percent price reduction might be a big promotional stimulus
- (3) More support of the GAC's biggest boosters when times are difficult. The allocation system this year was disastrous.
- (4) Monthly reports on crop + infrastructure. Advance news of any and all developments. More about what is happening internationally.
- (5) "SGS" certified inventories of the buffer stocks strictly assigned to fulfilling particular contracts. Uniform policy linked to helping those who most help the GAC.
- (6) Promotion and R&D . Stronger responsiveness to the U.S.A. market needs through a more informed, active, growth-oriented, open, and responsible marketing policy .

Interviews with additional gum arabic industry participants elicited more detail on market reactions to the Sudanese gum arabic supply crisis. That additional information will not be presented comment-by-comment in this study, except to strengthen or clarify subjects presented in this and succeeding chapters.

DESCRIPTION OF MARKET SHARE LOSS - 4C

In Chapter Three, the competition for Sudanese gum arabic was introduced and described. In the first two sections of this chapter, the 1984-1985 crisis was described and the market's reaction as expressed in the gum arabic Questionnaire responses were tabulated and interpreted. This section describes the changes in gum arabic usage which have occurred during 1985 and are projected to occur during 1986. Questionnaire, interview, and trade information are assimilated to describe the key events which have occurred in each of gum arabic's U.S.A. market segments. The descriptive treatment presented in this section will be followed by Chapter Five's more quantitative analysis of the segment-by-segment price elasticity of demand and gum arabic usage projections under various scenarios of price and availability.

SEGMENT A-1: OWN-USE LIQUID BEVERAGE EMULSION

There are conflicting rumors as to the size of the two largest users' inventories, but one of the two may have ran out of gum arabic during the third quarter of 1985. Other users are in similar difficulties and reformulation efforts are taking place. Gum arabic remains the flavor carrier of choice, but several major companies have decided that it is a premium product which may be replaced without meaningful product quality loss in some canned, low quality, dark-colored, children's, and even some acidic beverages.

Substitutes are also being considered for the "emulsion cloud" effect achieved with the aid of gum arabic in some beverages. Emulgum, modified starch gums (especially from National Starch, A.E.Staley, and American Maize Products)

are important substitutes being widely considered. Ethylene glycol, gelatin, and altered flavor homogenization processes are also reducing - permanently to some considerable degree - gum arabic usage.

Most companies in this market segment will currently pay twice or more of the 1984 prices to promptly obtain quantities of Sudanese gum arabic in any form, and many report obtaining spot product from other users as well as European sellers. This apparent price elasticity of demand is temporary only and reflects desperation to deal with immediate shortages at a time when longterm solutions to the gum arabic supply problem are not yet available. Based upon the data obtained the study team, it appears that most companies in this segment are not yet convinced that there are any suitable substitutes for the higher quality beverage emulsions, including low calorie beverages. There should be an eager return to gum arabic for a major portion of usage if supplies return to normal before reformulation and labelling decisions are made. The timing of renewed arrivals of gum arabic to the U.S.A. appears to be crucial: the longer the supply crisis continues, the more gum arabic applications in this segment will be permanently lost.

SEGMENT A-2: OTHER OWN-USE LIQUID AND SPRAYDRIED EMULSION FOR FOOD AND BEVERAGES

Much of this segment was lost to gum arabic after the 1972-1975 crisis, and permanent losses have already occurred. The largest user announced to the press during the second quarter reformulation of many products away from gum arabic, the principal exception being in citrus products. One very large company, a medium-sized gum arabic user, is now undecided whether to continue considering gum arabic as an ingredient for a major dessert product launching being

prepared. Visual characteristics of some of the products in this segment are less vital than for Segment A-1, and permanent reformulation for more than half the segment is quite possible. Gum arabic's purported special non-caloric and non-cariogenic (e.g. does not cause tooth decay) characteristics give it tremendous potential in this segment, but without assured supplies or stable prices there seems little interest in conducting research to prepare for major product development based on those characteristics. Modified starches, dextrans, malto-dextrans, and formulations containing acacia gums (not necessarily Sudanese gum arabic) are being increasingly used.

SEGMENT A-3: CUSTOM EMULSION MANUFACTURE

This segment has quite sophisticated research and development capabilities and was among gum arabic's biggest areas of market share loss during 1972-1975. Very large and most permanent market share losses are again anticipated for this sector. The biggest, most influential user in this category was among the first to prepare contingency plans for the crisis. That user's gum arabic buyer proudly, if sadly, informed the study team that it has reformulated 5,000 products out of gum arabic to starch substitutes.

Other segment participants have followed the same path to varying degrees. The reformulation costs are quite substantial, but these companies sell custom formulations in a highly competitive environment; they are unwilling to have their customers impatiently awaiting deliveries or chafing at having to pay higher prices because of spot gum arabic prices more than twice and sometimes as much as 10 times 1984 levels. Many of the participants in this segment recall the 1972-1975 crisis, are highly sceptical of any reports of improved 1985

deliveries, and are quite outspoken in their unwillingness to have their business made vulnerable to gum arabic supply interruptions.

One hopeful aspect of the reformulation surge occurring in Segment A-3 is the conservatism of its clients. Changing labelling is tedious, often involves regulatory agencies, and is costly, especially when already printed packaging may need to be destroyed. The sooner gum arabic supplies reach the U.S.A., the larger the number of final users will decide to endure the uncertainties of supply from Africa in order to avoid the shortterm pain of relabelling.

SEGMENT B-1: HARD AND GUMMY DIETETIC CANDIES

This is perhaps the market segment of most rapidly growing gum arabic usage although annual volume is still only about 200 MT. The leading manufacturer advises that there is a ready potential to achieve a usage of 1,000 MT within 5 years, but this is contingent on availability, price, and quality. In questionnaire and interview data, no indication of intentions to switch to substitutes is present, but a reduced calorie substitute, polydextrose from Pfizer, is readily available to low calorie food and candy manufacturers who can no longer accept the uncertainties of using gum arabic as their bulking agent.

SEGMENT B-2: NONDIETETIC HARD AND GUMMY CANDIES

Before the 1972-1975 crisis, several of the biggest users of gum arabic belonged to this segment. The hard cough drops and gummy children's candies that they manufactured using gum arabic were largely reformulated with modified waxy maize starches and other products. The Henry Heidi Candy Company, for example,

reportedly purchased in one year more than 700 MT of gum arabic. The companies that were still using gum arabic in early 1985 are now using substitutes, notably gum talha, to meet their requirements. There is a large roster of starch substitutes that are apparently performing successfully in other candies.

The users in B-2 are therefore in a position to demand that gum arabic vendors win back the business with price concessions and better performance guarantees. Even small price increases will lessen the chances of a gum arabic usage recovery in this segment.

SEGMENT B-3: COATED CANDIES, FRUITS, AND NUTS

Some of this segment is permanently lost to gum arabic sales. The crisis provided the incentive to test substitutes, and the successful panning and glazing trials using much more cost-effective modified food starches pushed gum arabic out. The largest user is presently enduring the crisis by using gum talha and another product containing acacia gums; this company is committed to producing coated confections of highest possible quality and therefore hopes to return to total reliance on gum arabic. However, this user advises that if the 1986 price is much higher than 1984 levels, their commitment to 100 percent use of the product will have to be reconsidered.

SEGMENT C: VITAMIN AND NUTRITIONAL SUPPLEMENTS

In the vitamin pre-mix portion of this segment, active trials are underway to replace spraydried gum arabic permanently. The crisis has interfered with production campaigns, and such disruptions caused company-wide crises that

diverted resources from more constructive (money-making) activities. Sudanese gum arabic is a minor cost in these formulations, but soon it will probably be eliminated from most of its applications after the exceptionally costly reformulation and relabelling procedures for this industry are completed on a product-by-product basis. Spraydried gum arabic is still the product of technical choice because of its film-forming and non-dusting properties as well as its exceptional stability. However, the shock of the shortage has led to decisive action.

The study team did not obtain enough information on gum arabic's usage in the nutritional supplement area to be confident of its projections. However, other carriers and dispersants of calcium supplements are available at lower cost (starches and probably other natural gums), and reformulation using products (starches, dextrans, other bulking agents) providing equivalent functionality at lower cost is likely.

SEGMENT D: INK INGREDIENT FOR LITHOGRAPHIC FOUNTAIN AND SENSITIZING SOLUTIONS

The substitutes being used by most companies in the industry are gum talha and Lithogum . Gum arabic remains the product of choice, especially for the highest quality fountain solution jobs. However, several of the biggest users have been able to "clean up" gum talha, making it suitable for almost all jobs. The degree of Sudanese gum arabic recovery in this industry will be very closely linked to its price as compared to the price of the substitutes. Some companies may blend gum talha and gum arabic to keep raw material costs low without sacrificing any essential quality. This is an industry with very price competitive products, and the acacia gums constitute a major part of the raw

material costs.

Sterabic and other starches are not suitable substitutes in this industry except for several small highly specialized applications in the protection of lithographic plates.

SEGMENT E: INK ENCAPSULATOR FOR CARBONLESS PAPER - E

In 1982, Appleton Papers, the largest user of gum arabic in carbonless papers, switched from the gelatin-gum arabic capsule wall system to a "synthetic capsule" (probably modified starch) system. This eliminated their gum arabic usage in favor of a much less costly and functionally equivalent system. One industry observer suggested that spraydried gum arabic at USD 1.00 per pound (USD 2.20 / kilo) would make gum arabic competitive for this usage. However, gelatin is the larger part of the raw material cost of the capsule wall. Gelatin prices are presently at the lowest levels in years, but stability testing of the synthetic gum encapsulating system continues.

Without the 1984-1985 crisis, the future of gum arabic in this sector was already in jeopardy. The crisis has made reformulation more attractive, and an industry participant predicted the end of most gum arabic usage in carbonless papers by the end of 1986.

SEGMENT F-1: INSECTICIDE CARRIER

The film-forming property of gum arabic is most important for this application. The industry prediction is that other acacia gums will perform

properly and that product choice will in the future be closely linked to price.

SEGMENT F-2: PETFOOD (BIRDSEED GLAZE)

The industry participants in this segment perhaps had larger inventories and were therefore less upset by the crisis than others. Reformulation has not been discussed. Gum arabic usage is reportedly static in this segment .

SEGMENT F-3: TOBACCO FLAVOR CARRIERS

Reformulation testing is underway, but the substitute being tried is unknown. Gum arabic is unusual in not "masking" the flavor of the oils it protects and carries, but acacia gum formulations and improved modified starches have been successful in Segment A-3 and may well prove cost effective replacements for gum arabic in Segment F-3.

SEGMENT F-4: MISCELLANEOUS USES (PHOSPHATE MINING, HIGH-TECH CERAMICS)

The study team did not obtain enough information on this segment to be confident of its predictions. However, the supply crisis would certainly discourage companies from using gum arabic in new applications, and other products can probably be readily formulated to replace gum arabic in phosphate mining. The mining application is probably very price elastic once the shock of shortage stimulates users to look at gum arabic substitutes.

CHAPTER FIVE DEMAND PRICE ELASTICITIES

THE 1985 AND LONGTERM CONTEXT - 5A

As of mid-September, 1985, U.S.A. demand for gum arabic, future prices, and, above all, the outlook for supply were all shrouded in uncertainty. The only decision that could be made with confidence in this environment was a decision to drop the usage of gum arabic; without tangible evidence of any actual new crop arrivals, The Gum Arabic Company and its distributor network were unwilling to make optimistic projections that might again be proven totally inaccurate.

The price elasticity of demand in each of gum arabic's market segments is closely related to the pricing of competitive products, and the quality of finished product obtained using gum arabic versus using the competition. The degree of confidence users have in longterm gum arabic availability, quality, and price stability will also influence procurement decisions. In Chapter 2, we discussed gum arabic pricing. In Chapter 3, we described the competitive products and described their overall pricing structure and economics. In Chapter 4 we examined in detail survey responses of the market to the crisis and the consequent reopening of the issue of whether to continue using gum arabic. In this chapter, information thusfar gathered is combined to attempt statements as to 1986 gum arabic usage given different gum arabic prices. All the other variables are held constant, such as the renewal of deliveries, renewed user confidence, and marketing efforts undertaken by The Gum Arabic Company and its distributors.

The conditions affecting demand will be fixed under two different scenarios. The first scenario, which shall be called "Near Optimal Scenario", assumes that several thousand tons of gum reach the United States by the end of the first quarter of 1986, an abundant harvest is shipped rapidly to the U.S.A., and renewed user confidence in gum arabic develops because of effective marketing and outstanding deliveries. Given this near-optimal scenario, a 1986 usage projection is made in Section 5 B presuming gum arabic prices are maintained at 1984 levels. In Section 5 C, the conditions of 5 B are held constant with the exception of price and estimations of the change in usage in each segment is made.

In Section 5 D, the influence of non-price factors on demand is estimated. In Section 5 E, the study team guesses at a "Most Likely Scenario", that is, a set of conditions that are its expectations of what the non-price factors influencing demand will be during 1986. With these most likely conditions fixed, price elasticity of demand is again assessed.

The short term uncertainties are so great that it is quite difficult to focus on long term price elasticity of demand. For 1986, mainly situations are evaluated where there is current gum arabic usage which may increase if price is lowered or decreased (possibly being totally eliminated) if the price is increased. There are no circumstances that the study team knows about for 1986 where a decrease of price, possibly coupled by other incentives or developments, would lead to the introduction of gum arabic into a new application (although several new products similar to existing lines might be introduced). With future marketing and research and development improvements, new potential applications may develop and corporate decision makers may be influenced by the

price of gum arabic; that is to say, in the future, new uses for gum arabic may be important factors when price elasticity and demand are evaluated.

This research project has assembled sufficient data to suggest demand/price elasticity for the next several years. In earlier chapters, it has been pointed out which segments must make difficult and costly decisions before altering product formulas; such market segments will tend to be more inelastic over the long term, whereas those segments which can readily substitute products for gum arabic temporarily when convenient will tend to be more price elastic over the long term. At this time, greater detail cannot be offered concerning long term/price elasticity. However, the database assembled as part of this project can be used as the starting point for studying this question as part of overall marketing program development.

NEAR-OPTIMAL SCENARIO - 5 B

In this section gum arabic usage by industry segment is projected for 1986. The estimates are presented in terms of the number of tons of Cleaned Amber Sorts required to yield the total tonnage of various grades obtained and also in terms of NEU'S A nearly optimal scenario is assumed. A bumper 1985-1986 crop occurs, and about 3,000 metric tons of Cleaned Amber Sorts are dispatched to the United States before the end of the first quarter of 1985 at prices approximately the same as the announced 1984 levels. Excellent information presentation has convinced those users and importers willing to take the risk that gum arabic supplies will once again be reliable. An estimate of real usage is attempted. The study team ignored the probable extra initial purchases that will be made by many to rebuild and possibly permanently increase inventories to lessen vulnerability to shortage.

To develop the following estimate, the study team considered all the information it obtained from all sources and estimated what the 1986 usage for each enduser should be. Individual estimates were blended into industry profiles. The endusers themselves, in many cases, cannot predict their 1986 usage and it is therefore stressed that the data presented in Chapter Five is highly speculative.

Appendix 5B contains data on pricing and price elasticity of demand mostly not presented elsewhere in this report. This additional data was also considered by the study team when the projections in this chapter were made.

The questionnaire and interview responses dealt frequently with real industry growth, and this data has been used to project hypothetical increased gum arabic usage. Census of Manufacturers data was also sometimes consulted as a check on the "realism" of the industry respondents' comments on industry growth. It may be useful when setting future goals to compare 1986 projections under present conditions with what might have been had adequate supplies at the announced prices been available also during 1985. These projections will be given under the column labelled "1986 HYPOTHETICAL (CEU'S)". Quantities are, as usual, in thousands of pounds with numbers in parentheses in units of thousands of MT.

INDUSTRY SEGMENT	ACTUAL 1984 CEU'S LBS	HYPOTHETICAL 1986 CEU'S LBS	PROJECTED 1986 CEU'S NEU'S LBS	
-----	-----	-----	-----	-----
SEGMENT A-1: LIQUID BEVERAGE EMULSION MAKERS FOR IN-HOUSE USAGE				
	6,533 (3/0)	7,111 (3.2)	6,471 (2.935)	7,111 (3.2)
SEGMENT A-2: OTHER OWN-USE LIQUID AND SPRAY-DRIED EMULSION FOR FOOD AND BEVERAGES				
	1,793 (0.8)	1,850 (0.8)	375 (0.2)	412 (0.2)
SEGMENT A-3: CUSTOM EMULSION MANUFACTURE				
	5,225 (2.4)	5,852 (2.7)	1,625 (0.7)	1,786 (0.8)
SEGMENT A TOTALS				
	13,551 (6.2)	14,813 (6.7)	8,471 (3.8)	9,309 (4.2)

INDUSTRY SEGMENT	ACTUAL 1984 CEU'S LBS	HYPOTHETICAL 1986 CEU'S LBS	PROJECTED 1986 CEU'S NEU'S LBS	
-----	-----	-----	-----	-----
SEGMENT B-1: DIETETIC HARD AND GUMMY CANDY				
	394	591	591	649
	(0.2)	(0.3)	(0.3)	(0.3)
SEGMENT B-2: NONDIETETIC HARD AND GUMMY CANDY				
	288	308	105	115
	(0.1)	(0.1)	(0.1)	(0.1)
SEGMENT B-3: COATED CANDIES, FRUITS, AND NUTS				
	2,347	2,372	1,579	1,735
	(1.1)	(1.1)	(0.7)	(0.8)
SEGMENT B TOTALS:				
	3,029	3,271	2,492	2,738
	(1.5)	(1.1)	(0.5)	(1.2)
SEGMENT C: VITAMIN AND NUTRITIONAL SUPPLEMENT MAKERS				
	960	1056	600	659
	(0.4)	(0.5)	(0.3)	(0.3)
SEGMENT D: INGREDIENT FOR LITHOGRAPHY				
	3,490	4,188	2,173	2,388
	(0.6)	(1.9)	(1.0)	(1.1)
SEGMENT E: IMC ENCAPSULATOR				
	825	825	0	0
	(0.14)	(0.4)		
SEGMENT F-1: INSECTICIDE CARRIER				
	700	825	431	474
	(0.3)	(0.4)	(0.2)	(0.2)

INDUSTRY SEGMENT	ACTUAL	HYPOTHETICAL	PROJECTED 1986	
	1984 CEU'S LBS	1986 CEU'S LBS	CEU'S	NEU'S LBS
SEGMENT F-2: PET FOOD				
	235	247	247	271
	(0.1)	(0.1)	(0.1)	(0.1)
SEGMENT F-3: TOBACCO FLAVOR CARRIER				
	196	205	206	226
	(0.1)	(0.1)	(0.1)	(0.1)
SEGMENT F-4 MISCELLANEOUS				
	100	100	0	0
	(0.1)	(0.1)		
SEGMENT F: TOTALS				
	1,231	(0.6)	884	971
	(0.6)	(0.6)	(0.4)	(0.4)
TOTALS:	23,086	25,531	14,421	15,847
	(10.5)	(11.6)	*(6.5)	(7.2)

*about 63 per cent of 1984 usage
about 56 per cent of 1986 hypothetical usage

ESTIMATION OF DEMAND/PRICE ELASTICITY FOR "NEAR-OPTIMAL SCENARIO" - 5C

TABLE 5C is a worksheet representing the study team's efforts to assess price elasticity of demand for each market segment based upon all data available, especially interviews and questionnaires. "Baseline" usage is the estimation of consumption under the condition of gum arabic prices remaining at 1984 announced levels. Even without a price increase, a loss of more than one-third of the market is projected.

A 10 percent price increase or decrease causes less than 8 percent consumption changes from the baseline level. The losses are in the price elastic sectors D, F, and, to a lesser degree, A-3. However, 25 and 50 percent price changes have very marked effects; the savings or losses associated with such large price changes may strongly influence the "go or no go" decisions of many users forced by the crisis into evaluating gum arabic substitutes. At least a 25 percent gum arabic price decrease is needed in most cases to make gum arabic competitive with the substitutes. Those users who decide to continue with gum arabic after the crisis will mostly accept moderate price increases if supplies are assured.

TABLE 5C: PROJECTION OF PRICE ELASTICITY OF DEMAND GIVEN
"NEAR-OPTIMAL SCENARIO"

NOTE: Price increases or decreases are percentage changes from the 1984 announced "Baseline Level" of USD 1600/ MT FOB Pt.Sudan All quantities are expressed in CAS Equivalent Units (thousands of pounds) with totals also expressed in metric tons (thousands).

SEGMENT /	PROJECTED 1986 CONSUMPTION						
	GIVEN PCT			CAS	PRICE CHANGE OF :		
	DOWN 50	DOWN 25	DOWN 10	BASELINE	UP 10	UP 25	UP 50
A1	7111	6800	6471	6471	6471	5800	4300
A2	1850	750	375	375	375	250	0
A3	4600	2010	1790	1625	1465	1300	1000
B1	1180	770	591	591	591	470	300
B2	308	105	105	105	105	0	0
B3	2250	1579	1579	1579	1579	1175	400
C	1056	950	600	600	600	0	0
D	4600	4188	3000	2173	1950	1740	1000
E	604	604	0	0	0	0	0
F1	825	825	520	431	350	0	0
F2	247	247	247	247	247	247	0
F3	206	206	206	206	206	0	0
F4	200	100	0	0	0	0	0

TOTALS:							
	25037	19134	15484	14421	13939	10982	7000
Metric tons	(11.4)	(8.7)	(7.0)	(6.5)	(6.3)	(5.0)	(3.2)
Percent of Baseline	174	133	107	100	97	76	49
Percent of Hypothetical 1984	98	75	61	56	55	43	27

INFLUENCE OF NON-PRICE FACTORS ON DEMAND - 5D

Section 4B reviewed questionnaire respondents' comments about the factors that encouraged reformulation and those factors which might stimulate renewed usage. Assurance of supplies was found to be the central factor in reformulation decisions. Price and supply assurance shared nearly equal importance as potential stimulants for renewed usage. Other factors, most linked to better information and overall service, were also significantly mentioned.

At the end of 1985's third quarter, adequate new crop supplies were by no means assured, although conditions were reported by The GAC to be favorable for a good crop. Very little information was coming from the Sudan, and great concern and disappointment over 1985 among users and importers remained. There was widespread uncertainty and scepticism about the future course of gum arabic supplies and the GAC sales policy. If fourth quarter 1985 or 1986 gum arabic supply and GAC policy developments in any way confirm the U.S.A. market's suspicions, usage will be adversely affected as compared to the "Near Optimal Scenario". Table 5D attempts a segment-by-segment projection of a "Most Likely Scenario":

An average or slightly better 1985-1986 crop occurs. About 1,000 metric tons of Cleaned Amber Sorts are dispatched to the United States before the end of the first quarter of 1985 at prices equal to the announced 1984-1985 prices. Logistical problems and inadequate information transmission continue to occur, contributing to a sense of uncertainty among the users as to whether supplies will arrive in a timely fashion. Continued political instability and economic crisis in the Sudan keeps that nation's condition in the view of the purchasing agents and corporate decision-makers.

Real usage only is estimated, ignoring probable inventory rebuilding and even extra stocking to avoid vulnerability to future shortages. . Quantities are thousands of pounds with thousands of MT's in parentheses.

TABLE 5D: M O S T L I K E L Y S C E N A R I O

INDUSTRY SEGMENT	"NEAR-OPTIMAL SCENARIO" (CEU'S)	"MOST LIKELY SCENARIO" (CEU'S)
A-1	6471	4314
A-2	375	375
A-3	1625	1100
B-1	591	591
B-2	105	105
B-3	1579	1579
C	600	480
D	2173	1950
E	0	0
F-1	431	431
F-2	247	247
F-3	206	206
F-4	0	0
TOTALS	14421 (6.6)	11378 (5.2)

The loss of about 20 percent of the Near-Optimal Scenario market under the Most Likely Scenario would principally reflect the reformulation decisions of a few of the remaining makers of flavor emulsions, principally liquid flavor beverage emulsions. These are very loyal gum arabic users, but the continued perceived crisis of supply and credibility into 1986 would reportedly convince several to abandon the use of gum arabic. Small further losses in Segments C and D would probably occur for the same reasons. Decreased usage should be clearly reflected in an import decline during the second half of 1986 into early 1987 after inventory rebuilding is finally completed (if supplies are abundant)

In Section 3D, the widespread availability and low basic costs of most of the gum arabic substitutes was stressed. One possible exception is gum talha, which is under the control of GAC. During 1985, several importers aggressively and successfully promoted talha as a substitute for gum arabic. Its much lower price and processing improvements have helped establish talha as a permanent gum arabic substitute in some applications. However, the GAC advised in August, 1985, that there is some uncertainty of supply for this item.

The GAC controls talha export prices. The figures presented in tables 5C, 5D, and 5E assume gum talha availability similar to 1985 levels; if talha was a less attractive substitute, gum arabic demand would increase somewhat, but other acacia gums and improved substitutes would also be in the competition for increased market share.

ESTIMATE OF DEMAND/PRICE ELASTICITY FOR "MOST LIKELY SCENARIO" - 5E

Table 5E presents the study team's estimate of the price elasticity of demand given the "Most Likely Scenario". As compared to the "Near Optimal Scenario" (Table 5 C), the negative effects on usage of a 10 percent price increase are much more severe: about 650 MT as compared to about 220 MT. In percentages, it is almost a 13 percent decline as compared to under 4 percent. This difference reflects partial or total gum arabic usage reductions among users who are frustrated and even angry with the overall gum arabic situation. Such an increase would be tolerated if normalcy is restored to supply and credibility, but without such improvements, the price increase makes the price advantage of the already appealing substitutes even more enticing.

The remaining aggregate figures in table 5 E show a pattern similar to 5 C with increases and decreases in prices resulting in comparable decreases and increases in projected uses. In both cases, for example, a price reduction of 10 percent improves consumption by a little under 500 MT but a reduction of 25 percent in the price results in a significant projected increase of about one third.

The "Negative Scenario" for 1986 would be another short crop in 1986 with a mix of other adverse factors. An inability to obtain adequate supplies in 1986 would strongly deter further use of Sudanese gum arabic in the U.S.A. except as a specialty product. With more time to study reformulation, consumer product makers would probably largely switch to their "next-best" formulas without gum arabic. Further intensive R&D efforts where needed would promptly improve the substitute formulations to the point of adequate consumer acceptance.

TABLE 5 E: PROJECTION OF PRICE ELASTICITY OF DEMAND GIVEN
 " M O S T L I K E L Y S C E N A R I O "

SEGMENT	P R O J E C T E D 1 9 8 6			C O N S U M P T I O N			
	Down 50 Pct	Down 25	Down 10	Baseline	Up 10	Up 25	Up 50
A-1	6471	4630	4314	4314	4314	3900	3200
A-2	1480	600	375	375	200	0	0
A-3	3400	1340	1210	1100	825	750	500
B-1	1180	770	591	591	591	470	300
B-2	308	105	105	105	0	0	0
B-3	2150	1579	1579	1579	1184	950	300
C	1056	950	600	480	480	0	0
D	4188	3770	2700	1950	1750	1570	900
E	604	0	0	0	0	0	0
F-1	825	825	520	431	350	0	0
F-2	247	247	247	247	247	247	0
F-3	206	206	206	206	0	0	0
F-4	200	100	0	0	0	0	0
=====							
TOTALS							
(1000's lbs)	22,315	15,122	12,437	11,378	9,941	7,887	5,200
(1000's MT)	10.1	6.9	5.7	5.2	4.5	3.6	2.4
(% of Baseline)	196	133	109	100	87	69	46
(% of "Hypothetical 1986")	87	59	49	45	39	31	20

In the case of the "Negative Scenario", the nonprice factors become deeply compelling. Improved 1987 supplies and deep price cuts would probably recover some market share (especially in B-3, D, and maybe F-1), but gum arabic's future in consumer products would be permanently severely curtailed.

In summary, under the "Near-Optimal Scenario", most of the remaining users would not increase or decrease usage given a 10 percent price change. If, however, scepticism and uncertainty about future supplies and sales policy are not promptly allayed, a 10 percent price increase would probably push several leading users to reformulate. Twenty-five percent plus increases or decreases in price will respectively yield major decreases or increases in usage. Another year of shortages will eliminate any need to further evaluate the price elasticity of demand of gum arabic: the product would have by then probably become a specialty ingredient purchased in very small volumes.

CHAPTER SIX: STRATEGIC OPTIONS

DESIRED RESULTS - 6A

The key result of a successful U.S.A. marketing program for Sudanese gum arabic is sustained increases in the tonnages sold above cost. In Chapters Two, Four, and Five, the absolute and the more dramatic market share declines in growing markets are chronicled. The dearth of dynamic marketing efforts and new product developments for this product has also been described. It does not matter for this study whether The GAC's "strategic objective" is measured in profits, foreign exchange generated, or the overall positive effects of the gum arabic business in the Sudan. The competitive position of Sudanese gum arabic should be strengthened with success measured by increased shares of market segments.

The study team presents the strategic options in the context of assumed longterm growth of Sudanese gum arabic supplies. The GAC advises that enough trees exist to allow for expanded business after recovery from the 1984-1985 depletion of stocks. The study team understands and appreciates the tremendous efforts required by many parties to restore supplies to pre-crisis levels and then increase those levels. Some observers believe that the GAC's optimism is unjustified and that relatively scarce supplies will have to be allocated longterm to markets that will adjust to the permanent supply shortfall. The study team, however, submits this final chapter assuming that at least 10,000 MT of CAS will be provided for ultimate delivery to the U.S.A. market. If further annual quantities are needed after several years, it is assumed that supplies can gradually be increased.

Rebuilding Sudanese U.S.A. gum arabic sales is an essential component in assuring the product's global future. The U.S.A. is probably about one third of the total world market for Sudanese gum arabic as measured by end usage. Many of the companies comprising this market are among the most prestigious worldwide leaders in their product areas; their ingredients decisions and new product developments are watched carefully (for example, at the IFT) and often mimicked throughout the world. The U.S.A. is also a most competitive market: competitors make their most polished presentations of lowest priced offers to capture the big accounts. Competitive success in the toughest market will teach techniques that may be applied to good advantage in other markets.

The GAC must uphold its best interests by having much more feedback from and influence in the American market. It must participate in the marketing of its product to assure that the result of building the business is properly and energetically carried out. A substantial portion of the U.S.A. market is wavering in its commitment to gum arabic usage. The present crisis requires an immediate response, and the business is certain to have many future urgent situations. The GAC must have an effective information network and streamlined decisionmaking structure that will enable it to implement well-informed policies sensitive to the needs of its clients in a timely and decisive manner.

This section has identified the three desired results of an effective U.S.A. gum arabic marketing policy:

1. Sustained increases in tonnages sold above cost.
2. Major GAC influence in and feedback from the U.S.A. market.
3. Timely and effective GAC decision making.

OVERVIEW OF MARKETING OPTIONS - 6B

A useful way to present marketing options is by breaking up the market process into its component parts, the so-called "marketing mix". A leading marketing textbook (Kotler, P., Marketing Management, Third Edition, Prentice Hall, NJ, 1976, p.59) defines "marketing mix" as

"the set of controllable variables that the firm can use to influence the buyers' responses"

For the marketing of Sudanese gum arabic, a useful marketing mix is "Product", "People and Promotion", and "Price", a small variation on McCarthy's "Four P's" (Ibid., p. 59)

The pressing nature of some of the issues confronting the GAC required the study team to further divide the options into "Shortterm Options" (Section 6C) and a more comprehensive and longterm applicable set of options presented under the appropriate "variables" in Sections 6D, 6E, and 6F. An outline of the topics covered in those three longer sections may be useful and is presented in Table 6B.

TABLE 6B: OUTLINE OF GUM ARABIC MARKETING OPTIONS

PRODUCT-6D

SHORTTERM AVAILABILITY

1. Earlier announcement by the GAC of new season natural gum prices
2. Ship some natural gum
3. Faster transport to the U.S.A.
4. Ship first available goods to the U.S.A.

LONGTERM AVAILABILITY

1. Maximize new crop collections
2. Rebuild inventories
3. Prevent hoarding

PRODUCT QUALITY

1. Provide a lower viscosity grade of CAS
2. Supply the market with granular grade and longterm with other grades
3. Improve packaging

PRODUCT AND APPLICATIONS RESEARCH AND DEVELOPMENT

1. Resource selection and improved species development
2. Applications research

PEOPLE AND PROMOTION-6E

U.S.A. REPRESENTATION

1. Establish a U.S.A. office staffed with GAC employees
2. Designate one existing or new agent as the exclusive U.S.A. GAC representative
3. Designate one existing or new gum arabic distributor as the sole U.S.A. distributor

TABLE 6B (CONTINUED)

DISTRIBUTION NETWORK

1. Protect the leading distributors
2. Support and reward innovative efforts

INFORMATION EXCHANGE

1. More frequent, accurate and timely crop information
2. Periodic market surveys by the U.S.A. GAC representative
3. Database development

CONDUCT AND FUNDING OF PROMOTIONAL EFFORTS

1. Ultimate GAC control with options for local control
2. GAC, representative, importer, user, and government agency funding sources

PRICE-6F

GENERAL SALES POLICY

1. Fix export prices six months at a time
2. Flexible payment terms
3. Market-responsive policy

DISCOUNTS

1. Single shipment discounts
2. Total volume discounts

PRICES

1. Increase prices by 10-25 percent
2. Maintain about 1984-1985 levels
3. Decrease prices by 25 percent or more
4. Option "1" followed after 6 months by Option "3" if conditions warrant it

SHORTTERM OPTIONS - 6 C

The GAC's official crop outlook and marketing policy for the new crop year usually is made during the first week of October. During September, 1985, importers and users were eager for the news because of its importance in resolving many uncertainties. They were, however, also concerned that a policy hurtful to the American market or their individual corporate futures might be made. Their apprehension was heightened by the continuing disappointment many still feel over the GAC's performance in 1984 and 1985.

To assist the GAC in its deliberations, the study team dispatched to it in early September a short report entitled "Options for Dealing with the Current Crisis in the U.S.A. Gum Arabic Market" (reprinted in Appendix 6C). The background, current crisis, and outlook were described. The critical linkage between the rushing of new supplies to the market and the longterm outlook was stressed. A summary of the preliminary price elasticity of demand results was presented.

Options, which will be developed in more detail in this chapter, were presented. Timeliness of new supplies, quick announcement of marketing policies, allocation to importers based upon historical usage, and stimulating maximum production were discussed. Discounts and improved public relations were also mentioned.

The report reached Khartoum before the principal meetings took place. One of the top officials of the GAC also participated in early September study team deliberations and was therefore well-informed about the documentation upon

which the presentation of options was based.

Some important options for constructive action presented in this chapter require prompt and decisive actions. Full report preparation and submission were therefore expedited to enable all involved parties to review it as soon as possible.

This section presents and discusses the GAC's options for improving gum arabic's shortterm availability, longterm availability, product quality, and product and applications research development.

SHORTTERM AVAILABILITY: For the 1985-1986 crop years the more rapidly fresh gum arabic supplies are delivered to the U.S.A. market, the more longterm gum arabic business will be preserved. In future years, earlier deliveries of some gum may diminish the harmful effects of end of previous season supply shortfalls, and thereby preserve some business or prevent reformulation. Several options exist to stimulate earlier deliveries:

1. Earlier announcement by the GAC of new season natural gum prices:

there is apparently a Sudanese law requiring all available gum supplies to be offered promptly and only to the GAC. However, there are reportedly inevitably still some small supplies of gum held in anticipation of higher new crop prices. Procuring and shipping these supplies, even if only several hundred tons, would assist needy clients. Equally important, it would demonstrate to the market decisive and effective actions by the GAC to do everything possible to serve the market. This action should be properly timed and carried out so as not to disrupt the orderly delivery of gum to the GAC during the main collection periods.

An early announcement of natural gum prices would give the GAC more time to assess the reactions of the Sudan supply network to the prices. If the response seems inadequate to meet projected export requirements, the GAC would have the

option of stimulating accelerated deliveries by revising prices upward. The GAC will know how to carry this out without creating expectations of further increases.

2. Ship some natural gum: Semi-dried hashab as delivered to the principal collection centers is probably suitable as is for use by many importers, flavor houses, and even users who grade and purify the gum in their own facilities. By-passing the grading process, which eliminates a few percent of foreign organic matter and abets moisture loss, could shorten by several weeks the export of the gum.

Clients desperately short of product will take all measures necessary to make the natural gum suitable for use. This point is demonstrated by the big increase during 1985 of U.S.A. gum talha usage. Talha is supplied as natural gum and contains more impurities than gum arabic. It probably has a higher bacteriological plate count, because it is collected off the ground and is not cleaned and sorted before export.

U.S.A. importers and clients can promptly be found who would accept experimental deliveries of natural gum. They would conduct all the necessary analysis and could probably be induced to share that information with the GAC. The viability of this option may be established or rejected, but, if established, it can at the very least be an option when supplies must be rushed to the market.

3. Faster transport to the U.S.A.: the study team has established the likelihood that direct Port Sudan to New York sailings can be chartered given an

inducement of as little as 3,000 MT. A direct sailing takes about two weeks as compared to a European transshipment which typically requires 30 to 45 days.

The pooled shortterm requirements of several leading importers exceeds 3,000 MT and the mechanism to pool periodic future purchases could be worked out with the assistance of the U.S.A. gum arabic industry.

Airfreight offers another path for expediting deliveries. The long journey to Port Sudan might be avoided if supplies were airfreighted directly from Khartoum or perhaps even from a major collections center such as El Obeid. The study team has established that chartered bulk air cargo can be obtained out of Khartoum, Port Sudan, and quite possibly, from El Obeid. The GAC has acknowledged the likely feasibility of airfreight and reported during August, 1985, that it was working out all necessary details.

First quotations of the additional airfreight transport cost were about USD 2.00 per kilo. In June, 1985, several U.S.A. parties indicated they were prepared to pay this additional freight to obtain scarce supplies. The position of the market on the extra costs to speed new crop delivery is not clear.

4. Ship first available goods to the U.S.A.: by giving the American market priority over other markets for deliveries, the GAC would further move strongly to counter the reformulation trend and demonstrate its commitment to its loyal but unhappy American buyers. The U.S.A. reportedly received a smaller percentage of its 1985 needs than Europe, and the dangers of further permanent market loss is perhaps more pressing in U.S.A. than in Europe. All markets should receive their "fair" shares of available product, but allocating the

first goods to U.S.A. could be a powerful gesture.

LONGTERM AVAILABILITY: After two major supply crises during the business careers of many U.S.A. purchasing agents, gum arabic has a dismal future unless the distributors and users become confident of assured supplies. Several options exist to promote justified regained confidence:

1. Maximize new crop collections: the study team predicts a marked reduction in 1986 usage, but substantial supplies are also required to replenish the U.S.A. inventories of those users and importers remaining in the business. The GAC also has no current supply reserves, and the confirmed presence of available product beyond immediate needs would encourage continued loyalty to gum arabic.

Several good crops are probably required to refill the supply "pipeline". The GAC best knows the many actions they and their suppliers must take to maximize the harvests that natural conditions will allow. The study team does pass on one suggestion it received: to be in a position to stimulate more collections, the GAC may consider the option of pricing natural gum at a fixed rate for perhaps six months at a time rather than for a full crop year. Prices may be adjusted after several months to react to the then-prevailing supply and demand conditions. For example, if inadequate supplies are being received, prices may be adjusted upward in succeeding periods as a stimulus. The GAC must carefully consider the psychology of their suppliers to make sure the desired supply result is obtained.

2. Rebuild inventories: supplies should not be withheld from customers

with real needs (as opposed to speculative hoarding). However, any excess

supply helps protect the industry from future supply shortfalls. The excess inventories might be utilized to rebuild Port Sudan buffer stocks, place a buffer stock in the United States, or sell some product to U.S.A. importers on extended payment terms.

A Port Sudan buffer stock of 30,000 MT would provide significant protection to the market--and to GAC sales levels--against a one year crop disaster. A specific percentage of that buffer could be allocated to the U.S.A. market. Existence of a declared tonnage could be established by periodic General Superintendance Company ("SGS") inspection, which would be accepted by all interested parties. Any reduction of the stocks would become promptly known by the market, which would ascertain the reasons for the reduction and take the appropriate actions. "Buffer stocks" refer to actual warehoused inventories and do not include supplies in transit to Port Sudan.

The study team learned that buffer stocks have not been consistently at the level of even a six months' supply for at least five years. Should supplies in excess of 30,000 MT be projected some years in the future, the GAC could decide what combination of incentives or disincentives to buy might be set up to bring inventories to desired levels without hurting longterm objectives.

Many importers and users will at least temporarily try to increase their U.S.A. inventories to accommodate accumulated demand and provide increased protection against the kind of supply shortfall so recently experienced. U.S.A. interest rates are at the lowest levels in many years. To the extent that importers and users maintain larger inventories, the size of the buffer stock allocated to the U.S.A. could be adjusted downward. Incentives, such as

longterm payment terms or volume discounts might stimulate importer and, in turn, user inventory building.

Increased inventories will protect the entire industry. It can be considered necessary "insurance". The allocation of costs for the "insurance" would be a matter of study and negotiation among all industry participants, since all would benefit.

3. Prevent hoarding: the percentage of GAC exports received directly by the U.S.A. during the third and fourth quarters of 1984 was reportedly much smaller than during previous periods. At least one leading European buyer purchased several times his usual needs during that period, thereby exaggerating the shortage experience by U.S.A. buyers when the 1984-1985 crop failed. The European buyer apparently showed superior foresight, and the GAC filled this buyer's unusually big orders without providing for the normal needs of the rest of the market.

Until large Port Sudan inventories are again available, the GAC should consider protecting its clients by reserving their normal requirements before providing excess or new needs. The subject of allocation could be studied and implemented. One possible formula would apportion the monthly availability in proportion to a given customer's average deliveries received directly from the GAC as a percentage of total worldwide gum arabic purchases. The average could be calculated over the 1980-1984 period. 1985 would not be included because imports in that year reflected contracts left over from 1984 and earlier rather than actual demand or historical usage levels.

PRODUCT QUALITY: Although few complaints about CAS or HPS quality were noted during the research effort, the study team did learn of several options to add value to or increase volumes of gum arabic exports. The economics of these options require further study.

1. Provide a lower viscosity grade of CAS: ----- companies that use large percentages of gum arabic in their candies or fountain solutions are limited in the concentration of product they can use by viscosity development caused by the gum arabic. There is considerable reported viscosity variation from lot to lot and several users told me they could use more product if they could avoid the "stringy" gum that generates a higher viscosity. At least one importer eliminates particularly stringy lots from delivery to particular customers.

Increased usage and possibly a slightly higher price could be obtained for such an improved grade. Some work has already been done in the Dudan on associating lower viscosity gum with other factors.

2. Supply the market with granular grade: ----- the breaking, sizing, and sifting operations to make this grade could be readily performed in Sudan provided properly cleanliness, quality control, and adequate spare parts inventory is maintained. The granular product could be sold at a fractionally higher price than CAS. The siftings byproduct can also be sold.

A study of the longterm opportunity for supplying production quantities of USP No. 1 powder and spraydried could also be undertaken by the GAC. The study team considers Sudanese exports of these grades an option for the 1990's, because the quality and cleanliness standards required will not be easily

achieved. Quality problems would be a major distraction and public relations disaster. At present, trial samples of powder could be submitted for client comments. A thorough study of the impediments, costs, and benefits of making these grades in the Sudan would be needed.

With greater political stability and a more healthy investment climate, the Sudan might be able to attract foreign assistance in setting up, running, and keeping a processing facility in good repair.

The principal U.S.A. importers and many of the users have for many years done - or subcontracted - this processing. They may have strong sentiments about maintaining the production in the U.S.A. for quality control, assurance of supplies, and profitability reasons. After the GAC resolves the compelling problems it faces in the Sudan, it might study participating in some way in the processing of gum arabic in the U.S.A.

3. Improved packaging: the present packaging of new jute bags holding 50 kilos net, with 400 bags per 20 foot house-to-house fumigated container is a most acceptable system according to several importers questioned. The study team encountered several users interested in trying deliveries of CAS from importers in some form of bulk packaging, but this was a very low priority subject. The study team's impression is that jute bag packing is more economical and feasible for the GAC than mechanical bulk loading of CAS into containers or using other packing materials. Improved packaging is therefore a presently unimportant option.

PRODUCT AND APPLICATIONS RESEARCH AND DEVELOPMENT: In the last few years, it has been demonstrated that the U.S.A. gum arabic industry will have to get more deeply involved with technical aspects of the polymer. The "second generation", acacia gums are capturing more customers, especially during the current crisis when the application effectiveness of each kilo of gum arabic is extended several times through combination with other ingredients. Users are now more seriously evaluating nonacacia substitutes; every existing and potential performance advantage of Sudanese gum arabic should be developed and exploited to advantage in the now intense survival competition. New uses for Sudanese gum arabic need to be found to generate tonnage sales replacing business permanently lost. The GAC has several options to progressively participate in product and applications "R&D":

1. Resource selection and improved species development: earlier in this section, the potential commercial benefit of providing selected clients with "non-stringy" gum was suggested. Research to develop and/or isolate selected trees on selected soils in selected climates that are tapped and processed in selected ways to yield gum with selected qualities could be more intensively conducted. The natural Sudanese gum arabic polymer is widely considered to be a superb resource, but its excellence could be enhanced and promoted. Product variations could be diminished. Improved Sudanese gum arabic grades - rather than for example, "African" gum specially selected by a European vendor, would be well-defined grades (A leading research scientist in the gum field advised the study team that "sorts" selected and supplied by the French were markedly superior to CAS or HPS).

Such research might be partly funded by foreign private or government agencies. If the GAC more intensively pursues this option, it should take all necessary steps to keep commercially valuable research proprietary to the Sudanese gum arabic industry. This is consistent with achieving the basic desired result of having more influence in the gum arabic business.

One very gracious technical director of a significant gum arabic user offered to use his good offices to establish contact between the GAC and "SUSTAIN", a group of food industry specialists who advise developing country ingredient or processed food industries on improvements needed to best serve both domestic and foreign markets. The group reportedly has considerable expertise in the area of food ingredient processing. The above-mentioned director recently participated in a mission to North Africa. SUSTAIN functions as a basically humanitarian group in cooperation with international agencies. The GAC has the option of meeting SUSTAIN members to learn more about opportunities for cooperation.

2. Applications research: the study team was informed of several

purported gum arabic properties that require scientific validation or application testing. Is gum arabic metabolized in the human digestive system? Is gum arabic metabolized by bacteria associated with tooth decay? Would the fast-growing "wine cooler" (wine plus fruit juice) industry benefit by using gum arabic as an emulsifying agent? Can it be demonstrated to the American wine industry's satisfaction that gum arabic can help improve visual and mouthful qualities? Do gum arabic's film-forming properties have a big future in high-technology ceramic glazes? Will new flavors perform best if encapsulated with an improved grade of gum arabic? Answers to the preceding questions will

help determine the future further participation of gum arabic in fast-growing dietetic food, candy, and beverages, wine coolers and wine, flavor, and refractory industries. Other examples could be found.

Iranex and several European university researchers have done work on many of the above subjects. The study team has learned that the limited U.S.A. R&D conducted by flavorhouses and users has occurred largely without much support from the GAC or the importers. Technical and purchasing individuals at several importers advised that the intense price competition among importers - and the resulting low margins - made gum arabic an unattractive product for developmental work. Certain other natural gums, notably guar, have benefitted greatly from importer-lead R&D. The GAC might find ways to elicit importer support for product development efforts.

One importer with technical expertise and a food industry scientist indicated willingness to outline research protocols with potential major commercial utility. Universities and/or laboratories specialized in rat feeding tests would conduct the research. The GAC can learn more about the subject matter, costs, benefits, and funding sources for such research.

The funding and promotion of product and applications research and development will be among the subjects discussed in the next section.

The "people" and "promotion" components of the gum arabic marketing mix are inextricably intertwined. This report has characterized the U.S.A. marketing efforts of the GAC as "passive". Its participation in terms of the presence of people actively promoting its best interests has been lacking. The degree to which the people working with the GAC use their resources to promote the gum arabic business in the future may strongly influence the outcome of the struggle for survival and market share in the U.S.A..

The GAC's contacts in the U.S.A. have been principally involved with the very important sales and distribution functions. Many of these longtime representatives and importers have suffered financially throughout the shortage and have been bewildered by the perceived failure of the GAC to fairly treat the U.S.A. market as a whole or them as individual companies.

Product improvements, information exchanges, promotional activities, and participation in the design and implementation of a comprehensive U.S.A. marketing strategy are other functions which should be aided by a GAC support group in the U.S.A. In this section, options for a more active participation in the U.S.A. are presented and discussed. The topics covered are U.S.A. representation, distribution network, information exchange, and conduct and funding of promotional efforts.

U.S.A. REPRESENTATION: The GAC would benefit from a more unified, active, and forceful voice promoting its marketing strategy and providing it with feedback on all developments. Such a representative could be made responsible - and accountable - for the overall effective marketing of Sudanese

gum arabic. The market would have one official party for information exchanges. The representative would have to avoid all potential conflicts of interest by not being involved with products competing with gum arabic shipped directly from the Sudan. Performance goals could be established and assessed after each crop year. The appointment of one official representative might be expedited so that a unified and championed response to the competitive threat to gum arabic could be promptly undertaken.

If the GAC decides to unify its U.S.A. representation, it could evaluate several options:

1. Establish a U.S.A. office staffed with GAC employees: the advantages
of such an office would be a direct presence and possibly more direct GAC observation of the market. Agents might no longer be required in which case agency commissions could be eliminated. However, the overhead costs for running and staffing such an office would probably match or exceed the savings. The ongoing support of an experienced agent would be lost unless some employment arrangement made sense and could be arranged. The importers would probably feel threatened by the direct GAC presence, and users would probably be confused as to the proper and most economical distribution channels for their CAS and siftings purchases. A transition period or other shortterm arrangement should be considered to lessen the impact on the agents who are no longer retained.

2. Designate one existing or new agent as the exclusive U.S.A. GAC
representative: many foreign suppliers of natural gums have exclusive U.S.A.
agents who abide by agreements to effectively and unambiguously promote the suppliers' interests in exchange for commissions on realized transactions. As

previously described, the existing agents are the survivors of pre-GAC Sudanese gum arabic sales efforts; as far as the study team could find out, there are no written agreements describing mutual obligations covering these agents.

A potential exclusive GAC agent probably already maintains an office whose overhead is covered also by the sale of other products. If already well-established in the U.S.A. foreign ingredients business, especially the natural gums, the agent would not require much of a learning period to handle the increased responsibilities. The agency agreement would make ongoing agent-principal ties contingent on the agent's performance.

Since the fortunes of a principal and its exclusive agent are unambiguously and intimately connected, the agent could be asked and expected to contribute to the promotion of gum arabic. For example, perhaps one quarter or one third of all commissions could be set aside for promotional activities such as direct advertising, advertising allowances for distributors, or for funding university research grants aimed at developing new uses for gum arabic. The agent would be a protector of the GAC's best interests but at the same time a strong source of feedback alerting the GAC to any market unhappiness with the supplier's performance. The agent would also champion all components of the marketing plan including promoting and helping to arrange funding for new applications research. The distribution network can be left unchanged without any upheaval, because the established importers and users are accustomed to the GAC being represented in the U.S.A. through agents.

If the GAC decided to explore this option, it would need to decide upon the candidate who would best serve the GAC's strategic objectives. A transition period or other shortterm arrangement should be considered to lessen the adverse impact on the agents who are not further retained. Those agents without GAC - supplied gum arabic to sell could be expected to aggressively attempt to find other gum acacia sources to represent or more heavily promote other gum acacia suppliers whom they already represent.

3. Designate one existing or new gum arabic distributor as the sole

GAC U.S.A. representative: some suppliers of natural gums have exclusive

distributors who purchase, usually inventory, and resell the product at a
marked-up price. A distribution arrangement can take many forms and will
usually be embodied in a written agreement designating mutual responsibilities
including sales goals to be achieved.

As compared to an exclusive agency, the exclusive distributor is usually much bigger with more assets and marketing and technical personnel. It will have had more experience preparing advertising, and, if it is an established gum arabic distributor, it will have valuable long relationships with most of the principal buyers. The 2 percent agency commission would be eliminated from the CAS cost. The distributor could be asked to participate in cooperative advertising and otherwise perform all the unified marketing tasks of an exclusive GAC marketing representative. Distributor profit margins - and probably also CAS prices - could be increased because of the elimination of competition for accounts among distributors. A transition period or other shortterm arrangement should be considered to lessen the impact on the seven other gum arabic importers and the three agents.

The selection of an exclusive distributor would cause an upheaval in the distribution network and terminate numerous distributor - user relationships that have sustained longterm gum arabic sales. The coverage of one major distributor would probably not equal that of the existing network. In the shortterm at least, Sudan gum arabic sales to the other distributors would disappear, and those distributors would in many cases aggressively search out competitive products. The conversion of powerful longtime customers and distributors into opponents would be a major competitive blow that probably offsets the advantage of having one distributor.

Strengthening U.S.A. representation seems to be a necessary part of improving the marketing of Sudanese gum arabic. One or another agent may presently sincerely attempt to provide that "unified voice", but the status quo does not provide the official structure that would legitimize such attempts.

DISTRIBUTION NETWORK: the preceding paragraphs present one option (that of designating one distributor as the exclusive GAC distributor) that would dramatically change the distribution that has prevailed in the U.S.A. for many years. In this subsection, it is assumed that that option is not adopted and that the GAC leaves its current distribution network intact. The options to be presented are methods to get distributors to most effectively defend and expand Sudanese gum arabic usage.

1. Protect the leading distributors: longtime sellers of Sudanese gum arabic have in recent years encountered competition from new importers who offer basically the same product to the same customers at slightly lower prices. It is now possible for a user to receive offers of CAS from about ten different

parties who have purchased the same grade directly from the GAC. Several options for supporting the principal existing vendors can be considered.

Only companies who booked contracts with the GAC in recent years might be given the authority to purchase directly from the GAC. The qualification of some historical level of minimum purchase volumes could be an additional condition of selection. Minimum annual purchase requirements could be stipulated as a condition for remaining a distributor. A certain degree of promotional or other marketing support could also be requested. A discount schedule rewarding increasing price reductions as the volumes shipped on a single vessel increase could be considered.

Each of the above options has the disadvantage of reducing the number of competitors and the possible disadvantage of reducing the number of companies who may purchase directly from the GAC. On the other hand, when suppliers are better protected by a supplier, their support of the supplier's objectives should strengthen.

2. Support and reward innovative efforts: distributors should participate in the full Sudanese gum arabic marketing program and be rewarded for that participation. Importer funds spent on gum arabic advertising could be matched to some degree by GAC advertising allowances. New product or applications "R&D" championed by the importers as a group or individually could be supported by GOS partial funding, active solicitation of grants from governments or agencies supporting Sudan development efforts, and finally by funds generated by each importation and set aside by the exclusive representative for promotional use.

Breakthrough sales to firsttime gum arabic users or for a new application might be rewarded. Publicity acclaiming the innovative seller and the new gum arabic user might be funded. A refunding of some pioneer sales or product development expenses might be considered if the project had not been previously supported.

Several importers challenged the study team to suggest how "breakthroughs" could be kept the property of the innovating party so that it could profit from its hard efforts. The study team suspects that adoption of some of the suggestions in this subsection about vendor support combined with the importer's follow-up service efforts would markedly encourage customer loyalty. Unless a product improvement is patented or kept secret, it would be hard to conceal, and other distributors would eventually be able to offer comparable improvements.

INFORMATION EXCHANGE: the importer and user questionnaire and interview responses revealed dissatisfaction with the accuracy and timeliness of information about supplies, crop outlook, and policies. The GAC has similarly commented about receiving inadequate information about the U.S.A. market; the study team has already commented on the advantages of the GAC being better informed about market developments. The establishment of an exclusive representative office accountable for more extensive information exchange is one GAC option already identified. Several other options are here presented.

1. More frequent, accurate, and timely crop information: during 1984 and
into 1985, the GAC apparently tried to prevent customer anguish and panic

by withholding for extended periods information about the disastrous crops and infrastructure situation. GAC officials have described to the study team the limitations of their crop prediction and information networks, and they have also pointed out that GAC statements and actions are subject to GOS review. However, at least sixty years ago, monthly reports of arrivals of gum to collection centers, prices, foreign demand, and often crop conditions were issued by at least one private gum arabic seller operating out of the Sudan. The monthly reports are distinguished by numerical data and historical comparisons. The annual crop and sales reports carefully and quantitatively document each year and place it in historical perspective. Prediction of future price and supply trends are made (see Appendix to 6E).

The 1970 centralization of the gum arabic export trade and the fixing of annual export prices in no way reduces the world market's need to know the intimate details of the supply situation, especially when demand in recent years appears to have exceeded supply. Improvement of the GAC's credibility with its importer customers and the users could probably be achieved with much more detailed and timely published crop reports. The study team understands that a radio network linking the collection centers with Khartoum is or will shortly be functioning, and this facility might greatly speed the accurate transmission of crop data. The prompt adoption of this option could be particularly helpful, because some users may hold back from reformulating if some first bona fide hopeful news about the crop can be received in October or November. At least one report monthly during periods of crisis and quarterly reports in calmer times would be welcomed by the market.

2. Periodic market surveys by the U.S.A. GAC representative: without in

any way interfering with ongoing sales activities, the representative could periodically thoroughly consult with the distribution network and also survey gum arabic users to assess the progress of the marketing program. The activities of the competition would also be checked and evaluated. Trends in each market segment should be identified and comments and recommendations collected so that a better marketing job can be done. The distributors might take a more active role in collecting and reviewing this general but important information. The visits of GAC officials to the U.S.A. would provide good opportunities to discuss marketing activities within the U.S.A. in addition to the customary review of the Sudan situation.

3.Database development: ongoing and improved information exchange could be accompanied by the further development of a gum arabic database to be used to continually improve the understanding and marketing of the product. This database, properly maintained by the GAC representative, would be shared within to-be-agreed-upon rules of confidentiality with participants in the GAC's marketing program. It would be part of a worldwide database; the U.S.A. experience could therefore benefit and be benefited by the worldwide information exchange.

For example, scientific studies done abroad could be made immediately available for constructive marketing use in U.S.A.. Some data on the use of gum arabic in a certain industry abroad could be shared on request with a U.S.A. importer or user interested in solving a gum arabic applications problem or coming up with a new application. The options for the further development and use of the database could be discussed with the GAC's U.S.A. colleagues.

CONDUCT AND FUNDING OF PROMOTIONAL EFFORTS: the previous paragraphs in this section have already touched upon the conduct and funding of promotional efforts .

1. Control of the promotional efforts: the overriding responsibility for
the allocation of resources should be in the hands of the GAC. For specific decisions, one option would be to place responsibility in the hands of the U.S.A. GAC representative, who would follow clearly established guidelines for using funds set aside for promotion. Another possibility would be to have a U.S.A. review committee including the representative, importers, and perhaps even outside technical or marketing experts.

2. Funding of promotional efforts: the GAC through the mechanism
previously described (or perhaps through some better means) as well as the importers (through cooperative advertising with or without the GAC) could be important sources of funding for promotional efforts, including R&D projects. Another option already touched upon is to pursue funding from outside agencies. Users or potential users of gum arabic might also be willing to share the funding of projects that have commercial potential. Obtaining funding may be a very important subject for further study.

The last section of Chapter Four and also Chapter Five present the demand environment within which pricing decisions need to be made. The study team recognizes that supply conditions and The GAC's relations with and obligations to all Sudanese gum arabic industry participants (and the GOS) are also important factors to consider in setting a sales policy. As described in the two previous sections the pricing component of the marketing mix also may have an impact on the effectiveness of the other components. The topics to be covered in this section are general sales policy, discounts, and pricing.

GENERAL SALES POLICY: The GAC sales policy has already been described in Chapter Two. Several options exist to make the policy more effective and should be reviewed. As suggested in Sections 6 D and 6 E, The GAC should consider being more selective as to whom it will directly sell, thereby showing loyalty to its principal importer buyers, especially in times of shortage; the possible mechanisms for this greater selectivity have already been discussed.

1. Fix export prices six months at a time:

The GAC may wish to reconsider keeping the export price fixed for an entire year. From the supply point of view, there are two principal tappings annually, and the success or failure of the second tapping can dramatically alter the supply situation, as was demonstrated in 1984 and again in 1985. From the demand point of view, reserving the option to review prices every six months would enable The GAC to respond to unexpectedly weak or strong purchases without deviating from its new crop official policy announcement. For example, in the "Most Likely Scenario", a 10 percent price increase over 1984 markedly increases the falloff in demand after inventory rebuilding is completed. If the October,

1985, price increase is 10 percent and the "Most Likely Scenario" comes to pass, The GAC would at least have the option of reducing prices for the April 1, - September 30, 1986, period if a sales decline motivates it to want to stimulate demand with a price reduction. Contracts would probably be for a six month duration only, with unshipped quantities being repriced at the new price levels.

2. Flexible Payment Terms:

If gum arabic stocks reach a level higher than desired, The GAC might consider offering extended payment terms to stimulate further inventory building by the U.S.A. buyers, thereby reducing carrying costs or obtaining some additional benefit.

3. Market Responsive Policy:

If the results of the 1984-1985 crisis in different national markets or market segments vary, The GAC might consider altering its uniform global pricing policy to further its best interests. The possibility of price arbitrage between markets exists, but if a friend of the GAC advises that a certain price concession is needed to prevent the permanent loss of a longtime major client, the GAC might evaluate whether to back up its distributor's price cut rather than dogmatically adhere to a uniform policy. This is uncertain territory requiring careful review. The study team is concerned that major defections from gum arabic usage will continue during 1986, and it suggests that The GAC try to be receptive to taking the necessary actions to save its market. The "go - no go" decisions being made will not be readily reversed in most cases, and the upcoming season will probably be the last opportunity to influence many decisions. This option needs greater GAC sensitivity to the market and a "trading mentality" which were not needed when prices were annually.

DISCOUNTS:

1. Single Shipment Discounts:

A straightforward way to stimulate bigger single deliveries is through use of the single shipment discount. Larger shipments allow for more efficient order handling, materials movement and faster turnover of inventory.

The GAC could consider a progressive discount schedule that varies the price between the smallest and very largest shipments by as much as six or seven percent: the larger the incentive, the bigger the increase in shipment size. The actual discount amounts and threshold shipment quantities can be best determined by The GAC.

Single shipment discounts might be restricted to the periods when The GAC has the greatest quantity of goods available for export, usually the March to June (or July) period. The GAC might thereby flexibly utilize volume discounts to speed up deliveries only when needed. If the market is anxious for as much product as available, single shipment discounts may not be needed to achieve rapid inventory turnover.

2. Total Volume Discounts:

This discount system is harder to administer than the single shipment discounts, because it can only be properly carried out using retroactive adjustments. After a given threshold level is reached, the price on subsequent shipments might be reduced or outright rebates distributed. A fair total volume discount system should probably consider actual volumes shipped during the discount period rather than the volume of orders. Discounts could be fixed when bookings were made if the contracts issued had a "take or pay" provision

requiring delivery with a given period or with specific shipping schedules

PRICES:

According to the U.S.A. market, the demand factor second only to availability in importance is price. The FOB Port Sudan price for CAS is the benchmark price from which the prices of all other grades are calculated. The principal price options are to (1) increase prices by 10-25 percent (more than 25 percent would probably relegate gum arabic to specialty items status and that option is not here discussed) (2) maintain about 1984-1985 levels, or (3) decrease prices by 25 percent or more (smaller decreases are not predicted to stimulate much demand). As long as inventory rebuilding continues, sales will outpace supplies almost without regard to price. However, supplies may begin to catch up with demand by the second half of the season, particularly if option 1 is adopted.

The GAC should augment its observations of sales and shipments figures with market information. What are the users saying about prices, especially as it influences their "go - no go" decisions? Adoption of option 1 would not surprise the market which would probably suffer further defections from gum arabic usage (as compared to the influence of option 2) if the "Most Likely Scenario" occurs. Option 3, on the other hand, would represent an aggressive commitment to rebuilding market share and would probably be rewarded with roughly the increased demand predicted by the study team for either the "Near Optimal Scenario" or the "Most Likely Scenario".

Option 4: A possible strategy that deals with realities and does not unnecessarily sacrifice revenues would be to implement Option 1 in October for

six months. The U.S.A. market should be carefully assessed during this period. After six months, if supplies are adequate but the predicted drop in usage is occurring option 3 could be implemented to preserve and even possibly recover some market share.

Prices responsive to supply and demand conditions are the rule rather than the exception for commodities. The matter requires further study, but the study team suggests that the U.S.A. market would respond with favor rather than displeasure or confusion if a price change reflecting current supply and demand conditions was implemented in April, 1986. However, that market should be properly and fairly notified in October that the possibility for a price adjustment after six months exists.

In this section, the study team has presented sales policy options that all suggest alert flexibility to market developments. During the upcoming period of competitive struggle for survival and new growth, The GAC must try to use all marketing variables - including price - to fulfill its strategic objectives.

CONCLUDING REMARKS - 6 G

In Chapter Six, the study team has tried to assist the marketing program preparation process by presenting a range of options for consideration by the GAC and its colleagues in the GOS and the Sudan U.S.A.I.D. Mission. This report in its entirety is also just a step in what should become an ongoing and dynamic GAC study of and creative response to the U.S.A. market. Very important policy decisions need to be made almost immediately, but longterm considerations should strongly influence that decisionmaking. The study team has attempted to fulfill its research mandate, but part of the outcome has also been to identify numerous important issues which require further study.

The study team's specific mission is completed with the presentation of this report. Within U.S.A.I.D. guidelines, it will, however, be pleased to assist in clarifying any report topics. Research programs to explore some of the issues raised can also be developed.

Gum arabic is a remarkable polymer with intrinsic advantages that will assist The GAC and its allies in rebounding from the 1984-1985 disaster. With the basic information about the market and available options now assembled, a flexible marketing program responsive to market realities must be chosen, planned, budgeted, and implemented.

Annex A

OUTLINE

I. Objective

The objective of this study is twofold:

- A. To develop an accurate assessment of the current market for gum arabic and to determine the effect of the present supply crisis on future demand.
- B. To formulate a series of strategic options which will enable the Gum Arabic Co. (GAC) to realize its own strategic objective.

II. Scope

The scope of the study shall include:

- A. An accurate description of the U.S. distribution system for gum arabic.
 1. Agents
 2. Importers/Processors
 3. Product types
 4. Margins between FOB port of Sudan and end-users
 5. Basis for competition
- B. A detailed definition of the current U.S. market for gum arabic.
 1. Major End Uses
 - a. Volume/pricing
 - b. Major consumers
 - c. End-use technology
 - d. Competitive products
 - e. Basis for product selection and cross price elasticity with respect to major substitutes including other natural gums.
 2. Potential New Applications
 3. Current and Potential Institutional Constraints
- C. An assessment of the future price trends of major substitutes for gum arabic and their impact on the demand for gum arabic in the future.
- D. An assessment of the impact of the current supply crisis and its effect on future demand for gum arabic.

1. Outlook of Importers/Processors
2. Outlook of End Users
 - a. Purchasing
 - b. Technical

III. Strategic Options

Based on the results of the interviews, this section will present a series of marketing options available to the GAC.

- A. Neutral Impact Scenario
 1. Volume Projections
 2. Demand/Price Elasticity
 3. Demand Stimulation
 - a. Displacement of competitive products in traditional end-uses
 - b. Promotion of gum arabic in new end-uses
 - c. Polymer property modification through chemical derivatization
- B. Negative Impact Scenario
 1. Volume Projections
 2. Rebuilding of Lost Market Share
 - a. Re-establishment of supply credibility
 - b. Impact of pricing on demand stimulation
 3. Development of New End-Uses

Note:

1. A statement will precede the text specifying P.L. Thomas' market share and other interests in the U.S. gum arabic market.
2. Questionnaires and interview notes will be included as an annex to the final report.

GUM ARABIC QUESTIONNAIRE

THIS DATA IS RESPECTFULLY REQUESTED FOR UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT CONTRACT SUDAN 650-0047--00 2007-0. THE RESEARCHERS RECOGNIZE THE POTENTIAL SENSITIVITY OF THE DATA REQUESTED, WHICH WILL BE USED ONLY FOR THE CONFIDENTIAL MARKET STUDY.

COMPANY:

CONTACT:

DATE:

TITLE:

INSTRUCTIONS: PLEASE CIRCLE THE APPROPRIATE ANSWER OR ANSWERS AND ADD ANY CLARIFICATIONS OR COMMENTS IN THE EXTRA SPACE PROVIDED.

1. What form or forms of gum arabic does your company buy?

Crude Granules Siftings Powdered Spraydried Blended

Other:

2. How many years has your company used (or did they use) gum arabic?

1 2 3-5 5-10 10+ YEARS

3. Your company's 1984 gum arabic usage in thousands of pounds was

Under 100 100-250 250-500 500-1,000 (one million) 1,000+
(Alternative answer: approximate thousands of lbs used _____)

4. What percentage of your company's gum arabic requirements were filled by gum arabic purchases ... in 1984?

0-25 25-50 50-75 75-95 95-100 percent

... in 1985

0-25 25-50 50-75 75-95 95-100 percent

5. What is the projected annual shipment growth rate for your company's main products traditionally containing gum arabic (in cases, or pounds or other physical units) ... for 1984-1986?

Static Up 5 pct Up 5 pct Down 5 pct Down 5 pct
 or more or less or less or more
(Alternative answer form: Actual percentage projected?___)

... for 1984-1990 ?

Static Up 5 pct Up 5 pct Down 5 pct Down 5 pct
 or more or less or less or more
Alternative answer form: Actual percentage projected?___)

GUM ARABIC QUESTIONNAIRE

6. Before your company learned of the supply shortages, what was its 1985 gum arabic usage forecast as compared to 1984?

Static Up 5 pct Up 5 pct Down 5 pct Down 5 pct
 or less or more or less or more
(Alternative answer: actual percentage? ___)

7. Based upon the information you presently have, how much gum arabic will your company use in 1985 as compared to 1984?

Static Up 5 pct Up 5 pct Down 5 pct Down 5 pct
 or less or more or less or more
(Alternative answer: actual percentage? ___)

...in 1986 as compared to 1984?

Static Up 5 pct Up 5 pct Down 5 pct Down 5 pct
 or less or more or less or more
(Alternate answer: precise percentage estimate? ___)

8. If by the first quarter of 1986 your company can obtain as much gum arabic as required at prices close to 1984 levels, would your 1986 usage (as compared to 1984) be

Static Up 5 pct Up 5 pct Down 5 pct Down 5 pct
 or less or more or less or more
(Alternative answer: precise percentage estimate? ___)

1987 usage (as compared to 1984)?

Static Up 5 pct Up 5 pct Down 5 pct Down 5 pct
 or less or more or less or more

9. If your company presently uses or plans to use an alternative product to gum arabic, what were the reasons for the change or for the initial decision not to use gum arabic?

The alternative results in a better product.

The alternative is more cost effective.

The alternative is a more assured supply source.

The alternative is provided by a more helpful or reliable vendor.

The alternative is the traditional ingredient and there is insufficient incentive to reformulate.

The alternative is more consistent in quality.

Other:

GUM ARABIC QUESTIONNAIRE

10. Which of the following actions would increase your company's interest in using more gum arabic than is presently planned?

The development of improved grades or mixes of gum arabic blend specialties for specific or new applications (what improvements would you like to see...for what applications?)

Lower price(s) for the gum arabic grade(s) your company is already familiar with (what price would make increased or renewed usage worth considering?)

Improved service from the gum arabic vendors (what improvements would you most like to see?)

Better information (what data has been lacking that you need?)

Guaranteed availability of goods (what form should such a guarantee take to be the most useful to you and your company?)

Other:

11. Please rank any answers that you circled in question nine in order of their interest to your company. "1" is the most interesting.

The data you have provided us in this project will significantly influence the nature of the efforts undertaken to make gum arabic from the Sudan a more attractive ingredient for you and your company's consideration. THANK YOU VERY MUCH!!

Paul M. Flowerman
18 Exeter Lane
Morristown, New Jersey
07960

Re: Gum Arabic Supplies and Information

Dear Sirs:

The U.S. Agency for International Development (A.I.D.) is funding a study of the U.S.A. gum arabic market with the objective of assisting the Sudan in better understanding and serving the market's requirements. The Gum Arabic Company, Ltd., (GAC) of the Sudan has for several decades supplied well over 90 percent of the gum arabic (also called gum acacia) used in the United States. The GAC is grateful for the inclusion of this ingredient in many formulations and recognizes its obligation to reliably supply product.

Gum arabic is a critically important product for the Sudan, both as the second largest foreign exchange earner and as the key crop holding back the encroachment of the Sahara Dessert on precious arable land. A rare combination of unfavorable climatic events greatly diminished the 1984/1985 harvest, but the number of tapable trees - and potential crop size - has been increasing over the last decade. Adequate supplies are hoped for - and indeed projected by the end of 1985.

Would you please assist our efforts by filling out the enclosed eleven question questionnaire (five minutes or less)? Your responses will be used only for evaluation of the marketing job being done and will be kept confidential. We enclose a stamped self-addressed envelope in which you may return the questionnaire. Any specific information you supply us will be blended in the study into the appropriate industry profile. Any specific confidentiality requests will be completely respected. I will be calling you shortly, and you are most welcome to contact me at 201-221-0990.

Very truly yours,

Paul M. Flowerman

Enclosures: Letter of Introduction from Checchi and Company
Questionnaire

Study Team Covering Letter
Appendix 1B-4

CHECCHI AND COMPANY
1730 RHODE ISLAND AVENUE, N. W.
WASHINGTON, D. C. 20036-3193

TELEPHONE
202 452-9700

CABLE ADDRESS
"CHECCHI"
TELEX 440157

June 3, 1985

TO WHOM IT MAY CONCERN:

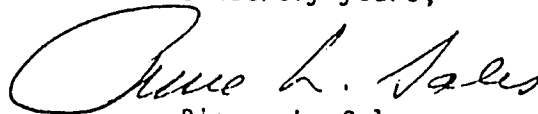
Checchi and Company, under a contract with the Agency for International Development (Contract 650-0047-00-2007-00), dated January 15, 1983, to implement the Agricultural Sector Planning and Statistics Project in the Sudan, has been requested by both the United States and Sudanese Governments to undertake a special study on the U.S. market for gum arabic. For this purpose, a team including Mr. Paul M. Flowerman has been engaged.

The quality of the study will inevitably depend upon the data gathered and on the analysis of these data. In the course of the team's efforts, a number of important sources will be contacted.

The purpose of this note is to elicit your full cooperation in assisting the team in compiling as much relevant information as possible, as well as obtaining your frank opinions/views of the current and future market for gum arabic in the U.S. It is recognized that some information will be of a sensitive nature. Please be assured that, in such cases, confidentiality will be respected. Should you wish any amplification of the foregoing, please feel free to contact the undersigned.

Thank you in advance for your cooperation.

Sincerely yours,



Pierre L. Sales
Vice President

Checchi Covering Letter
Appendix 1B-5

GUM ARABIC QUESTIONNAIRE

THIS DATA IS RESPECTFULLY REQUESTED FOR UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT CONTRACT SUDAN 650-0047--00 2007-0. THE RESEARCHERS RECOGNIZE THE POTENTIAL SENSITIVITY OF THE DATA REQUESTED, WHICH WILL BE USED ONLY FOR THE CONFIDENTIAL MARKET STUDY.

COMPANY:

CONTACT:

DATE:

TITLE:

INSTRUCTIONS: PLEASE CIRCLE THE APPROPRIATE ANSWER OR ANSWERS AND ADD ANY CLARIFICATIONS OR COMMENTS IN THE EXTRA SPACE PROVIDED.

1. What form or forms of gum arabic does your company buy?

Crude Granules Siftings Powdered Spraydried Blended
Other:

2. For how many years has your company purchased gum arabic?

2 3-5 5-10 10+ YEARS

3. Your company's 1984 gum arabic purchases in 1000's of lbs. was

Under 100 100-250 250-500 500-1,000 (one million) 1,000+

(Alternative answer: approximate thousands of lbs used _____)

4. What percentage of your company's gum arabic requirements were filled by gum arabic purchases ... in 1984?

0-25 25-50 50-75 75-95 95-100 percent

... in 1985

0-25 25-50 50-75 75-95 95-100 percent

5. Before your company learned of the supply shortages, what was its 1985 gum arabic purchase forecast as compared to 1984?

Static Up 5 pct Up 5 pct Down 5 pct Down 5 pct
 or less or more or less or more

(Alternative answer: actual percentage? ___)



GUM ARABIC QUESTIONNAIRE

6. Based upon the information you presently have, how much gum arabic will your company have accepted contracts for in 1985 as compared to 1984?

Static Up 5 pct Up 5 pct Down 5 pct Down 5 pct
 or less or more or less or more
(Alternative answer: actual percentage? ___)

...in 1986 as compared to 1984?

Static Up 5 pct Up 5 pct Down 5 pct Down 5 pct
 or less or more or less or more
(Alternate answer: precise percentage estimate? ___)

7. If by the first quarter of 1986 your company can obtain as much gum arabic as required at prices close to 1984 levels, would your 1986 purchases (as compared to 1984) be

Static Up 5 pct Up 5 pct Down 5 pct Down 5 pct
 or less or more or less or more
(Alternative answer: precise percentage estimate? ___)

1987 usage (as compared to 1984)?

Static Up 5 pct Up 5 pct Down 5 pct Down 5 pct
 or less or more or less or more
(Alternative answer: precise percentage estimate? ___)

8. If your company presently buys or plans to buy and supply an alternative product to gum arabic, what were the reasons for the change or for the initial decision not to use gum arabic?

The alternative results in a better product for your clients.

The alternative is more cost effective.

The alternative has a more assured supply source.

The alternative is provided by a more helpful or reliable vendor.

The alternative is the traditional ingredient and there is insufficient incentive to reformulate.

The alternative is more consistent in quality.

Other:

GUM ARABIC QUESTIONNAIRE

9. Which of the following actions would increase your company's interest in buying more gum arabic than is presently planned?

The development of improved grades or mixes of gum arabic blend specialties for specific or new applications (what improvements would you like to see...for what applications?)

Lower price(s) for the gum arabic grade(s) your company is already familiar with (what price would make increased or renewed usage worth considering?)

Improved service from the gum arabic vendors (what improvements would you most like to see?)

Better information (what data has been lacking that you need?)

Guaranteed availability of goods (what form should such a guarantee take to be the most useful to you and your company?)

Other:

10. Please rank any questions that you circled in question 9 in order of their interest to your company. "1" is the most interesting.

11. What is the single most important improvement in the supply and marketing of gum arabic that would most assist the longterm growth of U.S.A. gum arabic sales?

The data you have provided us in this project will significantly influence the nature of the efforts undertaken to make gum arabic from the Sudan a more attractive ingredient for you and your company's consideration. THANK YOU VERY MUCH!!

Paul M. Flowerman
18 Exeter Lane
Morristown, NJ 07960
August 22, 1985

Water Soluble Gum Association of America, Inc.
P.O. Box 95
New Dorp Station
Staten Island, NY 10306
Attn: A. Arnessen

Re: Gum Arabic Supplies and
Information.

Dear Ms. Arnessen:

The U.S. Agency for International Development (A.I.D.) is funding a confidential study of the U.S.A. gum arabic market with the objective of assisting the Sudan in better understanding and serving the requirements of their U.S.A. colleagues and clients. WSGA members know that the Gum Arabic Company, Ltd., of the Sudan has for nearly two decades supplied well over 90 percent of the gum. The Importers Section of the WSGA has always accounted for a high percentage of total purchases and is uniquely knowledgeable and influential in the U.S.A. gum arabic trade. Gum arabic has great ongoing importance for each Importer.

Would you please telephone each Importer and request their assistance in jointly providing as soon as possible the data requested in the enclosed questionnaire? The data provided will be given the prominence befitting the special position of the WSGA. A copy of this letter and the questionnaire is being sent to each of the four gum arabic buyers for his convenience.

A different questionnaire (copy enclosed) has been sent to each member of the WSGA Agent's Section. The agents are involved with gum arabic to varying degrees, and we have therefore requested individual responses.

Thank you very much for the assistance given to the project by you and the WSGA members. If I may be of help, kindly contact me (any evening) at 201-539-9206.

Very truly yours,

Paul M. Flowerman
Project Member

cc. Celanese Water Soluble Polymers Attention: Mr. Sol Kaminsky
Colony Import and Export Corp. Attention: Mr. John Tinker
Neer Corporation Attention: Mr. Harvey Neer
TIC Gums, Inc. Attention: Mr. Chris Andon

Enclosure: Questionnaire
Authorization Letter from Checchi and Co., Inc.

GUM ARABIC QUESTIONNAIRE

THIS DATA IS RESPECTFULLY REQUESTED FOR UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT CONTRACT SUDAN 650-0047--00 2007-0. THE RESEARCHERS RECOGNIZE THE POTENTIAL SENSITIVITY OF THE DATA REQUESTED, WHICH WILL BE USED ONLY FOR THE CONFIDENTIAL MARKET STUDY.

TO: WSGA

DATE: AUGUST 23, 1985

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This questionnaire has been developed for the IMPORTERS' SECTION of the WSGA. The special insights of the IMPORTERS into the U.S.A. gum arabic business is recognized and demanding--often hypothetical questions are asked. Your efforts are appreciated. We understand that many of the requested answers can only be estimated or guessed at, but your estimates and guesses are valuable guides to better understanding by and hopefully better support from the Sudan.

1. About 19.1 million pounds of crude and processed gum arabic from all origins was imported into the U.S.A. in 1983. During 1984, about 25.5 million pounds were imported. What 1985 import level would have been achieved from all origins to meet U.S.A. market requirements if gum arabic from the Sudan had been abundantly available at the prices announced during October, 1984?

"Maximum possible level" estimate:

"Best guess" estimate:

"Minimum possible level" estimate:

Comments:

2. About 77.4 percent of all 1983 U.S.A. gum arabic importations and 69.4 percent of all such 1984 importations were made directly from the Sudan. What percentage of the 1985 importations, given the same conditions as presented in Question 1, do you estimate have been made from the Sudan?

"Maximum possible level" estimate:

"Best guess" estimate:

"Minimum possible level" estimate:

Comments:

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3. Total annual U.S.A. gum arabic imports have fluctuated sharply downward and upward during the last five years as follows:

YEAR	TOTAL IMPORTATIONS (Millions of pounds)
----	-----
1980	21.9
1981	19.1
1982	14.7
1983	19.1
1984	25.5

Correcting for changes in your inventory levels and those of your customers, what do you estimate the annual consumption levels of gum arabic to have been during the last five years?

YEAR	TOTAL ANNUAL CONSUMPTION
----	-----
1980	
1981	
1982	
1983	
1984	

- ((Please make 1985 projections))
 1985 (Actual, excluding talha)
 1985 (Hypothetical, presuming gum arabic had been abundantly available at announced prices)
 ((Please make 1989 projections))
 1989 (Hypothetical, presuming gum arabic had been abundantly available at very slowly increasing prices)

4. What percentage of the U.S.A. market's 1985 gum arabic needs will not be filled by gum arabic supplies?...

at the Importer level of receiving supplies:

at the End-User level of receiving supplies:

Comments:

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5. Please circle the reasons or opinions of some of your clients for beginning during 1985 to use gum arabic substitutes in applications where gum arabic had been used during 1984.

The alternative results in a better end-product for your clients.

The alternative is more cost effective.

The alternative is available whereas gum arabic presently is not.

The longterm supply outlook for gum arabic has become too uncertain for arabic to be relied upon as an important ingredient.

The longterm price outlook for gum arabic has become too uncertain for arabic to be relied upon as an important ingredient.

The alternative is provided by competitors who provide greater technical assistance.

The alternative is the traditional ingredient and there is insufficient incentive to reformulate.

The alternative is more consistent in quality.

Other:

((Please rank the importance of the reasons circled above in order of their influence on the market as a whole by placing a ranking to the left of each circled reason. "1" is the most important))

Comments (we realize the market is quite diverse and would appreciate any further specific details you can share with us):

GUM ARABIC QUESTIONNAIRE

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6. Please circle the reasons or opinions of some of your clients for beginning or continuing to use during the second half of 1986 substitutes for gum arabic in applications where gum arabic had been used during 1984. Please assume a better-than-average crop with first arrivals during the early second quarter of 1986 and abundant arrivals by the end of the second quarter (Optimistic Scenario):

The alternative results in a better end-product for your clients.

The alternative is more cost effective.

The longterm supply outlook for gum arabic has become too uncertain for arabic to be relied upon as an important ingredient.

The longterm price outlook for gum arabic has become too uncertain for arabic to be relied upon as an important ingredient.

The alternative is provided by competitors who provide greater technical assistance.

The alternative is the traditional ingredient and there is insufficient incentive to reformulate.

The alternative is more consistent in quality.

Other:

((Please rank the importance of the reasons circled above in order of their influence on the market as a whole by placing a ranking to the left of each circled reason. "1" is the most important))

Comments (we realize the market is quite diverse and would appreciate any further specific details you can share with us):

7. What percentage of 1984 consumption levels do you feel might be recovered by 1987 assuming the most optimistic supply conditions and a price stabilized at the October, 1984 levels?:

...by 1988?:

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8. Please circle the reasons or opinions of some of your clients for beginning or continuing to use during the second half of 1986 substitutes for gum arabic in applications where gum arabic had been used during 1984. Please assume a worse-than-average crop with first arrivals during the early second quarter of 1986 but 1986 availability of only about half of 1984 world demand (1984 world demand estimated at about 40,000 metric tons). Adopt whatever price scenario you consider to be most likely under such circumstances.

(Pessimistic Scenario):

The alternative results in a better end-product for your clients.

The alternative is more cost effective.

The alternative is available whereas gum arabic presently is not in sufficient quantities.

The longterm supply outlook for gum arabic has become too uncertain for arabic to be relied upon as an important ingredient.

The longterm price outlook for gum arabic has become too uncertain for arabic to be relied upon as an important ingredient.

The alternative is provided by competitors who provide greater technical assistance.

The alternative is the traditional ingredient and there is insufficient incentive to reformulate.

The alternative is more consistent in quality.

((Please rank the importance of the reasons circled above in the order of their importance by placing a numerical ranking to the left of each circled reason. "1" is the most important))

Comments (we realize the market is quite diverse and would appreciate any further specific details you can share with us):

9. What percentage of 1984 consumption levels do you feel might be recovered by 1987 assuming the above Pessimistic Scenario?:

...by 1988?(Assume an average crop finally by 1987-1988):

GUM ARABIC QUESTIONNAIRE

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10. Which of the following actions would increase the U.S.A. market's interest in buying more gum arabic than might otherwise occur?

The development of improved grades or gum arabic blends specific or new applications (what improvements would you like to see... for what applications?):

Lower price(s) for the gum arabic grade(s) your company is already familiar with (what price would make increased or renewed usage worth considering?):

Improved service from the Gum Arabic Co., Ltd. (what improvements would you most like to see?)

Better information (what data has been lacking that you need?)

Guaranteed availability of goods (what form should such a guarantee take to be the most useful to the IMPORTERS?)

Other:

11. What is the single most important improvement in the supply and marketing of gum arabic that would most assist the longterm growth of U.S.A. gum arabic sales?

12. What is the 1986 potential market for gum talha ... given the Optimistic Scenario for gum arabic presented earlier?:

... given the Pessimistic Scenario for gum arabic presented earlier?:

(Make what you feel to be are the most likely assumptions about gum talha pricing, but assume enough talha supplies of customary quality are available to fill orders).

GUM ARABIC QUESTIONNAIRE

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The data you have provided us in this project will significantly influence the nature of the efforts undertaken to improve the supplying of gum arabic from the Sudan. THANK YOU VERY MUCH!!

Paul M. Flowerman
18 Exeter Lane
Morristown, NJ 07960

Re: Gum Arabic Supplies and
Information

Dear Sirs:

The U.S. Agency for International Development (A.I.D.) is funding a study of the U.S.A. gum arabic market with the objective of assisting the Sudan in better understanding and serving the market's requirements (Contract 650-0047-00-2007-00). As you know very well, the Gum Arabic Company, Ltd., (GAC) of the Sudan has for several decades supplied well over 90 percent of the gum arabic (also called gum acacia) used in the United States. The data collected for this study will be used to aid the GAC in better supporting their American colleagues and clients.

Would you please assist the study's efforts by filling out the enclosed six question questionnaire (five minutes or less)? Your responses will be used only for evaluation of the gum arabic supply job being done and will be kept confidential. We enclose a stamped self-addressed envelope in which you may return the questionnaire. Any specific information you supply us will be blended into an industry profile, preserving confidentiality. specific confidentiality requests will be completely respected. You are most welcome to contact me evenings at 201-539-9206, if you have any questions.

This questionnaire is being sent to every member of the Agent's section of the WSGA. Your assistance will be deeply appreciated.

Very truly yours,

Paul M. Flowerman

Enclosure: Questionnaire

GUM ARABIC QUESTIONNAIRE

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COMPANY: CONTACT:
DATE: TITLE;

INSTRUCTIONS: PLEASE CIRCLE THE APPROPRIATE ANSWER OR ANSWERS AND ADD ANY CLARIFICATIONS OR COMMENTS IN THE EXTRA SPACE PROVIDED.

1. For how many years has your company participated in the gum arabic trade?

1 2 3-5 5-10 10+ YEARS

2. What is the overall level of purchased and received tonnage in 1985 as compared to 1984 for your clients in total?

Up 5 pct Up 5 pct Static Down 5 pct Down 5 pct
or more or less or more or less

3. If any of your clients presently buy or plan to buy and supply an alternative product to Sudanese gum arabic, what were the reasons for the change or for the initial decision not to use gum arabic?

The alternative results in a better product for your clients.

The alternative is more cost effective.

The alternative has a more assured supply source.

The alternative is provided by a more helpful or reliable vendor.

The alternative is the traditional ingredient and there is insufficient incentive to reformulate.

The alternative is more consistent in quality.

Other:

GUM ARABIC QUESTIONNAIRE

4. Which of the following actions do you believe would increase your clients' interest in purchasing more gum arabic from the Sudan when supplies become readily available once again?

The development of improved grades or mixes of gum arabic blend specialties for specific or new applications (what improvements would you like to see...for what applications?)

Lower price(s) for the gum arabic grade(s) your clients are already familiar with (what price would make increased or renewed usage worth considering?)

Improved service from the Gum Arabic Co., Ltd. (what improvements would you most like to see?)

Better information (what data has been lacking that you need?)

Guaranteed availability of goods (what form should such a guarantee take to be the most useful to your company and your clients?)

Other:

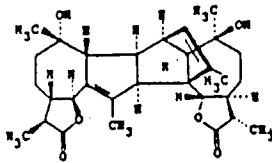
5. Please rank any questions that you circled in question 4 in order of their interest to your company. "1" is the most interesting.

6. What is the single most important improvement in the supply and marketing of gum arabic that would most assist the longterm growth of U.S.A. gum arabic sales?

The data you have provided us in this project will significantly influence the nature of the efforts undertaken to make gum arabic from the Sudan a more attractive ingredient for you and your company's consideration. THANK YOU VERY MUCH!!

Abscisic Acid

ined from (jequinity): Rubson, J. Jackson, J. *mun*, 21, 1485 (1956); see also *Chem. & Ind. (London)* 1955, 569. Structural studies: Novotny *et al.*, *ibid.* 1958, 465; *Coll. Czech. Chem. Commun.* 25, 1492 (1960); Vokac *et al.*, *Tetrahedron Letters* 1968, 3855. Structure: J. Beauhaire *et al.*, *ibid.* 21, 3191 (1980).



g in 10 ml methanol, alkalis, 222, sol-

[α]_D²⁰ -14°

trimethyl-4-enoic acid; H 7.63τ, O none. Pres-form (also birch, rose storch *et al.* th domrin; *Tetrahedron*, oung colton Synthesis of *et al.*, *Nature* is, *Agr. Biol.* y, MacKay, nforth *et al.*, *Iron Letters* is trans-form- used stereo- *et al.*, *J. Am. lar structure:* 2218 (1977). *ture* 285, 655 *Plant Physiol*

form + petr aq NaHCO₃ lightly sol in max (metha- erison: Corn-

ng substance. 1592 (1963). Carns, *Science* cidic reaction; limethyl ether; sol): 250 nm. usly used for

.9,10,10a,13a, 6,8,11,14,15- 2,2,6,7,5,5, 3a-2,12(11H)- wt 496.62. C r principle of *siae*. Isola by *Chem. Com-*

Very bitter orange needles from abs ether. mp 179-180° (dec).

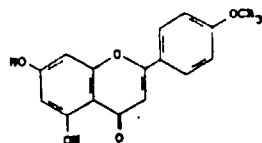
Solvated crystals from benzene, decomp 165°. [α]_D²⁰ +180.0° (c = 1.9 in CHCl₃). Bitterness threshold: 1:70,000.

7. Absinthium, Wormwood; Absinthe; Armoise. Dried leaves and flowering tops of *Artemisia absinthium* L., *Compositae*. *Habit*: Grows as weed or is cultivated in Europe, U.S., Canada, North and West Asia, Africa. *Constit*: Absinthin, anabsinthin, dark green or brown volatile oil (chiefly thujone). E. Guenther, *The Essential Oils*, V, 487 (Van Nostrand, New York 1952). Isolation of various constituents: Cekan, Herout, *Coll. Czech. Chem. Commun.* 21, 79 (1956); Herout *et al.*, *ibid.* 1485.

Very strong odor, acid taste. USE: As flavoring in alcoholic beverages, e.g. vermouth, which is a blend of white wines, contg traces of absinthium and other flavors. *Caution*: Ingestion of the volatile oil or of the liqueur, absinthe, may cause G.I. symptoms, nervousness, stupor, convulsions, death.

THERAP CAT: Anthelmintic.

8. Acacetin, 5,7-Dihydroxy-2-(4-methoxyphenyl)-4H-1-benzopyren-4-one; 5,7-dihydroxy-4'-methoxyflavone; apigenin-4'-methyl ether. C₂₁H₂₀O₆; mol wt 384.26. C 67.60%, H 4.26%, O 28.14%. The glycon of linann, q.v., and of acacin. Isola from linarin: Zemplén, *Bognar, Ber.* 74B, 1818 (1941). From acacin: Hatton, *Acta Phytochim.* 2, 105 (1925). Isola from *Robinia pseudoacacia* L., *Leguminosae*: Nakazawa, Matsuura, *J. Pharm. Soc. Japan* 73, 481 (1953). Structure: Baker *et al.*, *J. Chem. Soc.* 1951, 691. Synthesis: Robinson, Venkataraman, *ibid.* 1926, 2348; Zemplén, *Bognar, Ber.* 76B, 452 (1943); Narasimhachari, Seshadri, *Proc. Indian Acad. Sci.* 30A, 151 (1949); Simpson, *Sci. Proc. Roy. Dublin Soc.* 27, 111 (1956). C.A. 51, 8082a (1957).



Yellow needles from 95% alcohol, mp 263°. Sol in hot alc, practically insol in ether. Sol in alkalis with yellow color. Diacetate, C₂₃H₂₀O₈, lustrous needles from alc, mp 203°. 7-Rhamnoglucoside, C₃₃H₄₀O₁₀, acacia. From *Robinia pseudoacacia* L., *Leguminosae*: Freudenberg, Hartmann, *Ann.* 587, 207 (1954). Structure: Zemplén, *Mester, Magyar Kém. Folyóirat* 36, 2 (1950), C.A. 43, 7977d (1951). Needles from pyridine + water, mp 263°. [α]_D²⁰ -85.3° (pyridine); -99.5° (glacial acetic acid). Sparingly soluble in cold, more sol in boiling water; slightly sol in organic solvents.

9. Acacia, Gum Arabic. Estimations of mol wt range from about 240,000: Oakley, *Trans. Faraday Soc.* 31, 136 (1935), to 580,000: Anderson *et al.*, *Carbohydr. Res.* 3, 308 (1967). According to the U.S.P., acacia is the dried gummy exudation from the stems and branches of *Acacia senegal* (L.) Willd., *Leguminosae*, or other African species of *Acacia*. According to C. L. Mantell, *The Water-Soluble Gums* (New York, 1947), Kordofan gum (*hashab gennina*), the gum from

Use the cross index before using this section.

MERCK INDEX

Accecarbromal

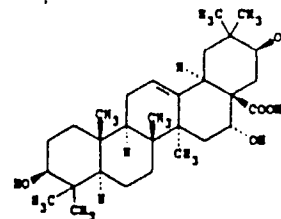
Acacia werek Quill. & Perr. from plantations in the Kordofan province (Sudan) is considered the best commercial variety. Grades of Kordofan gum which are clear, white (sun bleached) and tasteless are preferred for food preps and pharmaceuticals. (There is a close relationship between color and flavor due to the presence of tannins.) *Acacia* was originally thought to be composed only of (-)-arabinose, (+)-galactose, (-)-rhamnose, (+)-glycuronic acid. Revised composition and structural studies: Anderson *et al.*, *J. Chem. Soc. (C)* 1966, 1959. See also Swenson *et al.*, *J. Polym. Sci. Part A-2* 6, 1593 (1968). General review: Anderson, *Dea. J. Soc. Cosmet. Chem.* 22, 61-76 (1971).

Occurs in spheroidal tears up to 32 mm in diameter. Also flakes and powder. Solns of gum from *Acacia werek* are jevorotatory; other *acacia* species are dextrorotatory: Hamy, *Bull. Sci. Pharmacol.* 35, 421 (1928). Specific gravity: 1.35-1.49 (samples dried at 100° are heavier). Moisture content usually varies from 13-15%. U.S.P. limit 15%. Material containing less than 12% chips easily and produces dust during transportation. Insol in alchol, but almost completely sol in twice its weight of water. 100 grams of a satd soln contains 37 g at 25°; 38 g at 50°; 40 g at 90°. Talli, Malm, *Trans. Kans. Acad. Sci.* 32, 49 (1929). Aq soln acid to litmus. Also sol in glycerol and in propylene glycol, but prolonged heating (several days) may be necessary for complete solution (about 5%).

Incompat: Precipitates or jellies result upon addition of solns of ferric salts, borax, basic lead acetate (lead subacetate, but not neutral lead acetate), alcohol, sodium silicate, gelatin, ammoniated tincture of guaiac.

USE: As mucilage, excipient for tablets, size, emulsifier, thickener, also in candy, other foods; as colloidal stabilizer. In the manufacture of spray-dried "fixed" flavors—stable, powdered flavors used in packaged dry-mix products (puddings, desserts, cake mixes) where flavor stability and long shelf life are important.

10. Acacia Acid, 3β,16β,21β-Trihydroxyol, n-12-en-28-oic acid. C₃₈H₆₀O₄; mol wt 486.68. C 73.73%, H 9.90%, O 16.37%. From pods of *Acacia concinna* D.C., *Leguminosae*: Varshney, Shamsuddin, *Tetrahedron Letters* 1964, 2055. Structure and stereochemistry: Varshney *et al.*, *ibid.* 1965, 1187. Revised structure: A. K. Barua *et al.*, *Trans. Base Res. Inst., Calcutta* 39, 61 (1976), C.A. 87, 53460c (1977).



Needles from methanol, mp 270-281°.

Methyl ester, C₃₇H₆₀O₄, needles from methanol, mp 223-224°.

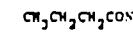
Diacyetyl lactone, C₃₄H₅₈O₆, crystals, mp 235-236°.

11. Acarbosa, O-4,6-Dideoxy-4-[[[1S-(1a,4a,5b,6a)]-4,5,6-trihydroxy-3-(hydroxymethyl)-2-cyclohexen-1-yl]amino]-α-D-glucopyranosyl-(1-4)-O-α-D-glucopyranosyl-(1-4)-D-glucose; Bay-g-5421; Glucobay. C₂₇H₄₁NO₁₀; mol wt 645.63. C 46.51%, H 6.71%, N 2.17%, O 44.61%. An α-glucosidase inhibitor that reduces sugar absorption in the gastrointestinal tract. Isola from strains of *Actinoplanes*: W. Frommer *et al.*, *Ger. pat.* 2,347,782 corresp to U.S. pat. 4,062,990 (1975, 1977 both to Bayer). Glucosidase inhibition studies: D. D. Schmidt *et al.*, *Naturwiss.* 64, 535 (1977); W. Puls *et al.*, *ibid.* 536. Use in treatment of diabetic adults: D. Sailor, O. Roder, *Arzneimittel-Forsch.* 30, 2182 (1980); H. Laube *et al.*, *ibid.* 1154. Long-term study in sulfonylurea-treated diabetics: H. Vierhapper *et al.*, *Diabetologia* 20, 586 (1981). Potential use in prophylaxis of dental caries: N. E. Fieha, D. Moe, *Scand. J. Dent. Res.* 90, 124 (1982).



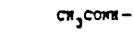
THERAP CAT: α-12, Accel[®], the living cells of *rec* USE: In the manula and semi-dry summer

13. Acebutr methylethylamin 4'-[2-Hydroxy-3-(2-acetyl-4-n-butylra ylamino)propane; 5'-ylamino)propoxy]acet: 336.43. C 64.26°. Wooldridge, *Basil pat.* 3,857,952 (1974) cology: Cuthbert, O. 639 (1971); *Basil et al. Heart J.* 32, 743 (197 *Acta Crystallogr.* 1



Crystals, mp 11 Hydrochloride, 1780JA, *Nepall*, Sn anhydry diethyl ether THERAP CAT: β-

14. Acecain naitethylbenzamide... acetanilide; N-acety 277.37. C 64.95%, H 7.16; lite of procainamid[®] 2,062,978 (1971) re cology studies: *Pharmacol.* 59, 11 ski, *J. Pharmacol. E netics*: M. Wierzech *Ther. Toxicol.* 18, 7 anti-arrhythmic c. 1250 (1980); R. A



Hydrochloride, mp 190-193°. THERAP CAT: Ca

15. Acecarbromo-2-n-butylbut urea; acetyl bromo-α-ethylbu: Carbased; Sedamyl 279.14. C 38.72° 17.19%. (C₁₁H₁₇)Cl yating carbroma ZnCl₂; Ger. pat. *mittelsynthese* (Sf Crystals, slightly ter; freely sol in alc *Caution*: Abuse THERAP CAT: 5

Consult the cross index before using this section.

Table 2. Schedule A Commodity by Country of Origin

*For coverage, valuation, and sampling procedures, see General Explanation. Shipments valued at less than \$251 are shown only under Schedule A commodity 990 0000 and excluded from all other commodities. OTH CTRY represents total for countries averaging under \$1,000 per month based on general imports.

Country of origin	General imports				Imports for consumption			
	Current month		Cumulative, January to date		Current month		Cumulative, January to date	
	Net quantity	Value (dollars)	Net quantity	Value (dollars)	Net quantity	Value (dollars)	Net quantity	Value (dollars)
2922030 GUM ARABIC (LBS)								
CANADA	-	-	30 450	7 210	-	-	30 450	7 210
PERU	-	-	33 069	9 359	-	-	33 069	9 359
U KING	-	-	23 259	6 507	-	-	23 259	6 507
ITALY	-	-	64 138	13 467	-	-	64 138	13 467
INDIA	-	-	607 394	135 669	-	-	607 394	135 669
INDONESIA	-	-	-	-	-	-	5 312	1 093
SUDAN	1 725 522	452 387	30 822 777	7 296 628	1 483 012	392 781	30 533 086	7 326 103
SENEGAL	-	-	586 795	125 223	-	-	586 795	125 223
NIGERIA	11 200	2 912	261 520	63 610	11 200	2 912	261 520	63 610
MALAGAS	121 255	34 322	121 255	34 322	121 255	34 322	121 255	34 322
TOTAL	1 897 977	489 621	32 552 657	7 491 995	1 615 467	430 015	32 268 480	7 622 563

Country of origin	General imports				Imports for consumption			
	Current month		Cumulative, January to date		Current month		Cumulative, January to date	
	Net quantity	Value (dollars)	Net quantity	Value (dollars)	Net quantity	Value (dollars)	Net quantity	Value (dollars)

2922838 GUM ARABIC (LB) 1968								
BRAZIL	-	-	600	390	-	-	600	390
U KING	-	-	1 547	1 231	-	-	1 547	1 231
W GERM	-	-	5 512	1 133	-	-	5 512	1 133
FRANCE	-	-	55 116	14 812	-	-	55 116	14 812
SUDAN	112 000	26 283	24 205 207	5 381 305	112 000	26 283	24 205 207	5 425 723
SENEGAL	-	-	517 966	117 238	-	-	517 966	117 238
NIGERIA	27 400	5 262	350 578	79 185	27 400	5 262	350 578	79 185
LIBERIA	-	-	132 453	31 722	-	-	132 453	31 722
TOTAL	134 400	31 945	25 368 778	6 829 886	134 400	31 945	25 368 778	6 829 886

2922030 GUM ARABIC (LB) 1969								
U KING	-	-	6 537	16 680	-	-	6 537	16 680
W GERM	-	-	8 471	7 771	-	-	8 400	2 771
FRANCE	-	-	167 791	47 093	-	-	167 991	47 093
SUDAN	5 073 059	1 314 671	25 883 251	6 460 497	5 073 059	1 314 671	25 883 251	6 460 497
SENEGAL	-	-	21 614	5 134	-	-	21 614	5 134
NIGERIA	-	-	594 810	149 864	-	-	594 810	149 864
TANZANIA	-	-	4 388	776	-	-	4 388	776
TOTAL	5 073 059	1 314 671	26 748 986	6 877 815	5 073 059	1 314 671	26 748 986	6 877 815

2922030 GUM ARABIC (LB) 1970								
U KING	7 205	597	14 785	2 320	7 205	597	14 785	2 320
FRANCE	-	-	138 184	23 454	-	-	138 184	23 454
W GERM	-	-	9 039	2 839	-	-	9 039	2 839
INDIA	-	-	99 287	25 219	-	-	99 287	25 219
TUNISIA	-	-	55 115	15 868	-	-	55 115	15 868
SUDAN	781 099	276 712	26 641 798	7 307 754	781 099	276 712	26 641 798	7 307 754
SENEGAL	-	-	55 126	15 784	-	-	55 126	15 784
NIGERIA	-	-	67 200	16 093	-	-	67 200	16 093
TOTAL	782 304	277 309	27 089 374	7 484 331	782 304	277 309	27 089 374	7 484 331

2922030 GUM ARABIC (LB) 1971								
SWEDEN	-	-	67 241	21 330	-	-	67 241	21 330
U KING	-	-	86 320	16 114	-	-	86 320	16 114
NETHLDS	-	-	101 292	43 074	-	-	101 292	43 074
FRANCE	-	-	171 765	18 247	-	-	171 765	18 247
SWITZLD	-	-	317	327	-	-	317	327
INDIA	39 483	11 191	39 483	11 191	39 483	11 191	39 483	11 191
SUDAN	2 330 136	673 914	27 379 708	7 731 426	2 330 136	673 914	27 379 708	7 731 426
TOTAL	2 369 619	695 306	27 959 526	7 795 526	2 369 619	695 306	27 959 526	7 795 526

2922838 GUM ARABIC (LB) 1972								
SWEDEN	-	-	64 138	21 684	-	-	64 138	21 684
U KING	-	-	71 700	14 687	-	-	71 700	14 687
NETHLDS	-	-	35 750	19 875	-	-	35 750	19 875
FRANCE	55 115	10 500	582 874	148 893	55 115	10 500	582 874	148 893
W GERM	-	-	1 323	825	-	-	1 323	825
SWITZLD	-	-	953	1 083	-	-	953	1 083
SUDAN	863 181	271 523	30 502 373	9 270 878	863 181	271 523	30 502 373	9 270 878
SENEGAL	-	-	353 388	111 488	-	-	353 388	111 488
INDIA	-	-	47 637	7 849	-	-	47 637	7 849
NIGERIA	2 239	571	220 834	62 749	2 239	571	220 834	62 749
CHAD	-	-	72 752	24 750	-	-	72 752	24 750
TOTAL	829 433	282 094	31 855 726	9 874 826	829 433	282 094	31 855 726	9 874 826

2922030 GUM ARABIC (LB) 1973								
U KING	44 097	20 000	44 097	20 000	44 097	20 000	44 097	20 000
SWEDEN	-	-	7 200	1 041	-	-	7 200	1 041
FRANCE	-	-	286 594	56 100	-	-	286 594	56 100
GERM	-	-	52 580	16 997	-	-	52 580	16 997
INDIA	-	-	64 138	22 808	-	-	64 138	22 808
INDONESIA	-	-	10 140	5 610	-	-	10 140	5 610
SENEGAL	-	-	110 130	30 851	-	-	110 130	30 851
FRANCE	1 109 000	150 000	15 000 000	5 000 000	1 109 000	150 000	15 000 000	5 000 000
INDIA	-	-	91 264	22 631	-	-	91 264	22 631
INDONESIA	-	-	66 138	14 250	-	-	66 138	14 250
NIGERIA	-	-	19 681	1 607	-	-	19 681	1 607
TOTAL	1 109 000	150 000	16 100 000	5 285 885	1 109 000	150 000	16 100 000	5 285 885

Table 2. Schedule A Commodity by Country of Origin, Customs Value, F.a.s. and C.i.f. - Continued

(For information on coverage, definitions of Customs, f.a.s., and c.i.f. values, see Explanation of Statistics. Shipments valued less than \$251 are shown only under Schedule A commodity number 990 0000 and excluded from all other commodities. OTH CTY represents total for countries averaging under \$1,000 per month based on Customs Value)

Country of origin	Schedule A commodity number, description and unit of quantity							
	Current month				Cumulative, January to date			
	Net quantity	Value (dollars)			Net quantity	Value (dollars)		
Customs		F.a.s.	C.i.f.	Customs		F.a.s.	C.i.f.	
2922030 GUM ARABIC								(LB)
			1974					
CANADA.....	11 490	14 000	14 136	14 116	16 940	20 797	20 946	20 946
MEXICO.....	1 107	5 000	5 125	5 175	2 204	9 800	9 969	9 969
U.KING.....	-	-	-	-	50 480	86 948	87 218	95 319
NETHUS.....	-	-	-	-	2 205	4 291	4 291	4 400
FRANCE.....	-	-	-	-	95 734	131 606	131 646	149 748
GERM.....	1 170	731	731	648	157 794	269 565	269 505	302 926
SWITZLD.....	-	-	-	-	661	1 743	1 743	1 888
SEBRACH.....	-	-	-	-	1 091	1 245	1 465	2 787
IPAN.....	-	-	-	-	93 510	109 410	109 429	114 059
INDIA.....	-	-	-	-	24 600	40 690	40 690	42 803
PHIL N.....	-	-	-	-	15 000	8 145	8 145	9 560
AUSTAL.....	-	-	-	-	44 525	4 677	4 677	5 840
SUDAN.....	223 600	313 245	313 245	344 819	22 933 896	20 182 291	20 200 802	21 243 519
OTH CTY.....	-	-	-	-	73,476,356	2,566	14,566	15,144
						20,809,4		
2922030 GUM ARABIC			1975					
CANADA.....	-	-	-	-	15 040	11 077	11 213	11 213
SWEDEN.....	-	-	-	-	66 138	42 680	42 680	47 951
U.KING.....	-	-	-	-	202	628	628	645
FRANCE.....	531	694	694	768	40 825	91 538	91 538	92 810
INDIA.....	-	-	-	-	2 425	2 240	2 240	2 429
JAPAN.....	-	-	-	-	2 200	4 210	4 210	4 334
SUDAN.....	40 000	27 005	27 005	29 157	5 429 902	3 748 681	3 730 521	4 041 837
NIGERIA.....	-	-	-	-	13 440	4 245	4 245	4 775
CHAD.....	-	-	-	-	77 000	112 000	112 000	114 815
ETHIOP.....	-	-	-	-	11 023	17 500	17 500	18 075
TOTAL.....	40 531	27 699	27 699	29 925	6 054 195	4 034 819	4 016 795	4 338 978
SUDAN	606 265	318 245	318 245	370 641	19 494 642	8 184 369	8 167 295	8 415 516
FRANCE	300	565	562	618	216 309	110 394	110 419	122 439
TOTAL	406 565	319 510	319 507	371 259	14 712 951	8 299 763	8 277 725	9 038 155
GUM ARABIC			1976					(LB)
INDIA	-	-	-	-	110 230	67 389	67 389	67 927
SUDAN	3 795 321	2 157 225	2 187 215	2 669 786	20 840 052	11 899 602	11 904 282	13 265 444
FRANCE	33 060	4 712	4 712	6 600	158 132	82 913	83 883	92 887
TOTAL	3 829 381	2 191 937	2 191 927	2 676 386	21 978 741	12 171 372	12 177 022	13 578 156
2922030 GUM ARABIC			1978					(LB)
FRANCE.....	-	-	-	-	323 659	193 136	193 199	207 214
SUDAN.....	1 225 758	672 400	672 400	740 254	14 360 534	10 204 733	10 208 733	11 199 441
OTH CTY.....	12	285	285	290	126 760	68 641	68 291	77 243
TOTAL.....	1 225 770	672 685	672 685	740 544	16 810 953	10 466 560	10 466 223	11 484 544
2922030 GUM ARABIC (LB)			1979					
FRANCE.....	396 876	199	199	221	1 339 400	557	637	723
INDIA.....	5 100	4	4	4	360 181	229	229	250
TUNISIA.....	-	-	-	-	110 230	68	68	75
SUDAN.....	2 718 628	1 501	1 501	1 647	12 922 847	11 375	11 375	12 389
OTH CTY.....	-	-	-	-	52 873	31	31	34
TOTAL.....	3 120 584	1 704	1 704	1 877	21 785 247	12 259	12 292	13 471

APPENDIX TO TRADE STATISTICS

1750

27,870,000 LB

2922030 GUM ARABIC (LB)									
FRANCE.....	121 582	62	62	60	1 644 231	629	659	1 956	
INDIA.....					110 271	68	68	1 777	
SUDAN.....	2 081 047	1 256	1 256	1 285	14 616 085	9 109	9 109	4 787	
OTH CTY.....	44 894	32	32	40	57 314	41	41	151	
TOTAL.....	2 247 523	1 351	1 351	1 394	16 457 860	10 107	10 106	10 871	

1751

2922030 GUM ARABIC (LB)									
FRANCE.....	78 366	40	40	44	1 172 848	608	608	667	
SUDAN.....	551 150	381	381	426	17 659 122	12 408	12 408	13 585	
OTH CTY.....					276 944	136	136	158	
TOTAL.....	630 516	420	420	470	19 058 914	13 152	13 152	14 409	

1752

Schedule A Commodity number, description, and unit of quantity								
Country of origin	Current month, General imports				Cumulative, January to date			
	Net quantity	Value (thousands of dollars)		Net quantity	Value (thousands of dollars)		Net quantity	Customs value (thousands of dollars)
		Customs	Cif.		Customs	Cif.		
2922030 GUM ARABIC (LB)								
FRANCE.....	176 922	116	126	1 310 271	387	1 064	1 310 271	987
INDIA.....				199 948	144	183	199 948	144
PARISIN.....	236 716	195	204	1 449 246	324	1 013	1 449 246	921
EGYPT.....				56 250	189	192	56 250	159
SUDAN.....	1 421 967	936	1 033	11 594 154	7 976	8 559	11 594 154	7 476
OTH CTY.....	149	2	2	69 089	67	75	69 089	67
TOTAL.....	1 833 754	1 250	1 365	14 678 958	10 287	11 085	14 678 958	10 287

1753

2922030 GUM ARABIC (LB)								
CANADA.....				51 984	63	63	51 984	63
SWEDEN.....				110 000	72	80	110 000	72
U KING.....	158 344	105	110	1 683 680	1 160	1 225	1 683 680	1 160
FRANCE.....	238 090	182	198	2 144 284	1 559	1 659	2 144 284	1 559
INDIA.....				312 487	252	274	312 487	252
SUDAN.....	998 359	663	704	14 757 274	9 781	10 646	14 757 274	9 781
OTH CTY.....				3 966	8	9	3 956	8
TOTAL.....	1 394 703	950	1 012	19 063 675	12 896	13 959	19 063 675	12 896

1784

2922030 GUM ARABIC (LB)								
U KING.....	236 667	165	179	4 062 448	2 889	3 019	4 062 448	2 889
FRANCE.....	79 680	62	74	2 228 035	1 958	2 147	2 228 035	1 958
FR GERM.....	6 614	8	8	175 360	116	123	175 360	116
INDIA.....				793 658	518	561	793 658	518
SUDAN.....	1 145 983	819	875	17 755 402	12 054	12 915	17 755 402	12 054
NIGERIA.....				374 724	152	162	374 724	152
OTH CTY.....	30 192	25	35	125 746	109	114	125 746	109
TOTAL.....	1 529 198	1 093	1 172	25 515 371	17 795	19 041	25 515 371	17 795



WATER SOLUBLE GUM ASSOCIATION OF AMERICA, INC.

P.O. Box 95, New Dorp Station
Staten Island, New York 10306

GUM ARABIC

This brochure is meant to familiarize the reader with the resources being made available to increase its usefulness to industry. Wider application of Gum Arabic will tend to encourage its principal producer to stabilize the crop and the price which it charges for this important commodity.

The Water Soluble Gum Association of America, Inc., is an association of the water soluble gum manufacturers whose purpose is to develop, service and expand the market for water soluble gums. Its members deal with the overseas producer and provide intermediate processing and an orderly and reliable distribution in the United States and Canada.

- 1) Gum Arabic is a natural product.
- 2) Substantial inventories are being stored to preclude future shortages at the port in Sudan.
- 3) Acacia trees are being planted and cultivated in the Sudan to increase the availability for future use and expansion of the market.
- 4) Because of this increased production, price stability has been maintained for the past several years and only this year has there been a small price increase.

The Gum Arabic Company (GAC) was formed in the Sudan by the government.

Sudan is the largest source of Gum Arabic in the world and produces the best quality available. The fact that the Sudan is the biggest producer of Gum Arabic in the world made it necessary that trade in this commodity should be organized on sound commercial basis. So a public concession company has been set up to handle all export of Gum. Even though the Government holds shares in the company, the management is left entirely in private hands. The role of the Government is to ensure the provision of adequate export services and facilities. The marketing policy of GAC is practical in its endeavour to maintain and expand the market.

The Raw Material is Available in the Following Grades:

a) Cleaned (Cleaned Amber Sorts)

The bulk of the Gum Arabic is exported in this grade. Impurities, such as bark and bits of other varieties of Gum are removed during cleaning and packing in 50 kg. bags.

b) Handpicked Selected

Small quantities are specially selected by hand-picking and consist only of larger uniform pieces and more transparent gum.

GUM PRODUCTION

Largely as a result of its possession of pure stands of *Acacia Senegal* and the consequent ease of collection, the Sudan is the dominant producer of Gum Arabic, supplying in the period 1960–1978 between 80% and 90% of the annual world requirements.

The Sudan is aware that Gum Arabic is a national asset and that it needs to be conserved, improved and developed; and not only to provide a sustained yield of Gum, but also for other, important socio-economic benefits of protection and production.

The Sudan is also aware of the fact that the gum belt is a natural buffer zone between the desert proper in the North and the good agricultural tall grass Savanna in the South. Therefore, any destruction or misuse in this zone will induce desert encroachment and consequently seriously threaten agricultural production. This is a matter of paramount importance not only to the Sudan but probably to the world at large because this area is considered to be one of the future grainaries of the world.

All this explains the high priority given by the Sudan Government for the production, improvement and development of Gum Arabic, to the extent that:

- a) A development project be introduced in the six year plan to promote Gum Arabic production.
- b) Large scale mechanized Gum Arabic plantations be maintained in the clay plains in the Eastern Sudan and in the sandy areas of the West.

CHEMISTRY AND PROPERTIES

IDENTITY AND ORIGIN

Gum Arabic is the trade name for a forest product of the genus *Acacia* and is mainly produced from *Acacia Senegal* commonly known as *Hashab*. The species has a wide distribution and remarkable adaptability. It is essentially a semi-arid zone species but is so adaptable that it is not only drought resistant but is also frost hardy. It can regenerate naturally from seeds or vegetatively from coppice.

The main area of its occurrence is the central part of the Sudan where the species is uniform and is found in pure stands, giving the Sudan the advantage of being the biggest producer and exporter of the best qualities.

Another important comparative advantage is that in the Sudan it occurs both wild and cultivated in a wide area giving the benefits of economies of scale.

PROCESSING

The most important factor in processing is removal of the bark content which can amount to 1% in the tears, and sorting out the sand or silica. Clean gum results. The grinding, sizing and blending and/or spray drying of the gum consistent with quality control specifications produce a uniform and dependable gum and maintain its functional properties.

PHYSICAL CHARACTERISTICS

Gum Arabic USP tears and crystals are colorless or nearly colorless and practically tasteless. The powdered gum is white to yellowish white. The spray dried Gum is pale yellow to white powder and is completely soluble.

SOLUBILITY

Gum Arabic is almost completely soluble in twice its weight of water. This is an important property because the other gums tend to swell in water. A 40% solution produces an excellent mucilage for adhesiveness. A solution of over 50% concentration may be made. It is insoluble in alcohol and most organic solvents. It is practically insoluble in 60% alcohol.

VISCOSITY

Gum Arabic is not normally used where swelling or thickening power is required. This gum is very soluble and the viscosity increases slowly up to 25% concentration, above which the viscosity increases much more rapidly in proportion to gum content. Increasing temperature reduces viscosity considerably. The addition of salts or electrolytes affects the consistency of the solution as well as does pH. Gum Arabic solutions become most viscous near pH 6 to 7.

CHEMICAL CHARACTERISTICS

Gum Arabic is a complex mixture of calcium, magnesium and potassium salts of arabic acid. Arabic acid is a complex of galactose, rhamnose, arabinose and glucuronic acid. The molecular weight is on the order of 240,000. Powdered gum arabic contains 15% maximum moisture and 0.5% maximum acid insoluble ash. Gum Arabic has an acid reaction. The pH of a 10% solution is about 4.6.

COMPATIBILITY

Gum Arabic is the most widely used of all the plant hydrocolloids. It is compatible with other plant hydrocolloids and proteins, carbohydrates and starches. Electrolytes tend to reduce the consistency of gum arabic solutions. Some reagents give precipitates or heavy jellies, e.g. borax, ferric chloride and basic lead subacetate. Gum Arabic solutions are incompatible with soap in making emulsions. The viscosity of a solution of a mixture of Gum Arabic and Gum Tragacanth tends to be lower than that of either constituent solution. A minimum viscosity is attained in a mixture consisting of 80% tragacanth and 20% arabic.

PRESERVATIVES

Gum Arabic solutions can be preserved by using 0.1% concentrations of sodium benzoate or benzoic acid. Methyl and propyl p-hydroxybenzoate at a maximum of 0.17% and 0.03% concentration respectively are also effective.

PACKAGING

The various grades available are packed to suit industry requirements in paper bags, fibre drums or other suitable containers.

Members of

WATER SOLUBLE GUM ASSOCIATION OF AMERICA, INC.

Celanese Water Soluble Polymers

290 Brighton Road
Clifton, New Jersey 07012

Colony Import & Export Corp.

101 West 31st Street
New York, NY 10001

Meer Corporation

9500 Railroad Avenue
North Bergen, New Jersey 07047

TIC Gums, Inc.

144 East 44th Street
New York, New York 10017

ESTIMATE OF 1985 GUM TALHA PRICES - ALL GRADES APPENDIX TO 3C

Note: Many of the U.S.A. costs are calculated to the nearest tenth of a cent but are then rounded off to the nearest cent when carried on to further costs.

*F.O.B. Port Sudan price for Gum Talha : USD 550 per metric ton net
(Price is inclusive of 2 percent agent's commission)

Fumigation Charges: USD 8/MT net

Ocean Freight Charges to New York and other East
Coast U.S.A. ports (USD .050-2950/MT -AVERAGE 2500): USD 125/MT net

Insurance, clearance and dock charges, and shipment to N.Y.Warehouse
(About USD 7.00 + USD 10.00 + USD 15.00) USD 32/MT net

*Cost for Gum Talha delivered to N.Y. warehouse: USD 715/MT net
(32.4 cents per lb. net)

Warehouse costs, inventory carrying cost, delivery charges to customer (note:some goods delivered straight from the docks to the customer - in this minimum cost case we estimate an additional one cent per lb. cost above the base level given above. Other goods may be warehoused for for long periods of time and then delivered cost country in fairly small volumes): (1.00 -10.00 cents per lb. net)

***Cost for CAS delivered to U.S.A. end-user:(34-43 cents per lb. net)

(No seller administrative or facility overhead or profit margin factored into the above cost)

Estimated cost for processing Gum Talha into uniformly sized pieces with impurities sifted out (Talha "Kibbles" or "Granules"):

- Processing total cost often including transport to and from contract processor (used by some importers -about 2 cents per lb., rebagging -about 2 cents per lb., and crushing and sifting costs -unconfirmed estimate: about 3 cents per lb.):

About 5 to 7 cents per lb. net

APPENDIX 3C CONTINUED

(Cost of Gum Talha Granules, continued)

- Material lost from crushing, sizing, and sifting
(unconfirmed estimate of 5-10 percent weight loss)
0.08 X (32 cents FOB warehouse + 8 cents processing)
About 3.2 cents per lb. net

Note: we do not know whether gum talha siftings have any commercial application although we have rumors of such product being presently tested by an optimistic major user of gum arabic siftings. We shall presume none of the material loss cost is presently recoverable.

Estimated total granulation cost: 8.2- 10.2 cents per lb. net

*F.C.B. N.Y. warehouse cost of Talha Granules: 41- 43 cents per lb. net

***Delivered cost to users of Talha Granules: 42- 53 cents per lb. net net

(Note: no seller administrative or facility overhead or profit margins factored into the above costs. Freight estimated at 1.00 - 10.00 cents per lb.)

Cost of producing First Quality Talha Powder from Crude Gum Talha

- Processing Cost: Crushing, Sifting, Grinding, Rebagging, Transport to and possibly from contract processor. We estimate (unconfirmed estimate) a cost of one cent per pound more than the cost for the kibbling.
About 6 - 8 cents per lb. net

- Material Loss: Estimated at between 7 and 15 percent
.11 X (32 cents base cost + about 7 cents processing)
About 4.3cents per lb. net
Note: We assume material loss cannot yet be recovered from siftings sales

Estimated Total Powdering Cost: About 10.3 - 12.3 cents per lb. net

* F.O.B. warehouse cost for First Quality Talha Powder:
About 43 - 45 cents per lb.

APPENDIX 3C (CONTINUED)

(First Quality Powdered Gum Talha cost structure continued)

***Delivered cost to Users of First Quality Gum Talha Powder:
About 44 - 55 cents per lb. net

(Note: no seller administrative or facility overhead or profit margins factored into the above costs. Freight estimated at 1.00 - 10.00 cents per lb.)

Cost of Producing Spraydried Powder First Quality Gum Talha

- Processing Costs: Done mostly by contract processors but increasing percentage of one importer's needs now done in-house with recent assembly of a large spraydrier. Estimated cost of putting into solution, filtering, and spraydrying (unconfirmed estimate): About 13 - 15 cents per lb. net

- Material loss: About 30 pct. We do not believe this material is readily recoverable because of being wetted in the processing. Our estimate in this particular case is particularly rough and also critical in the estimation process. We know for certain that the actual loss must be markedly greater than for CAS processing but we do not know how much greater or how pure the resulting process is. We believe experimentation on this continues.

$0.30 \times (32 \text{ cents} + 14 \text{ cents} - \text{almost all is contract processed}) =$
About 13.8 cents per lb. net

Total Spraydrying Cost: About 26.8 - 28.8 cents per lb. net

* F.O.B. N.Y. Warehouse cost for Spraydried Gum Talha First Quality:
About 59 - 61 cents per lb. net

*** Delivered to User cos. for Spraydried Gum Talha First Quality:
About 60 - 71 cents per lb. net

(Note: no seller administrative or facility overhead or profit margins factored into the above costs. Freight estimated at 1 - 10 cents per lb.)

APPENDIX 3C (CONTINUED)

IMPORTER SELLING PRICES:

We estimate Importer Mark-ups on the F.O.B. N.Y. warehouse costs during 1985 (the first time significant sales of Gum Talha have been made in the U.S.A) based upon limited data from end-users (no trade estimates). The mark-ups are much larger than the mark-ups for the comparable gum arabic grades they are replacing because they are taken during a period of shortage with customers who have been paying CAS level prices. Also, considerable expenditures have no doubt been involved in developing and testing suitable products from this long-neglected grade. Finally, the importers of talha are faced with very considerable revenue losses in most cases from the gum arabic shortage.

CRUDE TALHA: 25 - 80 percent

GRANULES : 25 - 70 percent

FIRST QUALITY TALHA POWDER: No pricing data. Guess: 25 - 70 percent

SPRAYDRIED FIRST QUALITY POWDER: No pricing data. Guess: 50-100 percent

The resulting Delivered Prices to customers are:

CRUDE: Minimum 1.25×32.4 cents + 1 cent = 41 cents per lb. net

Maximum 1.80×32.4 cents + 10 cents = 68 cents per lb. net

GRANULES: Minimum 1.25×41 cents + 1 cent = 52 cents per lb. net

Maximum: 1.70×43 cents + 10 cents = 83 cents per lb. net

FIRST QUALITY GUM TALHA POWDER:

Minimum: 1.25×43 cents + 1 cent = 55 cents per lb. net

Maximum: 1.70×45 cents + 10 cents = 77 cents per lb. net

SPRAYDRIED FIRST QUALITY:

Minimum 1.50×59 cents + 1 cent = 89 cents per lb. net

Maximum 2.00×61 cents + 10 cents = USD 1.32 per lb. net

NOTE: Only the very largest buyers located close to N.Y. will be able to obtain the minimum prices. We believe that the margins for all grades of talha will be reduced somewhat in the future even if prices from origin remain the same because current pricing is directly influenced by the gum arabic shortage and talha supplies coming into the market appear to be barely sufficient to meet growing market demand.

APPENDIX 5B

PRICING: COLLECTION OF ALL PRICE-RELATED DATA OBTAINED IN STUDY

SEGMENT A-1: LIQUID BEVERAGE EMULSION MAKERS FOR IN-HOUSE USAGE

SEGMENT A-1 TOTAL: 5,435,000 LBS ESTIMATED USAGE (6,533,000 CEU'S)

Major user: During July, they were offered gum arabic at \$22 per kilo (declined). They were concerned that Europe was somehow getting more product than the U.S. because somehow - although the prices were high but not unreasonable - offers could be obtained from Europe but not from the U.S.A. importers. Price consideration secondary to availability at a fairly stable price. they wanted reassurance that willingness to pay higher price would not yield more supplies this year. In response to questionnaire query on reduced price as causing interest in increased usage, reply was "yes".

A.E.Staley salesman: Sta-mist now pregelatinized (hence, water soluble) gum arabic substitute for beverage emulsions is now available at 70 cents per lb. F.O.B. warehouse. Mira cap is available at 60 cents per pound. Both are pound-for-pound gum arabic replacements.

SEGMENT A-2: POWDERED EMULSION MAKERS FOR IN-HOUSE FOOD/BEVERAGES

SEGMENT A-2 TOTALS: 1,738,000 LBS. ESTIMATED USAGE (1,793,000 CEU'S)

Big user, suggested 50 percent reduction in price in answer to questionnaire:"what price would make increased or renewed usage worth considering?"

Same corporation as a big user: technical man felt price promotion would be the most effective way of getting companies to look at gum arabic again and suggested a price of 50 cents per lb.. People should sell it, then go to the companies and show them how to use it again in more applications...must "get in the door again".

Major user in category, but overall small: technical person concerned that price might increase a great deal and then arabic would be unsuitable. However, much more concerned with availability as they wish to use old equipment that gives dusting problems with other gums and other stabilizers, but not with gum arabic.

100 MT user: \$.88-.95/lb (for spraydried)

SEGMENT A-3: FLAVORS AND FRAGRANCES COMPANIES MANUFACTURING LIQUID

AND POWDERED EMULSIONS FOR BEVERAGE, FOOD, AND MISCELLANEOUS USES

SEGMENT A-3 TOTALS: 4,591,000 LBS. ESTIMATED USAGE (5,225,000 CEU'S)

Compared to gum arabic, starches are less costly and much less trouble as less concern about purity and variation in product, also the finished product delivered {this large user makes his own spraydried}. The starches are less costly, "run quicker - spray faster. Many applications do not require the expensive "Cadillac" {i.e. arabic} when a "Chevie" {i.e. starches} can do the job.

Medium-to-large user: Were paying \$1.10 per pound for granules during 1984, went up to \$1.45 and by end-June reached \$2.45 per lb. Willing generally to pay a little more for better quality product. Their current propylene glycol solution costs fifty cent per lb. whereas gum arabic solution, at \$1.45 per lb for granules costs 36 cents per lb. At \$2.45 per lb. for granules longterm, they would completely reformulate out of gum arabic. At \$1.45, they have dropped over half of their usage (not just price, also forced to because of shortage).

Big user, was paying \$1.35 per lb. delivered for spraydried arabic before the crisis. They are somewhat demanding for quality, buying quite a bit of product with low guaranteed plate count levels. The last price they paid was \$3.00 per lb., and they have had product offered to them at as high as \$5.95 per lb.. To compete with the starch substitutes, arabic would have to be delivered to the processor through the importers at \$1.00 to \$1.10 per lb (spraydried). Later in conversation, he said, well perhaps \$1.30 per lb. might be enough for them to look at spraydried once again. He foresees parties requiring liquid beverage emulsions going back to gum arabic, but in other areas, the substitutes are every bit as good. He is paying 80 cents to \$1.15 per pound for starches with their preferred grade costing him presently \$1.05 per lb. delivered. Under such competitive pricing conditions, he is unwilling to pay \$1.85 per lb. for arabic spraydried, which was, we believe, an early 1985 offering level.

Big user. In the questionnaire, question 10 circled "Lower prices" (his only notation on that question) as being important for his company's considering increased usage for gum arabic.

SEGMENT A TOTALS: 11,526,000 LBS. ESTIMATED USAGE (13,258,000 CEU'S)

SEGMENT B-1: CONFECTIONARY MAKERS: HARD CANDIES

SEGMENT B-1 TOTALS: 150,000 LBS. ESTIMATED USAGE (188,000 CEU'S)

Medium, once quite big, user. In response to questionnaire "what price would make increased or renewed usage worth considering?", replied "65-85 cents per lb." {They used powdered and spraydried} and have reformulated.

SEGMENT B-2: CONFECTIONARY MAKERS: SUGARY AND DIETETIC GUMMY CANDIES

SEGMENT B-2 TOTALS: 663,000 LBS. ESTIMATED USAGE (691,000 CEU'S)

Medium-size user. They bought CAS during 1984 "in the high 70's" { 75 - 79 cents per lb. }. Powdered polydextrose at 93 cents per lb is not nearly as good as gum arabic but can be used in some applications. Price is extremely important , and with 15 to 20 pct reduction in the 1984 price of gum arabic, plus readily available supplies, he predicts that his company by 1989 would conservatively use five million pounds per year as consumption growth of the arabic-containing products is well over 30 percent per year. This growth and the great future for gum arabic is in the dietetic candy industry only. In response to questionnaire, "what prices would make increased or renewed usage worth considering?", replied, "15-20 pct lower as compared to 1984."

SEGMENT B-3: MAKERS OF COATED CANDIES, FRUITS, AND NUTS

SEGMENT B-3 TOTALS: 1,940,000 LBS. ESTIMATED USAGE (2,150,000 CEU'S)

Big user: until the recent crisis, they were paying 90 cents per lb. delivered for USP No. 1 powder. Currently (July, 1985) , they have been paying \$1.40 per lb. and are supplementing their needs with gum talha. They are very concerned about longterm availability and price stability, switched to dextrans in 1978 for lower prices, but came back and have no current plans to defect from gum arabic because of their commitment to the highest quality confectionary products.

Small user. Pre-shortage price was \$1.32 per lb. delivered in batches of 2,000 - 4,000 lbs. at a time. Their response to crisis was swift, began immediately talking with substitute suppliers offering Crystalgum and Kdex (tapioca dextrans from National Starch) and Aragum 3,00 Powder (from TIC), the latter offered at \$1.35 per lb. , FOB N.Y.. Kdex is the new and total substitute, priced at 98 cents per lb delivered. Using only 40 percent of the amount of spraydried gum arabic, they can get the equivalent effect for their coating application. Arabic gives a slightly better surface appearance but that is not enough to overcome the significant price difference.

Medium user: in response to questionnaire "what price would make increased or renewed usage worth considering?", they replied "\$1/lb." They use granules and spraydried and have not reformulated, so we presume this means they had been paying more than \$1.00 for granules and lower prices would increase their usage.

SEGMENT B TOTALS: 2,753,000 LBS. ESTIMATED USAGE(3,0129 CEU'S)

SEGMENT C: VITAMIN AND NUTRITIONAL SUPPLEMENT MAKERS

SEGMENT C TOTAL: 825,000 LBS. ESTIMATED USAGE (960,000 CEU'S)

Large user for this segment. Had been buying spraydried for \$1.30 - \$1.35 per lb. delivered. They now buying substitutes like National Starch's Capsulgum at about \$1.00 per lb. If spraydried arabic becomes available at under \$1.20, then perhaps - only perhaps - for certain applications, #61 would be tempted to try the product again. Company suffering very high research costs reformulating.

SEGMENT D: FORMULATORS OF FOUNTAIN SOLUTIONS FOR PRINTING

SEGMENT D TOTALS: 2,884,000 LBS. ESTIMATED USAGE (2,965 CEU'S)

Major user, paid an average of 80 cents per pound for CAS during 1984 and used an average of 2.6 pound per gallon of fountain solution. Raw material cost overall is about \$2.20 per gallon, so gum arabic is by far the most important and costly raw material. If the basic arabic price goes up to \$1.00 or \$1.20 per lb., the fountain solution cost becomes prohibitive. Every 20 cents increase in gum arabic basic cost is a 52 cent per gallon fountain solution increase, and selling price increased even more as profits calculated on a fixed percentage. Feels other participants in this segment will find substitutes to maintain their costs, so his company must follow suit as price competition great. Arabic is used in acid and neutral fountain solutions which cost \$2.00 per gallon or more compared with the alkaline solutions costing \$1.00 to \$1.20 per gallon. At about 45 cents per pound, gum arabic (or gum talha?) could make a fountain solution comparable in price to the alkaline solution, which is phosphate-based. They heard that a competitor bought CAS at \$3.00 per lb. and \$4.20 per lb.. They need not ever buy gum arabic again if it does not go below \$1.20 per lb.. If price went down to 55 - 60 cents per lb. (equal to current price they paying for crude gum talha), they would use 100 pct CAS. At about 80 cents (the 1984 preshortage price), they would use 50 percent gum talha and 50 percent CAS. Elsewhere said their talha purchase price is 50 - 60 cents per lb. (crude). 0 percent return to arabic at this company is price is \$1.20 but 100 percent if price goes down to 70 cents per lb.

Large user: Importers will sometimes advise him to take selected sorts at a somewhat higher price than CAS when they think the CAS quality is not up to his high standards. He will go back to CAS when the crisis fades, although presently has to use substitutes to get by. At a lower price, feels that some companies would use a higher percentage of gum arabic, thereby increasing the quality of the printing obtained from their solutions. Prices would have to be in the "high 40's per lbs" to capture some of the alkaline-based fountain solution business. Anticipating higher prices for arabic that he will have to pass on to reluctant customers.

Small user. They paying \$1 per lb FOB East Coast for granulated select grade. Arabic is 25 percent of their product cost in fountain solutions, so price variations have a significant impact on their

basic costs. Detergent-based vat solutions are preferred as they are half the cost or, at 1985 arabic levels, one third the cost of the arabic acid-based solution. The last price paid was \$1.67 per lb. FOB East Coast as compared to the pre-crisis 1984 level of \$1 per lb. He prefers to pay a little more for better gum. Deep Edge Coating, a technically advanced method of plate preparation that used high percentage of gum arabic was replaced because arabic prices some years ago were too high to make process economical.

SEGMENT E: MANUFACTURERS OF CARBONLESS PAPERS

SEGMENT E TOTALS: 600,000 LBS. ESTIMATED USAGE (604,000 CEU'S)

Big user, all competitors but perhaps one very small one use products other than gum arabic for the ink capsule wall, but this company and the former biggest user had used gelatin which requires the addition of arabic for maximum strength in the capsule walls. However, at a much lower price, they expect to be finished by 1985 with successful trials on a capsule wall using a synthetic {starch plus other products} replacement. Gum talha - especially as provided through a new French process - is working all right but is not the product of the future. At \$1/pound for spraydried, there is interest in continuing.

Medium user: for only comments on questionnaire question 10, wrote "Guaranteed availability at a lower price and better quality."

SEGMENT F: USERS OF GUM ARABIC FOR MISCELLANEOUS APPLICATIONS

SEGMENT F-1: INSECTICIDE MAKER

Big user. Trials on gum talha nearly completed. Unless gum arabic siftings price returns to previous levels, his company will almost certainly switch to a lower price alternative, probably talha if it is adequately available. In answer to questionnaire "what price would make increased or renewed gum arabic usage worth considering?", he replied: "60 - 70 cents per lb. delivered for purified siftings. Also requested in response to questionnaire "what data has been lacking that you need?": "accurate market prices for various forms offered by the Sudanese Gum Arabic Company Ltd to foreign buyers/processors."

SEGMENT F-1(TOTALS): 750,000 LBS. ESTIMATED USAGE (750,000 CEU'S)

SEGMENT F-2: PETFOOD (PROBABLY FOR BIRDSEED) MAKER

SEGMENT F-2 TOTALS: 188,000 LBS. ESTIMATED USAGE (235,000 CEU'S)

SEGMENT F-3: TOBACCO MIXTURE MAKER

SEGMENT F-3 TOTALS : 188,000 LBS. ESTIMATED USAGES (196,000 CEU'S)

SEGMENT F-4: MISCELLANEOUS USES (PHOSPHATE MINING, HIGH-TECH CERAMICS)

SEGMENT F-4 TOTALS: 350,000 LBS. ESTIMATED USAGE (375,000 CEU'S)

SEGMENT F TOTALS: 1,476,000 LBS. ESTIMATED USAGE (1,556 CEU'S)

ALL SEGMENTS: 1984 USAGE	CRUDE	GRAN.	POWDER	SPRYDR.	SFTG.	C.E.U.'S
20,302	4,775	2,529	2,745	9,053	1,200	22,665
PERCENTAGES: 100%	23.5%	12.5%	13.5%	44.6%	5.9%	

Importer Comments

Big importer. feels that candy and beverage industry significant growth areas for gum arabic at current prices. Dessert gelatins need a clear gel that can only presently be obtained from arabic and this usage will be only very reluctantly switched to substitutes. National Starch substitutes in recent years have crept up to gum arabic's price levels, and their marketing performance has been most uneven. If the price of gum arabic moves up "substantially" (I think he meant perhaps 20 percent), a "big percentage of users will be able to apply substitutes to former gum arabic uses."

Small importer, very experienced in the gum arabic trade also as an agent: the price sensitive users of gum arabic switched to other products after the 1972-1975 crisis and only "hard-core users" are left. Suggested a more "dynamic pricing policy based on reality" that might be helpful to increasing the quantity of gum arabic purchased. If bumper crop, lower prices to try to sell more goods. When short, raise prices to deliver relatively scarce goods at better returns to those users willing to pay the most. On the other hand, applauded the relative price stability over the last ten years, considering that a very helpful policy for the recovery of the product.

Small dealer: in response to question 10, re lower prices giving increase usage interest, wrote: "\$1.15", which means \$1.15 per lb. F.O.B. East Coast for spraydried gum arabic.

Agent, deeply involved for many years in the gum arabic trade: in answer to agent's questionnaire no. 4 (the "increased interest" question), wrote: "10-15 percent price reduction might be a big promotional stimulus".

OPTIONS FOR DEALING WITH THE CURRENT CRISIS IN THE U.S.A. GUM ARABIC MARKET

Submitted by The U.S.A.I.D. Gum Arabic Study Group, September 8, 1985

In the course of its deliberations, the Gum Arabic Study Group concluded that the gum arabic market in the U.S. is in a state of crisis. In light of the fact that The Gum Arabic Company is scheduled to announce its 1985 marketing policy on October 1st, before the Study Group's findings become available, the Study Group has found it advisable to call attention to the immediate need for The Gum Arabic Company to announce a special short term marketing policy for the U.S. consistent with the longer term views that the study report will describe. The urgency is underscored by the prospective further loss of U.S. demand due to anticipated decisions to reformulate by U.S. endusers.

Background

The 1973-1974 crisis in gum arabic supplies and prices resulted in a decline in U.S.A. usage of about 50 percent (from about 30 million pounds in 1972 to about 15 million in 1976).

The lost business went to substitutes such as modified starches and dextrans. Lower price and greater perceived reliability of supply were the major factors in this loss of business.

Gum arabic consumption improved only very slowly during the 1976 - 1983 period, mainly as the products using gum arabic grew in volume. Very little in the way of new product applications occurred, but by 1984, actual usage had finally clearly again exceeded 20 million pounds per year.

Reliable supplies, very slowly increasing prices, and consistent deliveries contributed to the above slow recovery.

The Current Crisis

The U.S.A. market was poorly prepared for the shortages of supply which only became evident to the U.S.A. distributors during the third quarter of 1984. Unable to prepare for this crisis by stockpiling in earlier periods or allocating gum arabic supplies to critical needs, the U.S.A. market began running out of product by the end of the first quarter of 1985.

By the start of the third quarter, a substantial part of the market had already reformulated to substitutes, such as modified food starches and, for certain large volume end-uses, gum talha.

The competition for scarce supplies has led to record price levels, which in turn has accelerated the movement toward permanent reformulation away from gum arabic.

The market has lost confidence in The Gum Arabic Co., which did not warn of the impending crisis or accurately predict the further crop problems once the shortage became known. Infrequent market reports also contributed to the panic among users and distributors and the collapse of The GAC's credibility. Several of the largest distributors and users resent what they feel is the discrimination they have suffered as compared with European buyers.

Assessment

Based on a survey of companies who account for over 80 percent of the 1984 gum arabic usage, the following is anticipated:

- Under the most favorable conditions, such as an abundant crop and 1984 price levels, about one-third of the 1984 gum arabic business will nevertheless be lost to competitive products; a reduction in usage of more than 3,000 metric tons.
- This usage loss may be temporarily disguised by purchases to rebuild inventory, but will become clear within one year. The losses are longterm, because expensive reformulation and relabeling has occurred.
- A significant piece of the remaining gum arabic market (about an additional 5 million pounds out of the 15 million pounds remaining) is presently (September, 1985) seriously evaluating substitutes as the resolution of the supply crisis is not yet seen.
- In the present troubled environment, any further shock to user confidence in gum arabic, such as further supply problems, or price increases will convince some uncertain users to permanently reformulate.
- Eight to ten million pounds of the market is not yet readily replaced with gum arabic substitutes although active study of reformulation is taking place.

Present Problems and Options

- SUPPLY: the more rapidly fresh gum arabic supplies are delivered to the market, the more longterm gum arabic business will be preserved. Even a

delivery two weeks earlier of some supplies will preserve extra business.

Quick announcement of 1986 marketing policy to stimulate availability and procurement of any remaining gum arabic supplies for immediate dispatch to U.S.A. by airfreight. Delay in delivery will cause some avoidable permanent market loss.

- As part of 1986 marketing policy, an allocation program based upon the 1980-1984 average annual consumption by country and individual buyer. The U.S.A. market should receive some extra consideration (such as more tonnage and/or priority shipment) in consideration of the lower-than-average percent of world supplies it received in 1984. The first available one thousand tons should be allocated to the U.S.A.. The above measures will demonstrate the importance placed on the U.S. market by The GAC. Failure to do so will further reinforce the perception that The GAC discriminated against the U.S.A. market in 1985.

- Exceptional measures should be taken by The GAC to stimulate maximum collection of newcrop gum. Any shortfall in availability of newcrop will cause further market loss.

- PRICING:

- 1985-1986 crop year pricing is key to longterm business prospects.

Assuming no supply shortfall, we roughly estimate the following pricing/1986 usage relation:

<u>PRICE (USD PER MT)</u>	<u>1986 USAGE (millions of lbs)</u>
1440 (10 percent reduced)	16
1600 (no change)	15
1760 (10 percent increase)	14
2000 (25 percent increase)	10

Note: actual 1985 delivery prices were mostly at 1984 levels of about USD 1500 (with discount).

- To encourage the largest users, The Gum Arabic Company should introduce a discount schedule which rewards large single shipments.

- OTHER: The Gum Arabic Co. must let all U.S.A. market participants know that it is committed and actively undertaking steps to resolve the crisis quickly. An active U.S.A. - based public relations effort should be undertaken promptly. If the positive steps being taken are not made evident to the market, then the continued discouragement will lead to further erosion of volume.

BOXALL & COMPANY

Gum Arabic Exporters.

KHARTOUM

P. O. Box No. 1.

Cablegrams: "BOXALL"

JUDAN AGENCIES.

PORT SUDAN.

EL OBEID ⚡ TENDELTI
 NAHUD | SINGA
 RAHAD | GEDAREF
 UM RUABA ⚡ QALAA-EN-NAHL

OMDURMAN.

		1931		
HASHAB			HASHAB	
CROP :			RECOLTE :	
Kordofan and Tendelti		19000	Kordofan and Tendelti	
G. G. G. Qualities :			Qualités "G.G.G." :	
Gedaref			Guédaref... ..	
Gezireh, Gebelaine, &c. ...			Guézireh, Guébelaine, &c. ...	
Total G. G. G.		4500	Total des "G.G.G."	
Total Hashab Arrivals		23500	Total des Arrivages de Hashab ...	
Less Estimated Loss in Weight ...		1650	Moins : Perte de poids estimée...	
NETT HASHAB CROP		21850	RECOLTE NETTE DE HASHAB	
CARRY OVER from previous year (stocks of old crop and/or new crop in transit)		2150	REPORT DE L'ANNEE PRECE- DENTE : (stocks d'ancienne récolte et/ou gomme de nouvelle récolte en cours de transit)	
TOTAL GUM HASHAB AVAILABLE		24000	QUANTITE TOTALE DE GOMME HASHAB DISPONIBLE	
EXPORTS HASHAB & BLEACHED		19100	EXPORTATIONS DE HASHAB & BLANCHIE	
STOCKS :			STOCKS :	
New Crop Gum in course of transit and awaiting shipment at end of year		1200	Gomme de nouvelle récolte en cours de transit et attendant embarquement à la fin de l'année	
Old Crop Gum Stocks at end of year (including Gum for Bleaching)		300 } 3400 }	Stocks de gomme d'ancienne ré- colte à la fin de l'année (y com- pris gomme à blanchir)	
Total Gum in existence in country at end of year		4900	Total de la gomme en existence dans le pays à la fin de l'année.	
SUDAN EXPORTS & STOCKS ...		24000	EXPORTATIONS & STOCKS AU SOUDAN	
TALHA			TALHA	
CROP AND EXPORTS ...			RECOLTE & EXPORTATIONS	

(†) C.E.B's figures total 5650 tons wh reduce by 300 tons (gum probably wise we cannot explain previous tons of gum.

(*) Stocks for Bleaching included but

(‡) Stocks for Bleaching only.

(†) Le total des chiffres publiés par le Central Economic Board s'élève à 5650 tonnes, mais nous avons dû le réduire par 300 tonnes (gomme probablement vendue deux fois) autrement nous n'aurions pu expliquer le report de 300 tonnes de l'année précédente.

(*) Stocks pour blanchir inclus mais chiffre inconnu.

(‡) Stocks pour blanchir.

to say owing to varying distances of transport and differing stages of development of the natives but one thing is certain and that is 60 piastres is an extremely low average—even for gum before the war though the sugar, tea and cotton goods which the Native buys cost him about double pre-war prices.

No actual wage basis for cost of production.

The value of gum overseas created by demand and supply must settle the problem of price at El Obeid until, of course, after deducting the cost of internal transport a stage is reached when the tapping and collection of gum is not even worth while to a Sudan Native. An abundance of dura tends, undoubtedly, to make the native of Khartoum and the Gezira less inclined to work but we are not sure whether this influence has the same effect on gum collection, due, we assume, to most of the crop being gathered under a kind of community profit-sharing basis which prevents any actual wage factor on which to base our calculations.

Low average c.i.f. prices 1927.

Selling prices, based on Chamber of Commerce Journals, in 1927 reached the low average of 39s. 3d. for Kordofan Natural c.i.f. Continental ports and fluctuations during the whole twelve months seldom exceeded at any time £1 per ton.

Future prices

Sudan exporters and buyers overseas should not forget in their considerations as to what limits prices are likely to fall under present circumstances that:—

- (1) Since 1914 expenses have gone up nearly 10s. per cwt. of which only a small portion is extra sea freight, the balance being Government charges.
- (2) If the Native is paid 14s. per cwt. (P.T. 60 per kantar) at El Obeid (from which must be deducted camel or other local transport Government royalty, railway freight and export duty amount to 18s. and this is by no means all that the Government gets out of the gum business.
- (3) If there is no known absolute rock bottom basis of price, lower than which the Native will not go or below which supplies will commence to be restricted, we must already be very near that level and we might well be there even now.

N.B.—At the time of correcting proofs prices at El Obeid have reached the almost unprecedented level of 52 piastres (out of which camel or other local transport must be deducted) which is equal to £11.17.5 per ton of 1,000 kilos and to this is added Government charges of royalty, railway freight and export duty totalling £17.16.2 per ton of 1,000 kilos.

CONVERSION TABLE.

P.T. 1 = (about) 2½d.

P.T. 100 = £2.1 = £1.0.6.

One kantar of 100 rotls = 99.05 lbs.

1 cwt. = 112 lbs. = 113 rottles.

(Tons referred to are of 1,000 kilos.)

It is this increased production which has caused such falling levels of prices but vice versa one might say it is now obvious the low prices were essential to the export and consumption of such large crops. Fall in levels of price.

Average price at El Obeid :—

	P.T.
1918	148
1919	115
1920	143
1921	76
1922	104
1923	134
1924	109
1925	105
1926	73
1927	61

The fall in price averages would have been more regular and we should not have had such a high average price in 1920 except for an exporter, now out of the business, buying to make large stocks and it was those stocks which afterwards depressed the average in 1921. Nor would 1923 have had such a high average on a big crop except for the three previous years' average shortage. It was in the 1923 season that prices fell from 165 piastres in December 1922 to 110 piastres in December 1923.

Great credit is due to the Government and particularly those Officials who have been instrumental in making such increase of production possible, and that such large crops have all been exported affords striking evidence of the expansion of demand. What remains most unsatisfactory, however, is that the whole fall in prices has had to be borne by the native collector and at times very largely by the exporter here and the importer abroad before the prices paid to the Native on a falling market could adjust themselves whilst the Sudan Government have always refused to reduce either royalty or railway freight charges. Lower borne by Native, Exporters & Importers.

The supplies which might well come from the Sudan could undoubtedly be developed to an extent almost as unlimited as the demand—if only a natural product had a price more in relation to its natural cost and so enabled it to better compete with Dextrin and Gelatine. Possibility of increased production and demand.

The expenses on Gum Arabic since the War have gone up nearly £ 10 per ton of which only a small portion is extra sea freight and the rest Government charges. So far we have hoped in vain for a gradual return to pre-war charges which were already high on Gum Arabic in those days and even then due to the forced necessities of a Government who wanted money in an extremely poor and undeveloped country. Increased Government charges.

What are the crop prospects for 1928? With cotton we know approximately the extent of the area under cultivation and a prediction may be ventured with comparative safety but it would be exceedingly dangerous to do so in the case of Gum Arabic, in view of the many conflicting factors bearing on production. Just prior to and early in the season it looked as if the crop would at least be late but there is no doubt that ideal conditions for production have been created by a period of far hotter weather for the time of the year than has been previously known, following ample rains. This caused arrivals to be abnormally high and, provided we do not get cold weather in March to restrict the second tappings, or very early rains to shorten the period of exudation, the probabilities are that we shall have a very large crop. Weather prophets in the Sudan are, however, about as trustworthy as elsewhere. Crop prospects for 1928.

We have hitherto believed that comparatively low prices paid to the native collector against former years has an important influence on production and that a high price for dura in years of diminished crops compelled him to earn a living by collecting gum. Whether the low level price of 60 piastres per kantar at El Obeid may be considered sufficiently remunerative is difficult Are prices to the Native remunerative?

		1927.			
		Tons			Tons
Hashab Stocks at end of 1926	2,900	Exports Hashab and Bleached 1927 ...			19,150
Arrivals of Hashab in 1927	18,600	Loss in weight, etc. on Hashab			1,000
		Old Crop Stocks for Bleaching			300
		New crop gum in course of transit and awaiting shipment			1,050
	<hr/>				<hr/>
	21,500				21,500

The arrivals for 1926 might be somewhat incomplete and if so there is room to slightly enlarge the figure for *New Crop* Gum at the end of 1927 (gum in transit and awaiting shipment) beyond the figure named without upsetting the known facts that whereas there was a large crop and large stocks in 1926 there were practically no stocks of old crop at the end of 1927.

The January 1926 Chamber of Commerce Journal estimated the old crop stocks at the end of 1926 at 1,000 tons but at that time no better information was available and it has been one of the purposes of the present calculations to obtain more correct figures than rough ideas of what various merchants held could possibly give.

With a large crop expected for 1928 it is satisfactory to know that all old stocks were cleared at the end of 1927.

Exports 1926 and 1927 compared.

Comparison of the distribution of the exports for 1926 and 1927 might be of interest, all markets showing a decline with the exception of Germany and Belgium.

		1926.	1927.	Plus or Minus.
Great Britain		5,962	4,402	— 1,560
United States of America		5,169	4,358	— 811
Germany		2,441	3,641	+ 1,200
France		2,513	2,258	— 255
Italy		1,772	1,483	— 289
Belgium		1,337	1,680	+ 343
Other Countries		3,531	3,438	— 113
Total Tons		<hr/> 22,745	<hr/> 21,260	<hr/> — 1,485

As, however, there was no more old crop gum available at the end of 1927 the exports in the latter year could not be increased in the total whatever the demand might have been, but on the other hand there was no real shortage of supplies as against demand, otherwise we should have had higher prices.

Increased production.

It may not be generally realized that from 1923 onwards gum production has increased over 50 per cent. on the previous five years.

Exports 1918-1922.			Exports 1923-1927.		
Tons.			Tons.		
1918	16,349		1923	22,424	
1919	15,490		1924	20,388	
1920	12,097		1925	18,950	
1921	11,023		1926	22,742	
1922	14,675		1927	21,260	
	<hr/>			<hr/>	
Average ...	13,926		Average ...	21,153	

Head Office:— KHARTOUM
P. O. Box 221.

Branch: PORT SUDAN

Sudan Agencies:—
El Obeld Um Ruaba
Mahnd Tendelti
Rabed Sineh



Cablegrams: "BOXALL"

Codes: A. R. C. 5th and 6th
Dentley's
Lieber's
Morse's
Western Union
and Private

Report No. 60.

GUM ARABIC TRADE IN 1927.

One is tempted to treat the exports of any one year as roughly indicating the Gum Arabic Crop though an estimate is usually made of stocks at the end of the year which over the past few years has varied between say 500 and 1,500 tons.

The clear up of practically all stocks of old crop gum at the end of 1927 together with a very close study of arrivals figures published by the Central Economic Board and market figures kept by merchants, in the light of local conditions, shows how fallacious the assumption has been.

As regards *Talha* we can safely reckon that the *entire crop* is shipped from year to year because little or no stocks are carried over at the end of any one season. The exported Gum Dust, classed with *Talha* for Customs' purposes, is so small that it is hardly worth considering.

Talha
Arrivals.

The exports of *Hashab* (including bleached) for 1927 were roughly 10,150 tons against 20,900 tons for 1926, a difference of 1,750 tons but who would suppose the difference in arrivals amounted to about 6,000 tons which is shown by the following figures:—

Hashab
Arrivals
Compared.

	1926.	1927.	Plus or Minus.
Kordofan (including Tendelti)	17,150	13,300	— 3,850
Kassala (Gedaref Hashab)	2,750	2,100	— 650
Other Hashab : Gezireh, Gebelain, etc. ...	4,700	3,200	— 1,500
Tons	24,600	18,600	— 6,000

At a first glance these differences appeared not only astounding but depressing too because it seemed the carry over from the large crop of 1926 could not have been shipped in 1927 extra to the arrivals of that year but the following approximate calculations put a better face upon matters by bringing the *stocks at the end of 1926 to no more than 2,000 tons* and ultimately agree with the known *lack of stocks of old crop gum at the end of 1927*. Whilst various figures are estimated and can only be approximate it is not to be supposed they are merely guessed or altered to get a working result. For instance, the figure for loss in weight through evaporation of moisture has taken the peculiarities of various districts into consideration whilst loss in gum due to cleaning both *Hashab* and *Talha*, bleaching, etc. has all been allowed for.

Stocks.

	1926.		1926.	
Hashab Stocks at end of 1925	Tons. 400	Exports Hashab and Bleached 1926	Tons. 20,900	<i>Crops, Exports and Stocks compared.</i>
Arrivals of Hashab in 1926	24,600	Loss in weight, etc. on Hashab	1,200	
		Stocks 31st December, 1926	2,900	
	25,000		25,000	

Head Office:— KHARTOUM
P. O. Box 1.

Branch: PORT SUDAN

Sudan Agencies:—

El Obeid Um Ruoba
Nahed Tendelti
Rahed Singa



Cablegrams: "BOXALL"

Codes: A. B. C. 31th and 6th
Zerilly
Lieber
Marconi
Western Union
and Private

GUM ARABIC.

20th December, 1928.

Report No. 71.

Market 21st November to 20th December.

Arrivals of Old Crop Gum from the 21st to 30th November amounted to 5 tons only as against 16 tons last year, and since then have ceased altogether. The total of the Kordofan crop for the season 1927/1928 remains, therefore, higher than that for the season 1926/1927 by about 2780 tons or 20%.

Arrivals of New Crop Gum in Kordofan Stations (including Tendelti) amounted from the 21st November up-to-date to 804 tons as compared with 623 tons for the same period last year.

Prices—New Crop: Taking the El-Obeid market as the standard, the market opened on the 21st November at about 4d. per cwt. less than the closing price of the previous day. From that date up to the 3rd December the market was firm, prices fluctuating within the limits of about 6d. after which they gradually fell, the total fall amounting on the 20th to 1/10d. per cwt. as against the price paid on the 21st November.

Demand as shown by our sales was generally good.

Stocks: As already pointed out in our previous Reports old crop stocks are virtually exhausted and this is borne out by the Customs' figures of the Exports during November, when only 511 tons were exported from the country—the smallness of the exports being explained not so much by lack of demand from overseas as by the fact that there were no more old crop stocks available whilst it was, of course, too early yet to make it possible to ship any new crop gum.

Marché 21 Novembre au 20 Décembre.

Les Arrivages d'Ancienne Recolte du 21 au 30 Novembre se sont élevés à 5 tonnes contre 16 tonnes l'année passée. Le total de la récolte du Kordofan pour la saison 1927/1928 demeure, donc, supérieur à celui de la saison 1926/1927 par environ 2780 tonnes au 20%.

Les Arrivages de Nouvelle Recolte: dans les Stations du Kordofan, y compris Tendelti, se sont élevés du 21 Novembre à ce jour à 804 tonnes contre 623 tonnes pour la même période de l'année passée.

Prix—Nouvelle Recolte: En prenant El Obeid comme base, le marché ouvrit le 21 Novembre à environ 41. par cwt., en moins du prix de clôture le jour précédent. A partir de cette date jusqu'au 3 Décembre le marché demeura ferme, les prix fluctuant dans les limites d'environ 6d. après quoi, les prix baissèrent graduellement, la baisse totale s'élevant, le 20, à 1/10d. par cwt., en comparaison du prix payé le 21 Novembre.

Demande: La demande, telle qu'elle est indiquée par nos ventes, a été généralement bonne.

Stocks: Comme déjà mentionné dans nos Rapports précédents les stocks d'ancienne récolte sont virtuellement épuisés et que ceci soit le cas est aussi indiqué par les chiffres de la Douane des exportations pour Novembre, quand seulement 511 tonnes ont été exportées du pays—la petitesse des exportations étant expliquée, non pas autant par l'absence de demande des marchés d'outre-mer, comme par le fait qu'il y avait plus de stock d'ancienne récolte disponible d'autre part et, encore, bien entendu, trop tôt pour pouvoir expédier de la gomme de nouvelle récolte.

JANUARY/NOVEMBER—EXPORTS OF GUM ARABIC.

DESTINATION.	1927			1928		
	Jan./Oct.	November	TOTAL	Jan./Oct.	November	TOTAL
Great Britain	4,153	97	4,250	3,812	15	3,827
America U.S.	3,786	329	4,115	4,473	104	4,577
France	1,938	147	2,085	3,613	88	3,701
Germany	3,171	287	3,458	3,287	76	3,363
Italy	1,300	60	1,360	1,429	26	1,455
Belgium	1,492	89	1,581	1,631	3	1,634
Japan	489	30	499	664	20	684
Egypt	409	18	427	347	13	360
Holland	638	67	705	692	15	707
Denmark	80	—	80	39	—	39
Norway and Sweden	218	10	228	431	5	436
Australia and New Zealand	120	2	122	89	17	106
China	608	38	646	411	5	416
Canada	199	3	201	173	30	203
Argentina	78	—	78	59	—	59
Brazil	47	—	47	77	—	77
Uruguay	24	8	32	62	—	62
Finland	10	—	10	22	—	22
British India	70	—	70	5	—	5
Other countries in America	70	—	70	231	9	240
Other countries	9	1	10	7	13	20
	67	—	67	63	—	63
Total Tons	18,869	1,203	20,072	21,664	631	22,295

The Export figures are made up of the following qualities:—

	Hashab	Bleached	Totals	Total
January/November 1927: Tons	17,630	464	1,812	20,072
January/November 1928: Tons	19,664	356	2,099	22,099

Though every care is taken in compilation no responsibility can be assumed by Messrs. Boxall & Company for the complete accuracy of the facts given and opinions expressed in these reports.

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