



1975 Resurvey of the Annual Poundage of Food Chemicals Generally Recognized as Safe (GRAS) (1978)

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1975 RESURVEY
OF THE ANNUAL POUNDAGE
OF FOOD CHEMICALS
GENERALLY RECOGNIZED AS SAFE (GRAS)

Committee on GRAS List Survey -- Phase III

·Food and Nutrition Board
·Division of Biological Sciences
·Assembly of Life Sciences
National Research Council

National Academy of Sciences, Washington, D.C.

November, 1978

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Committee on GRAS List Survey -- Phase III

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NOTICE

The project that is the subject of this report was approved by the Governing Board of the National Research Council, whose members are drawn from the Councils of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine. The members of the Committee responsible for the report were chosen for their special competencies and with regard for appropriate balance.

This report has been reviewed by a group other than the authors according to procedures approved by a Report Review Committee consisting of members of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

The work on which this report is based was performed pursuant to Contract No. 223-77-2025 with the Food and Drug Administration.

Introduction

In 1971, a survey of the use of generally recognized as safe (GRAS) substances in food was conducted for the Food and Drug Administration (FDA) by a committee of the Food and Nutrition Board of the National Academy of Sciences - National Research Council. An explanation of this survey, known as the Phase II Survey, and a summary of its findings can be found in A Comprehensive Survey on the Use of Food Chemicals Generally Recognized as Safe (available from the National Technical Information Service as publication number PB-221 949). The data collected in the Phase II Survey included the total poundage of each substance added to foods in 1970. As part of its continuing review of the safety of GRAS substances, FDA asked the Academy (through its Committee on GRAS List Survey -- Phase III) to undertake the 1975 Annual Poundage Resurvey. This follow-up to the Phase II Survey was to determine the poundage of GRAS substances used in food in 1975. In early 1976, each company that had reported the use of GRAS substances in the Phase II Survey was sent a computer printout of the 1970 poundage it reported for each substance used, and was requested to update this information for 1975. These were sent both to respondents to the Academy's GRAS Survey and, in addition, to member companies of the Flavor and Extract Manufacturers Association (FEMA). FEMA had conducted a survey of its members in 1971, data from which were included in the report of the Phase II Survey.

In reviewing the response to the Poundage Resurvey, several problems were immediately apparent. The Phase II Survey had not reached, nor had it been designed to cover,

every food company in the United States. The Committee estimated that in general the Survey accounted for approximately 60% of the dollar volume of sales for the U.S. food processing industry. The 1975 Poundage Resurvey was an attempt to obtain trend information and so was restricted to those companies for which baseline (1970) data were available. In the intervening years, some of these companies had gone out of business, had merged with or been acquired by other firms, or had moved from one location to another. In addition, some companies did not respond with data for 1975 usage. These facts made matching the 1970 data with those collected in 1975 very difficult. Substances for which the data base from the Phase II Survey and the 1975 Resurvey was considered too small to be reliable are noted "insufficient data reported in resurvey" in the report.

An additional problem was encountered in dealing with data obtained through three subsurveys of various industry segments contributing to the Phase II Survey. These special subsurveys covered the brewing, chewing gum, and hard candy segments of the food industry; of these, only poundage information for substances used in chewing gum in 1975 was provided to the Academy. These data were not as detailed as the remainder of the 1975 Resurvey. Because only the total poundage of each substance used in 1975 by the entire chewing gum industry was reported, it was not possible to match 1970 data on a company by company basis. Data for the chewing gum section of the Resurvey are shown only in the totals for each substance (see page 5 below).

Format of the Data

The information received in the 1975 Poundage Resurvey is presented in this report as a computer printout, and includes the following data:

Substance Name and Number. The printout is sequenced alphabetically by substance name. The code number for each substance is printed beneath the substance name. Substances included in both the NAS and FEMA Survey were assigned different numbers in each survey; both numbers are shown.

Total 1970 Poundage, NAS and FEMA. The total poundage reported in Phase II by both NAS and FEMA companies is given. All figures have been rounded to three significant digits. This column includes 1970 poundage figures from respondents to the brewing, chewing gum, and hard candy industries.

Number of Reports, 1970/1975/New. This column displays response information separately for NAS and FEMA companies. The first figure given in each set ("1970") is the number of reports received for each substance in the Phase II Survey. The second figure ("1975") indicates the number of these respondents reporting in the 1975 Survey. The third figure ("New") is the number of reports received in the 1975 Resurvey from companies not reporting the use of a substance in 1970. In each column, an asterisk indicates that three or fewer reports were received.

Matched 1970 Poundage and Percent. Although the number of reports shown in the previous column can be used to compute a response rate for each substance, the Committee felt that matching 1970 and 1975 poundage figures yielded a more realistic estimate of the 1975 Resurvey's coverage. The first number shown is the number of 1970 pounds reported in the Phase II Survey that were accounted for by the respondents to the 1975 Resurvey. This is also expressed in percent.

Matched 1975 Poundage. This is the 1975 poundage for each substance as reported by only those companies responding both in the Phase II and 1975 Surveys.

The "matching" concept is best illustrated by using the data for Acacia (NAS 0001/FEMA 2001) as an example. In the Phase II Survey, the use of 10,400,000 pounds of Acacia in 1970 was reported by 65 NAS companies and 59 FEMA companies (for a total of 124 companies). In the 1975 Resurvey, 33 of the 65 NAS companies and 50 of the 59 FEMA companies responded with data on this substance (for a total of 83 companies). In addition, three or fewer NAS companies not reporting on Acacia in the Phase II Survey reported in 1975. The 83 companies responding to both the Phase II Survey and the 1975 Poundage Resurvey accounted for 6,330,000 of the 10,400,000 pounds reported in 1970 (61%). These companies reported using 2,780,000 pounds of Acacia in 1975.

Ratio 1975/1970. This is obtained by dividing the matched 1975 poundage by the matched 1970 poundage. Great care must be used in interpreting these ratios. In many cases they are indicative of a trend in the use of a substance, but they cannot be relied upon as an exact measure of the change in the use of individual substances between 1970 and 1975.

Total 1975 Pounds Reported. This is the total of all 1975 poundage reports for each substance. If this figure is not the same as "matched 1975 poundage", the difference can be accounted for either by "new" reports in the 1975 Resurvey or by the inclusion of reported use of the substance in chewing gum (see page 2 above) in the total 1975 poundage.

The effect of the data for the chewing gum industry can easily be seen in the figures shown for candelilla wax (NAS substance number 0261). Although the 1975/1970 Ratio is only .44, note that only 1,580 of the 1,430,000 pounds reported in 1970 were matched in the Resurvey. A comparison of the 1970 and 1975 totals, however, shows a slightly upward trend.

Notes. The numbers in this column refer to the footnotes found on the last page of the printout:

"1. This substance was included in the "Chewing Gum" subsurvey in 1970. Resurvey data for poundages reported in this subsurvey are present only for Total 1975 Poundage."

See the paragraph concerning Candelilla wax, above, for an example.

"2. This substance was included in the "Brewing" and/or "Hard Candy" subsurveys in 1970. Resurvey data for poundages reported in these subsurveys are not included."

See the listing for papain (NAS substance number 0142) for an example. Note that although the 1975/1970 ratio shows a decrease in use, only 29% of the 1970 poundage was matched in the Resurvey. The remaining 71% (well over 100,000 pounds) is accounted for by the brewing industry, for which 1975 data are not available.

"3. This substance is widely used and it is probable that neither the original survey nor this resurvey reached many companies which, although

using small amounts individually, account in the aggregate for a substantial share of total use."

Discussion of Specific Substances

As explained above under "Ratio 1975/1970", some trends in the use of certain substances are discernible, most of which might be the result of a number of related conditions. In attempting to identify possible reasons for trends, the Committee sought the opinions of individuals familiar with the manufacture, marketing, and use of a number of these substances.

One of the primary reasons for an increase in the use of GRAS substances is that the food supply itself is increasing. According to Statistical Abstract of the United States 1977 (U.S. Department of Commerce, Bureau of Census), the U.S. population grew from 204,900,000 to 213,600,000 between 1970 and 1975, an increase of 4.25%. As the population grows, more food is produced, resulting in the addition of a correspondingly greater number of pounds of food additives.

Economics seems to be a major reason for the shift from one substance to another. Several substances can often be used interchangeably to achieve the same functional effect in food, and preference for one substance over another will frequently be the result of both cost and quantity factors. Examples of the cost-effectiveness process can be seen in the decreasing use of sucrose and dextrose, which are being replaced in many applications with high fructose corn syrups. This could also be one explanation for the increasing use of mono- and diglycerides and glyceryl monostearate, as these substances are used

in place of the more expensive acacia, glycerin, and chondrus extract as emulsifiers, stabilizers and thickeners. Economics could explain as well the apparent shift from potassium metabisulfite to sodium metabisulfite.

Public concern with, and regulatory action on, the use of certain substances also have an effect. The use of acacia, carrageenan, sodium chloride, and sucrose has decreased; it is likely that this is in part due to concern about the safety of the first two and adverse publicity about the use of salt and sugar in processed food. The increase in use of sodium saccharin and sorbitol undoubtedly results from the ban on cyclamates imposed in late 1969.

Some substances come into greater use with improvements in technology. Examples include the modified food starches and corn syrup, for which many new uses have been found in the food industry. Improved technology also contributes to a decrease in use of certain substances. An example might be the decrease in the use of sulfur dioxide, made possible by improvements in processing that reduce the need for antioxidants.

Still another possible reason for some trends in use may be related to changing food consumption patterns. The increase in the use of rennet parallels the growth of the cheese industry. The increasing use of yeasts may be due in part to the interest in "natural" food products and to increased use of hydrolyzed yeast. Increased consumer interest in the need for trace minerals and vitamins is probably responsible for the increase in (among others) copper, iron, and zinc compounds; in the A, B, and C vitamins; and in niacin and niacinamide.

Summary and Conclusions

In an attempt to discern trends in the use of GRAS substances in food between 1970 and 1975, companies that provided poundage information to the Academy in its 1971 GRAS Survey (Phase II) were asked to provide updated information on the use of these substances in 1975. The data from the 1975 Annual Poundage Resurvey are incomplete, because not all respondents to the GRAS Survey provided data in the Resurvey; because many food companies had changed hands or gone out of business, making 1970-1975 comparison difficult; and because two major segments of the food industry -- brewers and manufacturers of hard candy -- did not participate in the Resurvey.

Although the poundage figures and resulting ratios are imprecise, they may indicate trends in the use of certain GRAS substances. Reasons for these shifts in use include innovative technology, cost, safety concerns, adverse publicity, regulatory action, and changing patterns of food consumption.

SUBSTANCE NAME (SIPVEY NR)	TOTAL 1970 POUNDAE		*****NR REPCPTS***** 1970/1975/NEW		MATCHED 1970 POUNDAE	%	MATCHED 1975 POUNDAE	RATIO 75/70	TOTAL 1975 LBS REPORTED	NOTES
	NAS + FEMA	****NAS****	****FEMA****							
ACACIA NAS 0001 FEMA 2001	10,400,000	65/ 33/ *	59/ 50/	6,330,000	61	2,780,000	.44	3,590,000	1,2	
ACETIC ACID NAS 0002 FEMA 2006	10,200,000	13/ 7/ 5	64/ 46/ *	5,870,000	58	7,060,000	1.20	7,770,000	1,2	
ADIPIC ACID NAS 0003 FEMA 2011	5,100,000	9/ 7/ *	7/ 4/	5,050,000	100	4,070,000	.80	4,160,000		
AGAR-AGAR NAS 0004 FEMA 2012	210,000	21/ 13/ *	*/ */ *	124,000	59	145,000	1.20	149,000		
ALANINE NAS 0005 FEMA 3251	12	INSUFFICIENT DATA REPORTED IN RESURVEY								
ALUMINUM AMMON SULFATE NAS 0008	302,000	4/ */	/ /	256,000	98	216,000	.73	216,000		
ALUMINUM POT SULFATE NAS 0009	950	INSUFFICIENT DATA REPORTED IN RESURVEY								
ALUMINUM SODIUM SULFATE NAS 0010	4,760,000	5/ 4/	/ /	4,650,000	98	1,490,000	.32	1,490,000		
ALUMINUM SULFATE NAS 0011 FEMA 3547	673,000	13/ 12/	*/ /	661,000	98	427,000	.65	427,000		
AMMONIUM ALGINATE NAS 0012	68,200	*/ */	/ /	66,000	97	90,600	1.40	90,600		
AMMONIUM BICARBONATE NAS 0013	4,270,000	19/ 15/	/ /	4,120,000	97	5,100,000	1.20	5,100,000		
AMMONIUM CARBONATE NAS 0014	32,200	4/ */ *	/ /	32,200	100	6,600	.20	10,600		
AMMONIUM HYDROXIDE NAS 0015	741,000	5/ 4/	/ /	687,000	93	804,000	1.20	804,000		
AMMONIUM PHOSPHATE DI NAS 0016	585,000	8/ 6/ *	/ /	524,000	90	274,000	.52	941,000		
AMMONIUM PHOSPHATE MONO NAS 0017	65	INSUFFICIENT DATA REPORTED IN RESURVEY								
AMMONIUM SACCHARIN NAS 0018	20	INSUFFICIENT DATA REPORTED IN RESURVEY								

SUBSTANCE NAME (SURVEY NR)	TOTAL 1970	*****NR REPORTS*****		MATCHED 1970		MATCHED 1975	RATIO	TOTAL 1975	NOTES
	POUNDA NAS + FEMA	1970/1975/NEW	***NAS***	***FEMA***	POUNDA	%	POUNDA	75/70	
AMMONIUM SULFATE NAS 0019	1,980,000	11/ 8/ *	/ /	1,870,000	94	3,430,000	1.80	3,490,000	
ASCORBIC ACID NAS 0022 FEMA 2109	2,490,000	69/ 55/ 5	35/ 32/ *	2,170,000	87	3,500,000	1.60	3,520,000	2
ASCOPRYL PALMITATE NAS 0023	66	INSUFFICIENT DATA REPORTED IN RESURVEY							
BEESWAX NAS 0026	16,400	10/ 9/	/ /	14,700	90	8,890	.60	9,820	1
BEESWAX, BLEACHED NAS 0027 FEMA 2126	4,440	INSUFFICIENT DATA REPORTED IN RESURVEY							
BENZOIC ACID NAS 0029 FEMA 2131	84,300	6/ */	17/ 12/	78,800	93	303,000	3.60	303,000	1
BENZOYL PEROXIDE NAS 0254	1,040,000	7/ 6/ *	/ /	1,010,000	97	1,460,000	1.40	1,470,000	
BIOTIN NAS 0030	43	INSUFFICIENT DATA REPORTED IN RESURVEY							
BOUILLON, VEGET, SMOKED NAS 0256	2,550	INSUFFICIENT DATA REPORTED IN RESURVEY							
BRANDY NAS 0257	1,850,000	5/ 4/	/ /	1,850,000	100	2,180,000	1.20	2,180,000	
BUTTER FAT ENZ MOD W /B A NAS 0258	186,000	7/ 6/ *	/ /	185,000	99	266,000	1.40	267,000	
BUTYLATED HYDROXYANISOLE NAS 0032 FEMA 2183	551,000	55/ 43/ 5	42/ 29/ *	481,000	87	440,000	.91	443,000	1,2
BUTYLATED HYDROXYTOLUENE NAS 0033 FEMA 2184	597,000	52/ 33/ 4	22/ 15/ *	335,000	56	244,000	.73	280,000	1,2
CAFFEINE NAS 0034 FEMA 2224	1,390,000	*/ */	26/ 24/ *	1,390,000	100	2,040,000	1.50	2,040,000	
CALCIUM ACETATE NAS 0035 FEMA 2228	52,700	6/ 5/ *	*/ */	45,200	86	51,000	1.10	129,000	
CALCIUM ALGINATE NAS 0036	10,400	INSUFFICIENT DATA REPORTED IN RESURVEY							

SUBSTANCE NAME (SUPPLY NR)	TOTAL 1970	*****NR REPORTS*****		MATCHED 1970		MATCHED 1975	RATIO	TOTAL 1975	NOTES
	POUNDA NAS + FEHA	1970/1975/NEW	****NAS**	***FEHA**	PCLNDAGE	%	POUNDA	75/70	
CALCIUM CARBONATE NAS 0038	19,800,000	48/ 26/ 5	/ /	7,160,000	36	5,510,000	.77	21,150,000	1
CALCIUM CHLORIDE NAS 0039	1,300,000	50/ 42/ *	/ /	1,190,000	92	3,040,000	2.60	3,040,000	2
CALCIUM CITRATE NAS 0040	17,900	5/ 5/	/ /	17,900	100	9,400	.53	9,400	
CALCIUM GLUCONATE NAS 0041	275,000	7/ 6/	/ /	275,000	100	59,700	.22	59,700	
CALCIUM HYDROXIDE NAS 0044	868,000	19/ 13/ 4	/ /	530,000	61	471,000	.89	861,000	
CALCIUM LACTATE NAS 0045 FEMA 3535	73,600	9/ 9/	*/ */	73,600	100	52,300	.71	52,300	
CALCIUM OXIDE NAS 0046	108,000	4/ 4/	/ /	108,000	100	123,000	1.10	123,000	
CALCIUM PANTOTHENATE NAS 0047	8,000	14/ 9/ *	/ /	6,920	87	3,280	.47	3,930	
CALCIUM PHOSPHATE DI NAS 0048 FEMA 3656	18,200,000	26/ 21/ *	*/ */	17,800,000	98	1,930,000	.11	3,330,000	
CALCIUM PHOSPHATE MONO NAS 0049	34,200,000	49/ 40/ *	/ /	32,100,000	94	47,800,000	1.50	47,800,000	
CALCIUM PHOSPHATE TRI NAS 0050 FEMA 3081	4,090,000	50/ 41/ *	24/ 21/ *	3,980,000	97	4,320,000	1.10	6,300,000	1
CALCIUM PHYTATE NAS 0051	3,380	INSUFFICIENT DATA REPORTED IN RESURVEY							
CALCIUM PROPIONATE NAS 0052	3,930,000	33/ 20/	/ /	1,980,000	50	3,090,000	1.60	3,090,000	
CALCIUM SACCHARIN NAS 0054 FEMA 3528	56,000	16/ 14/	*/ */	46,000	81	20,800	.45	20,800	
CALCIUM SILTICATE NAS 0055	1,210,000	15/ 14/ *	/ /	1,200,000	99	575,000	.48	576,000	
CALCIUM STEARATE NAS 0260 FEMA 3572	378,000	18/ 14/	4/ */	334,000	98	241,000	.72	288,000	1,2

SUBSTANCE NAME (SURVEY NP)	TOTAL 1970	*****NR REPCRTS*****		MATCHED 1970		MATCHED 1975	RATIO	TOTAL 1975		
	POUNDA NAS + FEMA	1970/1975/NEW	*****NAS***	***FEMA***	POUNDA	%	POUNDA	75/70	LBS REPORTED	NTES
CALCIUM SULFATE NAS 0057	15,700,000	30/ 21/ *	/ /	/ /	11,200,000	71	14,600,000	1.30	14,600,000	2
CANDELILLA WAX NAS 0261	1,430,000	6/ */	/ /	/ /	1,580		700	.44	1,730,000	1
CAPRYLIC ACID NAS 0058 FEMA 2799	1,530	/ / *	20/ 16/		1,530	100	5,360	3.50	5,400	1,2
CARAMEL NAS 0059 FEMA 2235	75,600,000	115/ 69/ 4	83/ 62/ 5		72,400,000	96	73,200,000	1.00	74,100,000	2
CARBON NAS 0262	13,370	6/ 6/ *	/ /		13,300	100	31,500	2.40	36,100	
CARBON DIOXIDE NAS 0050	26,700,000	15/ 11/ *	/ /		20,300,000	76	24,700,000	1.20	25,700,000	
CARBOXYMETHYL CELLULOSE NAS 0263 FEMA 2239	660,000	12/ 8/ *	22/ 18/ *		604,000	92	129,000	.21	366,000	
CARNALIBA WAX NAS 0061 FEMA 3514	117,000	20/ 12/	*/ /		77,100	66	63,100	.82	73,100	1
CAROB BEAN GUM NAS 0062 FEMA 2243	2,610,000	16/ 12/ *	32/ 30/ 4		1,920,000	74	1,290,000	.67	1,300,000	2
CAROTENE NAS 0063 FEMA 3548	42,600	37/ 30/ *	*/ /		39,100	92	93,700	2.40	94,700	
CELLULOSE NAS 0265	579,000	10/ 8/	/ /		547,000	94	994,000	1.80	994,000	
CHLOROPHYLL NAS 0266	2,720	INSUFFICIENT DATA REPORTED IN RESURVEY								1
CHOLINE BITARTRATE NAS 0065	37,100	INSUFFICIENT DATA REPORTED IN RESURVEY								
CHOLINE CHLORIDE NAS 0066	9,140	5/ */ *	/ /		5,200	57	9,240	1.00	9,940	
CHONDROS EXTRACT NAS 0067 FEMA 2596	1,270,000	26/ 18/	8/ 7/ *		1,150,000	91	568,000	.49	572,000	
CITRIC ACID NAS 0068 FEMA 2306	35,900,000	136/104/ 8	109/ 77/ *		33,200,000	92	56,000,000	1.70	56,500,000	1,2

SUBSTANCE NAME (SUPVEY NR)	TOTAL 1970	*****NR RFPRTS*****		MATCHED 1970		MATCHED 1975	RATIC	TOTAL 1975		
	POUNDAE NAS + FFMA	1970/1975/NEW	***NAS***	***FFMA***	PCUNDAE	%	PCUNDAE	75/70	LBS REPORTED	NTES
COPPER GLUCONATE NAS 0069	2,870	7/ 4/ *	/ /		2,840	99	5,140	1.80	9,990	1
CORN MINT OIL NAS 0269	1,800	INSUFFICIENT DATA REPORTED IN RESURVEY								
CORN SYRUP NAS 0270	1,030,000,000	137/104/ 4	/ /		882,000,000	86	1,440,000,000	1.60	1,530,000,000	1,3
L-CYSTEINE NAS 0071 FEMA 3285	26,600	5/ 4/ *	11/ 11/		26,600	100	34,800	1.30	34,800	
CYSTINE NAS 0072 FEMA 3286	55	INSUFFICIENT DATA REPORTED IN RESURVEY								
DEXTRUSE NAS 0271	514,000,000	136/103/ *	/ /		448,000,000	87	266,000,000	.59	277,000,000	1,3
DIACETYL TAR MONODIGLY NAS 0076	428,000	6/ 6/	/ /		428,000	100	437,000	1.00	437,000	
ENZYMES, BACTERIAL NAS 0273	40,200	5/ 5/	/ /		40,200	100	44,300	1.10	44,300	
ENZYMES, PROTEOLYTIC NAS 0274	270,000	8/ 7/ *	/ /		270,000	100	226,000	.84	231,000	
EPYTHOPBIC ACID NAS 0078 FEMA 2410	550,000	6/ 4/ *	6/ 6/ *		549,000	100	698,000	1.30	853,000	
ETHYL FORMATE NAS 0079 FEMA 2434	29,100	*/ */ *	56/ 36/		25,300	87	27,600	1.10	31,600	1,2
FERRIC PHOSPHATE NAS 0080	651,000	20/ 16/	/ /		616,000	95	387,000	.63	387,000	
FERRIC PYROPHOSPHATE NAS 0081	1,510	INSUFFICIENT DATA REPORTED IN RESURVEY								
FERRIC SODIUM PYROPHOS NAS 0082	403,000	12/ 7/ *	/ /		329,000	82	18,800	.05	22,400	
FERROCYANIDE SALTS NAS 0276	1,150	*/ */	/ /		1,150	100	2,380	2.10	2,380	
FEROUS GLUCONATE NAS 0093	2,200	INSUFFICIENT DATA REPORTED IN RESURVEY								

SUBSTANCE NAME (SURVEY NR)	TOTAL 197C	*****NR REPCRTS*****		MATCHED 197C	MATCHED 1975	RATIO	TOTAL 1975	
	PCUNDAFE NAS + FEMA	1970/1975/NEW	*****NAS***	***FEMA***	%	75/70	LBS REPCRTED	NCTFS
FERRIC SULFATE NAS 0085	416,000	23/ 13/ *	/ /	140,000	34	355,000	2.50	362,000
GHATTI GUM NAS 0086 FEMA 2519	4,470	INSUFFICIENT DATA REPORTED IN RESURVEY						
GLUCONO-DOLTA LACTONE NAS 0278	96,800	8/ 6/ *	/ /	16,700	17	35,500	2.10	41,000
GLUTAMIC ACID NAS 0087 FEMA 3307	5,780	*/ */	5/ 5/	5,780	100	6,620	1.10	6,620
GLYCERIN NAS 0089 FEMA 2525	6,480,000	41/ 24/ *	38/ 31/ *	4,420,000	68	2,300,000	.52	4,190,000 1,2
GLYCEROL LACTOPALMITATE NAS 0281	60,400	INSUFFICIENT DATA REPORTED IN RESURVEY						
GLYCERYL MONOSTEARATE NAS 0090 FEMA 2527	6,140,000	34/ 22/	5/ 4/	5,820,000	95	14,200,000	2.40	15,400,000 1
GUAR GUM NAS 0092 FEMA 2537	4,350,000	40/ 36/ *	14/ 9/ *	3,950,000	92	4,840,000	1.20	5,170,000
GUMS, VEGETABLE NAS 0282	317,000	20/ 12/ *	/ /	289,000	91	926,000	3.20	938,000 1
HYDROCHLORIC ACID NAS 0097	37,900,000	17/ 15/ 5	/ /	37,600,000	99	81,000,000	2.20	81,700,000
HYDROGEN PEROXIDE NAS 0098	917,000	7/ 6/	/ /	862,000	94	1,390,000	1.60	1,390,000
INOSITOL NAS 0099	7,130	INSUFFICIENT DATA REPORTED IN RESURVEY						
IRON, REDUCED NAS 0100	343,000	19/ 15/ 6	/ /	257,000	75	633,000	2.50	670,000
ISO-LEUCINE NAS 0101 FEMA 3330	9	INSUFFICIENT DATA REPORTED IN RESURVEY						
ISOPROPYL CITRATE(S) NAS 0285	46,100	*/ */	/ /	46,100	100	55,200	1.20	55,200
LACTIC ACID NAS 0103 FEMA 2611	1,490,000	24/ 21/ *	56/ 39/ 4	1,340,000	90	1,170,000	.87	1,210,000 1,2

SUBSTANCE NAME (SURVEY NR)	TOTAL 1970	*****NR REPORTS*****				MATCHED 1970		MATCHED 1975	PATIO	TOTAL 1975	NOTES
	POUNDAGE NAS + FFMA	1970/1975/NEW	****NAS***	***FEMA***	POUNDAGE	%	POUNDAGE	75/70	LBS REPORTED		
LECITHIN NAS 0104 FFMA 3519	9,130,000	95/ 75/ *	*/ */		7,890,000	86	8,070,000	1.00	8,630,000	1,2	
LECITHIN, MOD W/HYD PFR NAS 0217	403,000	7/ 6/ *	/ /		285,000	71	339,000	1.20	473,000	1	
LFUCINE NAS 0135 FEMA 3329	48				INSUFFICIENT DATA REPORTED IN RESURVEY						
LIVER FRACTIONS NAS 0229					INSUFFICIENT DATA REPORTED IN RESURVEY						
L-LYSINE NAS 0109	149,000	4/ */ *	/ /		140,000	94					
MAGNESIUM CARBONATE NAS 0110	498,000	14/ 9/ *	/ /		489,000	98	70,800	.14	92,000		
MAGNESIUM HYDROXIDE NAS 0111	170,000	*/ */	/ /		170,000	100	78,500	.46	78,500		
MAGNESIUM OXIDE NAS 0112	4,290	6/ */ *	/ /		3,690	86	40,900	11.00	49,900		
MAGNESIUM PHOSPHATE DI NAS 0113	12,900				INSUFFICIENT DATA REPORTED IN RESURVEY						
MAGNESIUM SILICATE NAS 0115	47,100				INSUFFICIENT DATA REPORTED IN RESURVEY						
MAGNESIUM STEARATE NAS 0116	233,000	16/ 12/ *	/ /		201,000	86	363,000	1.80	438,000	1	
MAGNESIUM SULFATE NAS 0117	15,200	4/ 4/ *	/ /		15,200	100	4,000	.26	4,050		
MALIC ACID NAS 0118 FEMA 2655	4,170,000	35/ 28/ *	37/ 28/ 5		2,270,000	54	11,500,000	5.10	11,600,000	1,2	
MALT SYRUP NAS 0291 FEMA 3579	7,530,000	22/ 18/ *	*/ /		6,280,000	83	6,980,000	1.10	6,990,000	1	
MANGANESE CHLORIDE NAS 0119	10				INSUFFICIENT DATA REPORTED IN RESURVEY						
MANGANESE SULFATE NAS 0124	3,430	12/ 8/ *	/ /		2,980	87	16,900	5.70	17,000		

SUBSTANCE NAME (SURVEY NR)	TOTAL 1970 POUNDAGE	*****NR REPORTS***** 1970/1975/NFW		MATCHED 1970 POUNDAGE	%	MATCHED 1975 POUNDAGE	RATIO 75/70	TOTAL 1975 LBS REPORTED	NOTES
	NAS + FEMA	****NAS****	****FEMA****						
MANNITOL NAS 0176 FEMA 3520	1,750,000	11/ 6/	*/ */	112,000	6	101,000	.90	3,200,000	1
METHYLCELLULOSE NAS 0127 FEMA 2696	118,000	11/ 8/	7/ 5/	97,100	82	62,400	.64	67,300	1
METHYL PARABEN NAS 0129 FEMA 2710	9,040	9/ 8/	*/ */	5,030	56	826	.16	826	
METHYLPOLYSILICONE NAS 0292	2,880	7/ 6/	/ /	2,830	98	1,450	.51	1,450	
MILK POWDR WHOLE, ENZ MOD NAS 0293	6,490,000	11/ 9/	/ /	6,380,000	98	2,870,000	.45	3,110,000	1
MONO- AND DIGLYCERIDES NAS 0130 FEMA 3511	72,700,000	74/ 54/ *	*/ */ *	65,300,000	90	84,500,000	1.20	85,900,000	1,2
MONOAMMONIUM GLUTAMATE NAS 0129 FEMA 3648	19,000	*/ */	*/ */	19,000	100	24,000	1.30	24,000	
MONOGLYCERIDE CITRATE NAS 0131	4,000	*/ */	/ /	4,000	100	0	.00	0	
MONOPOTASSIUM GLUTAMATE NAS 0133 FEMA 3523	86,000	*/ */	*/ */	86,000	100	42,200	.49	42,200	
MONOSODIUM GLUTAMATE NAS 0134 FEMA 2756	27,300,000	61/ 48/ 6	47/ 38/ *	22,600,000	83	27,300,000	1.20	28,400,000	
MONOSODIUM PHOSPHONODIGLY NAS 0135	27,000	*/ */	/ /	27,000	100	9,000	.33	9,000	
NIACIN NAS 0136	665,000	28/ 27/ 5	/ /	437,000	66	1,270,000	2.00	1,300,000	
NIACINAMIDE NAS 0137	140,000	23/ 17/ *	/ /	135,000	96	386,000	2.90	2,590,000	
NITROGEN NAS 0178	13,900,000	11/ 7/ *	/ /	13,800,000	99	15,800,000	1.16	15,900,000	
NITROUS OXIDE NAS 0139 FEMA 2779	118,000	*/ */ *	*/ */	118,000	100	75,000	.64	308,000	
OX BILE EXTRACT NAS 0140	470	INSUFFICIENT DATA REPORTED IN RESURVEY							

SUBSTANCE NAME (SURVEY NR)	TOTAL 1970	*****R REPCRTS*****		MATCHED 1970		MATCHED 1975	RATIO	TOTAL 1975		
	POUNDRGE NAS + FEMA	1970/1975/NEW	****NAS**	***FEMA**	POUNDRGE	%	PCUNDRGE	75/70	LRS REPORTED	NTES
PAPAIN NAS 0142	159,000	57/ 14/	/ /	/ /	45,600	29	32,000	.70	32,000	2
PEPSIN NAS 0296	16,900	*/ */	/ /	/ /	12,700	75	6,650	.52	6,650	1
PEPTONE NAS 0297	43,600	6/ */	/ /	/ /	18,600	43	2,210	.12	2,210	2
PHENYLALANINE NAS 0143 FEMA 3372	6	INSUFFICIENT DATA REPORTED IN RESURVEY								
PHOSPHORIC ACID NAS 0145 FEMA 2900	10,500,000	24/ 13/ *	29/ 28/ *	/ /	9,870,000	84	18,500,000	2.10	19,400,000	3
POTASSIUM ACID TARTRATE NAS 0146	589,000	27/ 23/	/ /	/ /	442,000	75	299,000	.48	299,000	
POTASSIUM ALGINATE NAS 0147	300	INSUFFICIENT DATA REPORTED IN RESURVEY								
POTASSIUM BICARBONATE NAS 0148	22,400	*/ */ *	/ /	/ /	22,400	100	40,000	1.80	40,200	
POTASSIUM BROMATE NAS 0299	303,000	20/ 16/ *	/ /	/ /	300,000	99	185,000	.62	196,000	
POTASSIUM CARBONATE NAS 0150	2,400,000	8/ 6/ *	/ /	/ /	2,390,000	100	2,270,000	.95	2,270,000	
POTASSIUM CHLORIDE NAS 0151	795,000	22/ 19/ *	/ /	/ /	783,000	98	1,980,000	2.50	1,990,000	
POTASSIUM CITRATE NAS 0152	574,000	20/ 17/ *	/ /	/ /	500,000	87	806,000	1.40	811,000	
POTASSIUM HYDROXIDE NAS 0154	1,140,000	9/ 8/ *	/ /	/ /	1,140,000	100	1,600,000	1.40	1,620,000	
POTASSIUM IODIDE NAS 0155	37,100	23/ 18/ *	/ /	/ /	37,000	100	53,700	1.50	51,700	
POTASSIUM METABISULFITE NAS 0156	248,000	22/ */	/ /	/ /	64,100	26	27,400	.43	27,400	2
POTASSIUM PHOSPHATE DI NAS 0157	2,580,000	13/ 11/ *	/ /	/ /	2,130,000	83	4,530,000	2.10	4,880,000	

SUBSTANCE NAME (SUPVEY NR)	TOTAL 1970	*****NR REPORTS*****				MATCHED 1970		MATCHED 1975	PATIO	TOTAL 1975	
	POUNDAE NAS + FEMA	1970/1975/NEW		1970/1975/NEW		POUNDAE	%	POUNDAE	75/70	LBS REPORTED	NOTES
		****NAS***	****FEMA***								
POTASSIUM PHOSPHATE, MONO NAS 0304	41,500	4/	4/ *	/	/	41,500	100	28,700	.69	34,800	
POTASSIUM PHOSPHATE, TRI NAS 0305	175,000	*/	*/	/	/	175,000	100	370,000	2.10	370,000	
POTASSIUM SORBATE NAS 0158 FEMA 2921	1,080,000	55/	46/ 4	29/	25/ *	919,000	85	1,900,000	2.10	2,020,000	
POTASSIUM SULFATE NAS 0159	40,600	*/	*/	/	/	40,600	100	8,050	.20	8,050	
POTASSIUM TRIPOLYPHOS NAS 0308	2,480	*/	*/	/	/	2,480	100	4,000	1.60	4,000	
PROLINE NAS 0161 FEMA 3377	3	INSUFFICIENT DATA REPORTED IN RESURVEY									
PROPIONIC ACID NAS 0163 FEMA 2924	30,200	*/	*/ *	22/	20/	24,700	82	26,400	1.10	54,700	1,2
PROPYL GALLATE NAS 0165 FEMA 2947	137,000	14/	8/ *	7/	6/	130,000	95	103,000	.75	108,000	1
PROPYLENE GLYCOL NAS 0164 FEMA 2940	5,680,000	49/	40/ *	91/	56/	5,380,000	95	8,490,000	1.60	8,560,000	1,2
PROPYLENE GLYCOL MONOSTEARAT NAS 0309 FEMA 2942	7,060,000	7/	4/	*/	*/	6,460,000	92	4,100,000	.63	4,100,000	
PROPYL PARABEN NAS 0166 FEMA 2951	4,030	12/	11/	5/	4/	3,840	95	1,380	.36	1,380	
PROTEIN, ANIMAL, HYDROLYZ NAS 0310	250,000	*/	*/	/	/	250,000	100	60,000	.24	60,000	
PROTEIN, VEGE, HYDROLYZED NAS 0311 FEMA 3517	17,200,000	52/	45/ *	*/	*/	16,600,000	97	21,100,000	1.30	22,600,000	
PYRIDOXINE HYDROCHLORIDE NAS 0167	17,300	20/	14/ 4	/	/	17,100	99	62,300	3.60	62,900	
RENNET NAS 0168	281,000	12/	9/	/	/	226,000	80	330,000	1.50	330,000	
RIBOFLAVIN NAS 0169	121,000	45/	34/ 6	/	/	65,100	54	150,000	2.30	153,000	

SUBSTANCE NAME (SURVEY NR)	TOTAL 1970	*****NR REPORTS*****		MATCHED 1970	MATCHED 1975	RATIO	TOTAL 1975	NCES	
	POUNDA NAS + FEMA	1970/1975/NEW	*****	PCLNDAGE	PCUNDA	75/70	LBS REPORTED		
RIBOFLAVIN 5-PHOSPHATE NAS 0170	41	INSUFFICIENT DATA REPORTED IN RESURVEY							
SACCHARIN NAS 0171 FEMA 3672	2,640	INSUFFICIENT DATA REPORTED IN RESURVEY							1
SAUSAGE CASINGS NAS 0313	5,950	INSUFFICIENT DATA REPORTED IN RESURVEY							
SILICA APOCEL NAS 0174 FEMA 3506	32,300	15/ 12/ *	*/ /	19,200	59	76,000	4.00	82,700	
SILVER-SILVER DRAGEES NAS 0314	9,000	INSUFFICIENT DATA REPORTED IN RESURVEY							
SODIUM ACETATE NAS 0175 FEMA 3024	210,000	12/ 10/ *	4/ 4/ *	170,000	81	116,000	.69	169,000	
SODIUM ACID PYROPHOS NAS 0176	20,900,000	34/ 30/ *	/ /	19,800,000	95	17,500,000	.88	17,500,000	
SODIUM ALGINATE NAS 0177 FEMA 2015	656,000	19/ 17/ 4	19/ 16/ *	629,000	96	1,150,000	1.80	1,170,000	
SODIUM ALUMINOSILICATE NAS 0178	4,590,000	20/ 19/ *	/ /	4,550,000	99	3,190,000	.70	3,190,000	
SODIUM ALUMINUM PHOS NAS 0179 FEMA 3657	23,300,000	26/ 21/ *	*/ */	21,200,000	91	13,800,000	.65	14,700,000	
SODIUM ASCORBATE NAS 0180 FEMA 3525	897,000	37/ 19/ *	*/ */	663,000	74	1,680,000	2.50	1,680,000	2
SODIUM BENZOATE NAS 0181 FEMA 3025	3,320,000	77/ 61/ *	51/ 45/ *	2,840,000	86	4,700,000	1.70	4,730,000	
SODIUM BICARBONATE NAS 0182 FEMA 3536	57,200,000	103/ 86/ *	*/ */	54,200,000	95	59,700,000	1.10	59,700,000	2
SODIUM BISULFITE NAS 0183	3,020,000	42/ 35/ *	/ /	2,970,000	98	4,050,000	1.40	4,050,000	2
SODIUM CAL ALUMSIL HYD NAS 0184	33	INSUFFICIENT DATA REPORTED IN RESURVEY							
SODIUM CARBONATE NAS 0185	20,900,000	20/ 16/	/ /	20,800,000	100	22,000,000	1.10	22,000,000	

SUBSTANCE NAME (SURVEY NR)	TOTAL 1970	*****NR REPCRTS*****				MATCHED 1970	MATCHED 1975	RATIC	TOTAL 1975	NOTES
	POUNDAGE NAS + FEMA	1970/1975/NEW	****NAS**	***FEMA***	POUNDAGE	POUNDAGE	75/7C	LBS REPORTED		
SODIUM CASEINATE NAS 0187 FEMA 3550	13,200,000	33/ 27/ 6	*/ */		12,200,000	92	11,300,000	.93	11,500,000	
SODIUM CHLORIDE NAS 0188 FEMA 3537	1,830,000,000	213/158/ 5	*/ */		1,740,000,000	95	1,420,000,000	.62	1,420,000,000	2
SODIUM CHLORIDE NAS 0316	400	INSUFFICIENT DATA REPORTED IN RESURVEY								
SODIUM CITRATE NAS 0189 FEMA 3076	16,300,000	72/ 55/ 6	39/ 36/ 6		15,000,000	92	14,100,000	.54	14,200,000	2
SODIUM CMC NAS 0186	3,730,000	44/ 37/	/ /		3,410,000	91	2,770,000	.81	2,770,000	
SODIUM DIACETATE NAS 0190 FEMA 3512	135,000	10/ 8/	*/ /		109,000	81	377,000	3.50	377,000	
SODIUM ERYTHROBATE NAS 0317	657,000	37/ 13/ *	/ /		402,000	61	525,000	1.20	569,000	2
SODIUM FLUORIDE NAS 0318	176	INSUFFICIENT DATA REPORTED IN RESURVEY								
SODIUM GLUCONATE NAS 0191	49,500	INSUFFICIENT DATA REPORTED IN RESURVEY								
SODIUM HYDROXIDE NAS 0177	15,800,000	27/ 20/ *	/ /		12,100,000	77	12,300,000	1.00	12,400,000	
SODIUM HYPOCHLORITE NAS 0319	1,090,000	*/ */	/ /		1,050,000	100	600,000	.55	600,000	
SODIUM METABISULFITE NAS 0193	183,000	16/ 6/	/ /		65,700	36	85,600	1.30	85,600	2
SODIUM METAPHOSPHATE NAS 0194 FEMA 3027	2,680,000	23/ 17/ *	6/ 6/ *		2,550,000	95	4,690,000	1.60	4,770,000	
SODIUM PHOSPHATE DI NAS 0197 FEMA 2398	11,400,000	36/ 29/ 4	14/ 10/ *		10,900,000	96	13,100,000	1.20	13,200,000	
SODIUM PHOSPHATE MONO NAS 0198 FEMA 3534	2,340,000	21/ 19/ *	*/ /		2,320,000	99	257,000	.11	320,000	1
SODIUM PHOSPHATE TRI NAS 0199	5,010,000	16/ 13/ 4	/ /		4,710,000	94	2,470,000	.52	2,620,000	

SUBSTANCE NAME (SURVEY NR)	TOTAL 1970	*****NR REPORTS*****		MATCHED 1970	MATCHED 1975	FATIO	TOTAL 1975	NOTES
	POUNDAE NAS + FEMA	1970/1975/NEW	***NAS***	***FEMA***	PCUNDAE	75/70	LBS REPORTED	
SODIUM PROPIONATE NAS 0201 FEMA 3513	1,540,000	27/ 22/	*/ /	831,000	54	228,000	.27	228,000
SODIUM PYROPHOSPHATE NAS 0202 FEMA 3625	2,230,000	25/ 21/ *	*/ */	1,210,000	54	1,870,000	1.50	1,990,000
SODIUM SACCHARIN NAS 0203 FEMA 2997	884,000	21/ 13/ 4	33/ 27/ *	762,000	86	1,780,000	2.20	1,810,000 1,2
SODIUM SULFITE NAS 0206	195,000	14/ 10/	/ /	161,000	83	194,000	1.20	194,000 2
SODIUM THIOSULFATE NAS 0209	1,230	*/ */	/ /	1,230	100	4,000	3.30	4,000
SODIUM TRIPOLYPHOSPHATE NAS 0210 FEMA 3553	18,700,000	20/ 16/ *	*/ /	17,300,000	93	9,700,000	.56	9,770,000
SORBITIC ACID NAS 0211 FEMA 3624	904,000	28/ 25/ *	*/ */	895,000	99	1,420,000	1.60	1,450,000
SORBITOL NAS 0212 FEMA 3029	7,620,000	42/ 31/ *	17/ 15/ *	2,550,000	34	5,640,000	2.20	24,000,000 1,2
STANNOUS CHLORIDE NAS 0213	40,600	14/ 12/	/ /	28,000	69	22,900	.82	22,900
STARCH, MODIFIED NAS 0325	70,400,000	98/ 77/ 4	/ /	58,000,000	82	98,500,000	1.70	102,000,000 1
STARTER DISTILLATE NAS 0326	1,010,000	6/ 5/ *	/ /	9,460	1	18,600	2.00	24,100
STERCULIA GUM NAS 0215 FEMA 2605	295,000	*/ */ *	8/ 8/ *	61,600	21	33,400	.54	40,700
SUCCINIC ACID NAS 0216 FEMA 3569	383	*/ */	*/ */	383	100	2,330	6.10	2,330
SUCROSE NAS 0328	6,430,000,000	184/136/ *	/ /	5,790,000,000	90	4,880,000,000	.84	5,000,000,000 1
SULFITES, STRONG ALKALI NAS 0329	44,100	10/ /	/ /					2
SULFUR DIOXIDE NAS 0217 FEMA 3039	8,590,000	15/ 13/	4/ */ *	8,490,000	99	9,550,000	1.10	9,570,000