

## **Historic, Archive Document**

Do not assume content reflects current scientific knowledge, policies, or practices.



A295  
B53F

4D-33 Bookplate  
(1-68)

**NATIONAL**

**A  
G  
R  
I  
C  
U  
L  
T  
U  
R  
A  
L**



**LIBRARY A295  
B53F**

**85120**

MAY 19 1965

D & R-PREP.

FREEZE-DRYING ATTITUDES 1/  
(Contains the 1964 Directory of Freeze-Drying)

by Kermit Bird

Food freeze-drying is now at its crossroads. Which way it goes at this juncture will be crucial to its future growth prospects. In our generation we have seen several food processing innovations become giants of industry. Others appearing to have had equal potential have never progressed beyond the infancy stage. Part of the future success of a new-fledged industry is determined by the way that industry got started. Goethe stated it, "Three things are to be looked to in a building: that it stand on the right spot; that it be securely founded; that it be successfully executed." 2/ Let's look at some of our attitudes and ways of thinking that may help to locate it, securely found it, and successfully execute the freeze-drying industry of tomorrow.

Background of Freeze-Drying of Foods

Freeze-drying of food, on a commercial basis, started in this country about 1960 or 1961. During 1959, the Thomas J. Lipton Company began market testing soups containing freeze-dried chicken and other soup ingredients. Two prominent meat companies were early entrants in the field. Shrimp were freeze-dried about 1954 in a small Texas plant, which is now part of United Fruit and Foods Corporation. In Europe, the first commercial freeze-drying operation was H. Hartog's Fabrieken, Oss, Netherlands. This was in 1955. They built their own drying equipment which, 10 years later, is still in use. 3/ In 1964 the first successful continuous freeze-drier opened its doors in Dahlenberg, Germany. 3/ The industry appears now to be readying for much greater volume than in the past.

Few people are aware that there was freeze-drying of food during World War II. We know blood plasma gave pharmaceutical freeze-drying its initial impetus. About a year ago, I prepared a talk on freeze-drying for school children. 4/ To illustrate freeze-drying I made up a fable of Inca Indians using sublimation for drying their potatoes. A reply received when I circulated this reprint mentioned that freeze-drying had been used by Japanese

---

1/ Speech to personnel of the research and marketing staffs of the National Dairy Corporation, Glenview, Illinois, November 1964. Reprints are available from the Division of Information, OMS, U. S. Department of Agriculture, Washington, D. C., 20250.

2/ Goethe, Johann. Elective Affinities. Book 1, Ch. 9, 1808.

3/ Bird, Kermit, Selected Writings on Freeze-Drying of Foods, ERS-147, gave a listing of freeze-dry processors and equipment manufacturers as of Nov. 1963, 53 pp. See appendix of this paper for a Nov. 1964 listing.

4/ Bird, Kermit, Freeze-Drying Fable for Fifth Graders, Wash., D. C. Oct. 1963, 2 pp. Copies are available from Division of Information, OMS, U. S. Department of Agriculture, Washington, D. C. 20250.



in the early 1940's to preserve cooked rice for their troops. 5/ As I understand it, cooked rice was spread out to freeze, and the ice sublimated in radiant sunlight. There are instances of even earlier uses of freeze-drying for foods. C. Hilyard Barr relates that his father, Courtland H. Barr, was a member of the team with Florsdorf and Mudd who developed the commercial concept of freeze-drying. They lypholized such substances as oysters which were taken on trips to the far North and reconstituted with fresh milk. This was in 1936, almost two decades ago. 6/

The past intrigues and Samuel Johnson's expression, "Wheresoe'r I turn my view, All is strange, yet nothing new" seems to apply. Let's now turn our attention to the present and future.

### Markets for Freeze-Dried Foods

Future outlets for the next few years are listed in ranking order of importance. These are my impressions only, and do not in any way reflect expected government purchases.

The Remanufacturing Market probably has the greatest future. At present, it absorbs more freeze-dried foods than any other outlet. Soups, stews, puddings, prepared meals, desserts, cereals, and many other items will be the end products to reach both the household and institutional consumers. Most freeze-dried foods going through this intermediate stage market will be mixed or blended with non-freeze-dried items. Many blending items will be dried by more conventional, cheaper drying methods.

Coffee and Tea may attain greater sales volumes than any other two products. Freeze-dried coffee, now being market tested, appears enough better than spray-dried coffee to warrant extensive usage in the United States, Canada, and Europe. Several South and Central American firms are building plants to dry coffee using this method. These items may be sold at retail, to institutions such as motels, and to the Armed Forces.

The Armed Forces are still probably the largest purchasers of freeze-dried foods. These high quality dried items have been of great value as emergency rations and combat foods. Now, some are regular mess items. At present about 59 different freeze-dried foods are being used in the services. Of these, 37 are rehydrated in the usual manner and the remaining 22 are saliva-wetted for rehydration. These latter ones are designed for use on space flights.

The freeze-drying industry of today owes a great debt of gratitude to the Engineering Command of the Armed Forces for its initial work and continuing developmental and testing program. Certainly their interest has been invaluable in getting this newborn industry past the bottle stage of growth.

---

5/ Personal correspondence with Dr. Eiju Kayama, known for his work in lypholization of blood plasma, and Dr. Mitsuo Yokoyama, Geneticist, University of Hawaii.

6/ Personal correspondence with C. Hilyard Barr, President of Courtland Laboratories, 5555 Valley Blvd., Los Angeles 32, California.

Retail Grocery Sales of freeze-dried foods have been of minor importance until this last year. Sales volumes, up until now, have been disappointing to those who felt that this was the major market for freeze-dried foods. Now, however, the market is being penetrated. Consumers are able to buy several household foods that were freeze-dried. The big breakthrough in this market came as a major U. S. meat company introduced mushrooms in a retail grocery store package.

Institutional Sales appear to some as the best outlet for foods that have been freeze-dried. I personally feel that opportunities to sell freeze-dried foods in this highly specialized market are limited. Expectations of great volumes being absorbed in this market are overly optimistic. The institutional market is one that demands uniformly high quality products. Except for a few items, present freeze-dried food products do not meet this rigid requirement. Therefore, I don't foresee a great market potential in the near future. The experience of several companies who unsuccessfully tried to breach this market on a broad scale bear out my feelings of pessimism. Nevertheless, the total institutional market is large. It has about \$18 to \$20 billion retail sales, and is growing. In the future it should not be ignored as a sizeable outlet for certain freeze-dried food items. This sounds like a contradiction to the above statements, but I feel that freeze-dried items do have a future in the institutional market. However, they need some more developmental work before they will be ready for this specialized market.

Specialized Sales include items for camping, safaris, mountain climbing, and so on. Although here freeze-dried foods probably have their greatest utility, volume expectations are small since the market itself is small compared with the ones mentioned above. A special market that may have good potential for a few firms is in drying such items as fruit powders, spices, and flavorings. This would apply most specifically to products that need a high degree of flavor retention, but present drying methods are deemed unsatisfactory. For example, a drier of fruit powders may feel there is a market for true fruit flavors in preserves, gelatin, ice cream, puddings, and other foods. If he cannot obtain a dried powder in other ways, freeze-drying may fill his need in spite of high drying costs. 7/

Export Sales are important to many foods and the above listing is for domestic sales only. In addition to sales in America, there is a good possibility that freeze-dried foods may be shipped abroad, particularly to Europe. I see little future for these high-priced foods to be shipped to underdeveloped countries for general food use. Of course, they may be used overseas as specialized foods for mountain climbing, hunting, fishing, expeditions, camping, and in bush country.

---

7/ Marshall Brewster, President of Test Laboratories, Inc., 7121 Canby Avenue, P. O. Box 342, Reseda, California feels there may be a market for freeze-dried tomato powder. One use would be for instant tomato juice. Other uses would be in manufacture of catsup, sauces, purees, and soups. He quotes the 1964 Tomato Yearbook as stating 48 million pounds of tomato sauces and purees are imported annually into this country. Regarding costs of freeze-drying these products as compared with spray-drying, Mr. Brewster feels that freeze-drying costs will be no more to the consumer when all factors including flavor retention, freight, storage, handling, distribution, and refrigeration are considered.



It may be mentioned in this connection that export sales of foods depend upon tariffs, regulations, and rules. Also, they depend on imports and exports of nonagricultural commodities. Foreign aid programs such as Public Law 480, the level of farm production in the importing countries and many other factors determine exports of food. In a recent speech, Willard Cochrane, former Director of Agricultural Economics, USDA, said ...."The level of U. S. farm exports is rising and will continue to rise over the next several years. It may reach \$6 billion by 1968. U. S. farm exports are rising faster than farm output. Public Law 480 shipments are expected to expand. The role of U. S. agriculture in the international economy is steadily expanding." 8/

#### Attitudes Toward Freeze-Drying Limit its Growth

Some attitudes and feelings may hinder the freeze-drying industry in its forward progress. One is the attitude toward freeze-drying processing costs. Although it is currently possible for costs to be as low as 5 to 7 cents per pound of water removed, I doubt whether many freeze-dry processors presently have costs that low. Nor are high processing costs completely offset by storage and transportation savings. Maximum savings on transportation and storage of freeze-dried vs. frozen foods are about 1½ cents per pound in favor of the freeze-dried items. This does not offset the much higher processing and packaging costs.

Not only are freeze-drying processing costs high relative to other drying costs, packaging costs of freeze-dried foods may also be high when compared with packaging requirements of foods processed in other ways. Actual drying costs of a freeze-dried food are only about 1/3 of the total processing costs involved. Other costs include food preparation, freezing, handling, packaging, and storing. All these functions need to be done, and are essential to a high quality product. We would all like to see costs lowered. But a major problem arises when we refuse to acknowledge that costs are high. 9/ Misinformation on costs is deadly if a firm gets into processing without really knowing how high they can be. We need to be openly honest and admit freeze-drying costs are now high and probably always will be higher than costs of other drying methods. The secret of freeze-drying will be to find which foods may be successfully processed in spite of high costs.

We might consider freeze-drying processing costs relative to some other unit. We now calculate freeze-drying costs per pound of water removed, per pound of wet input product, or per pound of dried food. Might it not be better to think in terms of the unit you want to save? For example,

---

8/ Cochrane, Willard. "Foreign Trade Outlook: Longer Term Implications." Address to the 41st annual Agricultural Outlook Conference, Washington, D. C., November 18, 1963. Copies of this talk are available from: Division of Information, OMS, U. S. Department of Agriculture, Washington, D. C., 20250.

9/ For a study of freeze-drying costs see Bird, Kermit, Freeze-Drying of Foods: Cost Projections. Washington, D. C., MRR-609, Jan. 1964, 34 pp., available from: Division of Information, OMS, U. S. Department of Agriculture, Washington, D. C., 20250.



if we are processing lemon powder to retain vitamin C, should we not relate costs per unit of vitamin C retained? In this way, we may find that freeze-drying actually has lower or comparable costs for some products.

Also misinformed are those who believe that freeze-drying may supercede other food processing methods. Some feel food processing has come through a series of evolutionary steps starting with sun-drying, and continuing on through freezing. Underdeveloped countries may be able to bypass other processing methods and hop-skip on to freeze-drying. To me, this interpretation of food processing is erroneous. It would be unwise for underdeveloped countries to develop a freeze-drying in preference to the more common preserving methods. Food processing methods are not evolutionary steps. Rather, each processing technique is important for specific foods and for particular needs. Costs differ. Final products vary. The automatic transmission of present-day American autos has not entirely replaced the conventional or overdrive transmission. "Three in the tree" and "four on the floor", as my 16-year-old son calls them, are still popular. Canning, pickling, fermentation and sun-drying maintain many advantages over newer, more sophisticated processing techniques. This is particularly true when we consider costs and the rigidity of food eating habits. Newer processing methods, as they come along, generally are additions rather than replacements. They add to the total volume of food processed. As processed foods improve in quality, competition evolves between processed and fresh, rather than among foods processed by various methods. Frozen foods, for example, appear to have replaced fresh rather than canned ones.

It is felt by some that freeze-drying will be among the major U. S. food processing methods in the future. This, too, in my opinion, is expecting overly much from the drying process. A processor will not use the technique unless it can do something for his product, costs, or share of the market. He will not use it simply because it has a glamorous sounding name. The consumer is not going to use freeze-dried foods just because they were freeze-dried. I question the wisdom of a processor putting the word "freeze-dry" on the label of a retail food package. This word may lead some to believe the contents are frozen. Some grocery clerks mistakenly place freeze-dried foods in frozen food cabinets.

Our basis of comparing freeze-dried foods is important. Since freeze dried foods are dried, we should compare them with dried rather than with fresh or frozen foods. Also, it may be helpful to think of freeze-dried foods in terms of dices, cubes, powders, patties, and granules. <sup>10/</sup> If we no longer think of whole chickens, steaks, roasts, and whole fruits, we won't be so apt to compare them with the fresh, canned, or frozen product. Freeze-dried foods cannot compete with these foods and it is unfair to expect them to.

---

<sup>10/</sup> A speech which expands this point is "New Convenience Foods from Freeze-Dehydration", Ronald C. Warnick, given at 1964 Annual Meeting of Research and Development Associates, Philadelphia, Pa., Nov. 18, 1964. Free copies are available from United Fruit and Food Corp., 30 Saint James Ave., Boston, Mass.

A minor point is that some persons feel freeze-drying is a simple, easy, and "do-it-at-home" project. <sup>10/</sup> Freeze-drying is, in fact, complicated and not a "plug in the wall and push the button" operation. Temperatures, time, and pressures are intricately related and vary from product to product. Equipment is expensive to purchase and maintain. It is certainly not now a home food preservation method.

An attitude that hurts is the mistaken impression that all freeze-dried foods are of superb quality. Because a given piece of food is freeze-dried is no assurance that it will be satisfactory. In tests I have studied and foods I have tasted, freeze-dried foods are not uniformly good. Some are excellent. Others are inedible. Most rate in between the two extremes. It makes a big difference whether you taste a laboratory sample or a market item. Type of package is important. Variability exists among samples of one brand of one product. Length of storage period affects quality. Freeze-dried coffee samples, for example, may vary depending on where they were located within the drying cabinet. Palatability also depends on the quality of food coming to the processing plant. If it was of poor quality before it was dried, there is no way for any processing method to overcome this handicap. Washing, preparation, cooking, recipe formulation, packaging, and storage are important. Time, temperatures, pressures, and other factors are vital to any high-quality processed food. These statements do not minimize the quality potential of the freeze-drying method. Rather, they stress that freeze-drying is just one step in the complete process. We need more basic research on the freeze-drying process, and also need research on functions that precede and follow it. For instance, we may need new mushroom varieties that dry easily. We may have to grow them in particular ways. We may have to freeze them using the low temperatures allowed by nitrogen. We may need an especially developed package. I use mushrooms as an example, but the general idea may apply to other freeze-dried foods.

With regard to the quality of freeze-dried foods of the future Frank Lawler, Editor of Food Engineering magazine warns against the industry releasing inferior foods to the public. He says, in part, "Freeze-driers are proceeding with caution required to turn out good products. But not everyone, not every time. In some instances, the equipment may not have the performance characteristics best suited to the product. Or it may be improperly operated by the user. This could be the fault of the manufacturer, of the purchaser, or of both. In the early stages of freeze-drying progress, such situations can be understood. But they cannot continue without giving freeze-dried foods a black eye. Some processors approach freeze-drying as an art, rather than a science. This seldom produces optimum results. Sometimes food technologists write hardware specifications without the necessary vacuum processing knowhow. Then performance is not so good. There is a future ahead for freeze-drying. How fast this future unfolds depends on how infrequently off-quality creates a lingering distaste." <sup>11/</sup>

---

<sup>11/</sup> Editorial, Food Engineering, Dec. 1964, p. 33.



Editor Lawler continues in the same editorial with these comments on cooperation and research: "The freeze-drying industry needs help. It needs common research on basic problems. Individual companies cannot afford to maintain the laboratories, personnel and research facilities necessary to work out all the answers. The logical thing is for the industry to pool its research funds - just as National Canners Association did more than 50 years ago for its field. Meanwhile, USDA should consider devoting more of its future research funds to this new process. Freeze-drying is struggling ahead at a rate considered at least normal for new food industries. And government research funds can make a sure-fire contribution at a relatively low cost." 11/ I agree with Mr. Lawler in his statements and might add that the present trend of processors towards intense competition seems a little forward. In this stage of development of the industry, cooperation appears more needed than competition. The competitive spirit should be used to get the whole range of freeze-dried products accepted by users, rather than which freeze-dried ones.

Another attitude that may inhibit future growth of the freeze-drying industry is the one that all foods need to be dried in cabinets. Type of drier used should depend on the type of food to be dried. There are semicontinuous drying plants now operating in Europe. Those now being used may not be the final answer, but certainly improvements can be made in present equipment. At our USDA Western Utilization Laboratory in Albany, California food processing engineers are working on several new types of freeze-drying equipment. A Swiss company has designed and now markets a freeze-drying drum drier. For raw material going into a drier as a liquid, slurry, flow of cubes or dices, different types of machine design are envisioned. 12/ Heating methods need re-examination. Water evacuation methods are continually being improved upon. Having refrigerated condensers within the cabinet appears a good step in solving water evacuation problems. As a result, however, problems arise including condenser defrosting, length of down time, and sanitation. We should free our imaginations to develop processes, and equipment that we may not now foresee as useful. "What is the use of this new invention?" someone asked Franklin. "What is the use of a newborn child?" was his reply. 13/ In advocating equipment and processing changes I do not advocate change for the sake of change itself. Although change is inevitable, change does not necessarily mean progress. We must evaluate each change from an economic viewpoint before we recommend its adoption. Does it improve the product? Does it lower real costs?

---

12/ We may expect many future improvements in freeze-drying of liquids. Two methods, spray freeze-drying and inner-heat freeze-drying have come up for discussion recently. An article describing these two methods is Mason, P. B., Improvements in Freeze-Drying, with Special Reference to Liquids. International Food Industries Congress 1964, Session 2, paper 2, 1964, 7 pp. Reprints of the paper may be obtained directly from P. B. Mason, Mitchell Engineering Ltd., 1 Bedford Square, London W.C.1, England.

13/ Parton, James. The Life and Times of Benjamin Franklin, 1864, Vol. II, P. 514.



To encourage more information exchanging on freeze-drying, I suggest there be set up a freeze-drying trade organization such as the one now being formed for the dehydration industry. It could have a publication such as IFT's journal, Food Technology. In addition, the freeze-drying industry would profit from more local, regional, national, and international courses, training sessions, and seminars. Here I am thinking of the meetings the Research and Development Associates had several years ago. Another type is the International Freeze-Drying Course in Lyons, France. We have potential speakers and many eager students. All we need is the desire and will to do it. Shakespeare said, "Pluck out the heart of mystery." Horace Wapole expressed it, "Mystery is the wisdom of blockheads."

Another point: Freeze-drying is not the best drying method for all applications. Many new food dehydration techniques have been developed to a high degree. Thus, a successful food processor will choose the particular dehydration method that best suits needs of the market for his specific food. 14/

Finally, for freeze-drying to develop to its fullest potential, the people involved need to keep in mind that they perform a service. As part of a new industry, the tone they now set will be a pattern for the future. Elbert Hubbard expressed the thought thusly; "All success consists ..... in doing something for somebody .....,... benefiting humanity. The feeling of success comes from the consciousness of this." 15/

---

14/ An interesting new drying method is foam-drying on moving belts. A speech discussing one such method is "The AMF Microflake Food Dehydration Process." Potter, Norman, et al., presented to the Research and Development Associates Convenience Food Conference, Philadelphia, Pa., Nov. 18, 1964. Free reprints of this speech are available from: Chem. Dev. Laboratory, Research and Development Division, American Machine & Foundry Company, Springdale, Conn.

15/ Hubbard, Elbert. The Mintage. Roycroft Pub. Co., East Aurora, N. Y., 1910.

---

Part or the whole of this speech may be used without permission. Free reprints are available from: Division of Information, OMS, U. S. Dept. of Agriculture, Washington, D. C., 20250.

DIRECTORY OF FREEZE-DRYING

Page

North America

Processors of freeze-dried foods ..... 10-11  
 Handlers of freeze-dried foods ..... 12  
 Food freeze-drying equipment manufacturers ..... 13  
 Equipment firms other than those manufacturing food freeze-  
 driers ..... 13  
 Consultants, food development, and miscellaneous ..... 14-15

Europe

Processors of freeze-dried foods ..... 16-17  
 Handlers of freeze-dried foods ..... 17  
 Food freeze-drying equipment manufacturers ..... 18  
 Equipment firms other than those manufacturing food freeze-  
 driers ..... 19  
 Consultants, food development, and miscellaneous ..... 19

Other than North America and Europe

Processors of freeze-dried foods ..... 20  
 Handlers of freeze-dried foods ..... 20  
 Food freeze-drying equipment manufacturers ..... 20

This Directory is compiled as a public service to the freeze-drying industry. To the best of my knowledge it is correct as of November 1964, but it is possible that some firm names have been inadvertantly omitted. There may be errors in address, although all firms listed herein have had an opportunity to check and verify their own entry.

*Kenneth Bird*

North America

Processors of Freeze-Dried Foods

APOLLO FREEZE-DRIED PRODUCTS, INC.  
1061 Martin Ave.  
Santa Clara, Calif.  
Paul Korody, Pres.  
12822 Simms Ave.  
Hawthorne, Calif.  
(Processes vegetables, fruits, herbs,  
and meats.)

ARMOUR GROCERY PRODUCTS CO.  
A Div. of Armour and Co.  
2701 W. Grant  
Bellwood, Ill.  
J. A. Ottenheimer, Pl. Mgr.  
(Processes complete lines of meats,  
some fishery products, eggs, some  
vegetables, casseroles, and mixes.  
Many packaged for campers, such  
as mushrooms, for retail market. Does  
custom and contract drying for indus-  
trial and gov't mkt., and engages  
joint developmental work.)

BERNARD FOOD INDUSTRIES, INC.  
1208 E. San Antonio St.  
P. O. Box 487  
San Jose, Calif. 95103  
Frank S. Bernard, Mgr.  
(With limited capacity processes  
meats, vegetables, & berries for  
institutional, dietary, camping &  
export. No grocery items. Purchases  
and distributes freeze-dried items.)

CALIF. VEGETABLE CONCENTRATES  
Div. of General Foods Corp.  
705 E. Whitmore Ave.  
P. O. Box 3659  
Modesto, Calif.  
G. A. Tessier, Gen. Mgr.  
(Processes vegetables, fruits, sea  
foods, meats, poultry, and spices  
for: domestic & export sales, Instit.,  
food processors, manuf. and QMC.  
Also supplies custom product dev. and  
prod. on contract basis.)

CAMPBELL SOUP CO.  
Camden 1, N. J.  
(Processes chicken, beef, mushrooms,  
and onions for own brand of dried  
soups.)

CANADA FREEZE-DRY FOODS LTD.  
P. O. Box 682  
579 Speers Road  
Oakville, Ontario, Canada  
W. R. Smithies, Pres.  
(Processes meats, fish, vegetables,  
fruits, coffee, and dairy products  
for remanufacture and own brand.  
Also processes on a custom and con-  
tract basis.)

COLGATE PALMOLIVE CO.  
Mexico City, Mexico  
(Processes fruits for gelatin  
desserts and chicken for mixes.)

EASTERN FREEZE-DRY CORP.  
Plum & Liberty St.  
Lancaster, Pa.  
C. L. Snavely, V. P.  
(Expect to start processing, early  
1965, mushrooms, poultry, and other  
items on contract.)

E. HIRSCHBERG FREEZE-DRYING  
E. Hirschberg, Pres.  
865 Burlway Road  
Burlingame, Calif.  
(Custom and contract work for  
instit. and remanuf. uses of fruits,  
vegetables and meat. Also new prod-  
uct development.)

FREEZ-DRI PRODUCTS CO.  
P. O. Box AD  
Watsonville, Calif.  
S. Castorina, Pres.  
P. O. Box 43006, La Tijera Sta.  
Los Angeles 43, Calif.  
(Processes complete line of freeze-  
dry foods on a custom basis.)



FREEZE-DRY PRODUCTS, INC.  
301 N. W. 8th St.  
Evansville, Ind.  
Ross Carey, Vice Pres. & Pl Mgr.  
William Fleig, Pres.  
(Processes dairy products, meats,  
and vegetables on a custom basis.  
Also does contract work for QMC and  
private companies.)

FRIGID-DRY FOODS CO.  
2735 N. Ashland Ave.  
Chicago, Ill. 60614  
Maurie Laskin, Pres.  
(Processes ice cream and center  
pieces for candy and cookies. Also  
custom drying and consulting, research  
development, and marketing.)

HULGUARD-MAVIS  
Venice, Calif.  
(Processes soluble coffee on a  
contract basis.)

MAXWELL HOUSE  
Div. of General Foods  
1125 Hudson St.  
Hoboken, N. J.  
(Processes soluble coffee for use  
in own blend.)

OREGON FREEZE DRY FOODS, INC.  
770 W. 29th St.  
P. O. Box 666  
Ellis Byer, Mgr. & Pres.  
(Processes complete line of foods on a  
custom and contract basis. Specialize  
in fruits and vegetables.)

PAUL A. MARIANI CO.  
10930 N. Highway 9  
Cupertino, Calif. 95014  
Paul Mariani, Jr., Pres.  
(Processes fruits, on contract  
basis, for domestic and export use.)

SLACK BROS., LTD.  
Waterloo, Quebec, Canada  
Robert Flood, V. P.  
(Processes mushrooms for own brand  
sales and industrial requirements.)

THOMAS J. LIPTON, INC.  
(Subs. of Unilever)  
Albion, N. Y.  
Roy Morse, V. P.  
Englewood Heights, N. J.  
(Processes chicken, meat dices,  
mushrooms for company's own brand  
of dried soups. Also has market  
test line of prepared dishes.)

UNITED FRUIT & FOOD CORP.  
P. O. Box 187  
Edinburg, Texas  
Ronald Warnick, Ex. V. Pres.  
30 Saint James Ave.  
Boston, Mass.  
(Produce and develop products and  
ingredients for use in convenience  
foods. Processes complete line of  
meat, sea food, poultry, fruit and  
vegetables.)

WILSON & CO., INC.  
(Plant Location - Omaha, Neb.)  
L. R. Siegel, Mgr.  
Dehydrated Foods Div.  
Prudential Plaza  
Chicago, Ill. 60601  
(Manuf. ground and diced meats,  
poultry, shrimp, mushrooms, meat  
and bacon bars, dinners and break-  
fasts. Market under own name.  
Also processes for QMC and on  
contract and custom basis.)

POST  
Div. of General Foods, Inc.  
Battle Creek, Michigan.  
(Processing plant under construction.  
Will process berries and fruits for  
use in own brand of breakfast  
cereals.)

Handlers of Freeze-Dried Foods

BERNARD FOOD INDUSTRIES, INC.  
217 N. Jefferson  
Chicago, Ill.  
Jules F. Bernard, Mgr.  
(Purchases and distributes freeze-dried items for campers & others).

COLGATE-PALMOLIVE CO.  
300 Park Ave.  
New York City, N. Y.  
Richard Severance  
(Markets prepared items under own label.)

CORN PRODUCTS CO.  
P. O. Box 345  
Argo, Ill., 60502  
(Markets dry soups under Knorr label.)

GOLDEN GRAIN MACARONI CO.  
1111 139th Ave.  
San Leandro, Calif.  
Jack Ziegler, Chief Chemist  
Vincent de Dimenico, Gen Mgr.  
(Markets dry soups under own label.)

HOLLAND DAIRY CO.  
Holland, Ind.  
(Distr. freeze-dried cottage cheese and other dairy products.)

KRAFT FOODS  
Div. of National Dairy Prod. Corp.  
99 Park Ave.  
New York 16, N. Y.  
Fred Huneke, Head of Instit. Prod.  
(Distributes United Fruit and Food freeze-dried foods.)

MOTHER PARKER'S TEA & COFFEE LTD.  
1275 Castlefield Ave.  
Toronto 12, Ont., Canada  
P. Higgins, Pres.  
(Markets freeze-dried coffee under own label.)

THE PILLSEURY CO.  
311 Second St., S.E.  
Minneapolis, Minn. 55414  
John P. Barnes, Tech. Mgr.  
(Liquid heat freeze-drying.)

POST  
Div. of General Foods  
Battle Creek, Mich.  
(Freeze-dried fruits in dry cereals.)

PUCCINELLI PACKING, INC.  
P. O. Box 430  
Turlock, Calif.  
Edward L. Fanucchi, Sales Mgr.  
(Contracts drying of vegetables, pieces, and powders. Distrib. in Europe.)

SEXTON & CO.  
Chicago, Ill.  
(Distributes shrimp, mushroom pieces and stems. Market testing cottage cheese, fish patties and meat balls.)

STOW-A-WAY PRODUCTS  
Cohasset, Mass., 02025  
Wm. B. White, Pres.  
(Handles complete line of freeze-dried foods processed by several companies and sold under own label.)

THE CHUN KING CORP.  
P. O. Box 206  
5020 Roosevelt St.  
Duluth 1, Minn.  
Nathan G. Fox, V. P.  
Research and Quality Control  
(Processing wild rice, fruits, mushrooms, celery, and other materials on a pilot-plant basis.)

ESSEX PACKERS LTD.  
Brant Street  
Hamilton, Ontario, Canada  
R. R. Furlong  
(Handles freeze-dried foods processed by other firms. No longer processes.)

Food Freeze-Drying Equipment  
Manufacturers\*

DEL-VAC ENGINEERING  
461 N. Eucalyptus Ave.  
P. O. Box 722  
Inglewood, Calif.  
John E. Blaine, Jr. Pres.  
(Design, manuf. and install freeze-driers and associated equipment.)

F. J. STOKES  
Div. of Pennsault Chem. Corp.  
5500 Tabor Road  
Phila 20, Pa.  
James Ryan, Mgr. of Food Systems  
John Magurie, Res. Mkt. Mgr. of  
Food Systems  
(Design, manuf., & install complete  
line of freeze-driers and assoc.  
equipment.)

FMC CORP.  
Central Eng. Lab.  
Erik Thuse, Mgr. Food Proc. Sec.  
P. O. Box 580  
Santa Clara, Calif.  
(Design, manuf. and install complete  
line of freeze-driers.)

FREEZ-DRINAMICS SYSTEMS, INC.  
3911 Empire Ave.  
Burbank, Calif.  
William R. Ulrich, Pres.  
(Design, manuf. and install com-  
plete line of freeze-driers.)

FFEEZE-DRY PRODUCTS, LTD.  
224 Merton St.  
Toronto 7, Ontario, Canada  
J. E. Margison, Pres.  
(Design, manuf. and install custom  
freeze-driers for food, biological,  
and pharmaceutical uses. )

VACUDYNE CORP.  
375 E. Joe Orr Road  
Chicago Heights, Ill. 60411  
Fred Lindstrom, V. P.  
(Design, manuf. and install complete  
line of freeze-driers.)

Equipment firms other than those  
Manufacturing Freeze-Drying Equipment

AMERICAN INSTRUMENT CO.  
8030 Georgia Ave.  
Silver Spring, Md.  
Jerry Scott, Sales Mgr.  
(Design and manuf. laboratory and  
pharmaceutical sublimators and  
accessories.)

AMERICAN STERILIZER CO.  
2424 W. 23rd Street  
Erie, Pa.  
James J. Wingenbach, Sales Mgr.  
(Design and manuf. pilot models  
and pharmaceutical sublimators.)

BETHLEHEM CORP. VACUUM FREEZE-DRYING  
DIV.  
225 W. 2nd St.  
Bethlehem, Pa., 18016  
William L. Root, 3rd. Mgr.  
(Design, manuf., and install  
sublimators.)

BUFLOVAK EQUIPMENT  
Div. of Blaw-Knox Co.  
M. W. Vincent, Asst. Mgr.  
1543 Fillmore Ave.  
P. O. Box 1041  
Buffalo, N. Y., 14240  
(Design, manuf., and install vacuum  
equipment and associated items  
needed for food processing.)

CHEMET ENGINEERS, INC.  
2560 E. Foothill Blvd.  
Pasadena, Calif.  
C. N. Sjogren, Pres.  
(Design, manuf. and install com-  
plete line of freeze-dryers and  
associated equipment. Specialize  
in large commercial installations,  
including overall plant design.)

\* Included here are only the equipment firms who have actually installed  
food freeze-driers in a commercial plant. Other equipment firms are listed  
in the following section.



DRESSER VACUUM

Div. of Dresser Industries, Inc.  
P. O. Box 111, 150 "A" St.  
Needham Heights, Mass.  
J. C. Smith, Gen. Mgr.  
(Design, manuf. and install  
Leybold equipment in N. A.  
Specializes in continuous flow  
equipment.)

EDWARDS HIGH VACUUM (CANADA) LTD.

P. O. Box 515  
Burlington, Ontario, Canada  
J. Morgan, Chief Exec.  
(Group co. of Edwards High Vacuum  
Inter. Ltd.)

EDWARDS HIGH VACUUM, INC.

3279 Grand Island Blvd.  
Grand Island, N. Y.  
R. G. Webster  
(Represent Edwards High Vacuum,  
Inter. Ltd. in U. S.)

FISHER SCIENTIFIC CO.

203 Fisher Bldg.  
Pittsburgh, Pa.  
(Manuf. controls for freeze-driers.  
Distributor of freeze-dry equipment.)

RADIO CORP. OF AMERICA

Industrial Market Development  
Lancaster, Pa. 17604  
H. F. Kazanowski, in charge  
(Microwave tubes for freeze-  
drying applications.)

REPP INDUSTRIES

Route 208  
Gardiner, N. Y.  
T. N. Thompson, Gen. Mgr.  
(Design and manuf. pharmaceutical  
and food laboratory sublimators.)

THE FOXBORO CO.

924 Neponset Ave.  
Foxboro, Mass.  
Wendell S. Young, Engr.  
(Design and manuf. controls for  
freeze-dryers.)

VILTER MFG. CORP.

2217 S. First St.  
Milwaukee, Wis.  
A. O. Vogel, Sales V. P.  
(Manuf. and install associated  
equipment including heat exchangers  
and refrigeration.)

VIRTIS CO., INC.

Gardiner, N. Y.  
C. E. Bender, Pres.  
(Design and manuf. laboratory sub-  
limators.)

VOTATOR

Div. of Chemetron Corp.  
P. O. Box 43  
Louisville 1, Ky.  
H. E. Huber, Mgr. Sales Div.  
Weld Conley, Director of Res.  
(Design and manuf. vacuum equipment.)

Consultants, Food Development and  
Miscellaneous

COURTLAND LABORATORIES

5555 Valley Blvd.  
Los Angeles 32, Calif.  
Paul Bogikes, V. P.  
(Pharmaceutical freeze-drying).

EVANS RESEARCH & DEV. CORP.

250 E. 43rd St.  
New York 17, N. Y.  
Wm. E. Holland, V. P.  
(Product dev., process eval., taste  
and consumer panel studies.)

FRIGID-DRY

Div. of Great Lakes Biochemical Co.  
P. O. Box 1297  
Milwaukee, Wis. 53201  
Maurie Laskin, Tech. Dir.  
(Custom freeze-drying, research,  
commercial prod. and custom equip-  
ment.)

FRITZSCHE ENTERPRISES  
Space Age Foods Laboratory  
4601 Downers Drive  
Downers Grove, Ill. 60515  
Lab. - 524 W. Sheridan Rd.  
Fritzsche Estates  
McHenry, Ill.

(Research and devel. of freeze-dried foods. Preparation, freezing, freeze-drying, and packaging of food products. Contract freeze-drying. Technical advice and freeze-dry processing design.)

GRIFFITH LABORATORIES, INC. (N. J.)  
855 Rahway Ave.  
Union, N. J.  
Harve Hearl  
(Product development.)

JOHN NAIR  
2424 Wentworth St.  
Raleigh, N. C.  
(Consultant)

ROBERT DECAREAU  
Old Coach Lane  
Amherst, N. H.  
(Consultant in microwave application to freeze-drying.)

SCIENTIFIC MENU FOOD PREP., INC.  
1832 Johnson St.  
Los Angeles 31, Calif.  
Sal Castorina, Pres.  
(Prepares, cooks, freezes, freeze-dries, and packages various foods as a service to food processors.)

TEST LABORATORIES, INC.  
Reseda, Calif.  
Marshall Brewster, Pres.  
(Development of citrus fruit & tomato powders. Also alfalfa powder.)

U. S. ARMY NATICK LABORATORIES  
Natick, Mass.  
F. P. Mehrlich, Dir. of Food Div.  
(Has driers for use in developing new foods and for supplying experimental tests for Armed Services.)

WALKER ASSOCIATES  
23 The Crescent  
Berkeley 8, Calif.  
L. H. Walker, Dir.  
(Consulting food engineers.)

Europe

Processors of Freeze-Dried Foods

AERATED FOODS, LTD.

K. Burness, Dir.  
Freeze-drying operation  
in Aberdeen, Scotland  
149 Heisham Rd.  
Walton-on-Thames  
Surry, England  
(Freeze-dried tea marketed through  
retail stores and vending machines.)

AFFINED FOODS, LTD.

Sub. of Ranks Houis McDougall, Ltd.  
Edric House, Castle St.  
High Wycombe, Bucks, England  
A. Spicer, Dir. of Res. & Dev.  
(Freeze-drying of products for  
industrial food mfg.)

ALLIANCE FREEZING CO.

Invercargill, N. Z.  
F. G. Stanley, Mgr.  
(Processes mince, beef stew, beef  
curry rice, beef mince, sausage,  
mixed vegetables.)

BACHELOR FOODS, LTD.

(Member of Unilever.)

BLA BAND PRODUCTER AB AND AB VATO  
(Unilever Associates)

Stalverksgatan, Postbox 240  
Halmstad, Sweden  
Gunnar Holman, Prod. Mgr.  
(Processes chicken, meats, and  
vegetables which are sold at retail  
in form of soups and complete  
dinners.)

BROOKE BOND & CO., LTD.

35 & 37 Cannon St.  
London E. C. 4, England  
Michael Spring  
(Processes tea for vending machine  
use. Produces, on a toll basis,  
soluble coffee.)

DRAGOCO

Mr. Windhorst, Tech. Dir.  
Holzminden, W. Germany  
(Processes berries & fruits.)

ERIN FOODS

(Of Irish Sugar Co., Ltd.)  
Mallow, Ireland  
J. Ginell, Dir. of Food Processing  
St. Stephen's Green House  
Dublin, Ireland  
(Processes meats, vegetables, fruits,  
and seafoods.)

H. HARTOGS' FABRIEKEN, N. V.

(A Unilever affiliate)  
Oss, Netherlands  
C. P. Huismans  
(Processes chicken and mushrooms  
for soup mixes, and vegetables.)

HELSINGBORG FRYSHUS A.B.

Landskronauen 11  
Helsingborg, Sweden  
(Processes seafoods, meats, berries,  
and vegetables on a custom or con-  
tract basis.)

J. LYONS, LTD.

London W.14, England  
Also Cadby Hall  
London W 2, England  
(Processes fruits, vegetables, and  
dairy products.)

KNORR FOOD PRODUCTS

(Subs. of Corn Products, Inc.)  
Small plant at Thayngen, Switzerland  
production plant at Heilbronn,  
Germany.  
Leutschenbachstrasse 46  
8050 Zurich, Switzerland  
Dr. Kock, Mgr.  
Wuether Boser, Ass't Mgr.  
(Processes meats, vegetables for  
our soup mixes.)

LIEBIG'S (IRELAND) LTD.

Sligo, Ireland  
J. Lyons, Tech. Mgr.  
(Processes scampis, fish, and  
vegetables for institutional and  
retail trade.)



LUCAS AARDENBURG, N. V.  
(A Unilever affiliate)  
Hoogeveen, Netherlands  
(Processes vegetables.)

LUCAS MEYER  
(Plant in Dahlenburg, Germany)  
Monckebergstrasse 17  
2 Hamburg, Germany  
(Processes vegetables and dairy  
products in a continuous plant.)

MAGGI G.M.B.H.  
Singen, W. Germany  
(Processes meat pieces and  
vegetables for dried soups.)

MELLIN D'ITALIA S.P.A.  
Via Correggio, 18  
Milano, Italy  
Stephano Dezza, Tech. Dir.  
(Processes meat, fruit, & vegetables  
for baby food.)

MILCHPULVERWERK  
4425 Billerbeck  
Westfalen, Germany  
Wolfgang SuWelak, Mgr.  
(Processes dairy products.)

MILCHWERKE G.M.B.H.  
5333 Hillesheim  
Eifel, Germany  
(Processes dairy products.)

MOLKEREIGENOSSENSCHAFT DAHLENBURG  
G. M. B. H.  
3148 Dahlenburg  
Germany  
Kurt Kautz, Mgr.  
(Processes dairy products, vege-  
tables, etc.)

N. V. PRESERVENBEDRIJF-BREDA  
P. O. Box 207  
Manager, D. d'Arnoud Gerkens  
Breda, Netherlands  
(Processes vegetables, poultry,  
beef, veal, soft fruit, and  
vegetables.)

OPDO COLOGNE  
Adm. at Opekta House, Cologne  
Plant at 4053 Suchteln  
Grefratherstrasse 208  
Germany  
Dr. Heinz Pabst, Mgr.  
(Mfg. meat bars and other items  
for German Army. Also ice cream  
powders.)

ROYAL HOLLANDIA MILK & FOOD CO.  
(Subs. of Nestlé)  
Vlaardingen, Netherlands  
G. H. Speidel, Dir.  
(Manufacture and use freeze-dried  
foods on intermediate basis.)

S A C A F  
Sperti Products, Inc.  
Salerno, Italy  
Dr. Poggioli, Tech. Dir.  
(Semi-continuous process freeze-  
drier installed, but not in commer-  
cial operation Oct. 1964.)

SITPA  
(Maggi affiliate)  
Auxonne, France  
(Processes freeze-dried meat and  
vegetables for soup mixes.)

STEWART & ARNOLD, LTD.  
Dr. A. Spicer  
High Wycombe, Bucks, England

WILLIAM STEWART & ARNOLD, LTD.  
High Wycombe, Bucks, England  
(Processes whole egg by SEC process.)

Handlers of Freeze-Dried Foods

MOTTA  
Milano, Italy  
Mr. Ferrante, Pres.  
(Distributes through own chain of  
Italian bakeries and coffee houses  
of 100% freeze-dried coffee.)

Food Freeze-Drying Equipment  
Manufacturers

A/S ATLAS

Baldersgade 3  
Copenhagen, Denmark  
O. Begtrup-Hansen  
(Design, manufacture, and install  
complete line of sublimators )

BONNET-SOGEV

Depart. Lyophilisation  
(Subs. of Thomson-Houston France -  
Repres. in U.S.A. by Thomson-Houston  
of New York)  
50, Rue du Four  
CHOISY-le-ROI, France  
J. L. Bloch, Mgr. of Depart.  
(Design, manuf. and install com-  
plete line of freeze-driers )

CIMET S.P.A.

Carlo Mardhi, Pres.  
Via Boccaccio, 21  
Milano, Italy  
Dr. Eliano Canetta  
Via della Rosa, 4  
Rovagnascodi Segrate  
Segrate - Milano, Italy  
(Design, Mfg. & install complete  
line of pharma. & food sublimators )

EDWARDS HIGH VACUUM LTD.

Manor Royal, Crawley,  
Sussex, England  
B. Drummond Smith (Food Freeze-  
Dryers)  
R. Kusay (Pharmaceutical Freeze-  
Dryers)  
(Design, manuf., and install sub-  
limators for biological preparations  
and food. Also manuf. high vacuum  
pumps and compressors, gauges,  
switches, & other accessories )

HEURTEY - STOKES CO.

30-32 Rue Guersant  
Paris 17, France  
(Design, mfg., and install freeze-  
driers )

ING. BRIZIO BAZI & CO.

So. Acc. Semplice  
Viale Monza, 198-200  
Milano, Italy  
Ing Brizio Basi, Pres.  
(Design, manuf. compressors, gauges,  
vacuum pumps, and freeze-driers for  
pharmaceutical and food-freeze-  
drying. Also lab. & pilot plant  
sublimators & controls.)

INTERNATIONAL MACHINERY CORP. S.A.

(Subs. of FMC)  
Breedstraat  
Sint-Nicklaas-Waas  
Belgium  
S. A. Mencacci, Pres.  
(Mfg. & install freeze-driers )

LEYBOLD-CHIMA S.P.A.

Via Farina 53 int.  
Milan, Italy  
(Design, mfg., install, and  
commission Leybold freeze-driers.)

LEYBOLD-ELLIOTT, LTD.

Tunnel Ave.  
London S. E. 10, England  
(Design, manuf., install, and  
commission Leybold freeze-driers  
within Sterling area of Common-  
wealth.)

LEYBOLD-HOCHUAKUUM-ANLAGEN-G.M.B.H.

P. O. Box 195  
Koln-Bayenthal (Cologne)  
Germany  
G. W. Oetjen, Gen. Mgr.  
(Design, mfg. & install complete  
line of freeze-driers )

MITCHELL ENGINEERING, LTD.

1 Bedford Sq.  
London, W.C. 1, England  
E. A. Woodward and P. B. Mason  
(General engineering. Design, mfg.,  
& install complete range of freeze-  
driers for inner heating, process  
for liquids. Assoc. with Edwards  
High Vacuum, Ltd.)

SEFFINGA ENGR. CO. N. B. \_SEL. N.V.  
Paardskerkhoweg 31  
Is - Hertogenbosch - Holland  
G. Seffinga, Gen. Mgr.  
(Design, mfg. & install complete  
line of freeze-driers.)

SECFROID  
Rue du Cret 2  
Lausanne, Switzerland  
(Design and manuf. drum freeze-driers)

VICKERS-ARMSTRONGS (ENGRS), LTD.  
P. O. Box 8, S. Marston Works  
Swindon, Wiltshire, England  
S. E. H. Lefever, Prod. Mgr.  
R. T. Cox, Sales Coordinator  
(Design, manuf. & install complete  
line of freeze-driers.)

Equipment Firms Other Than Those  
Manufacturing Freeze-Drying Equip-  
ment

CHRIST ITALIANA, S. R. L.  
Via Cassala, 39  
Milano, Italy  
(Mfg. small sublimators for  
pharmaceutical lab.)

COGER, S.P.A. MACCHINE E. METALLI  
4, Via Santa Margherita  
Milano, Italy  
Giuseppe G. Pasqua, Pres.  
(Design, mfg., and install vacuum  
equipment.)

DOTT BONAPACE & CO.  
Via Canova N. 6  
Milano, Italy  
A. A. Bonapace  
(Sell and install freeze-driers.)

EDWARDS ALTO VUOTO S. P. A.  
Group Co. of Edwards High Vacuum  
International Ltd.  
Via Gallarate N 217  
Milan, Italy  
P. M. della Porta, Dir.  
(Design, manuf., and install pilot  
plant and custom-built freeze-driers)

EDWARDS HIGH VACUUM INTERNATIONAL LTD.  
Manor Royal, Crawley,  
Sussex, England  
Central Res. Lab.  
Head - L. Holland  
Technical Liaison - T. W. G. Rowe  
(Basic research and advanced  
development in vacuum techniques  
including freeze-drying.)

EDWARDS HOCHVAKUUM GMBH,  
6 Frankfurt/Main-Niederrad  
Germany  
A. Runki - Chief Exec.  
(Group Co. of Edwards High Vacuum  
International Ltd.)

SOCIETE TECHNIQUE LEYBOLD  
48, Ruede La Bienfaisance  
Paris 8, France  
Bodo von Stumm, Mgr.

STAL-LAVAL APPARAT AB  
Linkoping, Sweden  
Eric Stenstedt, Mgr.  
(Manuf. vacuum equipment.)

Consultants, Food Development & Misc.

CANETTA DR. ELIANO  
Via Della Rosa 4  
Rouagnasco Di Segrate  
Milano, Italy  
(Consulting. Also see Cimet.)

FOOD DEVELOPMENT UNIT OF UNILEVER LTD.  
Greyhope Road  
Aberdeen, Scotland  
(Processes meats, poultry, vege-  
tables and fruits--for experiments  
and own use.)

NESTLE  
Case Postale 13  
Vevey, Switzerland  
(Research and Administration.)



Other Than North America & Europe

Processors of Freeze-Dried Foods

AUSTRALIAN FIRM

(name and address unknown)  
(Processes mushrooms.)

DALHOFF & KING (N.Z.), LTD.

G. P. O. 3040  
Wellington, New Zealand  
(Processes meat and cheese products.  
Associated with Alliance Freezing  
Co., Invercargill, N. Z.)

FRUTAS SOLUVEIS FRUSOL S. A.

Jeremias Lundarelli Neto, Dir. Supt.  
Campinas  
Est. Sao Paulo, Brazil  
(Will process bananas, tropical  
fruits, and coffee.)

INSTANT FOODS (NZ) LTD.

Ferry Road, Christchurch, N. Z.  
Plant - Blenheim, N. Z.  
R. O. Hooker, Technologist  
(Processes chopped onions, spaghetti  
sauces, soup mixes.)

JAPAN INSTANT FOODS, INC.

(Subs. of Ajinomoto Co.)  
Eiji Koyama, Exec. Dir.  
Kondo Bldg.  
163 Umegae-Cho, Kitaku  
Osaka, Japan  
(Processes meats, shrimp, mush-  
rooms, eggs, fruits, soybean, curd,  
and mixes for retail institutions,  
and export. Does contract defense  
work.)

LOBRAS - PRODUTOS LIOFILIZADOS

BRASILEIROS S. A.  
Av. Ipiranga, 104 - cj. 24  
Sao Paulo, Brazil  
(Will process instant coffee,  
fruits, vegetables for domestic  
and export uses. Expect to be  
in production by March 1965.)

TAIWAN MALING CANNED GOODS FACTORY  
CO., LTD.

81 Kweilin Rd.  
Taipei  
Taiwan (Formosa), China  
Mr. S. G. Koo, Mgr.  
(2 cabinets under construction.  
Expect to start processing mush-  
rooms early 1965.)

TECHNOPROMIMPORT

(No street or city)  
U. S. S. R.  
(Processes meats, vegetables, and  
fruits in 3 plants in different  
parts of U.S.S.R.)

Handlers of Freeze-Dried Foods

ALLIANCE FREEZING CO.

Invercargill, N. Z.  
(Markets freeze-dried products  
processed by Dalhoff & King, N.Z.)

Food Freeze-Drying Equipment  
Manufacturers

CORP. PICKER INTER. AMERICANA

White Plains, N. Y.  
G. C. Oswald  
(Distributor of REPP and Virtis  
laboratory sublimators outside of U.S.  
and Canada.)

JAPAN VACUUM ENGR. CO., LTD.

Nippon Seimei Ginza Bldg.  
5, 1-Chome, Ginza-Nishi, Chuo-ku  
Tokyo, Japan  
Hideo Sibata, Mgr. of Inter. Div.  
(Design, mfg., install freeze-  
driers of their own and of Vickers  
Armstrong. Also manuf. vacuum  
equip. and components.)

SULENE, S. A.

Av. Sao Joa 473 S/901  
Sao Paulo, Brazil  
Alfredo Morbelli, Pres.  
(Design, manuf. and install complete  
line of freeze-driers and provide  
technical assistance.)



