AP42 Section:	9.11.1
Title:	Vegetable Oil Processing Comments and letters from industry 1995

MIDWEST RESEARCH INSTITUTE
Suite 350
401 Harrison Oaks Boulevard
Cary, North Carolina 27513-2412
Telephone (919) 677-0249
FAX (919) 677-0065

Date: May 20, 1996

Subject: Site Visit -- Cargill
Emission Factor Documentation for AP-42, Section 9.11.1
EPA Contract No. 68-D2-0159; MRI Project No. 4602-03

From: Tom Lapp

To: AP-42 Section 9.11.1 Project File

I. Purpose

The purpose of the visit was to briefly review comments from the National Oilseed Processors Association (NOPA) and to conduct a walking tour of the soybean crush plant. This information will be incorporated into the revision of the background report and AP-42 Section 9.11.1, Vegetable Oil Processing.

II. Place and Date

Cargill, Incorporated
River Road, Box 2309
Fayetteville, North Carolina 28302

August 2, 1995

III. Attendees

National Oilseed Processors Association

David C. Ailor
Director of Regulatory Affairs
Washington, DC

Cargill, Inc.

Ron Moeller
Assistant General Superintendent
Operations and Engineering
Minneapolis, MN

Tom Richardson
Plant Superintendent
Fayetteville, NC

U. S. Environmental Protection Agency

Dallas Safriet, EFIG
Ron Ryan, EFIG
Roy Huntley, EFIG

Midwest Research Institute (MRI)

Tom Lapp

IV. Discussion

The visit as held primarily to conduct a walking tour of the facility in order to observe the actual processing steps in operation. Prior to the tour, a brief meeting was held to discuss general information on the soybean processing industry and to review suggested NOPA process diagrams for incorporation into the final report. This discussion presents information on the soybean processing industry and a description of the refining of edible soybean oil. The review of NOPA diagrams consisted of a discussion of process flow diagrams previously submitted to EPA by NOPA. Copies of the annotated diagrams are attached to this memorandum.

A. General Information

Generally, the soybean industry annually processes 1.1. to 1.3 billion bushels of soybeans. For 1995, most plants are operating at about 70 percent of capacity. The Cargill plant at Fayetteville is one of the larger plants in the U.S. and is in the top 20 percent in terms of production capacity.

For most plants, there have not been a lot changes over the past 15 years and those changes that have occurred were the result of EPA regulations or the increase in energy costs. During this 15 year period, there has been a move from the use of deep bed extractors towards shallow bed extractors. Also, changes have occurred in the desolventizing/toaster (DT) systems. Generally, plants do not change control devices without an increase in capacity.

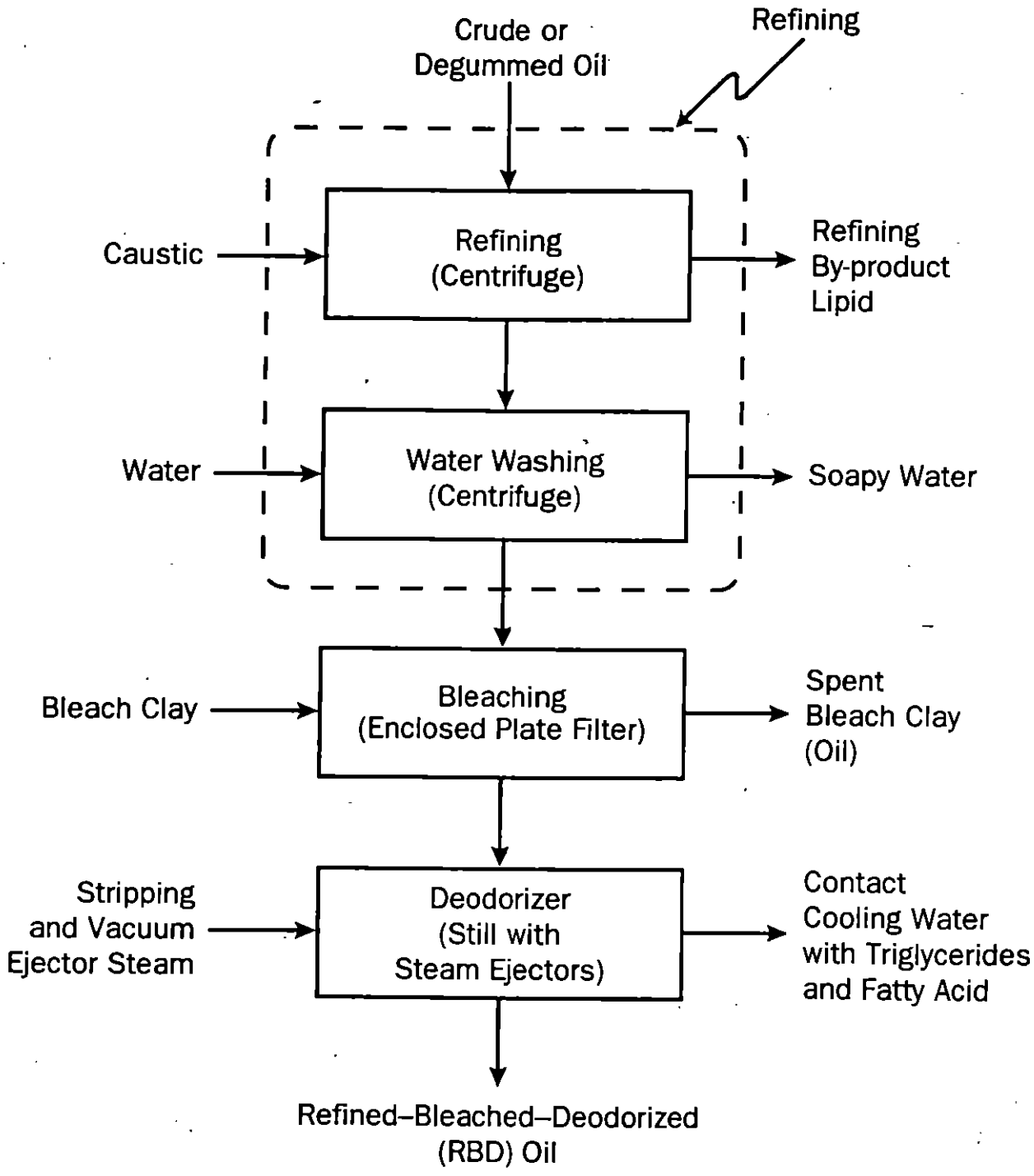
In conventional soybean processing plants, there is no production of soybean meal for human consumption (white flake production). Only about 8 plants in the U.S. have flasher systems for white flake production. These flasher systems use superheated hexane in the flake desolventizing step and do not use meal dryers.

B. Soybean Oil Refining

Crude soybean oil contains free fatty acids, phosphorus compounds, protein fines, and triglycerides. The crude oil can be either treated directly with caustic or undergo an optional

step to degum the oil, which removes the lecithin. After treatment with caustic, the oil is centrifuged to separate the aqueous refining by-product lipid from the oil. This lipid solution contains protein fines, phosphorus compounds, some saponified triglycerides, and sodium salts of the fatty acids. Following separation of the lipid, the oil is washed with water and centrifuged to remove some of the remaining saponified triglycerides.

The refined oil is then bleached and deodorized. In the bleaching step, the refined oil is treated with bleach clay and then transferred to a vacuum bleaching tank. Following the bleaching step, the spent clay is filtered from the oil and the refined, bleached oil is ready for the deodorizing step. Prior to the deodorizing step, the bleached oil may be hydrogenated using a nickel catalyst and the resultant liquid supercooled to filter out the saturated oil. The refined, bleached oil is deodorized by stripping in a still with steam ejectors. In the stripping process, any triglycerides and fatty acids remaining in the refined, bleached oil are removed and the refined-bleached-deodorized (RBD) oil is ready for processing into commercial products. A process flow diagram for the edible oil processing operation is attached to this memorandum.



Edible Oil Processing

ATTACHMENT 1

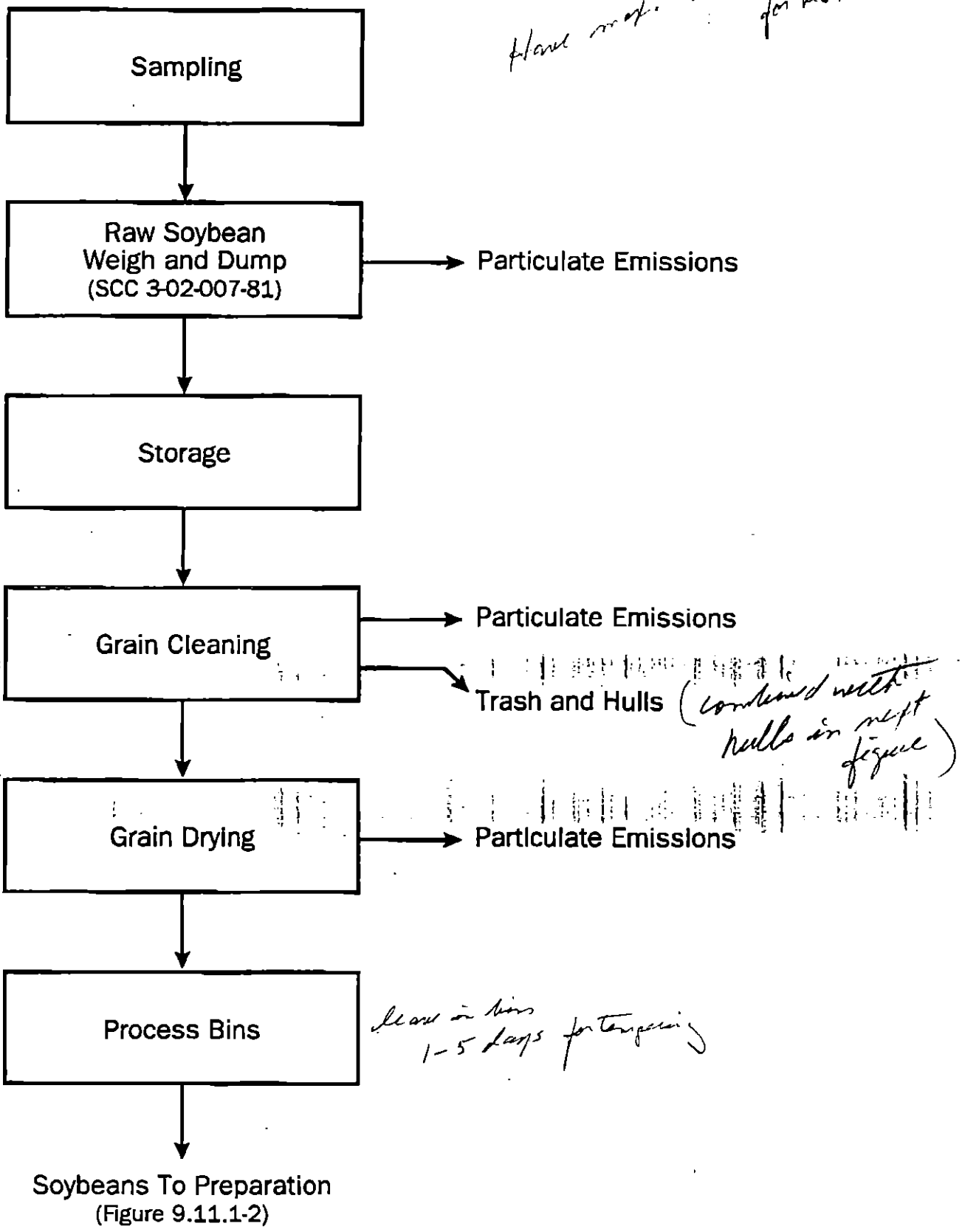


Figure 9.11.1-1. Flow diagram of typical soybean handling/elevator operations. (Source Classification Codes in parentheses.)

ATTACHMENT 2

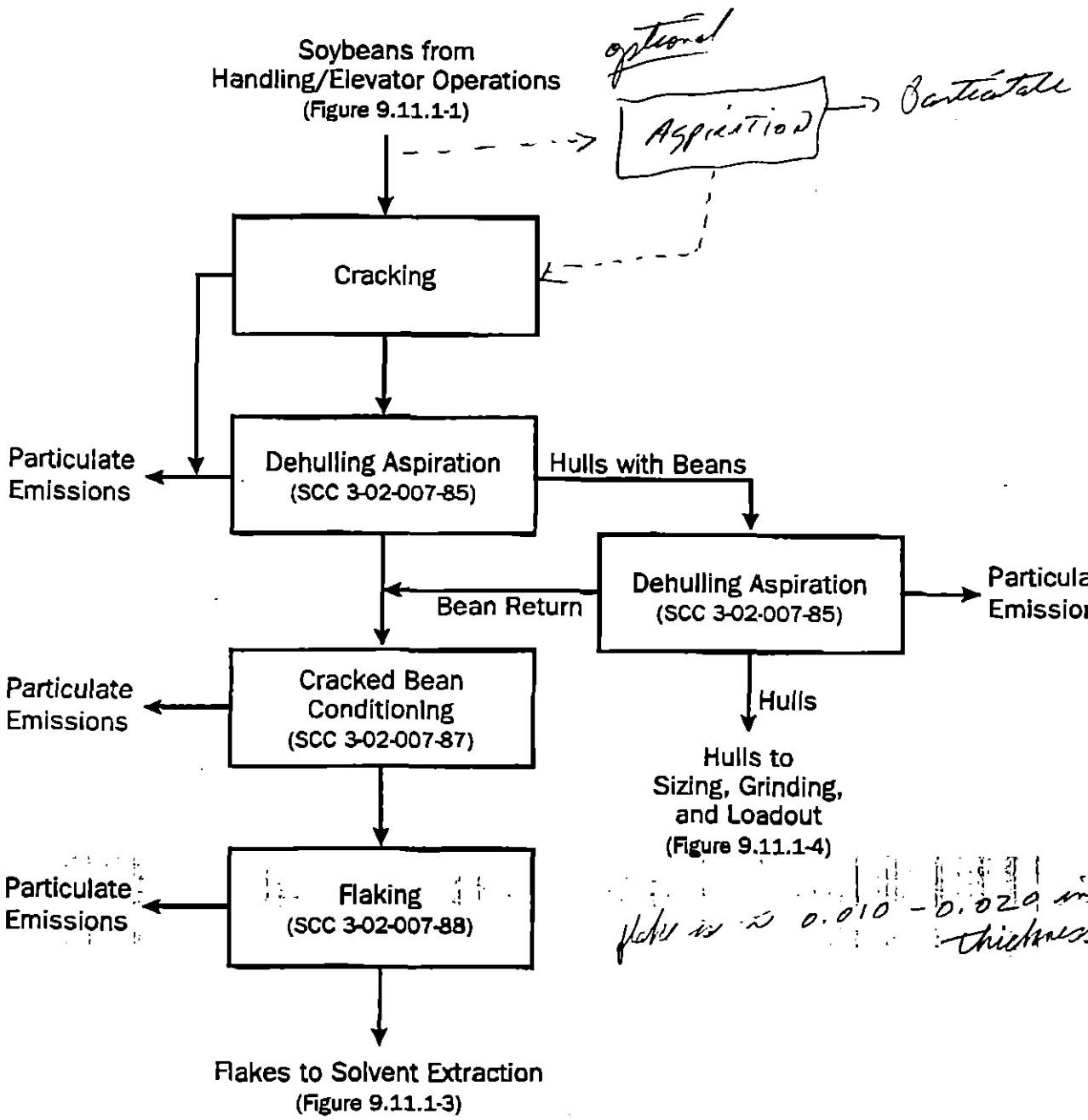


Figure 9.11.1-2. Flow diagram of the typical process for preparing soybeans for solvent extraction. (Source Classification Codes in parentheses.)

ATTACHMENT 3

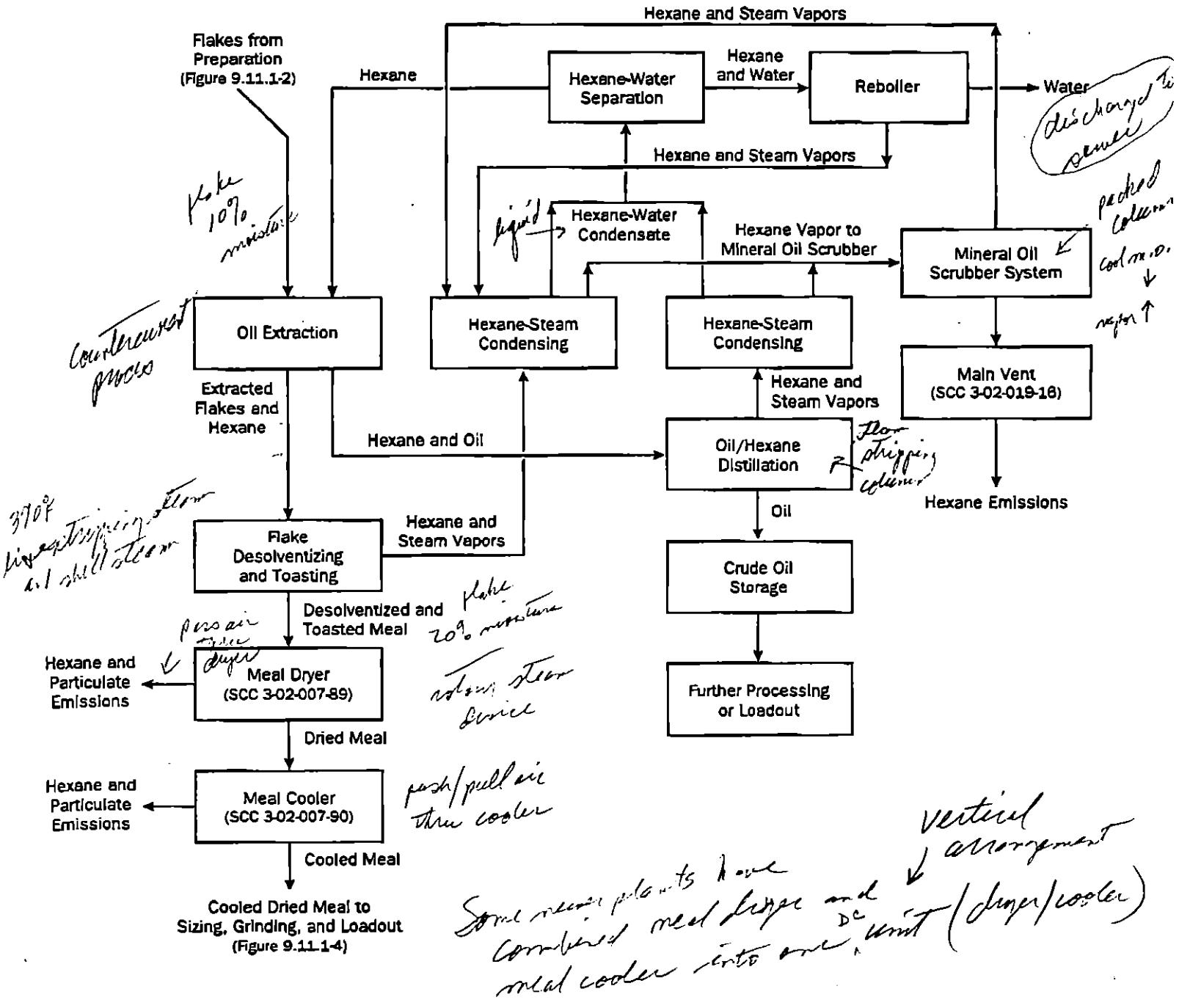


Figure 9.11.1-3. Flow diagram of the "conventional" soybean solvent extraction process. (Source Classification Codes in parentheses.)

ATTACHMENT 4

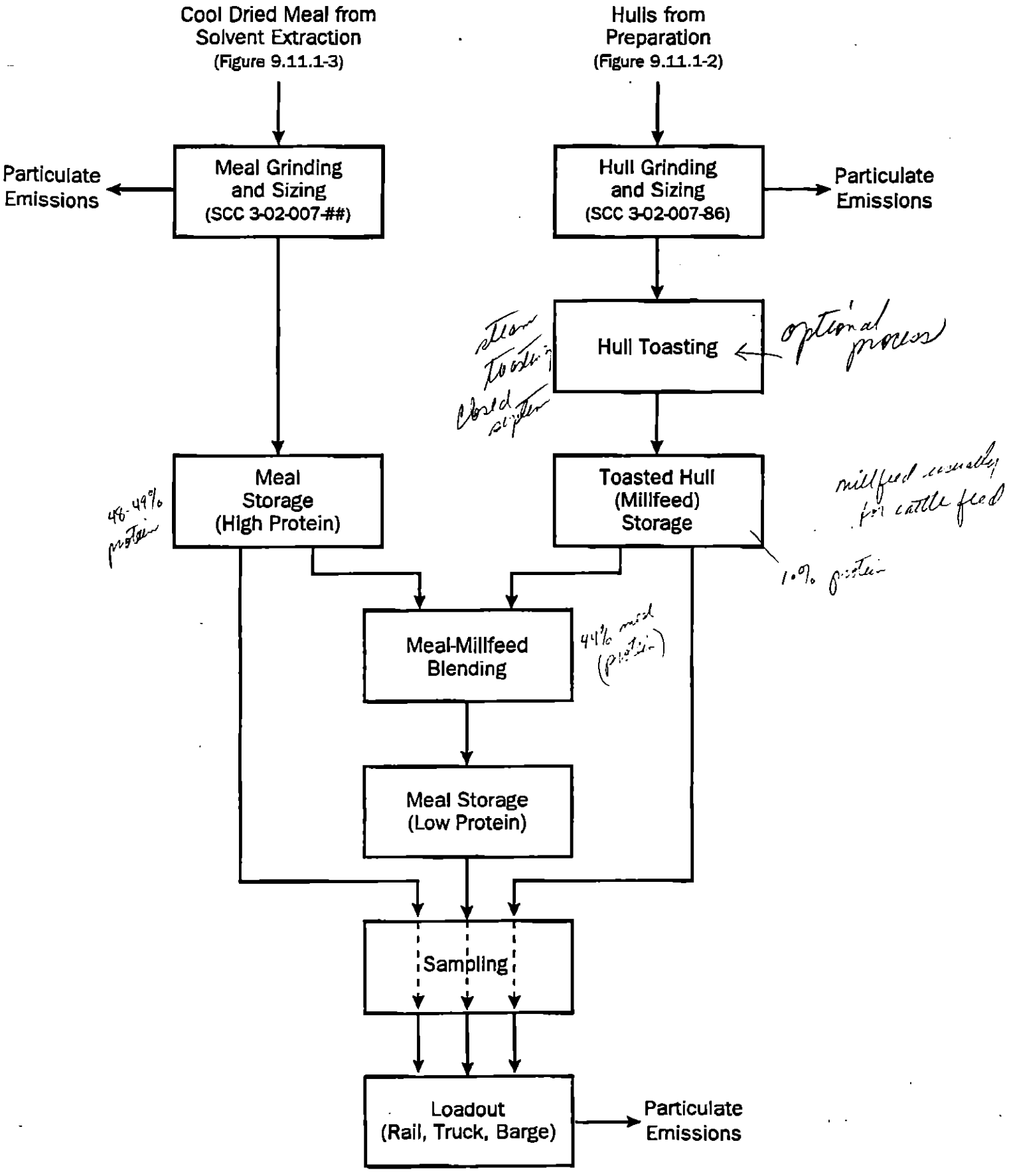


Figure 9.11.1-4. Flow diagram of the "conventional" process for dry material sizing, grinding, and loadout. (Source Classification Codes in parentheses.)

8/2/95

Cargill Plant Trip
Fayetteville

Dallas Ray Huntley also Tom
Ron Hayes TL Mallett

One of the larger plants in U.S. ~ top 20% capacity ~25 yrs old

Commercial plant - no white flake production
Plants currently running ~70% of capacity

Process ~ industry —
1.1 – 1.3 billion bushels/yr.

Generally
. Do not change control devices without an increase in capacity

Last 15 yrs
More stewards shallow bed extractor vs. deep bed.
Use in DT system

Not a lot of change in the last 15 yrs – changes due to ← energy cost
EPA regs.

Process flow diagram – same as NOPA submission.

~ 8 plants have flasher system for producing soy meal for human consumption
↳ uses superheated hexane in flake desolventizing step
do not use meal dryer

Refining oil –

optional step – degummed oil – removes lecithin

Crude oil – free fatty acids
phosphorus cpds
proteinaceous fines
~~phospholipids~~ triglyceride

Refining by-product lipid → Na^+ fatty acids
some saponified triglyceride
fines
phosphorus cpds

water washing – removes
some saponified triglycerides
remaining

Bleaching — add clay, go thru vacuum bleaching tank,

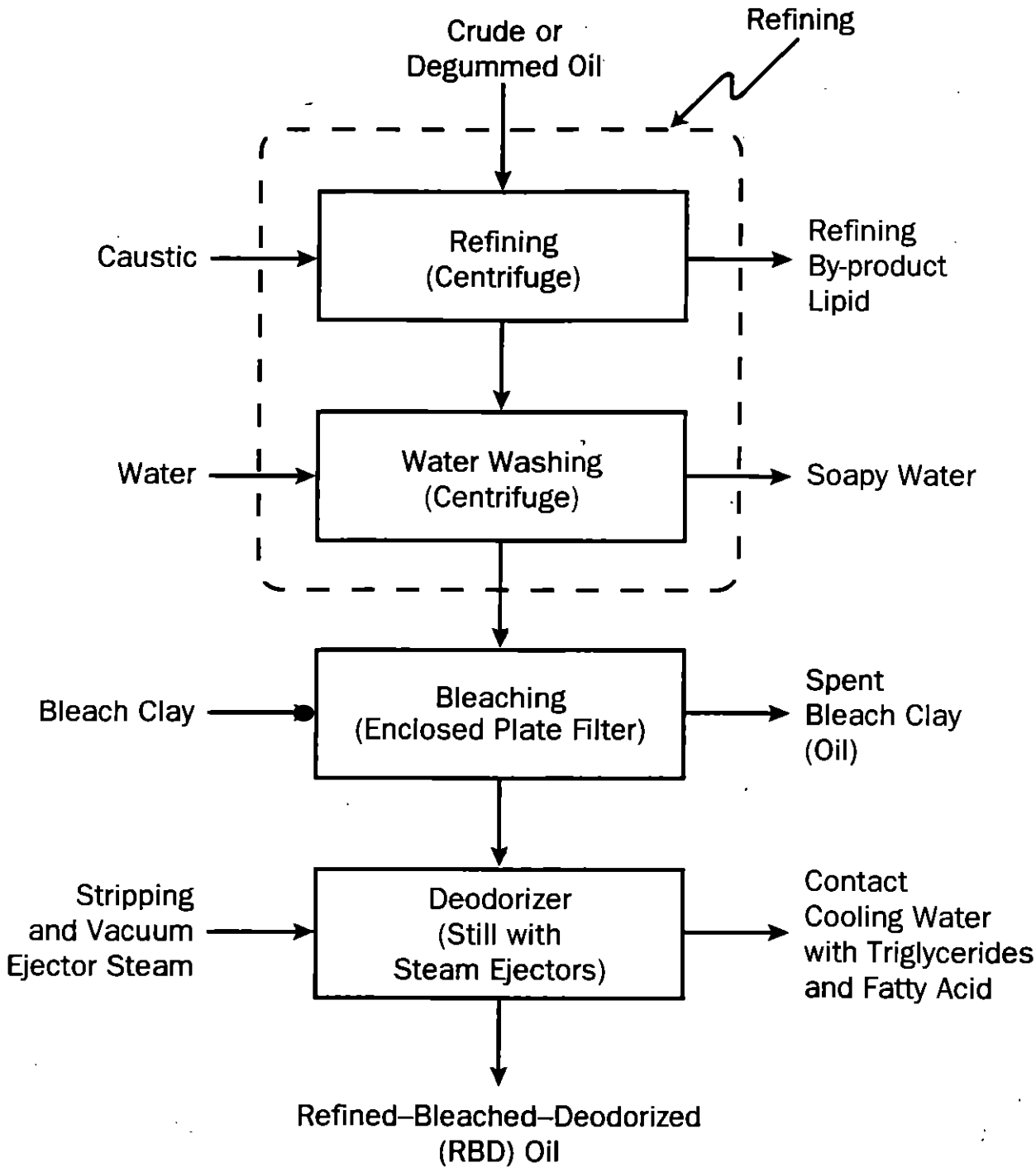
unbl. oil ↓ bleached oil

Deodorizer → condenser for salad oils

between bleaching & deodorizer

(1) hydrogenization (use Ni cat.)

(2) winterization - supercool liquid and filter out the saturated molecules



Edible Oil Processing

NATIONAL OILSEED PROCESSORS ASSOCIATION
1255 TWENTY-THIRD STREET, N.W.
WASHINGTON, DC 20037

Phone: (202) 452-8040
Fax: (202) 466-4949

Soybean Safflower Canola Sunflower

American Feed Industry Association
Brian Burnside

—FACSIMILE TRANSMITTAL FORM—

 # OF PAGES IN THIS FAX (including cover page): 13
If transmittal is incomplete or unclear, please call (202) 452-8040 for assistance.

DATE: 7-28-95

TO: DALLAS SAFRIET / EPA
TOM LAPP / MRI

FROM: David C. Ailor,
NOPA Director of Regulatory Affairs

RE: REVISED DRAFT AP-42 SECTION 9.11.1 (VEGETABLE OIL PROCESSING)

Robert Reeves - referred by oil mfg.
Orbo.
(202) 783-7960
fax 393-1367
ISED
1750 New York Ave NW
WDC 20006

T003

NOPA
NATIONAL OILSEED PROCESSORS ASSOCIATION

1255
TWENTY-THIRD
STREET,
N.W.
WASHINGTON,
DC
20037-1174

PHONE:
(202) 452-8040

FAX:
(202) 835-0400

July 28, 1995

U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards (MD-15)
Research Triangle Park, NC 27711

Attn.: Mr. Dallas W. Safriet, Emission Inventory Branch
Emission Standards Division

Re.: EPA's Revised Draft Emission Factor Documentation for AP-42 Section 9.11.1, Vegetable Oil Processing (June 1995)

Dear Mr. Safriet:

On June 9, 1995, Mr. Tom Lapp (Midwest Research Institute), acting on your behalf, sent our organization, the National Oilseed Processors Association (NOPA), the EPA's Revised Draft Emission Factor Documentation for AP-42 Section 9.11.1, Vegetable Oil Processing, that the EPA intends to publish in an upcoming supplement to AP-42, Compilation of Air Pollutant Emission Factors. You asked that we review and provide you with our comments on the revised draft document towards the Agency publishing this section as a new section in AP-42.

NOPA is a national trade association comprised of 13 regular and 27 associate member companies with plants engaged in the processing of vegetable meals and oils from oilseeds. NOPA's 13 regular member firms process an estimated 1.1 billion bushels of oilseeds annually at 72 plants in 22 states, employing an estimated 4,700 workers. We very much appreciate the invitation to share our views with you on a topic of such relevance to our industry.

Generally speaking, the document is much improved over the Draft Emission Factor Documentation for AP-42 Section 6.11.1 that you provided us for review/comment in August 1993. However, it is still incorrect or lacking in a few areas, and should be revised accordingly. Our detailed comments/recommended revisions are presented in the enclosure to this letter.

As you know, on Wednesday, August 2, you and several other representatives of EPA-OAQPS will be joining Ron Moeller (Cargill) and me in Fayetteville, NC, for a tour of Cargill's Fayetteville Crush Plant/Oil Refinery. Ron and I would like to utilize that meeting as an opportunity to briefly review our comments with you and answer any questions you may have. Please advise me should that present a problem.

Thank you again for the opportunity to comment on the Revised Draft Emission Factor Documentation for AP-42 Section 9.11.1, Vegetable Oil Processing. Please call me if you have any questions. I look forward to seeing you next week.

Sincerely,

David C. Ailor

David C. Ailor, P.E.
Director of Regulatory Affairs
Enclosure

cc: Thomas W. Lapp (MRI, 401 Harrison Oaks Boulevard, Suite 350, Cary, NC 27513-2412)

ENCLOSURE

1

NOPA Comments on EPA's Revised Draft Emission Factor Documentation for AP-42 Section 9.11.1, Vegetable Oil Processing (June 1995)

1. Page 9.11.1-1 (Section 9.11.1.2)

The last sentence in the first paragraph of this section is slightly incorrect as drafted. It should be revised to read as follows:

"The process consists of five steps: oilseed handling/elevator operations, preparation of soybeans for solvent extraction, solvent extraction and oil desolventizing, desolventizing flakes, and oil refining."

2. Page 9.11.1-2 (Figure 9.11.1-1)

This figure contains several inaccuracies/omissions as drafted. It should be revised in several ways, as discussed below:

a. References to "Moisture, "Foreign Material", and "Damaged and Treated Beans" are included in the figure, adjacent to the first box ("Sampling"). Such information is extraneous to the flowchart and should be deleted.

b. The Source Classification Code (SCC) associated with the process addressed in the second box in the figure ("Raw Soybean Weigh and Dump") should be included in the box. The correct SCC number (SCC 3-02-007-81) corresponds to that for "Receiving" in Table 9.11.1-2 on page 9.11.1-11.

c. The notations for the two exit streams leaving the "Grain Cleaning" box (i.e., "Trash and Hulls" and "Particulate Emissions") should be reversed, with the top exit stream being denoted as a horizontal arrow labeled "Particulate Emissions". The bottom exit stream, denoted by a downward sloped arrow, should be labeled "Trash and Hulls".

d. The exit stream from the box labeled "Process Bins" at the bottom of the figure is currently labeled "To Milling". To better and more accurately illustrate the relationship between the various processes/figures in this section, this exit stream should be relabeled "Soybeans to Preparation (Figure 9.11.1-2)".

Attachment 1 is a revised Figure 9.1.1-1 in which the suggested revisions have been incorporated.

3. Page 9.11.1-3 (Section 9.11.1.2)

The title of the last full paragraph on this page is slightly incorrect as drafted. It should be revised to read as follows:

"Solvent Extraction and Oil Desolventizing"

4. **Page 9.11.1-3 (Section 9.11.1.2)**

The last sentence of the last full paragraph on this page is slightly incorrect as drafted. It should be revised to read as follows:

"The desolventized oil, called "crude" soybean oil, is stored for further processing or loadout."

5. **Page 9.11.1-3 (Section 9.11.1.2)**

The discussion entitled "Desolventizing Flakes", which begins at the bottom of this page and continues on to page 9.11.1-6, is incorrect as drafted. It should be reordered/revised to read as follows:

"Desolventizing Flakes - The flakes leaving the extractor contain up to 35 to 40 percent solvent and must be desolventized before use. Flakes are desolventized in one of two ways: either "conventional" desolventizing or specialty or "flash" desolventizing. The method used depends upon the end use of the material. Flakes that are flash desolventized are typically used for human foods, while conventionally desolventized flakes are used primarily in animal feeds.

Conventional desolventizing takes place in a desolventizer-toaster where both contact and noncontact steam is used to evaporate the hexane. In addition, the contact steam "toasts" the flakes, making them more usable for animal feeds. The desolventized and toasted flakes then pass to a dryer, where excess moisture is removed by heat, and then finally to a cooler where ambient air is used to reduce the temperature of the dried flakes. The desolventized, defatted flakes are dried, cooled, and ground for use as soybean meal (see Figure 9.11.1-4).

Specialty or "flash" desolventizing utilizes different equipment and is far less efficient than conventional desolventizing in terms of energy consumption and solvent removal. Given these factors, solvent emission factors would be considerably higher for a specialty desolventizing process than for a similar-sized conventional desolventizing process."

6. **Page 9.11.1-4 (Figure 9.11.1-2)**

This figure contains several inaccuracies/omissions as drafted. It should be significantly revised, as discussed below:

a. This figure is currently entitled "Flow diagram of the process for preparing soybeans for solvent extraction". The figure should be retitled "Flow diagram of the typical process for preparing soybeans for solvent extraction" because it presents the process used by most, but not necessarily all, of the industry.

b. To better illustrate the relationship between the various processes/figures in this section, a new entrance stream labeled "Soybeans from Handling/Elevator Operations (Figure 9.11.1-1)" should be added to the first box in this figure ("Cracking"). 3

c. The figure as drafted indicates that the "Cracking" operation is a point source of particulate emissions. This is generally not the case in the typical process for preparing soybeans for solvent extraction. Instead, particulate matter generated in the cracking operation is typically routed to the discharge for the "Dehulling Aspiration" operation, where it is combined with particulate matter generated during that operation and routed to a control device. The figure should be revised accordingly.

already done

d. The SCC's associated with the boxes labeled "Dehulling Aspiration", "Cracked Bean Conditioning", and "Flaking" should be included in the boxes. The correct SCC's are SCC 3-02-007-85, SCC 3-02-007-87, and SCC 3-02-007-88, respectively. These SCC's correspond to the SCC's in Table 9.11.1-2 (page 9.11.1-11) for "Primary/secondary dehulling", "Bean conditioning", and "Flaking rolls", respectively.

e. The box labeled "Hull/Bean Separation Aspiration" should be relabeled "Dehulling Aspiration" as a more accurate description of the operation. The SCC for this operation, which corresponds to that for "Primary/secondary dehulling" (SCC 3-02-007-85) in Table 9.11.1-2 (page 9.11.1-11), should be included in the box.

f. The exit stream from the box labeled "Flaking" is currently labeled "To Extraction". To better and more accurately illustrate the relationship between the various processes/figures in this section, this exit stream should be relabeled "Flakes to Solvent Extraction (Figure 9.11.1-3)".

g. As currently drafted, this figure includes many steps which are not intrinsic to the typical process for preparing soybeans for solvent extraction. These steps, which include "Hull Grinding", "Meal Loadout", "Millfeed Loadout", and all the intermediate steps shown, should be removed from the figure and incorporated, with some modifications, in Figure 9.11.1-4 (page 9.11.1-7).

Attachment 2 is a revised Figure 9.1.1-2 in which the suggested revisions have been incorporated.

7. <u>Page 9.11.1-5 (Figure 9.11.1-3)</u>

This figure contains several inaccuracies/omissions as drafted. It should be revised in several ways, as discussed below:

a. This figure is currently entitled "Flow diagram of the solvent extraction process". The figure should be retitled "Flow diagram of the 'conventional' solvent extraction process" as a more accurate description of the process.

b. The entrance stream to the box labeled "Oil Extraction" at the top of the figure is currently labeled "Flakes from Milling". To better and more accurately illustrate the relationship between the various processes/figures in this section, this entrance stream should be relabeled "Flakes from Preparation (Figure 9.11.1-2)".

c. In the "conventional" soybean solvent extraction process, "Hexane-Water Separation" typically discharges a hexane and water stream to a reboiler. Accordingly, a new box labeled "Reboiler" should be added to the figure immediately downstream of "Hexane-Water Separation". The new box should be drawn with one entrance stream from "Hexane-Water Separation" labeled "Hexane and Water"; and, two exit streams, including "Hexane and steam vapors" (which should be drawn as exiting to "Hexane-Steam Condensing") and water.

d. The exit stream from the "Hexane-Steam Condensing" boxes is currently labeled "Exhaust to Mineral Oil Scrubber". This exit stream should be relabeled "Hexane Vapor to Mineral Oil Scrubber" as a more accurate description of the stream.

e. The box labeled "Further Processing" at the bottom of the figure should be relabeled "Further Processing or Loadout" as a more accurate description of the operation.

f. The exit stream from the box labeled "Meal Cooler" is currently labeled "Cooled Meal to Sizing and Grinding". To better and more accurately illustrate the relationship between the various processes/figures in this section, this exit stream should be relabeled "Cooled Dried Meal to Sizing, Grinding, and Loadout (Figure 9.11.1-4)".

Attachment 3 is a revised Figure 9.1.1-3 in which the suggested revisions have been incorporated.

8. <u>Page 9.11.1-7 (Figure 9.11.1-4)</u>

This figure contains several inaccuracies/omissions as drafted. It should be significantly revised, as discussed below:

a. This figure is currently entitled "Flow diagram of final processing stages". The figure should be retitled "Flow diagram of the 'conventional' process for dry material sizing, grinding, and loadout" as a more accurate description of the process.

b. The figure is currently incomplete/inaccurate in several areas. For example, as noted earlier, several process steps included in Figure 9.11.1-2 (page 9.11.1-4) are more accurately included (with some modifications) in Figure 9.11.1-4. These steps include "Hull Grinding and Sizing", "Meal Loadout", "Millfeed Loadout", and certain intermediate steps.

Attachment 4 is a revised Figure 9.1.1-4 in which the suggested revisions have been incorporated.

9. **Page 9.11.1-9 (Table 9.11.1-1)**

Among the various hexane emission factors included in the table, that for "Fugitive emissions from meal" is by far the largest in terms of mass of hexane emitted per mass of soybeans processed. Additionally, it is given the highest emission factor rating among the factors included in the table (i.e., a rating of "C"). The approach that was used to estimate fugitive emissions from meal at solvent extraction facilities assumes that all of the solvent in the meal at the exit point of the desolventizer-toaster is released onsite, either through the dryer or cooler vents, or as fugitive emissions (see page 4-16 of Revised Draft Report). However, this conclusion is inconsistent with the data

Page 2-17 of the Revised Draft Report provides as follows on this issue:

> "These results suggest that volatilization of hexane may occur from the soybean meal as it is processed into feedstuffs and marketed. Hexane in meal that is processed into flour for cooking or cooked feeds (many animal feeds like dog and cat food are often overcooked) will probably be volatilized during cooking. Processing that does not require cooking may result in hexane remaining in the meal until consumption."

Similar conclusions are included on page 9.11.1-8.

All of the conclusions presented above pertain to activities that occur downstream of solvent extraction facilities. Consequently, the data relied upon by EPA do not permit quantification of the fugitive emissions that may be occurring onsite at a solvent extraction facility or at later stages in the production stream (e.g., transportation, preparation of feedstuffs, use). The line item "Fugitive emissions from meal" should therefore either be deleted from the table altogether or, at a minimum, denoted by a "NA" in the table.

10. **Page 9.11.1-11 (Table 9.11.1-2)**

This table contains several inaccuracies/omissions as drafted. It should be revised in several ways, as discussed below:

a. The emission factors in this table are all given an emission factor rating of "E". However, no explanation is ever provided for this rating. To help readers better understand the basis for this rating, explanatory text from page 4-18 of the Revised Draft Report should be incorporated in the table as a footnote. The footnote should reads as follows:

> "These data were obtained from unpublished emission test data and from industry questionnaires. Because all data were secondary data, the test data and questionnaire data were weighted equally in calculating emission factors, and the factors were calculated as arithmetic means of the associated data. Because the data are secondary, all emission factors are rated E."

b. One process included in the table - "Hull screens" - is no longer a typical component of the "conventional" process for dry material sizing, grinding, and loadout. Consequently, this process should be deleted from the table.

c. One process included in Table 9.11.1-2 - "White flake cooling" - should be deleted from the table because it is associated with a specialty process that is not addressed in the related figures. White flake cooling is not a component of the "conventional" solvent extraction process, the principal focus of both the text and the four figures in the section. Rather, it is associated with the specialty or "flash" desolventizing process discussed on page 9.11.1-6 of the text. Omission or deletion of its related processes from the figures and the table is entirely appropriate because it is a specialty process.

d. One process included in Table 9.11.1-2 - "Meal grinder" - should be retermed "Meal grinder/sizing" to be consistent with the suggested revisions offered on Figure 9.11.1-4 (see comment no. 8).

11. **Page 9.11.1-13 (Reference No. 20 for Section 9.11.1)**

No publication date is provided for Reference no. 20. The date should be included for this reference along with the other pertinent information already provided.

ATTACHMENT 1

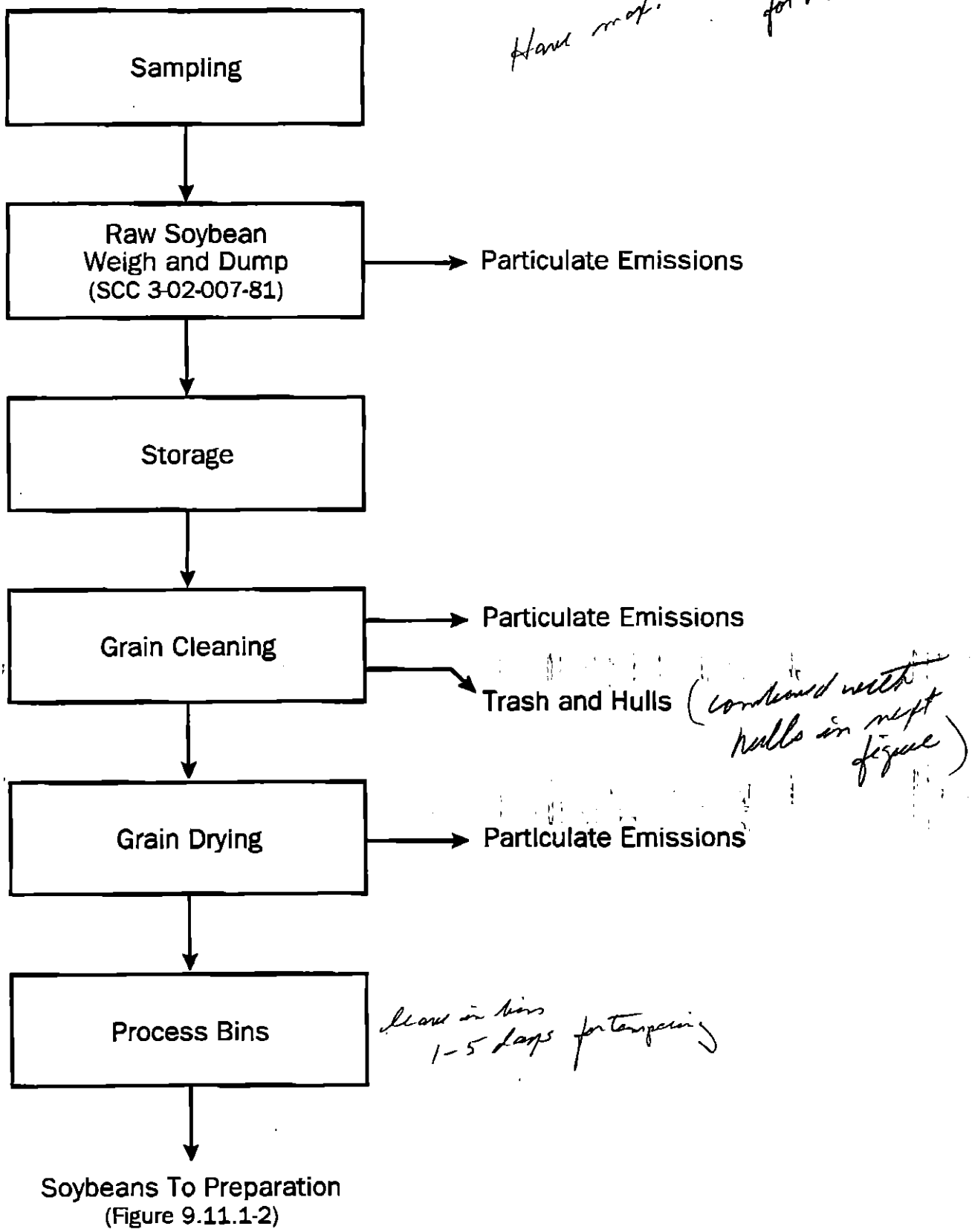


Figure 9.11.1-1. Flow diagram of typical soybean handling/elevator operations. (Source Classification Codes in parentheses.)

ATTACHMENT 2

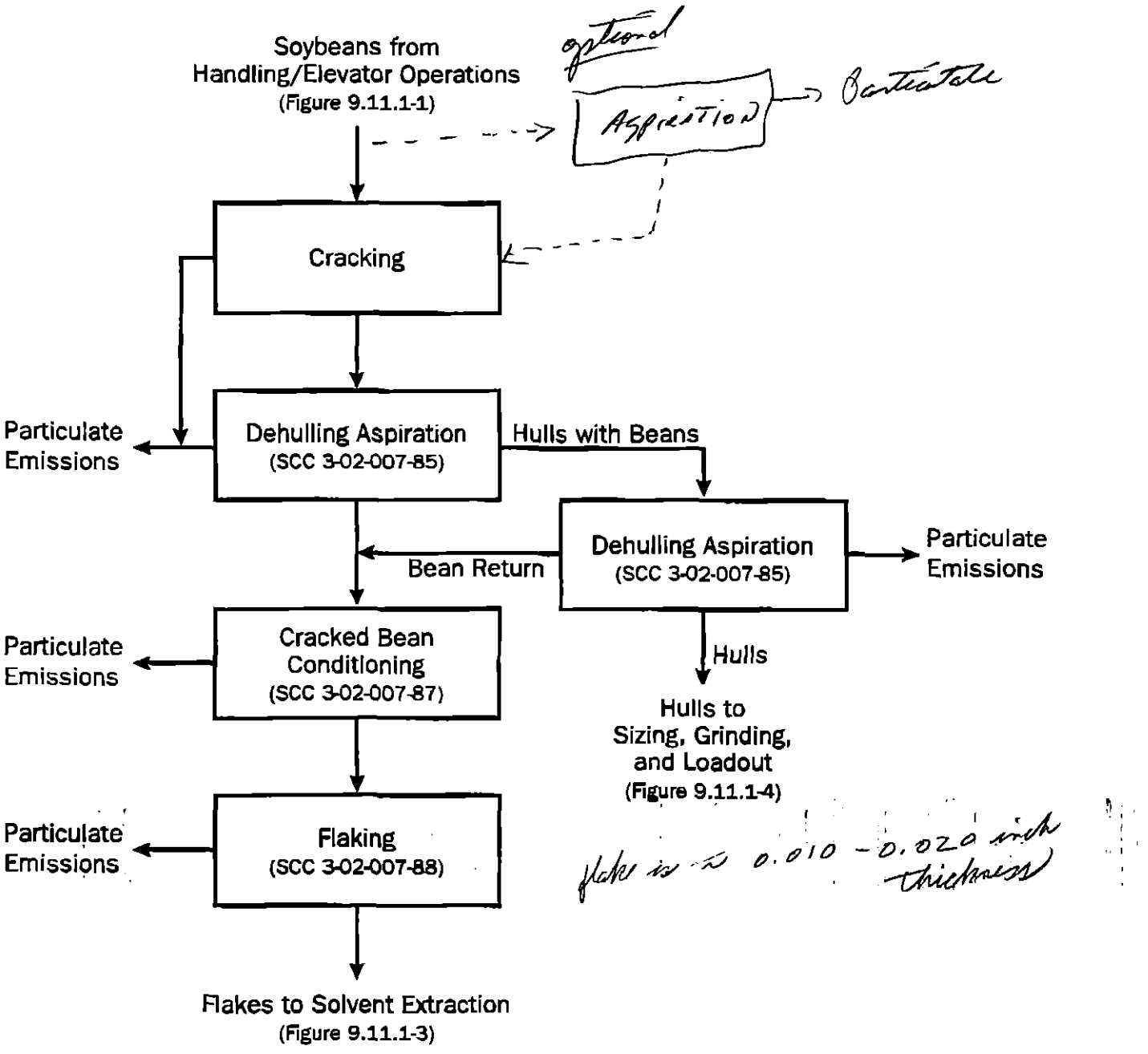


Figure 9.11.1-2. Flow diagram of the typical process for preparing soybeans for solvent extraction. (Source Classification Codes in parentheses.)

ATTACHMENT 3

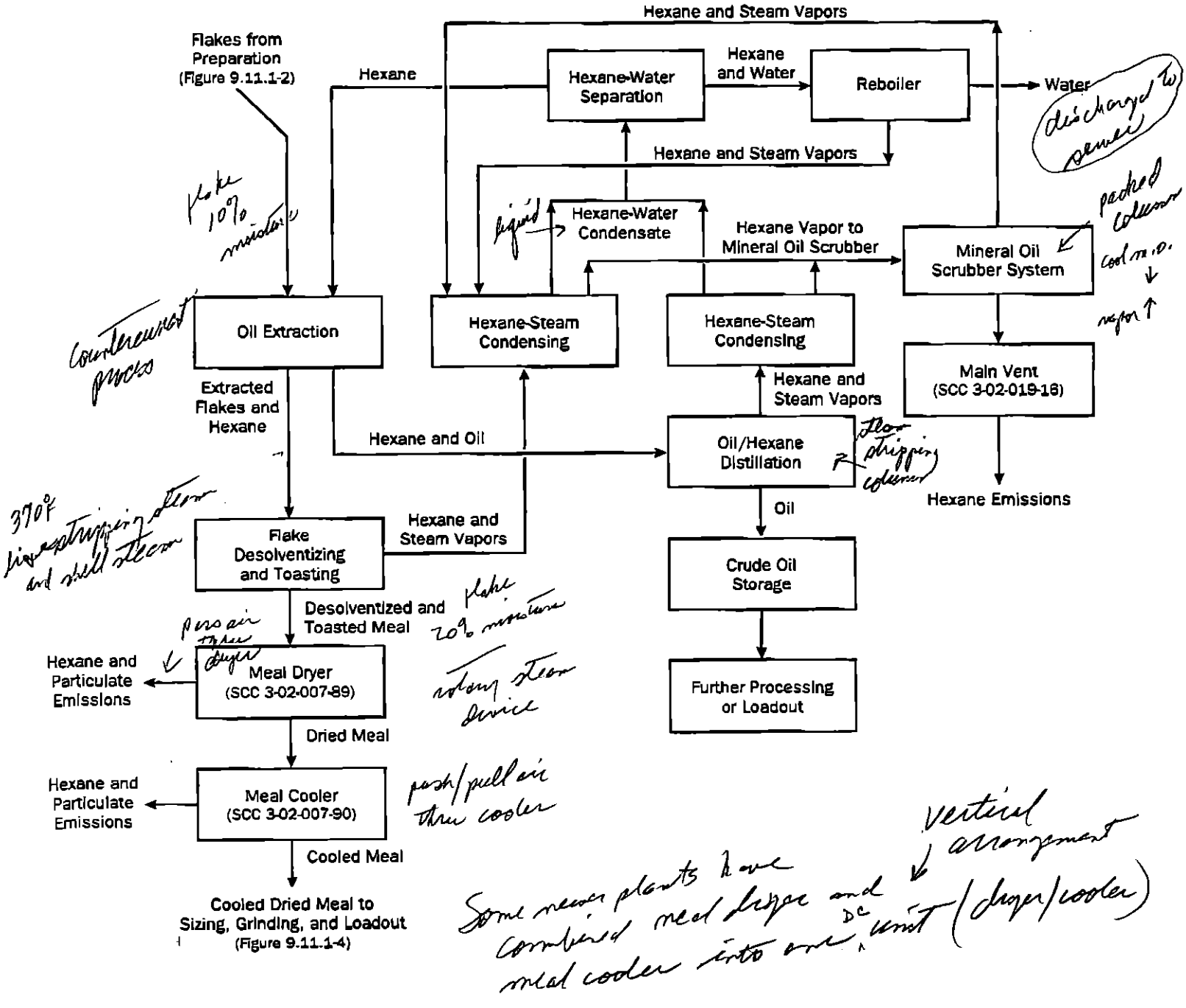


Figure 9.11.1-3. Flow diagram of the "conventional" soybean solvent extraction process. (Source Classification Codes in parentheses.)

ATTACHMENT 4

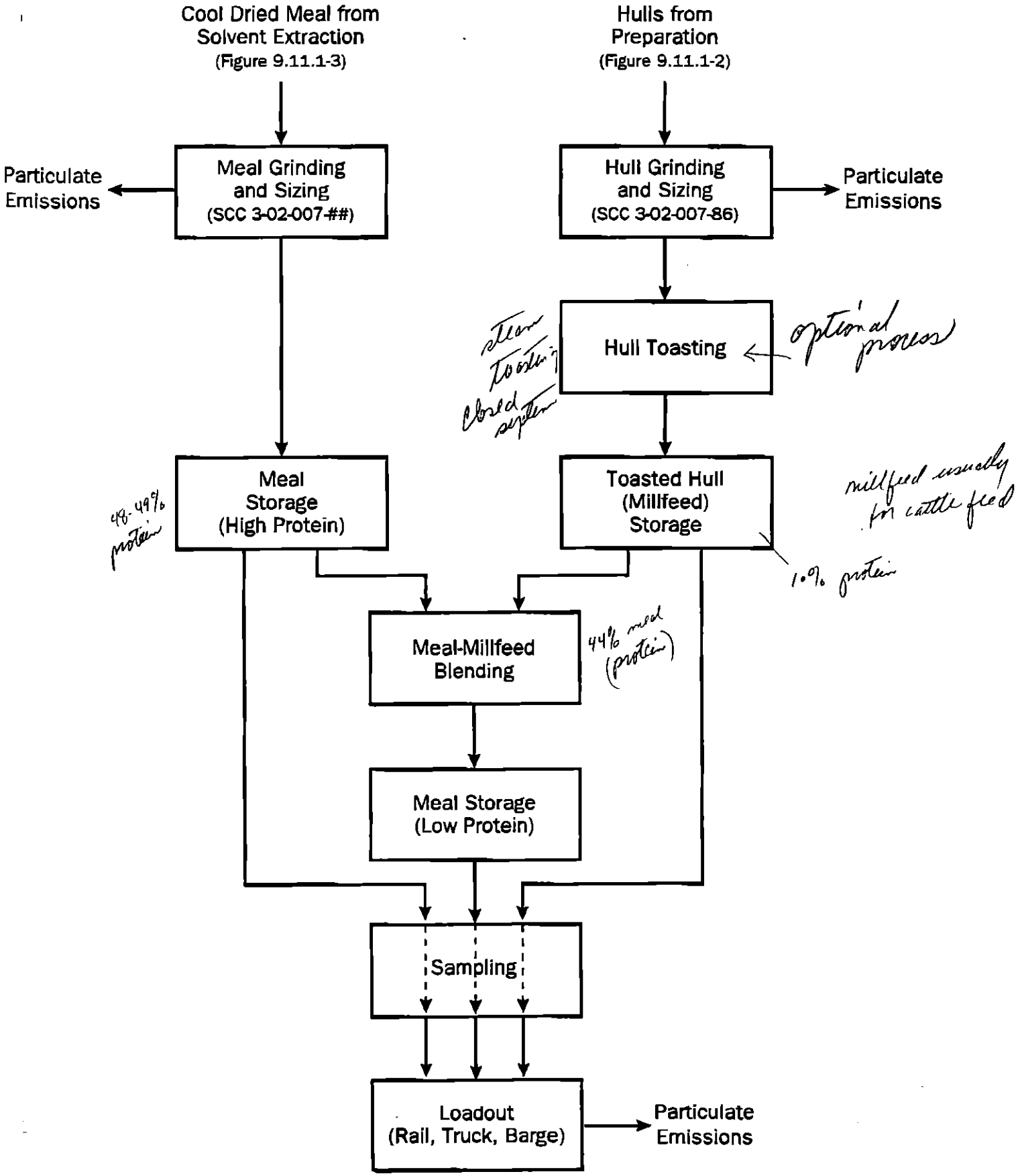


Figure 9.11.1-4. Flow diagram of the "conventional" process for dry material sizing, grinding, and loadout. (Source Classification Codes in parentheses.)

Soybean Meal

Average Hexane Emissions Gallons / Ton Processed Soybeans

Ref.	Plant	DT	DRYER	Cooler	Milling	FD	Cooling	Final Edible
7	A	0.066		0.033	0.0285			
9	B	0.117	0.108	0.1035	0.0165	0.528	0.4395	
10	C	0.0795		0.033	0.024			
9	E	0.1245	0.072		0.0495	0.1485		0.0675
11	F	0.0285			0.0315	0.1725	0.1485	0.0165
6	G	0.0795		0.0705	0.0465			
13	H	0.051	0.0315	0.0315	0.0285			0.02907
12	I	0.264	0.18	0.2085	0.1335			
3	J	0.267	0.1995	0.1755				
	$\bar{X}$	0.1197	0.1182	0.0936	0.0448	0.2833	0.2940	0.0420
	SD	0.0828	0.0635	0.0673	0.0351	0.1735	0.1455	0.0255

Average Hexane Concentration Exiting DT — Average Hexane Amount Exiting Dryer Vent — Average Hexane Amount Exiting Cooler Vent

0.1197 − 0.005 − 0.013 = 0.1017

1 ppm = 0.0003 gallons

1 ppm = 0.00113559 liters

gal/ton to liters/metric ton = 0.3726

1 bushel soybeans = 60 lbs approx

1 bushel yields 48 lbs (80%) meal

1 ton soybeans yields 1600 lbs meal

1600 lbs = 725.76 Kg = 725760 grams

.00022 grams/gram

220 gms/Mt

Conversion Factor

grams of hexane in 1 gallon ~~2200~~ 2422 / 725,760 grams in 1 ton of soybeans = 0.003333

2.7 lb/hour = 1.629 gal/hour

Corn Soybeans

197.5 tons/hour

83.3 tons/hour

$\frac{2 \cdot 1.8}{197.5}$ $\frac{3276 \cdot 8.7}{250}$

MRI-18

MIDWEST RESEARCH INSTITUTE

PROJECT DEVELOPMENT SKETCH

TITLE 6500-35 Food & Ag AP-42 - David H. Reisdorph

PROJECT NO. _____ DRAWN _____ APPR. _____ DATE Sept 1992

RTIs hexane ppm in soybean meal to gallons of hexane residue per ton of soybean meal

Conversion factor = 0.03 gallons of hexane/ton soybean = 100ppm hexane

0.0003 gallons/ton = 1ppm hexane

approx. 1600 lbs of processed soybean is produced from 1 ton raw soybean

one millionth of 1600 lbs is 0.0016 lbs

one gallon of hexane weighs approximately 5.5 lbs

0.0016 lbs / 5.5 lbs = 0.000291

$H = HC \cdot R$

H = gal of hexane/ton raw soybeans

HC = hexane concentrations, ppm

R = ratio

NOPA
NATIONAL OILSEED PROCESSORS ASSOCIATION

1255
TWENTY-THIRD
STREET,
N.W.
WASHINGTON,
DC
20037-1174

PHONE:
(202) 452-8040

FAX:
(202) 835-0400

June 1, 1994

U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards (MD-15)
Research Triangle Park, NC 27711

Attn.: Mr. Dallas W. Safriet, Emission Inventory Branch
Emission Standards Division

Re.: Comments on EPA's May 12 Draft AP-42 Introduction

Dear Dallas:

As you will recall, on Monday, March 21, I and several other representatives of the oilseed crushing industry met with OAQPS Director John Seitz and other OAQPS representatives, including yourself, to discuss possible solutions to issues surrounding the development and use of AP-42 emission factors. Since then we have exchanged thoughts on using the AP-42 Introduction to address these issues, with the most recent communication coming from you on May 17, when you faxed me the Agency's May 12 draft version of the Introduction *for our review/comment. This memorandum is to provide you* with our comments on the May 12 draft Introduction.

In general, we think that this version of the draft Introduction resolves our major concerns about the potential misuse of AP-42 emission factors. Our only comments, which are of a relatively minor nature, are discussed in the Attachment to this memorandum. We compliment the Agency on its responsiveness to our concerns, and look forward to seeing the final version of the Introduction in print. As stated in previous correspondence and at the meeting, we urge you to print the Introduction at the beginning of each chapter to minimize the likelihood that an AP-42 user will overlook the pertinent information.

On behalf of the Corn Refiners Association, the National Cotton Council, and NOPA, I want to thank you once again for working with us to resolve our concerns on the development and use of AP-42 emission factors. We have found our meetings and discussions most productive, and look forward to our continued dealings.

Thank you for your consideration of our concerns and your cooperation in addressing them. Please call me if you have any questions or wish to discuss our comments further.

Sincerely,

David C. Ailor

David C. Ailor, P.E.
Director of Regulatory Affairs
Attachment

cc: Dallas Safriet (via facsimile)
John Seitz (via Regular Mail)

T002

NOPA
NATIONAL OILSEED PROCESSORS ASSOCIATION

1255
TWENTY-THIRD
STREET,
N.W.
WASHINGTON,
DC
20037-1174

PHONE:
(202) 452-8040

FAX:
(202) 835-0400

January 10, 1994

U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards (MD-15)
Research Triangle Park, NC 27711

Attn.: Mr. Dallas W. Safriet, Emission Inventory Branch
Emission Standards Division

Re.: Draft Emission Factor Documentation for AP-42 Section 6.11.1, Vegetable Oil Processing (August 10, 1993)

Dear Mr. Safriet:

In August 1993 you sent our organization, the National Oilseed Processors Association (NOPA), a new draft Section 6.11.1, Vegetable Oil Processing, that the EPA intends to publish in a supplement to AP-42, Compilation of Air Pollutant Emission Factors. You asked that we provide you with our comments on the new draft document towards the Agency publishing this new section.

NOPA is a national trade association comprised of 14 regular member companies and 25 associate member companies with plants engaged in the production and processing of vegetable meals and vegetable oils from oilseeds. NOPA's 14 regular member firms process an estimated 1.1 billion bushels of oilseeds annually at 64 plants in 22 states and employ an estimated 1,900 workers. We very much appreciate the invitation to share our views with you on a topic of such relevance to our industry.

Generally speaking, the document provides a complete summary and analysis of the available information and data relative to the soybean crushing industry and the related hexane and particulate matter emissions. However, it is incorrect or lacking in several areas, and needs to be revised accordingly. Our detailed comments are presented in the enclosure to this letter.

Our principal concerns with the document are its discussion of the hexane emission data used to generate the hexane emission factors and its reliance on very limited and inaccurate particulate matter data for the particulate matter emission factors. For example, relative to hexane emissions, the document correctly notes that they are highly variable over time and may occur from a number of point and fugitive sources throughout the soybean crushing process. However, it does not emphasize two serious limitations of these data. These include:

- Emissions data are insufficient to document plant-to-plant and temporal variability from the various emission points.

- Emissions data are unavailable for several sources/events which may account for a significant portion of total hexane emissions (e.g., fugitive emissions sources; startup, shutdown, and upsets events).

Relative to particulate matter emissions, we are concerned that the particulate matter emission factors and the underlying data are uncertain and probably significantly overstate emissions for a number of the process units in soybean facilities. Several examples of our concerns with the particulate matter emission factors/data are noted below:

- It is unclear whether process weights are in terms of bean throughput for the plant, or material through a particular unit. This is an important point because the process weight through an individual unit (such as hull weight in the case of hull processing units) can be much lower than the bean process weight.
- There is some question as to how the indicated factors apply to units with differing numbers of vents.
- The grain loading data for a number of the processes appear high and inconsistent with current control levels.

As we discussed during our December 23, 1993, telephone call on the matter, NOPA would like to meet with the appropriate Agency personnel as soon as possible to discuss the deficiencies in the emission database and possible opportunities for improving it. At your suggestion, NOPA and several related trade associations with similar concerns about the database will soon be sending a letter to OAQPS Director John Seitz requesting such a meeting.

Thank you again for the opportunity to comment on the new draft AP-42 Section on vegetable oil processing. I look forward to our future dealings on the matter. Call me if you have any questions.

Sincerely,

David C. Ailor, P.E.
Director of Regulatory Affairs
Enclosure

T002

ENCLOSURE

NOPA Comments on EPA's Draft Emission Factor Documentation for AP-42 Section 6.11.1, Vegetable Oil Processing (August 10, 1993) 1

SECTION 2 - INDUSTRY DESCRIPTION

Section 2 is incorrect or lacking in several areas, and needs to be revised accordingly. Our detailed comments on the section are presented below. Attached for your use in revising this section are 1) "Vegetable Oil Manufacturing", as prepared by NOPA (see Attachment 1); and, 2) Appendix B to "NFPA 36 Standard for Solvent Extraction Plants", 1993 Edition, as prepared by the National Fire Protection Association (see Attachment 2).

- Page 2-1, Paragraph 2. The various markets listed for soy oil including fuels, paints, coatings, and inks are indeed important. The last sentence in the second paragraph on this page should be revised to read as follows:

  "These alternative uses currently do not represent a significant share of the total soybean oil market; however, they have potential ...".

- Page 2-2, Table 2-1. The number and distribution of plants in the soybean processing industry is considerably different from that shown in Table 2-1. The table should be revised as follows:

State	Soybean processing plants[1]
Alabama	1
Arkansas	4
California	2
Delaware	1
Georgia	3
Kansas	4
Hawaii	1
Illinois	12
Indiana	5
Iowa	13
Louisiana	1
Maryland	1
Michigan	2
Minnesota	6
Mississippi	4
Missouri	5
Nebraska	5
New York	1
North Carolina	3
Ohio	6
South Carolina	3
Texas	1
Virginia	1

Source: *93 Soya Bluebook - Guide to the World Soybean Industry*, Soyatech, Inc., 318 Main Street, P.O. Box 84, Bar Harbor, ME 04609 (see Attachment 3).

[1] The 85 soybean processing plants include 68 solvent extraction plants and 17 press plants.

- Page 2-4, Section 2.2.1.2. The fifth and sixth sentences in the first paragraph under this section should be revised to read as follows: 2

  "The widely-used second method is to extract the oil using a solvent, hexane, which dissolves the oil and strips it from the soybean flakes. The solvent extraction method requires stripping residual hexane from the oil and the soybean flakes."

- Page 2-5, Figure 2-2. Revise the figure as follows:

  - Insert a new block titled "Millfeed Sampling" between the two blocks titled "Millfeed Storage" and "Millfeed Loadout";

  - Revise the block titled "Blending with Other Feedstuffs" to read "Blending with Meal"; and,

  - Add two new blocks titled "Meal Sampling" and "Meal Loadout" in series below the retitled block "Blending with Meal".

- Page 2-6, Figure 2-3. Revise the figure by deleting the dashed line titled "Hexane and Steam Vapors"" and deleting the associated footnote.

- Page 2-7. The first sentence at the top of the page should be revised to read as follows:

  "Either a "deep bed" extractor or a "shallow bed" extractor is typically used in the extraction process."

- Page 2-7, Oil Refining. This section contains several inaccuracies and should be revised to read as follows:

  "Crude vegetable oils contain small amounts of naturally occurring materials including proteinaceous material, free fatty acids, and phosphatides which must be removed to produce a "finished" or "refined" oil. Phosphatides are removed for lecithin recovery or to prepare the crude oil for export by preventing the formation of precipitated gums during transit. The most common method of refining oil is by reacting it with an alkali solution which neutralizes the free fatty acids and reacts with the phosphatides. These reacted products and the proteinaceous materials are then removed by centrifuge. Following alkali refining, the oil is washed with water to remove residual soap, which is the result of saponification of small amounts of the triglycerides (oil)."

  "Color-producing substances within an oil (i.e., carotenoids, chlorophyll) are removed by a bleaching process which employs the use of adsorbents such as acid-activated clays. Volatile components which may cause undesirable odors or flavors are removed by deodorization. This process employs the use of steam injection under a high vacuum and temperature. The refined oil is then filtered and stored until used or transported. Nitrogen gas may be placed in the headspaces of tanks or transport vessels to reduce oxygen contact with the oil, thus preventing degradation of the oil by oxidation."

- Page 2-7, Section 2.2.1.5. The title of this section should be revised to read as follows:

  "Desolventizing and Processing Spent Soybean Flakes"

- Page 2-7, Section 2.2.1.5. The first paragraph in this section should be revised to read as follows:

  "The spent extractor feedcake is used in producing livestock feed and soybean flour. However, the flakes contain up to 35% to 40% solvent and must be desolventized before use. Desolventizing takes place in a desolventizer-toaster where both contact and noncontact steam are used to evaporate the hexane. In addition, the contact steam "toasts" the flakes, making them more usable for animal feeds. The desolventized and toasted flakes then pass to a dryer, where excess moisture is removed by heat, and then finally to a cooler, where ambient air is used to reduce the temperature of the dried flakes."

- Page 2-7, Last Paragraph. The first sentence of the last paragraph on this page should be revised to read as follows:

  "Flakes are desolventized either through a "conventional" desolventizing process or a specialty ("flash") desolventizing process, depending on the end use of the material."

- Page 2-8, Figure 2-4. Revise the figure as follows:

  - Revise the block titled "Blending with Feedstuffs" to read "Blending with Millfeed"; and,

  - Add a new block titled "Meal Sampling" between the blocks titled "Meal Sizing" and "Truck or Rail Loading".

- Page 2-9. Revise the last sentence in the second paragraph under the "Specialty or "flash" desolventizing" subsection to read as follows:

  "Given the above factors, solvent emission factors are considerably higher for a specialty desolventizing process than for a similar-sized conventional desolventizing process."

- Page 2-9. Insert a new section title "Dryer-coolers" immediately before the next to last paragraph on the page. The next-to-last and last paragraphs on this page pertain to dryer-coolers.

- Page 2-14, Section 2.3. The last sentence on this page which continues to the top of page 2-15 ("Gases from the meal dryer are vented through the main vent in some plants, but at least in few plants meal dryer gases are vented directly to atmosphere.") is incorrect and should be deleted. The sentence that follows on the top of page 2-15 should be revised to read as follows:

  "The meal dryer and cooler typically vents to the atmosphere."

- Page 2-15, Section 2.3.1. The last sentence in this section states that, as "... all oilseeds(soybeans, corn, cotton, peanuts, etc.) have some soil contamination from the field, there may be heavy metals present in particulate emissions from all vegetable oil mills." This statement is purely speculative, and should be deleted. 4

- Page 2-16, Reference 10. This reference has been released in final form since the draft AP-42 section was prepared. The final document should be used and referenced and the associated AP-42 text revised as appropriate to reflect any changes in the document from draft to final version.

SECTION 4 - AP-42 SECTION DEVELOPMENT

- Page 4-1. This first sentence on this page should be revised to note all trade associations that provided information used in developing the new AP-42 Section 6.11.1.

- Sections 4.1 - Review of Specific Data Sets

  Generally speaking, this section provides a complete summary and analysis of the available data relative to both hexane and particulate matter emissions from soybean crushing plants. However, relative to hexane emissions in particular, the section and others in the document correctly note that hexane emissions are highly variable over time and may occur from a number of point and fugitive sources throughout the process. Unfortunately, there are not sufficient emissions data to document plant-to-plant and temporal variability from the various emission points and, in fact, no emissions data are available for several sources which may account for a significant portion of total hexane emissions. This fact should be emphasized in the text.

- Section 4.2 - Development of Candidate Emission Factors

  While we believe that Section 4, other sections in the document, and the associated references provide adequate documentation of the data limitations, we are concerned that the proposed Section 4.2.5 and the proposed AP-42 Section fail to convey this message. We believe this can be resolved with several minor revisions. The following comments discuss the basis for our concerns and provide recommended revisions.

  1. Hexane

     a. Emissions Variability

        Total hexane emissions are variable both over time from individual plants and from plant to plant. In addition, individual source emissions are variable over time and from source to source within a process. Plant wide emission variability, which is in part a result of raw material composition and variations in throughput, is clearly illustrated by the data reported in Table 4-3 and in the discussion in Reference 16.

For example, annual hexane loss is reported in Table 4-3 to range from 0.3 to 2.2 gallons/ton of raw soybeans. The variability in emissions from individual vents is illustrated by the run to run variability shown in References 8 and 12 (e.g., individual test runs reported in Reference 12 for the main vent show a range of 0.001 to 0.22 gallons hexane per ton of crush). These appear to be valid samples, and it is noted in the discussion of meal sampling and analysis in Reference 16 that "we are fairly confident that the results reflect the actual levels found at the time of testing." 5

b. Data Limitations

Due to the significant variability in emissions over time and the number of total plants in the industry (85 soybean processing plants in 1993), the number of vents tests (i.e., two main vent tests; one dryer vent test; and, two cooler tests) is very small. The number of plants tested and the small number of tests is neither a random nor representative sampling of the industry.

Furthermore, data are unavailable on emissions from fugitive leaks, solvent storage, wastewater processing, and oil refining. The total emissions from these may account for a significant portion of total hexane emissions.

Finally, although data from nine plants were used to calculate an emission factor for fugitive emissions from meal, there was wide variability from plant to plant (0.195 to 0.829 gallons/ton reported in Table 4-4). Also, as noted in Reference 16, there appears to be a relationship between vent emissions and fugitive emissions from meal. Thus, the wide variability in meal samples, the fact that only one or two of these plants were sampled for vent emissions, and the interrelationship between meal and vent hexane concentrations, result in emission factors for these sources which are not necessarily comparable or additive. Note that only Reference 8 (Plant J) reports results both for the three vents and for meal concentrations, and the meal concentration for this plant is 50 percent higher than the average reported.

c. Recommended Revisions

Based on the above illustrations of emission variability and data limitations, the emissions factor ratings, associated narrative, and footnotes should be revised as follows:

- Section 4.2.5, Paragraph 1, and Tables 4-6, 6.11.1-1 and 2. Revise the emission factor ratings for the main vent, the meal dryer, and the meal cooler to "D", and revise the emission factor for fugitive emissions from meal to "C". (A "D" rating for the vent sources is consistent with the guidelines on page 3-3. These guidelines would assign a "D" rating when the test data are from a small number of facilities, when the representativeness is questionable, and where there is evidence of variability within the population. A rating higher than "D" would be incorrect due to the small number of facilities).

- Section 4.2.5, Paragraph 1. Revise this paragraph to state that there were a relatively small number of source tests, and that the sample was too small to determine that it is representative. Delete the current sentences which state that the number of source tests is large. (As noted above, one or two tests is a very small sample for a source category with this many facilities). 6

- Section 4.2.5, Paragraph 1. Revise this paragraph to state that the variability in the vent emissions over short time periods may be large, and that there may be a relationship between vent emissions and the fugitive emissions from meal which raises the question as to whether the individual point source factors are additive. Delete the current statement that the variability is believed to be small.

- Tables 6.11.1-1 and 6.11.1-2. Add the following footnotes to these tables:

  - A footnote to the title line as follows.

    "Available data indicate that hexane emissions are variable over time. The emission factors reported here are averages that would be expected to reflect typical emission rate or rates that would be associated with longer term averaging times (e.g., annual) for individual plants. Individual vent or meal samples may vary widely from these values."

  - A footnote to the three "NA"'s associated with fugitive leaks, solvent storage, and wastewater processing, respectively, as follows:

    "Limited data on total plant emissions indicate that fugitive emissions and emissions during startups, shutdowns, and upsets may constitute a significant portion of total plant emissions."

- Standard Deviation. The standard deviation presented in the document appear to have been calculated using the formula for the population standard deviation. We believe the correct calculation would be the n-1 method which computes the sample standard deviation.

2. Particulate Matter

The emission factors proposed for total particulate matter emissions from soybean milling are based on very limited data reported in 1973. These data, and the associated outlet grain loading reported in Appendix A, do not reflect the high efficiency of control devices that are currently used in the soybean milling industry. In addition, it appears that the emission factors may not be calculated on a consistent process weight basis.

For example, the emission factors calculated for the truck dump, the Forsberg screen system, and the white flake cooling system are based on "pounds/ton" (Appendix A, page A-64). However, the report does not indicate whether the process weight is in terms of beans processed by the plant, or process weight of material through the respective process units. From the variability in reported rates, it appears that the process weight rates reported are for the unit in at least some cases. For example, the process weight for white flake cooling is reported as 12,000 pounds per hour. This is almost certainly the weight of material processed by the cooling unit. As such, the calculated emission factor would be based on weight processed by the unit, not on the weight of beans processed. However, this is unclear in the emission factor table, and raises considerable uncertainty as to the appropriate basis for other factors. 7

In addition, it is unclear whether reported emission factors apply to units, or to individual vents at units which have multiple vents. This ambiguity makes emission estimates very uncertain, and is a particular problem relative to soybean facilities because designs differ significantly from plant to plant. For example, a rotary dryer typically would have one vent, whereas a dryer/cooler could have one, two, or three separate dryer vents. Although this problem is aggravated in this case by the dated and uncertain emission test data, it is unclear how to solve this problem. However, in any case, the bases for the emission factors should be described as clearly as possible.

Finally, we believe that current cyclones and, especially, fabric filters on soybean process vents tend to operate at or below about 0.1 grain/scf. As such, the emission factors reported for several of the soybean processing units appear to be unusually high, even for cyclone control. For example, the data for cracking rolls, hull grinding, and meal grinding are in the range of 0.2 to 0.4 grain/scf. These grain loadings are inconsistent with the "clear stack" performance levels typical of current operation at most plants.

ATTACHMENT 1

Vegetable Oil Manufacturing

INTRODUCTION

Vegetable oil manufacturing generally involves removal of oil from oilseeds (solvent extraction), followed by processing of the "crude" oil recovered from them (oil processing). The Process Description which follows describes specific operations related to soybeans.

PROCESS DESCRIPTION

OILSEED HANDLING/ELEVATOR OPERATIONS

Figure 1 is a schematic diagram of the typical soybean handling/elevator operations that precede preparing of soybeans for the solvent extraction process. Oilseed handling/elevator operations are typically comprised of the following:

- Receiving/storage; and,
- Cleaning/drying.

Each of these is discussed below.

Receiving/Storage

Soybeans that have been received at a facility by truck or rail are first sampled and analyzed for moisture content, foreign matter, and damaged seeds. After sampling/analysis is completed, the beans are weighed and conveyed to large concrete silos or metal tanks for storage to await processing.

Cleaning/Drying

When the facility is ready to process soybeans, the beans are removed from the silo or tank and cleaned of trash, other foreign materials, and loose hulls. Screens are typically used to remove foreign materials such as sticks, stems, pods, tramp metal, sand, and dirt. An aspiration system is used to remove loose hulls from the soybeans. The beans are then passed through dryers to reduce their moisture content to approximately 10 to 11 percent moisture by weight, and conveyed to Process Bins for temporary storage and tempering to facilitate dehulling.

PREPARATION OF SOYBEANS FOR SOLVENT EXTRACTION

Figure 2 is a schematic diagram of the process for preparing soybeans for the solvent extraction process. The process tends to be fairly well standardized, with the four principal operations being:

- Cracking;
- Dehulling/hull removal;
- Conditioning; and,
- Flaking.

Each of these is discussed below.

Cracking

Soybeans are conveyed from the Process Bins to the mill by means of belt or mass flow conveyors and bucket elevators. In the mill the beans are again aspirated, weighed, cleaned of tramp metal by magnets, and fed into corrugated cracking rolls. The cracking rolls serve to "crack" each bean into 4 to 6 particles to facilitate separation of the hulls from the oil-rich bean.

Dehulling/Hull Removal

The cracked beans are then passed through an aspirator to remove the hulls from the cracked beans. The hulls are processed separately after removal of residual bean chips. The cracked beans and bean chips are conveyed to conditioning.

Conditioning

The cracked beans and bean chips are put into a rotary steam tubed device or in a stacked cooker and heated to "condition" them (i.e., make them pliable and keep them hydrated). Conditioning is necessary to permit the flaking of the chips without their being broken into smaller particles.

Flaking

The heated, cracked beans are conveyed and fed to smooth, cylindrical rolls which press the particles into smooth "flakes" varying in thickness from approximately 0.010 to 0.020 inches thickness. Doing so exposes the soybean flakes' oil cells for easier extraction of the oil.

SOLVENT EXTRACTION

The extraction process consists of "washing" oil from the soybean flakes with a hexal solvent in a countercurrent extractor, and then evaporating solvent from (i.e., desolventizing) both the solvent/oil mixture (miscella) and the solvent-laden, defatted flakes separately (see Figure 3). The oil is desolventized by exposing the solvent/oil mixture to steam (contact and non-contact), after which the solvent is condensed, separated from the steam condensate, and reused. The desolventized oil, called "crude" soybean oil, is stored for further processing.

Flakes, on the other hand, are desolventized in either of two ways, depending on the end use of the flakes - "conventional" desolventizing, and specialty or "flash" desolventizing. In the conventional desolventizing process, the flakes are desolventized by steam (contact and non-contact), and the solvent is condensed, separated from the steam condensate, and reused. The desolventized, defatted flakes are dried, cooled, and ground for use as soybean meal - a protein source in animal feeds (see Figure 4).

In the specialty or "flash" desolventizing process, solvent is removed from the defatted flakes with superheated solvent or in a vacuum with a small quantity of non-contact steam. The defatted flakes, which have a much higher protein solubility than those from the conventional desolventizing process, are then cooled. Flakes desolventized in this manner are typically used for human foods.

The specific steps in the extraction and desolventizing processes are described below.

Extraction

Soybean flakes are conveyed into the extractor, where they are washed countercurrently with various hexal/oil mixtures and, finally, with pure hexane. The initial oil content of the soybeans is approximately 18 to 20 percent by weight, while the defatted flakes, after extraction, contain approximately 0.5 to 2.0 percent oil by weight.

There are two types of extractors that use the percolation process described above - a "deep bed" extractor and a "shallow bed" extractor. The deep bed extractor is a horizontal unit with pie-shaped mesh baskets that rotate around a vertical shaft. Bed depth in this extractor varies from approximately 6 to 10 feet. The shallow bed extractor, a more recent design than the deep bed extractor, conveys soybean flakes horizontally over closely spaced "vee-bars" while washing them with oil and hexane and, finally, pure hexane. Bed depth in the shallow bed extractor normally varies from approximately 2 to 3 feet.

Desolventizing (Oil)

An oil/hexane mixture is removed from the extractor separate from the defatted flakes. The mixture is first pumped through heaters, then evaporators under vacuum, and finally through a packed stripping column to remove the hexane.

A hexane/water vapor mixture is removed from each oil desolventizing unit and condensed in a "separation" tank to separate the hexane from the water. Once separated from the water, the hexane is reused in the extraction process. Crude oil is cooled and stored in tanks for further processing.

Conventional Desolventizing (Flakes)

The solvent-laden, defatted soybean flakes are conveyed from the extractor to a desolventizer-toaster (DT) where they are desolventized. The DT contains stacked pans with a vertical center shaft equipped with "sweeps" which mix and stir the flakes while they are being heated with both contact and non-contact steam to evaporate the solvent. The resulting steam/solvent vapor mixture is exhausted from the top of the DT, and both are subsequently condensed and put into the same separation tank as that used in the oil desolventizing process. The desolventized flakes, whose moisture content has increased from approximately 10 to 11 percent by weight to approximately 18 to 22 percent by weight, are conveyed to a "dryer-cooler" in sequence to reduce their moisture back to approximately 12 percent.

There are two types of dryer-coolers used by the industry. One type is a horizontal, cylindrical dryer paired with a horizontal cylindrical cooler. The dryer is approximately 6 to 10 feet in diameter, approximately 30 to 50 feet long, contains longitudinal steam tubes, and rotates on a horizontal axis. The cooler is a horizontal cylinder of approximately the same dimensions through which ambient air is circulated to cool the dried flakes.

The second type of dryer-cooler is a stacked pan unit similar in design to the DT discussed above. Each pan in the unit is perforated, and drying/cooling of the flakes is achieved by passing high volumes of air through the perforations and the defatted flakes. Heated air is circulated through the first couple of pans, while ambient air is circulated through the last couple of pans.

Specialty or "Flash" Desolventizing (Flakes)

Flash or specialty desolventizing is used when the objective is to minimize denaturation of the protein in the flakes which occurs with toasting. In this process, flakes are desolventized in a vacuum with a small quantity of non-contact steam or in a pneumatic loop using superheated solvent. This is followed by a final solvent stripping step using very small quantities of steam in a rotary or agitated vessel.

This type of desolventizing is far less efficient than conventional desolventizing in terms of both energy consumption and solvent removal. In addition, equipment used in the specialty desolventizing process is appreciably larger in volume than that for a similarly sized conventional process. Given the above factors, plant solvent emission factors are considerably higher for a specialty desolventizing plant than for a similarly sized conventional desolventizing plant.

FIGURE 1. GRAIN RECEIVING, DRYING, STORAGE

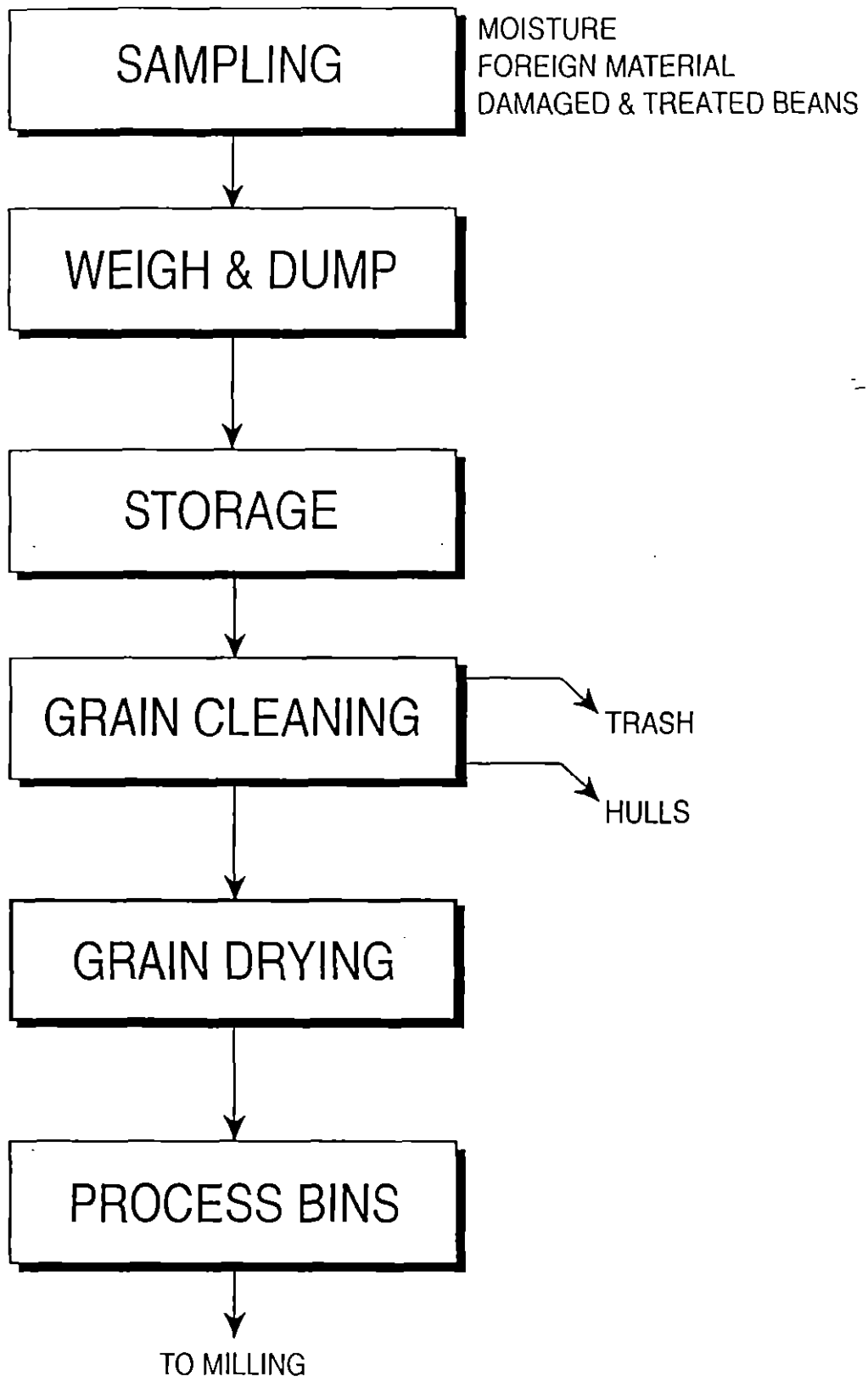


FIGURE 2. MILLING OR PREPARATION OPERATIONS

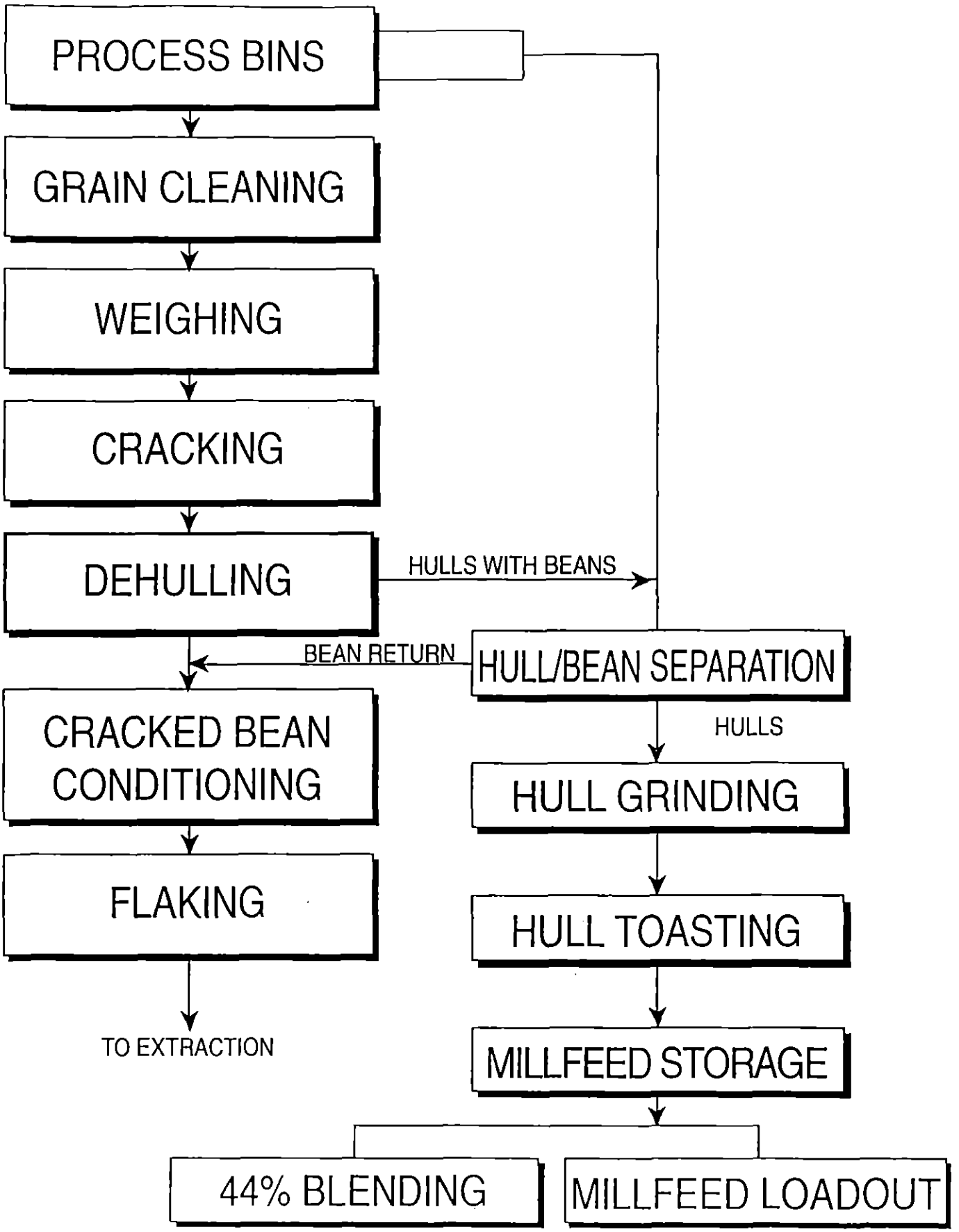


FIGURE 3. EXTRACTION, DISTILLATION, DRYING, COOLING

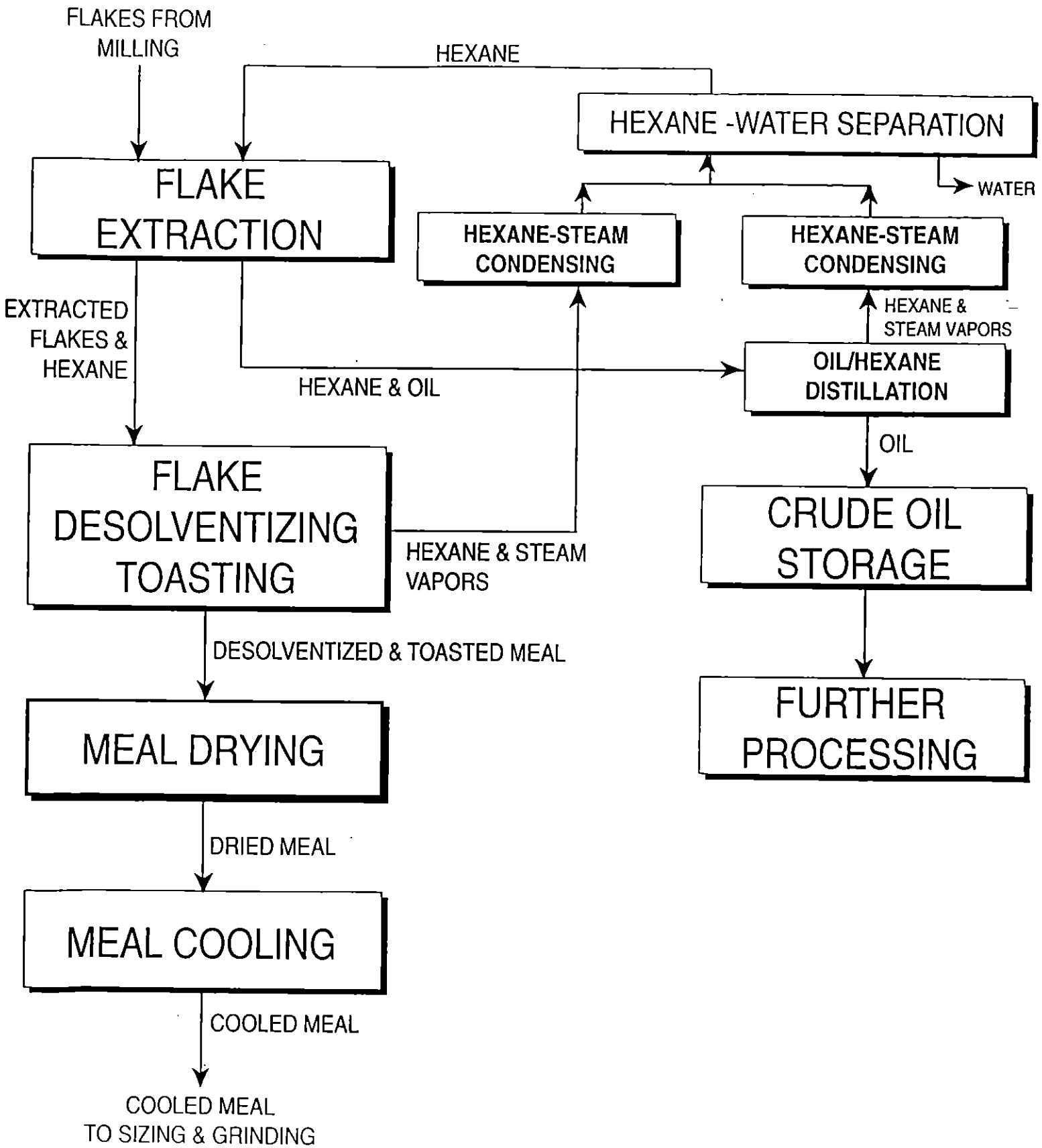
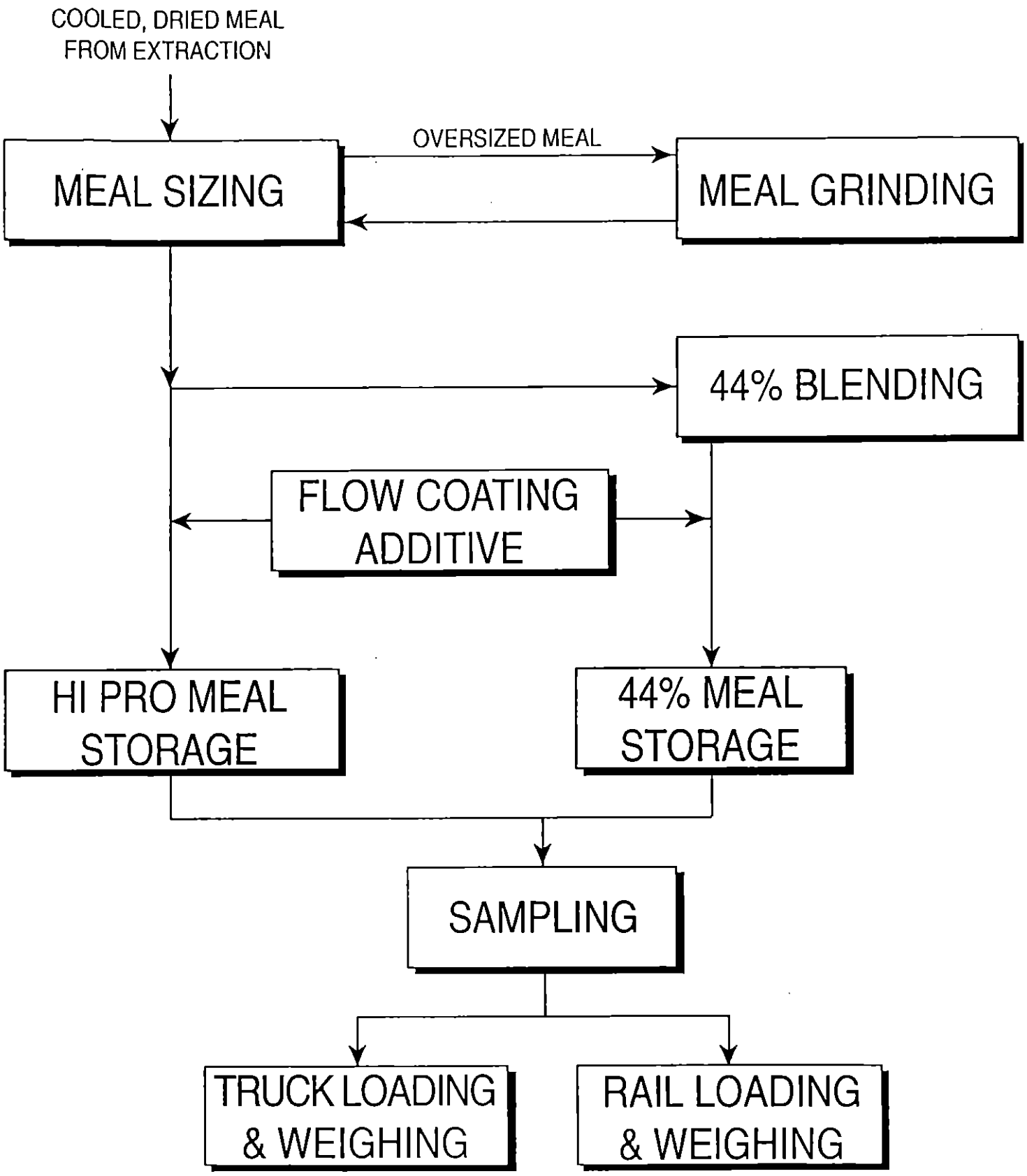


FIGURE 4. MEAL GRINDING, SIZING, BLENDING



PM02P024.B—08.06.93

ATTACHMENT 2

NFPA 36
Solvent Extraction Plants
1993 Edition

National Fire Protection Association 1 Batterymarch Park, PO Box 9101, Quincy, MA 02269-9101

NFPA 36

Standard for

Solvent Extraction Plants

1993 Edition

This edition of NFPA 36, *Standard for Solvent Extraction Plants*, was prepared by the Technical Committee on Solvent Extraction Plants, released by the Correlating Committee on Flammable Liquids, and acted on by the National Fire Protection Association, Inc. at its Fall Meeting held November 16-18, 1992, in Dallas, Texas. It was issued by the Standards Council on January 15, 1993, with an effective date of February 12, 1993, and supersedes all previous editions.

The 1993 edition of this document has been approved by the American National Standards Institute.

Changes other than editorial are indicated by a vertical rule in the margin of the pages on which they appear. These lines are included as an aid to the user in identifying changes from the previous edition.

Origin and Development of NFPA 36

This standard was developed at the request of the solvent extraction industry in an effort to achieve greater uniformity in fire protection practices for extraction plants. The purpose of this standard is to provide reasonable standards for the design and operation of solvent extraction processes and extraction plants.

NFPA 36 was tentatively adopted at the 1957 Annual Meeting of the Association. A revision of this tentative edition was adopted at the 1958 Annual Meeting. NFPA 36 was officially adopted by the Association at its 1959 Annual Meeting. Amendments were adopted in 1962, 1964, 1967, 1972, 1973, 1974, 1978, 1983, 1985, and 1988.

This 1993 edition of NFPA 36 incorporates the following amendments to the previous edition:

- A complete rewrite of the Scope of the document to eliminate inconsistencies and potential misapplication of the document to alcohol-based extraction processes.
- Addition of appropriate statements to Chapter 1, General, to address equivalency and retroactivity.
- A complete editorial rewrite of Chapter 1 to comply with NFPA's Manual of Style.
- A complete revision of Subsection 3-1.2, Bulk Solvent Storage Tanks, to address the need for more explicit requirements for aboveground storage tanks.
- An amendment to Paragraph 5-2.7.1 to achieve greater flexibility in siting of cooling towers having fill of limited-combustible materials.
- Amendments to Paragraphs 5-8.2.3 and 5-8.2.4 to clarify the purpose of the vapor seal on the extractor and to recognize that a single seal is adequate in most cases.
- A complete rewrite of Appendix B, General Description of Solvent Extraction Process, to reflect current practices and technology in the industry.
- A complete rewrite of Appendix C, Operational Practices, to reflect current industry practices and certain rules of the U.S. Occupational Safety and Health Administration.

Appendix B General Description of Solvent Extraction Process

This Appendix is not a part of the requirements of this NFPA document, but is included for information purposes only.

General. The removal of vegetable oils from oil-bearing materials by solvent extraction involves almost exclusively the use of solvents. The preparation processes that are employed depend on the oil content of the seed, the physical characteristics of the seed, the type of extraction system used, and the desired end products.

Extraction Solvents and Their Properties. The primary solvent used for the extraction of vegetable oils is the petroleum hydrocarbon fraction sold commercially as "hexane." This is because of hexane's low cost, stability, excellent thermal characteristics, and selectivity for oils and fats. Other solvents, such as pentane, heptane, and trichloroethylene, have been tried, but have not been widely used. Table B-1 shows hexane's physical properties. Table B-2 shows a typical distillation analysis for hexane.

Table B-1 Physical Properties of Hexane

Flammable limits (percent by vol.)	1.2–6.9
Ignition temperature °F	437
Flash point °F closed cup	- 15
Molecular weight	86.2
Melting point	-137°F
Coefficient of expansion	0.00135
Boiling point at 14.7 psia	156.1°F
Specific gravity at 60°F	0.664
A.P.I. gravity at 60°F	81.6
Pounds per gallon at 60°F	5.536
Vapor density (air equals 1)	2.975
Cubic feet vapor per gallon liquid, 60°F, 14.7 psia	25.5
Vapor weight per cu ft (lb at 60°F)	0.217
Vapor weight, cu ft per lb at 60°F	4.61
Latent heat of vaporization at 760 mm Btu/lb	143.3
Heat of combustion, Btu/lb (gross)	20,970
Btu per cu ft vapor (gross)	4,762
Btu per pound (net)	19,420
Vapor pressure at 100°F, psia	5.0
Specific heat liquid at 60°F	0.531
Specific heat vapor at 60°F	0.339
Solubility in water, moles per liter at 60°F	0.0016

Table B-2 Distillation Analysis of Hexane (°F)

Percent Distilled	
Initial Boiling Point	146
5	148
10	148
20	149
30	149
40	149
50	149
60	150
70	150
80	151
90	152
95	153
Dry end point	156

Two of hexane's more important properties are also safety concerns: its flash point and its vapor density. As shown in Table B-1, the flash point is -15°F (-26°C) and the boiling point is 156°F (69°C), making hexane a Class IB Flammable Liquid. The vapors of hexane are about three times more dense than air, which accounts for their tendency to flow across a surface and to collect in low spots and confined areas.

Preparation and Pre-Treatment. Oilseeds that have a high oil content, such as sunflower seed, rapeseed (canola), peanut, and corngerm, are difficult to prepare and do not allow economical direct extraction. Experience has shown that it is less costly to remove some of the oil by first pressing the seeds prior to solvent extraction. This is called "prepressing" and is done in screw presses. The oil from this prepressing is screened to remove fine material called "foots" and is then filtered or centrifuged to produce a clear oil. The foots are returned to the inlet of the screw press. Before pressing, the oilseeds are sometimes cracked, then flaked. Generally, the seeds must be cooked before pressing. This cooking step varies widely, depending on the variety of seed and the type of press. Some screw presses are able to handle whole, uncooked seeds. In any case, the cake produced by the prepressing is the raw material for the solvent extraction process. This cake may be granulated prior to the extraction step.

There are many ways to prepare soybeans for solvent extraction, although certain operations are common to all preparation processes. Soybeans generally bypass the prepressing step. The four major steps in preparing soybeans for solvent extraction invariably follow a sequence of cleaning, cracking, heating, and flaking. The demand for high protein soybean meal for poultry feed has led some extraction plants to add a process to remove the hulls from the cracked beans, using air separation. Sometimes the soybeans are dried to a relatively low moisture level and then dehulled before any heating takes place. Another method processes the beans at their normal moisture content, preheats them quickly in a fluidized bed drier, then cracks and dehulls the beans while they are still hot. The resulting meats are then conditioned in a second fluidized bed drier, prior to flaking.

Some processors, whether they dehull the beans or not, add an additional step that uses an extrusion device called an expander to produce pellets from the flakes. This process is said to improve the extractability of the flakes and to reduce the amount of hexane holdup in the flakes that leave the extractor.

Cottonseed and other soft seeds are prepared both with and without prepressing. Some processors consider the prepressing step to be essential, while others consider it costly and unnecessary. The preparation of cottonseed by the direct extraction method, i.e., without prepressing, consists of cleaning, delinting, cooking, and flaking. The last two steps may be adjusted to optimize the efficiency of the extraction step and to overcome the toxic effects of a pigment gland, called gossypol, that is usually present in the seed. Prepressing of cottonseed produces higher-than-normal temperatures because of the cooking step prior to the prepressing and the frictional heat developed in the press. As with other soft seeds, moisture adjustment and granulation, flaking, or both, of the press cake usually follows.

Extraction. Modern systems for the extraction of vegetable oils and fats by solvents appear rather complex. This complexity, however, is largely due to the systems for control, safety, automation, and energy recovery. The basic extraction process is rather simple, as shown in Figure B-1.

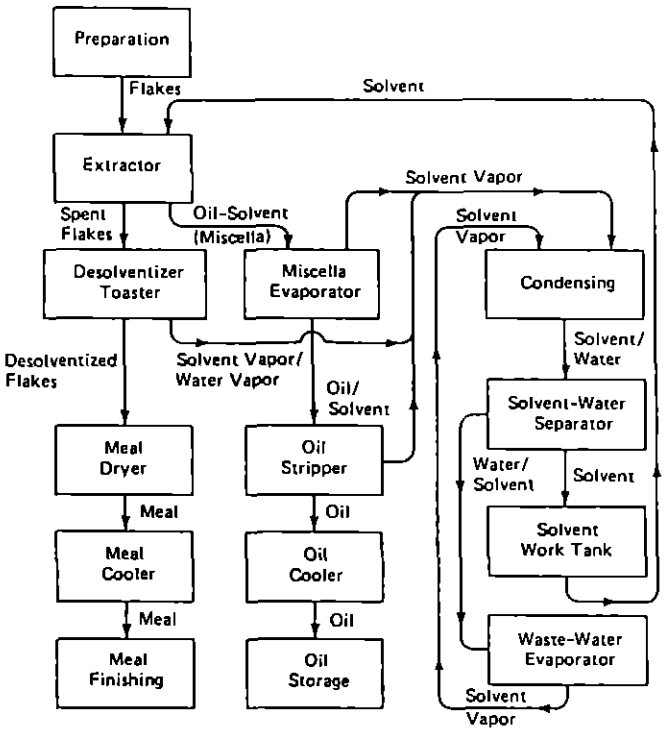


Figure B-1 Flow Diagram of Extraction Process.

Despite the seemingly complicated array of equipment, the process consists of just four major functions: extraction, desolventizing, distillation, and solvent recovery.

In the extraction step, the oil is removed from the oil-bearing material. The extraction of the oil or fat leaves the oil-bearing material saturated with solvent. This solvent is removed in the desolventizer, which drives off the solvent by direct and indirect steam heating. The miscella, or oil-bearing solvent, goes to the evaporation or distillation system, where the solvent is removed from the oil by means of heat, direct steam, and vacuum. The evaporation of the solvent from the miscella is not difficult because the solvent has the relatively low boiling point of about 156°F (69°C), compared to the boiling point of the oils, which can usually withstand temperatures as high as 250°F (121°C) without discoloration or polymerization. Thus, a wide temperature differential between the solvent and the oil, plus the use of stripping steam and vacuum in the final stage, facilitates desolventizing of the oil. The solvent recovered in this process is reused.

The functions of various components of the extraction process are described in the sections that follow.

Basket-Type Extractors. Basket extractors come in three varieties: vertical, rectangular, and horizontal. The material to be extracted is carried through the extractor in individually-suspended, perforated or screen-bottomed baskets. The baskets are hung on longitudinal shafts located just above the center of gravity of the basket. The shaft ends are affixed to bearing brackets that are part of endless chains. The chains are supported and guided by large sprockets at the top and bottom of vertical extractors and at each end of horizontal extractors. This configuration is shown for a vertical extractor in Figure B-2.

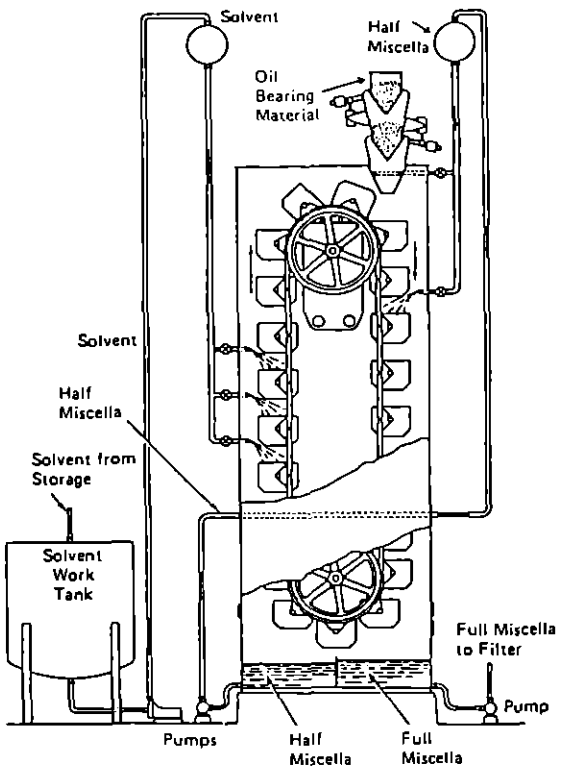


Figure B-2 Vertical Basket Extractor.

The baskets are guided by pins at the end of each basket that slide in a track fastened to the inside of the extractor. The track and pin arrangement prevents the basket from tipping until it reaches a point over a discharge hopper, where a mechanism inverts the basket and discharges the extracted material. As the basket passes the discharge position, it is righted and immediately recharged with oil-bearing material.

The number of baskets in the extractor depends on the through-put, the extraction time, and the design balance: 24 to 36 baskets would be normal. The most common type of charging system is a continuous screw conveyor that feeds a mixture of oil-bearing material and half-miscella to the baskets. The extracted material is removed from the discharge hopper by a paddle conveyor or a mass-flow type of conveyor that is set in the bottom of the hopper.

Vertical and rectangular basket extractors have both ascending and descending baskets traveling through a shower of solvent and miscella. A concurrent phase takes place from the time the baskets are filled until they reach the bottom of the extractor on the downward leg. Half-miscella from the bottom of the ascending side of the extractor is pumped to a basket near the top of the descending side and percolates down through the baskets

to the full-miscella chamber at the bottom. Raw solvent is sprayed onto one or more of the baskets near the top of the ascending side and flows concurrently through the baskets to the half-miscella chamber at the bottom of the ascending side.

Rectangular and horizontal basket-type extractors are quite similar to the vertical type, with the exception that a series of pumps continuously pump miscella to spray pipes above the baskets.

Rotary Extractors. (*See Figure B-3.*) A rotary extractor consists of a series of concentrically arranged cells supported from a vertical shaft. Extraction is effected in a manner similar to horizontal basket extractors, where the baskets pass beneath fixed nozzles fed from stage pumps recirculating various concentrations of miscella, as shown in Figure B-4. A primary difference is that the bed of material is much deeper in the rotary extractor; hence, the term "deep bed extractor" is sometimes applied to this type. Each cell has an open top and a hinged, perforated bottom door. As the cells travel around the track and pass beneath the feeding device, a slurry of oil-bearing material and half-miscella fills each cell. The rotation speed of the cells is variable to ensure that a continuous flow of slurry fills each cell to the desired level. While the cells are completing a revolution of the extractor, increasingly stronger concentrations of miscella, which is collected from the drain compartments that form the bottom of the extractor, are sprayed back onto the top of the cells. At approximately two-thirds of the distance around from the slurry inlet, raw solvent is sprayed onto the top of the cells, and the cells are allowed to drain free of excess solvent. After the drainage section, the cells pass over a discharge hopper. When each cell is directly over the hopper, a cut-out section of the track permits the cell bottom to be released, and the spent material drops into the hopper. Immediately after passing this position, the cell bottom is mechanically raised back to the closed position and is ready to be recharged. The spent material is continuously conveyed from the discharge hopper to the desolventizer at a uniform rate. This rate is regulated so that the discharge hopper is nearly empty when the next cell discharges.

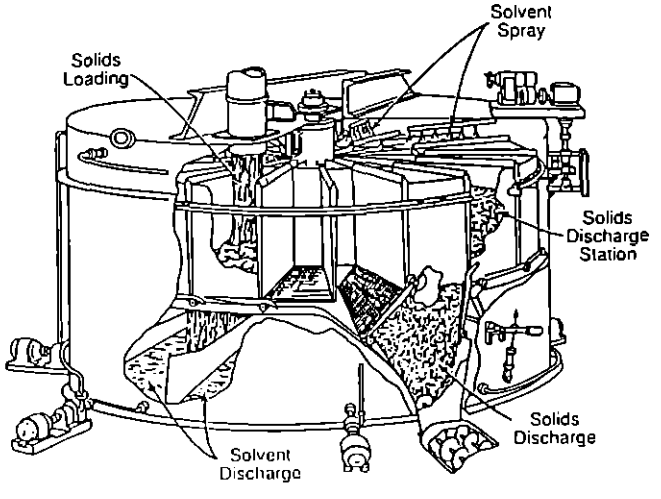


Figure B-3 Rotary or Deep Bed Extractor. (Courtesy *Chemical Engineering*, Vol. 57, No. 8, August, 1950, p. 109.)

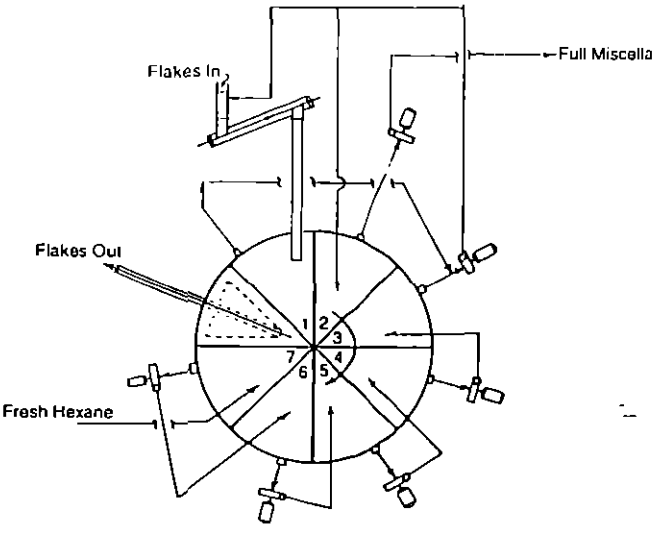


Figure B-4 Schematic of Operation of Rotary Extractor.

Stationary-bottom and sliding-plate extractors (Figure B-5) are variations of the deep bed rotary extractor. These extractors have concentric cells affixed to a central axis that is powered by a variable speed drive. The cells slide over a self-cleaning slotted bottom plate. Because of this feature, no doors are required to support the flakes. The cells are uniformly filled to a desired level. Several stage pumps are provided to recycle the solvent and gradient miscellas countercurrent to the mass as it is extracted. A drainage section is provided after the fresh solvent is added, and the extracted material drops into a discharge hopper, where it is conveyed to the desolventizer.

The stationary cell extractor is another type of rotary extractor. This type provides countercurrent extraction without moving the cells. Instead, the fill spout, spray nozzles, bottom screens, and miscella collection compartments rotate on a central shaft. The thrust load is carried on a circular track mounted on the bottom of the extractor shell. The oil-bearing material remains in the stationary basket until drained. As the bottom screen rotates under the basket, the material discharges into the internal discharge hopper from which it is conveyed from the extractor.

Perforated Belt Extractor. (*See Figure B-6.*) Another type of extractor is the horizontal perforated belt extractor in which the flakes are fed in a uniform depth onto one end of a slowly moving perforated belt. As the oil-bearing material, which is not as deep as in the rotary-type extractor, travels the length of the extractor, gradient miscellas are sprayed over the moving bed from stage pumps, in much the same fashion as the horizontal basket and rotary extractors. The belt is comprised of a pair of endless chains running on a set of large sprockets at each side of the extractor. Attached across the chains and forming a flat surface are a series of perforated plates or screens. Chambers or pans are arranged beneath the belt for the entire length of the extractor for collection of various concentrations of miscellas. The spent material is continuously discharged from the end of the belt into a hopper, from which it is conveyed to the desolventizer.

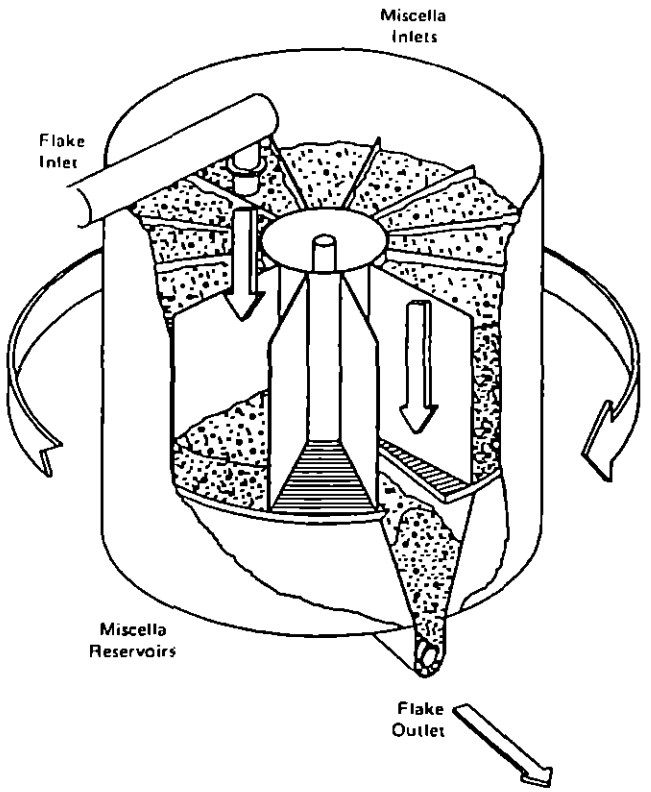


Figure B-5 Stationary-Bottom or Sliding-Plate Extractor.

Another type of perforated belt extractor, the sliding cell extractor (Figure B-7), provides two extraction surfaces where the flakes are separated by rectangular compartments, while traveling along the moving slotted screens or stationary vee-bar screen plates. This unit achieves countercurrent extraction by employing stage pumps and a series of collecting pans to direct the flow of the various miscella concentrations. Because there is an upper and a lower screen belt or plate, the filling device can be located over, but separated from, the discharge hopper. When the partially extracted material reaches the end of the top belt, it falls from the upper cell into a similar compartment on the lower belt. The mass continues to be sprayed with miscella from the stage pumps until it reaches the fresh solvent wash prior to draining and feeding into the discharge hopper.

Rectangular Loop Extractor. (*See Figure B-8.*) The same basic principles are used in the rectangular loop extractor as in the sliding cell extractor. However, the overall shape of this extractor utilizes an "en masse" type conveyor instead of individual baskets. The bottom part of the conveyor uses stationary, linear vee-bar screens. Flakes enter near the top of the extractor at the inlet hopper. A conveyor chain carries the flakes away from this hopper and down the first leg of the loop, where the flakes receive their first wash. In the bottom horizontal run of the loop, the flakes are washed with progressively weaker concentrations of miscellas. As the flakes travel up the vertical part of the loop, they are further extracted by a countercurrent wash of miscella flowing down the loop. On the sloping top run of the extractor, they receive a fresh solvent wash, are allowed to drain, and are discharged continuously from the unit.

The extractor conveying chain is open at the top, bottom, and sides. This allows easy loading and emptying of the material and for passage of the solvent through the flake bed as it is turned during its extraction wash cycle. The speed of the chain is automatically controlled by the level of flakes in the inlet hopper. A sensor in the feed hopper measures the level of flakes in the hopper and sends a signal to the extractor's variable speed drive.

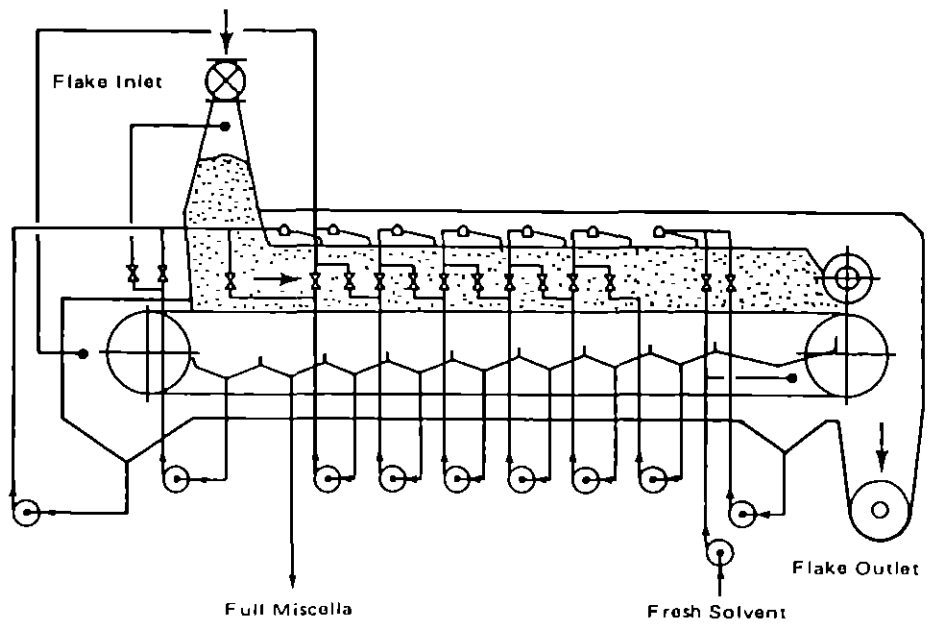


Figure B-6 Perforated Belt Extractor.

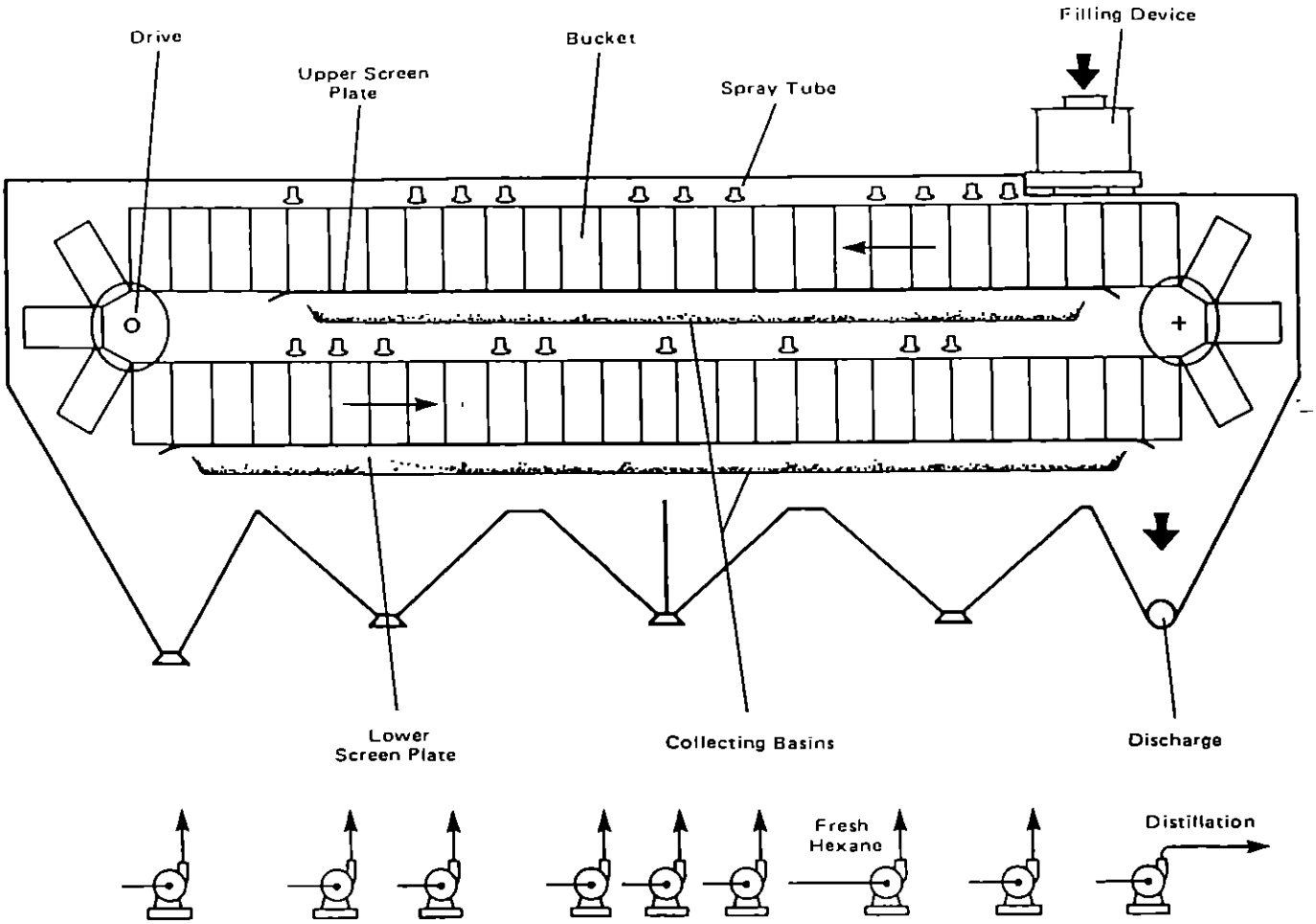


Figure B-7 Sliding Cell Extractor.

Other Types of Extractors. There are other types of extractors for extracting oil from oil-bearing materials, but they are not in general use. These other types include vertical immersion, filtration, and batch extractors. Some are used only for special applications.

Distillation. The distillation system of an extraction plant provides the means for evaporating and stripping the solvent from the oil. There are numerous methods for accomplishing this, from the early pot-type batch stills and pan-type evaporators to the currently popular long-tube rising film evaporators, followed by high vacuum stripping. Few of the pot stills or pan-type evaporators are still in use.

At this time, nearly all extraction plants use two long-tube rising film evaporators, with or without recirculation. The first evaporator usually operates under vacuum, while the second operates either under vacuum or at atmospheric pressure. Heat from the desolventizer vapor is recovered and used to supply heat to the first evaporator, while indirect steam supplies heat for the second evaporator. The choice of the type of oil stripper used depends on a number of factors, including the design and size of the other components in the system and the material being processed.

Stripping columns commonly used are either the packed column type or the disk-and-doughnut type. The stripping column distributes the oil into a very thin film on a large surface area with a relatively high velocity of dry steam passing over and through the film. A countercurrent flow is established by introducing the oil at the top of the column and allowing it to pass downward through the tower against the flow of the steam, which is introduced at the bottom of the tower. The tower must be operated under a vacuum of 22 to 28 in Hg (559 to 711 mm Hg) to achieve highest efficiency. The mixture of steam and solvent vapor passes from the top of the tower to a condenser from which the condensate is pumped to a solvent/water separator. The solvent flows from the separator to a work tank. Water flows from the separator to the waste water evaporator. Finished oil is usually pumped from the stripping column by a rotary positive displacement pump.

Desolventizing and Toasting. Desolventizing of the spent material is accomplished in several ways. In one of these, spent material is desolventized by passing through a series of steam-jacketed rotary conveyors commonly called "schneckens." These conveyors are usually stacked one above the other, and the material to be desolventized

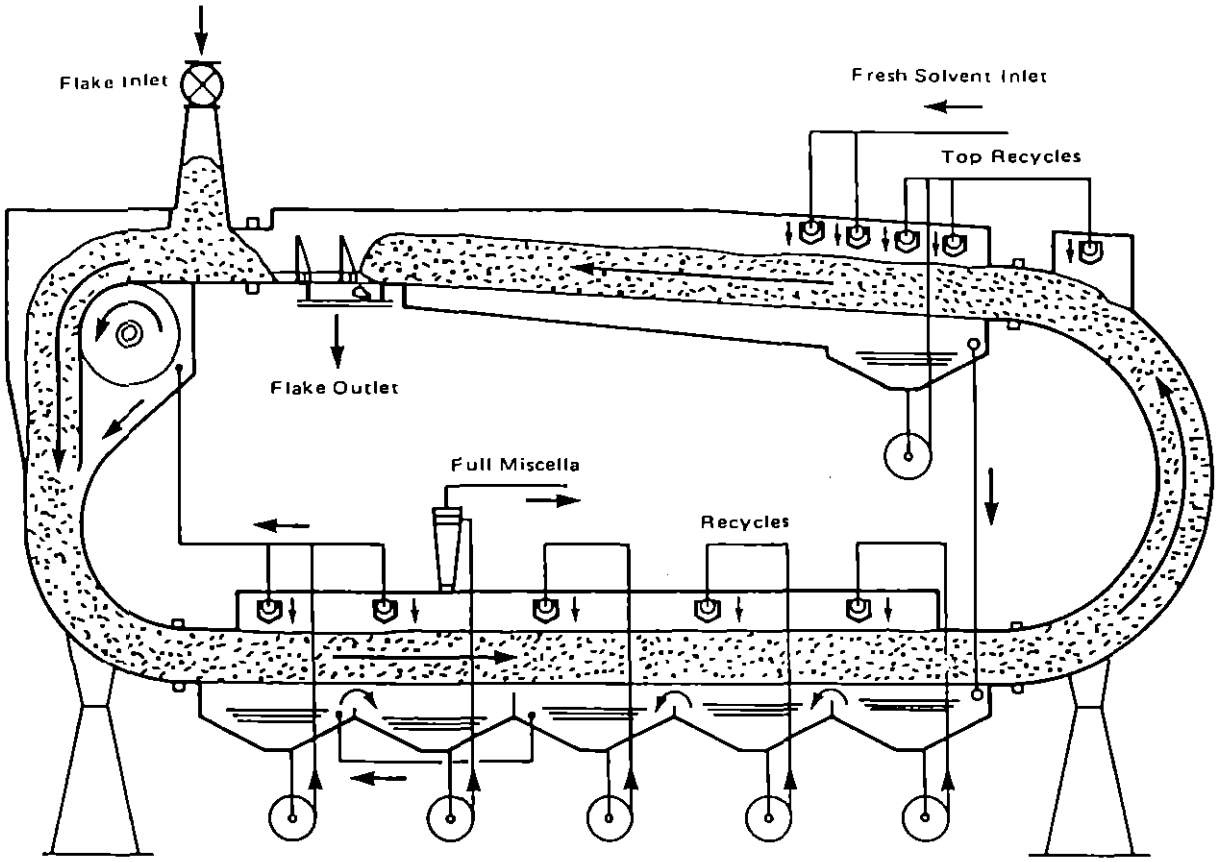


Figure B-8 Rectangular Loop Extractor.

drops by gravity from one to the next. The last conveyor often has a direct flow of steam to remove the final traces of solvent. Vapors are piped to a scrubbing and condensing system. The desolventized material is discharged from the bottom conveyor through a vapor seal.

Another type of desolventizer is the recycled vapor type, which consists of a single cylindrical vessel with a rotating element that tumbles the spent material from the inlet to the discharge end. The vessel is steam-jacketed, and part of the solvent vapor that is driven off is superheated and passed directly back to the vessel. The superheated solvent vapor provides the energy to desolventize the material. This type of desolventizer is usually followed by some type of stripper, often using heat, vacuum, and direct steam to remove the final traces of solvent. The desolventized material is then discharged through a vapor seal.

Many extracted oilseed products require toasting or cooking in order to deactivate enzymes and other constituents and yield a nutritional product. The moisture and heat of the toasting process also agglomerates the fine particles of meal into a more granular form. This helps to reduce the dust problem in subsequent cooling and milling steps. Toasting can be carried out as a separate stage of the process. The meal is conveyed from the desolventizer to the toaster, which may be a vertical stacked cooker or a jacketed stationary drum-type unit with an internal agitator. The toasting section of the combination desolventizer-toaster, often called a "D-T," is essentially a stacked cooker. The function of all toasters is to retain the spent material for a sufficient time at a temperature above 212°F (100°C) and at a specific moisture content. The length of time that the meal is held at these conditions determines the degree of cooking or toasting.

From a fire protection standpoint, the development of the desolventizer-toaster, with the elimination of the intermediate vapor seals, conveyors, etc., represents a significant advance. The D-T is now used in most large capacity solvent extraction systems and accomplishes two important processing steps with a minimum of moving machinery and maximum safety against escape of solvent vapors. The D-T consists of individual kettles or trays placed one above the other, each kettle containing a layer of spent material to a depth of 1 to 4 ft (0.3 to 1.2 m). The feeding of material from one kettle to the next lower one is accomplished by an automatic gate mechanism or spout. The trays that form the floor of each kettle are steam-jacketed and direct steam is sparged into the material in the top kettle or kettles. Some of this steam condenses as it evaporates the solvent, raising the temperature and the moisture of the material to the levels required for toasting in the lower kettles. The top kettle is provided with a large pipe to conduct hot vapors through a scrubber to the condensing system. In normal operation, at least half of the kettles (trays) of the D-T are filled with desolventized material, providing an effective seal against fluctuating pressures and other changes in plant performance.

More recently, the fully counterflow D-T has been introduced. In this unit, the trays have a relatively uniform pattern of perforations that allow the passage of steam through each upper level tray and bed of material. Most or

all of the direct steam is introduced at the bottom of the D-T and flows up through the beds in counterflow to the downward flow of material. This method desolventizes and toasts effectively, reduces the danger of solvent escaping from the bottom of the D-T, and is more energy efficient.

Condensing System. Condensing of solvent vapors and steam is usually accomplished by the use of shell-and-tube condensers. The tubes are normally made of stainless steel. Water flows through the tubes, and the solvent vapor and steam condense on the outer surfaces of the tubes. The cold water used in the condensers may be supplied from deep wells, cooling towers, spray ponds, or some other source that can supply water cool enough to operate the condensers efficiently and clean enough to prevent fouling of the tubes. Solvent vapor from the desolventizer is usually passed through a scrubber to remove any solids entrained in the vapor stream. The vapors are normally washed with liquid solvent, and this scrubbing liquid, along with the removed fines, is returned to the desolventizer. Water has also been used as a scrubbing liquid.

Vent Vapor Recovery System. It is standard practice in extraction plants to vent each piece of processing equipment to a common vent header. This header contains hexane vapor, water vapor, and air, which flow to the final solvent recovery system. At a minimum, the solvent recovery system consists of a water-cooled shell-and-tube condenser and a mineral oil absorption recovery system. The noncondensible components are scrubbed in a mineral oil absorption column and are discharged through a flame arrester to atmosphere by a vent fan. The mineral oil is heated, stripped of its hexane, cooled, and returned to the absorption column. The recovered vapors are condensed and returned to the solvent separator. By today's standards of efficiency, the solvent losses in a large, well-designed, and well-run plant will not exceed one-half gallon (1.9 L) of solvent per ton of material processed. In a soybean processing plant, this is equivalent to a solvent loss of 0.14 percent by weight, based on the weight of the soybeans processed. Many plants have solvent losses that are considerably lower than this.

Waste Water Evaporator. Water is continuously produced in the extraction process from the condensation of direct sparge steam that is used in many sections of the plant. This water is continuously removed from the solvent-water separator and sent to a vessel called the waste water evaporator, where direct steam is introduced to raise the temperature to at least 185°F (85°C). Often, the direct steam is provided by the final stripper vacuum ejector (and possibly other ejectors in the process). The purpose of this waste water evaporator is to heat the waste water well above the boiling point of the solvent, thus evaporating any remaining solvent in the waste water stream. This waste water flows to a large outdoor separation sump that is also connected to the floor drains of the extraction building. This sump serves two purposes: it provides an additional level of safety by separating any remaining oils, solvents, and miscella from the waste water prior to its discharge; it also provides containment for any spills.

ATTACHMENT 3

'93 Soya Bluebook

Guide to the World Soybean Industry

Published by Soyatech, Inc.

UNITED STATES OF AMERICA (U.S.A.)

A Natural Harvest Distributors ★★ *SF*
Affiliate of A Natural Harvest Incorporated
7122 So. Jeffery Blvd.,
Chicago, IL, 60649 U.S.A.
PH: 312/363-3939; FAX: 312/363-8811.
CONTACT: Cheryl Simms, CEO
Soyfoods, other soy-based foods, vegetarian tamales and commales.

Abripro Biosciences Inc. (ABI)
6700 Antioch, P.O. Box 2955,
Shawnee Mission, KS, 66213 U.S.A.
PH: 913/384-4940; FAX: 913/384-0208.
CONTACT: Tim Ream, Oilseeds Business Mgr.
Soybean breeder; soybean seed supplier.
EXPORTER: Soybean varieties; soybean seed.

Ag Processing Inc. ★ *C R SF IP*
MAIN OFFICE: 12700 W. Dodge Road,
P.O. Box 2047, Omaha, NE, 68103-2047 U.S.A.
PH: 402/496-7809; FAX: 402/498-2215.
OTHER OFFICES: Van Buren, AR; Eagle Grove, IA; Mason City, IA; Manning, IA, Sergeant Bluff, IA; Sheldon, IA; Dawson, MN; St. Joseph, MO; Denison, TX
CONTACT: James W. Lindsay, CEO
PLANT SUPERINTENDENT: Pat Reisner
Solvent extraction; animal/livestock feed, crude degummed soybean oil, crude soybean oil, hulls, meal, white flakes for edible purposes; served by barge, rail and truck.
CONTACT: Tony Porter
Crude degummed soybean oil, edible soy oil products; served by barge, rail and truck. Lecithin (edible grade); soy flour; soy grits; soy oil products, AGSOY cooking/salad oil. Lecithin (industrial grade); soy flour/soy protein (industrial grade); soy oil (industrial grade); soy sterols and tocopherols; soybean fatty acids.
CONTACT: Joe Meyer

Ag Processing Inc. ★ *C*
Kibler Road, P.O. Box 389,
Van Buren, AR, 72956-0389 U.S.A.
PH: 501/474-6871.
CONTACT: Fred Stephenson, Acting Mgr.
Solvent extraction; meal.

Ag Processing Inc. ★ *C*
1605 19th Street, S.W., P.O. Box 1068,
Mason City, IA, 50401-6334 U.S.A.
PH: 515/423-4733.
CONTACT: Jerry Moyer, Merch'g. Mgr.
PLANT SUPERINTENDENT: Carl Parker
Solvent extraction; meal.

Ag Processing Inc. ★ *C*
N. Commercial Street, P.O. Box 85,
Eagle Grove, IA, 50533-0085 U.S.A.
PH: 515/448-4711; TLX: 467762.
CONTACT: Cal Meyer, Merch'g. Mgr.
PLANT SUPERINTENDENT: Phil Huffman
Solvent extraction; meal.

Ag Processing Inc. ★ *C*
804 Second Avenue, P.O. Box 220,
Sheldon, IA, 51201-1404 U.S.A.
PH: 712/324-2531.
CONTACT: Gary Olsen, Merch'g. Mgr.
PLANT SUPERINTENDENT: Dave Nestor
Solvent extraction; meal.

Ag Processing Inc. ★ *C*
Port Neal Industrial Area, P.O. Box 200,
Sergeant Bluff, IA, 51054-0200 U.S.A.
PH: 712/943-4282.
CONTACT: Rich Lee, Merch'g. Mgr.
PLANT SUPERINTENDENT: Jeff Rogers
Solvent extraction; meal.

Ag Processing Inc. ★ *C*
P.O. Box 187, Manning, IA,
51455-0187 U.S.A.
PH: 712/653-3985.
CONTACT: Tom Rodis, Merch'g. Mgr.
PLANT SUPERINTENDENT: Mark Craigmile
Solvent extraction; meal.

Ag Processing Inc. ★ *C*
800 Diagonal St., Dawson, MN, 56232 U.S.A.
PH: 612/769-4386.
CONTACT: Lenny Miller, Merch'g. Mgr.
PLANT SUPERINTENDENT: Lee Gunderson
Solvent extraction; meal.

Ag Processing Inc. ★ *C*
900 Lower Lake Road, P.O. Box 427,
St. Joseph, MO, 64502-0427 U.S.A.
PH: 816/238-1700.
CONTACT: Terry McClatchey, Merch'g. Mgr.
PLANT SUPERINTENDENT: Mel Holder
Solvent extraction; meal.

Agricultural Exports, Inc. ★★
411 Fifth Street, P.O. Box 178, Hudson, IA,
50643 U.S.A.
PH: 319/988-4593;
TLX: 465653 (SOYP ROSK CFLS).
CONTACT: Jeanne M. Strayer, CEO–Vice Pres.
EXPORTER: Soybeans, corn.

Agronico Inc. ★ *C R SF*
Rural Route 1, Le Center, MN, 56057 U.S.A.
PH: 612/357-4474; FAX: 612/357-6388.
CONTACT: Mike Vincent, Pres.
PLANT SUPERINTENDENT: John Cooney
Continuous screw press; animal/livestock feed, crude soybean oil, hulls, meal; served by truck. Crude degummed soy oil, edible soy oil products; served by truck. Soy oil products, cooking/salad oil; soy flour (full fat); soy flour (partially defatted); textured soy flour; spray-dried soymilk.

Albert Lea Seed House ★
Box 127 , 1414 West Main Street,
Albert Lea, MN, 56007 U.S.A.
PH: 1/800-352-5247 or 507/373-3161;
FAX: 507/377-7245.
CONTACT: George Ehrhardt, Mgr.
Soybean seed supplier; supplier of soybeans for food use.

Aloha Tofu Factory Inc. *SF*
961 Akepo Lane, Honolulu, HI, 96817 U.S.A.
PH: 808/845-2669; FAX: 848-4607.
CONTACT: Jack Uyehara, Exec. Vice Pres.
Soyfoods, tofu & tofu products.

Amber, Inc. ★
220 White Plains Road,
Tarrytown, NY, 10591 U.S.A.
PH: 914/332-5550; FAX: 914/332-1480;
TLX: (WU) 317784 (AMBER TARY).
CONTACT: Philip C. Horldt, Pres.
Broker, cash/product. EXPORTER: Crude degummed soybean oil; refined, bleached, deodorized soybean oil.

American Feed Ingredients, Inc.
5120 Paddock Village Court, Suite B-21,
P.O. Box 2267, Brentwood, TN, 37027 U.S.A.
PH: 615/377-9844; FAX: 615/377-9848.
CONTACT: Richard S. Means, Pres.
Broker, cash/product.

C = Soybean Processor (Crusher)
R = Soybean Oil Refiner
SF = Edible Soy Products/Soyfoods
IP = Industrial Soy Products
★ Updated Listing
★★ New Listing

American Food Company *C*
4738 Valley Blvd.,
Los Angeles, CA, 90032-3834 U.S.A.
PH: 213/223-7738; FAX: 213/223-8450.
CONTACT: Jackson Wu, Pres.
Extraction process, continuous screw; crush cap. 2 - 3 MT/day; storage cap. +20008U.
Soyfoods, soymilk, drinks or beverages; tofu & tofu products.

American Health & Nutrition Inc. ★★ *SF*
508 Waymarket Drive,
Ann Arbor, MI, 48103 U.S.A.
PH: 313/994-7400; FAX: 313/994-4120.
CONTACT: Dennis Singsank, Pres.
Simulated meat products (analogs); soy oil products, cooking/salad oil; defatted soy flour; partially defatted soy flour; full fat soy flour; textured soy flour; soy grits; soy protein concentrates; soyfoods, full fat soy flakes; other soy-based foods, OCIA ORGANIC textured soy protein & soy oil. Broker cash/product; supplier of soybeans for food use; supplier of organically grown soybeans.
EXPORTER: OCIA ORGANIC soybeans; soy flakes; flour; textured soy oil.

See Our Advertisement P. 33

American Lecithin Company ★ *SF IP*
Affiliate of Nattermann Phospholipids Inc.
33 Turner Road, P.O. Box 1908,
Danbury, CT, 06813-1908 U.S.A.
PH: 203/790-2700; FAX: 203/790-2705.
CONTACT: Randy Zigmont, Pres.
ALCOLEC lecithin (edible grade). ALCOLEC lecithin (industrial grade) for coatings and cosmetics, Phosal™ and Phospholipon™ line of high purity phosphatidylcholine for cosmetics, pharmaceuticals and dermatology.
EXPORTER: Lecithin.

The American Milling Co. ★★ *C*
701 West Broadway, P.O. Box 8430,
Alton, IL, 62002 U.S.A.
PH: 618/462-6161; FAX: 618/462-6661.
CONTACT: Harold Hutson, Merchandiser
PLANT SUPERINTENDENT: Ric Lamb
Pelleting operation; pelleting cap. 1400MT/day; storage cap. 1700MT; hulls (pellets), meal (pellets); served by barge, rail and truck.
EXPORTER: Soybean hull pellets; soybean meal pellets.

The American Miso Company *SF*
Affiliate of Great Eastern Sun, Inc.
Rt. 3, Box 541,
Rutherfordton, NC, 28139 U.S.A.
PH: 704/287-2940; FAX: 704/286-0311.
OTHER OFFICES: Asheville, NC
CONTACT: Donald J. DeBona, Pres.
Soyfoods, MISO MASTER organic miso.

American Natural Snacks, Inc. ★ *SF*
Affiliate of Tree of Life, Inc.
1755 Lakeside Drive, P.O. Box 1067,
St. Augustine, FL, 32084 U.S.A.
PH: 904/825-2039; FAX: 904/825-2024.
CONTACT: Casey Van Rysdam, Pres.
PLANT SUPERINTENDENT: Melvin Carter
Soyfoods, other soy-based foods, SOYA KAAS soy cheese.

American Pride Soyfoods, Inc. *SF*
612 W. Kirkwood, Fairfield, IA, 52556 U.S.A.
PH: 515/472-9269.
CONTACT: Alex Green, Pres.
Soyfoods, AMERICAN PRIDE tofu & tofu products.

American Soy Products *SF*
1474 N. Woodland Drive,
Saline, MI, 48176 U.S.A.
PH: 313/429-2310; FAX: 313/429-2112.
CONTACT: James Fox, Vice Pres.
Soyfoods, soymilk, drinks or beverages, original, vanilla and carob flavors.

Archer Daniels Midland Company ★ *C R SF IP*
MAIN OFFICE: 4666 Faries Parkway,
P.O. Box 1470, Decatur, IL, 62525 U.S.A.
PH: 217/424-5200; FAX: 217/424-5447;
TLX: 25-0121 (ADM CO DTR).
OTHER OFFICES: Little Rock, AK; Augusta, Valdosta, GA; Des Moines, IA; Frankfort, IN; Champaign, Galesburg, Granite City, Taylorville, IL; Fredonia, KS; Mankato, MN; N. Kansas City, Mexico, MO; Clarksdale, MS; Fremont, Lincoln, NE; Fostoria, OH; Kershaw, SC; Windsor, Ontario, CANADA (ADM Agri-Industries, Ltd. d/b/a/ Maple Leaf Monarch); Spyck, GERMANY (ADM Oelmuehlen GmbH); Rotterdam, NETHERLANDS (A.D.M. Company Europe); Europoort, NETHERLANDS (A.D.M. Europoort).
CONTACT: Randy Neumayer, Mgr.
Solvent extraction; crude degummed soybean oil, crude soybean oil, hulls, meal, white flakes for edible purposes; served by rail and truck.
CONTACT: Randy Neumayer, Mgr.
Crude degummed soybean oil, edible soy oil products, hydrogenated soy oil, industrial oil products, refined soybean oil; served by rail and truck.
CONTACT: James Stowell
Isolated soy proteins; simulated meat products; soy flour; full fat soy flour; soy grits; soy protein concentrates; lecithin (edible grade) liquid: YELKIN, BEAKIN, CAPSULEC, THERMOLEC, powdered/granulated: YELKINOL; soy oil products, cooking/salad oil; margarine; shortening. Lecithin (industrial-grade) liquid: YELKIN, STABLEC EDS, STABLEC IDC, R& R551, powdered/granulated: YELKINOL for paints, inks, animal feeds; soy oil (industrial-grade).
CONTACT: Roger Kilburn for proteins, Pat Schroder for lecithins.

See Our Advertisements on Back Cover and P. 30, 54 & 55

Archer Daniels Midland Company ★ *C*
Foot of E. 9th Street, P.O. Box 30,
Little Rock, AR, 72203 U.S.A.
PH: 501/372-0277; FAX: 501/372-0276;
TLX: 25-0121 (ADM CO DTR).
CONTACT: Mark Bemis, Mgr.
Solvent extraction; crude soybean oil, hulls, meal.

Archer Daniels Midland Company ★ *C*
P.O. Box 1589, Valdosta, GA, 31603 U.S.A.
PH: 912/242-0100; FAX: 912/242-7422;
TLX: 25-0121 (ADM CO DTR).
CONTACT: Kevin Burgard, Mgr.
Solvent extraction; crude soybean oil, hulls, meal; served by rail and truck.

Archer Daniels Midland Company ★ *C*
960 Molly Pond Road, P.O. Box 729,
Augusta, GA, 30903 U.S.A.
PH: 404/722-3165; FAX: 404/722-3165;
TLX: 25-0121 (ADM CO DTR).
CONTACT: Bob Meismer, Mgr.
Solvent extraction; hulls, meal; served by rail and truck.

Archer Daniels Midland Company ★ *C R*
P.O. Box C, Des Moines, IA, 50316 U.S.A.
PH: 515/263-3256; FAX: 515/263-3282;
TLX: 25-0121 (ADM CO DTR).
CONTACT: Royce Wilken, Mgr.
Solvent extraction; crude degummed soybean oil, hulls, meal; served by rail and truck.
CONTACT: Royce Wilken, Mgr.
Crude degummed soybean oil, edible soy oil products, hydrogenated soy oil, refined soybean oil; served by rail and truck.
CONTACT: Jim Stowell

Archer Daniels Midland Company ★ *C*
P.O. Box 1249, Granite City, IL, 62040 U.S.A.
PH: 618/931-8249; FAX: 618/797-2989;
TLX: 25-0121 (ADM CO DTR).
CONTACT: Arnie Blackfelner, Mgr.
Solvent extraction; crude soybean oil, hulls, meal.

Archer Daniels Midland Company ★ *C*
Wilbur Heights Road, P.O. Box 68,
Champaign, IL, 61820 U.S.A.
PH: 217/424-5422; FAX: 217/424-5447;
TLX: 25-0121 (ADM CO DTR).
CONTACT: Randy Neumayer, Mgr.
Solvent extraction; hulls, meal; served by rail & truck.

Archer Daniels Midland Company ★ *C*
No. Route 48, P.O. Box 139,
Taylorville, IL, 62568 U.S.A.
PH: 217/824-3371; FAX: 217/824-3371;
TLX: 25-0121 (ADM CO DTR).
CONTACT: Dale Royer, Mgr.
Solvent extraction; crude degummed soybean oil, crude soybean oil, hulls, meal; served by rail and truck.

Archer Daniels Midland Company ★ *C SF*
1021 S. Henderson Street, P.O. Box 711,
Galesburg, IL, 61401 U.S.A.
PH: 309/343-1155; FAX: 309/343-0056;
TLX: 25-0121 (ADM CO DTR).
CONTACT: Bob Rasmus, Mgr.
Solvent extraction; crude soybean oil, hulls, meal; served by rail and truck.

Archer Daniels Midland Company ★ *C R*
Blinn Road, P.O. Box 249,
Frankfort, IN, 46041 U.S.A.
PH: 317/654-8426; FAX: 317/654-8426;
TLX: 25-0121 (ADM CO DTR).
CONTACT: Dave Marshall, Mgr.
Solvent extraction; crude soybean oil, hulls, meal; served by rail and truck. Crude degummed soybean oil, edible soy oil products; served by rail and truck.

Archer Daniels Midland Company ★ *C*
209 W. Adams Street, P.O. Box 558,
Fredonia, KS, 66736 U.S.A.
PH: 316/378-2102; FAX: 316/378-4566;
TLX: 25-0121 (ADM CO DTR).
CONTACT: Kirk Hartnett, Mgr.
Solvent extraction; crude soybean oil, hulls, meal; served by rail and truck.

Archer Daniels Midland Company ★ *C*
Third & Harper Streets, P.O. Box 728,
Mankato, MN, 56001 U.S.A.
PH: 507/625-7947; FAX: 507/625-8420;
TLX: 25-0121 (ADM CO DTR).
CONTACT: Dan Larson, Mgr.
Solvent extraction; crude soybean oil, hulls, meal; served by rail and truck.

Archer Daniels Midland Company ★ *C*
200 W. 19th Avenue, P.O. Box 12567,
N. Kansas City, MO, 64116 U.S.A.
PH: 816/221-2117; FAX: 816/221-1468;
TLX: 25-0121 (ADM CO DTR).
CONTACT: Craig Huss, Mgr.
Solvent extraction; crude soybean oil, hulls, meal; served by rail and truck.

Archer Daniels Midland Company ★ *C*
400 E. Holt Street, P.O. Box 797,
Mexico, MO, 65265 U.S.A.
PH: 314/581-4195; FAX: 314/581-2056;
TLX: 25-0121 (ADM CO DTR).
CONTACT: Mark Smith, Mgr.
Solvent extraction; crude degummed soy oil, crude soybean oil, hulls, meal; served by rail and truck.

Archer Daniels Midland Company ★ *C*
Lyon Road, P.O. Box 10,
Clarksdale, MS, 38614 U.S.A.
PH: 601/627-9245; FAX: 601/624-8693;
TLX: 25-0121 (ADM CO DTR).
CONTACT: Tommy Simms, Mgr.
Solvent extraction; crude degummed soybean oil, crude soybean oil, hulls, meal; served by rail and truck.

Archer Daniels Midland Company ★ *C R SF*
78th & Thayer, P.O. Box 29268,
Havelock Station, Lincoln, NE, 68529 U.S.A.
PH: 402/464-9131; FAX: 402/464-3757;
TLX: 25-0121 (ADM CO DTR).
CONTACT: Scott Frederickson, Mgr.
Solvent extraction; crude degummed soybean oil, crude soybean oil, hulls, meal; served by rail and truck.
CONTACT: Jim Stowell
Crude degummed soybean oil, edible soy oil products, hydrogenated soy oil, industrial oil products, refined soybean oil; served by rail and truck. Lecithin (edible grade); soy oil products, cooking/salad oil; margarine; shortening.

Archer Daniels Midland Company ★ *C*
130 N. Broad, P.O. Box 1286,
Fremont, NE, 68025 U.S.A.
PH: 402/721-6798; FAX: 402/721-6798;
TLX: 25-0121 (ADM CO DTR).
CONTACT: Jim Hansen, Mgr.
Solvent extraction; crude soybean oil, hulls, meal; served by rail and truck.

Archer Daniels Midland Company ★ *C SF*
608 Findlay Road, P.O. Box 110,
Fostoria, OH, 44830 U.S.A.
PH: 419/435-6633; FAX: 419/435-6472;
TLX: 25-0121 (ADM CO DTR).
CONTACT: Brian Forster, Mgr.
Solvent extraction; crude degummed soy oil, crude soybean oil, hulls, meal; served by rail and truck.

Archer Daniels Midland Company ★ *C*
427 N. Hampton, P.O. Box 10913,
Kershaw, SC, 29067 U.S.A.
PH: 803/475-3029; FAX: 803/475-8245;
TLX: 25-0121 (ADM CO DTR).
CONTACT: Ray Sertain, Mgr.
Solvent extraction; crude soybean oil, hulls, meal; served by rail and truck.

Arista Industries, Inc.
1082 Post Road, Darien, CT, 06820 U.S.A.
PH: 203/655-0881; FAX: 203/656-0328;
TLX: 996493 (HACKBEN DARN).
CONTACT: Charles Hillyer, Vice Pres.
EXPORTER: Refined soybean oil; epoxidized soybean oil; partially hydrogenated soybean oil.

Arrowhead Mills, Inc. *SF*
110 S. Lawton, P.O. Box 2059,
Hereford, TX, 79045 U.S.A.
PH: 806/364-0730; FAX: 806/364-8242.
CONTACT: Boyd Foster, Pres.
Full fat soy flour, 12 and 24 ounce cases and 30 pound bags; soyfoods, whole grain soy flakes, 12 and 1 pound cases.
CONTACT: Pete Holcombe

Ashland Soy Works *SF*
225 Water St.,
Ashland, OR, 97520-1883 U.S.A.
PH: 503/482-1865.
CONTACT: James Muhs
Soyfoods, soymilk, drinks or beverages; tofu; other soy-based foods, various.

Atomergic Chemetals Corporation ★ *SF IP*
222 Sherwood Avenue,
Farmingdale, NY, 11735-1718 U.S.A.
PH: 516/694-9000; FAX: 516/694-9177;
TLX: 6852289.
CONTACT: Paula Weiss, Mkting. Mgr.
Lecithin (edible grade); isolated soy proteins; other soy-based foods, saponin. Soy sterols & tocopherols.

Avatar Corporation *SF IP*
7728 W. 99th Street,
Hickory Hills, IL, 60457 U.S.A.
PH: 708/430-4200.
OTHER OFFICES: Minneapolis, MN (warehouse)
CONTACT: Michael L. Shamie, Pres.
LSC 3070, LSC 5040 lecithin (edible grade); soyfoods, other soy-based foods, DPO-100, *BROWN 'N SERVE oil (bread pan oils)*; CO 8020 (release agents).
CONTACT: Matthew Peterschmidt
Pharmaceutical grade triglycerides (soy based).

Azumaya Inc. *SF*
1575 Burke Avenue,
San Francisco, CA, 94124 U.S.A.
PH: 415/285-1130; FAX: 415/285-0327.
CONTACT: William Mizono, Pres.
Soyfoods, tofu & tofu products, AZUMAYA Japanese tofu; Chinese 2 pe; kinugoshi; other soy-based foods, STIR FRUITY, creamy tofu treat.

H. J. Baker & Bro., Inc. ★
100 East 42nd Street, Pershing Square Building, New York, NY, 10017 U.S.A.
PH: 212/867-0200; FAX: 212/370-1639;
TLX: (ITT) 420944 (HJBA) or (MCI) 620268 (HJBAK) or (WUI) 12487 (HJBA).
OTHER OFFICES: Atlanta, GA; Laguna Hills, CA; Little Rock, AK; Chicago, IL
CONTACT: K. E. Mayer, Mgr., Fats & Oils Dept.
Broker, cash/product.

BAR N.A., Inc. *C SF*
205 S. Main Street, P.O. Box 190,
Seymour, IL, 61875 U.S.A.
PH: 217/687-4810; FAX: 217/687-4830;
TLX: 754477 (BAR NA UD).
CONTACT: Julie Ohlsson, Admin. Asst.
Continuous screw press; crush cap. 10MT/day; crude degummed soybean oil, meal. Soy flour, stone ground, natural; extruded full fat soy flour. **EXPORTER:** Natural and certified organic mechanically pressed soy oil and stone-ground soy flour.

Barricini Foods, Inc. ★ *SF*
Affiliate of Farm Foods
49 Old Bloomfield Avenue,
Mountain Lakes, NJ, 07046 U.S.A.
PH: 201/334-0101; FAX: 201/334-1630.
CONTACT: Steve A. Myers, Vice Pres., Sales
Soyfoods, frozen yogurt, pints, bars, and sandwiches; ICE BEAN nondairy frozen desserts, pints, quarts, bars and sandwiches; honey sweetened nondairy, brown rice syrup, sweetened; other soy-based foods, organic pita classics; soy-based frozen entrees.

Bartlett and Company ★
4800 Main Street, Suite 600,
Kansas City, MO, 64112- U.S.A.
PH: 816/753-6300; FAX: 816/753-0062;
TLX: 510-601-6803 (BART GRAIN KSC).
CONTACT: Duncan Wilson, Merchandiser
Broker, cash/product.
EXPORTER: Soybeans, soybean meal.

Benson-Quinn Company
1075 Grain Exchange Building (North),
P.O. Box 15226,
Minneapolis, MN, 55415-0226 U.S.A.
PH: 612/340-5900; FAX: 612/340-1416.
CONTACT: Laurence Neumann, CEO
Broker, cash/product.

Best Foods, CPC International, Inc. *SF*
International Plaza, P.O. Box 8000,
Englewood Cliffs, NJ, 07632 U.S.A.
PH: 201/894-4000; FAX: 201/894-2186;
TLX: 135440.
CONTACT: Roger Knapp, Dir., Commodity Purchasing
Soy oil products, MAZOLA cooking/salad oil; MAZOLA margarine; HELLMANN'S, BEST FOODS salad dressing.

Betsy's Tempeh ★ *SF*
14780 Beardslee Road,
Perry, MI, 48872 U.S.A.
PH: 517/675-5213.
CONTACT: Betsy Shipley, Mgr.
Soyfoods, BETSY'S tempeh (grated & patties).
CONTACT: Gunter Pfaff

Biofix Corporation ★
200 Provident Bank Building, Suite 200,
Denton, TX, 76205 U.S.A.
PH: 817/382-2594; FAX: 817/387-2294;
TLX: 730649 (EXPORTS).
OTHER OFFICES: Panama City, PANAMA; Monterrey, MEXICO; Madrid, SPAIN
CONTACT: Martin Blair, Pres.
Broker, cash/product. **EXPORTER:** Soybean seeds; soybean meal; soybean lecithin.

Bountiful Bean Soyfoods ★ *SF*
620 Main Street, P.O. Box 329,
Ridgeway, WI, 53582-0329 U.S.A.
PH: 608/924-1703.
CONTACT: Elizabeth Hanson
PLANT SUPERINTENDENT: Richard Kraemer
Soyfoods, plain & vanilla soymilk; tempeh; tofu & tofu products (plain & herbed), hummus with tofu; taboolie with tofu; TASTY TOFU (herbed tofu basted with soy sauce & baked).

Broadway Organicsl ★
Affiliate of Joel Wollner & Assoc.
7A Woodridge Circle, P.O. Box 1343,
Clifton Park, NY, 12065 U.S.A.
PH: 518/371-7014; FAX: 518/373-8337.
CONTACT: Joel Wollner, Pres.
Broker cash/product; supplier of soybeans for food use; supplier of organically grown soybeans. **EXPORTER:** Organic soybeans, soya sauce (Chinese & Japanese). **IMPORTER:** Soya sauce (Chinese & Japanese).

C = Soybean Processor (Crusher)
R = Soybean Oil Refiner

SF = Edible Soy Products/Soyfoods
IP = Industrial Soy Products

★ Updated Listing
★★ New Listing

Brown Seed Enterprises ★
Rt. 1, Box 358 A, Neoga, IL, 62447 U.S.A.
PH: 217/895-2335.
CONTACT: Dennis Brown, Gen. Mgr.
Soybean seed supplier; supplier of soybeans for food use.

BSYD Corporation ★★ *SF*
485 Churchill Rd., Teaneck, NJ, 07666 U.S.A.
PH: 201/833-2103; FAX: 201/833-4715.
CONTACT: Norman Schmutter, Pres.
Soy fiber; soy flour (defatted); soyfoods; soymilk, drinks or beverages; spray-dried soymilk.

See Our Advertisement P. 50

Bunge Corporation *C*
MAIN OFFICE: 11720 Borman,
P.O. Box 28500, St. Louis, MO, 63146 U.S.A.
PH: 314/872-3030;
FAX: 314/872-0110 or 872-0111.
OTHER OFFICES: Decatur, AL; Marks, Vicksburg, and Jackson, MS; Cairo and Danville, IL; Emporia, KS; Destrehan, LA; and Logansport, IN
CONTACT: Archie Gwathmey, Sen. Vice Pres.
Solvent extraction; animal/livestock feed, crude degummed soybean oil, crude soybean oil, hulls, meal; served by barge, rail, and truck.

Bunge Corporation *C*
1400 Market Street, N.E., P.O. Box 2248,
Decatur, AL, 35602 U.S.A.
PH: 205/350-4550; FAX: 205/350-1952.
CONTACT: Jack Thiessen, Dist. Mgr.
Solvent extraction; storage cap. 7,500,000BU or 204,000MT; animal/livestock feed, crude degummed soybean oil, crude soybean oil, hulls, meal; served by barge, rail, and truck.

Bunge Corporation *C*
203 34th Street, Cairo, IL, 62914 U.S.A.
PH: 618/734-4141 or 800/851-3810;
FAX: 618/734-1515.
CONTACT: Claude J. Rose, District Mgr.
Solvent extraction; crude degummed soybean oil, crude soybean oil, hulls, meal; served by barge, rail, and truck.

Bunge Corporation *C*
700 E. Sixth Avenue, P.O. Box 518,
Emporia, KS, 66801 U.S.A.
PH: 316/342-7270; FAX: 316/343-6234.
CONTACT: Tom Schmitt, Dist. Mgr.
Solvent extraction; crush cap. 1,742MT/day; storage cap. 3.5 millionBU; crude degummed soybean oil, crude soybean oil, hulls, meal; served by barge, rail and truck.
CONTACT: Jerry Murphy

Bunge Corporation *C*
River Road, Destrehan, LA, 70047 U.S.A.
PH: 504/466-5300.
CONTACT: John Robson, Plant Mgr.
PLANT SUPERINTENDENT: John Robson
Solvent extraction; crude degummed soybean oil, crude soybean oil, hulls, meal; served by barge, rail, truck.

Bunge Corporation *C*
520 Cherry Street, Marks, MS, 38646 U.S.A.
PH: 601/326-2411.
CONTACT: Mickey Lay, District Mgr.
Solvent extraction; crude degummed soybean oil; crude soybean oil, hulls, meal; served by rail, truck.

Bunge Corporation ★ *C*
1000 N. Mill Street, P.O. Box 1410,
Jackson, MS, 39205 U.S.A.
PH: 601/948-5880.
CONTACT: Jim Crowley, Merch'g. Mgr.
Solvent extraction; crude degummed soybean oil, crude soybean oil, hulls, meal; served by rail, truck.

Bunge Corporation ★ *C*
1833 Haining Road,
Vicksburg, MS, 39180-9069 U.S.A.
PH: 601/326-2411.
CONTACT: Larry Clarke, Merch'g. Mgr.
Solvent extraction; crude degummed soybean oil, crude soybean oil, hulls, meal; served by barge, rail, truck.

Bunge Foods ★ *R SF*
725 N. Kinzie Avenue,
Bradley, IL, 60915 U.S.A.
PH: 815/937-8136; FAX: 815/939-4289.
OTHER OFFICES: Chattanooga, TN;
Fort Worth, TX
CONTACT: John C. Brady, Vice Pres.
Hydrogenated soy oil, refined soybean oil, edible soy oil products; served by rail and truck. Soy oil products, cooking/salad oil,salad dressing, margarine, shortening.

C & T Quincy ★★ *R SF IP*
Affiliate of Moorman Manufacturing Co.
4918 South Blvd.,
Charlotte, NC, 28210 U.S.A.
PH: 704/523-0414.
OTHER OFFICES: Helena, AR [Quincy Soybean Co. of Arkansas], Quincy, IL [Quincy Soybean Co.] (oil refineries); Richmond, VA (C & T Quincy); New York, NY (ContiQuincy)
CONTACT: Rick Schuering, Mktg.
Fractionated soy oil, hydrogenated soy oil, refined soybean oil; served by barge, rail and truck.
CONTACT: Bob Holden (804/359-5786)
Lecithin (edible grade); soy oil products, cooking/salad oil, margarine, shortening.
CONTACT: Bob Holden (oil products); Pat Humphrey (lecithin)
Lecithin (industrial grade).
CONTACT: Pat Humphrey (217/224-1800)
EXPORTER: Soybean meal; soybean hulls; crude soybean oil; refined vegetable oils (ContiQuincy, Mitch Dawson, 212/207-5520).

C & T Refinery, Inc. *R SF*
Affiliate of The C. F. Sauer Company
2000 W. Broad Street,
Richmond, VA, 23220 U.S.A.
PH: 804/359-5786; FAX: 804/359-5514;
TLX: 752-903 (CTRICH).
OTHER OFFICES: Charlotte, NC;
Greenville, SC (The C.F. Sauer Co.);
Richmond, VA (Dean Foods Co.)
CONTACT: Robert E. Holden, Vice Pres.
PLANT SUPERINTENDENT: Dave Logsdon
Edible soy oil products, hydrogenated soy oil. Soy oil products, MASTER CHEF cooking/salad oil; margarine; DUKE'S salad dressing.

Cabotage Trading Company, Inc.
205 W. Avenida Gaviota, Suite A,
San Clemente, CA, 92672 U.S.A.
PH: 714/492-4503; FAX: 714/492-4503.
OTHER OFFICES: Mexico City, MEXICO
CONTACT: Jon S. Grund, CFO
EXPORTER: Soymilk products (dry); soybeans (specialize in exporting to Mexico & Chile).

Calgene Chemical, Inc. ★ *SF IP*
Affiliate of Calgene, Inc.
7247 Central Park Ave.,
Skokie, IL, 60076-4045 U.S.A.
PH: 708/675-3950; FAX: 708/675-3013;
TLX: 206168 (AGRO-ING).
CONTACT: Frank J. Flider, Pres.
Lecithin (edible grade); soy oil products, cooking/salad oil; shortening. Lecithin (industrial grade); soy oil (industrial grade).
CONTACT: Ed Trauth
Broker, cash/product.

California Kitchen ★★ *C SF*
1919 Park Ave., Chico, CA , 95928 U.S.A.
PH:916/342-1405.
CONTACT: Cal Parrott
Soyfoods, soymilk, drinks or beverages; CAL'S ORGANIC TOFU tofu & tofu products.

Callahan Enterprises, Inc.
Affiliate of Rhone Poulene Agro.
1122 E. 169th Street,
Westfield, IN, 46074 U.S.A.
PH: 317/896-5551; FAX: 317/896-5558;
TLX: 276127.
CONTACT: Lynn Croxton, Vice Pres.
Soybean breeder; soybean seed supplier.
EXPORTER: Soybean varieties.

Cargill, Inc. ★ *C R SF IP*
MAIN OFFICE: 15615 McGinty Road, West,
P.O. Box 9300, Minneapolis, MN, 55440 U.S.A.
PH: 612/475-5365; FAX:612/475-6301;
TLX: 29-0794.
OTHER OFFICES: Wichita, KS; Des Moines, IA; Savage, MN; Cedar Rapids, IA; Sioux City, IA; Iowa Falls, IA; Kansas City, MO; Sidney, OH; Bloomington, IL; Lafayette, IN; Gainesville, GA; Fayetteville, NC; Chesapeake, VA; Raleigh, NC; Buenos Aires, ARGENTINA; Melbourne, AUSTRALIA; West Footscray, AUSTRALIA; Queensland, AUSTRALIA; Antwerp, BELGIUM; São Paulo, SP, BRAZIL; Bootle, Liverpool, Merseyside, ENGLAND; Brest, FRANCE; St. Nazaire, FRANCE; Amsterdam, NETHERLANDS; Madrid, SPAIN
CONTACT: John March, Exec. Vice Pres.
Solvent extraction; animal/livestock feed; crude soybean oil; hulls; meal. Hydrogenated soy oil, refined soybean oil. Soy flour; soy grits. Soy flour/soy protein (industrial grade).

Cargill, Inc. ★ *C R*
862 Ridge Road, P.O. Box 1298,
Gainesville, GA, 30503 U.S.A.
PH: 404/531-4700; FAX: 404/531-4757.
CONTACT: Mike Venker, Acct. Mgr.
Solvent extraction; crude soybean oil; hulls; meal. Hydrogenated soy oil, refined soybean oil.

Cargill, Inc. ★ *C R*
3030 S.E. Granger, P.O. Box 1636,
Des Moines, IA, 50306 U.S.A.
PH: 515/263-3115; FAX: 515/263-3117.
CONTACT: Ted Williams, Acct. Mgr.
Solvent extraction; crude soybean oil; hulls; meal. Refined soybean oil.

Cargill, Inc. ★ *C*
602 Industrial Road, P.O. Box 788,
Iowa Falls, IA, 50126 U.S.A.
PH: 515/648-5101; FAX: 515/648-2105.
CONTACT: Ted Williams
Solvent extraction; crude soybean oil; hulls; meal.

Cargill, Inc. ★ *C IP*
411 6th St NE , P.O. Box 1748,
Cedar Rapids, IA, 52406 U.S.A.
PH: 319/399-4025; FAX: 319/399-4046.
CONTACT: Larry Fogdall
Solvent extraction; crude soybean oil; hulls; meal. Soy flour; soy grits. Soy flour/soy protein (industrial grade).

Cargill, Inc. ★ *C R*
980 Clark Street, Sioux City, IA, 51102 U.S.A.
PH: 712/279-1220; FAX: 712/279-1211.
CONTACT: Steve Rieke
Solvent extraction; crude soybean oil; hulls; meal. Hydrogenated soy oil, refined soybean oil.

Cargill, Inc. ★★ *C SF*
1103 12th ave SW , P.O. Box 1748,
Cedar Rapids, IA, 52406 U.S.A.
PH: 319/399-4025; FAX: 319/399-4046.
CONTACT: Larry Fogdall
Solvent extraction; crude soybean oil; hulls; meal. Soy flour, defatted; soy grits.

Cargill, Inc. ★ *C*
P.O. Box 1286, Bloomington, IL, 61702 U.S.A.
PH: 309/827-7100; FAX: 309/827-7140.
CONTACT: Dave Cyrus, Mgr.
Solvent extraction; crude soybean oil; hulls; meal.

Cargill, Inc. ★ *C*
P.O. Box 119, Lafayette, IN, 47902 U.S.A.
PH: 317/423-1511. FAX: 317/742-0004.
CONTACT: John Bill
Solvent extraction; crude soybean oil; hulls; meal.

Cargill, Inc. ★ *C R*
715 East 13th Street,
Wichita, KS, 67214 U.S.A.
PH: 316/292-2380; FAX: 316/267-1445.
CONTACT: Doug Debelak, Acct. Mgr.
Solvent extraction; crude soybean oil; hulls; meal. Hydrogenated soy oil, refined soybean oil.

Cargill, Inc. ★ *C*
2306 Rochester Avenue, P.O. Box 33413,
Kansas City, MO, 64120 U.S.A.
PH: 816/245-0503; FAX: 816/245-0509.
CONTACT: Curt Johnson, Acct. Mgr.
Solvent extraction; crude soybean oil; hulls; meal.

Cargill, Inc. ★ *C*
P.O. Box 26987, Raleigh, NC, 27611 U.S.A.
PH: 919/899-6600; FAX: 919/899-6630.
CONTACT: Doug Fink, Accts. Mgr.
Solvent extraction; crude soybean oil; hulls; meal.

Cargill, Inc. ★ *C R*
River Road, P.O. Box 2309,
Fayetteville, NC, 28302 U.S.A.
PH: 919/433-4900; FAX: 919/433-4917.
CONTACT: Walker Humphries, Gen. Mgr.
Solvent extraction; crude soybean oil; hulls; meal. Refined soybean oil.

Cargill, Inc. ★ *C R*
2400 Industrial Drive,
Sidney, OH, 45365 U.S.A.
PH: 513/498-4551; FAX: 513/498-9982.
CONTACT: Stan Ryan, Gen. Mgr.
Solvent extraction; crude soybean oil; hulls; meal.

Cargill, Inc. ★ *C*
P.O. Box 7506,
Chesapeake, VA, 23324 U.S.A.
PH: 804/545-8461; FAX: 804/545-8460.
CONTACT: Gary Mills
Solvent extraction; crude soybean oil; hulls; meal.

Cemac Foods Corporation *SF*
90 West Street, New York, NY, 10006 U.S.A.
PH: 212/964-8740; FAX: 212/791-1863;
TLX: 232098 or 62849 or 420538 (BERN UR).
CONTACT: Thomas W. May, Vice Pres.
Soyfoods, tofu & tofu products; other soy-based foods, NU-TOFU cheese alternative.

Central Soya Company, Inc. ★ *C R SF IP*
MAIN OFFICE: 1300 Fort Wayne National Bank Bldg., P.O. Box 1400,
Fort Wayne, IN, 46801-1400 U.S.A.
PH: 219/425-5100; FAX: 219/425-5153;
TLX: 276170 (CENSOYA FWA A).
OTHER OFFICES: Decatur, IN; Indianapolis, IN; Remington, IN; Gibson City, IL; Bellevue, OH; Delphos, OH; Marion, OH; Hamilton, Ontario, CANADA (Central Soya of Canada Ltd.)
CONTACT: Barry G. Collinsworth,
Corp. Comm. Mgr.
Crude degummed soybean oil, hulls, meal; refined soybean oil; served by truck and rail. SOYARICH soy flour; CENTEX and MIRATEX textured soy flour; PROMOSOY, PROCON, RESPONSE and PROCON (textured) soy protein concentrates; CENTROCAP lecithin (edible grade); CENTROLEX granules, CENTROPHIL liquid, CENTROL liquid lecithins (edible grade), Promocaf, Promoveal.
CONTACT: Don Lindsey (PH: 219/425-5442)
Industrial soy oil; CENTROMIX lecithin (industrial grade) for paint, ink and animal feed.
CONTACT: Charles T. Worrall (PH: 219/425-5361)

See Our Advertisement P. 56

Central Soya Company, Inc. ★ *C SF IP*
Rts. 47 and 9, Box 112,
Gibson City, IL, 60936 U.S.A.
PH: 217/784-8261.
CONTACT: Gary Hammond,
Merchandising Mgr.
Solvent extraction; crude degummed soybean oil, hulls, meal; served by rail and truck.
CONTACT: Gary Hammond.
CENTROCAP lecithin (edible grade); SOYARICH soy flour; CENTEX and MIRATEX textured soy flour; PROMOSOY, PROCON, RESPONSE and PROCON (textured) soy protein concentrates.
CONTACT: Don Lindsey (PH: 219/425-5442)
CENTROMIX lecithin (industrial grade) for paint, ink and animal feed.
CONTACT: Charlie Worrall (PH: 219/425-5361)

Central Soya Company, Inc. ★ *C*
1160 W. 16th Street, P.O. Box 44570,
Indianapolis, IN, 46244 U.S.A.
PH: 317/632-8441.
CONTACT: Neil McGough
Solvent extraction; crude degummed soybean oil, hulls, meal; served by rail and truck.

Central Soya Company, Inc. ★ *C R SF*
1200 N. 2nd Street, P.O. Box 1002,
Decatur, IN, 46733-5002 U.S.A.
PH: 219/724-2101;
TLX: 6711149 (CENSOY UW).
CONTACT: Joe Brocklesby
Solvent extraction; crude degummed soybean oil, crude soybean oil, hulls, meal; served by rail and truck.
CONTACT: Joe Brocklesby
Hydrogenated soybean oil, refined soybean oil; served by rail and truck.
CONTACT: Gary Chenoweth (PH: 219/425-5609).
CENTROPHASE, CENTROLENE, BLENDMAX, CENTROL ACTIFLO liquid lecithins (edible grade).
CONTACT: Charles T. Worrall (PH: 219/425-5361)

Central Soya Company, Inc. ★ *SF*
413 Cressy Avenue, P.O. Box 127,
Remington, IN, 47977 U.S.A.
PH: 219/261-2124; FAX: 219/261-2390.
CONTACT: John Kastelic
Soy protein concentrates-functional: PROMAX, PROMINE, VAH.
CONTACT: Don Lindsey (PH: 219/425-5442)

Central Soya Company, Inc. ★ *C R SF IP*
605 Goodrich Road, P.O. Box 369,
Bellevue, OH, 44811 U.S.A.
PH: 419/483-5340.
CONTACT: Loren Keske
Solvent extraction; crude degummed soybean oil, hulls, meal; served by rail and truck.Crude degummed soybean oil, refined soybean oil; served by truck and rail.
CONTACT: Dan Kramer (PH: 291/425-5752).
CENTROLEX granules, CENTROPHIL liquid, CENTROL liquid lecithins (edible grade), Promocaf, Promoveal.
CONTACT: Charles T. Worrall (PH: 219/425-5361)
Industrial soy oil.
CONTACT: Dan Kramer (PH: 219/425-5752)

Central Soya Company, Inc. ★ *C*
234 S. Jefferson Street, P.O. Box 485,
Delphos, OH, 45833 U.S.A.
PH: 419/692-6010.
CONTACT: Noel Kimmel
Solvent extraction; crude soybean oil, hulls, meal; served by rail and truck.

Central Soyfoods *SF*
11 W. 14th Street,
Lawrence, KS, 66044 U.S.A.
PH: 913/843-0653.
CONTACT: Jim Cooley, Partner
Soyfoods, soymilk, drinks or beverages; tempeh; tofu & tofu products, regular and smoked.

Central Valley Vegetable Oils *C R SF*
2838 Leonis Blvd., P. O. Box 86312,
Los Angeles, CA, 90058-863 U.S.A.
PH: 213/587-5952; FAX: 213/587-5905;
TLX: 691556 (PROIN LSA).
CONTACT: Jaime Ruiz
Continuous screw press; animal/livestock feed, crude soybean oil; served by truck. Soy oil products, MANCAO margarine (cocoa butter substitute).

Champlain Industries, Inc. *SF*
MAIN OFFICE: 25 Styertowne Road,
Clifton, NJ, 07012 U.S.A.
PH: 201/778-0094 or 800/222-4904;
FAX: 201/778-0094.
OTHER OFFICES: Cornwall, Ontario, CANADA; Harbor Beach, MI
CONTACT: Rudy J. Krukar, V. P., Sales & Mktng.
PLANT SUPERINTENDENT: Miguel Granielio
Hydrolyzed soy proteins; soyfoods, other soy-based foods, soy sauce.

Champlain Industries, Inc. *SF*
79 State Street, Harbor Beach, MI, 48441 U.S.A.
PH: 517/479-3211; FAX: 517/479-3320.
OTHER OFFICES: Cornwall, Ontario, CANADA; Clifton, NJ
CONTACT: Jim Tenbusch
PLANT SUPERINTENDENT: Jim Tenbusch
Hydrolyzed soy proteins.

Charlie Lin's "Vitalite" Foods *SF*
103 S. Westminster Street,
Box 10, Waynesfield, OH, 45896 U.S.A.
PH: 419/225-5139 or 568-8638.
OTHER OFFICES: Lima, OH (office)
CONTACT: Charles Meeker, Pres.
PLANT SUPERINTENDENT: Lisa Bolender
Simulated meat products (analogs), substitute for pork and beef fats, sausage or beef patties; soy fiber; soyfoods, soymilk, drinks or beverages; tofu & tofu products, firm and medium firm, retail and bulk pack; other soy-based foods, sausage, link and patty; beef pattie.

Chew International
43 Fifth Avenue, New York, NY, 10003 U.S.A.
PH: 212/242-5242.
CONTACT: Ralph H. Chew, Pres.
Broker, cash/product. **EXPORTER:** Soy shortening & soy oil. **IMPORTER:** Soybeans.

C = Soybean Processor (Crusher)
R = Soybean Oil Refiner
SF = Edible Soy Products/Soyfoods
IP = Industrial Soy Products
★ Updated Listing
★★ New Listing

Clarkson Grain Co., Inc. ★★
MAIN OFFICE: Box 80, 320 East South St.,
Cerro Gordo, IL, 61818-0080 U.S.A.
PH: 217/763-2861; FAX: 217/763-2111.
OTHER OFFICES: Beardstown, IL
CONTACT: Mr. Lynn Clarkson, Pres.
Supplier of soybeans for food use; supplier of organically grown soybeans. **EXPORTER:** Soybeans for tofu, miso, natto and sprouts.

W. A. Cleary Products, Inc. ★
SF IP
Affiliate of W.A. Cleary Corporation
1049 Somerset Street, P.O. Box 10,
Somerset, NJ, 08873 U.S.A.
PH: 908/247-8000; FAX: 908/247-6977.
CONTACT: Margaret (Peggy) A. Cleary, Pres.
PLANT SUPERINTENDENT: Kerry Barry
CLEARATE lecithin (edible grade).
CONTACT: Evelyn
Lecithin (industrial grade) for paint.
CONTACT: John Christman
EXPORTER: Lecithin.

See Our Advertisement P. 31

Clofine Dairy & Food Products, Inc. ★ *SF*
1407 New Road, Box 335,
Linwood, NJ, 08221 U.S.A.
PH: 609/653-1000; FAX: 609/653-0127;
TLX: 132622 (CLOFINE DAIRY).
CONTACT: Richard Eluk
Soyfoods, frozen desserts; soymilk, drinks or beverages; SOYFINE LF & FF spray-dried soymilk; SOYFINE LF & FF spray-dried tofu; tofu & tofu products; other soy-based foods, dry tofu bases for frozen desserts, beverages, baking and salad dressings.

See Our Advertisements P. 51, 57

Colfax, Inc. ★ *R SF*
38 Colfax Street, Pawtucket, RI, 02860 U.S.A.
PH: 401/724-3800; FAX: 401/724-4313.
CONTACT: Michael B. Dressler, Treas.
PLANT SUPERINTENDENT: Gary Dressler
Refining cap. 600MT/day; storage cap. 4,500MT; edible soy oil products, hydrogenated soy oil, refined soybean oil. Soy oil products, COLFAX, GOLDLINE and private labels cooking/salad oil; COLFAX, GOLDLINE and private labels shortening. **EXPORTER:** Colfax soya oil; Colfax veg. shortening.

Colfax of Philadelphia, Inc.
R SF
38 Colfax Street, Pautucket, RI, 02850 U.S.A.
PH: 215/423-4242; FAX: 215/423-2231.
CONTACT: Gary R. Dressler, Mgr.
Crude degummed soybean oil, edible soy oil products; refined soybean oil; served by truck, barge, rail and ship. Soy oil products, COLFAX, YOLANDA, POPSIT PLUS cooking/salad oil.

Connell & Company
Part of The Connell Company
1100 Jorie Blvd., Suite 105,
Oak Brook, IL, 60521 U.S.A.
PH: 708/574-7781; FAX: 708/574-7783.
OTHER OFFICES: Westfield, NJ
CONTACT: Bob Linden, Vice Pres.,
Dir. of Mktng. & Consulting
Broker, cash/product.

Connell & Company
Part of The Connell Company
45 Cardinal Drive, Westfield, NJ, 07092 U.S.A.
PH: 908/233-0700; FAX: 908/233-1070.
OTHER OFFICES: Oak Brook, IL
CONTACT: Alfred Diaz, Vice Pres.
Broker, cash/product.

Consolidated Grain and Barge Company
100 N. Broadway, 18th Floor,
St. Louis, MO, 63102 U.S.A.
PH: 314/331-0500; FAX: 314/331-0506.
CONTACT: James Stitzlein, Mktng. Dev. Mgr.
Supplier of soybeans for food use.
EXPORTER: Soybeans; soybeans for food use.

Continental Grain Company ★★
GA Ports Authority, Garden City Terminal,
P.O. Box 1527, Savannah, GA, 31402 U.S.A.
PH: 912/964-8524; FAX: 912/964-6627.
CONTACT: Louis G. Reiser, Gen. Mgr.
EXPORTER: Soybeans; soybean meal.

Continental Grain Company
277 Park Avenue, New York, NY, 10172 U.S.A.
PH: 212/207-5530; FAX: 212/207-5261.
OTHER OFFICES: Guntersville, AL
CONTACT: Ronald L. Anderson, Sr. V.P. & Gen. Mgr.
Broker, cash/product.
EXPORTER: Soybean oil & meal.

Continental Grain Company, Processing Division *C*
2900 Lake Guntersville Park Drive,
Guntersville, AL, 35976 U.S.A.
PH: 205/582-9924.
CONTACT: William H. Yochum
Solvent extraction; crush cap. 1,400MT/day; storage cap. 3,000,000BU: crude degummed soybean oil, crude soybean oil, hulls, meal; served by barge, rail and truck.

Conway Oil Company *R SF IP*
1405 W. Washington Street,
Denison, TX, 75020 U.S.A.
PH: 903/465-3655; FAX: 903/465-2705.
CONTACT: John R. Davis, Pres.
Refining cap. 400MT/day; storage cap. 20,000MT; edible soy oil products, hydrogenated soy oil, refined soybean oil; served by truck and rail. Soy oil products, cooking/salad oil; margarine; salad dressing; shortening. Soy oil (industrial grade); soy sterols & tocopherols; soybean fatty acids.
CONTACT: Andy Wilson

Cooperative Elevator of Greenwood
2000 Garrard Avenue, P.O. Box 392,
Greenwood, MS, 38930 U.S.A.
PH: 601/453-5423.
OTHER OFFICES: Philipp, MS (Cooperative Elevator)
CONTACT: Lester A. Shipley, Jr., Gen. Mgr.
Broker, cash/product.

Country Brand Seeds, Inc. ★
4735 Sergeant Road,
Waterloo, IA, 50701 U.S.A.
PH: 319/233-5504; FAX: 319/233-9452.
CONTACT: James E. Dunn, Pres.
Soybean breeder; soybean seed supplier; supplier of soybeans for food use.
EXPORTER: Soybeans and soybean seed.

Country Grown Foods
C R SF IP
Formerly Specialty Grain Company, 12202 Woodbine, Redford, MI, 48239 U.S.A.
PH: 313/535-9222; FAX: 313/535-9712.
CONTACT: David Singsank, Mktng. Dir.
Continuous screw press; crude degummed soybean oil (organic), crude soybean oil, meal (organic); served by rail, ship and truck. Crude degummed soybean oil, organic, edible soy oil products; served by rail, ship & truck. Soy flour; soy grits; soyfoods, soy flakes; All OCIA certified organic only. Soy flour/soy protein (industrial grade); organic only, supplier of organically grown soybeans. **EXPORTER:** OCIA organic Clear Hilum soybeans; OCIA organic Corsoy soybeans; OCIA organic partial fat (6%) soy meal; soy flakes (organic); OCIA organic unrefined soy oil (degummed & not degummed).

Crawford Grain International Inc. ★★
14818 West Doyle, Manhattan, IL, 60442 U.S.A.
PH: 815/478-4962.
CONTACT: Ron Crawford, Jr., Vice Pres.
Soybean seed supplier (identity preserved soybeans, Vinton-Burlison); supplier of soybeans for food use (for natto, miso, and specialty soy food products). **EXPORTER:** Identity preserved soybeans for food use.

Cricklewood Soyfoods ★ *SF*
RD #1, Box 161, Mertztown, PA, 19539 U.S.A.
PH: 215/682-4109.
CONTACT: Karl Krummenoehl, Pres.
Soyfoods, tempeh, organic soy tempeh, soy-brown rice tempeh, 3 bean-3 grain tempeh, tempeh burger; other soy-based foods, BALANCE BURGER/CUTLET.
CONTACT: Renate Krummernoehl

Patrick Cudahy Inc. ★ *R SF IP*
3500 E. Barnard Avenue, P.O. Box 9990,
Cudahy, WI, 53110 U.S.A.
PH: 414/744-2000; FAX: 414/744-4213;
TLX: 269455.
CONTACT: Dean Jacobson, Asst. V.P.,
Edible Fats & Oils
Edible soy oil products, hydrogenated soy oil; industrial oil products; served by rail & truck. Soy oil products, shortening.
CONTACT: Charlie Brah
Soy oil (industrial grade).

Custom Food Products, Inc. *SF*
730 N. Albany Avenue,
Chicago, IL, 60612 U.S.A.
PH: 708/722-7500.
CONTACT: James W. Jones, Pres.
Soyfoods, other soy-based foods, dry gravy bases; binders for meat products.

D.C.A. Services Inc.
P.O. Box 9637, Santa Rosa, CA, 95405-3547 U.S.A.
PH: 707/538-5588.
CONTACT: Richard R. Glowe, Pres.
Broker, cash/product.

Dae Han Inc. *SF*
737 S E Alder St., P.O. Box 14242,
Portland, OR, 97214-2251 U.S.A.
PH: 503/233-8638; FAX: 503/233-8638.
CONTACT: Yeun M. Koo
PLANT SUPERINTENDENT: Yeun M. Koo
Extraction process, continuous screw; served by truck. Soyfoods, tofu & tofu products supplier of organically grown soybeans.

Dairyland Products, Inc. *SF*
5345 W. 125th Street, Savage, MN, 55378 U.S.A.
PH: 612/890-5305; FAX: 612/890-0638.
CONTACT: Thomas C. Sando, Pres.
Isolated soy proteins; soyfoods.

Dairyland Seed Company, Inc.
3570 Hwy. H, P.O. Box 958,
West Bend, WI, 53095 U.S.A.
PH: 414/338-0163; FAX: 414/626-2281.
OTHER OFFICES: Clinton, WI (Dairyland Research Int'l); Gibson City, IL (Corn Belt Research); Mt. Hope, WI (Dairyland Seed Processing)
CONTACT: Thomas G. Strachota, Vice Pres.
Soybean breeder; soybean seed supplier; supplier of soybeans for food use.

DeKalb Plant Genetics ★
3100 Sycamore Rd., DeKalb, IL, 60115 U.S.A.
PH: 815/756-7333.
OTHER OFFICES: Venezia-Mestre, ITALY
CONTACT: Charles W. Crum, V.P.,
Tech. Services Int'l.
Soybean breeder; soybean seed supplier.
EXPORTER: Soybean varieties, maturity group 0 thru IV.

Delta & Pineland Company
P.O. Box 157, Scott, MS, 38772 U.S.A.
PH: 601/742-3351; FAX: 601/742-3795.
CONTACT: Randy Dismuke, V.P.
Soybean breeder; soybean seed supplier.

DEVANSOY, INC. ★ *SF*
202 W. 7th St., Carroll, IA, 51401 U.S.A.
PH: 712/792-9665; FAX: 712/792-2712.
OTHER OFFICES: Manning, IA (mfg.)
CONTACT: Elmer Schettler, Pres.
Soy flour; textured soy flour; soyfoods, SOLAIT spray-dried soymilk, powdered soymilk beverage (24 oz. jars or 60 lb. bulk paks), spray-dried tofu powder.
CONTACT: Bev Tierney, Sales/Dist.
EXPORTER: Soymilk, dry.

See Our Advertisement P. 58

DMV USA ★ *SF*
Affiliate of DMV Campina
2340 Enterprise Ave., P.O. Box 1628,
La Crosse, WI, 54602-1628 U.S.A.
PH: 608/781-2345; FAX: 608/781-3299.
CONTACT: Ed Pedrick, Dir.
PLANT SUPERINTENDENT: Don Sykora
Hydrolyzed soy proteins; isolated soy proteins; soy fiber; partially defatted soy flour; full fat soy flour; textured soy flour; soy protein concentrates; soyfoods, soymilk, drinks or beverages (drink bases-bulk); spray-dried tofu; spray-dried soymilk. **EXPORTER:** Hydrolyzed soy proteins; isolated soy proteins; soy fiber; partially defatted soy flour; full fat soy flour; textured soy flour; soy protein concentrates; soyfoods, soymilk, drinks or beverages (drink bases-bulk); spray-dried tofu; spray-dried soymilk.

See Our Advertisement P. 59

Louis Dreyfus Corp.
10 Westport Road, Wilton, CT, 06897 U.S.A.
PH: 203/761-9700; FAX: 203/761-2375;
TLX: 697-5459.
CONTACT: Joseph Petrowski
Broker, cash/product. **EXPORTER:** Soybeans; soybean meal; soybean oil.

Dunn International, Ltd. ★
4735 Sergeant Road,
Waterloo, IA, 50701 U.S.A.
PH: 319/233-5504; FAX: 319/233-9452.
CONTACT: James E. Dunn, Pres.
Broker, cash/product; soybean seed supplier; supplier of soybeans for food use.
EXPORTER: Soybeans; soybean seeds.

Eastman Chemical Company *IP*
Eastman Road, P.O. Box 511,
Kingsport, TN, 37662 U.S.A.
PH: 615/229-4322; FAX: 615/229-1127;
TLX: 4995088 (TEC ECPI).
OTHER OFFICES: Rochester, NY (DPI)
CONTACT: Thomas Fields, Sr. Purchasing Engr.
Soy sterols & tocopherols.

Eden Foods, Inc. ★ *SF*
701 Tecumseh Road,
Clinton, MI, 49236 U.S.A.
PH: 517/456-7424; FAX: 517/456-7025.
OTHER OFFICES: Saline, MI (American Soy Products)
CONTACT: Nancy Potter, Pres.
Soyfoods, EDENSOY soymilk, drinks or beverages; soy sauce (EdenFoods).
EXPORTER: Dried soy beans. **IMPORTER:** Misos, soy sauces, organic, low sodium & traditional.

Ehrich Seed Farms, Inc.
R.R. 1 Box 47, Elmore, MN, 56027 U.S.A.
PH: 507/943-3762.
CONTACT: Jim Ehrich, Pres.
Soybean seed supplier; supplier of soybeans for food us. **EXPORTER:** Soybean seeds; soybeans for food use.

Ener-G Foods, Inc. ★ *R SF IP*
5960 1st Avenue, So., P.O. Box 84487,
Seattle, WA, 98124 U.S.A.
PH: 206/767-6660 or 800/331-5222;
FAX: 206/767-4088.
CONTACT: Sam M. Wylde III, Chman.
PLANT SUPERINTENDENT: Roger Traynor
Hydrogenated soy oil; refined soybean oil; edible soy oil products; served by barge, rail, ship and truck.
CONTACT: Bryant Konen
Hydrolyzed soy proteins; isolated soy proteins; lecithin (edible grade); simulated meat products (analogs); soy oil products, cooking/salad oil; shortening; soy fiber; defatted soy flour; partially defatted soy flour; full fat soy flour; textured soy flour; soy grits; soy protein concentrates; soyfoods, SOYQUIK soymilk, drinks or beverages. Soy flour/soy protein (industrial grade), full fat; soy oil (industrial grade).
CONTACT: Sam Wylde, III
Supplier of soybeans for food use: supplier of organically grown soybeans.

Energy Sprouts & Texas Tofu ★ *SF*
3602 High Point,
San Antonio, TX, 78217 U.S.A.
PH: 210/654-3963; FAX: 512/654-3989.
CONTACT: Bob Phipps, Pres.
Soyfoods, tofu & tofu products; other soy-based foods, soy sprouts.

Fandrich Supply Company
Highway 64, P.O. Box 86,
Belvidere, TN, 37306 U.S.A.
PH: 615/967-3377.
CONTACT: John S. Fandrich, Jr., Pres.
Soybean seed supplier; supplier of soybeans for food use. **EXPORTER:** Soybeans.

Fantastic Foods, Inc. ★ *SF*
1250 N. McDowell Blvd.,
Petaluma, CA, 94954-1113 U.S.A.
PH: 707/778-7801; FAX:707/778-7607;
TLX: 705077 (FANTASTIC UD).
CONTACT: Deborah Terre, R & D Mgr.
PLANT SUPERINTENDENT: *Jim Smith*
Soyfoods, other soy-based foods, TOFU SCRAMBLER, TOFU BURGER, TOFU CLASSICS (3 flavors), tofu helpers; FANTASTIC NOODLES (miso flavor); meals in a cup (most have miso base); vegetarian chili.
CONTACT: Barbara Chapman, Ntl. Sales, Mgr.

Farmers Commodities Corporation
P.O. Box 4887, Des Moines, IA, 50306 U.S.A.
PH: 515/223-3788;
FAX: 515/223-3701 or 223-3708.
OTHER OFFICES: Chicago, IL; Platteville, CO; Minnetonka, MN; Kansas City, MO; Omaha, NE; Spirit Lake, IA
CONTACT: Harold Richard, Pres.
Broker, cash/product.

Fearn Natural Foods *SF*
Affiliate of Modern Products, Inc.
3015 W. Vera Avenue, P.O. Box 09398,
Milwaukee, WI, 53209 U.S.A.
PH: 414/352-3333; FAX: 414/352-4478.
CONTACT: Anthony Palermo, C.E.O.
FEARN isolated soy proteins; FEARN lecithin (edible grade), liquid & granular; simulated meat products (analogs); full fat soy flour; textured soy flour; soy grits.

Feed Service Company, Inc. ★
303 Lundin Blvd., P.O. Box 698,
Mankato, MN, 56002-0698 U.S.A.
PH: 507/387-4464.
CONTACT: Thomas E. Cashman, Pres.
Broker, cash/product.

Fibred, Inc. *C SF*
10900 Day Rd., S.E.,
Cumberland, MD, 21502 U.S.A.
PH: 301/724-6050; FAX: 301/722-7131.
CONTACT: Fred Griffin, V.P. Sales
PLANT SUPERINTENDENT: Blair Deremer
Served by rail, truck. Soy fiber (FI-1, powder, 98% total dietary fiber).

Food Ingredients, Inc. ★ *SF*
535 Tollgate Road, Suites A & B,
Elgin, IL, 60123 U.S.A.
PH: 708/695-7717; FAX: 708/695-7986.
CONTACT: Robert A. Leonard, Exec. Vice Pres.
HI PRO full fat soy flour. Broker, cash/product.

The Food Plant *SF*
2889 Tradeswest,
Santa Fe, NM, 87501 U.S.A.
PH: 505/471-8979.
CONTACT: Richard Jennings, Dir.
Soyfoods, SOY LECHE soymilk, drinks or beverages; SOUTHWEST SOY, SANTA FE HARVEST tofu & tofu products; other soy-based foods, secondary soy products (tofu meat analogs).

Francis-Mustoe & Company ★★
MAIN OFFICE: 1440 N. Harbor Blvd., Suite 715.
P.O. Box 5355, Fullerton, CA, 92635 U.S.A.
PH: 714/992-6710; FAX: 714/992-5100.
OTHER OFFICES: Bridgewater, NJ
CONTACT: Kent Burrell, Pres.
Broker cash/product.

Fresh Tofu Inc. ★ *SF*
P.O. Box 1125, Easton, PA, 18044 U.S.A.
PH: 215/258-0883.
CONTACT: Gary Abramowitz, Pres.
Soyfoods, tofu & tofu products.

G & T Commodities, Inc.
103 E. 4th Street, P.O. Box 1057,
Rochester, MI, 48307 U.S.A.
PH: 313/656-1661; FAX: 313/656-0513.
CONTACT: George A. Enders, Pres.
Broker, cash/product.

Galaxy Cheese, Soyco Foods Div. *SF*
2441 Viscount Row, Orlando, FL, 32809 U.S.A.
PH: 1/800/441-9419, 407/855-5500;
FAX: 407/855-7485.
CONTACT: Christopher Morini, V.Pres.
Soyfoods, other soy-based foods, SOYCO and SOYMAGE soy cheese substitutes.

Gamac Grain Company, Inc.
7101 College Blvd., Suite 800,
Overland Park, KS, 66210-2315 U.S.A.
PH: 913/661-6100; FAX: 913/661-6159;
TLX: 238899 (GARN).
CONTACT: Terry Porter, Mgr., Soybean Dept.
EXPORTER: Soybeans, soybean meal & soybean oil.

Gateway Food Products Company *SF*
1728 N. Main Street, P.O. Box 278,
Dupo, IL, 62239 U.S.A.
PH: 314/231-9932.
CONTACT: Carroll Crosley, Pres.
Soy oil products, cooking/salad oil; shortening.

C = Soybean Processor (Crusher)
R = Soybean Oil Refiner
SF = Edible Soy Products/Soyfoods
IP = Industrial Soy Products
★ Updated Listing
★★ New Listing

General Spice ★ *SF*
238 St. Nicholas Avenue, P.O. Box 394,
South Plainfield, NJ, 07080 U.S.A.
PH: 908/753-9100; FAX: 908/753-9635.
OTHER OFFICES: Malden, MA; Detroit, MI
CONTACT: Werner F. Hiller, Pres.
PLANT SUPERINTENDENT: Saul Samber
BAKOTEX and SOTEX simulated meat products (analogs)—colored, uncolored, flavored & fortified items available; textured soy flour—colored, uncolored, flavored & fortified items available; soy grits, formulated into various other products; soy protein concentrates, texturized; soyfoods, other soy-based foods, PATTY BINDERS, seasoned & unseasoned, colored & uncolored, & fortified if necessary; bacon bits, flavored .

Golden Key Farms, Inc. ★
11705N 16000E, Kankakee, IL, 60940 U.S.A.
PH: 708/946-6686.
CONTACT: Frank L. Pilotte, Mgr.
Supplier of soybeans for food use; supplier of organically grown soybeans.

Golden Pacific, Inc.
Affiliate of Chieng Yu Co., Ltd.
2101 S. Hamilton Road,
Columbus, OH, 43232 U.S.A.
PH: 614/575-3066; FAX: 614/575-0460.
CONTACT: Judy Sheu, President
EXPORTER: Soy flakes.

Goods Inc., Mainland Oriental Express *SF*
4264 Shoreline Drive, P.O. Box 405,
Spring Park, MN, 55384 U.S.A.
PH: 612/471-8034; FAX: 612/471-8037.
CONTACT: Robert Housman, C.E.O.
Soy oil products, KENNEDY salad dressing; soyfoods, frozen desserts; MAINLAND EXPRESS soymilk, drinks or beverages; MAINLAND EXPRESS tofu & tofu products.

Grain States Soya, Inc. ★
C R IP
P.O. Box 157, West Point, NE, 68788 U.S.A.
PH: 402/372-2429.
CONTACT: Mark R. Knobbe, Gen. Mgr.
Continuous screw press; crush cap. 85MT/day; storage cap. 205MT; crude degummed soybean oil, crude soybean oil, meal (pellets & cubes), soybean cake; served by truck.
Refining cap. 20 MT/day; storage cap. 250MT; crude degummed soybean oil, industrial oil products; served by truck.Full fat soy flour/soy protein (industrial grade).

Granplex, Inc. ★
Affiliate of Nichimen Corporation
(Tokyo, JAPAN)
One S.W. Columbia Street, Suite 430,
Portland, OR, 97258-2005 U.S.A.
PH: 503/228-7559, 228-7550;
FAX: 503/228-3497; TLX: 36-0563.
CONTACT: Masaaki Hisatomi, Vice Pres.
EXPORTER: Soybeans.

Great Eastern Sun, Inc.
92 McIntosh Road,
Asheville, NC, 28806 U.S.A.
PH: 704/252-3090; FAX: 704/667-8051.
OTHER OFFICES: Rutherfordton, NC
(The American Miso Co.)
CONTACT: Donald E. DeBona, Pres.
IMPORTER: Soy sauce (shoyu and tamari) and miso.

Growmark Inc. ★★
1701 Towanda Avenue, P.O. Box 2500,
Bloomington, IL, 61701 U.S.A.
PH: 309/557-6288; FAX: 309/829-8532.
CONTACT: John McClenathan, Vice Pres.
Soybean seed supplier; supplier of soybeans for food use.

Carl R. Gurley Inc.
Hwy. 70, East, P.O. Box 995,
Princeton, NC, 27569 U.S.A.
PH: 919/936-7333 or 800/753-3800.
CONTACT: Carl Gurley, Pres.
Soybean seed supplier; supplier of soybeans for food use. **EXPORTER:** Edible soybeans.

Howard Hall Division *SF*
Affiliate of R.W. Greeff & Co., Inc.
777 West Putnam Avenue,
Greenwich, CT, 06830 U.S.A.
PH: 203/532-2900; FAX: 203/532-2980.
CONTACT: Howard E. Hall, Pres.
HIGH FIBER MICROSOY soy fiber.
EXPORTER: Soy fiber.

Jacob Hartz Seed Company, Inc.
No. Park Avenue, P.O. Box 946,
Stuttgart, AR, 72160 U.S.A.
PH: 501/673-8565 or 800/932-7333;
FAX: 501/673-1476.
CONTACT: Keith Thompson,
Food & Export Mgr.
Soybean breeder; soybean seed supplier; supplier of soybeans for food use.
EXPORTER: Soybean for food use.

Hawaiian Miso & Soy Company, Ltd. ★ *SF*
1714 Mary Street, Honolulu, HI, 96819 U.S.A.
PH: 808/841-7354.
CONTACT: William T. Higa, Pres.
Soyfoods, SHIRO KOJI miso.

Helena Chemical Company
6075 Poplar Avenue, K #500,
Memphis, TN, 38119-4720 U.S.A.
PH: 901/761-0050; FAX: 901/761-0133.
CONTACT: Richard Guthrie, Mgr., Seed Dept.
Soybean seed supplier.

Henkel Corporation, Emery Group ★ *R IP*
11501 Northlake Drive,
Cincinnati, OH, 45249 U.S.A.
PH: 513/530-7300; TLX: 155187 (EMERY);
FAX: 513/530-7581.
CONTACT: Robert B. Bellstrom
Industrial oil products. EMERY soybean fatty acids.

HIPro Food Products, Inc. ★ *SF*
775 Colorado Avenue So.,
Minneapolis, MN, 55416 U.S.A.
PH: 612/545-0151; FAX: 612/545-1638.
OTHER OFFICES: New Germany, MN (mfg.)
CONTACT: Robert F. Cross, Pres.
Soy fiber; full fat soy flour; full fat soy grits; both available as enzyme active or stabilized (trypsin inhibitor inactivated).

See Our Advertisement P. 60

Holsum Foods *SF*
Affiliate of Harvest States Cooperatives
919 14th Street,
Albert Lea, MN, 56007 U.S.A.
PH: 507/373-2431; FAX: 507/373-7069.
OTHER OFFICES: Waukesha, WI; Omaha, NE; Philadelphia, PA
CONTACT: Aaron Summers, Plant Mgr.
PLANT SUPERINTENDENT: Aaron Summers, Plant Mgr.
Soy oil products, cooking/salad oil; margarine; salad dressing; shortening. Holsum-Private Label.

Homer Oil Co., Inc. *C*
4 Center St., P.O. Box 412,
Homer, NY, 13077 U.S.A.
PH: 607/749-2609; FAX: 607/749-5636.
CONTACT: David Brown, V.P.
PLANT SUPERINTENDENT: David Brown
Continuous screw press; crude soybean oil; served by rail, truck.

Homestyle Foods *SF*
Affiliate of Welder Foods Cos.
2317 Bluebell Drive,
Santa Rosa, CA, 95403-2552 U.S.A.
PH: 707/525-8822; FAX: 707/579-3972.
OTHER OFFICES: 1191 South 3850 West, Salt Lake City, UTAH
CONTACT: David Burns, Vice Pres./Gen. Mgr.
Soyfoods, frozen desserts; tempeh; tofu & tofu products; other soy-based foods, tofu & tempeh salads and entrees; tofu desserts; dips & dressings.

Honeymead Products Company ★ *C R SF IP*
Affiliate of Harvest States Cooperatives
2020 S. Riverfront Drive, P.O. Box 3247,
Mankato, MN, 56002 U.S.A.
PH: 507/345-2251; FAX: 507/345-2254.
CONTACT: Dave Schostag, Vice Pres., Oil
PLANT SUPERINTENDENT: Jim Amlie, Sr. V.P., Operations
Solvent extraction; crush cap. 2,200MT/day; storage cap. 3,000,000MT; animal/livestock feed, hulls, meal, white flakes for edible purposes; served by rail and truck.
CONTACT: Gaylen Ferley.
Refining cap. 680MT/day; storage cap. 8,000 MT; edible soy oil products, hydrogenated soy oil, industrial oil products, refined soybean oil; served by truck and rail. Lecithin (edible grade); soy flour; soy oil products, cooking/salad oil, margarine, salad dressing; shortening (all sold in bulk); soyfoods, soy flakes.
CONTACT: Dave Schostag (for lecithin & soy oil)
Lecithin (industrial grade); soy flour/soy protein (industrial grade); soy oil (industrial grade).
CONTACT: Ed Senska (for flour)

Horizon Trading Company Inc.
1510 H Street, N.W.,
Washington, DC, 20005 U.S.A.
PH: 202/783-4455; FAX: 202/783-4465;
TLX: 248890 (HORN).
CONTACT: J. Browning Rockwell, Pres.
EXPORTER: Soymilk, tofu & tofu products, isolated soy protein, soybean oil, soy concentrates, soy flour.

House Foods & Yamauchi, Inc. ★ *SF*
526 Stanford Avenue,
Los Angeles, CA, 90013 U.S.A.
PH: 213/624-3615; FAX: 213/612-0281.
CONTACT: Harry Tanikawa, Sales Mgr.
Soyfoods, HINOICHI soymilk, drinks or beverages; tofu.

House of Tsang *SF*
185 Berry Street, Suite 5405,
San Francisco, CA, 94107 U.S.A.
PH: 415/243-9760; FAX: 415/243-0157.
CONTACT: William Sher, Dir. of Operations
Soyfoods, specialty flavored soy sauces.

Houston Calco Inc. ★ *C SF*
2400 Dallas Street,
Houston, TX, 77003 U.S.A.
PH: 713/236-8668; FAX: 713/236-1920.
CONTACT: Amy Huang
Continuous screw press; storage cap. 25 MT; meal; served by truck. Soyfoods, soymilk, drinks or beverages; tofu & tofu products.

Hudson Tank Terminals Corporation ★
Marsh & Export Streets, Building 173,
P.O. Box 2549, Newark, NJ, 07114 U.S.A.
PH: 201/465-1115; FAX: 201/465-9053;
TLX: 130026 (HUDSONTAK).
CONTACT: Liam Rogers, Mktg. Mgr.
EXPORTER: Soybean oil.
IMPORTER: Soybean oil.

See Our Advertisement P. 252

HYBCO, U.S.A. ★ *SF*
333 S. Mission Road,
Los Angeles, CA, 90033 U.S.A.
PH: 213/269-3111; FAX: 213/269-3130;
TLX: (RCA) 215485 (HYBC).
CONTACT: David Kashani, Man. Dir.
PLANT SUPERINTENDENT: Manouchehr Kashani
Soy oil products, cooking/salad oil, margarine, salad dressing, shortening.

Identity Seed & Grain Company ★
1325 N. Atlantic Avenue, Suite 34,
Cocoa Beach, FL, 32931 U.S.A.
PH: 407/783-7333; FAX: 407/799-0405.
CONTACT: David R. Kemmerer, Exec. Vice Pres.
Broker, cash/product; supplier of soybeans for food use. **EXPORTER:** Soybeans for tofu, miso, natto and sprouting.

See Our Advertisement P. 49

Illinois Foundation Seed ★
P.O. Box 722, Champaign, IL, 61824 U.S.A.
PH: 217/485-6260; FAX: 217/485-3687.
CONTACT: Lowell Mennenga, Sales Mgr.
PLANT SUPERINTENDENT: Richard Denhart
Soybean breeder; soybean seed supplier; supplier of soybeans for food use. **EXPORTER:** Soybean varieties in maturity groups I-IV.

INARI, Ltd. (International Nutrition & Resources, Inc.) ★ *SF*
1764 Crabtree Lane, Elkhart, IN, 46514 U.S.A.
PH: 219/266-1956; FAX: 219/264-6707.
CONTACT: Charles Follett, Pres.
PLANT SUPERINTENDENT: Glen Byron
Soyfoods, NUTTY NUGGETS soynuts (whole soybean snacks), flavored and confection coated; other soy-based foods, soynut butter, paste made from ground soynuts. **EXPORTER:** Soyfoods, NUTTY NUGGETS soynuts (whole soybean snacks), flavored and confection coated; other soy-based foods, soynut butter, paste made from ground soynuts.

International Farmers Grain Inc. ★
460 West 34th Street,
New York, NY, 10001 U.S.A.
PH: 212/947-8585; FAX: 212/629-3147;
TLX: 12319 (EAST EUR NYK).
CONTACT: Dr. Robert Ross
Broker, cash/product. **EXPORTER:** Soybeans; soybean meal 44% & 48%.

International Proteins Corporation
25 Just Road, P.O. Box 1169,
Fairfield, NJ, 07007 U.S.A.
PH: 201/227-2714; FAX: 201/227-6533;
TLX: 178010 (MAPCO).
OTHER OFFICES: Fresno, CA; Santiago, CHILE
CONTACT: Eric H. Jackson, Vice Pres.
EXPORTER: Soybeans; soybean meal.
IMPORTER: Soybeans & soybean products.

Island Spring, Inc. ★ *SF*
18846 103rd Street, S.W., P.O. Box 747,
Vashon, WA, 98070 U.S.A.
PH: 206/463-9848; FAX: 206/463-5670.
CONTACT: W.M. Luke Lukoskie, CEO
Soyfoods, ISLAND SPRING soymilk (plain); tofu, 5 types; other soy-based foods, ISLAND SPRING tofu burgers; ISLAND SPRING tofu pasta; ISLAND SPRING Rollums.

C. Itoh & Company, (America) Inc.
Affiliate of C. Itoh & Co., Ltd.
335 Madison Avenue,
New York, NY, 10017 U.S.A.
PH: 212/818-8310; FAX: 212/818-8328.
CONTACT: Kohji Nagasaka, Vice Pres.
IMPORTER: Soybeans.

JFC International Inc. *SF*
Affiliate of Kikkoman Corporation, Japan
540 Forbes Blvd., P.O. Box 7251,
San Francisco, CA, 94120 U.S.A.
PH: 415/871-1660; FAX: 415/952-3272.
OTHER OFFICES: Los Angeles, CA; Chicago, IL; New York, NY (Tokyo Foods, mfg.)
CONTACT: Thomas Sugihara, Vice Pres., Mkting. Mgr.
Soyfoods, tofu & tofu products.Broker, cash/product.

JMS Seed Company
Affiliate of Biotechnica Agriculture Inc.
105 Pine Street, P.O. Box 211,
Dieterich, IL, 62424 U.S.A.
PH: 217/925-5212; FAX: 217/925-5210.
CONTACT: Ron Prinz, Gen. Mgr.
Soybean breeder; soybean seed supplier.
EXPORTER: Proprietary soybean seed.

Kapaa Pol Factory *SF*
RR 1 Box 366, Kapaa/Kauai, HI, 96746 U.S.A.
PH: 808/822-5426.
CONTACT: Ken Fujinaga
Soyfoods, tofu & tofu products.

Karlshamns USA Inc. *SF IP*
Subsidiary of Karlshamns A.B., Sweden
525 W. 1st Avenue, P.O. Box 569,
Columbus, OH, 43216-0569 U.S.A.
PH: 614/299-3131; FAX: 614/299-2584;
TLX: 25494 (CAPCTY PRD COL).
CONTACT: John B. LaFontaine, Pres.
PLANT SUPERINTENDENT: James E. Willits, Vice Pres., Operations
Soy oil products, cooking/salad oil; margarine, shortening.
CONTACT: Frank Stynes.
Industrial soy oil for paints; soybean fatty acids for paints and lecithin thinner.
CONTACT: R. T. Edwards.

Kikkoman Foods, Inc. *SF*
Hwy. 14 & Six Corners Road, P.O. Box 69,
Walworth, WI, 53184 U.S.A.
PH: 414/275-6181; FAX: 414/275-9452.
CONTACT: William Nelson, Vice Pres.
Soyfoods, KIKKOMAN soy sauce; other soy-based foods, KIKKOMAN teriyaki sauce.

Kraft Food Ingredients Corp. *R SF*
Affiliate of Kraft General Foods
1161 Oak River Road,
Memphis, TN, 38120 U.S.A.
PH: 901/682-8085; FAX: 901/766-2120.
OTHER OFFICES: Memphis, TN; Sherman, TX; Jacksonville, IL; Champaign, IL
CONTACT: W. D. Cox, Vice Pres.
Oil Procurement
Hydrogenated soy oil, refined soybean oil; served by truck and rail. Soy oil products, cooking/salad oil; margarine; salad dressing; shortening.

L.J.B. Enterprises, Inc. ★ *SF*
P.O. Box 1251, 2129 41st St., Suite A,
Los Alamos, NM, 87544 U.S.A.
PH: 505/662-4699; FAX: 505/662-4699.
CONTACT: Leroy J. Binder, President
Simulated meat products (analogs), GOLDEN AGE meatless "meat".

Lauhoff Grain Company *C SF*
Affiliate of Bunge Corporation
321 E. North Street, P.O. Box 571,
Danville, IL, 61834 U.S.A.
PH: 217/442-1800.
CONTACT: Richard T. Pittelkow, Pres.
Solvent extraction; crush cap. 3000MT/day; storage cap. 12,000,000BU; crude soybean oil, hulls, meal; served by rail and truck.crude nondegummed soybean oil; served by rail and truck. Soy fiber; soy flour; soy grits.
CONTACT: Robert L. Linn

Lecanto Tofu Shop *SF*
Affiliate of Day, Inc.
2601 NW 23rd Blvd, Apt. 204,
Gainesville, FL, 32605-2937 U.S.A.
PH: 904/496-3714.
CONTACT: Donald Young, Pres.
PLANT SUPERINTENDENT: Donald Young
Soyfoods, tofu & tofu products, water- & vacuum-packed (soft & firm), baked & yeast baked tofu.
CONTACT: Greg Young

Lee Seed Company, Inc. ★ *SF*
RR1, P.O. Box 14, Inwood, IA, 51240 U.S.A.
PH: 712/753-4403.
CONTACT: Joyce Lee, Pres.
Soyfoods, SUPER SOYNUTS soynuts (whole soybean snacks), 10 flavors, available packaged or bulk.

Legume, Inc. *SF*
112 Main Road,
Montville, NJ, 07045-9777 U.S.A.
PH: 201/263-1013.
CONTACT: Gary Barat
Soyfoods, other soy-based foods, LEGUME frozen entrees; BARAT tofu chocolate.

Lever Brothers Company *SF*
Affiliate of Unilever, London & Rotterdam
390 Park Avenue, 4th Floor,
New York, NY, 10022 U.S.A.
PH: 212/906-4743; FAX: 212/644-4980;
TLX: (MCI/RCA) 666113 (LBCOM).
CONTACT: David Italiaander, Mgr., Fats & Oil Trading
Soy oil products, IMPERIAL, PROMISE, SHEDD'S SPREAD, MRS. FILBERTS, I CAN'T BELIEVE IT'S NOT BUTTER margarine.

Lightlife Foods, Inc. ★ *SF*
74 Fairview Street, P.O. Box 870,
Greenfield, MA, 01302 U.S.A.
PH: 413/774-6001; FAX: 413/772-2682.
CONTACT: Michael Cohen, Pres.
TOFU PUPS® (meatless frankfurters), SMARTDOGS™ (fat-free meatless franks), SMART DELI® (fat-free deli slices), FAKIN BACON®, FAKIN BACON® BITS, AMERICAN GRILL™ (vegetarian burger) simulated meat products (analogs); soyfoods, TEMPEHWORKS™ tempeh,6 varieties.
CONTACT: Richard McKelvey, Sales & Mktg. Mgr.

Litetrends Company, Inc. ★ *SF*
1430 Progress Way, Suite 101,
Eldersburg, MD, 21784 U.S.A.
PH: 410/795-1008; FAX: 410/795-1009.
CONTACT: Ed Walker, Chmn.
PLANT SUPERINTENDENT: Andy Wilks
Soyfoods, tofu & tofu products, second generation tofu products.
CONTACT: Andy Wilks, Vice Pres.

C = Soybean Processor (Crusher)
R = Soybean Oil Refiner

SF = Edible Soy Products/Soyfoods
IP = Industrial Soy Products

★ Updated Listing
★★ New Listing

O. H. Little Company
P.O. Box 5099,
Shreveport, LA, 71135-5099 U.S.A.
PH: 318/865-5580; FAX: 318/869-0175.
CONTACT: Chuck Prince, Pres.
Broker, cash/product.

Living Farms ★
187 4th Street, P.O. Box 50,
Tracy, MN, 56175 U.S.A.
PH: 507/629-4431; NAT WATS: 800/533-5320;
FAX: 507/629-4253.
CONTACT: Ardell Anderson
Broker, cash/product; supplier of soybeans for food use; supplier of organically grown soybeans. **EXPORTER:** Organically grown soybeans for food use.

Lockhart Grain & Fertilizer Company, Inc.
Port Elevator - White River,
200 Campbell Street, P.O. Box 521,
Augusta, AR, 72006 U.S.A.
PH: 501/347-2581; FAX: 501/347-5174.
CONTACT: Bob Brannon
Broker, cash/product; supplier of soybeans for food use. **EXPORTER:** Soybeans (bulk).

Lou Ana Foods, Inc. *R SF IP*
Affiliate of Schad Industries, Inc.
P.O. Box 591,
Opelousas, LA, 70571-0591 U.S.A.
PH: 318/948-6561; FAX: 318/942-6239;
TLX: 58-6645 (LAF/OPLS).
OTHER OFFICES: Kingwood, TX
CONTACT: James Boswell, Vice Pres., Indus. Sales
Edible soy oil products, hydrogenated soy oil, industrial oil products; refined soybean oil; served by truck, ship and rail. Soy oil products, LOU ANA cooking/salad oil (bulk, institutional & retail). Soy oil (industrial grade).

Loveland Industries, Inc. *IP*
14520 Weld Co Road #64, P.O. Box 1289,
Greeley, CO, 80632 U.S.A.
PH: 303/356-8920; FAX: 303/356-8926.
CONTACT: Larry Jenkins
Lecithin (industrial grade); soy oil (industrial grade).

Lucas Meyer, Inc. ★ *SF IP*
Affiliate of Lucas Meyer GmbH & Company
765 E. Pythian Avenue, P.O. Box 3218,
Decatur, IL, 62524 U.S.A.
PH: 217/875-3660; FAX: 217/877-5046.
CONTACT: Scott Hagerman
PLANT SUPERINTENDENT: Howard Bleschke
M-C-THIN, EPIKURON, METARIN lecithin (edible grade); soy fiber; NURUPAN soy flour; defatted soy flour; partially defatted soy flour; full fat soy flour; NURUPAN soy grits; soyfoods, NURULAT soymilk, drinks or beverages.
CONTACT: David Rosenbery
LECIWET, EMULMETIK, COLOROL, FORBEST, M-C-THIN lecithin (industrial grade).
CONTACT: Fred Zilz

Lumen Food Corporation ★ *SF*
409 Scott Street, P. O. Box 350,
Lake Charles, LA, 70601 U.S.A.
PH: 318/436-6748; FAX: 318/436-1769.
CONTACT: Greg Caton, Pres.
HEARTLINE MEATLESS MEATS, CAJUN JERKY simulated meat products (analogs).
EXPORTER: Soybean products.

Mallet & Company, Inc. ★ *SF*
Bell Avenue & Roslyn Road, P.O. Box 474,
Carnegie, PA, 15106 U.S.A.
PH: 412/276-9000; FAX: 412/276-9002.
CONTACT: Aaron E. Margolis, Exec. Vice Pres.
PLANT SUPERINTENDENT: J. Galicic
Soy oil products, MELLO GOLD, MELLOW SUPREME cooking/salad oil; SATIN GLO, PRIME FRY, FRY WELL shortening; soyfoods, other soy-based foods, PAN & GRIDDLE GOLD, GOURMET, SUNSHINE, POPNGOLD & SPARKLE popcorn oils; VEGALUBES bread pan oils; THRIFTEE cake depanning compounds; bread divider oils; trough greasers.
CONTACT: F. Sichok or J. Reichel

Mandarin Soy Sauce, Inc. ★ *SF*
419 North Street,
Middletown, NY, 10940 U.S.A.
PH: 914/343-1505; FAX: 914/343-0731.
CONTACT: Michael Wu, Vice Pres.
Soyfoods, WANJASHAN soy sauce; other soy-based foods, hoisin sauce, bean sauce.

Marubeni America Corporation ★
200 Park Avenue, New York, NY, 10166 U.S.A.
PH: 212/599-3755; TWX: (WU) 012424;
FAX: 212/599-3987.
CONTACT: T. Ishigami, Mgr., Oilseed Dept.
EXPORTER: Soybeans, soybean oil, soybean meal. **IMPORTER:** Soybeans, soybean oil, soybean meal.

Maywood Holdings, Inc. ★
990 N. Corporate Drive, #222,
New Orleans, LA, 70123 U.S.A.
PH: 504/436-2000; FAX: 504/734-7136;
TLX: 6821248 (MAYWOOD).
CONTACT: Jacques Brazy, Pres.
PLANT SUPERINTENDENT: Douglas R. Bernard, Vice Pres.
EXPORTER: Soybeans, soybean oil, soybean meal.

MBS Inc.
P.O. Box 308, Ames, IA, 50010 U.S.A.
PH: 515/296-2676; FAX: 515/296-2688;
TLX: 5101007164.
CONTACT: John Mathias, Int'l. Mkting. Mgr.
Broker, cash/product; soybean seed supplier, supplier of soybeans for food use.

Mercantile Food Company ★
4 Old Mill Road, P.O. Box 1140,
Georgetown, CT, 06829-1140 U.S.A.
PH: 203/544/9891 FAX: 203/544-8409.
CONTACT: Lynda Rockwell, Purchasing Mgr.
Supplier of organically grown soybeans (domestic & export).
EXPORTER: Corsoy soybeans (organic).

Merchants Cold Storage Company
1305 E Houston Street, P.O. Box 828,
San Antonio, TX, 78293 U.S.A.
PH: 512/227-0244; FAX: 512/227-7468.
CONTACT: Charles Emrick
PLANT SUPERINTENDENT: Charles Emrick, Jr.
IMPORTER: Public refrigerated warehouse-cooler & freezer storage 1,800,000 cu. ft.

Metamora Elevator Company ★★ *C*
3822 State Route 120, P.O. Box G,
Metamora, OH, 43540 U.S.A.
PH: 419/644-4711; FAX: 419/644-6032.
CONTACT: Scott Duncan, Mgr.
PLANT SUPERINTENDENT: Fred Duncan
Continuous screw press or expeller; crush cap. 109MT/day; storage cap. 1 million BU; crude soybean oil, meal; served by rail and truck.

The Miami Margarine Company ★ *SF*
5226 Vine Street,
Cincinnati, OH, 45217 U.S.A.
PH: 513/242-2310; FAX: 513/242-2310.
CONTACT: James K. Heldrich, Jr., CEO
PLANT SUPERINTENDENT: Bob Williams
Soy oil products, cooking/salad oil, margarine, shortening (retail, food service & industrial).
CONTACT: Kevin P. McDole, Sales Mgr.
EXPORTER: Margarine; shortening; cooking/salad oil.

Michigan Soy Products ★★ *SF*
1213 North Main,
Royal Oak, MI, 48067 U.S.A.
PH: 313/544-7742.
CONTACT: Dorothy Hwang
Soyfoods; soymilk, drinks or beverages; tofu & tofu products.

Midwest Soya International, Inc. ★
814 N. 5th Street, P.O. Box 537,
Clear Lake, IA, 50428 U.S.A.
PH: 515/357-6131; FAX: 515/357-7168.
OTHER OFFICES: Thornton, IA
CONTACT: Kim F. Pleggenkuhle, Mgr.
Soybean seed supplier; supplier of soybeans for food use. **EXPORTER:** Food soybeans for tofu, miso and tempeh & natto.

Mighty Soy, Inc. ★ *SF*
1227 S. Eastern Ave.,
Los Angeles, CA, 90022 U.S.A.
PH: 213/266-6969;
CONTACT: Maung Myint, Pres.
PLANT SUPERINTENDENT: Mr. Michael Lee
Soyfoods, soymilk, drinks or beverages; tofu & tofu products.

Mills Brothers International, Inc.
7066 S. 188th Street,
Kent, WA, 98032 U.S.A.
PH: 206/575-3000; FAX: 206/251-0744;
TLX: (RCA) 298555 (MILLS UR).
CONTACT: Eric Mills, Vice Pres.
Broker, cash/product; supplier of soybeans for food use. **EXPORTER:** Soybeans; soybean meal; soy flour.
IMPORTER: Soybeans; soybean meal.

Minnesota Edamame Co. ★★ *SF*
Rt. 1 Box 53A, Jackson, MN, 56143 U.S.A.
PH: 507/847-3591; FAX: 507/847-5094.
CONTACT: Robert Luedtke, Dir.–Proj. Mgmt.
PLANT SUPERINTENDENT: Dave Hansen
Soyfoods, MINNESOTA EDAMAME. Soybean seed supplier; supplier of soybeans for food use; supplier of organically grown soybeans.
EXPORTER: Tofu, edamame.

Minnesota Soybean Growers Association ★
360 Pierce Avenue, Suite 110,
N. Mankato, MN, 56003 U.S.A.
PH: 507/388-1635; FAX: 507/388-6751.
CONTACT: Bonnie McCarvel, Exec. Dir.
Soybean seed supplier, supplier of soybeans for food use.
EXPORTER: Soybeans for food use.

Minnesota Waxy ★ *C SF IP*
Affiliate of M.W.C.G. Export Company
Elevator Avenue, P.O. Box 128,
Hope, MN, 56046 U.S.A.
PH: 507/451-3316; FAX: 507/451-2910.
CONTACT: Bruce Waugh, Mgr.
Meal; served by barge, rail, ship, truck.
Soyfoods, SOY-SUPREME soymilk, drinks or beverages; SOY-SUPREME spray-dried soymilk; SOY-SUPREME spray-dried tofu; SOY-SUPREME tofu & tofu products; soy flour; full fat soy flour.Industrial products, full fat soy flour.
CONTACT: Allan Routh
Broker, cash/product; supplier of soybeans for food use; supplier of organically grown soybeans. **EXPORTER:** Soybeans for soymilk, tofu and natto; soybeans for food uses; soymilk powder; spray-dried tofu.

Mississippi River Grain Elevator, Inc.
200 Carondelet Street, Suite 1900,
New Orleans, LA, 70130 U.S.A.
PH: 504/592-4600; FAX: 504/525-5937;
TLX: (MCI) 6822036.
CONTACT: Al Iliss
Broker, cash/product.

Mitsubishi International Corp.
Affiliate of Mitsubishi Corp.
Foods A Division, 520 Madison Avenue,
New York, NY, 10022 U.S.A.
PH: 212/605-2572; FAX: 212/605-2476;
TLX: 710-581-6762.
OTHER OFFICES: Portland, OR;
San Francisco, CA
CONTACT: Syunji Takase, Gen. Mgr.
Broker, cash/product. **EXPORTER:** Soybean oil.

Mitsui & Co. (USA), Inc.
Affiliate of Mitsui & Company, Ltd.
303 East Ohio Street, 28th Floor, Time Life Bldg., Chicago, IL, 60611-3392 U.S.A.
PH: 312/670-3370; FAX: 312/670-2494.
OTHER OFFICES: Portland, OR
CONTACT: Hiroshi Tokunaga, Asst. Gen. Mgr.
EXPORTER: Soybeans; soybean oil; soybean meal.

Miyako Oriental Foods, Inc. ★ *SF*
Affiliate of Yamajirushi—Jyoza K.K., Japan
4287 Puente Avenue,
Baldwin Park, CA, 91706 U.S.A.
PH: 818/962-9633; FAX: 818/814-4569.
CONTACT: Teruo Shimizu, Vice Pres.
Soyfoods, edamame; COLD MOUNTAIN miso. YAMAJIRUSHI miso.

Morinaga Nutritional Foods, Inc. ★ *SF*
2050 W. 190th St., Suite 110,
Torrance, CA, 90504 U.S.A.
PH: 310/787-0200; FAX: 310/787-2727.
CONTACT: Arthur Mio, Nat'l Sales Mgr.
Soyfoods, MORI-NU aseptically packaged tofu.

Mycal Group/Nichii America ★ *SF*
Affiliate of Nichii Company, Ltd., Osaka, Japan
MAIN OFFICE: 23440 Hawthorne Blvd.,
Skypark 2, Suite 140,
Torrance, CA, 90505 U.S.A.
PH: 310/791-0010; FAX: 310/791-0018.
OTHER OFFICES: Jefferson, IA (mfg.)
CONTACT: Al Richardson, Dir. of Mktg.
Hulls; soy flour, full fat; soyfoods, soy flakes, full fat; supplier of soybeans for food use; supplier of organically grown soybeans.
EXPORTER: Natural dehulled soybean flakes & flour, organic and nonorganic.

See Our Advertisements P. 37, 61

Mycal Group/Nichii America ★ *SF*
Affiliate of Nichii Company, Ltd., Osaka, Japan
21 Mycal Drive, Jefferson, IA, 50129 U.S.A.
PH: 515/386-2100; FAX: 515/386-3287.
OTHER OFFICES: Torrance, CA
CONTACT: John Baranowski, Operations, Plant Supt.
PLANT SUPERINTENDENT: John Baranowski
Hulls; soy flour, full fat; soyfoods, soy flakes, full fat; supplier of soybeans for food use; supplier of organically grown soybeans.
EXPORTER: Natural dehulled soybean flakes & flour, organic and nonorganic.

Nasoya Foods ★ *SF*
23 Jytek Pk., P.O. Box 841,
Leominster, MA, 01453 U.S.A.
PH: 508/537-0713; FAX: 508/537-9790.
CONTACT: John Paino, Pres.
PLANT SUPERINTENDENT: Bob Bergwall
Soyfoods, soymilk, drinks or beverages; tofu; other soy-based foods, vegi dressings; vegi-dips; NAYONAISE.

National Sun Industries, Inc. *C*
7760 France Avenue, So., Suite 850,
Minneapolis, MN, 55435 U.S.A.
PH: 612/831-6855; FAX: 612/831-6443;
TLX: 6879112 (CMSHP).
OTHER OFFICES: Enderlin, ND (National Sun Industries, Inc.) (mfg.)
CONTACT: John Burritt, Exec. Vice Pres.
Continuous screw press; crush cap. 820MT/day; storage cap. 600,000BU; crude degummed soybean oil; served by rail and truck.
CONTACT: Don Lemm
EXPORTER: Soybeans, meal & oil.
IMPORTER: Soybeans, meal & oil.

Natural, Inc. ★ *SF*
6650 Santa Barbara Road,
Elkridge, MD, 21227 U.S.A.
PH: 410/796-3211; FAX: 410/796-3977.
CONTACT: William Tsai, Gen. Mgr.
Soyfoods, tofu & tofu products, vacuum and water pack (bk) tofu; other soy-based foods, NECTA soy; tofu burger; vegi burger; tofu nuggets.

Natural Pacific Tofu *C SF*
153 Makaala Street, P.O. Box 11001,
Hilo, HI, 96721 U.S.A.
PH: 808/935-3220.
CONTACT: Tyler Katibah, Owner
Hydraulic press, storage cap. 700BU. Soy oil products, salad dressing; soyfoods, miso; tempeh; tofu & tofu products, other soy-based foods, tofu snacks, tofu dip.

Nikken Foods Company Ltd.
1374 Clarkson Clayton Center, Suite 319,
Ellisville, MO, 63011 U.S.A.
PH: 314/532-1019; FAX: 314/527-5057;
TLX: 7101111912.
CONTACT: Herbert Bench, Pres.
IMPORTER: Fermented Japanese soy sauce.

Nissho Iwai American Corporation ★
1211 Avenue of the Americas,
New York, NY, 10036 U.S.A.
PH: 212/704-6844; FAX: 212/704-6838;
TLX: (WU) 127090 (NIAC NYK).
OTHER OFFICES: Tokyo, JAPAN
CONTACT: H. Kawasaki, Sr. Mgr.
EXPORTER: *Edible purpose soybean tofu/* natto; soy lecithin; soy flour.
IMPORTER: Edible purpose soybean tofu/ natto; soy lecithin; soy flour.

Northern Soy *SF*
545 West Avenue,
Rochester, NY, 14611 U.S.A.
PH: 716/235-8970; FAX: 716/235-3753.
CONTACT: Norman Holland, Pres.
PLANT SUPERINTENDENT: Andrew Schecter, Vice Pres.
Soyfoods, SOYBOY tempeh; SOYBOY tofu & tofu products.

Northrup King Company
P.O. Box 959, Minneapolis, MN, 55440 U.S.A.
PH: 612/593-7333; FAX: 612/593-7165.
CONTACT: Kip Pendleton,
Soybean Produce Mgr.
Soybean seed supplier.

Nutri Meal Products Company ★ *C SF*
10288 Wilmington Road,
Clarksville, OH, 45113 U.S.A.
PH: 513/289-2131; FAX: 513/289-2132.
CONTACT: John A. Settlemyre, Pres.
White flakes for edible purposes. Soy flour; textured soy flour.

Nutricia - Loma Linda *SF*
11503 Pierce Street,
Riverside, CA, 92505 U.S.A.
PH: 714/687-7800; FAX: 714/689-5124.
OTHER OFFICES: Mt. Vernon, OH
CONTACT: Steven de Clercq, Pres.
Soyfoods, other soy-based foods, SOYALAC, I-SOYALAC Infant formula.

Oilseeds International Ltd. ★★ *R SF*
MAIN OFFICE: P.O. Box 2799,
San Francisco, CA, 94126 U.S.A.
PH: 415/956-7251; FAX: 415/394-9023.
OTHER OFFICES: Fresno, CA
CONTACT: John Gyulai, Vice Pres.
PLANT SUPERINTENDENT: Chris Kopas
Refining cap., 115MT/day; refined soybean oil; served by rail and truck. Soy oil products, cooking/salad oil.

Okura & Company (America), Inc. ★★
450 Lexington Avenue, Ste. 1460,
New York, NY, 10017-3904 U.S.A.
PH: 212/450-0040; FAX: 212/450-0045.
CONTACT: Ken Asami
EXPORTER: Edible soybeans (special varieties for Japanese market).

The Original Pizsoy ★ *SF*
P.O. Box 1314, Cherry Hill, NJ, 08034 U.S.A.
PH: 609/354-2267; FAX: 609/354-8335.
CONTACT: Robert Savar, Owner
Soyfoods, tofu & tofu products (PIZSOYS).

Ota Tofu Company *SF*
812 S.E. Stark Street,
Portland, OR, 97214 U.S.A.
PH: 503/232-8947.
CONTACT: Eileen Ota, Owner
Soyfoods, tofu; other soy-based foods, age.

P.A.T.M. Company ★
RR #2, P.O. Box 1, Swan, IA, 50252 U.S.A.
PH: 515/848-3760; FAX: 515/848-3760.
CONTACT: Douglas Downing, Pres.
Supplier of soybeans for food use; supplier of organically grown soybeans.
EXPORTER: Soybeans, soymilk.

C = Soybean Processor (Crusher)
R = Soybean Oil Refiner

SF = Edible Soy Products/Soyfoods
IP = Industrial Soy Products

● Updated Listing
★★ New Listing

Pacific Foods *SF*
19480 S.W. 97th Avenue,
Tualatin, OR, 97062 U.S.A.
PH: 503/692-9666; FAX: 503/692-9610.
CONTACT: Patrick Carey, Vice Pres., Sales & Mkting.
PLANT SUPERINTENDENT: Chuck Gray
PACIFIC soy protein concentrates; soyfoods, soymilk, drinks or beverages; PACIFIC spray-dried tofu; other soy-based foods, various.

Pacific Soybean & Grain ★
One Sutter Street, Suite 300,
San Francisco, CA, 94104 U.S.A.
PH: 415/433-0867; FAX: 415/433-9494.
CONTACT: Daniel J. Burke, Pres.
Broker, cash/product; soybean breeder; soybean seed supplier; supplier of soybeans for food use; supplier of organically grown soybeans. **EXPORTER:** Soybeans (varietal pure) and organic.

See Our Advertisements P. 48, 149

Pagaza & Sons Company ★
5400 Mitchelloale B8,
Houston, TX, 77092 U.S.A.
PH: 713/680-2152; FAX: 713/680-1446.
OTHER OFFICES: Mexico City, MEXICO
CONTACT: Jose M. Pagaza, Pres.
Broker, cash/product. **EXPORTER:** Soybean oil (crude). **IMPORTER:** soybean oil (refined).

Panda Food Products, Inc. *SF*
R.D. #2, Box 168, Goshen, NY, 10924 U.S.A.
PH: 914/651-4490; FAX: 914/651-4480.
CONTACT: Henri Creces, Gen. Mgr.
PLANT SUPERINTENDENT: Henri Creces
Soyfoods, tofu & tofu products, firm, soft, spicy and herb (all vacuum packed); other soy-based foods, tofu for cheese and ice cream processing.

PdT International, Inc.
323 W. Schlieman Avenue,
Appleton, MN, 56208 U.S.A.
PH: 612/289-1981; FAX: 612/289-1982.
CONTACT: Otto Schmid, Pres.
Supplier of soybeans for food use. **EXPORTER:** Variety specific soybeans for food use.

PEDCO ★★ *SF*
270 7th Street, Wheeling, IL, 60090 U.S.A.
PH: 708/541-5513.
CONTACT: Ralph De Weese
Soyfoods, DEWEESE NUTTY SOYS soynuts (whole soybean snacks).

Pendleton Oil Mill, Inc. *C*
349 E. Main Street, P.O. Box 38,
Pendleton, SC, 29670-0038 U.S.A.
PH: 803/646-3294.
CONTACT: John Sitton, Exec. Vice Pres.
Hydraulic press; storage cap. 75,000BU; meal, (mealcake for fish bait); served by rail and truck.

Penta Manufacturing Company, Inc. *R SF IP*
Affiliate of Penta International Corp.
P.O. Box 1448, Fairfield, NJ, 07007 U.S.A.
PH: 201/575-7475; FAX: 201/575-8907;
TLX: (RCA) 219472 (PENT UR).
CONTACT: George M. Volpe, Sr. Vice Pres.
Refining cap. 5,000MT/day; storage cap. 20,000/GAL; edible soy oil products, fractionated soy oil, hydrogenated soy oil, refined soybean oil; served by ship and truck. Lecithin (edible grade), liquid and powder; soy oil products, cooking/salad oil; salad dressing. Lecithin (industrial grade); soy oil (industrial grade) for lubricants.

Perdue Farms, Inc. ★ *C*
P.O. Box 1537, Salisbury, MD, 21801 U.S.A.
PH: 410/543-3847; FAX: 410/543-3902.
OTHER OFFICES: CoField, NC (C)
CONTACT: Richard L. Willey, V.P., G.M., Grain/Oilseed Div.
Solvent extraction; crush cap. 1000MT/day; storage cap. 5 millionBU; animal/livestock feed, crude soybean oil, hulls, meal; served by barge, rail and truck.
CONTACT: Harold Shockley
Refining cap. 380MT/day; hydrogenated soy oil, refined soybean oil; served by rail and truck.
CONTACT: Keith Darby

Perdue, Inc. ★ *C*
Affiliate of Perdue Farms, Inc.
Route 1, Box 119H, CoField, NC, 27922 U.S.A.
PH: 919/358-0311.
CONTACT: Billy Mizelle
Solvent extraction; crush cap. 700MT/day; storage cap. 2 MillionBU; animal/livestock feed, crude soybean oil, hulls, meal; served by barge, rail and truck.
CONTACT: Richard Willey

The Pillsbury Company ★
M.S. 21A9, 200 South 6th Street, Pillsbury Center, Minneapolis, MN, 55402 U.S.A.
PH: 612/330-4254; FAX: 612/330-8961;
TLX: 687-9040 (PILLS UW).
CONTACT: Myron W. Achenbach, Mgr., Export Feed
Broker, cash/product. **EXPORTER:** Soybean meal, 44% & 48%; soybeans.

Pioneer Hi-Bred International, Inc. ★
Specialty Plant Products Div., 11252 Aurora Ave., Des Moines, IA, 50322 U.S.A.
PH: 515/254-2700; FAX: 515/254-2744;
TLX: 478327 PIOSEED.
CONTACT: Nicholas M. Frey, Prod. Dev. Mgr.
Soybean breeder; soybean seed supplier; supplier of soybeans for food use; supplier of organically grown soybeans. **EXPORTER:** Food grade soybeans (tofu and natto); Better Life soybeans, grown without pesticides; identity preserved soy oils and protein meal.

PMS Foods, Inc. ★ *SF IP*
2701 E. 11th, P.O. Box 1099,
Hutchinson, KS, 67504-1099 U.S.A.
PH: 316/663-5711; TWX: 910-380-6461;
FAX: 316/663-7195.
CONTACT: Derek Park, Pres.
PLANT SUPERINTENDENT: Floyd Shoup
ULTRA SOY textured soy flour.

Port of Houston Authority
P.O. Box 2562, Houston, TX, 77252 U.S.A.
PH: 713/670-2563; FAX: 713/670-2438;
TLX: (WU) 792623 (HOUPUBHOU).
CONTACT: Glenn Fellner, Mgr., Bulk Facility
EXPORTER: Bulk soybeans; soybean meal.

Prairie Products, Inc. ★★ *SF*
300 7th Street N.W.,
West Fargo, ND, 58078 U.S.A.
PH: 701/282-5164; FAX: 701/282-5119.
CONTACT: Stephen Benser, Pres.
Soyfoods, soynuts (whole soybean snacks).

Pro-Seed ★
236 Sugar Street, P.O. Box 55,
Blissfield, MI, 49228 U.S.A.
PH: 517/486-3520; FAX: 517/486-2631.
CONTACT: Ronald Jacob, Owner
PLANT SUPERINTENDENT: Tim Peirce
CONTACT: Duane Bell, Plant Breeder
Soybean breeder, soybean seed supplier; supplier of soybeans for food use; supplier of organically grown soybeans.

Producers Cooperative Association *C*
Foot of Buffalo Street, P.O. Box 323,
Girard, KS, 66743 U.S.A.
PH: 316/724-8241.
CONTACT: William R. Huston, Gen. Mgr.
Continuous screw press; storage cap. 650,000BU; crude soybean oil, meal; served by rail and truck.

Protein Research Associates ★ *SF*
1999 Pike Ave.,
San Leandro, CA, 94577-6706 U.S.A.
PH: 510/614-7716.
CONTACT: Theodore Aarons, Dir.
Hydrolyzed soy proteins; isolated soy proteins; lecithin (edible grade); soy fiber; defatted soy flour; textured soy flour; soy protein concentrates; soyfoods, soymilk, drinks or beverages; other soy-based foods, nutritional supplements containing soy bran, soy flour, soy protein concentrates and other protein sources.
CONTACT: Theodore Aarons, Dir.

Protein Technologies International, Inc. ★ *SF IP*
Subsidiary of Ralston Purina Company
MAIN OFFICE: Checkerboard Square-13T,
St. Louis, MO, 63164 U.S.A.
PH: 314/982-1186 or 800/325-7108;
FAX: 314/982-5057.
OTHER OFFICES: Sydney, AUSTRALIA; Ieper (mfg.), Zaventem, BELGIUM; Mississauga, CANADA; Volsins-le-Bretonneux, FRANCE; Dietzenbach, GERMANY; Hong Kong, HONG KONG; Agrate Brianza, ITALY; Hannan (mfg.), Tokyo, JAPAN; Seoul, KOREA; Kuala Lumpur, MALAYSIA; Mexico City, MEXICO; Metro Manila, PHILIPPINES; Warsaw, POLAND; Moscow, RUSSIA; Barcelona, SPAIN; Karlshamn, SWEDEN; Geneva, SWITZERLAND; Taipei, TAIWAN; Bangkok, THAILAND; Corby, Northants, UK; Caracas, VENEZUELA; Novi Sad, YUGOSLAVIA; USA - St. Louis, MO (headquarters); Louisville, KY (mfg.); Pryor, OK (mfg.); Memphis, TN (mfg.); Hager City, WI (mfg.); Urbana, OH (mfg.)
CONTACT: Sales Dept.
SUPRO, PROPLUS isolated soy proteins; FIBRIM soy fiber; SOLKA-FLOC and KEYCEL powdered cellulose products. NURISH isolated soy proteins for high-performance weaning rations; PRO-COTE soy polymer for paper coating additive, adhesive.

Quality Food Oils, Inc. *SF*
87 Picken District Road,
New Milford, CT, 06776 U.S.A.
PH: 203/355-9421; FAX: 203/354-9672.
CONTACT: Anthony Capizzi, Pres.
PLANT SUPERINTENDENT: Frank Capizzi
Soy oil products, cooking/salad oil; shortening.

Quincy Soybean Company ★
C R SF IP
Affiliate of Moorman Manufacturing Co.
1900 Gardner Expressway, P.O. Box 329,
Quincy, IL, 62306-0329 U.S.A.
PH: 217/224-1800; FAX: 217/224-2036;
TLX: 40-4421 (QCYSOYBEAN).
OTHER OFFICES: Helena, AR [Quincy Soybean Co. of Arkansas], Charlotte, NC [C & T Quincy] (oil refineries); Richmond, VA (C & T Quincy); New York, NY (ContiQuincy)
CONTACT: Rick Schuering, Mktg.
Solvent extraction; crude degummed soybean oil, crude soybean oil, hulls, meal; served by barge, rail and truck.
CONTACT: Rick Schuering, Mktg. (217/224-1800)
Fractionated soy oil, hydrogenated soy oil, refined soybean oil; served by barge, rail and truck. Lecithin (edible grade); soy oil products, cooking/salad oil, margarine, shortening.
CONTACT: Bob Holden (oil products); Holden (804/359-5786)
Lecithin (industrial grade).
CONTACT: Pat Humphrey (217/224-1800)
EXPORTER: Soybean meal; soybean hulls; crude soybean oil; refined vegetable oils · (ContiQuincy, Mitch Dawson, 212/207-5520).

Quincy Soybean Company of Arkansas ★ *C R SF IP*

Affiliate of Moorman Manufacturing Co.
Highway 20 South, P.O. Box 70,
Helena, AR, 72342 U.S.A.
PH: 501/338-6481; FAX: 501/338-8206.
OTHER OFFICES: Quincy, IL (Quincy Soybean Co.), Charlotte, NC (C & T Quincy) (oil refineries); Richmond, VA (C & T Quincy); New York, NY (ContiQuincy)
CONTACT: Rick Schuering, Mktg.
Solvent extraction; crude degummed soybean oil, crude soybean oil, hulls, meal; served by barge, rail and truck.
CONTACT: Rick Schuering, Mktg.
(217/224-1800)
Fractionated soy oil, hydrogenated soy oil, refined soybean oil; served by barge, rail and truck. Lecithin (edible grade); soy oil products, cooking/salad oil, margarine, shortening.
CONTACT: Bob Holden (oil products); Holden (804/359-5786)
Lecithin (industrial grade).
CONTACT: Pat Humphrey (217/224-1800)
EXPORTER: Soybean meal; soybean hulls; crude soybean oil; refined vegetable oils (ContiQuincy, Mitch Dawson, 212/207-5520).

Quong Hop & Company ★ *SF*

161 Beacon Street,
San Francisco, CA, 94080 U.S.A.
PH: 415/761-2022; FAX: 415/952-3329.
CONTACT: Ben Lee, V.P., Mktg.
Soyfoods, SOY FRESH soymilk, drinks or beverages; SOY DELI tempeh; SOY DELI tofu & tofu products.

Rainey Commodities, Inc. ★

5160 Sanderlin Avenue, Suite 1,
Memphis, TN, 38117-4371 U.S.A.
PH: 901/767-0010.
CONTACT: Jasper E. Rainey, Pres.
Broker, cash/product.

Riceland Foods, Inc. ★

C R SF IP

2120 S. Park Avenue, P. O. Box 926,
Stuttgart, AR, 72160 U.S.A.
PH: 501/673-5500; FAX: 501/673-5397;
TLX: (RCA) 240064 (RLND UR);
TWX: 910-720-6240 (Arkansas Grain Co.).
OTHER OFFICES: Little Rock, AR
CONTACT: James K. Smith, Vice Pres.
PLANT SUPERINTENDENT: Max Montgomery
Solvent extraction; hulls, meal; served by barge, rail and truck.
CONTACT: John B. Ruff
Edible soy oil products, refined soybean oil; served by barge, rail and truck.
CONTACT: Gerard Delatte
LECIPRIME liquid lecithin (edible grade); LECIGRAN powdered, granulated lecithin (edible grade); soy oil products, CHEFWAY and private labels cooking/salad oil; CHEFWAY and private labels shortening. LECIKOTE liquid lecithin (industrial grade); LECIGRAN MT granulated lecithin (industrial grade); FEED QUALITY powdered lecithin (industrial grade); for paint mixes, magnetic tape, animal feeds.
CONTACT: Marolyn Chambers, Mktlng. Mgr., Lecithin

Rich Products Corporation *SF*

1150 Niagara Street, P.O. Box 245,
Buffalo, NY, 14240 U.S.A.
PH: 716/878-8000; FAX: 716/878-8238 or 716/878-8266;
TLX: 710-522-1840 or 522-1841.
CONTACT: Robert E. Rich, Sr., Chman.
Soy protein concentrates, whipped toppings; isolated soy proteins, whipped toppings; soy oil products, cooking/salad oil; margarine (frozen foods); soyfoods, frozen desserts.
CONTACT: Dawn Wolfe

Ring Around Research Center

1109 Yonkers St.,
Plainview, TX, 79072-4859 U.S.A.
PH: 806/830-2424 or 296-6161.
CONTACT: William H. Davis, Proj. Leader
Soybean breeder.

Rose International ★ *SF*

P.O. Box 5020,
Santa Rosa, CA, 95402-5020 U.S.A.
PH: 707/576-7050; FAX: 707/545-7116.
CONTACT: Richard Rose, Pres.
Simulated meat products (analogs); soyfoods, frozen desserts, dry instant & concentrates; other soy-based foods, soy cheese; soy cheese. **EXPORTER:** Various.

Rosewood Products Inc. ★ *SF*

738 Airport Blvd., Ann Arbor, MI, 48108 U.S.A.
PH: 313/665-2222.
CONTACT: Bruce Rose, Pres.
CHINA ROSE & ROSEWOOD FARMS simulated meat products (analogs); soyfoods, nondairy frozen desserts; soymilk, drinks or beverages; tempeh; tofu & tofu products; other soy based foods.

Rustco Products Company *SF*

Affiliate of Park Corporation
1485 E. 61st Avenue,
Denver, CO, 80216 U.S.A.
PH: 303/287-3203; FAX: 303/287-2203.
CONTACT: Mark Hingiss, Vice Pres., Industrial Sales
PLANT SUPERINTENDENT: Bob Burgess
Soy oil products, RUSTCO and PRIVATE LABEL cooking/salad oil; margarine; shortening.

S. E. Rykoff & Company *SF*

Affiliate of Rykoff-Sexton
737 Terminal Street, P.O. Box 21903,
Los Angeles, CA, 90021 U.S.A.
PH: 213/486-9182; FAX: 213/689-9766.
OTHER OFFICES: Indianapolis, IN (John Sexton & Co.)
CONTACT: Terry Burgon, Mgr., Commodity Purchasing
PLANT SUPERINTENDENT: Jim Peterson
Soy oil products, cooking/salad oil, salad dressing; shortening.

SAFFOLA Quality Foods, Inc. *SF*

633 S. Mission Road,
Los Angeles, CA, 90023 U.S.A.
PH: 213/265-4300; FAX: 213/269-6330.
CONTACT: Greg MacIntosh, CEO
Soy oil products, GOLDENSWEET cooking/salad oil (all private label); GOLDENSWEET TABLEMAID margarine; shortening.

Sam Sung Foods Inc. *SF IP*

409 Morse Street, N.E.,
Washington, DC, 20002 U.S.A.
PH: 202/544-6690; FAX: 202/544-2477.
CONTACT: Kim Salazar
Soyfoods, soymilk, drinks or beverages; tofu & tofu products.

San-J International, Inc. ★ *SF*

Affiliate of San-Jirushi Corporation
2880 Sprouse Drive,
Richmond, VA, 23231 U.S.A.
PH: 804/226-8333; FAX: 804/226-8383;
TLX: 510-100-0513.
OTHER OFFICES: San Francisco, CA; Shibuya-ku, Tokyo; Kuwana, Mie, JAPAN (San-Jirushi Corp.)
CONTACT: Donald J. Iwinski, Dir., Industrial Sales
Soyfoods, miso (soybean and soybean and rice); soy sauce, tamari, tamari lite, shoyu (liquid & dry), teriyaki sauce, Szechuan sauce, Thai peanut sauce.

Sanders Elevator Corp. ★

North Sharpe Avenue, P.O. Box 1169,
Cleveland, MS, 38732 U.S.A.
PH: 601/843-2394; FAX: 601/843-6250.
CONTACT: Sonny King, Secy./Treas.
Soybean seed supplier.

Santa Fe Tempeh *SF*

General Delivery, Cerrillos, NM, 87010 U.S.A.
PH: 505/471-7034.
CONTACT: Joy or Scott Hauenstein, Owner
Soyfoods, SANTA FE tempeh.

The C. F. Sauer Company *SF*

2000 W. Broad Street,
Richmond, VA, 23220 U.S.A.
PH: 804/359-5786; FAX: 804/359-5514;
TLX: (Easylink) 752-903 (CT RICH).
OTHER OFFICES: Charlotte, NC
CONTACT: Robert E. Holden, Vice Pres.
Soy oil products, salad dressing.

Schnupp's Grain Roasting, Inc. ★ *C*

R.D. 6, Box 840, Lebanon, PA, 17042 U.S.A.
PH: 717/865-6611; FAX: 717/865-7334.
CONTACT: Dale L. Schnupp, Pres.
Roast cap. 100MT/day; animal/livestock feed.
EXPORTER: Roast-a-Matic Grain Roaster.

Schouten USA Inc. ★

Affiliate of Schouten/Giessen NV
6750 France Avenue, So.,
Minneapolis, MN, 55435 U.S.A.
PH: 612/920-7700; FAX: 612/920-7704.
CONTACT: Arthur J. Otto, Pres.
EXPORTER: Soybeans; soybean meal.

Seaboard Trading and Shipping ★

Affiliate of Seaboard Corp.
9000 W. 67th Street, P.O. Box 2972,
Shawnee Mission, KS, 66201 U.S.A.
PH: 913/677-5200; FAX: 913/676-8899;
TLX: 6730639 (STBS UW).
CONTACT: Luis H. Rodriguez, Vice Pres. Trading
Broker, cash/product. **EXPORTER:** Oilseeds and by-products (meal and pellets).
IMPORTER: Oilseed meals and pellets.

Seymour Organic Foods ★ *C SF*

205 S. Main Street, P.O. Box 190,
Seymour, IL, 61875 U.S.A.
PH: 217/687-4810; FAX: 312/687-4830;
TLX: 754477 (BAR NA UD).
CONTACT: Julie Ohlsson, Admin. Asst.
Continuous screw press; crush cap. 10MT/day; storage cap. 40MT; crude soybean oil; served by truck.SOF soy flour, organic, low fat; SOF full fat soy flour, organic; soy oil products, ORG-SOY-O cooking/salad oil. **EXPORTER:** Natural and certified organic mechanically pressed soy oil and stone-ground soy flour.

Shuster Certified Seeds

1883 Route 89,
Seneca Falls, NY, 13148 U.S.A.
PH: 315/568-9337, FAX: 315/568-2978.
CONTACT: Peter C. Shuster, Owner
PLANT SUPERINTENDENT: Ken Dean
Soybean seed supplier (certified vinton 81); supplier of soybeans for food use; supplier of organically grown soybeans.

Siegel Chemical Export Corporation ★

23 Bonnyview Drive,
Livingston, NJ, 07039; U.S.A.
PH: 201/535-9580; FAX: 201/535-9576.
CONTACT: Kiki Siegel, Vice Pres.
EXPORTER: Lecithin; soybeans; soybean oil; soy meal.

C = Soybean Processor (Crusher)
R = Soybean Oil Refiner

SF = Edible Soy Products/Soyfoods
IP = Industrial Soy Products

★ Updated Listing
★★ New Listing

Sigco Sun Products, Inc.
90 N. 8th Street, P.O. Box 331,
Breckenridge, MN, 56520 U.S.A.
PH: 218/643-8467; FAX: 218/643-4555;
TLX: 910-561-3930 (RESH BRKR).
OTHER OFFICES: Wahpeton, ND; Breckenridge, MN; Colby, KS
CONTACT: David A. Skyberg, Pres.
Supplier of soybeans for food use; supplier of organically grown soybeans.
EXPORTER: Soybeans.

W. M. Simeral & Company, Inc.
29 N. River Street, Batavia, IL, 60510 U.S.A.
PH: 708/406-1400; FAX: 708/406-1499;
TLX: 281006 (WMSIMERAL HINS).
OTHER OFFICES: Burbank, CA (Ryco Inc.); San Juan, PR (Interagro Commoditles); Metro Manila, PHILIPPINES
CONTACT: Steve Simeral, Pres.
Broker, cash/product.

The Simple Soyman ★ *SF*
4877 N. Green Bay Avenue, P.O. Box 09771,
Milwaukee, WI, 53209-0771 U.S.A.
PH: 414/264-4133.
CONTACT: R. Jay Gruenwald, Partner
Soyfoods, tofu & tofu products, TOFU TERKEY savory, baked, marinated tofu; other soy-based foods, SAUCY JO, SOMBRERO JO & ITALIAN JO tofu sloppy-joe; TOASTER BURGERS pattles; CURRY DIP; DEVILED TOFU "eggless" egg salad; SAVORY HERB PATÉ; WHOLE GRAIN PIE CRUSTS (wheat & dairy free); TOFU PUMPKIN PIE.

A. R. Smith & Company, Inc.
2217 - 152nd, N.E., P.O. Box 6369,
Bellow, WA, 98007 U.S.A.
PH: 206/643-4515;
TLX: (WU) 9102508154 (A.R. SMITH CO UQ).
CONTACT: Bruce Heyduck, Mdser.
Broker, cash/product; supplier of soybeans for food use. **EXPORTER:** Soybeans, soymeal.

Solnuts, Inc. ★ *SF*
Affiliate of Solnuts, B.V.
711 7th Street, P.O. Box 450,
Hudson, IA, 50643 U.S.A.
PH: 319/988-3221; FAX: 319/988-4647.
OTHER OFFICES: Tilburg, HOLLAND (Solnuts, B.V.)
CONTACT: Linda S. Weigel, Sales Mgr.
Soy fiber; SOLFLOUR F.F. full fat soy flour; soy grits; soyfoods, SOLNUTS soynuts (whole soybean snacks).

Sonne, Inc. ★ *SF*
896 22nd Ave. N.,
Wahpeton, ND, 58075 U.S.A.
PH: 701/642-3068; FAX: 701/642-9403;
TLX: 910-561-3930 (RESHBRKR).
CONTACT: Neil Doty, Gen. Mgr.
Soyfoods, DAKOTA GOURMET soynuts (whole soybean snacks), many flavors.

South River Miso Company *SF*
South River Farm, Shelburne Falls Road,
Conway, MA, 01341 U.S.A.
PH: 413/369-4057.
CONTACT: Christian Elwell, Pres.
Soyfoods, miso.

Southern Soya Corp. *C*
P.O. Box 727, Estill, SC, 29918 U.S.A.
PH: 803/625-2711; FAX: 803/625-2711.
OTHER OFFICES: Allendale Grain Co., Allendale, SC; Sumter Grain Co., Sumter, SC
CONTACT: Thomas L. Harper, Pres. & G.M.
PLANT SUPERINTENDENT: Paul E. Hankey, Jr.
Extraction process, solvent extraction; crush cap 800MT/day; storage cap. 3,500,000BU; hulls, meal, crude soybean oil; served by rail, truck.

Sovex Natural Foods, Inc. *SF*
Affiliate of McKee Baking Company
9104 Apison Pike, P.O. Box 2178,
Collegedale, TN, 37315 U.S.A.
PH: 615/396-3145; FAX: 615/396-3402.
CONTACT: Glenn Fuller
PLANT SUPERINTENDENT: Dan Clark
Soyfoods, soymilk, drinks or beverages; tofu & tofu products; other soy-based foods, TVP-textured vegetable protein.

Soy Power Company, Inc. ★ *SF*
1602 Stanford Street,
Santa Monica, CA, 90404 U.S.A.
PH: 310/829-2331; FAX: 310/829-1266.
CONTACT: Kevin Cross, Pres.
Soyfoods, soymilk, drinks or beverages; tempeh; tofu & tofu products.

Soy-Cot Sales, Inc. ★
2590 E. Devon Avenue,
Des Plaines, IL, 60018 U.S.A.
PH: 708/297-4160; FAX: 708/297-4166.
CONTACT: Ann M. Vicek, Pres.
Broker, cash/product.

Soyeh Natural, Inc. ★ *SF*
3458 Depot Road, Hayward, CA, 94545 U.S.A.
PH: 510/670-8621; FAX: 510/670-8639.
CONTACT: Woody Yeh, Pres.
Soyfoods, other soy-based foods, soy yogurt.

Soyfoods of America *SF*
1091 E. Hamilton Road,
Duarte, CA, 91010 U.S.A.
PH: 213/681-5393.
CONTACT: Ken Lee, Owner/Pres.
PLANT SUPERINTENDENT: Tim Huang
Soyfoods, FURAMA™, NATURE'S SPRING™, tofu & tofu products, YUBA, DEEP-FRIED TOFU, TOGUN (baked, spiced tofu).

Soyworld, Inc. *SF*
819 Cedar Street, Honolulu, HI, 96814 U.S.A.
PH: 808/523-8080.
CONTACT: Amy Higa, Vice Pres., Business
Soyfoods, SOYUMMY OF HAWAII frozen desserts.

Specialty Grains, Inc.
3001 Gill Street,
Bloomington, IL, 61704 U.S.A.
PH: 309/662-8721; FAX: 309/662-0278.
OTHER OFFICES: Bonita Springs, FL; LeRoy, IL
CONTACT: J. Curtis Haynes, Pres.
Soybean seed supplier; supplier of soybeans for food use. **EXPORTER:** Soybeans for tofu, miso, natto, sprouts, tempeh and soymilk.

Spring Creek Natural Foods ★ *SF*
212-C E. Main St., Spencer, WV, 25276 U.S.A.
PH: 304/927-1815 FAX: 304/927-1815.
CONTACT: Mark Bossert
PLANT SUPERINTENDENT: Sandra Holt
Soyfoods, fresh soymilk, drinks or beverages; tofu & tofu products, fresh, marinated-baked; other soy-based foods, soysage, okara based; tofu salads; simulated meat products (analogs), soysage.

Springfield Creamery ★ *SF*
29440 Airport Road,
Eugene, OR, 97402-9524 U.S.A.
PH: 503/689-2911; FAX: 503/689-2915.
CONTACT: Susan Kesey, Plant Superintendent
PLANT SUPERINTENDENT: Susan Kesey
Soyfoods, other soy-based foods, NANCY'S CULTURED SOY soy yogurt.

A. E. Staley Manufacturing Company, Gunther Division ★ *SF*
2200 Eldorado Street, P.O. Box 151,
Decatur, IL, 62525-1801 U.S.A.
PH: 800/526-5728; TLX: (Decatur) 25-0113 or (STLW UW AE STALEY CO DTR);
TWX: (Decatur) 910-243-0459;
FAX: 217/421-2881.
OTHER OFFICES: Galesburg, IL (mfg.)
CONTACT: Steve Martin, Prod. Mgr.
PLANT SUPERINTENDENT: James Dechert
MIRA-FOAM, VERSA-WHIP modified soy proteins; other modified proteins (functional blends). **EXPORTER:** Modified proteins (functional blends).

Jacob Stern & Sons, Inc. *IP*
1464 E. Valley Road, P.O. Box 50740,
Santa Barbara, CA, 93150 U.S.A.
PH: 805/565-1411; FAX: 805/565-1415;
TLX: 658312 (J STERN SNC).
OTHER OFFICES: Houston, TX; Seattle, WA; Clovis, CA (Snow Commodities Co.)
CONTACT: Philip L. Bernstein, Pres.
Purchasers of soy oil (industrial grade) for soapstock, acidulated soy oil soapstock.
Broker, cash/product.

Stine Seed Company ★
2225 Laredo Trail, Adel, IA, 50003 U.S.A.
PH: 515/677-2605; FAX: 515/677-2716.
CONTACT: Harry H. Stine, Pres.
Soybean breeder; soybean seed supplier.

Strayer Seed Farms ★
162 West Hwy. 58, P.O. Box 690,
Hudson, IA, 50643 U.S.A.
PH: 319/988-4187; FAX: 319/988-3922.
CONTACT: Dennis Strayer, Gen. Mgr.
Soybean breeder; soybean seed supplier; supplier of soybeans for food use; supplier of organically grown soybeans.
EXPORTER: Specialty soybeans for food use (including high protein, special protein quality, high oil, small seed, large seed).

See Our Advertisement P. 62

Sumitomo Corporation of America ★
345 Park Avenue, New York, NY, 10154 U.S.A.
PH: 212/207-0692; FAX: 212/207-0848;
TLX: (WUD) 12311 (SUMITOMONYK A).
CONTACT: Koichi Satoh, Prod., Mgr.
Broker, cash/product.

Summercorn Foods, Inc. ★ *SF*
1410 W. Cato Springs Road,
Fayetteville, AR, 72701 U.S.A.
PH: 501/521-9338; FAX: 501/443-5771.
CONTACT: David Druding
SAVORY SOYSAGE simulated meat products (analogs); soyfoods, soymilk, drinks or beverages; tempeh; tofu & tofu products, baked, marinated; other soy-based foods, tofu/granola bars.

Surata Soyfoods Co-op ★ *SF*
325-A West 3rd, Eugene, OR, 97401 U.S.A.
PH: 503/485-6990; 503/343-8434.
CONTACT: Kathleen Downey, Sales & Mkt. Coord.
Soyfoods, tempeh; tofu & tofu products.

Swan Gardens, Inc. *SF*
Affiliate of American Natural Snacks
6029 Lagrange Blvd., Atlanta, GA, 30336 U.S.A.
PH: 404/346-1712; FAX: 404/344-5170.
CONTACT: Casey Van Rysdam, Pres.
PLANT SUPERINTENDENT: Melvin Carter
Soyfoods, tofu & tofu products, (Soya Kaas, Vegie Kaas).

Taus Trading Company ★
327 S. LaSalle Street, Suite 1000,
Chicago, IL, 60604 U.S.A.
PH: 312/408-5600; FAX: 312/408-0903.
OTHER OFFICES: Atlanta, GA
CONTACT: Christian A. Taus, Pres.
Broker, cash/product.

James C. Taylor Company Inc. ★
415 Cambridge Avenue #10,
Palo Alto, CA, 94306 U.S.A.
PH: 415/321-6660.
CONTACT: Merridee Taylor, Pres.
Broker, cash/product.

Terral-Norris Seed Company, Inc.
P.O. Box 826,
Lake Providence, LA, 71254 U.S.A.
PH: 318/559-2840; FAX: 318/559-2888.
CONTACT: Larry J. Mullen, Sales Dir.
Soybean breeder; soybean seed supplier.
EXPORTER: Soybean seed.

Alfred C. Toepfer International, Inc. ★
Normandale Lake Office Park,
8300 Norman Center, Suite 1180,
Bloomington, MN, 55437 U.S.A.
PH: 612/835-9100; FAX: 612/835-6590.
CONTACT: Klaus Neitzel, Sr. Vice Pres.
EXPORTER: Soybeans; soybean meal; soybean oil.

Tofu Palace Products ★ *SF*
2075 Madison Street,
Eugene, OR, 97405 U.S.A.
PH: 503/345-4407.
CONTACT: Toby Alves, Pres.
PLANT SUPERINTENDENT: Toby Alves
Soyfoods, tofu & tofu products (patés, tofu-based salad dressings, tofu sour creme).

Tofu Shop *SF*
Box 94, Dixon, NM, 87527 U.S.A.
CONTACT: Toufic Haddad
Soyfoods, tofu & tofu products.

The Tofu Shop Specialty Foods Company ★ *SF*
100 Erickson Court, Suite 150,
Arcata, CA, 95521 U.S.A.
PH: 707/822-7401.
CONTACT: Matthew Schmit, Owner/Mgr.
Soyfoods, JOY O' SOY soymilk, drinks or beverages (pt., qt., 1/2 gal. & gal. sizes); FIRM NIGARI tofu & tofu products (14 oz. & 20 lb. sizes); other soy-based foods, vegie-patties; cutlets; sausage patties; salads and desserts (regional only).

Tofutti Brands Inc. *SF*
50 Jackson Drive, P.O. Box 786,
Cranford, NJ, 07016 U.S.A.
PH: 908/272-2400; FAX: 908/272-9492.
CONTACT: Lisa Quinn
PLANT SUPERINTENDENT: Ruben Rapoport
Soyfoods, TOFUTTI and LAND OF THE FREE nondairy frozen desserts; other soy-based foods, TOFUTTI EGG WATCHERS egg substitute; TOFUTTI BETTER THAN CREAM CHEESE imitation cream cheese, TOFUTTI SOUR SUPREME imitation sour cream.

Tomanetti Foods, Inc. ★ *SF*
201 Ann Street, Oakmont, PA, 15139 U.S.A.
PH: 412/828-3040; FAX: 412/828-2282.
CONTACT: Mary Bolgert, Supv.
Soyfoods, other soy-based foods, SOYDANCE soy cheeses; MAIN SQUEEZE squeezable soy cheese; SOYDANCE frozen pizza; ORIGINAL RICE CRUST PIZZA soycheese-style frozen pizza.

Tomen America
1000 Corporate Grove Drive,
Buffalo Grove, IL, 60089-4507 U.S.A.
PH: 708/497-5086.
CONTACT: Daniel Keefe, Commodities Spec.
Supplier of soybeans for food use.
EXPORTER: Soymeal hi-pro; soyoil & other vegetable oils; soybeans food & crushing.

Toshoku America, Inc. ★★
Affiliate of Toshoku Ltd.
780 Third Avenue, 37th Floor,
New York, NY, 10017 U.S.A.
PH: 212/759-0300; FAX: 212/759-0724.
CONTACT: T. Asanuma, V.P.
EXPORTER: Soybeans & soybean products.

Toshoku Los Angeles, Inc. ★★
Affiliate of Toshoku Ltd.
465 California Street, Ste. 610,
San Francisco, CA, 94104 U.S.A.
PH: 415/986-5622; FAX: 415/986-0549.
CONTACT: Fumi Sugawara, Senior V.P.
EXPORTER: Soybeans & soybean products.

Townsends, Inc. ★ *C R SF IP*
State Route 24, East, P.O. Box 468,
Millsboro, DE, 19966 U.S.A.
PH: 302/934-3015; FAX: 302/934-3290.
CONTACT: Daryl Houghton, Gen. Mgr.—Soybean Div.
PLANT SUPERINTENDENT: Mack McCary
Solvent extraction; crush cap. 1100MT/day; storage cap. 5,360,000BU; crude soybean oil, hulls, meal; served by rail and truck. Refining cap. 325MT/day; storage cap. 2572MT; edible soy oil products, industrial oil products, refined soybean oil; served by truck and rail. Soy oil products, cooking/salad oil. Soy oil (industrial grade) refined and bleached for paint, varnish, chemicals and carrier.
CONTACT: Matt Porter

Toyomenka (America), Inc.
Affiliate of Toyo Menka Kaisha, Ltd.
1000 Corporate Grove Drive,
Buffalo Grove, IL, 60089-4507 U.S.A.
PH: 708/520-8409; FAX: 708/520-1821;
TLX: 4977069.
CONTACT: Tamio Miake, Dpty. Mgr.
Broker, cash/product; supplier of soybeans for food use.
EXPORTER: Ordinary soybeans for crushing purposes; variety soybeans for food use.

Tree of Life, Inc. *SF*
Affiliate of Wessanen, N.V.
1750 Tree Blvd., P.O. Box 410,
St. Augustine, FL, 32085-0410 U.S.A.
PH: 904/825-2026; FAX: 904/825-2009;
TLX: 910-997-8139.
OTHER OFFICES: St. Augustine, FL (Tree of Life, southeast); North Bergen, NJ (northeast); Bloomington, IN (midwest); Cleburne, TX (southwest); Kent, WA (northwest); Sun Valley, CA (west); Hayward, CA (west).
CONTACT: Greg Leonard, Dir., of Merch.
TREE OF LIFE soy grits (16 oz. pkg.); soy oil products, TREE OF LIFE cooking/salad oil (various flavors, 16 & 32 oz.); TREE OF LIFE margarine (soya and soya no salt, 16 oz.); soyfoods, TREE OF LIFE miso (kome-ric,e 1 lb. & mugi-barle,y 1 lb.); TREE OF LIFE soy sauce (tamari, shoyu and wheat-free tamari); tofu & tofu products, baked tofu, organic (bulk & savory baked).

Tumaros, Inc. *SF*
5300 Santa Monica Blvd.,
Los Angeles, CA, 90029 U.S.A.
PH: 213/464-6317.
CONTACT: Kaye L. Dunham, Pres.
TUMARO'S RANCH BARBEQUE, TUMARO'S TEXAS TAMALE, TUMARO'S TEXAS BURRITO simulated meat products (analogs); soyfoods, TUMARO'S TOFU ENCHILADA VERDE tofu & tofu products.

Turtle Island Foods, Inc. ★ *SF*
P.O. Box 176, Hood River, OR, 97031 U.S.A.
PH: 503/386-7766; FAX: 503/386-7754.
CONTACT: Seth Tibbott, Pres.
Soyfoods, KISS (Keep It Simple Stirfry)—diced, marinated IQF tempeh.

Twin Oaks Community Foods ★ *SF*
Route 4, Box 169, Louisa, VA, 23093 U.S.A.
PH: 703/894-4112; FAX: 703/894-4112.
CONTACT: Twin Oaks Community
Soyfoods, tempeh; tofu & tofu products.

H. J. Underwood Company, Inc.
701 N. East Blvd., P.O. Box 436,
Clinton, NC, 28328 U.S.A.
PH: 919/592-3167; FAX: 919/592-2649.
CONTACT: Richard Underwood, Pres.
Soybean breeder; soybean seed supplier; supplier of soybeans for food use.
EXPORTER: Soybeans.

United Edible Oils, Inc. *SF*
7 New England Executive Park, 6th Floor,
Burlington, MA, 01803-5008 U.S.A.
PH: 617/527-3413 or 800/866-8989;
FAX: 617/964-9567.
CONTACT: Edward Berman, Pres.
Soy oil products, cooking/salad oil (bulk & packaged).

Universal Edible Oils, Inc. (UNEDO) ★ *R*
Affiliate of Birla Group
4421 W. 31st Street,
Chicago, IL, 60623-4811 U.S.A.
PH: 312/523-0214; FAX: 312/523-0797.
CONTACT: Jerry B. Shipp, G.M.
PLANT SUPERINTENDENT: Felicidado M. Pugeda
Hydrogenated soy oil; refined soybean oil; edible soy oil products.

Van den Bergh Foods ★ *R SF IP*
Affiliate of Unilever
2200 Cabot Drive, Lisle, IL, 60532 U.S.A.
PH: 708/955-5156; FAX: 708/955-5540;
TLX: 224069 (VDB FOODS).
OTHER OFFICES: New York, NY (sales office); Joliet, IL; Elgin, IL; Sunnyvale, CA; Vernon, CA; Carson, CA; Olathe, KS; Dallas, TX; Medalla, MN; Detroit, MI; Baltimore, MD; Rochester, NY; Dalton, GA; Atlanta, GA; Greenville, SC; Maplewood, NJ; Thorofare, NJ (mfg.)
CONTACT: Milton Neurenchon, Vice Pres., Commodities
Refining Cap. 500MT/day; storage cap. 15,000MT; crude degummed soybean oil, edible soy oil products, fractionated soy oil, hydrogenated soy oil, industrial oil products, refined soybean oil; served by barge, rail, ship and truck.
CONTACT: Don Grubba, Dir. Sls., Food Ingred. Lecithin (edible grade); soy oil products, cooking/salad oil; margarine; salad dressing; shortening; soyfoods, frozen desserts; other soy-based foods, soy hard butters; shortenings; emulsifiers; stearines; lubricants; bakery products (doughs, specialties). Soy oil (industrial grade) for lubricants; soybean fatty acids.
CONTACT: T.W. Craig, VP/Tech & Food Ingredients

Vitasoy (USA) Inc. ★ *SF*
99 Park Lane, Brisbane, CA, 94005 U.S.A.
PH: 415/467-8888; FAX: 415/467-8910;
TLX: 171784 (VICIX).
CONTACT: Yvonne Lo, Pres.
Soyfoods, soymilk, drinks or beverages.
IMPORTER: VITASOY natural soy drinks.

C = Soybean Processor (Crusher)
R = Soybean Oil Refiner

SF = Edible Soy Products/Soyfoods
IP = Industrial Soy Products

★ Updated Listing
★★ New Listing

W. D. & J. International
Affiliate of Investment Planning Inc.
6047 Frantz Road, Suite 104,
Dublin, OH, 43017 U.S.A.
PH: 614/764-0137; FAX: 614/764-0195.
CONTACT: John Lim, Pres.
EXPORTER: Soybean products by Worthington Foods Inc. and La Loma Foods Inc.

Wellens & Company, Inc.
6600 France Avenue So.,
Minneapolis, MN, 55435 U.S.A.
PH: 612/925-4600.
CONTACT: LeRoy Wellens, Pres.
Broker, cash/product. **IMPORTER:** Acidulated soapstock; edible soy oil products; other soybean oil by-products.

Welter's Premium Popcorn ★★
1226 120th Street, RR1, Box 93,
Ottosen, IA, 50570 U.S.A.
PH: 515/379-1463 or 800/743-1463.
CONTACT: Chuck Welter, Owner
Supplier of soybeans for food use; supplier of organically grown soybeans.

West Bend Elevator Company ★ C
P.O. Box 49, West Bend, IA, 50597 U.S.A.
PH: 515/887-7211; FAX: 515/887-7291.
CONTACT: Bill Hocrafer, Sales Mgr.
Continuous screw press; crush cap. 40MT/day; storage cap. 400,000BU; animal/livestock feed, crude soybean oil, meal; served by rail and truck.

West Central Cooperative C
P.O. Box 68, Ralston, IA, 51459 U.S.A.
PH: 712/667-3200; FAX: 712/667-3215.
CONTACT: Dr. Doug Südham,
Feed/Soy Div. Mgr.
PLANT SUPERINTENDENT: Myron Danter
Continuous screw press; crush cap. 300 MT/day; storage cap. 2 million BU; animal/livestock feed, crude soybean oil; served by rail and truck.

Westbrae Natural Foods ★ SF
1065 E. Walnut St., Carson, CA, 90746 U.S.A.
PH: 310/886-8200; FAX: 310/886-8218.
CONTACT: Myron Cooper
Soyfoods, miso; WESTSOY, WESTSOY LITE, MALTEDS, WESTSOY PLUS, WESTSOY ORIGINAL soymilk drinks or beverages; soy sauce.
CONTACT: Lynne Minsky
IMPORTER: Miso, soy sauce.

White Wave, Inc. ★ SF
6123 East Arapahoe,
Boulder, CO, 80303 U.S.A.
PH: 303/443-3470; FAX: 303/443-3952.
CONTACT: Steven Demos, Pres.
Simulated meat products (analogs); soyfoods, frozen desserts; soymilk, drinks or beverages; tempeh; tofu & tofu products; other soy-based foods, cheese analogs.

Wildwood Natural Foods ★ SF
1560 Mansfield Avenue,
Santa Cruz, CA, 95062 U.S.A.
PH: 408/476-4448, FAX: 408-479-3764.
OTHER OFFICES: Fairfax, CALIFORNIA
CONTACT: Jeremiah Ridenour, Pres.
PLANT SUPERINTENDENT: Jeremiah Ridenour
Soyfoods manufacturer and distributor, soymilk, drinks or beverages; tempeh; tofu & tofu products (firm style in vacuum packs, water-pak, tofu-burgers).

Wilsey Foods, Inc. SF
14840 E. Don Julian Road, P.O. Box 3636,
City of Industry, CA, 91746 U.S.A.
PH: 818/336-4527; FAX: 818/336-3229;
TLX: 670351 (WILSECORP).
OTHER OFFICES: Oakland, CA; Atlanta, GA; Salem, OR; Fort Worth, TX (mfg.)
CONTACT: Customer Service Dept.
Soy oil products, BAK-TEX, CAKE TONE, CHEF'S PRIDE, CHURN SPREAD, CREAM FLAKE, DO KING, EVERGOOD, FANCY FRY, FLAKO, FRY-IT, GOLD-N-EG, GOLD-N-OIL, GOLD-N-RICH, GOLD-N-SWEET, HALF-CAL, HANDI-POP, HI-LIFE, HY-TOP, MELLO MOIST, MOVIE-POP, ONE PLUS TWO, OUR BETR FRY, RICHENOL, ROLLITE, SAVORY, SUPER HY-CAKE, TRAILHAND, VOPCO, VO-POP, W.B., WHITE CAP, EXTEND cooking/salad oil, margarine, shortening (pan coating and chocolate coating).
CONTACT: Customer Service Dept.

Worthington Foods, Inc. SF
900 Proprietors Road,
Worthington, OH, 43085 U.S.A.
PH: 614/885-9511; FAX: 614/885-2594.
CONTACT: David Maxwell, Materials Mgr.
MORNINGSTAR FARMS, NATURAL TOUCH, WORTHINGTON simulated meat products (analogs); soyfoods, SOYOMAL soymilk, drinks or beverages; other soy-based foods, TOFU TOPPERS tofu.

Wysong Corporation C SF
1880 North Eastman,
Midland, MI, 48640 U.S.A.
PH: 517/631-0009; FAX: 517/631-8801.
CONTACT: Pamela Sampler
Continuous screw press; crude soybean oil. Full fat soy flour; soy oil products, cooking/salad oil; salad dressing; soyfoods, other soy-based foods, whole extruded soybeans.

Yaupon Soyfoods ★ SF
P.O. Box 672, Elgin, TX, 78621 U.S.A.
PH: 512/285-3810.
CONTACT: Chico Wagner, Owner
Soyfoods, soymilk, drinks or beverages (plain in 1/2 gal., gal. and pint sizes); tempeh (plain soy, in 8 oz. pkg.); tofu & tofu products (16 oz. pkg. & 20 lb. bulk sizes).

Zen-Noh Unico America Corporation
245 Park Avenue, 25th Floor,
New York, NY, 10167 U.S.A.
PH: 212/983-3050.
CONTACT: Mr. Saito, Soybean Mgr.
Supplier of soybeans for food use.
EXPORTER: Soybeans.

Grupo Interamericano C.A.
Av. Los Jabillos, Centro Bancor Piso & Sabana Grande, P.O. Box 1846, Caracas 1010, VENEZUELA
PH: 582/716813; FAX: 582/717260;
TLX: 27289.
CONTACT: Marilu Ravelo, Comm. Mgr.
Broker, cash/product; supplier of soybeans for food use. **IMPORTER:** Soybean meal, soy protein isolates, soy bean oil.

Protein Technologies International ★ SF IP
Subsidiary of Ralston Purina Company
Torre Diamen, piso 1, Oficinas 17 y 18
CHUAO, Centro Comercial Tamanaco,
Caracas, VENEZUELA
PH: 58/2/913-729, or 915-732, 913-872, 915-387; FAX: 58/2/914621.
OTHER OFFICES: Sydney, AUSTRALIA; leper (mfg.), Zavertem, BELGIUM; Mississauga, CANADA; Voisins-le-Bretonneux, FRANCE; Dietzenbach, GERMANY; Hong Kong, HONG KONG; Agrate Brianza, ITALY; Hannan (mfg.), Tokyo, JAPAN; Seoul, KOREA; Kuala Lumpur, MALAYSIA; Mexico City, MEXICO; Metro Manila, PHILIPPINES; Warsaw, POLAND; Moscow, RUSSIA; Barcelona, SPAIN; Karlshamn, SWEDEN; Geneva, SWITZERLAND; Taipei, TAIWAN; Bangkok, THAILAND; Corby, Northants, UK; Caracas, VENEZUELA; Novi Sad, YUGOSLAVIA; USA - St. Louis, MO (headquarters); Louisville, KY (mfg.); Pryor, OK (mfg.); Memphis, TN (mfg.); Hager City, WI (mfg.); Urbana, OH (mfg.)
CONTACT: Sales Dept.
SUPRO, PROPLUS isolated soy proteins; FIBRIM soy fiber; SOLKA-FLOC and KEYCEL powdered cellulose products. NURISH isolated soy proteins for high-performance weaning rations; PRO-COTE soy polymer for paper coating additive, adhesive.

INTER OFFICE MEMO

FROM THE OFFICE OF J. DAVID MOBLEY

To: John Seitz — Date: 03/18
Lydia Wegman — Jim Weigold
Bill Hunt
Henry Thomas — CC: EFIG
Jeff Clark

Purpose:	Priority:	Effort:	Feedback:
___ Action	___ High	___ High	___ 1 Day
___ Approval	___ Medium	___ Medium	___ 1 Week
___ Circulate	___ Low	___ Low	___ 1 Month
✓ For Your Information	___ Up2U	___ Up2U	___ Up2U
___ Review & Comment	___ None	___ None	___ None

Remarks: Since we normally only make you aware of our problems, I thought you would appreciate hearing some good news.

Nice job Dallas!

Signed: David Mobley

Leader, Emission Factor and Inventory Group

Phone: (919) 541-4676 Fax: (919) 541-0684
Internet: Mobley.David@EPAMAIL.EPA.GOV
Mail Drop 14, U.S. EPA, RTP, NC 27711

NOPA
NATIONAL OILSEED PROCESSORS ASSOCIATION

1255
TWENTY-THIRD
STREET,
N.W.
WASHINGTON,
DC
20037-1174

PHONE:
(202) 452-8040

FAX:
(202) 835-0400

March 13, 1996

John S. Seitz
Director, Office of Air Quality Planning and Standards
U.S. Environmental Protection Agency
MD-10
Research Triangle Park, NC 27711

Re.: AP-42 Section on Vegetable Oil Manufacturing

Dear Mr. Seitz:

The National Oilseed Processors Association (NOPA) is a trade association comprised of 13 regular and 25 associate member companies with plants engaged in the processing of vegetable meals and oils from oilseeds. NOPA's 13 regular member companies process an estimated 1.1 billion bushels of oilseeds annually at 67 plants in 22 states, employing an estimated 4,250 workers.

I am writing you to express NOPA's appreciation for the time, attention and responsiveness shown our association by Mr. Dallas Safriet (EPA-OAQPS-EMAD-EFIG) in the Agency's development of an AP-42 section on vegetable oil manufacturing (which the Agency recently issued) and in the development of a revised introduction to AP-42. The significant effort that Mr. Safriet, the Agency's Project Officer for the development of this AP-42 section, made to understand the operation of vegetable oil plants is reflected in the quality of the final document. We are especially appreciative of the time Mr. Safriet took to meet with us during the development of the section and his consideration of the comments we offered him during the review process.

Please call me if you have any questions. We look forward to working with EPA-OAQPS in the future.

Sincerely,

David C. Ailor

David C. Ailor, P.E.
Director of Regulatory Affairs

cc: Dallas Safriet, EPA-OAQPS-EMAD-EFIG (MD-14)

T011

Bill Lamson

NATIONAL OILSEED PROCESSORS ASSOCIATION
1255 TWENTY-THIRD STREET, N.W.
WASHINGTON, DC 20037

Phone: (202) 452-8040 Fax: (202) 835-0400

—FACSIMILE TRANSMITTAL FORM—

 # OF PAGES IN THIS FAX (Including cover page): **3**
If transmittal is incomplete or unclear, please call (202) 452-8040 for assistance.

DATE: March 4, 1994

TO: Participants in March 7 Conference Call on Misuse of AP-42 Emission Factors

Don Keeton/Mark Craigmile	Ag Processing Inc.
Bob Ajax	Ajax and Associates
Mark Calmes	Archer Daniels Midland Co.
Ron Moeller/Leroy Venne	Cargill, Inc.
Dick Copeland	Central Soya Company Inc.
Monique Kosse	Corn Refiners Association
Bill Lamason → ~~Bob Kellam~~/Dallas Safriet	EPA-OAQPS
Phil Wakelyn	National Cotton Council
David Menotti	Perkins Cole

RE: Information on March 7 Conference Call

Gentlemen:

As you will recall, during our February 9 conference call we agreed to reconvene on Monday, March 7, to continue discussing and exploring possible solutions to an issue about which we share a common concern - the misuse of AP-42 emission factors. This memorandum is to provide you with information on the conference call, ***including a dial-in number for the call.***

The conference call is scheduled as follows:

Monday, March 7, 1994
2:00 p.m. EST (1:00 p.m. CST)

To participate in the conference call, dial the telephone number shown below approximately one to two minutes before the call is to begin and identify yourself as a participant in the "NOPA Conference Call":

703-276-6827

Among the topics that we would like to discuss on the call are the following:

- Appropriate/Inappropriate uses of AP-42 emission factors.
- Use of statistical evaluation in assessing emission factor accuracy, between-source variability, and within-source variability (e.g., see "Developing Improved Emission Factors and Assessing Uncertainties" by James H. Southerland, Ronald Myers, and Dennis Wallace, TTN Bulletin Board).

Attached to facilitate discussion on the latter topic are two tables illustrating statistical presentation of emissions data. Table 1 is taken from the above referenced "Southerland" paper, and Table 2 is an illustration of hypothetical data from a smaller data set.

Please call me if you have any questions.

Sincerely,

David C. Allor

David C. Allor, P.E.
Director of Regulatory Affairs
Attachment

0036

ATTACHMENT

used normal statistics - data are not normally distributed (I can't have <0)

Table 1

Summary of Preliminary Portland Cement Kiln Results

37 plants; 211 PM Tests

		Emission Factor (lb/ton clinker)		Uncertainty Estimate			
				Between Facility		Within Facility	
Pollutant	Scenario	Mean	95% Confidence Interval (1)	Standard Deviation	95% Confidence Interval (3)	Standard Deviation	95% Confidence Interval (4)
PM	FF/ESP	0.48	0.41 to 0.55 (2)	0.49	<0, to 1.44	0.4	±0.78

(1) This range is the confidence interval on the emission factor as an estimator of the true mean. The range is significantly affected by the number of plants used to calculate the mean. For example, if only 5 plants had been tested, the confidence interval would be about 3 times greater than for 37 plants.

(2) The original range presented in the referenced document is in error. The data shown here are correct.

(3) This is the expected range of average performance for individual sources in this population.

(4) This is the range of test results which would be expected at any one facility over time. This range is calculated with data from individual test runs taken at different times at the same plants.

Table 2

Example of Emission Factor Based on 4 Facilities and 12 Run

Emission Test Data (1)

	Facility 1	Facility 2	Facility 3	Facility 4
Run 1	8	2	7	10
Run 2	10	4	4	9
Run 3	5	5	8	8
Average	7.7	3.7	6.3	9.0

(1) Not actual Data

Emission Factor		Uncertainty Estimate			
		Between Facility		Within Facility	
Mean	95% Confidence Interval	Standard Deviation	95% Confidence Interval	Standard Deviation	95% Confidence Interval
6.67	3.0 to 10.3	2.29	0.6 to 14.0	1.25	±4.0

1.6 ±5.1 ??

I need to check these statistics

Tom Lapp Rec'd from Dallas 2/2/94 TL
FYI

NOPA
NATIONAL OILSEED PROCESSORS ASSOCIATION

1255 TWENTY-THIRD STREET, N.W.
WASHINGTON, DC 20037-1174
PHONE: (202) 452-8040
FAX: (202) 835-0400

January 19, 1994

conf. call w. Seitz on Monday 3/7

John S. Seitz
Director, Office of Air Quality Planning and Standards
U.S. Environmental Protection Agency
MD-10
Research Triangle Park, NC 27711

Re.: Meeting to Discuss Misuse of AP-42 Emission Factors

Dear Mr. Seitz:

I am writing to you on behalf of the National Oilseed Processors Association (NOPA) and the two other trade associations signing this letter who represent companies involved in grain/oilseed handling and processing. We are writing to request a meeting with you to discuss possible solutions to issues which are very important to our members pertaining to the development and use of AP-42 emission factors. As you may recall, our associations were members of a coalition of grain/oilseed trade associations that had a very productive meeting with you last year concerning the Agency's draft model permit program.

Since the passage of the Clean Air Act Amendments of 1990, EPA has undertaken a significant effort to develop, revise, and improve AP-42 emission factors for a number of source categories, including various grain and oilseed handling/processing source categories. In this effort, the Emission Inventory Branch has asked us to review drafts of proposed AP-42 sections relative to our industry, and we appreciate the Agency's willingness to involve us in the process. Dallas Safriet, in particular, has been helpful by providing time for us to understand and fully consider the proposed sections.

We agree that there is a need to update and improve AP-42 emission factors (for example, some of the current emission factors for soybean processes were developed in the early 1970's and do not reflect current control levels), and we have held discussions among our respective members as to how we might best assist in this. It is clearly in our best interest, as well as in that of the Agency, to improve these estimates.

However, we are very concerned that certain state/local regulatory agencies are misusing AP-42 emission factors in permitting of new and existing sources, and that new or updated emission factors will only aggravate this already serious problem. Specifically, we are concerned over the increasing use of AP-42 emission factors as a direct basis for permit limits in general, and for *maximum permitted emission levels* in particular.

Unfortunately, most AP-42 emission factors reflect *average* emission levels. Thus, a source owner using a technology covered by an AP-42 emission factor would have only a 50/50 chance of compliance. We believe this is a technically and statistically incorrect usage of AP-42 and an unacceptable means for establishing maximum allowable, technology-based standards.

The issue we are raising does *not* involve the type, effectiveness, or cost of controls, or any intention to use controls which are less effective than required. Rather, it involves the establishment of potentially unachievable permit limits based on emission factors which are wholly inappropriate for such purpose. Based on my discussions with Mr. Safriet, it appears that this is an important problem facing many industries.

We would appreciate the opportunity to discuss this issue with you, and to explore possible solutions to what we believe is a serious problem that will only worsen over time. Resolution of what is primarily a technical/statistical issue would improve emission factors, lessen conflicts in the permitting process, and encourage additional efforts by industry and trade associations to undertake new projects to obtain data.

I will contact your office in the near future to determine your availability for such a meeting. In the interim, please call me at (202)452-8040 if you have any questions.

Sincerely,

David C. Ailor, P.E.
Director of Regulatory Affairs
National Oilseed Processors Association,
for the Undersigned:

- Corn Refiners Association
- National Cotton Council
- National Oilseed Processors Association

cc: Dallas Safriet, EPA
Kyd Brenner, Corn Refiners Association
Phil Wakelyn, National Cotton Council

T011

NATIONAL OILSEED PROCESSORS ASSOCIATION
1255 TWENTY-THIRD STREET, N.W.
WASHINGTON, DC 20037

Phone: (202) 452-8040 Fax: (202) 466-4949

—FACSIMILE TRANSMITTAL FORM—

 # OF PAGES IN THIS FAX (including cover page): 16
If transmittal is incomplete or unclear, please call (202) 452-8040 for assistance.

DATE: September 15, 1995

TO:	**Dallas Safriet**	**EPA/OAQPS**
cc:	**Dennis Garceau**	**Archer Daniels Midland Company**
	Ron Moeller	**Cargill, Inc.**
	Leroy Venne	**Cargill, Inc.**
	Tom Lapp	**Midwest Research Institute**

RE: Further Input/Comments on EPA's Revised Draft AP-42 Section on Vegetable Oil Manufacturing

Dallas:

During our conference call yesterday with you and Tom Lapp to discuss NOPA's comments on EPA's revised draft AP-42 section on vegetable oil processing, Ron Moeller and I agreed to provide you with further input/comments on several of our concerns. Today's memorandum is to provide you with the respective input/comments (see Enclosure).

Thank you again for the opportunity to provide you input/comments on the draft document. Please call me if you have any questions.

Sincerely,

David C. Ailor, P.E.
Director of Regulatory Affairs
Enclosure
T003b

ENCLOSURE

NOPA Comments on EPA's Revised Draft Emission Factor Documentation for AP-42 Section 9.11.1, Vegetable Oil Processing (August 1995)

1. Draft Table 2-1

The number and distribution of plants producing soybean oil/other vegetable oils is now somewhat different from that shown in draft Table 2-1. The table should be revised to read as follows:

State	Soybean oil[1]	Other vegetable oils
Alabama	1	1
Arkansas	4	
California	2	5
Delaware	1	
Georgia	3	4
Hawaii	1	
Illinois	12	1
Indiana	5	1
Iowa	13	
Kansas	4	
Kentucky	1	
Louisiana	1	
Maryland	1	
Michigan	2	
Minnesota	6	3
Mississippi	4	
Missouri	5	
Nebraska	5	
New York	1	
North Carolina	3	
North Dakota		3
Ohio	6	
Oklahoma		1
South Carolina	3	
Texas	1	
Virginia	1	

A copy of the cover sheets from the source of this information (*'95-'96 Soya Bluebook Plus*, Soyatech, Inc., 318 Main Street, P.O. Box 84, Bar Harbor, ME 04609) is attached for your information (see Attachment 1).

[1] The 86 soybean processing plants include 68 solvent extraction plants and 17 press plants.

2. Method 25

You asked about the relevance of the Method 25 audit sample results for hexane emission sampling at vegetable oil processing plants. The answer is that Method 25 is a general method for measuring the concentration of all or total gaseous nonmethane organic compounds present in an effluent stream. It is a non-specific method in which all organic compounds, except methane, are analyzed and reported as a single ppm value in terms of carbon equivalent. With the method, an emission sample is withdrawn from the stack through a filter and condensate trap into an evacuated cylinder. The organic material contained in the trap and cylinder (after separation of methane) is first oxidized to CO_2, and then reduced to methane. The resulting methane is then analyzed quantitatively with a flame ionization detector. The method will not distinguish hexane from any other organic compound, and there is no reason that the method should be more or less accurate for any particular compound.

The audit, which is described in the article we mentioned yesterday (see Attachment 2, "A Statistical Analysis of Stationary Source Compliance Test Audit Data"), was performed using gas cylinders containing three organic compounds in ppm levels. Two concentration levels were available. The testing organizations, which were being audited, collected samples from the cylinders using a Method 25 sampling train, and performed an analysis exactly the same way that stack samples are analyzed. The article does not mention which three organic compounds were contained in the audit samples, as this would be irrelevant. Any organic compounds, including hexane or a number of other compounds, could have been used because the specific compounds and number of compounds present are irrelevant for this analysis.

In summary, Method 25 is a non-specific method which, in effect, counts carbon atoms, without any regard to the specific organic compounds which may be present in the effluent. As such, the method is applicable to hexane, and the audit results would apply to hexane sampling. It should be noted also, however, that the audit procedure only examines the ability of the method to measure the concentration of a known sample. It does not audit the ability to obtain a representative effluent sample, or to determine mass rates. As such, the audit results do not provide a complete assessment, and understate the magnitude of the inaccuracy that would be associated with mass emission rate determinations.

3. Draft Section 3.4

In light of the concerns Ron and I raised yesterday about Section 3.4 of the revised draft document, you asked that we provide you our thoughts on revising this section. We have no suggested revisions to the first three paragraphs. However, towards clarifying and correcting the remainder of the section, we suggest that it be revised to read as follows:

"Obtaining accurate and representative hexane emission samples from vents at soybean processing plants is difficult. Wide variability in test results has been reported, both for individual vents within plants and for similar vents among plants. For example, individual sample results reported in Reference 12 (discussed in Section 4.1.12), using Method 25, ranged from 0.0001 to 0.22 gallons of solvent emitted per ton of raw soybeans. The cause of this variability is not well understood, but it is believed to result from (1) the effect of process vent configurations that re inherently difficult to sample; (2) emission variability caused by a process never in equilibrium due to variables such as bean moisture content and ambient temperature; and, (3) analytical inaccuracy. Statistical analysis of Method 25 audit samples, published by EPA in 1995, reported an accuracy range of -51% to +75% at the 95% probability level.[1]

To assess hexane concentrations in soybean meal or flakes exiting the desolventizing process, samples can collected downstream of the process and analyzed for residual hexane . The method most commonly used for assessing the hexane content of meal or flakes is the American Oil Chemists' Society (AOCS) Method Ba 14-87. Statistical results from a collaborative study of audit samples using the AOCS method indicated a between-lab relative reproducibility range of +/- 47% at the 95% probability level."

A copy of the AOCS method referenced above is attached (see Attachment 3).

4. Draft Section 2.2.4

As Ron and I explained yesterday, NOPA does not represent the processors of peanut oil. However, several NOPA member companies that process peanuts indicate that some information in the draft section on peanut oil processing (Section 2.2.4) appears outdated. Should your timing for publication of the document allow it, we would suggest that you contact either of the following individuals for feedback on this section:

- Dennis Garceau (Archer Daniels Midland Company): Tel.217-424-5887
  Fax.424-7415
- Leroy Venne (Cargill, Inc.): Tel. 612-742-6671
  Fax.742-6681

T003b.1

[1] Mitchell, William J., et. al., "A Statistical Analysis of Stationary Source Compliance Test Audit Data," Journal of the Air and Waste Management Association, 45:83-88, February 1995.

ATTACHMENT 1

'95 • '96 Soya Bluebook Plus

the annual directory of the world oilseed industry

Published by Soyatech, Inc.

soyatech

Forward

After nearly 50 years of covering just the soybean processing industry, the Soya Bluebook has been expanded to cover more of the world's major oilseeds. We began this ambitious expansion by covering the oilseeds in which the majority of our readers indicated an interest. Over the next few years we will continue to expand and to present our readers with the finest and most comprehensive publication possible, in both text and electronic forms. This is our goal.

The '95 - '96 Soya Bluebook Plus is the result of over two years of research and careful planning, but it is not perfect. In this rapidly changing world, it seems as if countries change names as frequently as businesses change hands. As a result, although we strive to avoid errors in our data, some of our information may not be as current as we would like. We encourage our readers to inform us of changes we may have missed, major processors we have overlooked, or other growing, or new product areas that will be playing an important role in the future development of this industry.

As the world grows, and the need for information increases, publications such as this one will be playing an ever increasing role in the networking between producers, processors, marketers and consumers.

We look forward to continuing to serve the oilseeds industry in new and exciting ways.

Soya Bluebook Plus is published annually by **Soyatech, Inc.** Listings are provided free of charge to qualified members of the oilseed industry. Every effort has been made to present a publication free of errors and/or omissions. In the event either occur, please contact the publisher of *Soya Bluebook Plus* so corrections can be made in future editions. For additional copies of *Soya Bluebook Plus* ($58, U.S., Canada and Mexico: $68 all other countries), contact **Soyatech, Inc.** For advertising rates and information, contact the *Soya Bluebook Plus* advertising director. All inquiries should be directed to:

Soyatech, Inc.
318 Main Street, P.O. Box 84
Bar Harbor, ME 04609 U.S.A.
PH: 207/288-4969
TOLL FREE: 1/800/424-SOYA
FAX: 207/288-5264

Soya Bluebook Plus
ISSN 1081-3063

Table of Contents

AOCS Official Method Ba 14-87

Reapproved 1993

Total Hexane Content in Extracted Meals

Definition: Extraction of oilseeds with hydrocarbon-based solvents results in a residue (extracted meal) containing residual volatile hydrocarbons. The total residual hexane content in extracted meals is the quantity of volatile hydrocarbons desorbed by heating the sample at 110 C with water in a closed vessel. After developing a calibration curve, hydrocarbons are determined in the headspace above the sample by gas chromatography, using capillary or packed columns. Results are expressed as hexane in milligrams per kilogram (ppm) of oilseed residue.

Scope: This method is applicable to the determination of the total amount of volatile hydrocarbons, expressed in terms of hexane, remaining in oilseed residues after extraction of the seed with hydrocarbon-based solvents. This method is equivalent to International Union of Pure and Applied Chemistry standard method 1.171 (References, 1 and 2).

Apparatus

1. The gas chromatograph should have, at a minimum, the following characteristics—
   (a) Thermostated column oven capable of maintaining the desired column temperature within ± 1 C.
   (b) Sample inlet system, separately thermostated, that can be maintained at a minimum temperature of 100 C. If a capillary column is used, the inlet system must be capable of a 1:100 split injection. For serial analysis a headspace gas chromatograph with automatic sample injection and tempering bath has been shown to be satisfactory.
   (c) Flame ionization detector, separately thermostated, that can be maintained at a minimum temperature of 100 C.
2. Recorder—If the recorder trace is to be used to calculate the composition of the samples analyzed, an electronic recorder of high precision is required. The characteristics of the recorder should be:
   (a) Rate of response below 1.0 seconds (the rate of response is the time taken for the recording pen to pass from 0 to 90% following the momentary introduction of a 100% signal).
   (b) Breadth of paper, 25 cm (10 in.) minimum.
   (c) Paper speed, 25–100 cm/hr (10–40 in./hr).
   (d) Attenuator switch for range change.
3. Electronic integrator (preferred)—Rapid and accurate calculation can be performed using an electronic integrator or computer. This must give a linear response with adequate sensitivity and baseline correction consistent with good chromatographic practice. Horizontal, nonhorizontal and tangential baseline correction must be controlled by selectable electronic peak logic.
4. Chromatographic column—Either a packed or a capillary column with the following minimum requirements may be used for this analysis—
   (a) Packed column—The column can be constructed of either stainless steel or glass, approximately 2 m long and 3.175 mm (⅛ in.) i.d. Support: acid-washed and silanized diatomaceous earth, 150–180-µm particle size (80–100 mesh Chromosorb WAW is suitable). Stationary phase: squalane or methyl polysiloxane (SE-30, or equivalent) consisting of 10% of the packing.
   (b) Capillary column—The column should be constructed of glass or fused silica, approximately 30 m long and 0.3 mm i.d. Stationary phase: methyl polysiloxane (film thickness 0.2 µm).
5. Syringe—10-µL capacity.
6. Syringe—1000-µL capacity, gas-tight (preferably with valve).
7. Septum vials—50–60-mL capacity, all with the same volume to within 2%.
8. Septa and aluminum caps suitable for septum vials, together with crimping pliers—The septa must be resistant to oils and solvents (butyl rubber or red rubber is recommended).
9. Tongs—suitable for holding septum vials.
10. Electric oven—regulated at 110 C.

Reagents

1. Gases—
   (a) Carrier—helium (preferred for better resolution) or nitrogen, minimum purity 99.99 mol%, dried and containing a maximum of 10 mg O_2/kg.
   (b) Flame ionization detector—hydrogen, minimum purity 99.95 mol%; air or O_2, dry (dew point –59 C maximum) and hydrocarbon free (< 2 ppm hydrocarbons equivalent to CH_4).
2. Technical hexane or a light petroleum—with a composition similar to that used in industrial extraction, or failing these, n-hexane. For calibration, technical extraction hexane is preferred.

Sampling and Sample Storage

1. It is essential that loss of solvent from the sample be prevented. The laboratory sample shall be in a completely sealed container and stored at –20 C or below, for example in a deep freezer. Plastic containers should not be used. The determination of residual hydrocarbons shall be carried out as soon as the container, kept at + 4 C for 24 hr before opening, has been opened.

GC Operating Conditions

1. Carrier gas flow depends on the carrier gas and the type of column being used for the analysis and should be optimized accordingly. Helium is recommended, but nitrogen may be used. Some loss of resolution between

Total Hexane Content in Extracted Meals — Ba 14-87

peaks may be experienced with nitrogen.

2. The flow of hydrogen and air or oxygen to the flame ionization detector should be optimized according to the manufacturer's recommendation for the instrument being used.
3. Injector and detector temperatures should be set at about 120 C.
4. The column should be maintained at 40 C.

Procedure

1. Preparation of calibration curve—Three calibration standards, for example, with 2, 5 and 10 µL of solvent (Reagents, 2) are usually sufficient for constructing a calibration curve. They correspond, respectively, to 268, 670 and 1340 mg/kg (ppm) of technical hexane in a test portion of 5 g of meal. If using n-hexane, they correspond to 264, 660 and 1320 mg/kg (ppm), respectively. Add 6 mL of water to a septum vial (Apparatus, 7). This volume is determined by the fact that the test portion (5 g) hydrated with water (2.5 mL) will occupy a volume of 6 mL. Using a 10-µL syringe (Apparatus, 5), accurately and rapidly add a specific volume of solvent, corresponding to one of the prescribed calibration standards, to the vial. Seal with a septum and aluminum cap and crimp with pliers (Apparatus, 8). Place vial in the oven (Apparatus, 10) at 110 C for 10 min. Warm the gas-tight syringe (Apparatus, 6) to 60 C. Remove the vial from the oven and allow to cool for 2 min. Using the warmed gas-tight syringe (Apparatus, 6), take exactly 0.5 mL of the headspace and inject immediately into the gas chromatograph (Apparatus, 1). Determine the sum of the peak areas for the solvent peaks. Hydrocarbons that usually make up the technical solvents are 2-methylpentane, 3-methylpentane, methylcyclopentane, cyclohexane, etc.

   Repeat this operation for two additional quantities of solvent as described above. Determine the peak areas for the solvents in each case.

   Plot the calibration curve, expressing the relation between the sum of the solvent peak areas and the mass of solvent introduced into the vials. It may be assumed that 1 µL of solvent has a mass of 670 µg in the case of technical hexane and 659 µg in the case of n-hexane.
2. Sample analysis—Weigh rapidly, to the nearest 0.1 g, 5 g of the test sample into a septum vial (Apparatus, 7). Add 2.5 mL of distilled water. Seal with a septum and aluminum cap and crimp with pliers (Apparatus, 8). Place the vial in the oven (Apparatus, 10) at 110 C for exactly 90 min. It is important that each sample remain in the oven for the same length of time. Warm the gas-tight syringe (Apparatus, 6) to 60 C. Remove the vial from the oven and allow to cool for 2 min. Agitate the sample by inverting. Using the warmed gas-tight syringe (Apparatus, 6), take exactly 0.5 mL of the headspace and inject immediately into the gas chromatograph (Apparatus, 1). Determine the sum of the peak areas for the solvent peaks. Hydrocarbons that usually make up the technical solvents are 2-methylpentane, 3-methylpentane, methylcyclopentane, cyclohexane, etc. A typical chromatogram of these solvents was shown by the calibration standards. Do not include peaks due to the oxidation products. Some of these may be present in significant amounts. Determine from the calibration curve the corresponding quantity, m, of solvents present in the vial.
3. Number of determinations—Carry out two determinations in rapid succession on each sample.

Expression of Results

1. The total hexane content, expressed in milligrams per kilogram (ppm), is given by the formula:

$$\frac{m_1}{m_0}$$

Where—

m_0 = mass, in g, of test sample

m_1 = mass, in µg, of solvents present in the flask

Report as the final result the mean of the results of the two determinations, provided the requirements for repeatability are met. If the requirements for repeatability are not met, discard the results and carry out two additional determinations on the sample.

Precision

1. The results of one interlaboratory test organized at an international level (for different samples) gave the statistical results shown in Table 1.
2. Repeatability—When the mean of the duplicate determinations lies within the range of the mean values cited in Table 1, the difference between the results of the two determinations, carried out in rapid succession by the same operator, using the same apparatus for the analysis of the same test sample, should not be greater than

Table 1

Statistical analysis of results for total hexane (1984 collaborative study; determinations).

	Sample		
	Rapeseed residue	Soybean residue	Homogenized rapeseed residue
Number of laboratories	15	15	15
Number of results	30	30	30
Mean value, mg/kg (ppm)	452	378	341
Repeatability standard deviation (S_r)	35	19	29
Repeatability coefficient of variation (%)	7.8	5.1	8.6
Repeatability value r ($S_r \times 2.83$)	100	54	83
Reproducibility standard deviation (S_R)	109	129	108
Reproducibility coefficient of variation (%)	24	34	32
Reproducibility value R ($S_R \times 2.83$)	308	365	305

the repeatability value (r), which can be obtained from Table 1, for the level of hexane in the sample examined.

3. Reproducibility—When the means of the duplicate determinations, obtained in two different laboratories using this standard method for the analysis of the same laboratory sample, lie within the range of the mean values cited in Table 1, the difference between the mean results obtained by those laboratories should not be greater than the reproducibility value (R), which can be obtained from Table 1, for the level of hexane in the sample examined.

References

1. *Standard Methods for the Analysis of Oils, Fats and Derivatives*, International Union of Pure and Applied Chemistry, 7th edn., Blackwell Scientific Publications, 1987, IUPAC Method 1.171.
2. Collaborative study results published in *Pure Appl. Chem. 59 (10)*:1407 (1987).

A Statistical Analysis of Stationary Source Compliance Test Audit Data

William J. Mitchell, Jack C. Suggs, and Ellen W. Streib
Atmospheric Research and Exposure Assessment Laboratory, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina

ABSTRACT

The U.S. Environmental Protection Agency (EPA) provides audit materials to organizations conducting compliance tests using EPA Test Methods 6 (SO_2), 7 (NO_x), 18 (organics by GC), 25 (organics as ppm C), 106 (vinyl chloride), and 26 (HCl), and to those organizations conducting trial burn testing for toxic volatile organics under the Resource Conservation and Recovery Act (Method 0030). These audit samples must be analyzed and the results reported to the regulatory agency along with the compliance test results. Each regulation specifies accuracy (percent bias) limits that must be achieved on the audit samples. Failure to meet these accuracy limits may invalidate the compliance test results. A statistical analysis was done on the results from 4,321 compliance audits to determine if the limits will be achieved by most organizations. This analysis determined that they are likely to be achieved more than 90% of the time for Methods 6, 7, and 26, and also for some of the organics measured by Methods 18 and 0030. However, they are not likely to be achieved even 50% of the time for Method 25 and for many Method 18 measurements. No decision could be made for Method 106 because of insufficient data.

INTRODUCTION

Our laboratory provides audit materials to organizations who are conducting compliance tests using U.S. Environmental Protection Agency (EPA) Test Methods 6 (SO_2), 7 (NO_x), 18 (organics by GC), 25 (organics as ppm C), 26 (HCl), and 106 (vinyl chloride),[1,2] and to those conducting Resource Conservation and Recovery Act (RCRA) trial burn toxic organic emissions testing by Method 0030.[3] Each test method specifies accuracy (percent bias) limits that the organization being audited must achieve on these samples to demonstrate that it is proficient in using the test method. These limits are as follows.

	Percent Bias Limits	
Method	Lower	Upper
6	-5%	5%
7	-10%	10%
18	-10%	10%
25	-20%	20%
26	-10%	10%
106	-10%	10%
0030	-50%	50%

If the audited organization fails to meet these limits, the regulatory agency may reject the compliance test results.

The EPA limits were established from small-scale studies conducted while the test methodology and regulations were being developed. For Test Methods 6, 7, 18, 25, 26, and 106, EPA's goal was to establish audit test limits that would generally be achieved at least 90 times out of each 100 tries. Was this goal achieved? To answer this question, we examined the 3,887 audit test results reported for these test methods through June 1994.

The above test methods deal with a single compound, whereas trial burn tests involve simultaneous sampling for many compounds. Because of the complexity of trial burn tests, EPA has never established a frequency of achievability goal for Test Method 0030. Instead, the regulatory or permitting agency that is overseeing the test evaluates the audit results on a case-by-case, constituent-by-constituent basis tailored to the specific compounds required to be measured during the trial burn. The determination as to what is acceptable recovery is left to the discretion of the permitting agency.[4] We examined 434 audit results reported for trial burns through June 1994 to provide regulatory agencies with information on the frequency with which the limits of ±50% are likely to be met.

DESCRIPTION OF TEST METHODS AND AUDIT MATERIALS

Method 6 (SO_2)

The SO_2 stack gas sample is collected by impingement in 3% H_2O_2 solution. This solution is subsequently analyzed

IMPLICATIONS

Certain U.S. Environmental Protection Agency (EPA) compliance test methods for stationary sources specify accuracy limits that must be achieved on EPA-provided audit materials for the compliance test to be valid. This paper presents the results from an in-depth statistical analysis on 4,321 audit results that examined the frequency with which the EPA limits were being met. The results of this statistical analysis will be helpful to those responsible for determining the validity of compliance test results, as well as to those concerned with improving the accuracy of stationary source test methods.

for sulfate by titration with $BaClO_4$ in the presence of thorin indicator. The audit samples (two per compliance test) are aqueous solutions of H_2SO_4 in glass ampoules. An aliquot of the audit sample is diluted with 3% H_2O_2, and this solution is then analyzed using the Method 6 titration procedure. When diluted, the audit sample simulates a Method 6 stack sample equivalent to a stack gas concentration between 100 and 3000 mg SO_2 per dry standard cubic meter (DSCM). The audited organization reports the results as mg SO_2/DSCM to the regulatory agency, which sends a copy of the audit results to the EPA Atmospheric Research and Exposure Assessment Laboratory (AREAL) for information purposes.

Method 7 (NO_x)

The stack gas can be collected either in an evacuated flask containing an acidified H_2O_2 solution or by impingement in an alkaline $KMnO_4$ solution. The collected sample then is analyzed for the appropriate nitrogen oxide compounds by either colorimetry, ion chromatography, or UV absorption. The audit samples (two per compliance test) are aqueous solutions of KNO_3 in glass ampoules. An aliquot of the audit sample is diluted with the appropriate Method 7 sample collection solution, and this solution is then analyzed by the same method as used for the compliance samples. When diluted, the audit sample simulates a Method 7 stack sample equivalent to a stack gas concentration between 100 and 2000 mg NO_2/DSCM. The audited organization reports the results as mg NO_2/DSCM to the regulatory agency, which sends a copy of the results to EPA/AREAL for information purposes. The EPA/AREAL does not receive information on the analytical method used.

Method 18 (Organics by GC)

The stack gas sample is collected using any of the following methods: Tedlar bag; canister; solid adsorbent tube (XAD-2, charcoal, Tenax GC, silica gel, etc.); and direct transport from the stack to a GC through a heated line with or without sample dilution. After collection, the sample is analyzed for the target compounds using techniques such as GC/FID, GC/PID, or GC/EC. Each audit sample (one to two per compliance test) contains one organic compound at the ppm level in a compressed gas cylinder with N_2 as the balance gas. The audited organization attaches its own regulator and transfer line to the cylinder and transfers a representative sample from the cylinder to its sampling train either directly (e.g., filling a Tedlar bag) or through a manifold. The collected sample is then analyzed exactly as the stack samples. The audited organization reports the compounds found and their concentrations to the regulatory agency, which sends them to EPA/AREAL for evaluation. The EPA/AREAL notifies the regulatory agency of the accuracy achieved on the audit sample(s). The EPA/AREAL does not receive information on the specific sampling and analysis method used.

Method 25 (Organics as ppm C)

The stack gas sample is collected in a chilled condensate trap (condensible portion) and in an evacuated flask (noncondensible portion). The organic compounds collected in the trap are separated into nonmethane hydrocarbons, which then are oxidized to CO_2. An aliquot of the CO_2 then is reduced to CH_4, and the CH_4 is measured by GC/FID. The organic compounds collected in the flask are separated from CO_2, CO, and CH_4 by gas chromatography and then are oxidized to CO_2, reduced to CH_4, and analyzed by GC/FID. Each audit sample (two per compliance test) contains three organic compounds at ppm levels and 5% CO_2 in a compressed gas cylinder. The balance gas is N_2. Two concentration levels are available (50–300 ppm C and 700–2000 ppm C). The audited organization attaches its own regulator and gas transfer line to the audit cylinder and collects a representative sample in its Method 25 sampling train. The collected sample then is analyzed exactly as the stack samples are analyzed. The audited organization reports the results as ppm C to the regulatory agency. They send the results to EPA/AREAL for evaluation. The EPA/AREAL then notifies the regulatory agency of the accuracy achieved on the audit samples.

Method 26 (HCl)

The stack gas sample is collected by impingement in 0.1 N H_2SO_4; this solution then is analyzed for chloride by ion chromatography. The audit samples (two per compliance test) are aqueous solutions of KCl in glass ampoules. An aliquot of the audit sample is diluted with 0.1 N H_2SO_4, and this solution is analyzed for chloride by ion chromatography. When diluted, an audit sample simulates a stack sample containing between 10 and 50 mg chloride/DSCM. The audited organization reports the results as mg chloride/liter of audit sample to the regulatory agency, which sends a copy of the results to EPA/AREAL for information purposes.

Method 106 (Vinyl Chloride)

The stack gas sample is collected in a Tedlar bag without sample dilution. After collection, the sample is analyzed for vinyl chloride by GC/FID. Each audit sample (two per compliance test) consists of a compressed gas cylinder containing vinyl chloride in the concentration range of 5 to 50 ppm; N_2 is the balance gas. The audited organization attaches its own regulator and transfer line to the cylinder and transfers a representative sample from the cylinder to its Tedlar bag. The collected sample then is analyzed exactly as the stack samples. The audited organization reports the concentrations of vinyl chloride that are found to the regulatory agency, which sends them to EPA/AREAL for evaluation. The EPA/AREAL notifies the regulatory agency of the accuracy achieved on the audit sample(s).

Method 0030 (Organics by VOST)

The volatile organics in the stack gas are collected on Tenax GC (Method 0030). The collected sample is then

flash-desorbed and analyzed by GC-MS (Method 5040 — Protocol for Analysis of Sorbent Tubes).[3] Each audit sample (one per trial burn) consists of a compressed gas cylinder containing five to nine organic compounds at concentrations between 7 and 1000 ppbv; N_2 is the balance gas. A regulator, gas-transfer line, and glass sampling manifold accompany the audit material. The audited organization assembles the audit system, attaches its sampling train to the manifold, and collects a representative sample, which is then analyzed exactly as the stack gas samples. The audited organization reports the organic compounds that are found and their concentrations to the regulatory agency, which sends the results to EPA/AREAL for evaluation. The EPA/AREAL then notifies the regulatory agency of the accuracy achieved on the audit samples.

STATISTICAL ANALYSIS OF RESULTS

The bias statistic for each audit was calculated as follows: The expected concentration value was subtracted from the reported value, and this difference was then divided by the expected value. Our statistical analysis procedure employed the bi-weight function of Mosteller and Tukey.[4] The center measure of the distribution of percent bias was estimated as a weighted average.

$$\hat{y} = \Sigma w_i y_i / \Sigma w_i$$

where y_i is the percent bias for the i^{th} audit with weights,

$$w_i = \begin{cases} \left[1 - \left(\frac{y_i - \hat{y}}{6(MAD)}\right)^2\right]^2 & \text{when } \left(\frac{y_i - \hat{y}}{6(MAD)}\right)^2 < 1 \\ 0 & \text{otherwise} \end{cases}$$

and $\hat{y}$

$$MAD = \text{median}(|y_i - \hat{y}|).$$

Estimating $\hat{y}$ is an iterative procedure.

The MAD is approximately two-thirds the true standard deviation if underlying conditions are normal. Therefore, the bi-weight allows bias values that are within approximately ±6 standard deviations to be averaged as a measure of the center of the percent bias distribution.

The spread of the percent bias distribution is estimated from the asymptotic variance of the bi-weight as

$$n\sigma^2 = \frac{n\Sigma (y_i - \hat{y})^2 (1 - u_i^2)^4}{\Sigma (1 - u_i^2)(1 - 5u_i^2)][-1 + \Sigma (1 - u_i^2)(1 - 5u_i^2)]}$$

where $(1-u_i^2)^4 = w_i^2$.

This is indicative of the variability of percent bias across a wide range of clients and audit levels. Probability limits for predicting (1 − α)% of future percent biases are calculated as

$$\hat{y} \pm t_{\alpha/2,n-1}(1+\sigma)^{1/2}$$

where t is the Student's t for 0.7n − 1) degrees of freedom.

We used the bi-weight technique because it is more robust and efficient (lower variance) than either the arithmetic mean or the median, especially when things are less than perfect in the tails of the distribution.[4] In other words, the bi-weight has a greater chance of being closer to the true center than either the mean or the median when statistically analyzing data sets such as those we have obtained from the audit programs. Yet, it still yields results similar to those from the more traditional statistical outlier tests.

RESULTS AND DISCUSSION

The results in Tables 1 through 4 represent statistical predictions of the range in percent biases that will occur in future audits if no changes occur in the audit materials, the audit procedures, the proficiency of the audited organizations, and/or the EPA test method. In these tables, the nonparenthetical quantities under the heading N represent the number of audit results actually selected by the bi-weight technique for use in calculating the probability limits. The parenthetical quantities are the number of results in the data set. For example, for Method 6 (Table 1), 1970 of the 2089 audit results in the data set had a bi-weight value greater than zero and hence were used in calculating the upper (U) and lower (L) probability limits for Method 6. (Because of insufficient data, probability limits could not be calculated for Method 106.)

Table 1:
Probability Limits for Methods 6, 7, and 26 Audits

Method 6. As shown in Table 1, more than 90% of the percent biases will meet the acceptance limits of ±5%. Our analysis also determined that the probability limits will be symmetrically distributed about zero with a mean percent bias of -0.4%.

Method 7. As shown in Table 1, more than 90% of the percent biases will meet the acceptance limits of ±10%. Our analysis also determined that the probability limits will be symmetrically distributed about zero with a mean percent bias of 0.4%.

Method 26. As shown in Table 1, more than 90% of the percent biases will meet the acceptance limits of ±10%. Our analysis also determined that the probability limits will be symmetrically distributed about zero with a mean percent bias of -1.1%.

Table 2:
Probability Limits for Method 18 Audits

Thirty-one compounds have been used in Method 18 audits, but only 14 have been used in at least eight audits—

Table 1. Probability limits for predicting percent bias for future Methods 6, 7, and 26 audits.

Test Method	N	Mean % Bias	Probability Limits in % Bias 95/100 L	95/100 U	90/100 L	90/100 U	75/100 L	75/100 U	50/100 L	50/100 U
6 (SO_2)	197(208)	-0.4%	-5	4	-4	4	-3	2	2	1
7 (NO_x)	846(981)	0.4%	-11	12	-8	10	-6	7	-3	4
26 (HCl)	128(146)	-1.1%	-12	9	-10	8	-7	5	-5	2

L = Lower probability limit
U = Upper probability limit

the minimum number of audit results required for calculating the probability limits. Therefore, probability limits could only be calculated for 14 compounds. These represent 361 audits, 341 of which were used in calculating the limits shown in Table 2.

Table 2 shows that chloroform is the only one of these 14 that will yield percent biases meeting the present Method 18 limits of ±10% at least 90% of the time. It also shows that with five exceptions (ethylene, methyl ethyl ketone, perchloroethylene, propylene, and vinyl chloride), the percent biases for these compounds will be approximately symmetrically distributed about zero and will be less than 3%.

Table 3:
Probability Limits for Method 25 Audits

As shown in Table 3, less than 75% of the percent biases for the high concentration samples and less than 50% of the percent biases for the low concentration samples will meet the Method 25 limits of ±20%. The mean percent biases for the low and high concentration audit samples will be +12% and -6%, respectively. These probability limits were calculated using 335 of the 373 audit results in the data set. Note that these limits and percent biases remain unchanged when the analysis is limited to the most recent Method 25 audit results, i.e., those obtained between July 1992 and June 1994 (Table 3). This indicates that the performance on Method 25 audit samples of the organizations conducting Method 25 compliance tests has reached a plateau.

Table 4:
Probability Limits for Method 0030 Audits

Twenty-one compounds have been used for audits, but only 12 have been used in at least eight audits—the minimum number of audit results required for calculating the probability limits. Therefore, probability limits could only be calculated for 12 compounds; these represent 434 audits, of which 344 were used to calculate the probability limits in Table 4. Table 4 also shows that 6 of the 12 compounds (methyl ethyl ketone, toluene, trichloroethylene, vinyl chloride, 1,1,1-trichloroethane, and 1,2-dichloroethane) have

Table 2. Probability limits for predicting percent bias for future Method 18 audits

Test Method	N	Mean % Bias	Probability Limits in % Bias 95/100 L	95/100 U	90/100 L	90/100 U	75/100 L	75/100 U	50/100 L	50/100 U
Benzene	99(107)	0%	-15	15	-13	13	-9	9	-5	5
Carbon tetrachloride	9(8)	0%	-88	87	-77	76	-49	49	-28	27
Chloroform	9(13)	3%	-5	11	-3	9	-2	7	1	5
Ethylene	10(10)	-9%	-51	32	-42	23	-31	12	-22	3
Hexane	15(16)	-2%	-21	18	-16	14	-12	9	-8	5
Methyl ethyl ketone	10(16)	-12%	-102	77	-84	59	-59	35	-33	14
Methylene chloride	14(14)	1%	-91	93	-76	75	-49	51	-28	30
Perchloroethylene	15(16)	11%	-57	79	-44	66	-26	48	-10	32
Propane	44(50)	-2%	-18	15	-15	12	-11	8	-7	4
Propylene	12(12)	-4%	-27	20	-22	15	-16	9	-11	4
Toluene	32(42)	-2%	-53	38	-38	23	-20	15	-13	8
Trichloroethylene	11(14)	-3%	-15	10	-13	8	-8	4	-4	1
Vinyl chloride	16(23)	7%	-35	21	-30	15	-23	8	-16	2
1,3-butadiene	11(12)	3%	-24	19	-20	14	-14	9	-8	4

L = Lower probability limit
U = Upper probability limit

Table 3. Probability limits for predicting percent bias for future Method 25 audits.

Test Method	N	Mean % Bias	Probability Limits in % Bias 95/100 L	95/100 U	90/100 L	90/100 U	75/100 L	75/100 U	50/100 L	50/100 U
High ppm C	168 (181)[a]	-6%	-40	28	-34	22	-26	14	-18	5
Low ppm C	167 (192)	12%	-51	75	-41	64	-25	49	-10	33
High ppm C[b]	87 (83)	-5%	-39	28	-33	22	-25	14	-17	6
Low ppm C[b]	88 (85)	12%	-55	79	-44	68	-27	51	-10	35

[a]Audit results from July 1992 to June 1994.
L = Lower probability limit.
U = Upper probability limit.

mean percent biases substantially different from zero and very nonsymmetrical distributions.

CONCLUSIONS

Methods 6, 7, and 26

Because the limits are being achieved routinely, they should remain unchanged.

Method 18

The basis for the original limits for the majority of the compounds should be examined to decide if new limits are required. For example, if the limits were simply widened to ±30%, the audit limits would be achieved 90% of the time for 9 of the 14 compounds shown in Table 2. Another possibility would be to set compound-specific limits rather than use identical limits for all compounds.

Method 25

The basis for the original Method 25 limits should be examined to decide if new limits are required. For example, the limits could be widened to ±50% and adjusted for the biases associated with each concentration level (i.e., high concentration -6%; low concentration +12%). Then, more than 95% of the high concentration audit sample and 75% of the low concentration audit sample results would meet the new limits, which would be (-56% to +44%) and (-38% to +62%), respectively.

Method 106

Probability limits could not be calculated because of insufficient data. Although probability limits were calculated for vinyl chloride for Methods 18 and 0030, differences in the sampling and analysis methodology between Method

Table 4. Probability limits for predicting percent bias for future Method 0030 audits.

Test Method	N	Mean % Bias	Probability Limits in % Bias 95/100 L	95/100 U	90/100 L	90/100 U	75/100 L	75/100 U	50/100 L	50/100 U
Benzene	39 (45)	4%	-67	88	-47	55	-31	40	-16	25
Carbon tetrachloride	88 (112)	3%	-39	46	-32	39	-21	28	-11	18
Chlorobenzene	20 (28)	7%	-64	77	-51	64	-33	46	-16	29
Chloroform	43 (55)	-3%	-68	50	-47	41	-33	28	-21	15
Methyl ethyl ketone	9 (9)	-15%	-128	88	-104	66	-74	38	-50	12
Perchloroethylene	48 (60)	-2%	-71	67	-59	56	-41	38	-25	21
Toluene	18 (26)	10%	-62	82	-49	69	-30	50	-13	33
Trichloroethylene	13 (19)	15%	-21	50	-14	43	-4	34	-4	26
Trichlorofluoromethane	15 (16)	6%	-168	198	-151	182	-99	130	-54	85
Vinyl chloride	30 (38)	-33%	-119	53	-104	38	-82	16	-61	5
1,1,1-trichloroethane	17 (20)	13%	-67	83	-44	71	-25	52	-9	38
1,2-dichloroethane	8 (8)	15%	-33	63	-23	53	-9	38	-1	28

L = Lower probability limit.
U = Upper probability limit.

106 and these methods prohibit application of their limits to Method 106. For example, in Method 106, the audit sample is collected in a Tedlar bag; in Method 0030, it is collected on Tenax; and in Method 18, it can be collected by a variety of techniques, including direct analysis from the cylinder.

REFERENCES

1. Title 40, Code of Federal Regulations, Part 60, Appendix A—"Test Methods." Office of the Federal Register, National Archives and Records Administration: Washington, DC, July 1, 1992.
2. Title 40, Code of Federal Regulations, Part 61, Appendix B—"Test Methods." Office of the Federal Register, National Archives and Records Administration, Washington, DC, July 1, 1992.
3. *Test Methods for Evaluating Solid Waste*, Vol. II, 3rd ed.; Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency: Washington, DC, Nov. 1986; Report No. SW-846.
4. *Handbook, Quality Assurance and Quality Control Procedures for Hazardous Waste Incinerators*; Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency: Washington, DC, Jan. 1990; EPA-625/6-89/023.
5. *Test Methods for Evaluating Solid Waste*, Vol. I, 3rd ed.: Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency: Washington, DC, Nov. 1986; SW-846.
6. Mosteller, F.; Tukey, J. W. *Data Analysis and Regression*; Addison Wesley: Reading, MA, 1977; pp 205–208.

About the Authors

The authors are members of the Quality Assurance Support Branch of the Atmospheric Research and Exposure Assessment Laboratory (AREAL-MD-77B) of the U.S. Environmental Protection Agency, Research Triangle Park, NC 27711. This branch develops QA and QC materials and the procedures to use them, and also provides routine and specialized QA services to other EPA units and to other governmental organizations. William J. Mitchell (Ph.D. chemistry) is the chief of the branch. Jack C. Suggs (M.S. statistics) is a mathematical statistician and specializes in experimental design and the assessment of databases. Ellen W. Streib (A.A. chemical technology) is a physical scientist and coordinates the branch's QA program for stationary source measurements.

NATIONAL OILSEED PROCESSORS ASSOCIATION
1255 TWENTY-THIRD STREET, N.W.
WASHINGTON, DC 20037
Phone: (202) 452-8040 Fax: (202) 466-4949

—FACSIMILE TRANSMITTAL FORM—

 # OF PAGES IN THIS FAX (including cover page): **3**
If transmittal is incomplete or unclear, please call (202) 452-8040 for assistance.

DATE: September 21, 1995

TO:	Dallas Safriet	EPA/OAQPS
cc:	Mark Calmes	Archer Daniels Midland Company
	Dennis Garceau	Archer Daniels Midland Company
	Larry Hendricks	Archer Daniels Midland Company
	Ron Moeller	Cargill, Inc.
	Leroy Venne	Cargill, Inc.
	Tom Lapp	Midwest Research Institute

RE: Suggested Revisions to the Draft "Peanut Oil Processing" Section in the EPA's Revised Draft AP-42 Section on Vegetable Oil Manufacturing

Dallas:

As Ron Moeller and I promised you during our conference call earlier today, attached for your consideration in finalizing the AP-42 section on vegetable oil processing (Section 9.11.1), are suggested revisions to the draft "Peanut Oil Processing" section (Draft Section 2.2.4) in the revised draft AP-42 section (August 1995). Included with this memorandum are the following suggestions for Section 2.2.4:

- **Suggested text (see Attachment 1).** This text is offered as a complete substitute to the draft text contained in draft section 2.2.4.
- **Suggested Figure 2-6 (see Attachment 2).** This figure is offered as a complete substitute to draft Figure 2-6 contained in draft section 2.2.4.

Please remember in your review of the above that, as we have previously explained, NOPA does not represent the processors of peanut oil. However, two NOPA member companies do process peanuts - Archer Daniels Midland Company and Cargill, Inc. In light of the fact that NOPA's membership does include expertise on peanut oil processing, the fact that no peanut oil trade association has apparently stepped forward to work with you on the document, and our members' interest in working with you towards improving the document to the extent practicable, NOPA is submitting these suggestions to you for your consideration.

Please call me if you have any questions.

Sincerely,

David C. Ailor, P.E.
Director of Regulatory Affairs
Two Attachments

T003b

ATTACHMENT 1

PEANUT OIL PROCESSING

Peanut oil is extracted from peanuts via a process similar to that used for other high oil content oilseeds. Peanut kernels are typically cracked into small pieces, conditioned (cooked), and prepressed through continuous screw presses or expellers where approximately 50% of the oil is removed. The prepressed peanut cake is then conveyed to extraction where the balance of the oil is removed by hexane extraction.

The hexane is removed from the oil by an evaporation and condensing system. The crude oil is stored for further processing or shipment. The extracted peanut cake is desolventized and the evaporated hexane is condensed for reuse. The extracted, desolventized peanut cake (now peanut meal) is dried, cooled, ground, sized and stored for shipment.

Figure 2-6 illustrates a typical peanut oil extraction process.

T003b.2

ATTACHMENT 2

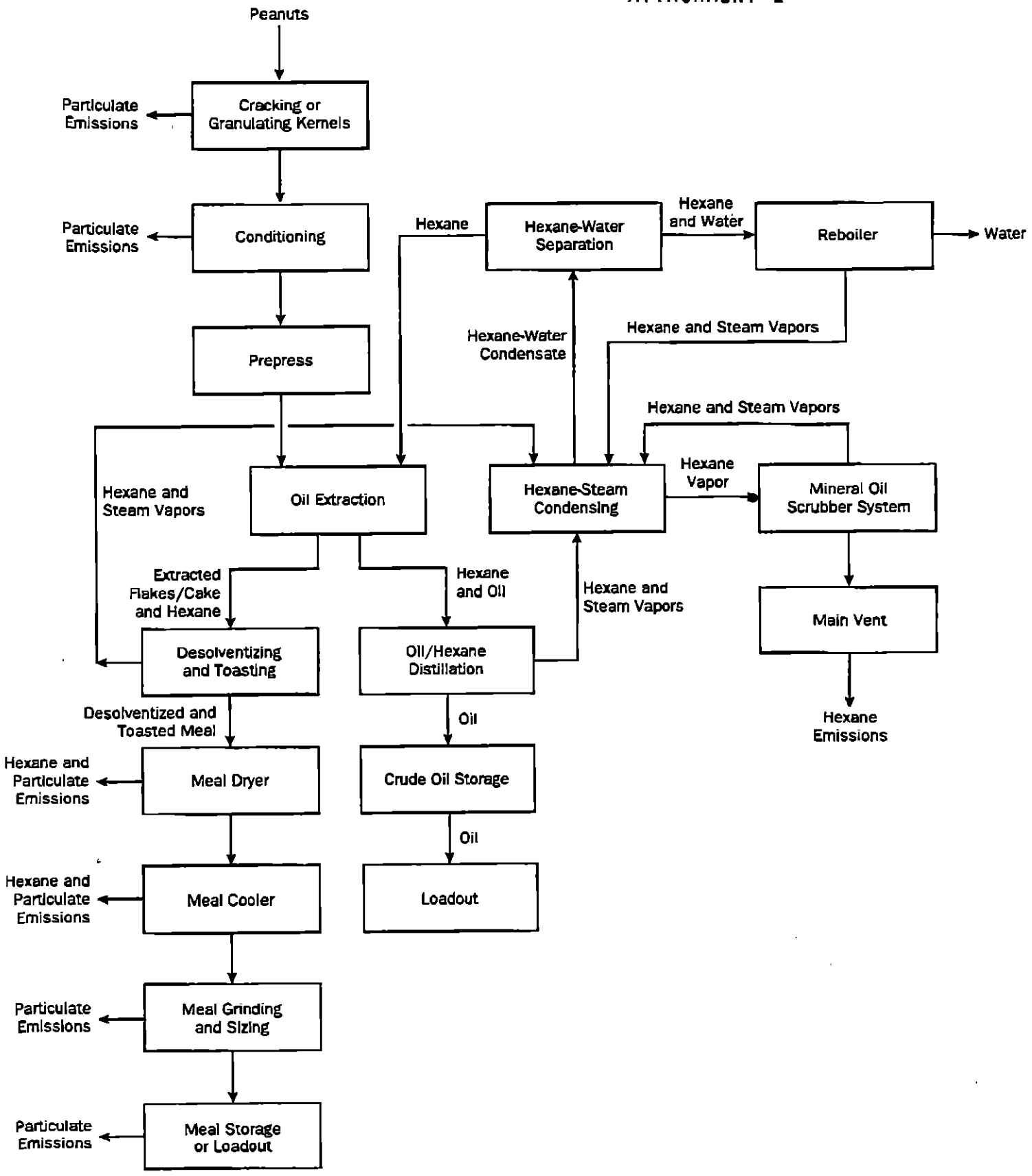


Figure 2-6. Flow diagram of the typical peanut oil extraction process.

National Cotton Council OF AMERICA

1521 New Hampshire Avenue, NW • Washington, DC 20036
(202) 745-7805 • FAX (202) 483-4040 • TELEX 650-252-9879 MCI

PRODUCERS • GINNERS • WAREHOUSEMEN • MERCHANTS • CRUSHERS • COOPERATIVES • MANUFACTURERS

November 17, 1993

Mr. Dallas Safriet
Environmental Engineer
U.S. Environmental Protection Agency
Emission Inventory Branch (MD-14)
Research Triangle Park, NC 27711

RE: New draft Section 6.11.1, Vegetable Oil Processing
(proposed supplement to AP-42,
Compilation of Air Pollutant Emission Factors)

Dear Dallas:

This is in response to your letter requesting comments on the proposed AP-42 supplement on Vegetable Oil Processing. These comments are submitted by the two trade associations which represent the U.S. cottonseed crushing industry, the National Cotton Council (NCC) and the National Cottonseed Products Association (NCPA).

NCC and NCPA feel that it is premature for EPA to add this proposed supplement for Vegetable Oil Processing to AP-42. There are no data (emission factors) for vegetable oil manufacturing from oilseeds other than soybean oil manufacturing (p. 5-1 of the draft). Furthermore, for soybean oil manufacturing the emission factors are very incomplete for hexane (Table 6.11.1, p. 6.11.1-6 of the draft) -- four of the eight factors are "NA" -- and for particulate the emissions factor rating is E (p. 6.11.1-7). EPA should have more appropriate data before putting this section in AP-42.

There are at least two main differences between cottonseed and soybean crushing. First, when considering overall solvent loss, scale of size favors the larger plants. In almost all cases, soybean crushers are much larger than cottonseed crushers and should have lower hexane emissions per ton processed. Second, the cottonseed crushing industry utilizes the additional step of delintering in processing cottonseed, which increases PM10 emissions per ton of raw product processed.

If hexane emissions are included in a new supplement to AP-42, they should be as a function of inventory reconciliation (gallon/ton of seed crushed), as opposed to point source testing. Any hexane point sources measurement would be extremely variable and

not really meaningful.

The cottonseed crushing industry is reviewing the available information from machinery manufacturers and individual oil mills to see if there are appropriate data available to make recommendations for hexane and particulate emissions from our industry.

Additional comments:

1. Attached is a revised description of Cottonseed Oil Processing (pp. 2-10 and 2-11).

2. Attached is a revised table 2-1, "Number of Plants in Major Vegetable Oil Producing States" (p. 2-2). There are about 32 cottonseed oil mils presently crushing cottonseed in the U.S.

3. Attached is a Table 6.11.1-2 listing possible hexane emission point sources from cottonseed oil manufacturing. However, measurement at these points would not be meaningful because the data would be too variable. As mentioned earlier, a more appropriate measure of hexane emissions would be gallons of hexane per ton of raw product processed.

4. Attached is a table listing the particulate emission point sources from a cottonseed oil mill. There are at least 30-50 cyclones on a cottonseed oil mill, so it would be impractical to do point source testing. The emission factor for particulate emissions from a cottonseed oil mill probably should be estimated from emission concentrations of air pollution abatement systems.

NCC and NCPA would like to continue to work with you on emission factors for hexane and particulate from cottonseed oil mills and will try to supply you further information soon.

Yours Sincerely,

P/ Wakelyn

Phillip J. Wakelyn, Ph.D.
Manager, Environmental Health
and Safety

CC: Lance Forster, NCPA

2.2.2 Cottonseed Oil Processing[8,10,11]

Cottonseed oil processing is similar to soybean oil processing. Figure 2-5 serves as a general process diagram. The process includes cleaning of the cottonseeds, preparation for oil extraction, oil extraction and refining, and processing spent cottonseed meal. As with the soybean process, extraction of cottonseed oil is accomplished by both pressing and solvent extraction methods. In some processing plants, however, cottonseed meals are prepressed to extract some oil before solvent extraction. Since pressing is ~~not believed to be a major source of VOC emissions~~ a mechanical process, only the solvent extraction method is described in detail in this report.

Cottonseeds are supplied from cotton gins, where the seeds are separated from the cotton fiber (see Section 6.7 of AP-42, Cotton Ginning, for process information). The cleaning process begins with screening and aspiration to remove the cotton lint (cotton fibers) and hull fragments remaining on the seeds after ginning. ~~A series of screens called linters remove lint of different fiber lengths from the seed.~~ After cleaning, the cottonseed passes through a series of cylindrical saws which remove the remaining fiber (fuzz fibers/linters).

Next, the cleaned (and delinted) seeds are prepared for oil extraction by hulling, flaking, and conditioning (cooking). The hulls are removed by bar-type hullers that split the hulls, and screens and/or aspirators separate the hulls from the seed meat. Further hull/meat separation is achieved with vibrating beaters. Cottonseed hulls are used as a source of protein and roughage in animal feeds.

Prior to solvent extraction, the seeds are steam conditioned at approximately ~~230~~ 180°F. The flaking step follows, which breaks down the cell structure and increases the surface area for contact with the solvent. Some facilities use an expander option in which flaked cottonseed is pelleted using an extrusion device. Expander processes are used to improve solvent extraction and reduce the amount of time for solvent to drain from the flakes. ~~Flakes, which are approximately 0.01 to 0.014 in thick, are created using rolling bar presses.~~ Flaking of the ~~soybean~~ cottonseed meats is the same as for soybeans.

Prepressing, which is used in some plants for initial oil extraction, is performed by mechanical screw presses exerting up to 2,000 pounds per square inch (psi) pressure. The remaining oil is extracted using the solvent extraction equipment. Likewise, the spent cottonseed meal is desolventized using the same desolventizer-toaster, dryer, and cooling processes as for soybeans. Oil refining and screened oil from prepressing produces fine solid material called foots or soapstock that is returned to the meal desolventizer.

There are at last two main differences between cottonseed and soybean crushing. First, when considering overall solvent loss, scale of size favors the larger plants. In almost all cases, soybean crushers are much larger than cottonseed crushers. Second, the cottonseed crushing industry utilizes the additional step of delintering in processing cottonseed, which increases PM10 emissions per ton of raw product processed.

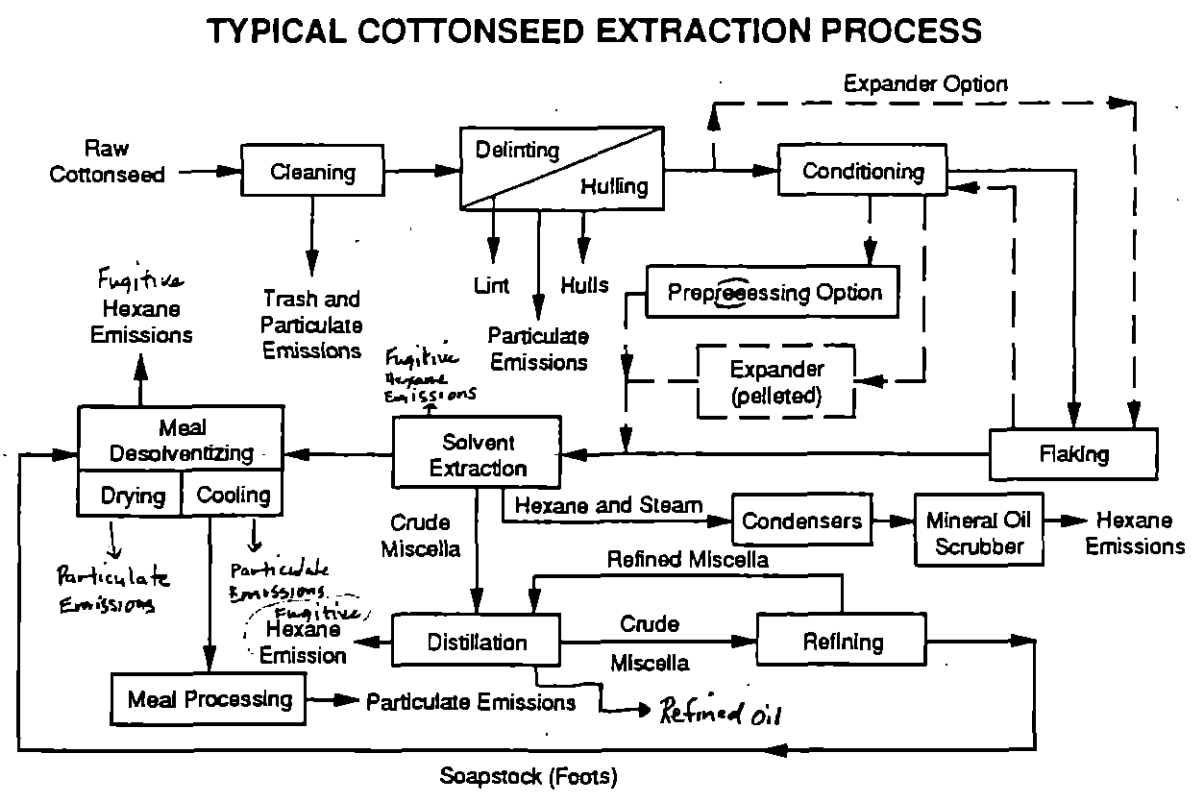


Figure 2-5. Flow diagram of a typical cottonseed extraction process.

TABLE 2-1. NUMBER OF PLANTS IN MAJOR VEGETABLE OIL PRODUCING STATES

State	Type of oil produced		
	Soybean oil	Cottonseed oil	Other vegetable oils[a]
Alabama	3	2	1
Arkansas	4	4	
California	5	2	5
Georgia	3	1	4
Kansas	5		
Illinois	16		1
Indiana	4		1
Iowa	13		
Louisiana	1	2	
Minnesota	5		3
Mississippi	4	4	
Missouri	6		
North Carolina	3	1	
Oklahoma	1	2	1
Texas	2	12	

Source: Reference 5.
[a]Plants in SIC 2076 and 2079; does not include corn oil production.

2.2.1 Soybean Oil Processing

Soybean oil processing consists of oilseed handling/elevator operations (receiving, storing, and cleaning the raw soybeans); preparing the soybeans for solvent extraction; solvent extracting and oil desolventizing; oil refining; and desolventizing and processing the spent soybean meal. These five processes are described below.

2.2.1.1 Oilseed Handling/Elevator Operations—

Figure 2-1 is a schematic diagram of the typical soybean handling/elevator operations that precede the preparation of soybeans for the solvent extraction process. Soybeans received at a facility by truck or rail are sampled and analyzed for moisture content, foreign matter, and damaged seeds. After the sampling/analysis is completed, the beans are weighed and conveyed to large concrete silos or metal tanks for storage prior to processing. When the facility is ready to process the soybeans, the beans are removed from the silo or tank and cleaned of foreign materials and loose hulls. Screens are typically used to remove the foreign materials such as sticks, stems, pods, tramp metal, sand, and dirt. An aspiration system is used to remove loose hulls from the soybeans. The beans are passed through dryers to reduce their moisture content to approximately 10% to 11% moisture by weight and then conveyed to process bins for temporary storage and tempering in order to facilitate dehulling.

Table 1. Total Particulate Emission Sources for Cottonseed Oil Processing

Type of Process	*Control Device*	*Emission Factor*
Receiving (sampling and unloading)	Cyclone, fabric filter, or truck shed containment	N/A
Seed cleaning	Cyclones (minimum of 8)	N/A
Delintering*	Cyclones (about 16 to 22)	N/A
Dehulling	Cyclones (about 11 to 22)	N/A
Flaking	Cyclone (1)	N/A
[Cooking, expander]		No emissions
Collette (pellet) cooling	Cyclone (1)	N/A
[Solvent extraction, desolventizing]		No emissions
Meal cooler	Cyclone (1)	N/A
Meal dryer	Cyclone (1)	N/A
Meal grinder	Cyclone (1)	N/A
Storage	No control	N/A
Shipping (truck loading of meal & hulls)	Cyclone, bag house, or no control	N/A

* Processes include: 1st and 2nd cut delintering (fuzz fiber removal); 1st cut linter, 2nd cut linter and mote cleaning; and bale pressing of 1st cut linters, 2nd cut linters and motes.

Table 6.11.1-1 (METRIC UNITS)

HEXANE EMISSION FACTORS FOR SOYBEAN OIL MANUFACTURING

Process (SCC)	Emission factor L/MT	EMISSION FACTOR RATING
Oil extraction-main vent (30201916)	0.153[a,b]	B
Meal dryer (30200789)	0.089[b]	C
Meal cooler (30200790)	0.021[c]	B
Fugitive leaks (30201919)	NA	-
Solvent storage (30201920)	NA	-
Wastewater processing (30201921)	NA	-
Oil refining (30201918)	NA	-
Fugitive emissions from meal (30201922)	0.455[d]	B

Table 6.11.1-2 (ENGLISH UNITS)

HEXANE EMISSION FACTORS FOR ~~SOYBEAN~~ Cottonseed OIL ~~MANUFACTURING~~ Processing *

Process (SCC)	Emission factor Gal/ton	EMISSION FACTOR RATING
Oil extraction-main vent (30201916) [mineral oil scrubber]	NA ~~0.041[a,b]~~	~~B~~
Meal dryer (30200789)	NA ~~0.024[b]~~	~~C~~
Meal cooler (30200790)	NA ~~0.005[c]~~	~~B~~
Fugitive leaks (30201919) [pressure release]	NA	-
Solvent storage (30201920)	NA	-
Wastewater processing (30201921)	NA	-
Oil refining (30201918)	NA	-
Fugitive emissions from meal (30201922)	NA ~~0.122[d]~~	~~B~~

SCC = Source Classification Code.

~~[a]Factor represents controlled emission.~~

~~[b]Reference 15.~~

~~[c]References 15 and 17.~~

~~[d]References 11, 12, 13, 14, 15, 17, 17, 18, 19.~~

* all hexane emissions except fugitive emissions would go through the mineral oil scrubber

National Cotton Council OF AMERICA

1521 New Hampshire Avenue, NW • Washington, DC 20036
(202) 745-7805 • FAX (202) 483-4040 • TELEX 650-252-9879 MCI

PRODUCERS • GINNERS • WAREHOUSEMEN • MERCHANTS • CRUSHERS • COOPERATIVES • MANUFACTURERS

April 20, 1994

Mr. Dallas Safriet
Environmental Engineer
U.S. Environmental Protection Agency
Emission Inventory Branch (MD-14)
Research Triangle Park, NC 27711

RE: Particulate Emissions from Oil Mills -- AP-42

Dear Dallas:

The U.S. cottonseed crushing industry is pleased that EPA is revising the preface to AP-42 to clarify to the states and others how AP-42 should be appropriately used.

There are at least 30-50 cyclones on a cottonseed oil mill as controls for particulate emissions. It would be impractical to do particulate emission point source testing (Method 5 and Method 21) for all of the cyclones.

Dr. Calvin Parnell, professor in the Department of Agricultural Engineering at Texas A&M University, prepared the attached suggested method for determining an emissions factor for particulate emission from a cottonseed oil mill. Dr. Parnell is a former member of the nine member citizen board that functions as the governing body of the Texas state air pollution regulatory agency and throughout his career has been involved with air pollution and air pollution abatement including research on cottonseed oil mills and cotton gins.

The approach that Dr. Parnell suggests is a simple and sensible estimating procedure. He uses an assumed grain loading of 0.01 gr/scf for all fabric filters, and 0.03 gr/scf for all cyclones, and assumes that facilities can estimate the flow rate through their various control systems. He uses the flow rate values to estimate mass emissions, and converts the result into an emission factor by dividing by the plant throughout.

Dr. Parnell's assumptions should be valid upper bound values, and this is what they are intended to be. As such, they would be useful for a source category where no better data exists. In addition, this approach eliminates the possibility of the emission factor

being biased high by erroneous data or by data from a malfunctioning control device. However, where there are sufficient data, such data should be used.

I would appreciate your comments on this approach and whether you think such an estimating procedure could be incorporated in AP-42 as an appropriate method for determining emissions from a cottonseed oil mill, which could be used for permitting purposes.

Yours sincerely,

Phil Wakelyn, Ph.D.
Manager, Environmental Health
and Safety

Attachments

CC: Andy Jordan
Lance Forster

EMISSION FACTORS FOR COTTON SEED OIL MILLS

The particulate emissions from a cottonseed oil mill will need to be estimated in order for the mill to obtain a Federal Operating Permit (FOP). Since most oil mills utilize Hexane and its associated Hexane emissions (based on the mass of Hexane accounted for) will exceed 10 tons per year, these mills will be classified "major" sources and will be required to pay $25 per annual ton of emissions of all criteria pollutants including particulate. In Texas, they will be paying $25 per annual ton of Total Suspended Particulate (TSP). It is my understanding that "major" sources in California will pay their annual fees for PM_{10} particulate which is estimated to be 50% of TSP.

An Emissions Factor (EF) for particulate emissions from a cottonseed oil mill can be estimated from emission concentrations of air pollution abatement systems using the following procedure:

1. The volume-rate-of-flows (VRF's) of each pneumatic conveyor or pneumatic dust control must be known. These data are usually documented in the permit obtained when the facility applied for their first operating permit. It is important that the VRF's be accurate in that low level high VRF's can impact the facility.

2. All air passing through a bag filter will be assumed to have an emission concentration of 0.01 grains per dry standard cubic foot (g/dscf). All air passing through a cyclone will be assumed to have an emission concentration of 0.03 gr/dscf.

3. The annual hours of operation and tons of cottonseed processed must be documented.

4. The emission factor can be given by the following equation:

$$EF = [\, Q_1 \times \frac{60}{7000} \times H \times 0.01 + Q_2 \times \frac{60}{7000} \times H \times 0.03] \div TP$$

Where Q_1 = volume rate of flow of air passing through bag filters
Where Q_2 = volume rate of flow or air passing through cyclones
Where H = hours of operation per year
Where TP = tons of cottonseed processed per year

This equation can be simplified to:

8.6

$$EF = \frac{8.6\,H[Q_1 + 3Q_2]}{TP \times 10^5}$$

Example: 400 ton/day oil mill with Q_1 = 60,000 cfm
Q_2 = 140,000 cfm

The mill operates for 200 days at 24 hours per day or 4800 hours. The total cottonseed processed in this period is 60,000 tons.

$$EF = \frac{8.6 \times (4800)(60{,}000 + 3(140{,}000))}{60{,}000 \times 10^5}$$

$$EF = 3.3 \text{ lbs/ton}$$

The annual TSP emissions will be 99 tons per year. If 50% of these emissions are PM_{10} then PM_{10} emissions will be 50 tons per year. This factor does not include fugitive emissions.

The advantage of this process for determining emission factors is that the emission rate of a cyclone should be equal to or less than 0.03 gr/dscf and the emission rate of a bag filter sould be equal to or less than 0.01 gr/dscf provided they have been designed properly. If the facility is required to have source sampling performed, they should be able to demonstrate compliance.

8.6 3 140,000

420,000

480,000

a:vegoil

MEMORANDUM

SUBJECT: Vegetable Oil Cooking

FROM: G. T. Helms, Chief
Ozone/CO Programs Branch (MD-15)

TO: Air Branch Chief, Regions I-X

Several months ago, members of the food preparation and processing industry presented information to us concerning vegetable oil emissions from their cooking operations. This memo deals with the issue of whether or not these emissions should be considered as volatile organic compounds (VOC's) in the ozone nonattainment planning process. Generally, they should not.

Specifically, we have received inquiries from the Frito-Lay Company concerning whether emissions from deep fat frying operations with vegetable oil should be treated as particulates or VOC's. The company contends that such emissions are particulates and should be controlled as such.

Attached is a copy of an August 21, 1990 memorandum from John Calcagni to Region IV discussing vegetable oil. We concluded in this memo that, based on its very low volatility, vegetable oil should not be considered as a VOC in ozone nonattainment planning. Subsequently, the Environmental Protection Agency (EPA) ran Method 24 tests on vegetable oil samples to determine whether vegetable oil used in paints and coatings would be counted as a VOC by this method. There was no loss of vegetable oil during the Method 24 tests, thus vegetable oil is not measured as a VOC by this method.

Even after these tests, there remained a question about whether there would be VOC emissions from the deep fat frying processes using vegetable oil (i.e., does the frying process cause the higher molecular weight vegetable oil to break down to lower molecular weight compounds which might become volatile?). Also, could the food products being cooked, such as corn chips or potato chips, give off VOC's? To answer these questions, Frito-Lay has submitted a report to EPA entitled "Characterization of Industrial Deep Fat Fryer Air Emissions." A copy of this report is attached for your information.

This report presents data which Frito-Lay interprets to show that the actual VOC emissions from cookers are low, perhaps in the range of 0.25 to 0.5 tons/year from individual cookers in some situations. Nevertheless, Table 2 of the report gives nonmethane hydrocarbon emissions as high as 0.54 lb/hour for corn chips. This level could produce emissions of 2.4 ton/year for an individual cooker, if operation for 8,760 hours/year is assumed. Facilities tend to have 2 to 10 kettles, so VOC emissions could approach 24 tons/year at a large facility. This would be below the cut point for major non-control techniques guidelines sources in all but extreme areas (Los Angeles) which have a major source cutoff of 10 tons/year. However, this seems to be a worst case situation. Most of the emissions given in the report are much lower, almost an order of magnitude smaller.

It is Frito-Lay's contention that much of this material would be caught by a Method 5 sample train and, thus, should be considered to be particulate.

I think the conclusion to be drawn from this information is that VOC emissions from vegetable oil deep fat frying processes are generally low and, in most cases, appear to be below the cutoff levels to be considered as major VOC sources. In such cases, they would not require non-CTG RACT controls.

For further information, contact Bill Johnson at (919) 541-5245.

Attachment

cc: K. Berry
J. Berry
B. Judge, Region I
P. Truchan, Region II
C. Stahl, Region III
C. Kemker, Region IV
S. Rosenthal, Region V
J. Tapp, Region VII
J. Houk, Region VIII
D. Lo, Region IX
M. Lidgard, Region X

processes are better documented than others. For example, several emission factors may be listed for the production of one substance: one for each of a number of steps in the production process, such as neutralization, drying, distillation, and other operations. However, only one emission factor may be listed for releases from production facilities for another substance, though emissions are probably produced during several intermediate steps. There may be more than one emission factor for the production of a substance because differing production processes may exist or the different control devices may be used. Therefore, it is necessary to look at more than just the emission factor for a particular application, and observe details in the text and table footnotes.

[redacted]

Emission factors may be appropriate in a number of situations, such as for source specific emission estimates in area wide emission inventories. These inventories are useful for many purposes, including ambient dispersion modeling and analysis, control strategy development, and screening sources for compliance investigations. Use of emission factors may also be appropriate in some permitting applications, such as applicability determinations and in establishing permit fees, such as Title V operating permit fees.

Emission factors in AP-42 are not EPA recommended emission limits (e.g., BACT or LAER) or standards (e.g., NESHAPS or NSPS). Use of these factors for developing source specific permit limits and/or determining compliance with emission regulations is not recommended by EPA. Because emission factors essentially represent an average of a range of emission rates, approximately half of the sources will have emission rates greater than the emission factor while the other half will have emission rates less than the factor. As such, permit limits based on an AP-42 emission factor would result in half of the sources being in non-compliance.

As stated above, source specific tests or continuous emission monitors can better determine the actual pollutant contribution from an existing source. Even then, the results

Recd 9/29/95 R

CORN REFINERS ASSOCIATION, INC.

September 21, 1995

Mr. Dallas W. Safriet
Environmental Engineer
Environmental Protection Agency
Emission Inventory Branch (MD-14)
Research Triangle Park, NC 27711

RE: Emission Factor Documentation for AP-42
Section 9.11.1; Vegetable Oil Processing

Dear Mr. Safriet:

We appreciate the opportunity to review the draft final report Section 9.11.1, Vegetable Oil Processing. We hope our comments will be helpful in the Agency's work in publishing a supplement to AP-42, Compilation of Air Pollution Emission Factors.

The Corn Refiners Association, Inc. is the national trade association representing the corn wet milling industry. Members of the Association produce starches, sweeteners, alcohol, feed ingredients and vegetable oil using the corn wet milling process. A list of Association members is enclosed.

Our comments focus specifically on the portions of the draft final report text that relate directly to corn wet milling. In Section 2.2.3 Corn Oil Processing, paragraphs 3 and 4 should be changed to read:

> In wet milling, clean corn is steeped (soaked) in tanks of warm water and dissolved SO_2 (approximately 0.1% reduces bacterial growth) to loosen the hulls from the corn kernels. The steeped corn is passed through a series of mills (of various types) to break down the kernel and loosen the germ. The ground corn, in a water slurry, flows to germ separators. The germ is separated from the slurry with cyclones, washed to remove starch and dried. For dry milling, once germ separation has been achieved by mechanical milling, the germ is ground and passed through a solvent extraction device.

1701 Pennsylvania Avenue, N.W. Washington, D.C. 20006 Telephone: (202) 331-1634 Facsimile: (202) 331-2054

Corn germ is typically prepressed through continuous screw presses or expellers before solvent extraction. Because pressing extracts about 80% of the germ's oil content, solvent extraction is typically used to remove the residual oil. After the expellers, the germ may be flaked and the remaining oil extracted using a solvent. Large wet milling operations use both prepress and solvent extraction. Again, solvent extraction processes are believed to be the only significant sources of VOCs.

We appreciate the opportunity to provide these comments. Please let me know if I can provide you with any further information.

Sincerely,

Monique Kosse

Monique Kosse
Director of Technical Affairs

Enclosure

MEMBER COMPANIES
Corn Refiners Association, Inc.
1701 Pennsylvania Avenue, N. W.
Washington, D. C. 20006

ADM Corn Processing
(A division of Archer Daniels
Midland Company)
P. O. Box 1470
Decatur, Illinois 62525

Plants:
Cedar Rapids, Iowa
Decatur, Illinois
Clinton, Iowa
Montezuma, New York

American Maize-Products Company
250 Harbor Plaza Drive
Box 10128
Stamford, Connecticut 06904

Plants:
Hammond, Indiana
Decatur, Alabama
Dimmitt, Texas

Cargill, Incorporated
P. O. Box 9300
Minneapolis, Minnesota 55440

Plants:
Blair, Nebraska
Cedar Rapids, Iowa
Eddyville, Iowa
Dayton, Ohio
Memphis, Tennessee

CPC International Inc.
International Plaza
P. O. Box 8000
Englewood Cliffs, New Jersey 07632

Plants:
Argo, Illinois
Stockton, California
Winston-Salem, North Carolina

Minnesota Corn Processors
400 West Main, Suite 201
Marshall, Minnesota 56258

Plants:
Marshall, Minnesota
Columbus, Nebraska

National Starch and Chemical
Company
P. O. Box 6500
Bridgewater, New Jersey 08807

Plants:
Indianapolis, Indiana
North Kansas City, Missouri

Penford Products Co.
(A company of PENWEST)
P. O. Box 428
Cedar Rapids, Iowa 52405

Plant:
Cedar Rapids, Iowa

Roquette America, Inc.
1417 Exchange Street
Keokuk, Iowa 52632

Plant:
Keokuk, Iowa

A. E. Staley Manufacturing Company
(A subsidiary of Tate & Lyle, PLC)
P. O. Box 151
Decatur, Illinois 62525

Plants:
Decatur, Illinois
Lafayette, Indiana (2)
Loudon, Tennessee

CORN REFINERS ASSOCIATION, INC.

September 24, 1992

Ms. Jamie C. Rusconi
Midwest Research Institute
425 Volker Boulevard
Kansas City, MO 64110

Dear Ms. Rusconi:

As you requested in your letter dated July 24, 1992, I am enclosing information on our industry's general process and production statistics. The general process can be found in the pamphlet entitled "Corn Refining, The Process, The Products." Our closest approximation to production statistics are the shipment statistics on page 5 of the 1992 Annual Report.

We are still working on your third request for air emission factors and will contact you as soon as something is available. I hope the information provided is helpful. If you need any further assistance, please call me at (202) 331-1634.

Sincerely,

Monique Kosse

Monique Kosse
Director of Technical Affairs

Enclosures:
Corn Refining, The Process, the Products
1992 Corn Annual

1100 Connecticut Avenue, N.W. Washington, D.C. 20036 Telephone: (202) 331-1634 Telecopier: (202) 331-2054

INSTITUTE OF SHORTENING AND EDIBLE OILS, INC.
1750 NEW YORK AVENUE, N.W.
WASHINGTON, D.C. 20006

TELEPHONE (202) 783-7960
FACSIMILE (202) 393-1367

February 16, 1993

Ms. Margaret Thomas
Midwest Research Institute
425 Volker Blvd.
Kansas City, MO 64110

Dear Ms. Thomas:

Pursuant to your request for information relative to Air Pollution Emission Factors of the edible oils industry, I provided information to Jamie Rusconi of your company on July 29, 1992. I am also aware of other pertinent information supplied by David Ailor of the National Oilseed Products Association addressing this issue. I am unaware of additional information which would shed any more light on this issue. I regret I could not assist you further.

Yours Truly,

Robert Reeves

Robert M. Reeves
President