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Fresh Products
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Pecans in the Shell

Inspection Instructions

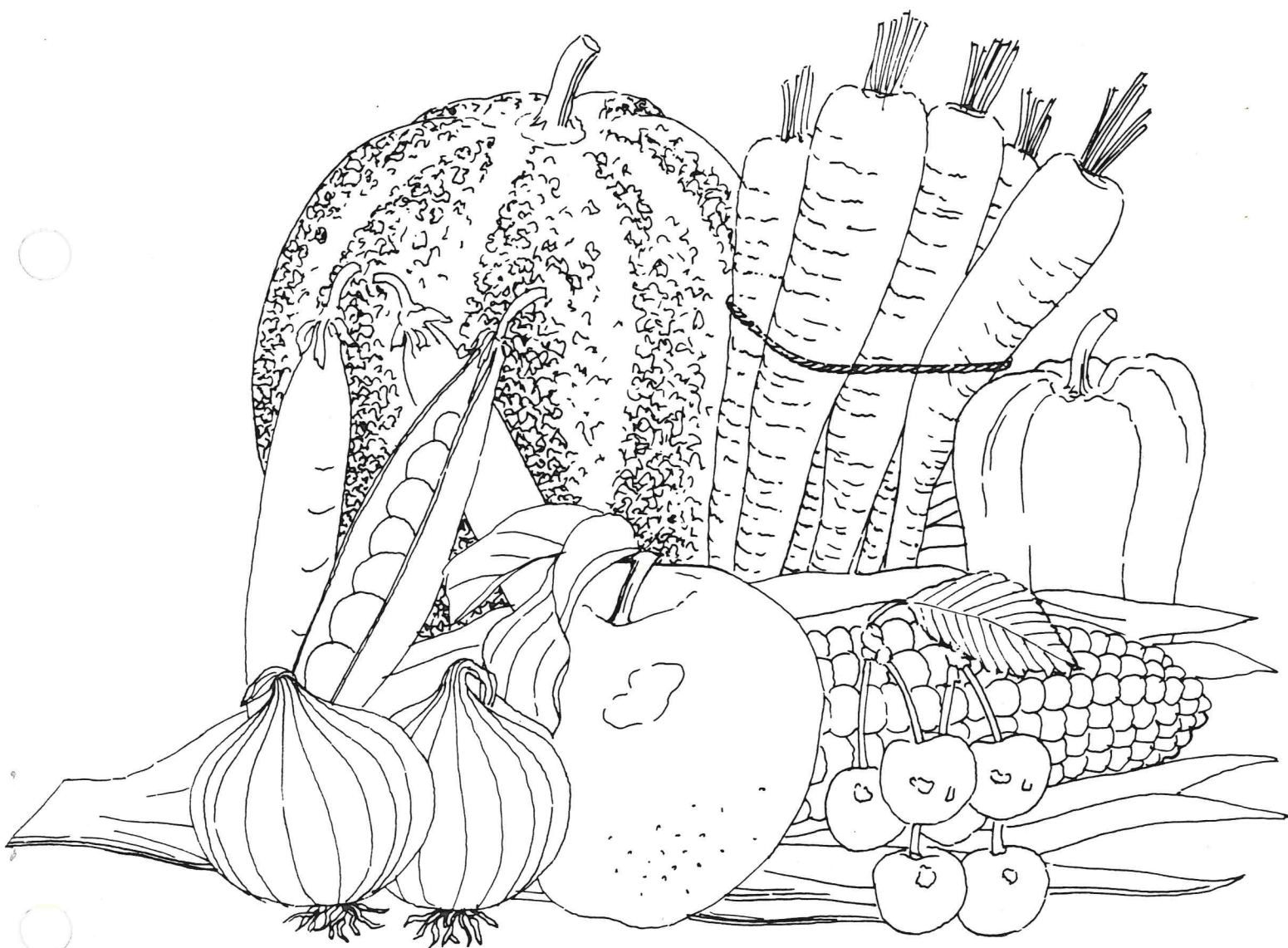


TABLE OF CONTENTS

	Paragraph Numbers
INTRODUCTION	1 - 4
INSPECTION EQUIPMENT	5
SAMPLING	6 - 16
Importance of Proper Sampling	6
Number of Containers to be Sampled	7
Method of Sampling	8
Loose Hulls and Other Foreign Material	9
Mixed Lots	10
Consumer Packages	11 - 15
Size of Samples	16
INSPECTION	17 - 21
INSPECTION POINT	22
KIND OF CAR	23
CAR INITIALS AND NUMBER	24 - 25
INSPECTION BEGUN — COMPLETED	26
CONDITION OF CAR	27
PRODUCTS	28 - 32
Type of Nut	29
Type of Container	30
Identifying Marks	31
Quantity Inspected	32
LOADING	33
PACK	34
TEMPERATURE	35

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Page II, Table of Contents, Pecans in the Shell,
Inspection Instructions, February 1968

II

	Paragraph Numbers	
SIZE	36 - 42	
Count per Pound	37	
Percentage Weight of 10 Smallest Nuts per 100	38	
Determining Size Designation	39	
Sizing by Diameter	40 - 41	
Reporting Size	42	
GENERAL EXTERNAL APPEARANCE	43 - 49	
Extraneous and Foreign Material	43	
Color of Shells	44 - 48	
Finish of Shells	49	
GRADING INDIVIDUAL NUTS	50 - 72	
Two Separate Gradings	51	
Shell Defects	52 - 55	
Shape	56	
Kernel Defects	57 - 72	
Curing	58	
Skin Color	59 - 63	
Development (meatiness)	64 - 67	
Kernel Spots	68	
Adhering Material	69	
Internal Flesh Discoloration	70 - 71	
Rancidity	72	
Dye Discoloration	72a	****
REPORTING QUALITY	73 - 74	
REPORTING GRADE	75 - 77	
REMARKS	78 - 79	
HOLDING SAMPLES	80	
THE CERTIFICATE	81 - 86	
APPENDIX I	U.S. Standards	

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
FRUIT AND VEGETABLE DIVISION
FRESH PRODUCTS BRANCH

SHIPPING POINT AND MARKET INSPECTION
OF
PECANS IN THE SHELL 1/

INTRODUCTION

There are two general classes of pecans: (1) named varieties, (1)
comprising about 25 percent of the total crop in most years and grown
chiefly east of the Mississippi River in the Southern states; (2)
seedling pecans, comprising approximately 75 percent of the crop and
grown principally in Texas, Oklahoma and states bordering the lower
Mississippi River. The named varieties are generally of larger size
than the seedlings, or native pecans, and a large proportion of the
better stock is distributed to the consumer in the shell. The poorer
quality stock is usually disposed of to shelling plants. Seedling
pecans are shelled commercially, with the exception of a small
percentage of larger sizes which are sold in the shell.

There are several hundred named varieties of pecans. In instances, (2)
these varieties have been developed from outstanding "seedling" trees
and are propagated by budding very young trees or grafting older
ones. Nuts from these named varieties are often called "improved
varieties," or "paper shells." The latter term is somewhat loosely
applied to cover the "improved varieties" in general. It is more
accurately used when applied only to relatively thin-shelled varieties
such as Schley, Mahan or Frotscher. Commercially important varieties
include Schley, Stuart, Moneymaker, Success, Frotscher, Moore, Mobile,

1/ Supersedes Shipping Point and Market Inspection Instructions,
Pecans in the Shell, reissued September 1965.

Van Deman, Mahan and Teche. Mixtures or "blends" of two or more of these and other varieties are common. Schley, a very thin shelled nut of high quality, commands a premium price and is seldom blended with other varieties.

- (3) Pecans are delivered by the growers to the buyer, handler or processor in lots ranging from a few pounds to several thousand pounds. Various types of sacks are used but heavy jute coffee sacks are common. Some growers may run their pecans over a rack in order to remove trash such as leaves, grass, twigs, loose hulls, etc., and to sort out the obvious defects. Others deliver nuts which have not been sorted and which may contain lightweight or empty shells, oil stained or badly discolored shells and other defects. The small buyer may sell to a large dealer or to a processor. He may grade his stock to some extent or he may sell direct to truckers or to retailers. Large handlers and some smaller ones are equipped to mechanically size, sort, and clean pecans.
- (4) Pecans are sized by machines having rotating cylinders with successive sections provided with openings of certain sizes. These openings are usually 2-1/2 inches long and vary from 8/16 to 15/16 inch in width, the gradations being in sixteenths of an inch. Lightweight or empty shells, known as "pops" or "blows", are removed by means of suction devices. The shells may be left in the natural state, in which case they will retain the normal dark streaks and other markings. In most plants they are "bleached" by passing them through a revolving cylinder containing sand and water. They emerge from this with a smooth, light-colored surface. Usually after this bleaching they are polished in a revolving drum containing wax. Prior to waxing, a yellow or red dye may be added to produce an attractive color of the shells. The final color will vary from a light yellowish-brown to a reddish-brown, depending upon the processor and the preference of the consumers in the area for which the finished product is destined. After this processing, the pecans are packed in one of several types of containers, ranging from 1 lb. transparent film bags to 100 lbs. burlap sacks.

INSPECTION EQUIPMENT

The following equipment is needed in the inspection of pecans in the shell: (5)

Scales, preferably one-pound or half-pound capacity; gram scales may be used.

Sizing Card, preferably of aluminum or other sheet metal, but fibre is satisfactory. It should be provided with 7 slot-shaped openings about 2-1/2 inches long and with widths varying from 10/16 to 16/16 inch in gradations of 1/16 inch.

Nut Cracker. Several types of nut crackers or nut shellers are available. The most satisfactory cracker is a lever type which applies pressure at the ends of the nut. A small screw-type cracker applies pressure at the ends but is slower than the lever type. There is an excellent hand sheller equipped with sharp jaws which snip off the shell in four operations. The ordinary household type of nut cracker which squeezes the nut between two bars is not satisfactory due to the likelihood of crushing the kernel.

Sample Board. This is a square of board or plywood about 14 x 14 inches with 10 rows of 10 holes each. The holes should be 1 inch in diameter and about 3/4 inch deep. Such a board provides a means of arranging the cracked pecans before and during the scoring of internal defects.

Inspectors who are stationed at processing plants or warehouses should be provided with the following:

Tables or Bench, large enough for cracking and grading operations.

Adequate Light. A fluorescent light, or a strong "daylight" bulb, is preferable to natural daylight because it will provide approximately the same intensity of light at all times, permitting more uniform interpretation of such factors as color and discoloration. The inspector should not proceed with an inspection unless adequate lighting is available.

SAMPLING

- (6) Importance of Proper Sampling. A lot pecans is more likely to lack uniformity in quality than many other products. This is true because the nuts in a shipment may have come from a number of growers in widely separated areas and may have been grown under considerably different conditions. Because of the likelihood of variation of quality within the lot, it is essential that a representative sample be obtained from all portions of the lot, whether it is located in a warehouse, truck, or freight car. This means that all parts of the lot must be available for sampling and the applicant will be expected to furnish help to assist the inspector in getting containers from inaccessible stacks in warehouses, trucks or cars, unless a restricted certificate is acceptable. Inspections that are based on samples which are not representative of the lot are of questionable value, regardless of the accuracy of grade interpretation.
- (7) Number of Containers to Sample for Lots Other than Consumer Size Packages. In lots of 50 or more containers, approximately 1 out of each 10 containers shall be sampled; in lots of from 5 to 50 at least 5 containers shall be sampled, and in lots of less than 5 all of the containers shall be sampled.
- (8) Method of Sampling. Draw the sample from containers selected at random from all parts of the stack or load. The quantity of nuts taken from each sample will vary from a few nuts to a large handful or more, depending upon the number and size of the containers sampled. However, about the same quantity should be taken from each package. A sufficient quantity should be taken from each to provide a sample for grading, a check sample, and a small additional amount for grading in borderline cases. Open the top of the sack or carton, being careful to avoid unnecessary damage to the container, but draw the sample from the central portion of some containers, from the bottom portion of some and from the top portion of other containers. In order to sample from the bottom portion of a large container, it will be necessary to dump the entire contents into an empty container to make the bottom readily accessible.

Watch for loose hulls and other foreign material when drawing the sample, and remember that heavy material such as dirt and stones will settle to the lower portion of the container. When excessive foreign material is present or suspected, the entire contents of each container selected as a sample should be emptied out into other containers or onto a canvas spread on the floor or ground, in order to determine whether the appearance of the sample is materially or seriously affected. In such cases, the composite sample can be selected at random while the contents of the container is emptied out. Uncleaned pecans usually are packed in used sacks and the inspector should be particularly alert for foreign material in such lots. (9)

Mixed Lots. When the lot contains two or more distinctly different qualities or sizes of nuts in separate containers, each quality or size should be considered as a separate lot if the different lots can be identified by distinguishing marks, or if the size and location of the lot makes segregation of the different qualities or sizes feasible. When drawing the sample, keep the nuts from each such lot in a separate container. Grade them separately and report the grade and size on each lot separately. If the portion of the lot represented by the containers of decidedly different nuts cannot be identified or segregated, the inspection shall be made on the basis of the composite sample from the entire lot, with a notation on the certificate under "Quality and Condition" regarding the lack of uniformity. Sacks containing shriveled or light-weight nuts sometimes may be detected because they will be fuller than sacks of the same weight containing good quality nuts. It is very important when drawing the sample to observe the appearance and any irregularity in quality and size in different containers; otherwise, inferior quality and smaller size may be certified on the basis of a higher grade and size classification than is justified by the lot. (10)

Consumer Size Packages. Pecans in the shell are sometimes shipped in consumer packages such as 1-pound or 2-pound transparent film bags packed in large master shipping containers. These lots shall be sampled as follows: (11)

- (12) **Carlot or Truck Load.** Select master containers at random at the rate of 1 out of 25. Take 1 consumer package out of each master container selected.
- (13) **Less than Carlot.** Regardless of size of lot select 20 master containers at random when consumer packages are 1-pound units; select 15 master containers when consumer packages are 2-pound units. Take 1 consumer package out of each master container selected. When lots contain 20 or less master containers with 1-pound units or 15 or less master containers with 2-pound units, a consumer package shall be taken from each master container in the lot.
- (14) Take some of the packages from the upper and some from the lower portions of the containers. Each of the consumer size bags removed shall be replaced with a bag from another master container selected for this purpose. When the consumer size packages have been collected, open them and thoroughly mix together the nuts to form a composite sample representing the lot. This can be done by pouring the nuts from one cardboard carton into another, two or three times. Reduce this sample to the size required for sizing and grading. If the sample is drawn at the processing plant and the packer is able to delay sealing the master containers until after the sample is drawn, the additional work of opening and resealing the cartons may be avoided. Inspectors who are assigned full time to processing plants may draw sample sacks from the packaging line before they are sealed, provided they observe the entire process of packaging and can definitely establish the identity of the lot. This will avoid damaging the bags as would be necessary otherwise.
- (15) The inspector may be asked to draw the sample from bins or large sacks before the lot has been packaged in consumer size packages. The inspector should not draw the sample until the pecans are actually in the containers which will be described on the certificate.
- (16) **Size of Sample.** The quantity of pecans taken for inspection should be twice as large as the amount required for grading plus at least 100 additional nuts to be graded or sized in borderline cases. This will provide for a check sample, equal in size to the graded sample, to be held for a period of thirty days. Pecans are a relatively high-priced

commodity and the inspector should be careful to draw only the necessary amount, thus diminishing waste and eliminating possible criticism. The minimum number of nuts to be used in determining the grade and size shall be as follows:

<u>Pounds in Lot</u>	<u>Sample Graded</u>
Up to 15,000	100 nuts
15,001 to 30,000	200 nuts
30,001 to 60,000	300 nuts

For each additional 20,000 pounds, or fractions thereof, use 100 additional nuts.

The above table indicates the minimum number of nuts to be graded in each instance and an additional 100 or 200 nuts may be necessary in borderline cases in order to make a definite decision concerning quality and size.

INSPECTION

The inspection should be completed promptly after the sample is drawn. The sample may be analyzed at the processing plant or warehouse if adequate equipment is available or it may be taken to the inspection office for analysis. (17)

The composite sample should be very thoroughly mixed before drawing the sample to be analyzed. The mixing may be done by gently pouring the nuts from one container to another six to eight times, being careful not to break any shells in the process. The sample to be analyzed should then be drawn at random from the thoroughly mixed composite sample. The check sample should then be drawn in the same manner. The remainder of the nuts should be held until the inspection has been completed and may then be returned to the handler. (18)

The inspection procedure consists of three distinct operations as follows: (19)

1. Size determination.
2. External quality determination.
3. Internal quality determination.

Each of these operations, which will be discussed later, is separate and bears no relation to either of the others. Size is not a grade factor and there are separate tolerances for internal and external (20)

defects. The percentage of internal defects is considered separately from the percentage of external defects in determining grade. After the size has been determined, the same nuts are used for determining the percentage of external defects, and then cracked, shelled and arranged in the sample board for the scoring of internal defects.

- (21) The information which should be recorded under the various certificate headings is discussed in the following paragraphs. Instructions for making the size determinations and for scoring defects also are given.

INSPECTION POINT

- (22) This is the station or siding, the address of the processing plant or warehouse, or other location at which the lot was sampled.

KIND OF CAR

- (23) Pecans in the shell are shipped in box, ventilated box or refrigerator cars, and in trucks or trailers. If a truck or trailer is used, block out the word "CAR" in this heading, inserting "TRUCK" or "TRAILER", and indicate whether Refrigerator, Covered or Open.

CAR INITIALS AND NUMBER

- (24) It is essential that car initials and numbers be correctly recorded. The initials and number recorded should be those on the outside of the car. Truck or trailer license numbers should be reported in this space; blocking out "Car Initials and Number" and inserting "Truck License Number" or "Trailer License Number."
- (25) Car numbers or truck or trailer license numbers should be shown under this heading only when the car, truck, or trailer is actually loaded prior to or during the course of the inspection. If the applicant requests that a lot be identified with a car or truck to be loaded at a later time the inspector should show under this heading "**See REMARKS**". Under "**REMARKS**" report as follows: "Applicant states that the above lot to be loaded into car FGEX 52470."

INSPECTION BEGUN.....COMPLETED.....

These headings refer to the date and time that the sample was drawn (26)
and the date and time that the analysis of the sample was completed,
respectively.

CONDITION OF CAR

The condition of a truck or trailer should be reported under this (27)
heading, blocking out "CAR" and inserting the appropriate word. Under
this heading mention any defect in the car, truck or trailer that
might cause damage to the shipment. Such items as leaky roofs, holes
in floors and contamination of the floor or walls by grease may
properly be shown. Report any special preparation of car or truck
such as papering of floor or walls or boarding of doorways. In case
of refrigerator cars indicate the position of hatch covers and plugs.

PRODUCTS

Mention under this heading: (28)

1. Type of nut, when specifically requested.
2. Type of container.
3. Identifying marks.
4. Quantity inspected.

Type of Nut. When specifically requested by the applicant the general (29)
type may be shown as, for example, "Blocky type", "long type", "short
type" or a "blend" or mixture of types. The inspector should not
attempt to certify the variety of pecans. Variety names should not be
shown on the certificate except when quoting markings on containers or
tags.

Type of Container. Pecans are packed in several different types of (30)
containers. The most common are 100-lb. and 50-lb. burlap sacks.
50-lb. and 25 lb. paper net or cotton net sacks, and consumer-size
paper net sacks containing 5 to 10 lbs. are used frequently. Some
processors pack 5 lb., 10 lb. or 25 lb. pasteboard cartons. One pound
transparent film bags, packed in fibreboard shipping cases are
becoming popular. Used heavy jute coffee sacks are commonly used by
growers for delivery to handlers and sometimes for shipment to
market. Be sure to indicate whether containers are new or used.

Identifying Marks. Show in quotation marks all brands, packers' or (31)
shippers' names and addresses, variety, grade and size marks and lot

numbers, whether printed, stencilled, stamped or written. Do not overlook insignificant appearing marks on tags because they may lot of pecans is more likely than many other products to be made up of several growers' lots. If the containers bear no distinguishing marks, a statement to that effect should be made.

- (32) Quantity Inspected. Report the number of containers, the weight of the contents, and the total net weight of the lot. When the weight of the contents is not marked, or is not uniform, report the number of containers and the total net weight of the lot, obtaining the latter from the applicant. If the inspector has not counted the containers, or reports a total net weight furnished by the applicant or other parties, the source of information must be shown as, for example, "Applicant's count", "Applicant's count and weight" or "manifested as."

LOADING

- (33) If a lot is being loaded into a car, truck or trailer, describe the arrangement of the containers. Otherwise merely make a statement regarding the location of the lot as, for example, "stacked in applicant's warehouse."

PACK

- (34) Block out this heading unless certification of weight is requested.

TEMPERATURE

- (35) Block out this heading.

SIZE

- (36) There is no size requirement in either the U.S. No. 1 or U.S. No. 2 grade. However, size usually is specified in connection with the grade. The U.S. Standards provide size designations which may be used in specifying size and which are based upon a combination of count per pound and weight of the 10 smallest nuts in a representative 100 nut sample. Size also may be specified in accordance with the maximum number per pound or the range in number per pound with reference to the weight of the smallest nuts. The size may also be specified as an exact number per pound. In addition, size may be described in terms

of the diameter of the smallest nuts or the range in diameters, stated in sixteenths of an inch. In most lots, the size will be specified in terms of definite size designations such as "Medium", "Large", etc. When the size is not specified the count per pound and the weight of the 10 smallest nuts per 100 should be determined and reported under the **SIZE** heading.

Count per pound. Weigh, as nearly as possible, an even pound of pecans from the mixed sample. If gram scales are used, the pound-equivalent weight is 453.6 grams. Count the nuts and record the count. Weigh and count a second pound. Average the two counts, and if the average count is clearly within the count range specified for one of the size classifications, that shall be the count reported for the lot. However, if the average of the two is on the borderline between two size classifications, make one or two more counts and average all of them, to help decide which size classification should be given the lot. (37)

Percentage Weight of 10 Smallest Nuts per 100. Count out 100 nuts at random from the mixed sample. Weigh the 100 nuts, preferably on gram scales, but on pound-ounce scales if they are the only ones available. Record the weight to the nearest gram, or in ounces to the nearest one-fourth of an ounce. (Example: "810 grams" or "27.75 ounces".) Spread the 100 nuts in a single layer, so that all may be seen at once. Carefully select 10 which appear to be the smallest among the 100. Sometimes it is easier to pick out 12 to 15 or more to start with, and then reduce the group down to 10 by putting back those in the group which appear to be larger. Weigh the 10 smallest nuts to the nearest gram or the nearest one-eighth of an ounce, and record the weight. (Example: "67 grams" or "2.13 ounces".) Now divide the weight of the 10 smallest nuts by the weight of the 100 nut sample to obtain the percentage weight of the 10 smallest. (In this example 2.13 divided by 27.75 gives 7.68 - report as 7.7%). If the 10 are borderline for meeting the 7% weight requirement, use one or two additional 100 nut samples to determine definitely whether the lot meets the requirement for uniformity. If the average is less than 7.00%, do not round it up to 7%, because the lot does not meet the size requirement. (38)

- (39) **Determining Size Designation.** When the count per pound has been established, and the 10 smallest nuts per 100 have been found to constitute 7 percent or more of the weight of the 100 - nut sample, the lot may be designated as meeting the size designation within the count range of which the particular count falls. Regardless of the number of nuts per pound, the lot cannot meet any size classification if the 10 smallest nuts weigh less than 7 percent of the weight of the 100-nut sample.
- (40) **Sizing by Diameter.** An applicant may request that size be determined and reported on the basis of diameter of the pecans. Although this method is not mentioned in the standards, it shall be applied to the lot if requested. In such cases, from 100 to 300 nuts should be measured, and the percentage in each size bracket on the overall range and the "mostly" range in diameter should be reported.
- (41) The pecan industry generally uses sizing reels with slot opening of various widths measured in sixteenths of an inch. The range from 10/16 to 16/16 inch slots on our sizing card covers practically all sizes which are ever sold in the shell. To measure, lay the nut on the slot, turn it over, and if it drops through without pressure, place it in the next lower size. Class each nut for size as to the largest slot which it will ride. A typical lot might have a distribution like this: 16/16 - 7%; 15/16 - 38%; 14/16 - 51%; 13/16 - 4%.
- (42) **Reporting Size.** The method of describing size on the certificate shall depend upon the request of the applicant or upon the size markings on the containers. When grading the sample on the basis of one of the size classifications, always report under the "Size" heading the number of nuts per pound and the percentage weight of the 10 smallest nuts per 100. The policy should be followed also if no size is specified and none is marked on the containers. If sizing is based upon diameter measurements, report the percentage of nuts of each diameter, or show the range of diameter sizes and the limited range covering most of the nuts. If requested to show only the average number of nuts per pound, no mention shall be made of the weight of the 10 smallest nuts. When a lot meets one of the size

classifications, the name of that classification shall be added to the grade statement. Example: "U.S. No. 1 Large".

GENERAL EXTERNAL APPEARANCE

Extraneous and Foreign Material. This is almost never a factor of importance, but lots coming directly from the orchard may contain enough trash to be objectionable. If a considerable amount is present, weigh the entire sample, sort out and weigh the foreign material and determine the percentage. Unless the percentage exceeds the grade tolerance of 0.5 percent, or unless the applicant requests that it be reported, the percentage need not be mentioned on the certificate. (43)

Color of Shells. A statement should always be made describing the general appearance of the shells. This is based primarily upon color which is determined to a large extent by bleaching, brushing, sanding, and dying processes, but also in some cases by the presence of many slight blemishes. U.S. No. 1 grade requires that the lot be at least "fairly uniform in color." U.S. No. 2 grade has no requirement for uniformity of color, but does exclude lots which are damaged in general appearance by numerous stains or bits of attached husks or other means. (44)

Terms to be used in describing general appearance are as follows: (45)

"Uniform in color" should be applied only to the best lots with no more than very slight variation between nuts, and none with distinct contrasting color.

"Fairly uniform in color" will be applicable to the great majority of lots which have had uniform treatment of the shells or which are "natural". As a guide, a lot may have up to but not over 5 percent nuts with sharply contrasting color, and the lot still be classed as fairly uniform. (46)

"Irregular in color" will be the term to describe lots which have a mixture of contrasting colors. Even though most of the nuts may be classed as fairly uniform, the lot as a whole shall be classed as irregular if it contains more than 5 percent nuts of sharply contrasting color. Such lots are permitted in U.S. No. 2. (47)

- (48) "Damaged in general appearance" may be used to describe lots containing very many slight shell blemishes, even though most of them are not large enough to be scored on the individual nut basis. Such lots fail to meet the requirements of both U.S. No. 1 and U.S. No. 2., even though they may meet the internal quality requirements.
- (49) Finish of Shell. To complete the general description of appearance, a few words should be added to describe the treatment given to the shells. Use the words natural, bleached, dyed, or waxed or combinations of these words, along with the statement describing the degree of uniformity of color.

GRADING INDIVIDUAL NUTS

- (50) The number of nuts to be graded individually shall be as stated in paragraph 16. In no case should the number be less than 100, and in cases where the sample is borderline for grade defects, it may be necessary to grade an additional 100, 200 or more nuts to arrive at a clear-cut grade determination.
- (51) Two Separate Gradings. The 100,200,300, or larger sized sample shall be completely graded and scored for shell defects, without any attention to what the kernel content may be. Then all of the same nuts shall be cracked and graded individually, without any reference to the shell of the nut. In other words, the two gradings are completely separate and independent.
- (52) Shell Defects. The standards provide definitions of defects which are classed as damage or serious damage. Most of the definitions should need no further explanation, but a few quality factors are discussed as follows:
- (53) Cracks. When the shell is cracked and the edges of the crack remain close together leaving practically no opening, the nut should not be scored as damaged. The "slight pressure" referred to in the definition of damage shall be interpreted to mean no more pressure than you would use to test a ripe strawberry. Unless such delicate pressure causes the crack to separate noticeably, the nut shall not be scored.

Stains. This term refers to blemishes such as the splotchy, dark gray (54)
or black areas caused by the action of husk worm, or to oil-soaked
spots on the shell. If either of these types of stains are dark,
conspicuous, and in excess of the 5 percent or 20 percent area of
the surface, the nut should be scored as damaged or seriously damaged
respectively.

Spotty Dye. Usually dyed nuts are about the same color over the (55)
entire surface. A slight to moderate mottling of the dye coloring
should not be considered as materially detracting from the appearance
of the individual nut. However, in rare instances there may be
individual nuts having extremely bad looking mottling which may be
scored as damaged under the general definition.

Shape. There is no requirement for shape in the standards, and a (56)
misshapen nut shall not be scored as defective.

Kernel Defects. Crack each pecan as gently as possible, so as to (57)
avoid shattering the kernel, and thus permit more accurate grading.
It is better to examine each kernel as it is removed from the shell,
before they get mixed together. A discussion of grade factors
follows.

Curing. Lots which have been packing-house graded rarely contain nuts (58)
which are not "well cured" as defined in the standards. New crop lots
which have just been harvested may have considerable numbers of nuts
which have not yet dried. Nuts which are not well cured are scored as
damaged. Given time and good ventilation, such kernels will usually
dry without molding, and they will then meet the U.S. No. 1 Grade
requirement.

Skin Color. The color classifications provided in the standards are (59)
defined to permit a kernel in a certain class to have up to one-fourth
of its surface one color classification darker than the color over the
majority of the kernel's surface. For example, 75 percent of the
entire outer surface could be "amber", the other 25 percent could be
"dark amber", and the kernel would be classed as "amber". Include the
outer surface of both halves of the kernel when estimating the area
affected.

- (60) Unless inspection is requested on the basis of "light" or "light amber" kernel color classification, it is not necessary to determine the percentage of kernels in these classes. The kernels which are "dark amber", but not otherwise defective, are scored as "damaged" by color. The kernels which have "dark discoloration" (blackish-brown) over more than 25 percent of the outer surface, but which are not rancid, decayed, moldy or injured by insects, are scored as "seriously damaged" by color. If the kernel is both dark discolored and rancid, decayed, moldy or insect injured, it shall be scored as one of the latter group which are the most objectionable.
- (61) When a lot is specified to be U.S. No. 1 Light or Light Amber, and inspection is requested on the basis of one of those colors, any kernel of a darker color classification shall be scored as a grade defect. Such kernels may be scored against the 12 percent general tolerance or the 8 percent additional tolerance, but those having dark discoloration must be scored against the 7 percent tolerance for serious defects. If there were no other defects, a lot could contain 13 percent darker than "light amber" plus 7 percent dark discoloration, and it would grade U.S. No. 1 Light Amber.
- (62) The 8 percent additional tolerance in U.S. No. 1 applies to kernels scored for skin color only, but must not be used for any having dark discoloration. All kernels having grade defects other than those of skin color, and those having dark discoloration must be scored against the 12 percent and the included 7 percent tolerance.
- (63) U.S. No. 2 grade has no provision for specifying a lighter skin color classification, but there is no restriction against a color specification. All grade defects are scored against the 30 percent total tolerance and the restricted tolerances for serious defects.
- (64) **Development (Meatiness)**. The standards recognize four degrees of development of the kernels. Three of them are described by definitions and cross-section sketches. "Well developed" kernels contain much more meat than the minimum requirement of U.S. No. 1 grade. This term should be used in describing lots which have "some" or "many" or "most" kernels well developed. U.S. No. 1 Grade requires kernels be at least "fairly well developed", and the sketches in

Figure 1 illustrate the least amount of meatiness permitted in this class. Kernels less than fairly well developed, classed as "poorly developed", are scored as damaged. Any kernels having less meat content than the minimum shown in Figure 1 for poorly developed are classed as "undeveloped", and shall be scored as seriously damaged.

Each of the definitions of kernel development contains the words (65)
"amount of meat in proportion to its width and length". This phrase means that a kernel from a smaller pecan need not be quite as thick as one from a larger pecan to meet the minimum requirement of "fairly well developed" or one of the other two stages of development.

When judging kernels for degree of development, it should not be (66)
necessary to cut a large percentage of the kernels, unless the lot being graded is of only fair to poor quality. Cut only those kernels which cannot be classified with certainty without cutting. In most cases, looking at both sides of the half-kernel and squeezing them will be sufficient to determine whether they are fairly well or well developed. A kernel which is thick through the center and very solid when squeezed has little or no hollow center and has ample meat. However, a few of the apparently meaty kernels should be cut in the beginning of the inspection, in order to make sure that they are what they seem to be.

Kernels should be cut crosswise about midway of the length of the half (67)
when judging development. However, the definitions are so worded that the length of the kernel shall be considered. If the end of either half of a kernel is badly shrunken, that kernel may have insufficient total meat to be classed as "fairly well developed", even though the cross-section cut may be as thick as shown in Figure 1. When a kernel is close to borderline for either fairly well developed or poorly developed, both halves shall be cut and the decision based upon the average thickness of the two halves.

Kernel Spots. The definitions in the standards of damage and serious (68)
damage by kernel spots are quite specific. However, attention is called to the fact that a kernel may have one dark spot less than 1/8 inch in greatest dimension on each half, and the kernel is not classed as damaged.

-18-

- (69) Adhering Material. Note that a kernel must have more than one-third of the outer surface affected by material which is firmly attached and contrasting in color before it may be scored as damaged. A kernel might have velvety material over most of its surface, but if there is not a noticeable contrast in color, the kernel should not be scored.
- (70) Internal Flesh Discoloration. This defect usually can be detected, or at least its presence can be suspected due to discoloration at the point where the halves were attached, or by a dark streak over the surface of the center ridge. To determine the extent of the defect, the half-kernel should be cut with a sharp knife, lengthwise of the kernel along the center ridge. This cut usually makes it possible to determine both the area affected and the intensity of the discoloration.
- (71) If the color is light gray or light brown, the kernel shall be passed, even though it may extend the full length of the half-kernel. A medium shade of gray or brown is not considered damage if it extends less than one-fourth inch in the kernel. If it extends more than one-fourth inch, even to the full length of the half-kernel, it shall be scored as damage. When a small area, less than one-fourth inch in length, is dark gray or black and detracts from the appearance more than the one-fourth inch of medium gray, the kernel shall be scored as damaged. To be scoreable as serious damage, more than one-third the length of the half-kernel must have dark discoloration. Scoring of the kernel as either damaged or serious damage shall be used based upon the worse of the two halves.
- (72) Rancidity. Caution must be taken to avoid scoring a pecan as rancid when it actually has only a stale, unattractive flavor. Pecans which have been held over in storage are likely to have poor flavor, but usually they are not actually rancid. Real rancidity produces a very objectionable flavor. Nuts scored as rancid fall into the more serious class of defects along with mold, decay and insect injury.
- ****
(72a) Dye Discoloration. Occasionally lots of in shell pecans may be dyed (usually red). If the shell has a slight crack or other opening the kernel may be affected by the dye. Score dye discoloration as damage when it materially affects the appearance of the kernel; as serious damage when it seriously affects the appearance of the kernel.
- ****

REPORTING QUALITY

The "quality" section of the certificate should be filled in with a description of the lot in three respects: 1. general appearance (including a statement on extraneous material only if it exceeds the 0.5 percent tolerance); 2. external (shell) defects; and, 3. internal (kernel) defects. (73)

Condition. Pecans are a very stable commodity after they have become cured and fully dried. They are rarely subject to change in quality due to so-called "condition" factors common in perishable commodities. Only when a lot has become wet with water or otherwise affected in some unusual way should a condition factor be mentioned. As a general rule, insect injury, rancidity, mold or decay are defects which develop during the growth or harvesting of the pecans. (74)

REPORTING GRADE

Under the "Grade" heading, there should be a statement of the grade of the lot, either U.S. No. 1 or U.S. No. 2, if the lot meets the requirements of one of them. In some cases, when a lot does not meet grade requirements, the applicant may request that we report the percentage of U.S. No. 1 kernel quality. This may be done by subtracting the combined percentages of kernel defects, including those damaged by dark amber skin color, from 100 percent. The remainder will be the percentage of U.S. No. 1 quality kernels. (75)

Size should be reported in connection with the Grade, although it is not a factor in determining grade. It may be reported in terms of meeting a certain size classification; or failing to meet a certain size classification, because of count per pound or percentage weight of the 10 smallest nuts per 100. If so requested, size may be described on the basis of a range of diameter, or on the basis of count per pound without reference to the 10 smallest nuts. (76)

Kernel Color. If the sample is graded by request on the basis of "light amber" or "light" kernel color classification, this factor also shall be covered in connection with the grade statement. Assuming that all kernel defects, including kernels darker than the specified color, are within the U.S. No. 1 grade tolerances, the lot may be (77)

reported as "U.S. No. 1 Light" or "U.S. No. 1 Light Amber". Otherwise, it may be necessary to report that the lot grades U.S. No.1, but fails to grade U.S. No. 1 Light Amber because of skin color.

REMARKS

- (78) Information which pertains to the lot but which does not properly belong on any other portion of the certificate may be reported under this heading.
- (79) **Restricted Certificates.** Any limitation of the portion of the lot sampled, or limitations of the extent of the analysis of the grade sample should be reported under "Remarks".

HOLDING SAMPLES

- (80) A check sample of a size equal to the sample used for analysis shall be held in the inspection office for a period of at least 30 days. This sample may be used later, in case a controversy arises over the grade of the lot. The container of the sample should be plainly marked with the date, applicant's name and car number or certificate number. The kernels from the graded sample should be held for a few days, in case a question should arise concerning the grading. It is a good plan to place the serious kernel defects in one small bag or envelope, the skin color defects in another, and the other defects in a third bag.

THE CERTIFICATE

- (81) Following are some examples of suggested wordings for certificates of inspection of in-shell pecans. Only those portions of the certificate which are peculiar to pecans are discussed.
- (82) **PRODUCTS:**
1. **PECANS IN THE SHELL** in new burlap sacks branded "Southland Brand, Southern Pecan Co., Albany, Georgia, 100 lbs. net". Stenciled "Extra Large Stuart". Manifested as 400 sacks, 40,000 pounds.

2. **PECANS IN THE SHELL** in transparent film bags, 24 bags per master carton. Bags and cartons printed "Dixie Gem Pecans, Dixie Pecan Co., Mobile, Alabama". Bags printed "1 lb net". Lot contains 75 cartons, equivalent 1,800 lbs.

1. Average 58 nuts per pound. 10 smallest nuts per 100 nuts weigh 8.2% of weight of 100. (83)

2. Average 78 nuts per pound. 10 smallest nuts per 100 nuts weigh 6.5% of weight of 100.

3. Irregular. Average 63 nuts per pound.

4. Ranging from 11/16 to 15/16, mostly 12/16 to 14/16 inch in diameter.

1. Shells dyed brown, polished and fairly uniform in color. External defects of U.S. No. 1 grade within tolerance. Kernels well cured, mostly light amber. 26 percent defects of U.S. No. 1 grade, mostly poorly developed, some dark amber, and including 4 percent seriously damaged by mold or insects. (84)

2. Shells bleached and polished, uniform in color. External defects within tolerance for U.S. No. 1. Kernels mostly well developed, many fairly well developed. Internal defects within tolerance for U.S. No. 1.

3. Shells natural and unpolished. General appearance damaged by many husk worm stains. 12 percent external grade defects, mostly damaged by stains or adhering husks. Kernels well cured, generally well to fairly well developed; defects within tolerance for U.S. No. 2 grade.

(85) GRADE:

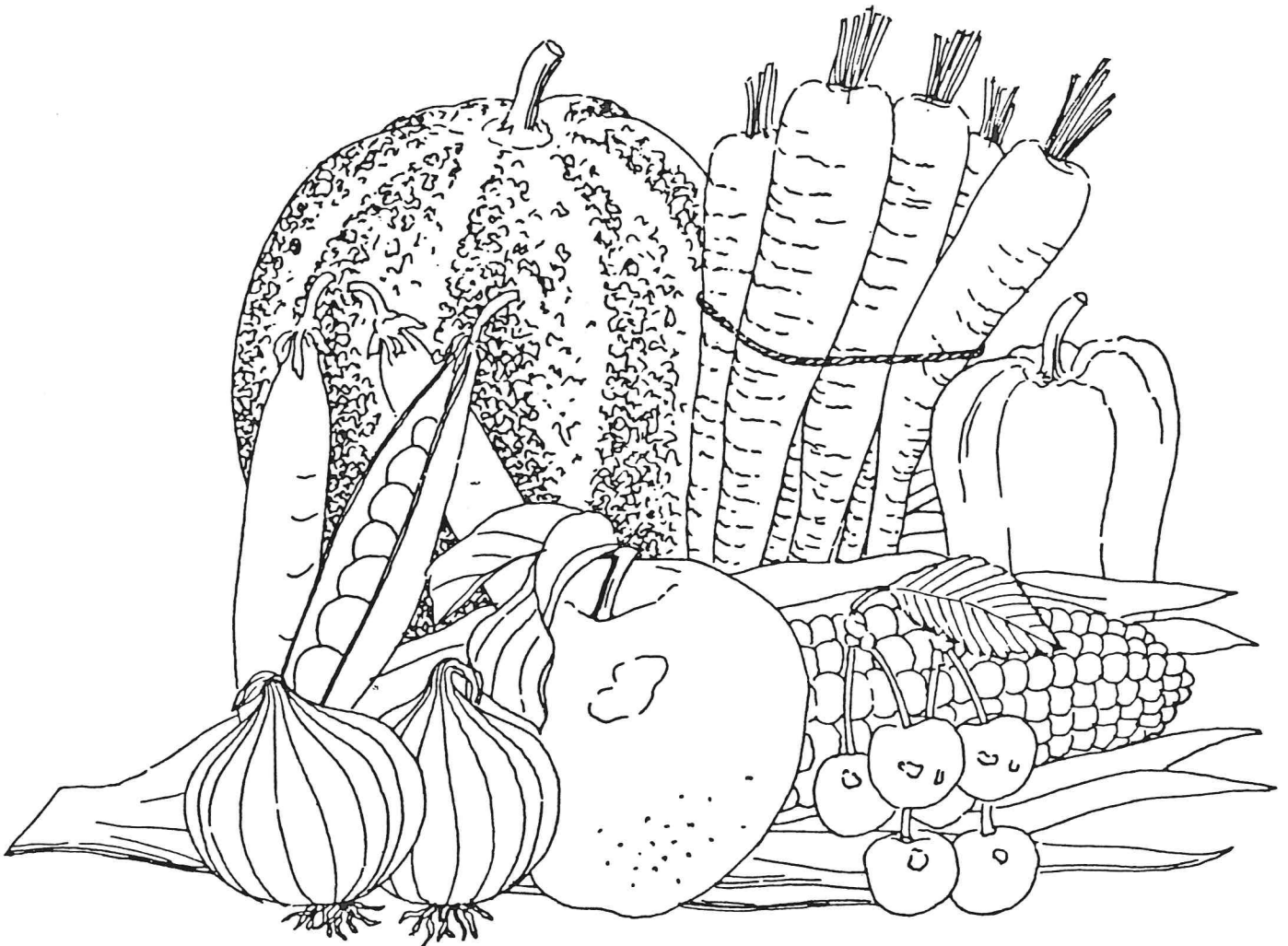
1. U.S. No. 2, Extra Large. Contains 74 percent U.S. No. 1 quality kernels.
2. U.S. No. 1, Large.
3. Fails to grade U.S. No. 2 account damaged general appearance of shells and shell defects in excess of tolerance. Count 63 nuts per pound. Contains 72% U.S. No. 1 quality kernels.

(86) REMARKS:

1. Inspection restricted to accessible portion of load consisting of sacks in 2 upper layers.
2. Size determined on basis of count per pound only at applicant's request.
3. Size based on diameter measurement at applicant's request.

Appendix I

United States Standards



UNITED STATES STANDARDS FOR GRADES OF PECANS IN THE SHELL¹

(41 F.R. 39303)

Effective October 15, 1976

GRADES	
Sec.	
51.1400	U.S. No. 1.
51.1401	U.S. No. 2.
SIZE CLASSIFICATION	
51.1402	Size classification.
KERNEL COLOR CLASSIFICATION	
51.1403	Kernel color classification.
TOLERANCES	
51.1404	Tolerances.
APPLICATION OF TOLERANCES	
51.1405	Application of tolerances.
SAMPLE FOR GRADE OR SIZE DETERMINATION	
51.1406	Sample for grade or size determination.
DEFINITIONS	
51.1407	Fairly uniform in color.
51.1408	Loose extraneous or foreign material.
51.1409	Well developed.
51.1410	Fairly well developed.
51.1411	Poorly developed.
51.1412	Well cured.
51.1413	Damage.
51.1414	Serious damage.
51.1415	Inedible kernel.
OPTIONAL DETERMINATIONS	
51.1416	Optional determinations.

AUTHORITY: Secs. 203, 205, 60 Stat. 1087, as amended, 1090 as amended; (7 U.S.C. 1622, 1624).

GRADES

§ 51.1400 U.S. No. 1.

"U.S. No. 1" consists of pecans in the shell which meet the following requirements:

(a) Free from loose extraneous or foreign material.

(b) Shells are: (1) Fairly uniform in color; and, (2) Free from damage by any cause.

(c) Kernels are: (1) Free from damage by any cause.

(d) For tolerances see § 51.1404.

¹ Packing of the product in conformity with the requirements of these standards shall not excuse failure to comply with the provisions of the Federal Food, Drug, and Cosmetic Act or with applicable State laws and regulations.

§ 51.1401 U.S. No. 2.

The requirements for this grade are the same as for U.S. No. 1 except for:

(a) No requirement for uniformity of color of shells; and,

(b) Increased tolerances for defects see § 51.1404.

SIZE CLASSIFICATION

§ 51.1402 Size classification.

Size of pecans may be specified in connection with the grade in accordance with one of the following classifications. To meet the requirements for any one of these classifications, the lot must conform to both the specified number of nuts per pound and the weight of the 10 smallest nuts per 100 nut sample.

Size classification	Number of nuts per pound	Minimum weight of the 10 smallest nuts in a 100-nut sample
Oversize.....	55 or less.....	In each classification, the 10 smallest nuts per 100 must weigh at least 7 pct of the total weight of a 100-nut sample
Extra large.....	56 to 63.....	
Large.....	64 to 77.....	
Medium.....	78 to 95.....	
Small.....	96 to 120.....	

KERNEL COLOR CLASSIFICATION

§ 51.1403 Kernel color classification.

(a) The skin color of pecan kernels may be described in terms of the color classifications provided in this section. When the color of kernels in a lot generally conforms to the "light" or "light amber" classification, that color classification may be used to describe the lot in connection with the grade.

(1) "Light" means that the outer surface of the kernel is mostly *golden* color or lighter, with not more than 25 percent of the outer surface darker than *golden*, none of which is darker than *light brown*.

(2) "Light amber" means that more than 25 percent of the outer surface of the kernel is *light brown*, with not more than 25 percent of the outer surface darker than *light brown*, none of which is darker than *medium brown*.

(3) "Amber" means that more than 25 percent of the outer surface of the kernel is *medium brown*, with not more than 25 percent of the outer surface darker than *medium brown*, none of

which is darker than *dark brown* (very dark-brown or blackish-brown discoloration).

(4) "Dark amber" means that more than 25 percent of the outer surface of the kernel is *dark brown*, with not more than 25 percent of the outer surface darker than *dark brown* (very dark-brown or blackish-brown discoloration).

(b) U.S. Department of Agriculture kernel color standards, Pec-MC-1, consisting of plastic models of pecan kernels, illustrate the color intensities implied by the terms "golden," "light brown," "medium brown" and "dark brown" referred to in paragraph (a) of this section. These color standards may be examined in the Fruit and Vegetable Division, AMS, U.S. Department of Agriculture, South Building, Washington, D.C. 20250; in any field office of the Fresh Fruit and Vegetable Inspection Service; or upon request of any authorized inspector of such service. Duplicates of the color standards may be purchased from NASCO, Fort Atkinson, Wisconsin 53538.

TOLERANCES

§ 51.1404 Tolerances.

In order to allow for variations incident to proper grading and handling in each of the foregoing grades, the following tolerances are provided as specified:

(a) U.S. No. 1—(1) *For shell defects, by count.* (i) 5 percent for pecans with damaged shells, including therein not more than 2 percent for shells which are seriously damaged.

(2) *For kernel defects, by count.* (i) 12 percent for pecans with kernels which fail to meet the requirements for the grade or any specified color classification, including therein not more than 7 percent for kernels which are seriously damaged: *Provided*, That not more than six-sevenths of this amount, or 6 percent, shall be allowed for kernels which are rancid, moldy, decayed or injured by insects: *And provided further*, That included in this 6 percent tolerance not more than one-half of one percent shall be allowed for pecans with live insects inside the shell.

(ii) In addition, 8 percent for kernels which fail to meet the color requirements for the grade or for any specified color classification, but which are not seriously damaged by dark discoloration of the skin: *Provided*, That these kernels meet the requirements for the grade other than for skin color.

(3) *For loose extraneous or foreign material, by weight.* (i) 0.5 percent (one-half of 1 percent).

(b) U.S. No. 2—(1) *For shell defects, by count.* (i) 10 percent for pecans with damaged shells, including therein not more than 3 percent for shells which are seriously damaged.

(2) *For kernel defects, by count.* (i) 30 percent for pecans with kernels which fail to meet the requirements of the U.S. No. 1 grade, including therein not more than 10 percent for pecans with kernels which are seriously damaged: *Provided*, That not more than seven-tenths of this amount, or 7 percent, shall be allowed for kernels which are rancid, moldy, decayed or injured by insects: *And provided further*, That included in this 7 percent tolerance not more than one-half of one percent shall be allowed for pecans with live insects inside the shell.

(3) *For loose extraneous or foreign material, by weight.* (i) 0.5 percent (one-half of 1 percent).

APPLICATION OF TOLERANCES

§ 51.1405 Application of tolerances.

Individual 100-count samples shall have not more than one and one-half times a specified tolerance of 5 percent or more and not more than double a tolerance of less than 5 percent, except that at least one pecan which is seriously damaged by live insects inside the shell is permitted: *Provided*, That the averages for the entire lot are within the tolerances specified for the grade.

SAMPLE FOR GRADE OR SIZE DETERMINATION

§ 51.1406 Sample for grade or size determination.

Each sample shall consist of 100 pecans. The individual sample shall be drawn at random from a sufficient number of packages to form a 100-count composite sample. The number of such individual 100-count samples drawn for grade or size determination will vary with the size of the lot. When practicable, at point of packaging the sample may be obtained from the grading belt after sorting has been completed.

DEFINITIONS

§ 51.1407 Fairly uniform in color.

"Fairly uniform in color" means that the shells do not show sufficient variation in color to materially detract from the general appearance of the lot.

§ 51.1408 Loose extraneous or foreign material.

"Loose extraneous or foreign material" means loose hulls, empty broken shells,

or any substance other than pecans in the shell or pecan kernels.

§ 51.1409 Well developed.

"Well developed" means that the kernel has a large amount of meat in proportion to its width and length (see Figure 1).

§ 51.1410 Fairly well developed.

"Fairly well developed" means that the kernel has at least a moderate amount

of meat in proportion to its width and length. Shriveling and hollowness shall be considered only to the extent that they have reduced the meatiness of the kernel (see Figure 1).

§ 51.1411 Poorly developed.

"Poorly developed" means that the kernel has a small amount of meat in proportion to its width and length (see Figure 1).

PECAN CROSS SECTION ILLUSTRATION



1. WELL DEVELOPED

Lower limit. Kernels having less meat content than these are not considered well developed.



2. FAIRLY WELL DEVELOPED.

Lower limit for U.S. No. 1 grade. Kernels having less meat content than these are not considered fairly well developed and are classed as damaged.



3. POORLY DEVELOPED

Lower limit, damaged but not seriously damaged. Kernels having less meat content than these are considered undeveloped and are classed as seriously damaged.

Figure 1.

§ 51.1412 Well cured.

"Well cured" means that the kernel separates freely from the shell, breaks cleanly when bent, without splintering, shattering, or loosening the skin; and the kernel appears to be in good shipping or storage condition as to moisture content.

§ 51.1413 Damage.

"Damage" means any specific defect described in this section; or an equally objectionable variation of any one of these defects, or any other defect, or any combination of defects, which materially detracts from the appearance or the edible or marketing quality of the individual pecan or the general appearance of the pecans in the lot. The following defects shall be considered as damage:

(a) Adhering hull material or dark stains affecting an aggregate of more than 5 percent of the surface of the individual shell;

(b) Split or cracked shells when the shell is spread apart or will spread upon application of slight pressure;

(c) Broken shells when any portion of the shell is missing;

(d) Kernels which are not well cured;

(e) Poorly developed kernels;

(f) Kernels which are dark amber in color;

(g) Kernel spots when more than one dark spot is present on either half of the kernel, or when any such spot is more than one-eighth inch (3 mm) in greatest dimension;

(h) Adhering material from the inside of the shell when firmly attached to more than one-third of the outer surface of the kernel and contrasting in color with the skin of the kernel; and,

(i) Internal flesh discoloration of a medium shade of gray or brown extending more than one-fourth inch (6 mm) lengthwise beneath the center ridge, or any equally objectionable amount in other portions of the kernel; or lesser areas of dark discoloration affecting the appearance to an equal or greater extent.

§ 51.1414 Serious damage.

"Serious damage" means any specific defect described in this section; or an equally objectionable variation of any one of these defects, or any other defect, or any combination of defects, which seriously detracts from the appearance or the edible or marketing quality of the individual pecan. The following defects shall be considered as serious damage:

(a) Adhering hull material or dark stains affecting an aggregate of more than 20 percent of the individual shell;

(b) Broken shells when the missing portion of shell is greater in area than a circle one-fourth inch (6 mm) in diameter;

(c) Worm holes when penetrating the shell;

(d) Rancidity when the kernel is distinctly rancid to the taste. Staleness of flavor shall not be classed as rancidity;

(e) Mold, on the surface or inside the kernel, which is plainly visible without magnification;

(f) Decay affecting any portion of the kernel;

(g) Insect injury when the insect, web or frass is present inside the shell, or the kernel shows distinct evidence of insect feeding;

(h) Kernel spots when more than three dark spots on either half of the kernel, or when any spot or the aggregate of two or more spots on one of the halves of the kernel affects more than 10 percent of the surface;

(i) Dark discoloration of the skin which is darker than dark amber over more than 25 percent of the outer surface of the kernel;

(j) Internal flesh discoloration of a dark shade extending more than one-third the length of the kernel beneath the ridge, or an equally objectionable amount of dark discoloration in other portions of the kernel; and,

(k) Undeveloped kernels having practically no food value, or which are blank (complete shell containing no kernel).

§ 51.1415 Inedible kernels.

"Inedible kernels" means that the kernel or pieces of kernels are rancid, moldy, decayed, injured by insects or otherwise unsuitable for human consumption.

OPTIONAL DETERMINATIONS

§ 51.1416 Optional determinations.

The determinations set forth herein are not requirements of these standards. They may be performed upon request in connection with the grade determination or as a separate determination. Samples of pecans for these determinations shall be taken at random from a composite sample drawn throughout the lot.

(a) *Edible kernel content.* A minimum sample of at least 500 grams of in-shell pecans shall be used for determination of edible kernel content. After the sample is weighed and shelled, edible appearing half kernels and pieces of kernels shall be separated from shells, center wall, and other non-kernel material, and inedible kernels (see § 51.1415) and

pieces of kernels, and weighed to determine edible kernel content for the lot.

(b) *Poorly developed kernel content.* A minimum sample of at least 500 grams of in-shell pecans shall be used for determination of poorly developed kernel content. The amount of poorly developed kernels and pieces of kernels shall be weighed to determine poorly developed kernel content of the lot (see § 51.1411 and Figure 1).

(c) *Edible kernel content color classification.* The amount of "Light," "Light amber," "Amber," "Dark amber" and darker shades of skin color shall be determined according to § 51.1403, Kernel Color Classification. The total weight of edible kernels and pieces of kernels shall be the basis for determining color classification content for the lot.

(d) *Kernel moisture content.* The sample of pecans for determination of kernel moisture content shall be shelled immediately before analysis and all shells, center wall and other non-kernel

material removed. The air-oven or other methods or devices which give equivalent results shall be used for moisture content determination.

These standards shall become effective on October 15, 1976, and will thereupon supersede the United States Standards for Pecans In The Shell which has been in effect since September 15, 1972, (7 CFR 51.1400-51.1415).

Dated: September 9, 1976.

DONALD E. WILKINSON,
Administrator.

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