GRAIN INSPECTION HANDBOOK

BOOK III, CHAPTER 1

INSPECTION OF SHIPLOTS AND UNIT TRAINS

CHAPTER 1
INSPECTION OF SHIPLOTS, UNIT TRAINS, AND LASH BARGES

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1.1 INTRODUCTION

a. This chapter establishes procedures for inspecting bulk grain loaded to or unloaded from ships and unit trains as single lots in accordance with section 800.86 of the regulations under the U.S. Grain Standards Act (USGSA). Sacked grain is inspected according to procedures found in FGIS Program Directive 9180.41, Sacked Grain. Sacked grain lots inspected online (inspected prior to or during the sacking operation) are inspected according to the procedures in this chapter.

b. The Uniform Shiplot and Combined Lot Inspection Plan, commonly known as the CuSum plan, set forth in this chapter represents an online acceptance sampling plan that provides continuous quality information with the objective of obtaining a consistent minimum quality throughout the lot. This is achieved by using statistically based tolerances which accept occasional portions of a lot that, due to known sampling and grading variations, may grade below the desired lot quality. There is no limit to the amount of better quality grain permitted in a lot.

c. The grade of a lot informs the buyer of the overall or average quality of a lot. The applicant for inspection indicates the contracted lot quality in a load order document submitted to inspection personnel prior to loading. Although the grade on portions of a lot may fluctuate above or below the indicated grade, the average quality of all factors in the certified lot must meet or be of better quality than that stated in the load order document once loading or unloading is completed.

d. The inspection process requires continuous sampling during loading or unloading. The grain sampled is accumulated in a systematic process and is examined at periodic intervals - subsamples, component samples, and sublot samples. Subsamples represent up to 5,000 bushels. Several subsamples are combined to form a component sample which represents a minimum of approximately 10,000 bushels and a maximum of approximately 40,000 bushels for ships. For unit trains, each railcar is considered a component. Component samples are combined to form a sublot sample, which may represent as much as 100,000 bushels for ships or 10 cars in a unit train. Unit train components are combined in the order they are sampled. Ship sublot samples may represent as much as 200,000 bushels if component sample analysis is requested as an optional inspection service.

e. Each subsample, component sample, and sublot sample is analyzed for specific quality criteria in accordance with the Official U.S. Standards for Grain and the sales contract. Any grain not meeting required quality levels is declared a “material portion” and separately certified. All grain meeting the quality requirements is certified as a single lot based on the combined average of the sublot results.

1.2 LOAD ORDER DOCUMENT

a. General. Prior to loading or unloading and before inspection can begin, the applicant for inspection must provide a load order document to official personnel, reflecting contract requirements for quality and quantity. The individual issuing the load order must sign the document.

The load order document must reflect the same quality and condition factors contained in the sales contract. Specifically, the document must declare the following:

(1) The exact grade and the percent moisture and dockage, when applicable;

(2) Details on CuSum or Average Quality factors. If the lot is based on average quality, state the term "Average" after the grade to be loaded (e.g., U.S. No. 2 or better YSB – Average). If average on most factors and minimum and/or maximum on select factors, state the grade accordingly (e.g., U.S. No. 2 or better YSB – Average except Moisture maximum 13.0 percent, Foreign Material maximum 2.0 percent).

If minimum and/or maximum (CuSum) on most factors and average on select factors state the grade accordingly (e.g., U.S. No. 2 or better YSB – CuSum except Moisture average 13.0 percent, Foreign Material average 2.0 percent).

To express a minimum and/or maximum factor requested at the grade or specified limit per sublot, state the term "No sublot to exceed" with "Minimum" or "Maximum" after the grade to be loaded or after a specific factor (e.g., U.S. No. 2 or better YSB – No sublot to exceed maximum 1.0 percent FM; or U.S. No. 2 or better YSB - No sublot to exceed, all factors minimum or maximum per sublot). "No sublot to exceed" is not applicable to Average Quality. Note: CuSum values will not be applied in this case.

(3) The approximate quantity of grain in the lot;

(4) The sublot size;

(5) The destination;

(6) "Option 1" or "Option 2" certification or the term "or better";

(7) The specified protein and/or oil information, when applicable;

(8) Any special requirements, such as aflatoxin, TCK smut, ergot, falling number, zero infestation, or other maximum or minimum limits for factor determinations. For wheat, include any specific insect damaged kernels (IDK) information as applicable, such as a maximum IDK count per sublot (other than the FDA acceptable limit of 31), any special instructions to inspect 100 grams per sublot, and IDK certification requirements; and

(9) Any other specific requirements needed to fulfill contract requirements.

If official personnel receive a load order document that is confusing as to the request, return the load order document to the applicant for an explanation and/or correction.

A load order grade is not required prior to loading if the applicant does not know the exact grade to be loaded or plans to load grain of different quality without cutoffs or separations (i.e., barge-to-ship operations). When a load order grade is not declared, the lot is certified to the best, uniform grade. If the lot is not uniform for any grade, combine the sublots of the **same grade** and certify them together as individual lots. Certification requirements are discussed in Chapter 2.

The applicant may change load order requirements after official personnel receive a load order provided the contract was amended to reflect the new requirements. When a contract is amended, a revised load order document is required. Official personnel may request a copy of the amended contract or confirmation of sale as verification if a load order requirement is revised after loading begins.

b. Establishing Sublot Size. The size of the sublot determines the frequency at which inspection personnel examine sublot samples. The number and size of sublots in a lot are dependent on certain restrictions. The applicant may establish the sublot size best suited for the size of the lot, the quality control of the elevator, and efficiency of inspection. Sublot restrictions are listed in the adjoining table. Applicants may not request a change to the sublot size once the sublot size is established and loading begins.

SUBLOT RESTRICTIONS:

Carrier	Lot Size	Minimum Number of Sublots	Maximum Size of Each Sublot
Vessels	**100,000 bushels or less**	**1**	**--------**
	100,000 to 200,000 bushels	**2**	**100,000 bushels**
	Over 200,000 bushels	**3**	**100,000 bushels 1/**
Unit Trains	**Less than 200,000 bushels (Less than 50 cars)**	**2**	**5 cars**
	200,000 bushels or more (50 cars or more)	**5**	**10 cars**

1/ 200,000 bushels when component sample analysis is requested on one or more factors.

(1) All sublots loaded, except for the last sublot in the lot, must be "reasonably uniform in size." That is, the largest sized sublot loaded shall not be more than 25 percent larger than the smallest sublot. To determine the allowable variation in size, multiply the smallest size sublot by 1.25, the resulting figure is the maximum sublot size. For example: if the smallest size sublot is 40,000 bushels then the maximum sublot size would be 50,000 bushels. 40,000 x 1.25 = 50,000

(2) The last sublot shall not amount to less than 5 percent of the average size of the sublots in the lot, unless after the final sublot is loaded aboard, the National Cargo Bureau (NCB) surveyor, port surveyor, stevedoring personnel, ship's captain, or other persons responsible for the security of the vessel, indicates that more grain must be loaded for vessel security. The additional amount ordered is considered the last sublot and is graded accordingly.

(3) The last sublot in a unit train may not be more than one car larger than the maximum sublot size allowed for the size of train.

c. Electing the Certification Option. Option 1 and Option 2 are two methods of certifying the grade of a lot. Under Option 1, the exact grade of the grain is shown on the certificate. Under Option 2, the lot is certified as being equal to or better than the grade specified by the contract.

(1) The applicant for inspection must select the certification option and indicate this choice on the load order document. Option 2 certification is used if the load order specifies "or better" as part of the load order grade or if Option 2 is specifically requested.

(2) The applicant may change the certification option at a later date provided the certificates have not been issued or corrected certificates are issued to reflect the new certification option.

d. Declaring the Grade to be Loaded. The applicant shall use the following guidelines when declaring the grade to be loaded.

(1) Declare the numerical grade consistent with the lowest quality factor limit established for the lot.

EXAMPLE: A contract is signed for a shipment of U.S. No. 2 Dark Northern and/or Northern Spring Wheat. The applicant requests certification under Option 2.

State the load order grade as "U.S. No. 2 or better Northern Spring Wheat."

(2) Include the phrase "or better" immediately following the numerical or Sample grade designation for Option 2 certification. The "or better" designation is applicable to all numerical (except U.S. No. 1) and Sample Grades, subclasses (except Soft White Wheat subclasses), special grades, special factor requirements, dockage, class in Mixed Wheat, Mixed Corn, Mixed Sorghum, Mixed Soybeans, and Mixed Grain.

(3) Include special factor requirements that are more stringent than the declared numerical grade. Adjust the numerical grade designation on the load order document to correspond to the special factor requirements if special factor requirements are of a lower quality than the contracted numerical grade.

EXAMPLE: The contract stipulates U.S. No. 2 or better Yellow Soybeans, maximum 4.0 percent foreign material (FM).

State the load order grade as: "U.S. No. 4 or better Yellow Soybeans, maximum 4.0 percent FM, all other factors U.S. No. 2 Yellow Soybeans."

NOTE: Special factor limits are used in determining uniformity, but are not shown on the grade line of an official certificate.

(4) Request "No sublot to exceed" when applicable.

(5) Declare any other official inspection or testing requirements needed to fulfill the sales contract. (e.g., max 15 IDK; minimum protein 12.5 percent)

e. Interpretation of Load Order Specifications.

(1) Maximum and Minimum Limits. Load orders generally specify maximum or minimum limits as quality criteria. Inspection plan tolerances are applied to a specific factor if the load order indicates a maximum or minimum limit. Factors that do not have tolerances (e.g., sprout damage) must meet contract specifications for each sublot unless specifically designated otherwise (e.g., soybean oil and protein).

Load orders which specify a quality limit without the term "maximum" or "minimum" are treated as a maximum for factors having maximum limits [e.g., damaged kernels total (DKT), foreign material, moisture (M)] or as a minimum for factors having minimum limits (e.g., test weight per bushel, sound barley). Applicants must indicate on the load order wheat protein as a maximum, minimum, or average amount if a specific wheat protein level is shown on the load order. Wheat protein expressed as "ordinary" is considered as an average.

(2) Average Quality. Inspection plan tolerances are not used when average quality certification is requested. The load order must indicate "average," "average not more/less than," or "average not to exceed" if an applicant wants certification of average quality when a specific percentage or count is declared.

Average quality is part of the CuSum loading plan and adheres to the basic CuSum rules (e.g., combining acceptable component samples in the order that sampling was completed to form a sublot, etc.). "Average" grade may be applied to grade factors, moisture, and official criteria factors, but does not apply to odor and condition. It also does not apply to aflatoxin test results that are above the FDA action limit of 20 ppb. Aflatoxin results above 20 ppb may not be averaged with results at or below 20 ppb. Average quality is not applicable to class (except for grains where class is a grading factor), subclass, sample grade factors or special grade factors. For grain where class is a grading factor, average quality is allowed, but each sublot must meet the class requirements for the grain type. Breakpoints and starting values do not apply. Any sublot not meeting class requirements is declared a material portion.

Limits for Grain Types with Class as a Grading Factor

Grading Factor	Minimum/Maximum Allowed per Sublot
Wheat - WOCL/CCL	Maximum 10.4 percent
Soybeans –SBOC	Maximum 10.0 percent
Malting Barley – SMT	Minimum 95.0 percent

When "average" factor result inspection is requested, it is the loading elevator's responsibility to meet the quality level specified in the contract. The final inspection certificate for "average" factors is based on the final factor average. No statements of "average" factor range results or which factor(s) were requested on an "average" basis are shown on the certificate unless specifically requested.

The average quality of a factor is also certified when a specific percentage is not declared on the load order (e.g., undeclared dockage, undeclared moisture) or wheat protein is expressed as "ordinary."

INTERPRETING AN AVERAGE QUALITY LOAD ORDER

(a) "Average". If a load order stipulates U.S. No. 2 or better YSB (average), interpret that as a request for an average of all grading factors. Setup all grading factors except SBOC as average quality. Set the SBOC grade limit to a maximum of 10.0 percent, do not apply a breakpoint and starting value.

(b) "Average" Select Factors. If the load order stated U.S. No. 2 or better YSB, maximum 1.5 Foreign Material (FM), all other factors "average," interpret the request as CuSum applied to FM only, and "average" for Test Weight (TW), Moisture, Damaged Kernels Total, Heat Damage and Splits. Soybeans of Other Colors are limited to a maximum of 10.0 percent per sublot.

(c) Example.
U.S. No. 2 or better Yellow Soybeans (Average):
Average 13.5 percent moisture
Average minimum TW 55.0 lbs.

FGIS' RESPONSIBILITY:
Set up a log with the applicable grade factor limits for U.S. No. 2 Yellow Soybeans with a moisture content of 13.5 percent and a SBOC grade limit set at a maximum of 10.0 percent per sublot.

- Indicate on the log that the grading factors, test weight and moisture are based on "average" quality.

Do not complete starting value or breakpoint blocks on log.

SHIPPER'S RESPONSIBILITY:
Maintain a final grade average of U.S. No. 2 or better Yellow Soybeans with 13.5 percent or less moisture.

- Maintain any self-imposed limits

(3) Range Limits. Some load orders specify a minimum limit as well as a maximum limit for factors to establish an acceptable range. Inspection plan tolerances are applied to both the minimum and maximum limits. Therefore, official personnel will use two factor columns for the single factor. One column is for the minimum limit and the other column is for the maximum limit. CuSum values are calculated for each column based on the inspection results.

(4) "No Sublot to Exceed" Limits. Some load orders indicate that certain factors must be within a specified limit per sublot. If an applicant indicates this type of request on the load order, tolerances are not applied to the factor(s). A material portion occurs if the specific factor(s) exceeds the load order limit. This provision applies to the sublot result but not to component sample results.

(5) Dockage Terms. Dockage is usually considered as a deductible amount from the weight of a lot. Some sales, however, limit the maximum amount of acceptable dockage in a shipment. The following examples provide guidelines for applying maximum limits or average quality for commonly used dockage terms.

Dockage Term	**Interpretation**
All deductible	Average Dockage
Clean Basis	Average Dockage
0.5 percent nondeductible	Average Dockage
0.5 percent dockage	0.5 percent maximum
0.5 percent nondeductible, 0.8 percent maximum	0.8 percent maximum
0.8 percent maximum, clean basis	0.8 percent maximum
0.1 percent nondeductible, 0.1 percent maximum excess all deductible	Average Dockage

(6) Special Factor Requirements. Some load orders contain factor limitations that are not at the numerical grade limit. For example, a contract for U.S. No. 2 Yellow Soybeans may contain a clause limiting the amount of foreign material (FM) to a maximum of 1.5 percent. The grade limit for foreign material in U.S. No. 2 Yellow Soybeans is 2.0 percent. Any special factor requirements stated in the load order are considered the allowable grade limit for the lot. In the above example, 1.5 percent is the allowable limit for foreign material.

(a) To apply the uniformity criteria for the inspection plan, official personnel must establish both the “more than one numerical grade” limit and a “breakpoint” limit. The “more than one grade” limit is used to determine uniformity between component samples (see section 1.3, b). The breakpoint limit is used to establish uniformity for sublot samples (see section 1.3, c).

(b) The "more than one grade" limit is computed by determining the difference between the numerical grade encompassing the special factor limit and the next inferior grade and adding this difference to the special factor limit. For instance, a load order grade of U.S. No. 2 Yellow Soybeans with a maximum of 1.5 percent foreign material is requested. The 1.5 percent foreign material is within the U.S. No. 2 grade limit. The difference between the foreign material grade limit for U.S. No. 2 (2.0 percent) and U.S. No. 3 (3.0 percent) is 1.0 percent. Add the 1.0 percent to the allowable limit which will yield the "more than one grade" limit of 2.5 percent.

(c) The breakpoint for the grade factor is the same as that of the numerical grade, which encompasses the factor limit. Using the same example, 1.5 percent foreign material is within the grade limit for U.S. No. 2 Yellow Soybeans. The breakpoint for foreign material in U.S. No. 2 Yellow Soybeans is 0.3. Thus the breakpoint for the special grade of 1.5 percent foreign material is also 0.3.

(7) Metric Test Weight Requirements. Some contracts contain grain density requirements expressed as a minimum amount in kilograms per hectoliter (kg/hL). For example, a contract for U.S. No. 2 or better Hard Red Winter Wheat may contain a clause that restricts the grain density to a minimum of 76 kg/hL. In this example, 76 kg/hL (or its pounds per bushel equivalent) is the allowable limit for grain density or test weight per bushel (TW). The corresponding TW is 57.7 lbs. (See example below)

Note: Official personnel may use the formulas listed below to make the appropriate conversions, or refer to Appendix 2, "Test Weight/Kilograms Per Hectoliter Conversion Charts for Wheat and Other Grains" of Grain Inspection Handbook II.

(a) To apply the uniformity criteria for the inspection plan, official personnel must convert the metric bulk density (MBD) in kg/hL to test weight in pounds per bushel (lbs/bu) using the following applicable formula.

Durum Wheat TW = (MBD - 0.630) ÷ 1.292

Other Wheat TW = (MBD - 1.419) ÷ 1.292

Other Grains TW = MBD ÷ 1.287

Example: TW = (76 - 1.419) ÷ 1.292
TW = (74.58 ÷ 1.292)
TW = 57.725 lbs/bu
Rounded minimum limit = 57.7 lbs

(b) The final certificate will show the average test weight (pounds per bushel) result using approved rounding and reporting procedures. Report the metric equivalent in the "Remarks" section of the certificate based on the average test weight per bushel value before rounding. Use the following conversion formula to determine the MBD to be shown in the certificate "Remarks" section.

Durum Wheat MBD = (TW x 1.292) + 0.630

Other Wheat MBD = (TW x 1.292) + 1.419

Other Grains MBD = TW x 1.287

(c) The ITW CuSum application will automatically calculate the kilograms per hectoliter for each sublot and convert the average test weight per bushel value before rounding to a kilograms per hectoliter, provided the custom factor kilograms per hectoliter is included on the ITW CuSum log.

1.3 UNIFORMITY CRITERIA

Samples (subsamples, component samples, and sublot samples) are continuously obtained and examined by official inspection personnel during the loading or unloading of shiplots or unit trains to determine uniformity. Official personnel are responsible for determining when subsamples, component samples, and sublot samples are analyzed.

a. Subsamples. Subsamples representing up to 5,000 bushels of grain are taken from each belt, mechanical sampler, moving stream of grain, etc., continuously throughout the loading or unloading of shiplots and lash barges. Subsamples are not applicable to unit trains.

(1) At the applicant's request, official inspection personnel may examine each subsample for the factors insects, heating, odor [sour, musty, or commercially objectionable foreign odor (COFO)], distinctly low quality (DLQ), and other unusual conditions. If a subsample includes one or more of these conditions (unless the load order grade includes the condition), the grain represented by that subsample is declared a material portion (MP).

CuSum values are not recalculated and breakpoints are not reset when a subsample is declared a material portion. For material portion subsamples, official inspection personnel shall record the factor analysis information on the inspection log, and carry forward the CuSum values from the previous sublot.

b. Component Samples. Acceptable subsamples are combined to form a component sample. Component samples should be reasonably uniform in size during the loading or unloading operation. The minimum component sample size for shiplots is approximately 10,000 bushels, with a maximum component size of approximately 40,000 bushels. Each railcar is considered a component sample when unit trains are inspected.

COMPONENT RESTRICTIONS
Lots Loaded with Sublot Factor Analysis:

Sublot Size	**Number of Components per Sublot:**
0 – 100,000 bu.	**2* - 10 components****

Minimum Component Size: 10,000 bu.
***Maximum Component Size: 40,000 bu.**
****** **The minimum number of components is not applicable to the last sublot in a lot.**

COMPONENT RESTRICTIONS
Lots Loaded with Component Factor Analysis:

Sublot Size:	**Number of Components per Sublot:**	
	Minimum*	**Maximum**
0 – 80,000 bu.	**2**	**4**
80,001 – 120,000 bu.	**3**	**5**
120,001 – 160,000 bu.	**4**	**6**
160,001 – 200,000 bu.	**5**	**8**

*** The minimum number of components is not applicable to the last sublot in a lot.**

(1) Official inspection personnel visually examine component samples to determine whether any factor exceeds the limits for the declared grade by more than one numerical grade. The "more than one grade limit" criteria does not apply to average quality factor(s) and nonnumeric grading factors, such as dockage, subclass, protein, oil, etc.

(2) Component samples are also examined for insect infestation, heating, odor, DLQ, and other unusual conditions.

(3) Official inspection personnel combine component samples to form a sublot when all factors in the component samples are within the "one grade" limit or when the component is infested and the applicant decides to fumigate according to FGIS procedures.

If a component sample does not appear to meet the inspection criteria, official personnel must analyze the component sample for the nonuniform factor. If the factor result(s) does not exceed the inspection criteria, do not record the factor result on the inspection log. The component sample is combined with other uniform component samples and graded as a sublot.

(4) When a component sample factor result exceeds the grade limit by more than one numerical grade or contains a condition not included in the load order (i.e., heating, odor, DLQ, etc.) after the factor analysis, the grain represented by that component sample is declared a material portion.

(5) If the applicant elects to remove the material portion from the lot, do not calculate CuSum values for the component sample. If the applicant elects to leave the material portion on board the carrier and receive separate certificates, inspect the component as a sublot. Analyze all factors, record the results on the inspection log beneath the last sublot inspected, and calculate CuSum values.

(6) When "average quality" certification is requested on the load order, uniformity rules for condition and type of grain must still be applied. Component samples must meet the type of grain definition for the contracted grain **(e.g. corn, soybeans, wheat, etc.).** Component samples not meeting the type of grain definition for the contracted grain or identified as Sample Grade, because they meet or exceed the Sample Grade criteria limits for that particular type of grain, will be designated as material portions.

(7) Upon request, official inspection personnel will inspect component samples for factors specified by the applicant provided sufficient advance notice is given. Inspection procedures for requested component sample services are found in section 1.6.

(8) Should the applicant decide to return a component sample to the house after it is graded and the component is known to be good, the entire sublot graded to that point must be returned.

(9) Unit train components are considered removed from the train when official personnel receive verbal intent to remove (unload) from the applicant. Railcars can be reloaded and considered as new components and included back into the train. Reloaded railcars must be introduced back into the unit train in the order that reloading was completed.

c. Sublot Samples. A component sample not designated as a material portion is combined with other uniform component samples in the order that sampling was completed to form a sublot sample. Official inspection personnel may combine more than two shipping bins/railcars to form a sublot as long as the combination does not exceed the maximum allowable sublot size and they are combined in the order in which they are filled. Official inspection personnel are responsible for determining when each sublot is completed and graded.

(1) Official inspection personnel must proportionately combine grain when sublots are formed from different sources in order for the sample to accurately represent the sublot. Official personnel must also obtain a large enough sample to maintain an unworked file sample after completing the original inspection and any subsequent review inspections on material portions. Review inspections of material portions are performed on unworked samples.

(2) Each sublot sample is analyzed for all factors and results are recorded on the inspection log. The results of the sublot analysis are used to calculate each factor's CuSum value.

A sublot is designated a material portion if any factor has a CuSum value which exceeds the allowable breakpoint or the sublot is U.S. Sample Grade. A sublot is also designated a material portion if a factor result exceeds the load order limit when the contract specifies the sublot factor result cannot exceed the specified limit. If a sublot is designated a material portion, all components that comprise the sublot are included in the material portion.

d. Average quality is not applicable to class, (except for grains where class is a grading factor) subclass and special grades. Breakpoints and starting values are applied to factors not applicable to average quality. Sublots exceeding the breakpoint are declared material portions.

Sublots that meet or exceed the Sample Grade criteria limits and aflatoxin results that exceed the FDA action limit of 20 ppb do not qualify for "average quality". These sublots are declared material portions.

For grain where class is a grading factor, average quality is allowed, but each sublot must meet the class requirements of the grain type. Breakpoints and starting values do not apply. The material error is used to determine if the review inspection is averaged with the previous result or replaces the previous result.

Sublots with factors loaded under "average quality" must meet the definition for the type of grain represented in the lot, (e.g., corn, soybeans, wheat, etc.). Sublots that do not meet the definition of the grain are declared material portions. Illustrated below are instructions for the setup of a factor in ITW to accommodate the failure of a sublot that does not meet the definition of the grain type.

- Create a verbal inspector-controlled factor named **"Type of Grain"** abbreviation **"TGR"** for reporting purposes.
- Report as **"FAIL"** only those results that do not meet the definition of the contracted grain type.
- Enter in sublot remarks the reason for the failure, including applicable percentages.
- A review inspection based on the type of grain will follow the basic rules in section 1.5. Review results will be averaged with the previous inspection results.

1.4 GENERAL PROCEDURES

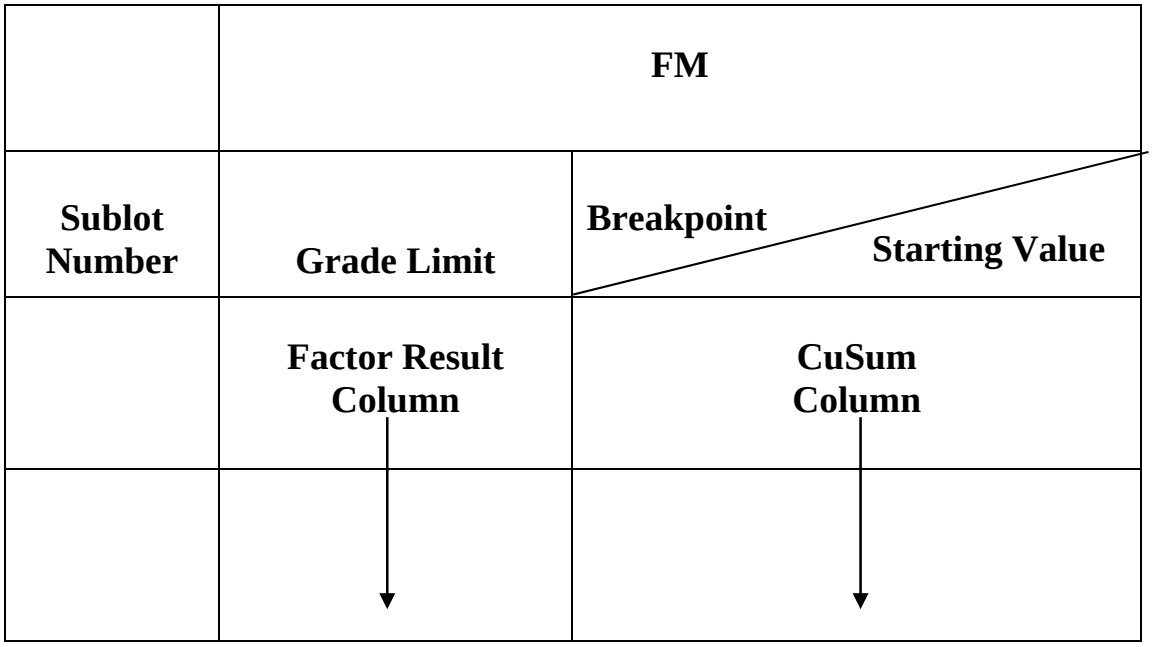
The inspection plan for shiplots and unit trains involves the comparison of the accumulated differences between inspection results and the grade limit or contracted limit. To determine if a lot of grain is uniform, it is necessary to calculate a CuSum value for each factor in all sublots. When any factor's CuSum value exceeds its breakpoint, a material portion is declared.

NOTE: To further illustrate the inspection plan procedure, a series of examples is included in this chapter which demonstrates an inspection under this plan.

The series of examples is based on a load order grade of U.S. No. 2 Yellow Soybeans with a stated average of 54.0 pounds per bushel test weight. In these examples, CuSum values are calculated for two factors: damaged kernels and foreign material. Test weight will be loaded under average quality, so a breakpoint and starting value are not applicable. In addition, a completed log coinciding with the examples is shown as Attachment 1.

a. Preparing the Inspection Log. Immediately below each factor heading is a box for recording the grade limit, breakpoint, and starting value. (See Figure 1.) Each factor column is divided into two portions: the left side for recording the factor inspection result; the right side for recording the factor CuSum value.

Figure 1 – Inspection Log Factor Column



(1) Prior to loading, the inspector records the grade limit, breakpoint, and starting value on the inspection log for each factor examined. (See Figure 2). Tables 1-24 contain grade limits and breakpoints for all grains. A starting value is needed for each grading factor examined during loading. Starting values are based on breakpoints. To find the proper starting value for a given factor, first determine the breakpoint for that factor then find the corresponding starting value from Table 28. Breakpoints and starting values for factors with minimum limits are recorded as negative figures.

When the load order grade specifies the lot inspection, and certification is to be based on an "average" quality; set up the inspection log for "average" quality on the specified factors. Include information on the log that provides information about which factor(s) are determined on the basis of "average" quality. Do not enter any starting values or breakpoints for the factor(s) that are "average" quality (See Figure 2).

Figure 2 – Recording grade limits, breakpoints, and starting values on the inspection log

MANUAL/HANDWRITTEN LOG EXAMPLE

SUBLOT NUMBER	TW		DKT		FM	
	54.0	AVG / QUAL	3.0	0.9 / .3	2.0	0.3 / .1

ITW CUSUM APPLICATION EXAMPLE

Sublot Number	TW	AVG QUAL	DKT 3.00	0.90 0.30	FM 2.00	0.30 0.10
1						

** ITW will calculate a weighted average for factors set to Average Quality*

(2) Inspection personnel must consider the rounding requirements for certain factors when recording the grade limit on the inspection log. For instance, fractions of a percent are added to the grade limit for maximum limit factors that disregard a fraction when rounding.

EXAMPLE

Factor	Load Order Grade	Grade Limit on Log
Wheat Subclass	Dark Northern Spring (75 percent minimum)	74.5
Barley Dockage	Maximum 1.0 percent dockage	1.49

b. Double Portion Analysis. The inspection plan for shiplots and unit trains allows for factor(s) to be analyzed on a portion size equal to double the normal portion size for the factor (e.g. 500g for DKT in corn or 30g for class in wheat). Applicants may request this service on interpretive factors only (i.e., damaged kernels total, heat damaged kernels, subclass, class). In order to arrange for inspection personnel to provide the requested service, official personnel must receive this request as early as possible prior to loading. Once loading begins, the applicant is not permitted to change the factor(s) analyzed on a double portion size, withdraw the request for double portion analysis, or ask to begin a double portion inspection service. This optional service may be used for factors inspected under either CuSum or average quality.

NOTE: Indicate the factor(s) requested on a double portion size in the "Remarks" section of the inspection log.

(1) Assigning Breakpoints, Double Portion Analysis. The breakpoint values assigned to factors analyzed using a double portion size are adjusted to reflect the reduced variability associated with the sublot result. Tables 25, 26 and 27 are used to determine the reduced breakpoint value when double portion analysis is requested. Determine the reduced breakpoint as follows:

(a) Determine the normal breakpoint value (from tables 1-24) for the factor(s) analyzed using a double portion size.

(b) Locate the normal breakpoint value in tables 25-27 and find the reduced breakpoint value listed in the column labeled "Double Portion or 2 Components".

(c) Use the corresponding reduced breakpoint value as the inspection plan tolerance for that factor.

EXAMPLE: An applicant requests double portion analysis for the factor damaged kernels total in a lot of U.S. No. 2 or better Soft Red Winter Wheat.

Step 1. The normal breakpoint value for the factor is 1.5 (from table 23).

Step 2. The corresponding reduced breakpoint value is 1.1 (from table 25).

Step 3. Record 1.1 on the inspection log as the breakpoint value.

(2) Assigning Starting Values, Double Portion Analysis. Table 28 is used to determine starting values. Determine the starting value as follows:

(a) Use the reduced breakpoint to locate the starting value in table 28.

(b) The corresponding starting value based on the reduced breakpoint is used for that factor.

EXAMPLE: Using the same example as stated above for determining the reduced breakpoint value, proceed as follows to determine the starting value:

Step 1. The reduced breakpoint value for the factor is 1.1 as determined in b (1) (b) above.

Step 2. The starting value is 0.4 (from table 28).

Step 3. Record 0.4 on the inspection log as the starting value.

(3) Assigning Material Errors, Double Portion Analysis Tables 29,30 and 31 are used to determine material errors. Determine the material error as follows:

(a) Use the reduced breakpoint to locate the material error in table 29.

(b) The corresponding material error based on the reduced breakpoint is used for that factor.

EXAMPLE: Using the same example as stated above for determining the reduced breakpoint value, proceed as follows to determine the material error

Step 1. The reduced breakpoint value for the factor is 1.1 as determined in b (1) (b) above.

Step 2. The material error is 1.5 (from table 29).

Step 3. Compare the review inspection result to the previous inspection result, average results within 1.5 for this example and replace with the review inspection result, those that exceed 1.5.

c. Recording Sublot Factor Results. The inspector records each factor result in the appropriate factor column on the inspection log after grading the sublot. Round and record results to the same number of decimal places as its corresponding breakpoint. (See Figure 3.) Factors which have fractions disregarded are recorded on the inspection log without rounding.

EXAMPLE

Factor	Inspection Results	Recorded Result
Soybean FM	1.96	2.0
Sorghum Dockage	0.779	0.77
Wheat Test Weight	58.26	58.3

Figure 3 – Recording sublot factor results on the inspection log

SUBLOT NUMBER	TW		DKT		FM	
	54.0	AVG / QUAL	3.0	0.9 / .3	2.0	0.3 / .1
1	55.1		2.9		2.0	

Sublot Number	TW	AVG QUAL	DKT 3.00	0.90 0.30	FM 2.00	0.30 0.10
1	55.1		2.9		2.0	
2						

d. Computing CuSum Values. A CuSum value is calculated for each factor for every sublot inspected and for every component declared a material portion that is not removed from the lot. CuSum values are not calculated on:

(1) Subsamples,

(2) Grain returned to the elevator before a sublot is designated by inspection personnel, or

(3) A sublot is inspected and found acceptable under the inspection plan, but the elevator elects to return the sublot.

The following table summarizes when CuSum values are calculated and recorded on the inspection log.

RECORDING CUSUM VALUES

	Material Portion		Acceptable	
Sample Basis	Returned	Onboard	Returned	Onboard
Sublot	*	*		*
Component		*		
Subsample				
* Denotes CuSum values are calculated and recorded on log.				

Calculate the CuSum values as follows:

Step 1. Determine the factor deviation by subtracting the grade limit, as determined by the declared grade, from the inspection result.

EXAMPLE: (Inspection result) minus (grade limit) = (deviation)

3.1 minus 3.0 = + 0.1

2.9 minus 3.0 = - 0.1

Step 2. Add the factor deviation to the previous CuSum value. For the first sublot, add the factor deviation to the starting value.

EXAMPLE: (Factor deviation) plus (previous CuSum or starting value) = (new CuSum value for that factor)

+ 0.1 plus + 0.3 = + 0.4

-0.1 plus + 0.3 = + 0.2

(1) CuSum values for factors listed as "maximum limits" (e.g., FM, DKT, DEF (total defects), CCL (contrasting class), WOCL (wheat of other class), etc.) are never less than zero. When the total from **Step 2** is a positive number, record the total as that factor's CuSum value. When the total from **Step 2** is a negative number, record the CuSum value as "0." It is not necessary to continually record "0" CuSum values on the inspection log as long as a factor's CuSum value remains at zero.

(2) CuSum values for factors listed as "minimum limits" (e.g., TW) are never greater than zero. When the total from **Step 2** is a negative number, record the total as that factor's CuSum value. It is not necessary to show the negative sign. When the total from **Step 2** is a positive number, record the CuSum value as "0." It is not necessary to continually record "0" CuSum values on the inspection log as long as a factor's CuSum value remains at zero.

EXAMPLE: Calculate the CuSum values for Sublot No. 1 when the factor deviation is added to the starting value.

Sublot No. 1	TW	DKT	FM
Factor result	55.1 (AVG)	2.9	2.0
Subtract grade limit	----	3.0	2.0
Factor deviation	----	- 0.1	0.0
Add starting value	----	+ 0.3	+ 0.1
Total	----	+ 0.2	+ 0.1
CuSum value	----	0.2	0.1

(3) Record each CuSum value in the appropriate factor column. (See Figure 4.)

Figure 4. Recording CuSum values for first sublot

SUBLOT NUMBER	TW		DKT		FM	
	54.0	AVG / QUAL	3.0	0.9 / .3	2.0	0.3 / .1
1	55.1		2.9	.2	2.0	.1

Sublot Number	TW	AVG QUAL	DKT 3.00	0.90 0.30	FM 2.00	0.30 0.10
1	55.1	55.10	2.9	0.20	2.0	0.10

EXAMPLE: Calculate the CuSum values for Sublot No. 2 when the factor deviation is added to that factor's previous CuSum value.

Sublot No. 2	TW	DKT	FM
Factor result	53.8 (AVG)	2.7	2.2
Subtract grade limit	----	3.0	2.0
Factor deviation	----	- 0.3	+ 0.2
Add CuSum value from preceeding sublot	----	+ 0.2	+ 0.1
Total	----	- 0.1	+ 0.3
CuSum value	----	0	.3

Record each CuSum value under the appropriate factor's CuSum column. (See Figure 5.)

Figure 5. Recording CuSum values for subsequent sublots

SUBLOT NUMBER	TW		DKT		FM	
	54.0	AVG / QUAL	3.0	0.9 / .3	2.0	0.3 / .1
1	55.1		2.9	.2	2.0	.1
2	53.8		2.7	0	2.2	.3

Sublot Number	TW	AVG QUAL	DKT 3.00	0.90 0.30	FM 2.00	0.30 0.10
1	55.1	55.10	2.9	0.20	2.0	0.10
2	53.8	54.42	2.7	0.00	2.2	0.30

In all subsequent sublots, calculate each factor's CuSum value in the same manner as in the above example. Starting values are only used to determine CuSum values on the first sublot.

e. Declaring a Material Portion. When a subsample exceeds acceptable quality conditions, a component is more than one numerical grade lower than the declared load order grade, or a sublot factor or official criteria factor result causes the CuSum value to exceed its breakpoint, the subsample/component/sublot is declared a material portion. Only the subsample/component/sublot that exceeds the inspection plan criteria is considered the material portion.

(1) If subsample analysis is requested by the applicant and a subsample is designated a material portion, the applicant may elect to leave the subsample onboard the carrier or remove the subsample from the carrier. If the subsample is left onboard the carrier it is considered as a separate lot and all factors are analyzed. If the material portion subsample is removed from the lot (returned to the elevator or discharged from the carrier), record the factor result for the degrading factor. In either instance, do not calculate CuSum values for the material portion subsample.

(2) Once a component is designated a material portion (because it is more than one grade inferior to the load order grade) and the applicant elects to leave the component on board the carrier, it is considered as a separate lot and all factors are analyzed and CuSum values calculated. If the material portion component is removed from the lot (returned to the elevator or discharged from the carrier), record the factor result for the degrading factor but do not calculate CuSum values. Include railcar identification(s) in all documentation and logs involving material portions for unit trains.

(3) A material portion sublot or material portion component on board is indicated on the log by:

(a) Placing a diagonal line through the CuSum column for any factor that exceeded its breakpoint;

(b) Recording the CuSum value above the diagonal line;

(c) Recording the breakpoint value below the diagonal line;

(d) Re-identifying the sublot as MP #1 for the first material portion, MP #2 for the second, etc. For unit trains, also identify railcar identification(s) for each material portion. (See Figure 6.)

Figure 6. Inspection log showing breakpoint violation

SUBLOT NUMBER	TW		DKT		FM	
	54.0	AVG / QUAL	3.0	0.9 / .3	2.0	0.3 / .1
1	55.1		2.9	.2	2.0	.1
2	53.8		2.7	0	2.2	.3
3	54.7		3.7	.7	2.2	.5

Sublot Number	TW	AVG QUAL	DKT 3.00	0.90 0.30	FM 2.00	0.30 0.10
1	55.1	55.10	2.9	0.20	2.0	0.10
2	53.8	54.45	2.7	0.00	2.2	0.30
3	54.7		3.7	0.70	2.2	

(4) Whenever a breakpoint is exceeded, the CuSum value for that factor is reset to the breakpoint value. Reset the CuSum value by recording the breakpoint value below the diagonal line drawn through the CuSum column for each factor that exceeded its breakpoint. Do no reset the CuSum value for factors that did not exceed the breakpoint. (See Figure 7.)

Figure 7. Resetting the CuSum value to the breakpoint

SUBLOT NUMBER	TW		DKT		FM	
	54.0	AVG / QUAL	3.0	0.9 / .3	2.0	0.3 / .1
1	55.1		2.9	.2	2.0	.1
2	53.8		2.7	0	2.2	.3
~~3~~ MP-1	54.7		3.7	.7	2.2	.5 / .3

Sublot Number	TW	AVG QUAL	DKT 3.00	0.90 0.30	FM 2.00	0.30 0.10
1	55.1	55.10	2.9	0.20	2.0	0.10
2	53.8	54.42	2.7	0.00	2.2	0.30
MP-1	54.7	54.51	3.7	0.70	2.2	0.50

(5) The reset CuSum value(s) and the CuSum values for the factors that did not exceed the breakpoint are used to determine the CuSum values for the next sublot. Identify the next sublot with the same number that would otherwise have been assigned to the material portion sublot. (See Figure 8.) The ITW CuSum application does not show the reset CuSum value(s), however it is being reset to the breakpoint and used to determine the CuSum value(s) for the next sublot.

Figure 8. Sublot following a material portion.

SUBLOT NUMBER	TW		DKT		FM	
	54.0	AVG / QUAL	3.0	0.9 / .3	2.0	0.3 / .1
1	55.1		2.9	.2	2.0	.1
2	53.8		2.7	0	2.2	.3
~~3~~ MP-1	54.7		3.7	.7	2.2	.5 / .3
3	53.9		2.2	0	1.8	.1

Sublot Number	TW	AVG QUAL	DKT 3.00	0.90 0.30	FM 2.00	0.30 0.10
1	55.1	55.10	2.9	0.20	2.0	0.10
2	53.8	54.42	2.7	0.00	2.2	0.30
MP-1	54.7	54.51	3.7	0.70	2.2	0.50
3	53.9	54.36	2.2	0.00	1.8	0.10

f. Holding Grain in Shipping Bins. Occasionally, extra grain is elevated, graded, and held in a shipping bin at the end of loading. When this occurs, a shipping bin can be held over for a subsequent shipment, provided that the next lot is for the same or lower (inferior) quality grade and loading begins within 88 hours of the inspection.

(1) If a portion of a completed and graded shipping bin is loaded aboard the carrier, do not use the remainder of the shipping bin towards the different lot. The partial bin must be returned to the elevator.

(2) If a sublot is comprised of two or more shipping bins and only one bin is loaded aboard the carrier, the final sublot grade is that of the grain sample representing the single bin loaded if the shipping bins contain different qualities. Official personnel should alert the shipper that this inspection will occur before grain in the bin is released to the carrier.

(3) When an acceptable sublot is transferred as part of a new (second) lot, calculate CuSum values for this sublot on the inspection log of the new (second) lot. If the transferred sublot becomes the first sublot on the new (second) lot, starting values must be applied.

(4) Extra grain elevated and graded for a CuSum lot (lot with minimum, maximum or absolute limits applied to some or all grade and other factors) may be transferred to an "average quality" lot. This can only be allowed if there is sufficient information available to complete the inspection and weighing requirements of the receiving lot. There are no load order grade requirements of the receiving lot since all grade factors are average quality.

If the load order states a minimum, maximum, or absolute limit of individual or certain grade factors, the "extra grain" sublot being offered for transferring must be the same or higher (better) quality grade on those factors. Non-grade factors and other official criteria factors must be within inspection plan tolerances of the receiving lot to qualify for transferring.

All other instructions regarding the transferring sublots apply when transferring grain from a CuSum lot to an "average quality" lot, as well as for extra grain transfers between "average" to "average" lots.

1.5 REVIEW INSPECTIONS

Applicants may request review inspections (reinspection, appeal inspection, Board appeal inspection) of a material portion sublot or of the entire lot. Review inspection procedures depend on the kind of request received.

Review inspections are not permitted on sublots that are not material portions (i.e., inspection results over the load order limit but within the breakpoint). This also applies to factors loaded under "average" quality. Since there are no breakpoints or starting values applied to "average" factors, a material portion may not occur on an "average" factor. Material portions can still occur on factors not applicable to average quality such as class (non grading factor), sample grade criteria, subclass, aflatoxin exceeding FDA action limits, special grade factors, or components/sublots not meeting the load order criteria for type of grain. If Average Quality is requested on grains where class is a grading factor (e.g. wheat, soybeans, malting barley), each sublot must meet the class requirements or the sublot will be declared a material portion. Applicants may also request a review of the entire lot.

Violations of self-imposed limits are not Material Portions, and therefore cannot have reinspections. Alternatively, applicants may request "double portion sizes" to reduce the variability on factors where review inspections are not permitted (see page 1-19).

The applicant for service may specify that official personnel perform review inspection service on only the factor(s) that caused the material portion, or on multiple sublot factor results. Official personnel performing the review inspection will perform analyses on the factor(s) as specified by the applicant, and any other factor that is deemed necessary by the inspector. Factors not analyzed by official personnel during the review are accepted from the previous inspection as part of the review.

For grains that have official criteria factors (e.g., protein, aflatoxin) analyzed in conjunction with grade analysis, special review inspection rules apply. If a sublot factor result causes a material portion, and the official criteria results are within CuSum tolerances, then a review inspection can be performed on all grade and official criteria factors performed on the original sublot. However, if a material portion is caused by an official criteria result (e.g., protein), and the grade factor results are within CuSum tolerances, then the review inspection will be restricted to the official criteria factor, unless the inspector determines that a review of all or some of the grade factors is necessary.

a. Review Inspection of a Material Portion. When a review inspection is requested on a material portion (subsample, component, or sublot), only one field review is permitted (i.e., reinspection (REX) or appeal inspection).

    (1) In addition to limiting the number of field review inspections, field review inspection results for each factor analyzed are compared to the original inspection results to determine if a material error exists. A material error is defined as any change in inspection results in excess of two standard deviations.

(2) If a material error exists, the field review inspection result will replace the original inspection result. If a material error does not exist, the factor results are averaged. Factors which are not expressed numerically (i.e., odor) are replaced by the determination made during the last review.

(3) Averaging review results with previous results also applies to Board appeal inspections. The Board appeal inspection result is compared to the previous sublot inspection result recorded on the log (average of original/field review result or field review result replacing the original result) to determine if a material error exists.

(4) Inspection results are compared on a factor basis. Therefore, some factors are averaged when other factors are replaced. Official personnel will use tables 29, 30 and 31 as the basis for determining when a material error occurs. Table 29 lists the allowable differences for factors having breakpoints. Table 30 lists the allowable difference for factors not having breakpoints. Table 31 lists the allowable difference for factors without breakpoints on a double portion analysis.

(5) A review inspection result is averaged with the previous inspection result when the difference does not exceed the allowable difference listed in Tables 29, 30 and 31. A review inspection result replaces the previous inspection result when the differences exceed the value in Table 29, 30 and 31.

(6) When a review inspection is requested, the previous inspection results are lined out on the inspection log with a note in the "Remarks" section that the applicant requested a review inspection. Results of the review inspection are recorded on the inspection log. Then compared to the previous results to determine what factors are averaged or replaced. The final results (averaged or replaced) are recorded on the inspection log and CuSum values are recalculated for the sublot. It is necessary to record the review inspection results on the inspection log in order to verify if correct procedures were followed when determining which factors are averaged or replaced or if a subsequent review of the entire lot is requested.

NOTE: The ITW CuSum application does not allow for circling or lining out entries on the log.

EXAMPLE: Determine which review inspection results are averaged with the original results and which replace the original results.

Sublot No. MP-1	TW	DKT	FM
Original Inspection	54.7 (AVG)	3.7	2.2
Review Inspection	----	2.4	2.0
Inspection difference	----	- 1.3	- 0.2
Allowable difference (from table #29)	----	+/- 1.2	+/- 0.4
Average/Replace results	----	Replace	Average
Results shown on log	----	2.4	2.1

(7) When a field review inspection (reinspection or appeal inspection) is requested on a material portion, official personnel will:

(a) Draw a line through the previous inspection results of the sublot under review. Include a notation in the "Remarks" section of the inspection log that the applicant requested a field review inspection (specify type as "REX" or "APPEAL").

(b) Record the field review inspection results on the inspection log. Do not calculate CuSum values for these results.

(c) Based on the field review results, determine which factors are averaged and which factor results are replaced.

(d) Record the averaged/replaced factor results in the factor columns on the inspection log. Draw a line through the field review results so only the averaged/replaced factor results are used to calculate new CuSum values.

(e) Reidentify the sublot by including a notation of the type of review with its corresponding sublot number.

(f) Recalculate the CuSum values for the material portion sublot to determine if the material portion designation is removed.

(g) Reidentify the sublot as a material portion (MP - 1, etc.) if a CuSum value exceeds the breakpoint value. (See Figure 9.)

Figure 9. Recording review inspection results on the inspection log.

SUBLOT NUMBER	TW		DKT		FM		Remarks
	54.0	AVG QUAL	3.0	0.9 / .3	2.0	0.3 / .1	
1	55.1		2.9	.2	2.0	.1	
2	53.8		2.7	0	2.2	.3	
3 MP-1	54.7		3.7	.7	2.2	.5 / .3	Applicant requests Field Review (REX) of MP – 1.
Field Review MP - 1					2.0		
Rex MP - 1	54.7		3.7	.7	2.1	.4 / .3	Field Review does not eliminate MP. Applicant elects to discharge MP – 1.

Sublot Number	TW	AVG QUAL	DKT 3.00	0.90 0.30	FM 2.00	0.30 0.10
1	55.1	55.10	2.9	0.20	2.0	0.10
2	53.8	54.42	2.7	0.00	2.2	0.30
MP-1	54.7	54.51	3.7	0.70	2.2	0.50
FR MP-1					2.0	
REX MP-1	54.7	54.51	3.7	0.70	2.1	0.40

(8) If a material portion is not removed from the lot, draw a circle around the factor results on the inspection log. If a material portion is removed from the lot, draw a line through the factor results on the inspection log.

(9) When the results of the review inspection eliminate a material portion, do not issue inspection certificates for the reviewed material portions unless they are requested by the applicant or deemed necessary by inspection personnel. When certificates are requested or deemed necessary, show the following statement in the “Remarks” section:

"The results shown on this certificate replaced the results shown on the inspection log for the above identified sublot loaded aboard the (name of carrier), dated (date), and were included in the average of the lot. This certificate is not valid for trading purposes."

(10) When a component material portion is eliminated by the review inspection results, official personnel will combine the component with other acceptable components to form a sublot.

(11) If the field review does not eliminate the material portion, the applicant for inspection has the option of:

(a) requesting a Board appeal inspection of the material portion;

(b) discharging the material portion;

(c) requesting a review inspection of the entire lot; or

(d) allowing the material portion to remain on board.

(12) Agencies must alert their respective field office when a Board appeal inspection is requested so that immediate arrangements for service may be made.

(13) When the results of the review inspection do not eliminate the material portion, do not issue an inspection certificate unless the material portion remains on board. Certify discharged and returned sublots when requested by the applicant or deemed necessary by official personnel.

b. Review Inspection of Entire Lot. When a review inspection is requested on the entire lot, the review inspection results replace the previous results and are placed on a new inspection log noting the level of inspection. A reinspection, an appeal inspection, and a Board appeal inspection are permitted when the entire lot is reviewed.

(1) All sublots offered for inspection (loaded or returned/discharged) are included in the review. While these three levels of review inspection are available, the acceptable starting point for a review of the entire lot must take into consideration what types of reviews were performed on material portions during the original lot. If a reinspection was the only review performed during the original lot, the applicant would be entitled to a reinspection, an appeal, and a board appeal of the entire lot. If an appeal inspection was the highest level of review inspection performed during the original lot, the applicant would be entitled to an appeal and a board appeal of the entire lot.

If a board appeal was the highest level of review inspection performed during the original lot, the applicant must request a board appeal of the entire lot. However, since a board appeal inspection must supersede a lower level of inspection official personnel must perform a reinspection and/or an appeal (as applicable) of the entire lot prior to the board appeal of the entire lot.

Since the reinspection/appeal of the entire lot is basically a formality, official personnel should consider performing an analysis on a single factor (e.g., moisture, test weight) before proceeding with the board appeal because the Board Appeal results of the entire lot will supersede the previous results. Official personnel may consult with the shipper on the factor(s) selected for reinspection/appeal analysis.

The review inspection results performed during the original inspection (same level of inspection as the review of the entire lot) are used as part of the entire lot review instead of analyzing the sample again. Specifically, use the results that are compared to the original material portion results to determine if the results are averaged or replaced. **Do not use the averaged or replaced results from the original inspection log as a part of the entire lot review.** Review inspection results are not averaged with previous results when the entire lot is reviewed.

(2) The tolerances of the inspection plan are reapplied to the review inspection results to determine if any material portions are observed. Material portions are certified accordingly. The applicant may request the next level (e.g., Board appeal) of inspection for the entire lot in order to eliminate a material portion designation.

1.6 COMPONENT INSPECTIONS

a. General.

Applicants may request a component inspection service on specific factors. Component inspection results are averaged to obtain sublot inspection values. Factors not requested to be analyzed on the component sample basis are analyzed on a sublot sample basis. In order to arrange for inspection personnel to provide the requested service, official personnel must receive this request as early as possible prior to loading. Once loading begins, the applicant is not permitted to change the factor(s) analyzed on a component sample basis, withdraw the request for component analysis, or ask to begin a component inspection service.

b. Sampling Criteria. In order not to delay loading, applicants may request a sublot size larger than the normal 100,000 bushel maximum limit. Sublots must not exceed 200,000 bushels. Component size is dependent on the sublot size. The minimum component size is 10,000 bushels and the maximum component size is 40,000 bushels. A minimum of two component samples and a maximum of four component samples are analyzed for sublots up to 80,000 bushels. For sublots between 80,001 and 120,000 bushels, a minimum of three component samples and a maximum of five component samples are analyzed.

For sublots between 120,001 and 160,000 bushels, a minimum of four component samples and a maximum of six component samples are analyzed. For sublots between 160,001 and 200,000 bushels, a minimum of five component samples and a maximum of eight component samples are analyzed. The minimum number of components is not applicable to the last sublot in a lot. **(SEE TABLE ON PAGE 1-14)**

c. Assigning Breakpoints, Starting Values and Material Errors. The breakpoint values assigned to the factors analyzed on a component sample basis are adjusted to reflect the reduced variability associated with the sublot result. The breakpoint value is dependent on the number of component samples analyzed as part of the sublot. The breakpoint value for the sublot reduces as the number of component samples increase. The starting value and material error are based on the breakpoint and are assigned using the reduced breakpoint. The ITW CuSum application is designed to automatically assign the reduced breakpoint, starting value and material error based on the number of component samples selected for the lot and the selection of factor(s) as a component factor(s).

(1) Tables 25, 26, and 27 are used to determine the reduced breakpoint value when component analysis is requested. Determine the reduced breakpoint as follows:

(a) Determine the number of component samples in a sublot.

(b) Determine the normal breakpoint value (from Tables 1-24) for the factor(s) analyzed.

(c) Locate the normal breakpoint value in Tables 25-27 and find the reduced breakpoint value corresponding to the number of component samples analyzed per sublot.

(d) Use the corresponding reduced breakpoint value as the inspection plan tolerance for that factor.

EXAMPLE: An applicant requests component analysis for foreign material for U.S. No. 2 or better Yellow Soybeans.

Step 1. Official personnel will inspect four components for each sublot.

Step 2. The normal breakpoint value for the factor is 0.3. (From Table 17)

Step 3. The corresponding reduced breakpoint value when four components are analyzed is 0.2. (From Table 25)

Step 4. Record 0.2 on the inspection log as the breakpoint value.

(2) Table 28 is used to determine the starting value based on the reduced breakpoint. Using the above example, a reduced foreign material breakpoint of 0.2 percent is used to determine the starting value of 0.1. Record 0.1 on the inspection log as the starting value.

(3) Table 29 is used to determine the material error based on the reduced breakpoint. Using the above example, a reduced foreign material breakpoint of 0.2 percent is used to determine the material error found in table 29 of 0.2 percent.

(4) Some factors are based on the sum of the results of other factors (e.g., defects in wheat). Apply a reduced breakpoint value to these factors when 50 percent or more of the factors needed to obtain this result are determined on a component sample basis.

For example, if shrunken and broken kernels and damaged kernels are determined on a component sample basis and foreign material is determined on a sublot basis for a wheat shipment, a reduced breakpoint is used for the factors shrunken and broken kernels, damaged kernels, and defects. The normal breakpoint is used for foreign material.

d. Double Portion and Component Analysis. Applicants may request a double portion size and component inspection service on specific factors (double portion analysis is limited to interpretive factors, i.e., damaged kernels total, heat damaged kernels, subclass, class). The rules of this section must be applied. **In addition, the general rule for determining the reduced breakpoint will be two times the number of components per sublot.**

NOTE: Indicate the factor(s) requested on a double portion size in the "Remarks" section of the inspection log.

EXAMPLE: An applicant requests a double portion size and three components per sublot for the factor damaged kernels total in a lot of U.S. No. 2 or better Soft Red Winter Wheat.

Step 1. The normal breakpoint value for the factor DKT is 1.5 (from table 23).

Step 2. Using Table 25, the corresponding reduced breakpoint value is 0.6. This is calculated by taking 2 times the actual number of components to accommodate for the double portion size. 3 components per sublot, times 2 for the double portion, equals 6 components per sublot (for the purpose of determining the reduced breakpoint).

e. Recording Results. Official personnel may record component sample results on the same inspection log as the sublot results or on a separate log. The sublot result (average of the component results) for the factor(s) is recorded on the same log as the other sublot inspection results. If a separate log is used for the component sample results, maintain this log with the official inspection log. When recording component sample results, official personnel must identify which inspection result is for which component.

f. Declaring Material Portions. Material portions occur whenever a component sample inspection result exceeds the more than one grade limit uniformity requirement for component samples (refer to section 1.3, b) or the average of the component results cause the CuSum value to exceed the reduced breakpoint value. Procedures for recording CuSum values on the inspection log are discussed in section 1.4, d.

g. Review Inspections. When a material portion occurs, the applicant is entitled to one field review (reinspection or appeal inspection) and a Board appeal inspection in an attempt to remove the material portion designation. As discussed in section 1.5, review results are compared to the previous results to determine if a material error exists which determines if the results are averaged or replaced. Procedures for determining when and how to average inspection results are dependent on the type of material portion observed.

(1) Component is a Material Portion. When the component exceeds the more than one grade limit uniformity requirement, only that component is reviewed. Initiate the review inspection with a factor analysis of the degrading factor.

(a) Determine if the review inspection result is averaged with the previous inspection result or if it replaces it. Use the normal breakpoint value (from Tables 1-24) for the factor reviewed to determine the allowable difference for averaging (from Table 29). For factor(s) analyzed on a double portion basis, use the normal breakpoint value as stated above to locate the reduced breakpoint value found in tables 25-27 under the column "Double Portion or 2 Components." Finally, use table 29 to determine the allowable difference for averaging. Average those results that are within the allowable difference. Replace those results which exceed the allowable difference.

(b) Determine if the material portion designation is removed based on the review inspection action.

Use the final result (averaged or replaced, whichever is applicable) to determine if the component is a material portion (more than one grade over the grade limit).

(c) If the material portion is not eliminated, the applicant may request a Board appeal inspection, remove the material portion from the lot, or receive a separate certificate if it remains on board.

(d) If the review inspection does not eliminate the material portion designation and the applicant elects to leave the component on board the carrier, it is considered as a separate lot and all factors are analyzed and CuSum values calculated. If the material portion component is removed from the lot (returned to the elevator or discharged from the carrier), only a factor analysis of the degrading factor is necessary and CuSum values are not calculated.

(e) If the material portion is eliminated, use the final component result when determining the sublot average result.

(2) Sublot is a Material Portion. When the sublot CuSum value exceeds the breakpoint causing a material portion, all components comprising that sublot factor are reviewed as part of the review inspection procedure. Only those factors, which were previously determined on a component sample basis, are review inspected on a component sample basis. All other factors are reviewed on a sublot basis. Factors other than the factor that caused the material portion designation are reviewed only when it is deemed necessary by the inspector.

(a) The procedure for determining if the review component inspection results are averaged or replaced with the previous component inspection results do not apply when the sublot is a material portion and all components are reviewed. Official personnel will review all components for the applicable factor(s) then average the revised component results to obtain a sublot result.

(b) Use the reduced breakpoint value for the factor analyzed on a component sample basis to find the corresponding allowable difference value in Table 29. Then determine if the review average sublot result is averaged with the previous average sublot result. If the factor in question does not have a breakpoint, use Table 30 or Table 31 (whichever is applicable) to determine the allowable difference. Average those results that are within the allowable difference. Replace those results which exceed the allowable difference.

(c) Record the sublot results on the inspection log and recalculate CuSum values as described in section 1.5. Determine if the material portion designation was eliminated based on the new CuSum values. If the material portion was not eliminated, the applicant may request a Board appeal inspection, remove the sublot from the lot, or certificate it separately.

(d) Official personnel must maintain a sufficient quantity of sample for each component involved in a material portion in order to provide for a review inspection on an unworked portion. After the material portion designation is eliminated, official personnel may dispose of the excess grain sample after saving an unworked file sample to represent the sublot.

(3) Review Entire Lot. Official personnel are not responsible for maintaining a file sample for components that are part of an acceptable sublot. Therefore, if a request is received for a review inspection of the entire lot, the review inspection is completed on a sublot basis instead of a component sample basis because file samples are not available for the components. Review inspection results replace the previous results and the normal breakpoints are applied.

h. Returning Components. Official personnel may release component inspection information to the applicant as results are available. When a component is inspected and the results are released to the applicant, the acceptable component becomes part of the sublot.

(1) An applicant may return a component to the elevator before inspection results are known or when it is designated as a material portion. Returning an acceptable component after inspection results are known and replacing it with another component adversely affects the overall operation of the inspection plan. Therefore, if an applicant returns an acceptable component after the inspection results are known, the entire sublot graded to that point must be returned.

(2) Failure to comply with this provision will result in official personnel not releasing subsequent component inspection information to the applicant until the sublot is completed or a component is designated as a material portion. This restriction is applicable to the remainder of the lot and, at the field office manager's discretion, to future lots which have components inspected during loading.

1.7 DISPOSITION OF MATERIAL PORTIONS

a. Disposition Options. At the option of the applicant for inspection, any grain designated as a material portion may, in lieu of separate certification, be:

(1) Returned to the elevator.

(2) Fumigated in accordance with the FGIS Fumigation Handbook when the material portion is a result of "infested" grain.

(3) Removed from a unit train line up.

(4) Removed by discharging from the carrier.

(5) Loaded to another lot for lower quality grain (not higher quality).

b. Loading a Material Portion to Another Lot. A material portion from one lot may be loaded as part of another lot in lieu of returning the material portion to the elevator provided sufficient information is available to complete the inspection and weighing functions of the other lot. This is permitted only when the original inspection results for the material portion sublot are within the load order grade limits of the other (second) lot. A material portion having results over the grade limit but within the inspection plan tolerances is not acceptable for loading to the other (second) lot, unless the material portion factor(s) are being transferred to an average quality lot with no maximum, minimum, or absolute limits applied to the material portion factors.

For transfers from CuSum lots to "average quality" lots, there are no requirements placed on the receiving lot for average quality factor(s); all original material portion factor results eligible for average quality are acceptable. Sublots rejected by the applicant due to self-imposed limits are not considered material portions, and are therefore not eligible to be transferred.

(1) This method of material portion disposition applies only to sublots designated as material portions and does not apply to components or subsamples.

(2) When a material portion is loaded as part of another (second) lot, do not calculate CuSum values for this sublot on the inspection log of the other (second) lot. Instead carry forward the CuSum values from the sublot recorded on the other (second) lot inspection log immediately before it. Include a note in the "Remarks" section that the CuSum values were carried forward because the sublot was a material portion intended for another lot. (See Figure 10.)

If the transferred sublot is the first sublot on the new (second) lot, do not calculate CuSum starting values. Staring values will be calculated on the first sublot actually loaded for the new (second) lot.

Figure 10. Recording CuSum values when a material portion is loaded to another lot.

SUBLOT NUMBER	TW		DKT		FM		Remarks
	52.0	AVG / QUAL	5.0	1.2 / .4	3.0	0.4 / .1	
1	54.0		5.2	.6	3.2	.3	
2	54.7		3.7	.6	2.2	.3	CuSum values brought forward for Sublot #2 because it was an MP on another lot
3	54.0		4.8	.4	2.9	.2	

Note: Identify the name of the vessel and MP where the sublot was transferred from.

Example of Receiving Lot

Sublot Number	TW	AVG QUAL	DKT 5.00	1.20 0.40	FM 3.00	0.40 0.10
1	54.0	54.00	5.2	0.60	3.2	0.30
2	54.7	54.33	3.7	0.60	2.2	0.30
3	54.0	54.22	4.8	0.40	2.9	0.20

(3) The inspection results and the CuSum values for the material portion are recorded on the first lot according to procedures when a material portion occurs and is subsequently returned or removed.

c. Inspection Log Notations. Regardless of which option the applicant elects, the CuSum value is reset back to the breakpoint value on the sublot factor whose CuSum value exceeded the breakpoint. Do not reset the CuSum values on the factors that did not exceed their breakpoints.

(1) Indicate in the "Remarks" section of the inspection log what disposition option as selected by the applicant or if the material portion remained on the carrier.

(2) Draw a line through the component or sublot inspection results if the material portion is removed from the lot (handwritten logs only).

(3) Draw a circle around all factor results in the material portion if the applicant elects to leave the material portion on the carrier (handwritten logs only).

d. Issuing Certificates. It is not necessary for official personnel to issue inspection certificates for material portions removed from the lot unless they are requested by the applicant or deemed necessary by inspection personnel. If a certificate is requested or deemed necessary, an "out" or "local" inspection certificate is issued.

1.8 DETERMINING MATHEMATICAL OR WEIGHTED AVERAGE

The ITW CuSum application automatically calculates factor averages by the weighted average method. At domestic locations where a hand written loading log is used, the applicable mathematical or weighted average method should be used.

a. Determining Factor Averages for Sublots that are Uniform in Quality.

(1) Mathematical Average. When a lot is composed of 10 or more sublots "reasonably uniform" 1/ in size, or any number of sublots "uniform" 2/ in size, a mathematical average is used to determine each factor in the following manner:

(a) Total each factor column recorded on the log.

(b) Record the sums in the appropriate space on the inspection log.

(c) Divide the sum of each factor column by the number of sublots in the lot. The quotient is the mathematical average for the factor.

(d) Record the mathematical average to one extra decimal place in the factor blocks termed "Average" located at the bottom of the inspection log.

1/ The largest sized sublot loaded shall not be more than 25 percent larger than the smallest sublot. Multiply the smallest sublot by 1.25. The resulting figure is the maximum sublot size.

NOTE: When there are 10 or more sublots "reasonably uniform" in size, there is very little difference between the mathematical average and the weighted average results when no material portion is present. However, if it appears that the mathematical average will cause the grain in a lot to grade differently than the weighted average, use the weighted average procedure.

2/ The sublots are one standard size or within 1,000 bushels (or equivalent) of the standard.

(2) Weighted Average. When a lot does not meet the criteria for using a mathematical average, compute the weighted average as follows:

(a) Multiply each sublot factor result by the number of pounds (bushels, tons, or railcars as applicable) represented by the sublot.

EXAMPLE		
Quantity	Factor	Product
60,000	2.3	138,000
58,000	2.5	145,000
42,000	2.8	117,600
160,000		400,600

(b) Total the products for each factor column.

(c) Divide the sum of each factor column by the number of pounds (bushels, tons, or railcars as applicable) in the lot. The quotient is the weighted average for the factor.

EXAMPLE: $\frac{400,600}{160,000} = 2.50$

(d) Record the weighted average to one extra decimal place in the factor blocks termed "Average" located at the bottom of the inspection log.

b. Determining Factor Averages for Sublots that are not Uniform in Quality. When a lot is not uniform in quality and is certified as two or more lots, the factor information is determined and recorded for each lot in accordance with the aforementioned procedures.

c. Rounding Procedures. Round the average factor results for each factor column as described in the applicable Official U.S. Standards for Grain or in the Grain Inspection Handbook, Book II, Grain Grading Procedures. Record the results in the bottom portion of the log marked "Rounded Average" as they are to be certified. For factors expressed as counts, such as smut balls, round the average result to the nearest whole number. Record garlic bulblets in wholes and/or in decimals to the hundredths place. When a fraction is something other than a 0.33, disregard that fraction and use the 0.33 that is lower (e.g., 1.36 rounds to 1.33).

e. Adjustment of Factors. In certain cases, individual factors are combined in an end factor (e.g., damaged kernels, foreign material, and shrunken and broken kernels are mathematically combined to calculate total defects in wheat). The end factor is not obtained by averaging the sublot results for the end factor but is obtained by the addition of the average (recorded to the nearest hundredth percent) of the individual factor results.

(1) Occasionally, the rounded averages for the individual factors will not correspond to the rounded average of the end factor. When this occurs, it is necessary to adjust the rounded average results of one of the individual factors. Adjustments are made by subtracting or adding 0.1 to the rounded result of the individual factor result that is nearest a midpoint (e.g., 0.05, 0.15, 0.25, 0.35, etc.).

EXAMPLE

	DKT	FM	SHBN	DEF
Weighted Average	2.59	0.78	3.26	6.63
Rounded Average	2.6	0.8	3.3 = (6.7)	6.6
Adjustment	None	None	-0.1	
Adjusted Rounded Average	2.6	0.8	3.2	6.6

(2) Since the sum of the rounded averages for DKT, FM, and SHBN (6.7) in the above examples does not equal the rounded average for total defects (6.6), an adjustment of -0.1 is needed for the rounded average of one of the individual factors. The rounded average for SHBN (3.3) was adjusted downward to 3.2 because it was nearer a midpoint (0.25) than the other factor averages

(3) When an adjustment in a combination factor is necessary, record the adjusted result on the inspection log directly below the rounded results and report the adjusted result on the inspection certificate.

1.9 FINAL GRADE

In addition to meeting the uniformity requirements of the inspection plan, the final rounded factor averages must be within the load order grade.

If the final average indicates the grade of the lot is inferior to the load order grade and no breakpoints were violated, the lot is certified as separate lots according to the grade of the individual sublots.

Unit Train loaders may remove or reload any sublot in an effort to improve grade quality. If the final average indicates a better grade than the load order grade and the applicant requests the better grade certification, official personnel shall review for the quality uniformity conditions for the better grade.

1.10 CUSUM CUTOFF REQUESTS

A "cutoff" is defined as an applicant's request to end inspection in order to receive certification on a portion of a shiplot or unit train inspected under the CuSum loading/unloading plan prior to the lot being loaded/unloaded in its entirety. This may be necessary for an applicant to meet contract requirements, or provide weight and/or grade certification on a certain date or time.

An applicant may request a "cutoff" at any time to accommodate various requirements to certify weight and/or grades on board at a certain date or time. However, there must be grain on board the carrier(s) (or unloaded from the carrier(s) in the case of inbound movements) for this request to be granted. In a situation where the first sublot presented for inspection results in a material portion, document the material portion and calculate CuSum values on the material portion sublot. **Do not grant a "cutoff" if grain for the particular lot presented for official inspection has not been loaded aboard the carrier.** A cutoff in this situation would reset the CuSum values and potentially circumvent the loading plan. See the example below for a "cutoff" request that should be denied.

Action	Sublot Number	Bin	Holds	Disposition	Quantity	ODOR	TW	AVG QUAL	M 13.00	0.30 0.10	HT 0.50	0.30 0.10	DKT 3.00	0.90 0.30	FM 2.00	0.30 0.10	SPL 20.00	2.20 0.70	SBOC 2.00	1.00 0.30	IN	INF
Select	MP-1	1-2		Returned	2451500	OK	55.2		12.8	0.00	0.1	0.00	4.1	1.40	1.8	0.00	10.8	0.00	0.0	0.00	2-0	0
Select	MP-2	3-4		Returned	2415200	OK	55.0		13.0	0.00	0.2	0.00	3.4	1.30	2.0	0.00	11.8	0.00	0.0	0.00	2-0	0

1.11 TOLERANCE TABLES

The following tables identify the breakpoints, starting values, and material error ranges for factors analyzed under this inspection plan.

TABLE 1 - GRADE LIMITS (GL) AND BREAKPOINTS (BP) FOR SIX-ROWED MALTING BARLEY AND SIX-ROWED BLUE MALTING BARLEY

Grade	Minimum limits of-						Maximum limits of-									
	Test weight per bushel (pounds)		Suitable malting type (percent)		Sound barley 1/ (percent)		Damaged kernels 1/ (percent)		Foreign material (percent)		Other Grains (percent)		Skinned and broken kernels (percent)		Thin barley (percent)	
	GL	BP	GL	BP	GL	BP	GL	BP	GL	BP	GL	BP	GL	BP	GL	BP
U.S. No. 1	47.0	- 0.5	95.0	- 1.3	97.0	- 1.0	2.0	0.8	0.5	0.1	2.0	0.8	4.0	1.1	7.0	0.6
U.S. No. 2	45.0	- 0.5	95.0	- 1.3	94.0	- 1.4	3.0	0.9	1.0	0.4	3.0	0.9	6.0	1.4	10.0	0.9
U.S. No. 3	43.0	- 0.5	95.0	- 1.3	90.0	- 1.6	4.0	1.1	2.0	0.5	5.0	1.3	8.0	1.5	15.0	0.9
U.S. No. 4	43.0	- 0.5	95.0	- 1.3	87.0	- 1.9	5.0	1.3	3.0	0.6	5.0	1.3	10.0	1.6	15.0	0.9

1/ Injured-by-frost kernels and injured-by-mold kernels are not considered damaged kernels or considered against sound barley.

TABLE 2 - GRADE LIMITS (GL) AND BREAKPOINTS (BP) FOR TWO-ROWED MALTING BARLEY

Grade	Minimum limits of-						Maximum limits of-							
	Test weight per bushel (pounds)		Suitable malting types (percent)		Sound barley 1/ (percent)		Wild Oats (percent)		Foreign material (percent)		Skinned and broken kernels (percent)		Thin barley (percent)	
	GL	BP	GL	BP	GL	BP	GL	BP	GL	BP	GL	BP	GL	BP
U.S. No. 1	50.0	- 0.5	97.0	- 1.0	98.0	- 0.8	1.0	0.6	0.5	0.1	5.0	1.3	5.0	0.4
U.S. No. 2	48.0	- 0.5	97.0	- 1.0	98.0	- 0.8	1.0	0.6	1.0	0.4	7.0	1.3	7.0	0.5
U.S. No. 3	48.0	- 0.5	95.0	- 1.3	96.0	- 1.1	2.0	0.8	2.0	0.5	10.0	1.8	10.0	0.9
U.S. No. 4	48.0	- 0.5	95.0	- 1.3	93.0	- 1.1	3.0	0.9	3.0	0.6	10.0	1.8	10.0	0.9

1/ Injured-by-frost kernels and injured-by-mold kernels are not considered damaged kernels or considered against sound barley.

TABLE 3 - GRADE LIMITS (GL) AND BREAKPOINTS (BP) FOR BARLEY

Grade	Minimum limits of-				Maximum limits of-									
	Test weight per bushel (pounds)		Sound barley (percent)		Damaged kernels 1/ (percent)		Heat damaged kernels (percent)		Foreign material (percent)		Broken kernels (percent)		Thin barley (percent)	
	GL	BP	GL	BP	GL	BP	GL	BP	GL	BP	GL	BP	GL	BP
U.S. No. 1	47.0	- 0.5	97.0	- 1.1	2.0	0.8	0.2	0.1	1.0	0.4	4.0	1.0	10.0	0.9
U.S. No. 2	45.0	- 0.5	94.0	- 1.4	4.0	1.0	0.3	0.1	2.0	0.4	8.0	1.5	15.0	0.9
U.S. No. 3	43.0	- 0.5	90.0	- 1.6	6.0	1.4	0.5	0.2	3.0	0.5	12.0	1.8	25.0	1.3
U.S. No. 4	40.0	- 0.5	85.0	- 2.2	8.0	1.5	1.0	0.5	4.0	0.5	18.0	1.8	35.0	1.9
U.S. No. 5	36.0	- 0.5	75.0	- 2.2	10.0	1.8	3.0	0.6	5.0	0.6	28.0	2.4	75.0	2.3

1/ Includes heat-damaged kernels. Injured-by-frost kernels and injured-by-mold kernels are not considered damaged kernels.

TABLE 4 - BREAKPOINTS FOR BARLEY SPECIAL GRADES AND FACTORS

Special Grade or Factor	Grade Limit	Breakpoint
Dockage	As specified by contract or load order	0.23
Two-rowed Barley	Not more than 10.0% of Six-rowed in Two-rowed 1/	1.8
Six-rowed Barley	Not more than 10.0% of Two-rowed in Six-rowed 1/	1.8
Malting (Blue Aleurone Layers)	Not less than 90.0%	-1.3
Malting (White Aleurone Layers)	Not less than 90.0%	-1.3
Smutty	More than 0.20%	0.06
Garlicky	3 or more in 500 grams	2.33
Ergoty	More than 0.10%	0.13
Infested	Same as standards	0
Blighted	More than 4.0%	1.1
Injured-by-Frost kernels	Not more than 1.9%	0.1
Injured-by-Heat Kernels	Not more than 0.2%	0.04
Frost-damaged kernels	Not more than 0.4%	0.05
Heat-damaged Kernels	Not more than 0.1%	0.1
Other Grains	Not more than 25.0%	2.4
Moisture	As specified by contract or load order grade	0.5
Protein	As specified by contract or load order grade	N/A 2/

1/ Use 10.4 as the grade limit due to reporting requirements.
2/ Breakpoints are not established for protein. Certify the average results of the sublots loaded. Material portions occur only when the contarct or load order specifies a limit per sublot and that limit is exceeded.

TABLE 5 - GRADE LIMITS (GL) AND BREAKPOINTS (BP) FOR CORN

Grade	Minimum limits of-		Maximum limits of-					
			Damaged kernels					
	Testweight per bushel (pounds)		Heat-damaged kernels (percent)		Total (percent)		Broken corn and foreign material (percent)	
	GL	BP	GL	BP	GL	BP	GL	BP
U.S. No. 1	56.0	-0.4	0.1	0.1	3.0	1.0	2.0	0.2
U.S. No. 2	54.0	-0.4	0.2	0.2	5.0	1.3	3.0	0.3
U.S. No. 3	52.0	-0.4	0.5	0.3	7.0	1.5	4.0	0.3
U.S. No. 4	49.0	-0.4	1.0	0.5	10.0	1.8	5.0	0.4
U.S. No. 5	46.0	-0.4	3.0	0.9	15.0	2.1	7.0	0.4

TABLE 6 - BREAKPOINTS FOR CORN SPECIAL GRADES AND FACTORS

Special Grade or Factor	Grade Limit	Breakpoint
Flint	95% or more of flint corn 1/	-1.0
Flint and Dent	More than 5%, but less than 95% of flint corn. 2/	1.0 or -1.0
Infested	Same as standards	0
Corn of other colors:		
White	Not more than 2.0%	0.8
Yellow	Not more than 5.0%	1.0
Waxy	95% or more	-3.0
High BCFM	As specified by contract or load order grade	10% of the load order grade
Moisture	As specified by contract or load order grade	0.4
Protein, Oil, Starch	As specified by contract or load order grade	N/A 3/

1/ Use 94.5 as the grade limit due to reporting requirements.
2/ Use 5.4 and 94.4 as the grade limit due to reporting requirements.
3 / Breakpoints are not established for protein, oil, or starch. Certify the average results of the sublots loaded. Material portions occur only when the contract or load order specifies a limit per sublot and that limit is exceeded.

TABLE 7 - GRADE LIMITS (GL) AND BREAKPOINTS (BP) FOR FLAXSEED

Grade	Minimum limits of-		Maximum limits of- Damaged kernels			
	Testweight per bushel (pounds)		Heat-damaged kernels (percent)		Total (percent)	
	GL	BP	GL	BP	GL	BP
U.S. No. 1	49.0	- 0.1	0.2	0.1	10.0	0.9
U.S. No. 2	47.0	- 0.1	0.5	0.1	15.0	1.1

TABLE 8 - BREAKPOINTS FOR FLAXSEED SPECIAL GRADES AND FACTORS

Special Grade or Factor	Grade Limit	Breakpoint
Moisture	As specified by contract or load order grade	0.4
Dockage	0.99% or above	0.32

TABLE 9 - GRADE LIMITS (GL) AND BREAKPOINTS (BP) FOR MIXED GRAIN

Grade	Maximum limits of-				
	Moisture	Total (percent)		Heat-damaged kernels (percent)	
	GL	GL	BP	GL	BP
U.S. Mixed Grain	16.0	15.0	0.6	3.0	0.4

Note: There is no tolerance for U.S. Sample Grade Mixed Grain

TABLE 10 - BREAKPOINTS FOR MIXED GRAIN SPECIAL GRADES AND FACTORS

Special Grade or Factor	Grade Limit	Breakpoint
Smutty	15 or more in 250 grams (wheat, rye, or triticale predominate)	6
	More than 0.2% (all other mixtures)	0.05
Ergoty	More than 0.30% (rye or wheat predominate)	0.13
	More than 0.10% (all other mixtures)	0
Garlicky	2 or more per 1,000 grams (wheat, rye, or triticale predominate)	1
	4 or more per 500 grams (all other mixtures)	2
Infested	Same as standards	0
Blighted	More than 4.0% (barley predominates)	1.1
Treated	Same as standards	0
Moisture	As specified by contract or load order grade	0.5

TABLE 11 - GRADE LIMITS (GL) AND BREAKPOINTS (BP) FOR OATS

Grade	Minimum limits of-				Maximum limits of-					
	Testweight per bushel (pounds)		Sound Oats (Percent)		Heat-damaged Kernels (percent)		Foreign Material (percent)		Wild Oats (percent)	
	GL	BP	GL	BP	GL	BP	GL	BP	GL	BP
U.S. No. 1	36.0	- 0.5	97.0	- 0.8	0.1	0.1	2.0	0.4	2.0	0.6
U.S. No. 2	33.0	- 0.5	94.0	- 1.2	0.3	0.4	3.0	0.4	3.0	0.8
U.S. No. 3 1/	30.0	- 0.5	90.0	- 1.4	1.0	0.5	4.0	0.5	5.0	1.1
U.S. No. 4 2/	27.0	- 0.5	80.0	- 1.9	3.0	0.8	5.0	0.5	10.0	1.4

1/ Oats that are Slightly Weathered shall be graded not higher than U.S. No. 3.
2/ Oats that are Badly Stained or Materially Weathered shall be graded not higher than U.S. No. 4.

TABLE 12 - BREAKPOINTS FOR OATS SPECIAL GRADES AND FACTORS

Special Grade or Factor	Grade Limit	Breakpoint
Heavy	38 pounds or more	- 0.5
Extra Heavy	40 pounds or more	- 0.5
Moisture	As specified by contract or load order grade	0.5
Thin	More than 20.0%	0.5
Smutty	More than 0.2%	0.05
Ergoty	More than 0.10%	0.10
Garlicky	4 or more in 500 grams	2.33
Infested	Same as standards	0
Bleached	Same as standards	0

TABLE 13 - GRADE LIMITS (GL) AND BREAKPOINTS (BP) FOR RYE

Grade	Minimum limits of-		Maximum limits of-									
			Foreign Material				Damaged Kernels					
	Test weight per bushel (pounds)		Foreign matter other than wheat (percent)		Total (percent)		Heat-damaged (percent)		Total (percent)		Thin Rye (percent)	
	GL	BP	GL	BP	GL	BP	GL	BP	GL	BP	GL	BP
U.S. No. 1	56.0	- 0.5	1.0	0.4	3.0	0.8	0.2	0.1	2.0	0.8	10.0	0.6
U.S. No. 2	54.0	- 0.5	2.0	0.5	6.0	1.1	0.2	0.1	4.0	1.1	15.0	0.8
U.S. No. 3	52.0	- 0.5	4.0	0.8	10.0	1.4	0.5	0.4	7.0	1.4	25.0	0.9
U.S. No. 4	49.0	- 0.5	6.0	0.8	10.0	1.4	3.0	0.8	15.0	2.0	---	---

TABLE 14 - BREAKPOINTS FOR RYE SPECIAL GRADES AND FACTORS

Special Grade or Factor	Grade Limit	Breakpoint
Moisture	As specified by contract or load order grade	0.3
Light Garlicky	2 or more per 1,000 grams 1/	1.33
Garlicky	More than 6 per 1,000 grams	7.33
Ergoty	More than 0.30%	0.10
Plump	Not more than 5.0% through 0.064 x 3/8 inch sieve	0.5
Light Smutty	More than 14 per 250 grams	6
Smutty	More than 30 per 250 grams	10
Infested	Same as standards	0
Dockage	As specified by contract or load order grade	0.2

1/ Use 1 2/3 as the grade limit.

TABLE 15 - GRADE LIMITS (GL) AND BREAKPOINTS (BP) FOR SORGHUM

Grade	Minimum limits of-		Maximum limits of-							
			Damaged Kernels				Broken kernels and foreign material			
	Test weight per bushel (pounds)		Heat-damaged (percent)		Total (percent)		Total (percent)		Foreign material (percent)	
	GL	BP	GL	BP	GL	BP	GL	BP	GL	BP
U.S. No. 1	57.0	- 0.4	0.2	0.1	2.0	1.1	3.0	0.5	1.0	0.4
U.S. No. 2	55.0	- 0.4	0.5	0.4	5.0	1.8	6.0	0.6	2.0	0.5
U.S. No. 3 1/	53.0	- 0.4	1.0	0.5	10.0	2.3	8.0	0.7	3.0	0.6
U.S. No. 4	51.0	- 0.4	3.0	0.8	15.0	2.8	10.0	0.8	4.0	0.7

1/ Sorghum which is distinctly discolored shall be graded not higher than U.S. No. 3.

TABLE 16 - BREAKPOINTS FOR SORGHUM SPECIAL GRADES AND FACTORS

Special Grade or Factor	Grade Limit	Breakpoint
Class:		
Tannin	Not less than 90.0%	-1.9
Sorghum	Not less than 97%	-1.0
White	Not less than 98%	-0.9
Smutty	20 or more in 100 grams 1/	8
Infested	Same as standards	0
Dockage	0.99% and above	0.32
Moisture	As specified by contract or load order grade	0.5

1/ Use 19 as the grade limit.

TABLE 17 - GRADE LIMITS (GL) AND BREAKPOINTS (BP) FOR SOYBEANS

Grade	Maximum limits of-									
	Damaged kernels									
	Heat-damaged Kernels (percent)		Total (percent)		Foreign Material (percent)		Splits (percent)		Soybeans of other colors (percent)	
	GL	BP	GL	BP	GL	BP	GL	BP	GL	BP
U.S. No. 1	0.2	0.2	2.0	0.8	1.0	0.2	10.0	1.6	1.0	0.7
U.S. No. 2	0.5	0.3	3.0	0.9	2.0	0.3	20.0	2.2	2.0	1.0
U.S. No. 3	1.0	0.5	5.0	1.2	3.0	0.4	30.0	2.5	5.0	1.6
U.S. No. 4	3.0	0.9	8.0	1.5	5.0	0.5	40.0	2.7	10.0	2.3

TABLE 18 - BREAKPOINTS FOR SOYBEAN SPECIAL GRADES AND FACTORS

Special Grade or Factor	Grade Limit	Breakpoint
Garlicky	5 or more per 1,000 grams 1/	2
Infested	Same as standards	0
Soybeans of other colors	Not more than 10.0%	2.3
Moisture	As specified by contract or load order grade	0.3
Oil	As specified by contract or load order grade	N/A 2/
Protein	As specified by contract or load order grade	N/A 2/
Test Weight per bushel	As specified by contract or load order grade	+/- 0.4

1/ Use 4.67 as the grade limit.

2/ Breakpoints are not established for oil and protein. Certify the average results of the sublots loaded. Material portions occur only when the contract or load order specifies a limit per sublot and that limit is exceeded.

TABLE 19 - GRADE LIMITS (GL) AND BREAKPOINTS (BP) FOR SUNFLOWER SEED

Grade	Minimum limits of-		Maximum limits of-					
			Damaged Sunflower Seed					
	Testweight per bushel (pounds)		Heat-damaged (percent)		Total (percent)		Dehulled Seed (percent)	
	GL	BP	GL	BP	GL	BP	GL	BP
U.S. No. 1	25.0	- 0.5	0.5	0.4	5.0	1.3	5.0	1.3
U.S. No. 2	25.0	-0.5	1.0	0.6	10.0	1.8	5.0	1.3

TABLE 20 - BREAKPOINTS (BP) FOR SUNFLOWER SEED SPECIAL GRADES AND FACTORS

Special Grade or Factor	Grade Limit	Breakpoint
Moisture	As specified by contract or load order grade	0.5
Foreign material	1.25% and less	0.27
	1.26% and above	0.39
Admixture	As specified by contract or load order grade	0.6

TABLE 21 - GRADE LIMITS (GL) AND BREAKPOINTS (BP) FOR TRITICALE

Grade	Minimum limits of-		Maximum limits of-											
	Test weight per bushel (pounds)		Damaged kernels				Foreign material							
			Heat-damaged (percent)		Total (percent)		Material other than wheat or rye (percent)		Total 2/ (percent)		Shrunken and broken kernels (percent)		Defects 3/ (percent)	
	GL	BP	GL	BP	GL	BP	GL	BP	GL	BP	GL	BP	GL	BP
U.S. No. 1	48.0	- 0.5	0.2	0.1	2.0	0.8	1.0	0.4	2.0	0.6	5.0	0.8	5.0	1.3
U.S. No. 2	45.0	- 0.5	0.2	0.1	4.0	1.1	2.0	0.5	4.0	0.9	8.0	0.8	8.0	1.3
U.S. No. 3	43.0	- 0.5	0.5	0.4	8.0	1.5	3.0	0.6	7.0	1.2	12.0	1.6	12.0	2.3
U.S. No. 4	41.0	- 0.5	3.0	0.8	15.0	2.0	4.0	0.8	10.0	1.4	20.0	2.3	20.0	2.3

1/ Include heat-damaged kernels.
2/ Includes material other than wheat or rye.
3/ Defects include damaged kernels (total), foreign material (total), and shrunken and broken kernels. The sum of these three factors may not exceed the limit for defects for each numerical grade.

TABLE 22 - BREAKPOINTS FOR TRITICALE SPECIAL GRADES AND FACTORS

Special Grade or Factor	Grade Limit	Breakpoint
Light Garlicky	2 or more per 1,000 grams 1/	0 or 1.33?
Garlicky	More than 6 per 1,000 grams	1.33?
Ergoty	More than 0.10%	0.1
Smutty	More than 14 per 250 grams	6
Infested	Same as standards	0
Dockage	0.99% or above	0.32
Moisture	As specified by contract or load order grade	0.5

1/ Use 1 2/3 as the grade limit.

TABLE 23 - GRADE LIMITS (GL) AND BREAKPOINTS (BP) FOR WHEAT

Grade	Minimum limits of -				Maximum limits of-											
	Test weight per bushel				Damaged kernels								Wheat of other classes 5/			
	Hard Red Spring or White Club 1/ (pounds)		All other classes and subclasses (pounds)		Heat-damaged kernels 2/ (percent)		Total 3/ (percent)		Foreign material (percent)		Shrunken and broken kernels (percent)		Defects 4/ (percent)		Contrasting Classes (percent)		Total 6/ (percent)	
	GL	BP	GL	BP	GL	BP	GL	BP	GL	BP	GL	BP	GL	BP	GL	BP	GL	BP
U.S. No. 1	58.0	-0.3	60.0	-0.3	0.2	0.2	2.0	1.0	0.4	0.2	3.0	0.3	3.0	0.7	1.0	0.7	3.0	1.6
U.S. No. 2	57.0	-0.3	58.0	-0.3	0.2	0.2	4.0	1.5	0.7	0.3	5.0	0.4	5.0	0.9	2.0	1.0	5.0	2.1
U.S. No. 3	55.0	-0.3	56.0	-0.3	0.5	0.3	7.0	1.9	1.3	0.4	8.0	0.5	8.0	1.2	3.0	1.3	10.4	2.9
U.S. No. 4	53.0	-0.3	54.0	-0.3	1.0	0.4	10.0	2.3	3.0	0.6	12.0	0.6	12.0	1.4	10.4	2.3	10.4	2.9
U.S. No. 5	50.0	-0.3	51.0	-0.3	3.0	0.7	15.0	2.7	5.0	0.7	20.0	0.7	20.0	1.5	10.4	2.3	10.4	2.9

1/ Use when HRS or WHCB predominate in Mixed wheat.
2/ Use an analytical portion of approximately 66 grams for Durum wheat.
3/ Use an analytical portion of approximately 20 grams for Durum wheat. Includes heat-damaged kernels.
4/ Defects include DKT, FM, and SHBN. The sum of these three factors may not exceed the limit for defects for each numerical grade.
5/ Use an analytical portion of approximately 20 grams for Durum wheat. Unclassed wheat may contain not more than 10.4 percent WOCL.
6/ Includes contrasting classes.

TABLE 24 - BREAKPOINTS FOR WHEAT SPECIAL GRADES AND FACTORS

Special Grade or Factor		Grade Limit	Breakpoint
Moisture		As specified by contract or load order	0.3
Garlicky		More than 2 per 1,000 grams	1.33
Light Smutty		More than 5 smut balls per 250 grams	3
Smutty		More than 30 smut balls per 250 grams	10
Infested		Same as standards	0
Ergoty		More than 0.05%	0.03
Treated		Same as standards	0
Dockage		As specified by contract or load order	0.2
Protein		As specified by contract or load order	0.5
Class	Subclass		
Hard Red Spring	DNS	75% or more DHV 1/	-5.0
	NS	25% or more DHV but less than 75% of DHV 2/	-5.0
Durum	HADU	75% or more HVAC 1/	-5.0
	ADU	60% or more HVAC but less than 75% of HVAC 3/	-5.0
Soft White	WH	Not more than 10% White Club wheat 4/	2.0
	WHCB	Not more than 10% of other Soft White wheat 4/	2.0
	WWH	More than 10% WHCB and more than10% of other Soft White wheat 5/	-3.0

1/ Use 74.5 as the grade limit due to reporting requirements.
2/ Use 24.5 and 74.4 as the grade limits due to reporting requirements.
3/ Use 59.5 and 74.4 as the grade limits due to reporting requirements.
4/ Use 10.4 as the grade limit due to reporting requirements.
5/ Use 10.5 as the grade limit due to reporting requirements.

TABLE 25 - BREAKPOINTS FOR DOUBLE PORTION SIZES AND COMPONENT SAMPLE INSPECTIONS FOR FACTORS EXPRESSED IN TENTHS 1/

Normal Breakpoint	Double Portion or 2 components	Double Portion and/or Number of Components per Sublot													
		3	4	5	6	7	8	9	10	11	12	13	14	15	16
0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
0.4	0.3	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1
0.6	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
0.7	0.5	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
0.8	0.6	0.5	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2
0.9	0.6	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2
1.0	0.7	0.6	0.5	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
1.1	0.8	0.6	0.6	0.5	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3
1.2	0.8	0.7	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3
1.3	0.9	0.8	0.7	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3
1.4	1.0	0.8	0.7	0.6	0.6	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4
1.5	1.1	0.9	0.8	0.7	0.6	0.6	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4
1.6	1.1	0.9	0.8	0.7	0.7	0.6	0.6	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4
1.7	1.2	1.0	0.9	0.8	0.7	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.4	0.4
1.8	1.3	1.0	0.9	0.8	0.7	0.7	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5

1.9	1.3	1.1	1.0	0.8	0.8	0.7	0.7	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5
2.0	1.4	1.2	1.0	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.6	0.6	0.5	0.5	0.5
2.1	1.5	1.2	1.1	0.9	0.9	0.8	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.5	0.5
2.2	1.6	1.3	1.1	1.0	0.9	0.8	0.8	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6
2.3	1.6	1.3	1.2	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.7	0.6	0.6	0.6	0.6
2.4	1.7	1.4	1.2	1.1	1.0	0.9	0.8	0.8	0.8	0.7	0.7	0.7	0.6	0.6	0.6
2.5	1.8	1.4	1.3	1.1	1.0	0.9	0.9	0.8	0.8	0.8	0.7	0.7	0.7	0.6	0.6
2.6	1.8	1.5	1.3	1.2	1.1	1.0	0.9	0.9	0.8	0.8	0.8	0.7	0.7	0.7	0.7
2.7	1.9	1.6	1.4	1.2	1.1	1.0	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.7	0.7
2.8	2.0	1.6	1.4	1.3	1.1	1.1	1.0	0.9	0.9	0.8	0.8	0.8	0.7	0.7	0.7
2.9	2.1	1.7	1.5	1.3	1.2	1.1	1.0	1.0	0.9	0.9	0.8	0.8	0.8	0.7	0.7
3.0	2.1	1.7	1.5	1.3	1.2	1.1	1.1	1.0	0.9	0.9	0.9	0.8	0.8	0.8	0.8
5.0	3.5	2.9	2.5	2.2	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.4	1.3	1.3	1.3

1/ Using Tables 1 – 24, find the normal breakpoint value for the factor which is determined on a larger portion size or on a component sample basis. Find the adjusted (reduced) breakpoint value based on the normal breakpoint value.

TABLE 26 - BREAKPOINTS FOR DOUBLE PORTION SIZES AND COMPONENT SAMPLE INSPECTIONS FOR FACTORS EXPRESSED IN HUNDREDTHS 1/

Normal Breakpoint	Double Portion or 2 Components	Double Portion and/or Number of Components per Sublot													
		3	4	5	6	7	8	9	10	11	12	13	14	15	16
0.03	0.02	.02	.02	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
0.04	0.03	.02	.02	.02	.02	.02	.01	.01	.01	.01	.01	.01	.01	.01	.01
0.05	0.04	.03	.03	.02	.02	.02	.02	.02	.02	.02	.01	.01	.01	.01	.01
0.06	0.04	.03	.03	.03	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
0.10	0.07	.06	.05	.04	.04	.04	.04	.03	.03	.03	.03	.03	.03	.03	.03
0.13	0.09	.08	.07	.06	.05	.05	.05	.04	.04	.04	.04	.04	.03	.03	.03
0.19	0.13	.11	.10	.08	.08	.07	.07	.06	.06	.06	.05	.05	.05	.05	.05
0.20	0.14	.12	.10	.09	.08	.08	.07	.07	.06	.06	.06	.06	.05	.05	.05
0.23	0.16	.13	.12	.10	.09	.09	.08	.08	.07	.07	.07	.06	.06	.06	.06
0.27	0.19	.16	.14	.12	.11	.10	.10	.09	.09	.08	.08	.07	.07	.07	.07
0.32	0.23	.18	.16	.14	.13	.12	.11	.11	.10	.10	.09	.09	.09	.08	.08
0.39	0.28	.23	.20	.17	.16	.15	.14	.13	.12	.12	.11	.11	.10	.10	.10
0.47	0.33	.27	.24	.21	.19	.18	.17	.16	.15	.14	.14	.13	.13	.12	.12

1/ Using Tables 1 – 24, find the normal breakpoint value for the factor which is determined on a larger portion size or on a component sample basis. Find the adjusted (reduced) breakpoint value based on the normal breakpoint value.

TABLE 27 - BREAKPOINTS FOR DOUBLE PORTION SIZES AND COMPONENT SAMPLE INSPECTIONS 2 TO 8 FOR FACTORS EXPRESSED AS COUNTS 1/

Normal Breakpoint	Double Portion or 2 Components	Double Portion and/or Number of Components per Sublot					
		3	4	5	6	7	8
1.33	1	1	1	.67	.67	.67	.67
2	1	1	1	1	1	1	1
2.33	1.67	1.33	1.33	1	1	1	1
3	2	1.67	1.67	1.33	1.33	1	1
6	4	4	3	3	2	2	2
7.33	5.33	4.33	3.67	3.33	3	2.67	2.67
8	6	5	4	4	3	3	3
10	7	6	5	5	4	4	3.67

TABLE 27 - BREAKPOINTS FOR DOUBLE PORTION SIZES AND COMPONENT SAMPLE INSPECTIONS 9 TO 16 FOR FACTORS EXPRESSED AS COUNTS 1/

Normal Breakpoint	Double Portion and/or Number of Components per Sublot							
	9	10	11	12	13	14	15	16
1.33	.67	.67	.67	.67	.67	.67	.67	.33
2	1	.67	.67	.67	.67	.67	.67	.67
2.33	1	1	1	1	.67	.67	.67	.67
3	1	1	1	1	1	1	1	1
6	2	2	2	2	1.67	1.67	1.67	1.67
7.33	2.67	2.33	2.33	2.33	2.33	2	2	2
8	3	2.67	2.67	2.33	2.33	2.33	2.33	2
10	3.33	3.33	3.33	3	3	3	2.67	2.67

1/ Using Tables 1 – 24, find the normal breakpoint value for the factor which is determined on a larger portion size or on a component sample basis. Find the adjusted (reduced) breakpoint value based on the normal breakpoint value.

TABLE 28 – STARTING VALUES (SV) 1/

Expressed in Hundredths		Expressed in Tenths		Expressed as Counts	
Breakpoint	SV	Breakpoint	SV	Breakpoint	SV
0.01	0	0.1	0	1 – 1 1/3	0
.02 - .04	.01	0.2 – 0.4	0.1	1 2/3 - 4	1
.05 - .07	.02	0.5 – 0.7	0.2	5 - 7	2
.08 - .10	.03	0.8 – 1.0	0.3	8 - 10	3
.11 - .13	.04	1.1 – 1.3	0.4		
.14 - .16	.05	1.4 – 1.6	0.5		
.17 - .19	.06	1.7 – 1.9	0.6		
.20 - .22	.07	2.0 – 2.2	0.7		
.23 - .25	.08	2.3 – 2.5	0.8		
.26 - .28	.09	2.6 – 2.8	0.9		
.29 - .31	.10	2.9 – 3.1	1.0		
.32 - .34	.11	3.2 – 3.4	1.1		
.35 - .37	.12	3.5 – 3.7	1.2		
.38 - .40	.13	3.8 – 4.0	1.3		
.41 - .43	.14	4.1 – 4.3	1.4		
.44 - .46	.15	4.4 – 4.6	1.5		
.47 - .49	.16	4.7 – 4.9	1.6		
		5.0 – 5.2	1.7		

1/ A starting value is needed for each grading factor examined during loading. Starting values are based on the breakpoint value. To find the starting value for a given factor, first determine the breakpoint value for that factor in Tables 1-27. Then find its corresponding starting value in the table below. If the breakpoint value is negative, the starting value is also negative. There is no starting value when the breakpoint value is "0" or when the factor does not have a breakpoint value.

TABLE 29 – MATERIAL ERROR TABLE FOR FACTORS WITH BREAKPOINTS 1/

Expressed in Hundredths		Expressed in Tenths		Expressed as Counts	
Breakpoint	Acceptable Average Range	Breakpoint	Acceptable Average	Breakpoint	Acceptable Average
.00	+/- 0.00	0.0	+/- 0.0	0.00	0.00
.01	+/- 0.01	0.1	+/- 0.1	0.33	0.67
.02	+/- 0.02	0.2	+/- 0.2	0.67	1
.03	+/- 0.04	0.3	+/- 0.4	1	1.33
.04	+/- 0.05	0.4	+/- 0.5	1.33	2
.05	+/- 0.07	0.5	+/- 0.7	1.67	2.33
.06	+/- 0.08	0.6	+/- 0.8	2	3
.07	+/- 0.09	0.7	+/- 0.9	2.33	3.33
.08	+/- 0.11	0.8	+/- 1.1	2 .67	3.67
.09	+/- 0.12	0.9	+/- 1.2	3	4.33
.10	+/- 0.14	1.0	+/- 1.4	3.33	4 .67
.11	+/- 0.15	1.1	+/- 1.5	3.67	5
.12	+/- 0.16	1.2	+/- 1.6	4	5.67
.13	+/- 0.18	1.3	+/- 1.8	4.33	6
.14	+/- 0.19	1.4	+/- 1.9	4.67	6.67
.15	+/- 0.21	1.5	+/- 2.1	5	7
.16	+/- 0.22	1.6	+/- 2.2	5.33	7.67
.17	+/- 0.24	1.7	+/- 2.4	5.67	8
.18	+/- 0.25	1.8	+/- 2.5	6	8.67
.19	+/- 0.26	1.9	+/- 2.6	6 .33	9
.20	+/- 0.28	2.0	+/- 2.8	6.67	9.33
.21	+/- 0.29	2.1	+/- 2.9	7	10
.22	+/- 0.31	2.2	+/- 3.1	7.33	10.33
.23	+/- 0.32	2.3	+/- 3.2	7.67	11
.24	+/- 0.33	2.4	+/- 3.3	8	11.33
.25	+/- 0.35	2.5	+/- 3.5	9	12.67
.26	+/- 0.36	2.6	+/- 3.6	10	14
.27	+/- 0.38	2.7	+/- 3.8		
.28	+/- 0.39	2.8	+/- 3.9		
.29	+/- 0.41	2.9	+/- 4.1		
.32	+/- 0.45	3.0	+/- 4.2		
.33	+/- 0.47	3.5	+/- 4.9		
.39	+/- 0.55	5.0	+/- 7.1		
.47	+/- 0.66				

1/ Using the factor breakpoint value, find the acceptable deviation range for averaging. If the difference between inspection results is within the acceptable range limit, the review inspection result is averaged with the preceding result. If the difference between inspection results is larger than the acceptable range limit, the review inspection result replaces the previous result.

TABLE 30 – MATERIAL ERROR TABLE FOR FACTORS WITHOUT BREAKPOINTS

DAMAGED KERNELS 1/					
Contract Limit (%)	Wheat Sorghum Triticale	Corn Barley	Soybeans Oats Flaxseed	Sunflower Rye	SAMPLE GRADE FACTORS 2/
(Acceptable Average Range)					
0.0	+/- 0.3	+/- 0.2	+/- 0.2	+/- 0.3	Sample Grade factors (i.e., FSUB, stones, etc.) are always averaged
0.1	+/- 0.4	+/- 0.2	+/- 0.2	+/- 0.3	
0.2	+/- 0.4	+/- 0.3	+/- 0.3	+/- 0.5	
0.3	+/- 0.6	+/- 0.5	+/- 0.4	+/- 0.5	
0.4	+/- 0.6	+/- 0.5	+/- 0.4	+/- 0.7	
0.5	+/- 0.8	+/- 0.6	+/- 0.5	+/- 0.7	
0.6	+/- 0.8	+/- 0.6	+/- 0.5	+/- 0.7	
0.7	+/- 0.8	+/- 0.7	+/- 0.6	+/- 0.8	
0.8	+/- 1.0	+/- 0.7	+/- 0.6	+/- 0.8	
0.9	+/- 1.0	+/- 0.7	+/- 0.7	+/- 0.8	
1.0	+/- 1.0	+/- 0.8	+/- 0.7	+/- 1.0	

1/ Using the contracted limit for special damage factors that do not have breakpoints (i.e., scab damage, mold damage, sprout damage, etc.), find the acceptable deviation range for averaging. If the difference between in inspection results is within the acceptable range limit, the review inspection result is averaged with the preceding result. If the difference between inspection results is larger than the acceptable range limit, the review inspection result replaces the previous result.

2/ Sample grade factors do not have breakpoints and are always averaged with the preceding result.

TABLE 31 – MATERIAL ERROR TABLE FOR FACTORS WITHOUT BREAKPOINTS DOUBLE PORTION ANALYSIS

DAMAGED KERNELS 1/					
Contract Limit (%)	Wheat Sorghum Triticale	Corn Barley	Soybeans Oats Flaxseed	Sunflower Rye	SAMPLE GRADE FACTORS 2/
(Acceptable Average Range)					
0.0	+/- 0.1	+/- 0.1	+/- 0.1	+/- 0.2	Sample Grade
0.1	+/- 0.2	+/- 0.2	+/- 0.2	+/- 0.2	factors
0.2	+/- 0.3	+/- 0.2	+/- 0.2	+/- 0.3	(i.e., FSUB, stones, etc.)
0.3	+/- 0.4	+/- 0.3	+/- 0.3	+/- 0.3	are always averaged
0.4	+/- 0.4	+/- 0.3	+/- 0.3	+/- 0.4	
0.5	+/- 0.5	+/- 0.4	+/- 0.3	+/- 0.4	
0.6	+/- 0.5	+/- 0.4	+/- 0.4	+/- 0.5	
0.7	+/- 0.6	+/- 0.4	+/- 0.4	+/- 0.5	
0.8	+/- 0.6	+/- 0.5	+/- 0.4	+/- 0.5	
0.9	+/- 0.6	+/- 0.5	+/- 0.5	+/- 0.6	
1.0	+/- 0.7	+/- 0.5	+/- 0.5	+/- 0.6	

1/ Using the contracted limit for special damage factors that do not have breakpoints (i.e., scab damage, mold damage, sprout damage, etc.), find the acceptable deviation range for averaging. If the difference between in inspection results is within the acceptable range limit, the review inspection result is averaged with the preceding result. If the difference between inspection results is larger than the acceptable range limit, the review inspection result replaces the previous result.

2/ Sample grade factors do not have breakpoints and are always averaged with the preceding result.

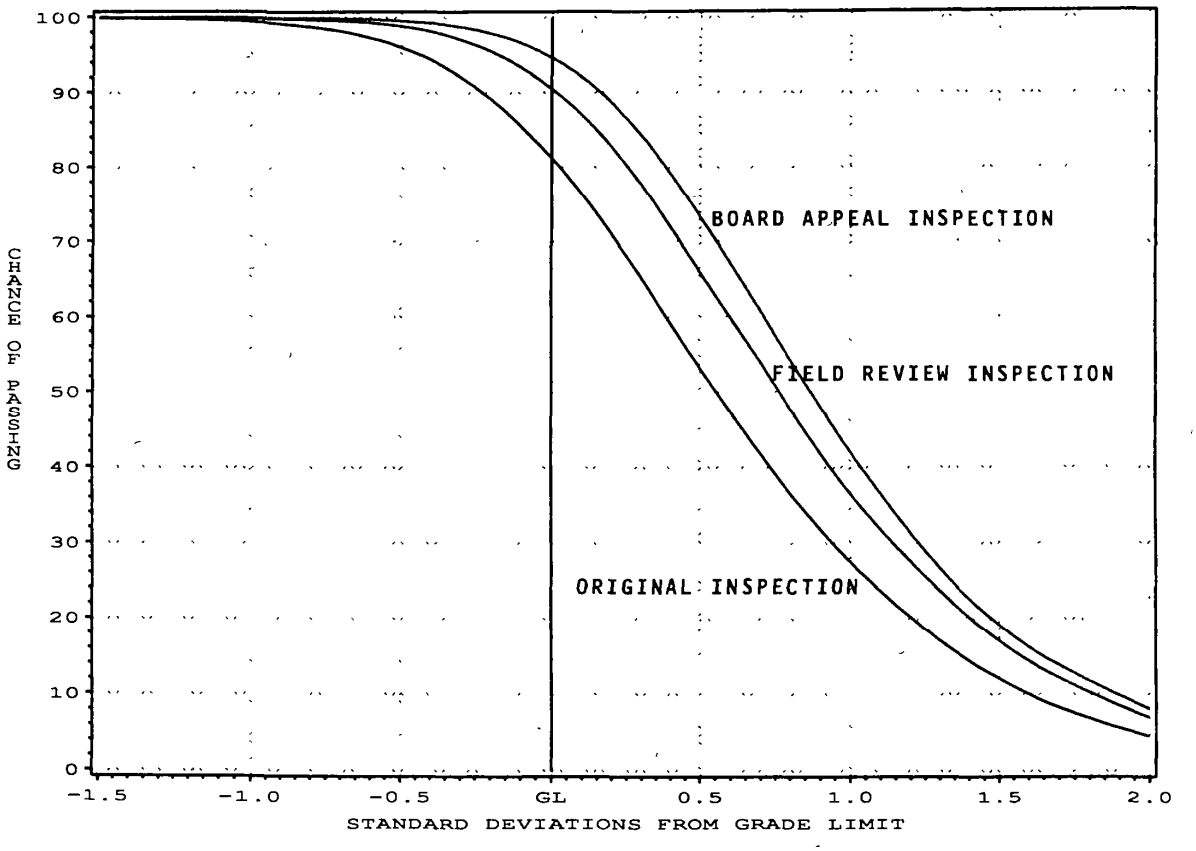
EXAMPLE – INSPECTION LOG (MANUAL/HANDWRITTEN)

SUBLOT NUMBER	TW		DKT		FM		Remarks
	54.0	AVG QUAL	3.0	0.9 / .3	2.0	0.3 / .1	
1	55.1		2.9	.2	2.0	.1	
2	53.8		2.7	0	2.2	.3	
~~3 MP-1~~	~~54.7~~		~~3.7~~	~~.7~~	~~2.2~~	~~.5 / .3~~	Applicant requests Field Review (REX) of MP – 1.
~~Field Review MP - 1~~					~~2.0~~		
~~Rex MP - 1~~	~~54.7~~		~~3.7~~	~~.7~~	~~2.1~~	~~.4 / .3~~	Field Review does not eliminate MP. Applicant elects to discharge MP – 1.
3	53.9		2.2	0	1.8	.1	
~~4 MP – 2~~	~~53.8~~		~~3.2~~	~~.2~~	~~2.4~~	~~.5 / .3~~	Applicant requests Field Review (REX) of MP – 2.
~~Field Review MP - 2~~					~~2.3~~		
~~Rex MP - 2~~	~~53.8~~		~~3.2~~	~~.2~~	~~2.4~~	~~.5 / .3~~	Field Review does not Eliminate MP. Applicant Requests Board Appeal.
~~BAR Review MP - 2~~					~~2.0~~		
~~MP – 2~~ BAR 4	53.8		3.2	.2	2.2	.3	BAR Review eliminates MP.

EXAMPLE – INSPECTION LOG (ITW CUSUM APPLICATION)

Sublot Number	TW	AVG QUAL	DKT 3.00	0.90 0.30	FM 2.00	0.30 0.10
1	55.1	55.10	2.9	0.20	2.0	0.10
2	53.8	54.42	2.7	0.00	2.2	0.30
MP-1	54.7	54.51	3.7	0.70	2.2	0.50
FR MP-1					2.0	
REX MP-1	54.7	54.51	3.7	0.70	2.1	0.40
3	53.9	54.36	2.2	0.00	1.8	0.10
4	53.8	54.24	3.2	0.20	2.4	0.50
FR 4					2.3	
REX 4	53.8	54.24	3.2	0.20	2.4	0.50
BR 4					2.0	
BAR 4	53.8	54.24	3.2	0.20	2.2	0.30

GENERAL OPERATING CHARACTERISTIC CURVE
FOR THE SHIPLOT INSPECTION PLAN



The general operating characteristic (OC) curve describes what the inspection plan will do for a given target at which an elevator operates. The use of standard deviation values on the horizontal axis makes the curve applicable to all grains, factors, and grades.

To read the OC curve, determine the "proper" standard deviation and read the process target value on the horizontal scale. Go up to the curve and then over to the vertical axis. The numbers on the vertical axis give the chance of a sublot being accepted for the target value and factor under consideration. Alternately, the numbers of the vertical axis can be interpreted as the percentage of sublots that would be accepted as meeting the grade for the specific factor and process target value.

As an example, an elevator is loading U.S. No. 2 soybeans and is targeting foreign material around 1.9 percent. What percent of sublots loaded will be accepted as U.S. No. 2 soybeans? (Assume the proper standard deviation for foreign material is 0.2 percent for U.S. No. 2 soybeans.)

a. Determine how many standard deviations 1.9 percent is from the grade limit (2.0 percent).

(1) 1.9 percent- 2.0 percent = 0.1 percent difference from grade limit

(2) $\frac{\text{-0.1 percent difference}}{\text{0.2 percent standard deviation}}$ = -0.5 standard deviations

(3) Therefore, 1.9 percent is -0.5 standard deviation from the 2.0 percent grade limit.

b. Find where the OC curve crosses -0.5 standard deviations.

c. From this point, read across to the vertical axis to determine the chance of passing.

If a shipper is targeting at 1.9 percent foreign material, approximately 96 percent of the sublots offered for inspection will be accepted on the original inspection. Approximately 99 percent will be accepted on the field review if a material portion occurs.

Regardless of grain, factor, or grade, if a shipper targets at the grade limit, approximately 81 percent of the sublots offered for inspection will be accepted for that factor on the original inspection. Approximately 90 percent are accepted after the field review of a material portion.