

CHAPTER 5

TESTS

5.1 DIVERTER-TYPE SAMPLER TESTS

- a. General. Examine<sup>4</sup> and test<sup>5</sup> a new diverter-type sampling system before issuing an authorization for official use. Thereafter, test all systems after any major repairs and alterations, and before an authorization suspended more than 6 months for non-use is reinstated. Perform all tests and examinations according to the procedures established herein.
- b. Test Theory. We assume a mechanical sampler examined visually and functioning properly will obtain a representative sample. Therefore, the test is not really an accuracy test for the sampler, but a performance test of the entire mechanical sampling system together with the material handling system. The test shows:
  - (1) Is there grain breakage after the sampler location, as it passes through scales, garners, or bins?
  - (2) What is the quantity of sample obtained?
  - (3) Does the sampler cut the entire grain stream?
  - (4) Is the grain flow past the sampler smooth?
  - (5) Does the secondary back up at the required timer setting?
  - (6) Is pressure venting adequate for spouting?

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<sup>4</sup> By visually checking the condition of various aspects of the system.

<sup>5</sup> By comparing samples drawn by the mechanical sampling system to samples drawn from the same lot(s) by a “standard” system.

- (7) Is dust collection needed, and is air flow properly balanced?
- c. Initial Test. Examine and test sampling systems before issuing a Form FGIS-980, "Authorization to Use Mechanical Sampler for Sampling." Sample five test lots of the commodity(ies) using the sampling system and using the standard sampling method. When possible, test systems as used. Evaluate the different flow rates, belt angles, belt speeds, bins, and other variable features of the grain handling system and, if necessary, do grain comparison tests to ensure that the system is accurate when various features are used.
- (1) Group 1 and 2 Approval.
- (a) Unlimited Approval. The sampling system may be authorized for all commodities in groups 1 and 2 (See Table III.) without further testing, if satisfactory results are obtained by testing the system with corn. Use corn containing a maximum 15.5 percent moisture and from 2.0 to 5.0 percent broken corn and foreign material (BCFM) for testing purposes. FGIS field office managers have the authority to allow more or less BCFM in the test lots, for good reason only, documented on the test form.
- (b) Limited Approval. If unlimited approval is not needed, the system may be authorized for either group 1 and/or group 2 commodities, except corn, by obtaining satisfactory results with one grain in each group:
- 1 Use a commodity containing a machine-separable factor such as, thin kernels, shrunken and broken kernels, broken kernels (milled rice or brown rice for processing), foreign material, or dockage in quantities more than 0.5 percent for testing the system, and
  - 2 If, at a later date, corn becomes available and will be offered for inspection, test the sampling system using corn before it is authorized to sample corn.
  - 3 If you need to sample corn for a determination of StarLink only, it is acceptable to use a sampler that has been approved for small grains or a grain other than corn. This should be noted on the sampler documentation.
- (2) Group 3 approval is handled on a case-by-case basis, but normally does not require testing, only an examination.

Table III, Commodity Groups

<b>Group 1 Small Commodities</b>		<b>Group 2 Coarse Commodities</b>	<b>Group 3 Powders</b>
Barley	Wheat	Soybeans	Flour
Flaxseed	Rice	Corn	Corn Meal
Rye	Lentils	Peas	Soybean Meal
Sorghum	Bulgur	Edible Beans	Other Meals
Oats	Rolled Oats	Sunflower Seed	Powdered Milk
Canola	Minor Oilseeds		Corn Soy Blend

- d. Periodic Tests. There is no requirement to test samplers with grain on a periodic basis.
- e. Supplemental Tests. Supplemental tests are required based on the same criteria for questioning system accuracy as in Chapter 4 instructions covering supplemental examinations, Page 4-3.
- f. Test Procedures-Diverter-Type Samplers.
  - (1) Outbound Movement Systems
    - (a) All Facilities. Test sampling systems used for securing official samples of outbound commodities with a pelican sampler at the end of the loading spout. At the discretion of the testing office, use a loading spout other than the normal spout if the additional routing does not increase or decrease breakage and is more feasible. The testing office may also consider using a sampling method other than the pelican at the end of the loading spout if they decide that a representative sample cannot be obtained with the pelican or using the pelican causes a safety problem. Consider the alternatives in this order:

- 1 Use of a "standard" diverter-type (primary) sampler. Except as noted on the authorization, use this standard only to test other diverter-type systems.
  - 2 Ellis cup sampling as close as possible to the end of the system (carrier).
  - 3 Comparison of the system in question with an authorized (tested) diverter-type sampling system at either origin or destination.
- (b) Shipping Bin Houses. Physically verify the shipping bins are clean before and after testing. Run the test lot(s) into a closed shipping bin(s) at the facility's normal loading rate. When the entire test lot is in the shipping bin, open the bin slide to provide a maximum flow of 15,000 bushels per hour. Take the standard sample after the grain has left the bin. A test lot should consist of a complete bin. At the discretion of the testing office, a test lot may be composed of a part bin of one normal component sample; however, the reasons for the variance shall be substantial and must be documented on the test form.
- (c) Direct Load Houses.
- 1 Facilities not using shipping bins must discharge the test lots at a maximum flow rate of 15,000 bushels per hour so the sample may be obtained at the end of the loading spout with the pelican sampler. When reduced flow rates are required to accomplish the testing, observe the system during operation at the facility's normal flow rate to see if it is accepting all the commodity.
  - 2 A test lot should be at least equal to one subplot, but may, at the discretion of the testing office, be equal to one component sample; however, the reasons for the variance shall be substantial and must be documented on the test form.
  - 3 At facilities where the commodity is loaded directly through bins without holding for grading, the commodity sometimes breaks up, causing the mechanical sampling system results to disagree with the standard results. If this occurs, a cushion of sufficient depth shall be maintained whenever the system is tested or being used. (Note this fact on the Form FGIS-980 and the sample collection

container.) In order for official inspection personnel to ensure that the cushion is present during loading, facilities shall install a continuous bin depth indicator system where inspection personnel are located.

- (2) Inbound Movement Systems.
  - (a) Test sampling systems installed to secure official samples of inbound commodities using the pelican or Ellis cup samplers. Obtain test samples before the initial elevation or immediately afterward, if necessary.
  - (b) Facility management must control the flow rate of the test lots to ease pelican or Ellis cup sampling. Where reduced flow rates are required to accomplish the testing, observe the sampler at the facility's normal flow rate to see if the sampler is accepting all the commodity.
- g. Analyzing Test Results and Completing the Test Form for Diverter-Type Samplers.
  - (1) Determination of Factor Results.
    - (a) Analyze the samples drawn from the test lots for the appropriate machine-separable factor but do not hand adjust for cobs, for pieces of foreign material, etc. Record the factor results on the reverse of Form FGIS-936, "Sampler Condition Report" (Figure 9) and compare the factor results or averages. Percentages should be rounded to 2 decimal places.
    - (b) When evaluating a sampler based on broken kernels in rice, offices may eliminate hand adjusting. This can save a considerable amount of time, and may improve consistency of results. However, this procedure is acceptable only if all samples are being run at the same office, on the same shaker, the same plate, and the same sieve. This "side-by-side" test is required because not all of the rice sizers, plates and sieves have been comparison tested.
  - (2) Determine whether the system is within the allowable tolerance of  $\pm 10$  percent of the standard result mean and notify the facility management of the test results. Do not issue a certificate.

- (3) For out-of-tolerance equipment, document all pertinent facts and action taken on the Form FGIS-936. This includes adjustments, retests, and follow-up action.
- (4) File the original Form FGIS-936 after all tests are completed and the results recorded. Do not send copies of the form to FGIS Headquarters.
- (5) If the tests are done by an official agency for initial authorization of the system, send the Form FGIS-936 to the FGIS field office for review. The FGIS field office must review the results and, if they are within acceptable limits, authorize the sampling system for use in obtaining samples of commodities for official inspection purposes.

MECHANICAL SAMPLING SYSTEMS HANDBOOK  
 CHAPTER 5  
 11-07-03

According to the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0580-0010. The time required to complete this information collection is estimated to average 45 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

GRAIN TEST DATA <span style="float: right;">10</span>					
SAMPLING METHOD USED FOR STANDARD: <input type="checkbox"/> PELICAN <span style="margin-left: 20px;">1</span> <input type="checkbox"/> CUP <input type="checkbox"/> OTHER _____			<i>for Mechanical Truck Probes only</i>		
COMMODITY: <input type="checkbox"/> SMALL GRAIN <span style="margin-left: 20px;">2</span> <input type="checkbox"/> COARSE GRAIN <input type="checkbox"/> OTHER _____			Date	Sample No.	Type
REMARKS:  <span style="font-size: 2em; color: blue;">3</span>				6	Test Unit Standard HP
				7	Test Unit Standard HP
				8	Test Unit Standard HP
				9	Test Unit Standard HP
				10	Test Unit Standard HP
				11	Test Unit Standard HP
				12	Test Unit Standard HP
				13	Test Unit Standard HP
				14	Test Unit Standard HP
				15	Test Unit Standard HP
	16	Test Unit Standard HP			
	17	Test Unit Standard HP			
	18	Test Unit Standard HP			
	19	Test Unit Standard HP			
	20	Test Unit Standard HP			
Date	Sample No.	Type	DKG	BCFM	
4	1	Test Unit Standard		5	
Difference <span style="margin-left: 20px;">6</span>					
Tolerance <span style="margin-left: 20px;">7</span>					
Result - One test lot <span style="margin-left: 20px;">8</span>			<input type="checkbox"/> IN <input type="checkbox"/> OUT	<input type="checkbox"/> IN <input type="checkbox"/> OUT	<input type="checkbox"/> IN <input type="checkbox"/> OUT
<span style="font-size: 2em; color: blue;">9</span>					
Date	Sample No.	Type	DKG	BCFM	
	2	Test Unit Standard			
	3	Test Unit Standard			
	4	Test Unit Standard			
	5	Test Unit Standard			
Test Unit MDS*					
Tolerance					
Result - Five test lots			<input type="checkbox"/> IN <input type="checkbox"/> OUT	<input type="checkbox"/> IN <input type="checkbox"/> OUT	<input type="checkbox"/> IN <input type="checkbox"/> OUT
*Mean Deviation from Standard			Test Unit MDS* Hand Probe MDS* Regression or T-test <span style="float: right;">11</span>		
			<input type="checkbox"/> IN <input type="checkbox"/> OUT	<input type="checkbox"/> IN <input type="checkbox"/> OUT	<input type="checkbox"/> IN <input type="checkbox"/> OUT

Form FGIS-936 (5-03) Previous editions are obsolete.

Figure 9. Form FGIS-936, "Sampler Condition Report," (Reverse)

INSTRUCTIONS FOR COMPLETING  
FORM FGIS-936, "SAMPLER CONDITION REPORT,"  
(REVERSE)

Use the reverse of Form FGIS-936 for testing (grain test). Always precede a test with an examination, documented on the front of the form. If the examination and the test are not recorded on the same sheet, properly identify the test by filling in the Name of Elevator, etc., Items 1 through 11, 41 and 42 on the front as described in Chapter 4, Examinations.

1. Method of sampling-What was the standard? If a special location or procedure was used, explain in remarks.
2. Specify grain.
3. Remarks-Summary of important observations on the sampling system and testing information. Was the test run at normal load-out speed, air pressure, belt depth, etc.? Was dust collection turned on? Shipping bins checked?
4. Enter date sampled.
5. One factor is required, but additional factors may be tested. If necessary, the field office manager shall decide the appropriate factors. Test weight is not to be used as the only factor. Report percentages to 2 decimal places.
6. Mathematical average of the mechanical sampler results, average of the standard results, average of other results. Round percentages to 2 places.
7. Tolerance or allowable deviation =  $0.10 \times$  (standard average).
8. Mark the appropriate box for each factor tested. If more than one factor was tested, each of them must be within tolerance for a pass. A factor is considered within tolerance when the mean deviation from the standard is less than or equal to the allowable deviation for the applicable factor(s).
9. If 5 test lots are to be evaluated, continue entering sample data.
10. If testing a mechanical truck probe, continue entering sample data for 20 test lots.
11. Truck probe performance is evaluated against a standard and a hand probe, using either a regression or a T-test. Technical Service Division provides support for the analysis.

5.2 PROBE-TYPE SAMPLER TESTS

- a. A probe-type sampling system (mechanical truck probe) test requires the sampling of 20 bobtail (farm) or other trucks by:
  - (1) Hand probe (trier).
  - (2) Mechanical truck probe.
  - (3) Pelican sampler.
- b. Examine a mechanical truck probe at least each 6 months (visual). Calculate the period starting from the first day of the next calendar month after the examination or test.
- c. The pelican sampler results serve as the standard results for the approval. In the event that a representative pelican sample cannot be obtained, the testing office may use an Ellis cup or a diverter-type sampler. The basis for the decision should be documented on the Form FGIS-936.
- d. The probe may be authorized for all commodities in groups 1 and 2 without further testing, if satisfactory results are obtained by testing the probe with corn. If unlimited approval is not needed, the probe may be authorized for either group 1 and/or group 2 commodities, except corn, by obtaining satisfactory results with one grain in each group. Make every effort to select test lots of corn with a wide range of test weight per bushel (TW) and broken corn and foreign material (BCFM) from the truck lots available at the testing site. For other grains, use TW and a machine-separable factor such as:
  - (1) Flaxseed -Dockage.
  - (2) Sorghum -Broken kernels and foreign material.
  - (3) Soybeans -Foreign material.
  - (4) Sunflower seed -Machine separated FM.
  - (5) Rough rice -Total rice or whole kernels or dockage, no TW.
- e. For either outbound or inbound trucklots, use a hand trier of approximately the same length as the mechanical probe and in the same sampling pattern normally

used for official sampling to draw the trier sample. Usually this will be the 7-probe truck pattern.

- f. Pelican sampling will employ tailgate sampling of the grain while the grain is being discharged into the truck pit. Any type of truck is acceptable, as long as the flow of grain can be controlled so a representative cut can be taken with the pelican. Exercise care in pelican sampling to ensure that the pelican does not fill and overflow before the grain stream is traversed. This can best be accomplished by restricting the flow of the grain from each truck. Restrict grain flow so a minimum of 10 pelican samples can be drawn, at regular intervals, from each load before the truck empties.
- g. Officially inspect all samples for the necessary factors, retaining file samples until the approval process is completed. For corn BCFM, combine machine and handpicked portions.
- h. Analyzing Test Results and Completing the Test Form for Probe Systems.
  - (1) Factor Results. Record the factor results on the reverse of Form FGIS-936, "Sampler Condition Report," but do not compare the factor averages directly. Instead, we test to see that the mechanical probe does not deviate from the pelican to a greater extent (absolute value) than the hand trier deviates from the pelican. To accomplish this, TSD analyzes the data using a T-test or regression analysis.
  - (2) Out-of-Tolerance Equipment. For out-of-tolerance equipment, document all pertinent facts and action taken on the Form FGIS-936. This includes adjustments, retests, and follow-up action.

### 5.3 TEST OR EXAMINATION FAILURE

- a. General. The best time to test a sampler is as used during normal loading or unloading operations. To encourage as used testing at export locations, the following procedures assure facilities that there will be no unwarranted qualifying statements on the official certificate.
- b. Export Grain Loading Situation. If a mechanical sampling system fails a test and/or examination during the sampling of an export cargo grain shipment and there is no alternate diverter-type sampling system available, sample the remainder of the shipment using either a pelican or Ellis cup sampler. Use the sample obtained by the alternate method for official purposes, not the sample obtained by the failed system.
  - (1) The FGIS field office will suspend authorization of the sampler, in writing, if the problem will not be corrected immediately.

- (2) Whatever the amount of grain to be loaded or the time it takes to complete loading, do not show a special statement on the inspection certificate of the shipment being loaded at the time of the failure.
- c. On all future shipments, until the diverter-type mechanical sampler passes a test, the show the type of sampling method actually used.
- d. Domestic Grain Loading Situation. If a diverter-type mechanical sampling system fails a test or examination during the sampling of a domestic lot of grain, stop using the sampler and implement an alternate sampling method. Show the actual sampling method(s) used on the inspection certificate regardless of the amount of time or volume of grain loaded using the alternate method. No special statement is required.

#### 5.4 REINSTATEMENT

To reinstate the authorization of a sampling system that fails an examination or test, the applicant must furnish data or make adjustments that suggest the system(s) will pass a succeeding examination and test. If the system fails a test, the succeeding test(s) must consist of five test lots preceded by a complete examination, the same as required for an initial authorization. If the system fails an examination, the system must be completely reexamined and, at the discretion of the testing office, the system may be retested with either one or five test lots.

Reserved