CHAPTER 3

SAMPLING WITH A DIVERTER-TYPE MECHANICAL SAMPLER

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Attachment 1, "Trouble Shooting Guide for Samplers"

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3.1 GENERAL INFORMATION

a. Diverter-type (D/T) mechanical samplers may be mounted in grain spouts, at the end of belts, or at the head of elevator legs. Regardless of their location, all D/T's draw a sample in the same way--by periodically moving a diverter (often called the "pelican") completely across a stream of grain.

(1) The frequency that the pelican moves through the grain, or takes a "cut," is controlled by a timing device. Grain collected by each "cut" of the pelican flows to a secondary sampler (SM) which reduces the sample size. From the SM, the sample flows to a collection box.

(2) For further information about D/T samplers, refer to the FGIS Mechanical Sampling Systems Handbook (MSSH).

b. D/T sampler attendants are responsible for:

(1) Ensuring that the D/T sampler and sampling system are functioning properly. (See section 3.2, "D/T Checks.")

(2) Securing D/T sampling system access points and grain flow diversion points. (See section 3.3, "Security.")

(3) Checking the grain during loading/unloading for infestation, condition, and uniformity. (See section 3.4, "Grain Quality Checks.")

(4) When sampling outbound grain, performing a prior-to-loading stowage examination of the carrier or container. (See FGIS Program Directive 918.48, "Stowage Examination Services.")

3.2 D/T CHECKS

a. Prior-to-Use Checks[1]

Each workday before using the D/T, physically examine the sampling system, including the elevator load-out/in system, to make sure that the sampling system is operating properly and all previously applied security seals/locks are still intact. This shall include, but not be limited to, the following checks:

- **General System Check**. Examine the primary sampler, secondary sampler, and the sample delivery system (i.e., sample delivery tube and collection area) to ensure that they are working properly and are free from noticeable obstructions and leaks.

- **Pelican/Dust Seal Check**.

  . . . Check the movement of the pelican; e.g., is it smooth.

  . . . Check the dust seals for wear and tear.

  . . . Check for objects stuck in the pelican opening or body.

  . . . Check that the pelican fits against the dust seals.

CAUTION: Follow appropriate lockout procedure before opening either the primary or the secondary sampler inspection doors

- **Grain Flow System Check**. Examine elevator load-out/in belts, trippers, turnheads, garners, scales, and bins to ensure that they are properly configured and free of residual grain and foreign material.

- **Timer Check**. Check the timer on the D/T sampler control panel to ensure that it is set for (and takes a cut at) the correct time interval. (Refer to the FGIS Mechanical Sampling Systems Handbook for timer setting requirements.)

- **Security Check**. Check all D/T system access points and grain flow diversion points to ensure that all security seals/locks are in place.

b. In-Use Checks.

(1) During sampling operations, keep a constant check for possible system malfunctions. Be especially aware of any change in the sample:

✓ If the sample flow stops, the delivery system may be plugged;

[1] Offical agency managers, in cooperation with local FGIS field office managers, may modify these procedures, when deemed necessary. See Appendix 1, **Local Quality Control Programs**, for additional information.

✓ If the sample contains an unusual amount of dust or foreign material, the dust seals may be torn or worn; or

✓ If the sample continues to dribble, even when the D/T control panel lights indicate that the pelican is not moving, then the pelican may not be resting properly against the dust seals.

NOTE: For a list of common problems, see Appendix--Trouble Shooting Guide for Samplers.

(2) If you suspect a problem, **STOP USING THE D/T** immediately and inform your supervisor and the elevator manager of the situation. Then, inspect the D/T sampling system. If the inspection indicates that there is a physical or mechanical problem with the system:

(a) Discontinue use of the D/T until the problem is corrected and the sampler has been fully examined and/or tested. Sample the remainder of the lot using an Ellis cup or pelican sampler, or re-sample the entire lot using a probe. Note on the sample ticket the amount of grain sampled by the D/T and the amount sampled by another device.

(b) Document the problem, repair, and all subsequent activities. Keep a copy of all documentation at the specified service point and, when practicable, at the elevator/work site.

c. Monthly Checks at Export Port Locations. Once a month, at a minimum, official personnel must physically check all security seals/locks and perform a general condition check of all D/T's used to sample export grain at export port locations. (On months when it is performed, the semi-annual examination shall also be considered to be the monthly check.)

(1) Examine the site for unauthorized modifications, such as unauthorized dust collection equipment or the addition of airvents.

(2) Stop the sampler with the pelican positioned so it can be inspected and gauged. This may be mid-spout or parked at the side, depending on the location of the inspection door.

(3) Follow appropriate lockout procedures.

(4) Record seal or lock identification numbers. Open the primary and secondary sampler inspection doors.

(5) Examine the pelican for damage. Use the go-no-go gauge to check for the correct pelican opening (3/4 to 7/8 inch).

(6) Check that the dust seals are undamaged.

(7) Check for objects stuck in the pelican opening or body.

(8) Check the secondary sampler and delivery tube for plugs.

(9) Release the equipment from lockout using appropriate procedures.

(10) Using the panel controls, energize the sampler to allow the pelican to come to rest under the left dust seal. Turn off the power. Open the inspection door. Don't place your hands or tools in the sampler.

(11) Visually determine if the pelican rests against the left dust seal. Repeat for the right dust seal.

(12) Reseal or lock the inspection plates, record the seal or lock identification numbers. **Record the results of the monthly check in a logbook**: include the date and your name or initials. (When a semi-annual examination is performed instead of the monthly check, write "See semi-annual exam file for (month) check results." in the logbook.) Maintain the logbook at the work site, under control of official personnel.

(13) If physical or mechanical problems (e.g., torn dust seals or bent pelican) are observed, do not use the sampler until the problems have been corrected. Inform your supervisor and elevator management. Document the problem, the repair, and all subsequent activities.

d. Semi-Annual Examinations.

(1) Once every 6 months or after any major repairs or alterations, official personnel must perform a detailed and comprehensive examination of all D/T sampling systems. Closely coordinate the scheduling of this examination with the elevator management.

(2) The semi-annual examination shall encompass the items listed on form FGIS-936, "Sampler Condition Report," and any other items deemed necessary.

(3) If physical/mechanical problems are observed, do not use the D/T until the problems are corrected. Inform your supervisor and the elevator manager of the D/T's status. Document the problem, the repair, and all subsequent examinations. Keep a copy of all documentation.

e. Performance Tests. Prior to authorizing new D/T sampling systems and, in some cases, before using systems with suspended authorizations, official personnel must check the performance of the system according to the procedures in the FGIS Mechanical Sampling Systems Handbook. Whenever a performance test is required, a semi-annual examination must also be performed.

3.3 SECURITY[1]

a. Controlling System Access and Diversion Points. Seal or lock all D/T sampler and sampling system access points (e.g., inspection plates and pipe connections) and elevator load-out/in diversion points (e.g., turnheads) that cannot be visually or electronically monitored by official personnel.

NOTE: Generally, use security seals--not locksy--unless official personnel are always onsite.

b. Broken Seals/Locks.

(1) If the elevator manager informs you that elevator personnel broke one or more security seals/locks in the course of normal operations (e.g., replacing a torn D/T dust seal), physically examine the affected area or equipment and, if satisfied that the integrity of the D/T sampling system is not compromised, replace the broken security seals/locks;

(2) If the elevator manager does not inform you that any security seals/locks are broken, but on subsequent investigation you find one or more broken security seals/locks, determine if there is a reasonable explanation:

If there is--physically examine the affected area or equipment and, if satisfied that the integrity of the D/T sampling system is not compromised, replace the broken security seals/locks.

If there isn't--suspend the D/T's authorization, and inform your supervisor and the elevator manager.

If you are unsure--contact your supervisor or the local FGIS field office manager.

(3) Document the situation, including the reason (if known) the seals/locks were broken, and all seal/lock numbers (broken and new). Keep a copy of all documentation at the specified service point and, when practicable, at the elevator/work site.

(4) If suspended, the D/T system must undergo a complete semi-annual examination before being returned to service. When deemed necessary, official personel may also require that a performance test, as described in the FGIS Mechanical Sampling Systems Handbook, be performed.

(a) After a suspended system has been returned to service, physically check the security seals/locks on a daily basis until the next semi-annual examination.

(b) If the sampling system security is not compromised during this 6-month period, return to checking seals and locks on a periodic basis.

[1] See footnote 1 on page 3-2 and Appendix 1, **Local Quality Control Programs**.

3.4 GRAIN QUALITY CHECKS [1]

When sampling grain being loaded into or unloaded from a unit train (Cu-sum only), a fleet of lash barges (Cu-sum only), a standard-size (river) barge, or an ocean-going vessel:

a. Periodically, monitor elevator operations to ensure that the sample being collected represents the lot being loaded/unloaded.

b. Examine subsamples and component samples for heating, "distinctly low quality" (DLQ), unusual conditions, odor, and infestation. If inspected under the Cu-sum plan, check grading factors. (See figure 1, page 3-9.)

NOTE: If it not possible to examine subsamples/component samples at the collection site, examine them later at an inspection laboratory.

(1) At least once every 5,000 bushels, remove the grain sample from the collection box or container. This sample is called a subsample.

(2) Determine if the subsample is heating, DLQ, has any unusual condition, or has a musty, sour, or commerically objectionable foreign odor.

NOTE: Subsamples may also be examined for insects injurious to stored grain. If this procedure is used, the total number of insects found in all sub-samples comprising the component shall be used to determine if the component is "infested". For instance, if one weevil is found in the first sub-sample and one in the second, the component has two weevils and is considered to be "infested". If the sub-samples are checked for insects, it isn't necessary to combine sub-samples and examine component samples.

(3) If the subsample is found to be heating, DLQ, have an ununusal condition, or have an off-odor, complete a sample ticket that notes the condition found. Then, place the sample--with the sample ticket--in a separate container and notify your supervisor and the elevator manager immediately.

(4) If the subsample is in sound condition, then it may be combined with the next consecutively-drawn subsample(s) to form a component sample. A component sample represents approximately 10,000 bushels of grain and should be approximately 2,500 grams in size.

(5) Sieve the component sample and then check the grain on top of the sieve and the material that passed through the sieve for insects. Don't sieve more than 1,000 grams at a time.

- Use an 8/64-inch round-hole sieve for corn and soybeans.
- Use a .064-inch X 3/8-inch oblong-hole sieve for other grains.

[1] See footnote 1 on page 3-2 and Appendix 1, **Local Quality Control Programs**.

- With the approval of both the official agency and the local FGIS field office manager, other sieve sizes may be used if needed to optimize particle separation and enhance the examination process.

(6) If insects are detected, note the kind and number of insects found on a sample ticket. Then, place the sample--with the sample ticket--in a separate container and notify your supervisor and the elevator manager immediately.

(7) If the component sample doesn't contain any insects injurious to stored grain, then it may be combined with another component sample(s) to form a sublot or lot sample.

c. Monitor the grain stream, as practical, for foreign material too large to enter the D/T and SM samplers, such as cobs, coal, concrete, stones, wood, paper, glass, lumps, and dead animals. If large foreign material is present in the grain stream, immediately inform your supervisor and the elevator manager. Document your observation on the sample ticket.

NOTE: DO NOT ATTEMPT TO REMOVE OBJECTS FROM THE GRAIN STREAM.

CARRIER(S)	FREQUENCY OF EXAM (Approximate)	FACTOR(S) ANALYZED
Ships/Lash Barges (Cu-sum)	Maximum 5,000 bushels (Subsample)	Odor, heating, DLQ, unusual conditions
	Minimum 10,000 bushels (Component)	Grading factors 1/, Infestation 2/
Unit Trains (Cu-sum) Articulated Railcars (Cu-sum)	Individual car basis (Subsample/Component) Individual "unit" basis (Subsample/Component)	Grading factors 1/, infestation 2/, odor, DLQ, heating, unusual conditions
Articulated Railcars (Single-lot)	Individual "unit" basis	Infestation 2/, odor, heating, DLQ, unusual conditions
Standard Railcars (Single-lot)	Individual car basis	Infestation 2/, odor, heating, DLQ, unusual conditions
Barges (Single-lot & Cum-sum)	Maximum 5,000 bushels (Subsample)	Odor, heating, DLQ, unusual conditions
	Minimum 10,000 bushels (Component)	Infestation 2/
Trucks (Single-lot)	Individual truck basis	Infestation 2/, Odor, heating, DLQ, unusual conditions

Figure 1. Sample Analysis Intervals

1 Under the Cu-Sum plan, examine for "more than a two grade difference in grade factor results" (see FGIS Grain Inspection Handbook, Book III, for more information about checking the quality of grain loaded aboard ships, lash barges, and unit trains).

2 Tolerances apply to individual trucks, railcars, rail "units," and barge/ship/unit train components. Minimum sampling rate for bargelots/shiplots is 500 grams for each 2000 bushels sampled.

RESERVED

TROUBLE SHOOTING GUIDE FOR SAMPLERS	
INCIDENT	POSSIBLE CAUSE AND ACTION
1. Grain does not flow into collection box or only dribbles. 2. Grain flows into collection box, but when collected, the sample is not the normal/proper size (i.e., there is more or less grain than usual.)	1 – 2. The sample delivery system and/ or the grain flow system is: (1) clogged with lumps of grain or dust, (2) leaking, (3) plugged with stones or other debris too large to enter the pelican, or (4) not operating properly because the timer is set incorrectly. Notify the elevator manager of problem. Check operation and/or set timer.
3. Grain in the collection box contains an unusual amount of dust or foreign material.	3. If the delivery system is secure and tight, then the dust seals may not be properly installed or they may be worn or torn. Have elevator manager check, replace, or reinstall dust seals.
4. The control panel indicates that the D/T pelican is at rest, but grain continues to dribble into the collection box.	4. The pelican is not properly seating/resting against the dust seals, dust seals are worn, or dust seals are torn. Have elevator manager align pelican or replace/reinstall dust seals.
5. The sampling area is dirty and/or contains spilled grain, debris, or other obstructions.	5. Ask the elevator manager to have the area cleaned.
6. The lighting in the sampling area is poor or the lighting is inadequate to properly perform sampling duties.	6. Ask the elevater manager to replace the bulbs or replace the light fixtures in the effected area.
7. The D/T sampling system breaks down during the sampling of an export cargo grain shipment and there is no other D/T sampling system available.	7. Sample the remainder of the lot with either a pelican or Ellis cup sampler.

TROUBLE SHOOTING GUIDE FOR SAMPLERS (CONTINUED)	
INCIDENT	POSSIBLE CAUSE AND ACTION
8. The D/T sampling system fails during the sampling of a domestic grain lot. No other D/T sampling system available.	8. Sample the remainder of the lot with an alternative sampling device. Show the actual sampling method(s) used on the sample ticket regardless of the time or amount of grain loaded after D/T failure.
9. The D/T sampling system is making an unusual noise and/or becomes hot during operation.	9. This is a potentially hazardous condition. Leave the sampling area immediately and notify the elevator manager.
10. Air pressure and/or voltage is low with or without a load (e.g., pelican slows).	10. Notify the elevator manager.
11. A sample is spilled, thrown, dropped, stored in an improper manner, or stored in an area not under control of official personnel.	11. Immediately notify your supervisor. Such samples are no longer representative. The sample may, however, be inspected as a submitted sample.
12. Angoumois moths are found flying or crawling around the lot.	12. Estimate the number of moths observed and record on the sample ticket.
13. Insect infestation is found in, on, or about the lot/carrier.	13. Record the number and type of insects on the sample ticket.
14. Large stones and sticks, pieces of metal, fertilizer, or rodent or bird excreta are found in, on, or about the lot/carrier.	14. Record, as applicable, the amount, size, number, and the location of such material on the sample ticket.
15. Heating grain is found.	15. Record the location and quantity of heating grain on the sample ticket.
16. An unusual condition is observed that may affect the quality of the lot.	16. Describe the condition, in detail, on the sample ticket.
17. An off-odor is detected.	17. Describe odor on the sample ticket.