

# Directive

9180.49

June 19, 2015

## **GRADING AND CERTIFICATION OF GRAIN CONTAINING DIATOMACEOUS EARTH AND SILICA GEL**

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## **1. PURPOSE**

The purpose of this directive is to expand the procedures for grading, testing, and certification of diatomaceous earth (DIAT) by providing for the inspection of silica gel, a manufactured product very similar to naturally occurring diatomaceous earth. These are the two main forms of amorphous (non-crystalline) silica.

## **2. REPLACEMENT HIGHLIGHTS**

This directive is revised to update certification instructions to reflect the current online certification system, update diatom images on the attachment, and supersedes FGIS Program Directive 9180.49, Grading and Certification of Grain Containing Diatomaceous Earth and Silica Gel, dated 4-16-96.

## **3. BACKGROUND**

DIAT consists of siliceous skeletons (diatoms) of unicellular plants of the algae family which are recognized by the complex structure of their cell walls. Individual diatoms are generally less than .005 inch in size; thus requiring microscopic examination for positive identification (see attachment).

DIAT is an EPA and FDA approved natural insecticide and is used to control insects in grain. When used on grain, DIAT usually appears as a light gray dust. When applied at low levels, DIAT may not be readily visible on grain but the texture of the grain may feel coarse compared to grain on which DIAT was not applied. Due to the inability to readily differentiate DIAT from potentially toxic crystalline substances with the naked eye, official inspection procedures require that grain suspected of containing DIAT be graded as U.S. Sample grade, the lowest designated quality grade.

The EPA approved silica gel is a synthetic product generally produced by dissolving quartz sand (a form of crystalline silica). It closely resembles DIAT in appearance and action. It usually appears as a white dust. The silica particles are of a more uniform size and pattern than DIAT.

A consensus of research shows that these two products achieve insect control through desiccation. The abrasive diatoms can cut through the thin oily or waxy waterproof outer layer of the insect and absorb this oily or waxy (lipid) outer layer by direct contact. Either way causes a loss of water within the insect. The insect dries out and dies.

#### **4. POLICY**

An applicant for inspection who has grain which contains or appears to contain DIAT or silica gel and who wishes to have the grain graded as though it did not contain an unknown foreign substance, must request a microscopic examination for DIAT or silica gel. Upon receipt of the request for examination, the inspector shall forward a sample of the grain to the Commodity Testing & Reference Laboratory (CTL) for examination. The grade of the grain will not be certificated until the laboratory result is received. Only the presence of DIAT or silica gel is being verified; the level of DIAT or silica gel in the sample will not be determined.

If a request for the examination of the grain for DIAT or silica gel is not received, and the grain at the time of inspection is found to contain an unknown foreign substance, even though the substance may be DIAT or silica gel, the grain will be graded as U.S. Sample grade. The microscopic examination for the presence of DIAT or silica gel must be specifically requested.

#### **5. FORWARDING SAMPLES TO THE CTL**

Upon receipt of a request for a DIAT or silica gel examination, send a 100-gram representative portion of the original sample to CTL, currently the only approved laboratory for official examination. The sample shall be identified by a carrier/sample identification number, agency or field office name, location, mailing address, and telephone number. Include a note with the sample that a test for DIAT or silica gel (or both) is requested. Send the sample(s) to:

Technology & Science Division, CTL  
USDA, AMS, National Grain Center  
10383 North Ambassador Dr.  
Kansas City, MO 64153

## 6. EXAMINATION AND REPORTING PROCEDURE

Upon receipt of a sample, the testing laboratory shall perform the examination in accordance with the following procedure:

- a. Place 50 grams of the grain in a 300 ml. Erlenmeyer flask.
- b. Add 100 ml. of 95 percent ethyl alcohol.
- c. Stopper the flask and shake it vigorously for fifteen seconds.
- d. Immediately transfer 0.20 ml. (200 micro liters) of the alcohol solution to a well in a clean and dry porcelain spot plate.
- e. Allow the alcohol solution to nearly, but not completely, evaporate to dryness.
- f. Add 0.20 ml. (200 micro liters) U.S.P. oil of cloves to the residue on the spot plate and thoroughly mix the oil and the residue by agitation. (Do not grind the residue against the spot plate which can fragment the diatoms.)
- g. Transfer a drop of the oil-residue material to a "Bright- Line" 0.1 mm. depth counting chamber (haemocytometer) in accordance with instructions furnished with the equipment.
- h. Using a 430 magnification microscope, examine the oil-residue material to determine only the presence of diatoms and diatom fragments. It is not necessary to determine the presence of any other foreign substance. A count of diatoms or diatom fragments is not required.
- i. Upon completion of the examination, the testing laboratory technician shall promptly report the applicable results to the laboratory manager as follows:

"Contains DIAT/silica gel" or "Does not contain DIAT/silica gel."
- j. The laboratory manager will promptly notify the inspection office by telephone, fax, or otherwise, of the results of the examination as follows:

"Carrier/Sample Identification No. gel."; or

"Carrier/Sample Identification No. contains diatomaceous earth/silica gel."; or

"Carrier/Sample Identification No. does not contain diatomaceous earth/silica gel."
- k. If the results are reported orally, they shall be confirmed in writing.

## 7. CERTIFICATION

If the examination determines that the grain does not contain an unknown foreign substance other than DIAT or silica gel, the grain is graded as though it contained no unknown foreign substance, and the following statement should appear in the “Remarks” section of the certificate (show the applicable one):

“Grain contains diatomaceous earth/silica gel.”

If it is determined that the grain does not contain DIAT/silica gel but some other unknown foreign substance, the grain is considered U.S. Sample grade in accordance with the Official U.S. Standards for Grain. Report the reason for U.S. Sample Grade in the “Results” section of the certificate and follow normal protocol referenced in Directive 9060.2, Implementation of the FGIS-FDA Memorandum of Understanding.

## 8. EXAMINATION FEES AND BILLING

The fees for FGIS testing are covered by the published fee schedule found in section 800.71 of the regulations. Fees are assessed in quarter-hour increments when an hourly rate is applicable. The test typically takes between 15 and 30 minutes to complete.

- a. Agencies Forwarding Sample for Analysis. The CTL will bill an agency on an hourly basis for samples analyzed as part of an original or reinspection service certificated by the agency. Agencies may defer this expense to the applicant who requested the test for DIAT or silica gel.
- b. FGIS Offices Forwarding Samples for Analysis. FGIS field offices will bill the applicant at locations which provide original inspection services or when an FGIS office provides an appeal inspection service. The hourly fee is applied at locations providing original inspection services (including reinspection and appeal inspection services). The appropriate appeal inspection unit fee for grade or factor analysis is applied when an appeal inspection service is performed on a sample which was originally inspected by an agency or when a Board appeal inspection is requested.

## 9. REVIEW INSPECTION

An examination for the presence of DIAT or silica gel can be performed as part of a review inspection (reinspection, appeal, or Board appeal) even though the test was not requested as part of the original inspection.

## 10. DISCLAIMER

This directive does not in any way, either expressed or implied, constitute a recommendation or endorsement of the efficacy of DIAT or silica gel, under any label or trade name, for any purpose whatsoever

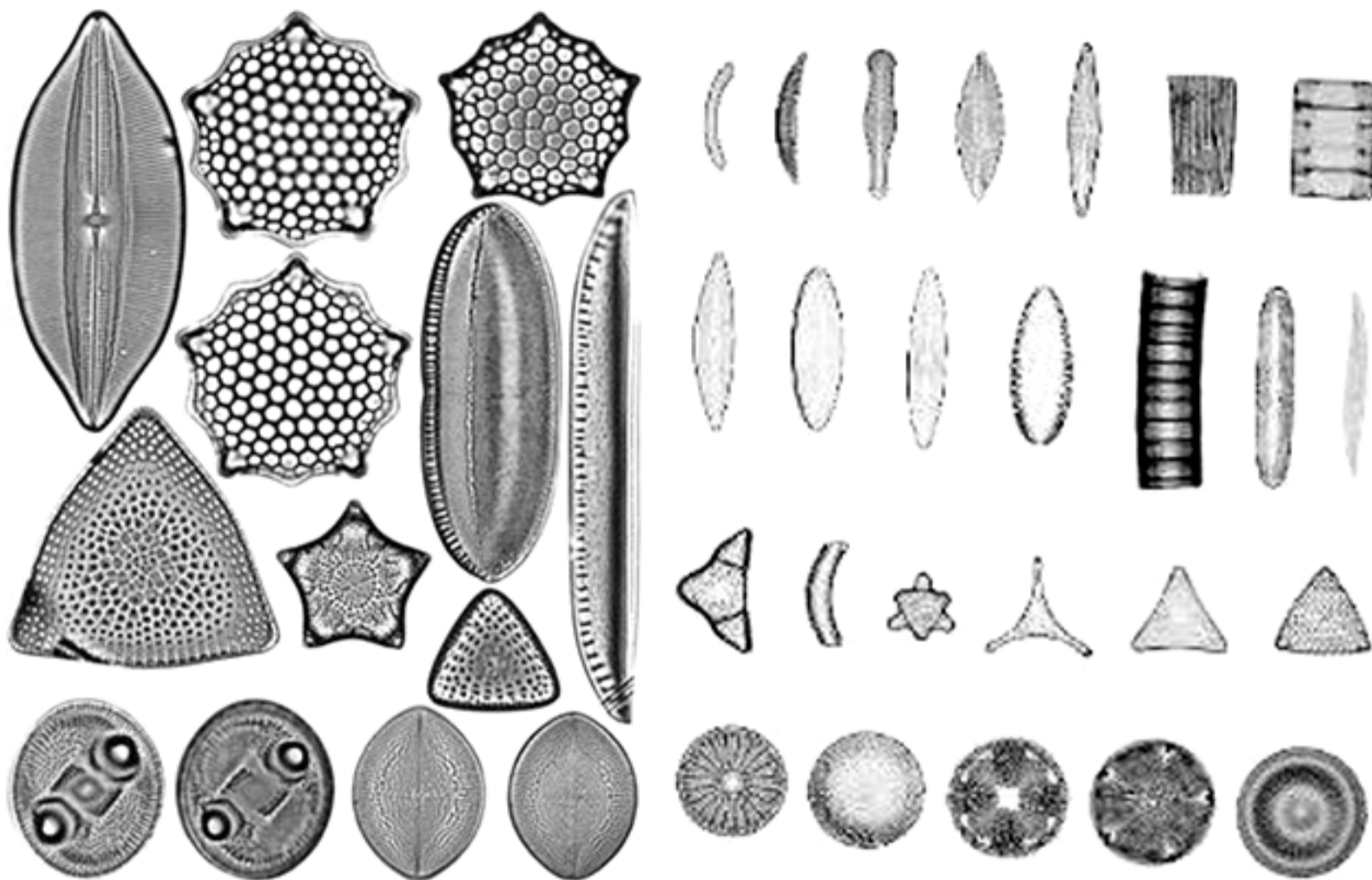
## 11. QUESTIONS

Direct any questions concerning this directive to the Policies, Procedures, and Market Analysis Branch at (202) 720-0228.

Attachment

# APPEARANCE OF DIATOMS UNDER THE MICROSCOPE

## TYPICAL DIATOM FORMS – Not excluding other skeletal structures (not to scale)



## TYPICAL DIATOM FRAGMENTS (not to scale)

