Recommended Practices for Testing Sand Used in Hydraulic Fracturing Operations

API RECOMMENDED PRACTICE 56
SECOND EDITION, DECEMBER 1995

American Petroleum Institute

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FOREWORD

These recommended practices were prepared by the Task Group on Evaluation of Hydraulic Fracturing Sand under the API Subcommittee on Evaluation of Well Completion Materials. They have been reviewed for content and accuracy by the Subcommittee on Evaluation of Well Completion Materials and by the API Executive Committee on Drilling and Production Practices. This publication is under jurisdiction of the Executive Committee on Drilling and Production Practices, American Petroleum Institute's Exploration and Production Department.

The tests recommended herein have been developed to improve the quality of frac sand delivered to the well site. They are for use in evaluating certain physical properties of sand used in hydraulic fracturing operations. These suggested tests will enable users to compare the physical characteristics of various sands tested under the described conditions and to select materials most useful for application in hydraulic fracturing operations.

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Recommended Practices for Testing Sand Used in Hydraulic Fracturing Operations

1 Scope

The objective of these recommended practices is to provide control of frac sand quality at the well site. As a first step in accomplishing this objective, the recommended tests should be applied at the basic point of supply where quality control is first exercised.

2 References

2.1 STANDARDS

Unless otherwise specified, the most recent editions or revisions of the following standards shall, to the extent specified herein, form a part of this standard.

ASTM[1]

E 11-95 *Specifications for Wire-Cloth Sieves for Testing Purposes*

2.2 OTHER REFERENCES

Krumbein, W.C. and Sloss, L.L., *Stratigraphy and Sedimentation*, Second Edition, 1963, W.N. Freeman and Co., New York, NY.

3 Recommended Sand Sampling Procedure

3.1 DESCRIPTION

The sampling procedure should provide a representative sample of the frac sand supplied by the sand supplier to the service company or by the service company to the user. This sample is to be compiled from a flowing stream of sand as opposed to material sampled at rest.

3.2 EQUIPMENT

The following equipment should be used to compile representative sand samples and conduct physical tests:

a. Box sampling device approximately 8 inches × 6 inches × 4 inches with a 1/2-inch opening. Refer to Figure 1.

b. Sample reducer (of appropriate size for handling sack-size samples and reducing in one pass to 1/16 original weight). Refer to Figure 2.

[1]ASTM, 100 Bar Harbor Drive, West Conshohocken, Pennsylvania 19428-2959.

c. Sample splitter of appropriate size. Refer to Figure 3.

d. Set of recently calibrated sieves, complying with requirements of the U.S.A. Sieve Series, 8-inch diameter. Refer to *ASTM E 11-95: Specifications for Wire-Cloth Sieves for Testing Purposes*. Refer to Figure 4.

e. Testing sieve shaker. Refer to Figure 5.

f. Scale (minimum of 100 gram capacity with precision of 0.1 gram or better).

3.3 NUMBER OF REQUIRED SAMPLES

A minimum of nine samples per rail car load and three samples per truck load should be obtained, combined, and tested. For material sampled at the fracturing job site, a minimum of five samples should be obtained per 100,000 pounds of sand or fraction thereof. These on-site samples should be combined and used as a single sample for subsequent testing operations.

3.4 SAMPLING

The sampling device, with its longitudinal axis perpendicular to the flowing sand stream, should be passed at a uniform rate from side to side through the full stream width of moving sand as the sand falls from a conveyor belt into a blender, truck, or rail car. Sand should be allowed to flow for at least 2 minutes after initial flow prior to taking the first sample. Several samples should be extracted at approximately uniform intervals through the body of sand to ensure a representative sample for analysis. The number of samples taken should comply with the requirements of 3.3. During sampling, the sampling receptacle should be swung completely across the moving sand stream in a brief interval of time so as to take all of the stream part of the time. Under no circumstances should the sampling receptacle be allowed to overflow.

4 Recommended Sand Samples Handling and Storage

4.1 SAMPLE REDUCTION (SACKED MATERIAL)

Place the contents of an entire sack of frac sand (approximately 100 pounds) in the sample reducer (refer to Figure 2). Obtain a reduced sample of approximately 6 pounds (approximately 1/16 of the original weight of the total sack's contents).