



PFI Quality Assurance/Quality Control (QA/QC) Program for Residential/Commercial Densified Fuels

Scope:

This program must be utilized by participating pellet fuel manufacturers to assure consistent quality of all residential/commercial pelletized fuels the bags for which are entitled to bear the PFI logo. The QA/QC program requires all participating pellet fuel manufacturers to draft a written QA/QC program for evaluating their finished product(s). It requires each mill to have an in-house laboratory for evaluating specific quality parameters and to have all PFI-required parameters routinely evaluated by an outside laboratory. It requires all in-house as well as outside laboratories to utilize specific methods when conducting the prescribed analysis, and it requires all outside laboratories to participate in a PFI-administered Proficiency Testing program. It requires all outside laboratories to submit all data generated as part of the mill's QA/QC Program to a data evaluation program administered through PFI for quarterly review by a data review board. It incorporates a registration system so that all mills following the program can list their products on the PFI website for the direct view of retailers, appliance manufacturers, or anyone wishing to purchase fuels produced by manufacturers following the program. Finally, it requires all mills and outside laboratories to submit an annual Certification of Compliance indicating that they have complied with program requirements.

Applicability:

PFI's QA/QC program applies to all pellet fuel manufacturers utilizing the PFI Standard Specification for Residential/Commercial Densified Fuel ("the PFI Standard Specification"), as well as to participating wholesale bagging operations that are producing and/or processing product that is to be used in the North American residential/commercial pellet fuels market. The QA/QC program and the PFI Standard Specification are not applicable to pelletized fuels being produced for and sold to overseas markets.

Special requirements for the first year of participation in the PFI program are presented in Appendix D.

QA/QC Program Components:

Mill QA/QC: Participating pellet fuel manufacturers shall establish a written QA/QC program for evaluating their finished product(s). MIL-I-45208 has been designated as a suitable outline for a quality management system that can be used by mills in establishing their written QA/QC programs. Information regarding this quality management system can be found on the two web links listed below:

<http://www.mil-i-45208.com/index.htm>

<http://www.quality-control-plan.com/cart/previews/33/mil-i-45208-manual.pdf>

For pellet fuel manufacturers that have more than one plant location, each plant shall have its own QA/QC program. Further, each product stream within each plant shall have its own QA/QC program, (e.g. if a pellet fuel plant is producing a premium grade pellet and a standard grade pellet, then each grade would be subject to its own QA/QC program). This would not apply to multiple product labels (e.g., if the same product is marketed under two or more labels, then a single QA/QC program can be utilized as long as all product labels contain the same product).

Each mill shall routinely assess bulk density, fines, pellet length, pellet diameter and moisture content as part of its internal QC program. Since ash is also a very important parameter, mills may also want to perform the testing for ash content. Incorporating additional testing is up to the discretion of the mill.

The frequency and location of sampling for in-house QC purposes is up to the discretion of the mill and will vary from mill to mill. For example, mills that have clean and consistent feed stock materials may find that relatively infrequent sampling and analysis generates consistent quality in their end product. By contrast, mills that have a large number of suppliers, the potential for contaminants such as dirt and salts, or varying tree species and/or the inclusion of bark may need to perform numerous QC checks in order to produce a consistent final product. All testing shall be conducted in accordance with the **PFI Standard Specification for Residential/Commercial Densified Fuel**.

As part of the QA program mills shall utilize an outside QA laboratory to assess overall pellet quality. QA samples shall consist of two (2) 40-pound bags taken directly from bagging operations. For bulk shipments, 40-pound samples shall be collected at transfer points after the pellet cooler. One (1) 40-pound bag taken shall be delivered to the outside QA laboratory. The mill shall perform and document QC analysis on the second 40 lb bag as a cross check with the QA laboratory. Samples shall be collected at a frequency of one sample per every 1,000 tons of pelletized product produced, but not less than one sample per quarter. Bags shall be date stamped and/or numbered by the bagging system to assure time or quantity separation of the samples submitted for QA analysis. This method shall enable tracking of the materials to the period of time the product was produced.

The results of outside laboratory testing, with the exception of fines, shall be utilized as the basis for grading pelletized fuels in accordance with the **PFI Standard Specification for Residential/Commercial Densified Fuel** and to provide the manufacturer's guaranteed analysis values on the bag. Fines are to be determined at the mill by using the results from the QC fines testing on the 40-pound bag adjacent to the bag submitted to the outside laboratory for QA analysis. Outside laboratories shall measure the bag weight and confirm that the measured weight is equal to or greater than the weight stated on the bag. Outside laboratories shall analyze each pelletized fuel sample for all properties listed in the **PFI Standard Specification for Residential/Commercial Densified Fuel**, with the exception of ash fusion properties which must be measured only once per quarter. Fuel properties that must be analyzed for each sample include bulk density, diameter, fines, durability, ash, length, chloride, moisture and heating value. All testing shall be conducted in accordance with the latest revision of the **PFI Standard Specification for Residential/Commercial Densified Fuel**.

QA laboratory analysis reports shall include results for all PFI required properties for the sample being analyzed and shall report the mean \pm 2 SD for all parameters as a one year rolling sum average and shall include control chart tracking of all parameters. The parameter mean \pm 2 Standard Deviations (SD) shall be utilized to establish a centerline value as well as upper and lower control limits and shall be the range listed on the bag for ash and heating value. This yields a 95.4% Confidence Interval (CI) that the pellets being produced fall within the prescribed parameters. A 95.4% CI implies that 1 sample per 20.7 QA samples submitted can be out of process control without failing the overall pass/fail criteria (approximately 2.5 samples per year of operation at 52 samples per year). Control limits can be voluntarily broadened by individual facilities if they wish to operate with a larger safety margin and/or confidence interval.

Grading shall be based on the mean \pm 2 Standard Deviations (SD) for all analysis parameters utilizing one year's worth of analysis data. If the +2 SD value exceeds a grade requirement then the fuel must be labeled the next lower grade. For example, if one year of QA ash testing yields a mean of 0.80% with a \pm 2 SD ash range of 0.50-1.10% then the material must be labeled as standard grade (if all other properties meet the requirement for that grade). This same process shall be used for all QA lab analysis parameters.

Outside QA Laboratories: All outside laboratories performing QA analysis on PFI registered products shall be registered with the PFI, shall utilize the analysis methods outlined in the **PFI Standard Specification for Residential/Commercial Densified Fuel**, shall submit a Certification of Compliance (see Appendix B1), and shall participate in a Proficiency Testing program administered through PFI. While not a requirement, mills may also choose to participate in this program.

Wholesale Storage/Bagging Operation QA/QC Programs: Wholesale storage facilities that receive bagged and bulk product for redistribution do not need to conduct QA testing for establishing pellet grade if QA testing has already been conducted by the mill and the bags are palletized and wrapped. Wholesale bagging operations shall have their own written QA/QC program to verify product quality prior to shipment to the end user. If the product was produced by a mill that does not follow the PFI QA/QC program then the bagging operation shall implement all components of the PFI QA/QC program and shall conduct QA analysis at a rate of one sample per every 1,000 tons of pelletized product bagged, but not less than one sample per quarter.

Registration, Grading, and Enforcement:

All participating pellet fuel manufacturers shall fill out initial registration information, provide analysis data proving that their product(s) meets the grade(s) specified by the mill, and provide PFI with a Certification of Compliance certifying that the mill intends to follow the QA/QC program outlined above. In addition, each participating QA laboratory must register with PFI and provide PFI with a Certification of Compliance stating it will meet the requirements outlined in the PFI QA/QC Program and the PFI Standard Specification for Residential/Commercial Densified Fuel. Example registration forms for labs and manufacturers are attached as **Appendix A1 and A2**. Examples of the Certifications of Compliance for labs and manufacturers are attached as **Appendix B1 and B2**. When all registration information has been provided, the

analysis data demonstrates that the mill is producing the grade(s) of fuel stated, and PFI receives the Certification of Compliance verifying that the mill is following the outlined QA/QC program for one continuous year, then the company's product(s) shall be registered on the PFI website for reference by retailers, appliance manufacturers, consumers, etc. All mills shall submit on an annual basis an updated Certification of Compliance confirming that the mill is still following PFI's outlined QA/QC program. Registration data shall be updated annually.

All QA laboratories shall submit QA analysis data generated for registered mills on a quarterly basis to the PFI's data evaluation program. Non-compliant data identified through PFI's data evaluation program shall be addressed by a PFI Review Board. When submitted data does not substantiate the product grade claimed by the manufacturer and immediate cooperative efforts fail to bring the mill back into compliance, then the mill will be required to reclassify the material being produced. Failure to do so would result in the removal of the product from the PFI's registration website. A description of the data review process is set forth in **Appendix C**.

If disputes arise regarding registration, grading, and enforcement they will be brought before the PFI Board of Directors for resolution. PFI also retains the right to perform unannounced audits on participating mills or labs that had received complaints, that appear to be selling product that had been improperly labeled or falsely registered, or just as a periodic spot check.

Product Labeling

Information that will allow purchasers to make informed decisions must be provided on each bag of fuel. This information should be provided in a consistent, standardized format. See Appendix E for an example showing the use of a bar scale to represent the mean value ± 2 Std. Dev.

1. It is required to print the mean higher heating value in BTU per pound as well as the ash content in % on the fuel bag label using a bar scale to represent the mean value ± 2 Std. Dev.
2. The bag must be labeled indicating which PFI grade of material is in the bag.
3. The bag label must also disclose the type of materials as well as all additives used. For this purpose, additives are defined in 3.1.10 of the **PFI Standard Specification for Residential/Commercial Densified Fuel**.
4. It is required that manufacturers include on their bags the PFI logo and in a printed block the guaranteed analysis of the fuel.

Proposed PFI QA/QC Program - Appendix A1

PFI QA / QC Program - Laboratory Registration Form

The following information will be required of any laboratory wishing to become a "**PFI Registered Laboratory**" for the purpose of testing of pelletized fuels, produced by PFI member facilities wishing to have their product accepted as a "**PFI Registered Pellet Fuel**".

Laboratory Name:

Mailing address:

Physical Address (Civic Address):

Contact name:

Title:

Contact phone:

Contact Fax:

Contact E-mail:

Is this Lab currently a PFI member? Yes / No

Number of years this lab has been testing densified fuels? _____

Does this lab authorize the PFI to list it on the PFI's website as a **Registered Lab**? Yes / No

Does this lab have a copy of the **PFI QA / QC Program**? Yes / No

Does this lab have a copy of **PFI Standard Specification for Residential/Commercial Densified Fuel**? Yes/No

Is this lab capable of performing all test methods and procedures specified in

PFI Standard Specification for Residential/Commercial Densified Fuel? Yes/No

Is this lab willing to participate in a **PFI proficiency testing program**? Yes / No

Is this lab fully compliant with all other aspects of the **PFI QA / QC Program**? Yes / No

Is this lab willing to prepare and submit **Control Chart Tracking** as a means of ongoing data evaluation? Yes / No

Will this lab prepare and submit required quarterly reports in the prescribed format, for participating PFI member producers' pellet fuels? Yes / No

Will this Lab sign an annual **Certification of Compliance** to confirm on-going compliance with the **PFI QA / QC Program**? Yes / No

Completed by (Signature): _____

Print Name: _____

Title: _____

Date: _____

Proposed PFI QA/QC Program - Appendix A2

PFI - Required Registration Start-up & Grading Information

The following information will be required of any mill intending to participate in the new QA / QC program with the intent of selling a **PFI Registered Pellet Fuel** and use of the PFI logo.

Producer Company Name:

Mailing address:

Physical Address (Civic Address):

How Many mills (production facilities) do you operate?

Where are your Mills located?

Note: You must register each mill (production facility) seperately.

Company Contact:

Contact name:

Contact phone:

Contact Fax:

Contact E-mail:

Mill Contact:

Contact name:

Contact phone:

Contact Fax:

Contact E-mail:

Internal QA/QC Contact:

Contact name:

Contact phone:

Contact Fax:

Contact E-mail:

Which **PFI Registered Laboratory** is this mill using?

Product(s)- list all

Fuel Brand Name(s):

Grade of Brand(s):

Raw Feed source(s):

Chemically treated feed: If yes.....identify all):

Additives (list all):

Approx. Annual tonnage per grade:

PFI Program Compliance:

Producer has copy of PFI Standard Specification for Residential/Commercial Densified Fuel: (Yes / No)

Producer has initiated internal QC protocol: (Yes / No) Date

Producer has submitted a copy of their written QA/QC program? Yes / No

Producer has Initiated External QA protocol: (Yes / No) Date

Producer has supplied initial product data verifying product grade: (see Note below) Yes / No

Producer has signed and submitted a "**Certificate of Compliance**": (Yes / No)

Note: Initial product grading must be verified by external lab testing, with a minimum of 5 - 40 pound samples, each taken from a different day of operation and taken in a manner which will be most representative of the product's normal variability.

Appendix B1

Certification of Compliance - Laboratory

Laboratory Name: _____ Year: _____

Laboratory

Location: _____

Note: All laboratories wishing to perform testing for pellet fuel manufacturers to demonstrate PFI product grade must submit on an annual basis a certification that the results of any testing conducted has been reported accurately, that sampling was conducted and analysis was conducted utilizing the methods outlined by PFI's Standard Specification for Residential/Commercial Densified Fuel. Laboratories will not be registered by PFI without this certification.

1.) Certification by Laboratory Manager:

"I certify that all QA analysis conducted for pellet fuel manufacturers pursuing registration by PFI is conducted in accordance with the analytical methods outlined by the PFI's QA/QC program and PFI's Standard Specification for Residential/Commercial Densified Fuel. I further certify that the data presented by the lab to represent PFI product quality is to the best of my knowledge and belief true, accurate, and complete. All exceptions are listed and explained below."

Signature

Printed Name of Person Signing

Title

Date

Exceptions to PFI's QA/QC Program:

Appendix B2

Certification of Compliance – Pellet Fuel Manufacturer

Facility Name: _____ Year: _____

Facility

Location: _____

Note: All pellet fuel manufacturers participating in the PFI registration program must submit on an annual basis a certification by the responsible parties that the results of any testing conducted to demonstrate product grade have been reported accurately, that sampling was conducted in accordance with the required sampling procedures, and that analysis was conducted by an outside laboratory utilizing the methods required by PFI. Products will not be registered by PFI without this certification.

1.) Certification by Mill Owner/Operator:

“I certify that the mill listed above has adopted and is currently implementing a quality management program consistent with the QA/QC program outlined by PFI and that the data presented by the mill to represent product quality and quantity produced is to the best of my knowledge and belief, true, accurate and complete. All exceptions are listed and explained on the attached sheet.”

Signature

Printed Name of Person Signing

Title

Date

2.) Certification by mill Quality Manager:

“I certify that the quality management program of the mill listed above is implemented under my direction and/or supervision and that all sampling and analysis conducted within the mill for the use of establishing pellet fuel quality is conducted in accordance with the QA/QC program outlined by PFI. I further certify that the data presented by the mill to represent product quality and quantity produced is to the best of my knowledge and belief, true, accurate and complete. All exceptions are listed and explained on the attached sheet.”

Signature

Printed Name of Person Signing

Title

Date

Exceptions to PFI’s QA/QC Program:

Appendix C
Data Review Process

Note: This Appendix is included as a placeholder until sufficient data is accumulated from the QA/QC Program to allow a process to be formulated.

Appendix D

Special Requirements Regarding a Mill's First Year of Participation in the QA/QC Program

1. The mill must register with PFI.
2. The test laboratory must be registered with PFI.
3. The one year interim period begins when PFI approves the mill. (See Appendices A2 and B2).
4. Testing must continue in uninterrupted fashion at minimum per the frequency requirements specified in the QA/QC Program (every 1000 tons or at least quarterly).
5. Data must be submitted to PFI quarterly.
6. Labeling
 - a. The manufacturer will determine the Interim Pellet Grade in accordance with the requirements of the PFI Standards Specification for Residential/Commercial Densified Fuel after 5 samples have been analyzed and results submitted to PFI by the QA laboratory.
 - b. The bag will be labeled stating that the grading has been determined in accordance with the PFI Standards Specification for Residential/Commercial Densified Fuel based on testing conducted by a PFI registered laboratory.
 - c. Until a one year rolling sum average has been established for all analyzed parameters, the bag label must show the full ranges for each required fuel property within the grade specified rather than the mean \pm 2 SD. For example, if the analysis of the first five samples shows that the grade is Super Premium, the Inorganic Ash would be reported on the bag as \leq 0.50% rather than the actual mean value \pm 2 SD.
 - d. The fuel analysis will be stated as being the Mill's Guaranteed Analysis.
 - e. The PFI logo can be used on the bag and the product(s) registered on the PFI website before a one year rolling sum average has been established for all analyzed parameters, but during that period, a statement indicating that the specified pellet grade is provisional must be included on the bag label.
 - f. For both the interim and annualized labeling, grading shall be based on the mean \pm 2 SD for all analyzed parameters. If a \pm 2 SD value falls outside the grade requirement, the fuel must be labeled with the next lower grade (assuming all other properties fall within that grade).

Appendix E

Example of label format showing the use of a bar scale to represent the mean value \pm 2 Std. Dev.

