

Project no. 038644
Bio-Norm II

Pre-normative research on solid bio-fuels for improved European standards
SPECIFIC TARGETED RESEARCH OR INNOVATION PROJECT
PRIORITY [6-1] – Sustainable energy systems



Report on design of second round for sampling and testing.

Deliverable D.I.11

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CTI – Comitato Termotecnico Italiano
UNIVPM – Università Politecnica delle Marche
SLU – Swedish University of Agricultural Science

Revision 1

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Involved Participants

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Revisions

Version	Date	Author(s)	Change
1	24/08/2009	SLU, CTI, UNIVPM	-

1. Design for second round of sampling and testing

1.1 Introduction

At a meeting in Ancona, Italy the 5th of August 2009 the results from the first round of Task I.2 were discussed in the WP I-group. From these results the second round for the sampling and testing of the various materials in Task I.2 were decided as described below.

1.2 Sampling and testing plan for grape residue

Since the production period for grape residue is very short during September and October, it was realised during the planning of the first round of Task I.2 Sample planning that it should not be possible perform a second round of Task I.2 in 2009 without breaking the time schedule for WP I. It was therefore decided that for grape residue, 4 samples a week during 5 weeks should be sampled and analysed during the first round, but where only 2 samples a week were used in the statistical calculation of the first round. In the second round instead, all samples were used in the evaluation. An equal experimental design as in the first round was used in the second round.

1.3 Sampling and testing plan for olive residue

Since the processing period of olives is very short during October and November, and the shipments of olive residues from other Countries are generally no planned, it was realised that it should not be possible perform a second round of Task I.2 in 2009 without breaking the time schedule for WP I. Moreover, during the first round of Task I.2 due to the fact that a limited number of lorries of olive residues were received at the power plant, it was not possible to perform a second round sampling as for grape residues in section 1.2.

1.4 Sampling and testing plan for bark

The results from the first round of task I.2 for bark showed good agreement with the results from Task I.1. The WP I-group therefore made the judgement that further analyses would not gain any more knowledge and that a second round for bark is not needed.

1.5 Sampling and testing plan for wood chips

Since the time period for the sampling of wood chips in round 1 of Task I.2 was only 2 weeks due to the delay in the plant (see D.I. 10), a second round will be performed where the sampling is carried out during a period of 10 weeks instead. An equal experimental design as in the first round will be used in the second round.

1.6 Sampling and testing plan for pellets (6mm diameter)

Since there was no possibility of performing the sampling for further 10 weeks in the same pellet production plant, it was therefore decided - during the first round of Task I.2 - that for the 6mm pellets, 4 samples a week during 5 weeks should be sampled and analysed during the first round, but where only 2 samples a week were used for the statistical calculation of the first round. In the second round instead, all samples were used in the evaluation. An equal experimental design as in the first round was used in the second round.

12.7 Sampling and testing plan for pellets (8mm diameter)

As was reported in the delivery D.I.10 Report on the first round on sampling and testing, the sampling of 8mm pellets had to be carried out from an earlier produced heap that had been stored during a couple of weeks, since the plant had got a large order of 6mm pellets. The results are therefore not reliable especially for the moisture content. A second round will therefore be performed during a 10 week period, where the moisture and ash content will be studied. Since the plant is producing 6mm pellets until October, the analysis of mechanical durability is not possible since this parameter is very dependent on the size of the pellets. An equal experimental design as in the first round will be used in the second round.

1.8 Method for statistical analyses

The aim of Bionorm II, WP I, Task I.2 is to investigate the variance over time of specified properties of a material in a process chain. A suitable statistical method for the evaluation of long term variation is the Shewhart control chart. In this method the values from the analyses of a fuel parameter are collected over a long period of time. From these values the average \hat{y} and the standard deviation s are calculated. A control chart is then constructed where the individual values are plotted in time order and where the average \hat{y} together with $\pm 1s$ and $\pm 2s$ are shown in the chart as control lines (see figure 1 below).

The feature with the Shewhart chart is that you easily get a measure of the long term variation in the data. In addition, it indicates how much variation about the average \hat{y} that can be expected to occur by chance and if you have any outliers or trends in the data.

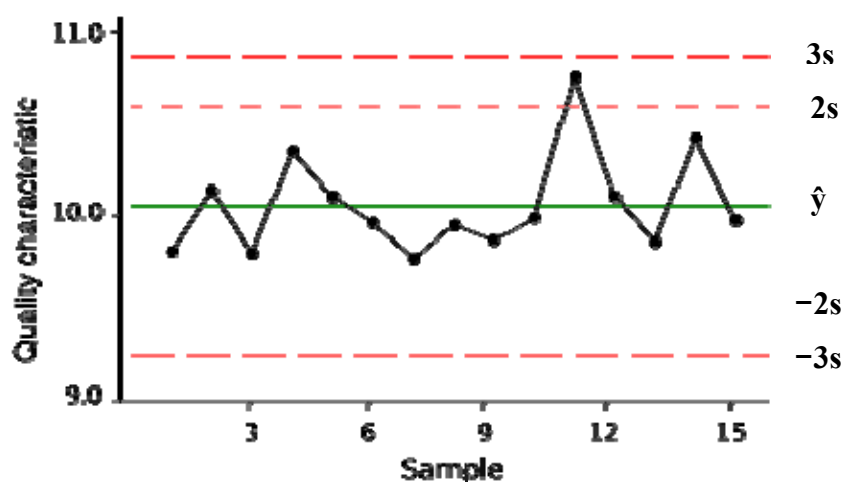


Figure 1 Example of a Shewhart control chart

2. State of affairs

Task I.1 Sampling and sample reduction, and the first round of Task I.2 Sample planning have been finished. A final report from Task I.1 and from the first round of Task I.2 has been delivered in August 2009.

3. Time planning

The round 2 of BioNorm II, WP I, Task I.2 Sample planning, will start during the month of August 2009. In figure 2 a time plan of the activities is shown.

	2009				
Activities	Aug.	Sep.	Oct.	Nov.	Dec.
<i>Meetings</i>	■			■	
<i>Sampling</i>	■	■	■		
<i>Analyses</i>		■	■	■	
<i>Statistics</i>				■	
<i>Report</i>					■

Figure 2 Time planning for the activities in Task I.2 Sample planning (round 2).