

RENEWABLE FUEL STANDARD PROGRAM – RFS2

THIRD PARTY ENGINEERING REVIEW



Prepared for:

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RCO

Abengoa Bioenergia Agroindústria Ltda.

Pirassununga, São Paulo, Brazil.

Company ID 3924

Facility ID 70473

Prepared by:

Control Union

Date:

January 30, 2013

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Requirement

80.1450(d):

(i) For all producers of renewable fuel and foreign ethanol producers registered in calendar year 2010, the updated registration information and independent third-party engineering review shall be submitted to EPA by January 31, 2013, and by January 31 of every third calendar year thereafter.

Executive Summary

This report outlines the results of the third party engineering review conducted at Abengoa Bioenergia Agroindústria Ltda. to demonstrate compliance with requirements in the Renewable Fuels Standard Regulation (RFS2). The on-site review was conducted by D. Silva, auditor of Control Union Certifications, under São Paulo Professional Engineer (PE) license number 04362514, from January 30, 2013. D. Silva is chemical engineer that has over 16 years of experience in various fields of chemical and renewable fuel industries as process, production and project engineering.

Abengoa Bioenergia Agroindústria Ltda. is a foreign ethanol producer, according to Title 40: Protection of Environment, PART 80 – REGULATION OF FUELS AND FUEL ADDITIVES, Subpart M – Renewable Fuel Standard, § 80.1401 – Definitions. The independent third party engineering review included, but it was not limited to, a site walkover, verification of production process and production capacity, energy inputs, feedstock, supplemental plans, and applicable permits.

The independent third party engineering review did not indicate any discrepancies between the registration form and supporting documents. That being said, Control Union Certifications recommends Abengoa Bioenergia Agroindústria Ltda. to be approved and accepted.

Background

Abengoa Bioenergia Agroindústria Ltda. facility located in Pirassununga, São Paulo, commenced construction on 07/29/1980 as supported by the initial installation permit N° 016076, process N° 05/1380/0 and started operation on may, 1981, as supported by the initial functional permit N° 012956, process N° 05/1815/0. Today, according to the actual operating and air permit, license operating N° 43003389, process N° 43/00011/09, Abengoa Bioenergia Agroindústria Ltda. has a production capacity of 13,525,651 gallons of advanced biofuel per year under the Code-5.

Figure 1 shows the facility.



Figure 1: Abengoa Bioenergia Agroindústria Ltda., facility.

1. Professional Licensed Engineer Qualifications

A copy of D. Silva's documents can be found in Appendix A in order to attest his qualifications. D. Silva is not disbarred, or proposed for suspensions or disbarment.

D. Silva has over 16 years of experience in chemical engineering as production, process and project, four of these years were spent working in the renewable fuel industry as process engineering, working at the sugar and ethanol facilities of Destilaria de Álcool São José S/A as a processes engineer.

2. Third Party Independence

To qualify as an independent third party, the professional engineer (PE) conducting the engineering review cannot be operated by the renewable fuel producer or any subsidiary or employee of the renewable producer. The professional engineer must also be free of any interest in the fuel producer's business, and equally, the renewable fuel producer must be free of any interest in the professional engineer's business.

Control Union reviewed 40 CFR 80.1450(b)(2)(ii) and has determined that D. Silva complies with the established third party requirements. Control Union is not operated by Abengoa Bioenergia Agroindústria Ltda. or any subsidiary or employee of Abengoa Bioenergia Agroindústria Ltda. and is free of any interest in Abengoa Bioenergia Agroindústria Ltda. business. In addition, Abengoa Bioenergia Agroindústria Ltda. is free of all interest in Control Union.

3. Verification, Exceptions or Discrepancies

As required by RFS2, the independent PE should review and evaluate the accuracy of all the registration information the renewable fuel producer is required to submit to EPA for registration. The site visit that accompanies the document review was conducted on January 30, 2013. Each registration requirement has been addressed in the engineering report for Abengoa Bioenergia Agroindústria Ltda.

3.1. Fuel Types

Abengoa Bioenergia Agroindústria Ltda. registered under D-Code 5 Renewable Fuel are capable of producing 13,525,651 gallons ethanol per year. The facility is capable of producing anhydrous and hydrous ethanol. Abengoa Bioenergia Agroindústria Ltda. did not indicate that they intend to produce or are capable of producing any additional fuels without significant modifications to the existing facility. During the site visit, the PE verified this information against construction permits and as a result agrees with this component of RFS2 registration.

3.2. Feedstock, Co-products and Process Heat Fuel

Abengoa Bioenergia Agroindústria Ltda. registered under Feedstock Code 120, Sugarcane. Abengoa Bioenergia Agroindústria Ltda. is not capable of using others feedstock without significant modification to the existing facility. This information was verified by reviewing the process flow diagrams and inspection of processing equipment.

Abengoa Bioenergia Agroindústria Ltda. is not registered under Codes 20, Dry Distillers Grains and Code 10, Wet Distillers Grains as all of the available co-products codes are only available for grains distillers. During the site visit, the PE verified Abengoa Bioenergia Agroindústria Ltda. produces as co-products sugar, bagasse, fusel oil, yeast, CO₂, vinegar water and sludge coming from the washing of sugarcane and from the juice decanter. Sugar is stored and sold to local and international trading companies. Bagasse is used as a heat process supply and both vinegar water and sludge are used as soil fertilizers in the sugarcane fields. It is Control Union understanding that there are no co-products codes for the co-products above mentioned. This information was verified by reviewing the process flow diagrams and inspection of processing equipment.

Abengoa Bioenergia Agroindústria Ltda. provided for review a Process Heat Fuel Supply Plan as required by 40 CFR 80.1450 as part of the registration requirements. The plan indicated that the bagasse is the only process heat fuel. The total throughput as used for process heat for obtaining ethanol is 153,385,930 BTU/h whereas the steam boiler can produce 1,641,420,000 BTU/h. The total energy used for obtaining ethanol is 9.3% of the total energy produced. While in site the PE verified that bagasse is indeed the only significant source of process heat used at Abengoa Bioenergia Agroindústria Ltda. by observation of the process equipment, fuel supply lines, and Piping and Flow Diagram (P&FD). Bagasse is burned and water is heated for steam generation. The generators are moved with steam for electricity production and turbines are moved by the steam generated in the process. The steam is then used to run the distillery.

3.3. Production Process

Under Abengoa Bioenergia Agroindústria Ltda. State Environmental Agency (CETESB) license operating N° 43003389, process N° 43/00011/09 of 04/07/2011 is allowed to operate a fuel grade ethanol production facility based on sugar cane.

Abengoa Bioenergia Agroindústria Ltda., Pirassununga, São Paulo, Brazil, operates a fuel grade ethanol production facility based on sugarcane milling. Sugarcane fields are located on a 31.3 km radius from the renewable fuel production facility. The production of sugarcane per hectare is 83.06 ton/ha. The mix production unit is 72% of TRS (total reducing sugars) for production of sugar and 28% of TRS for production of ethanol.

The basis for the production of ethanol is to convert the sugarcane juice into ethanol. Abengoa Bioenergia Agroindústria Ltda. receives sugarcane by truck. The trucks are weighted and sampled for sugar content analysis, after that the sugarcane is unloaded. The unloaded sugarcane is conveyed for milling in a 6 stage cascaded in counter flow with the juice, as follows:

1. The facility has a nominal capacity of processing 17,000 ton/day of sugarcane. The juice is drained and separated from the bagasse. The juices are heated and pH corrected and transferred into a tank for gravity sedimentation. The facility produces 184,921 gal/h of purified juice. The purified juice is pumped to the sugar production plant. The facility produces purified molasses, as co-product of sugar production.
2. The facility consumes 670 ton/day of purified molasses to produce ethanol. Water is added to purified molasses, producing the mixture which is pumped to the ethanol production plant. At the ethanol plant enzymes are added to the fermenters.
3. After fermentation, the resulting crude wine is first separated in a series of centrifuges. The wet yeast will be used in new fermentation, after suffering a suitable chemical treatment.
4. The separated wine is then sent to two distinct distillation stills trains. One distillation train will produce hydrated ethanol at 93.0% weight basis and the other train will produce anhydrous ethanol at 99.3% using cyclohexane in order to break the azeotrope mixture. The volume of ethanol produced per ton of sugarcane is 6.21 gallons/ton (23.52 liters/ton).
5. The distillation bottom is acidic water named vinegar water. This vinegar water is then cool at room temperature and pumped to a centralized system for soil fertilization purposes. Bagasse is the fuel for process heating. High pressure steam is used to generate electricity and in the steam driven motors. Low

pressure steam is used for process heating. The excess bagasse is stored in piles outside of the plant. The sludge from the juice decanter and from the sugarcane primary washing are concentrated and used as composite soil fertilizer.

3.4. Production Capacity

All the permits submitted by the renewable fuel producer to EPA that support the facility's baseline volume were reviewed to verify the facility's baseline volume. The facilities actual operating and air permit, license operating N° 43003389, process N° 43/00011/09, last issued on 04/07/2011, valid until 04/07/2013, by State Environmental Agency (CETESB), states a total baseline volume of 13,525,651 gallons of ethanol per year. The permits specifies a total capacity of 51,200 cubic meters of ethanol production per year which using the conversion rate of 3.7854 (liter/gallons) gives the total mentioned gallons of ethanol per year. Per 40 CFR80.1403 the permitted capacity is 105% of the permissible volume output of renewable fuel, there for the permitted capacity for Abengoa Bioenergia Agroindústria Ltda. is of 14,201,934 gallons of ethanol per year.

3.5. Items Verified Not To Occur

In addition to the above we would like to point out that the following items were not required as part of the registration materials:

The use of separated yard waste, separated food waste or separated municipal solid waste (MSW) was verified no to occur. This is in line with the registration information provided by Abengoa Bioenergia Agroindústria Ltda. to the EPA.

4. Confidential Business Information

This third party engineering review was prepared in such a way that it does not contain confidential business information (CBI).

Conclusion

In conclusion the independent third party review process as conducted by Control Union auditor, D. Silva, revealed no exceptions between the registration form, supporting documents, and the Abengoa Bioenergia Agroindústria Ltda. facility.

Therefore, Control Union recommends that Abengoa Bioenergia Agroindústria Ltda. RFS2 registration be approved and accepted.

Denilton Silva

CRQ-4ª Região Nº. 04362514

Professional Chemical Engineer's Name

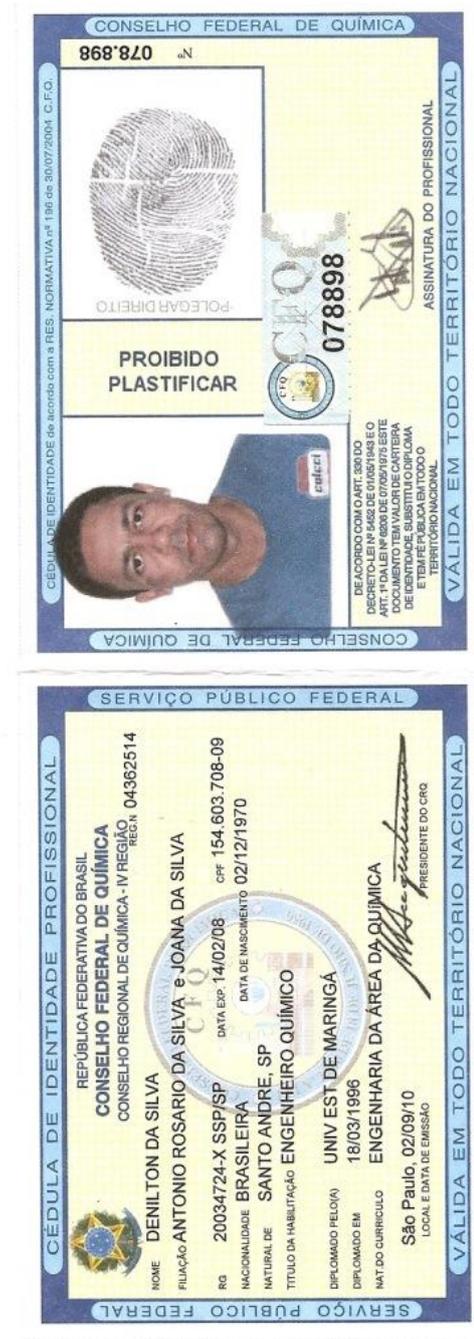
Registration Number

January 30, 2013

Professional Chemical Engineer's Signature

Date

Appendix A – Professional Licensed Engineer Documentation



Universidade Estadual de Campinas

O Reitor da Universidade Estadual de Campinas, no uso de suas atribuições legais, tendo em vista a conclusão em 17-12-2007, do Curso de Mestrado em Engenharia Química, ministrado pela Faculdade de Engenharia Química, reconhecido pela Portaria MEC nº 524 de 29-04-2008, confere o título de

Mestre em Engenharia Química

na área de Ciência e Tecnologia de Materiais a

Denilton da Silva

Brasileiro, natural do Estado de São Paulo, nascido a 02 de dezembro de 1970, RG: 20034724-SP de acordo com a defesa de dissertação homologada em 26-08-2008, pela Comissão Central de Pós-Graduação, Deliberação CCPG nº 1448 de 26-08-2008, para constar, manda expedir-lhe o presente diploma.

Cidade Universitária "Zeferino Vaz", 17 de setembro de 2008

Antonio Magalhães
Diretor Acadêmico

Teresa Dib Zamboni Atvares
Pró-Reitora de Pós-Graduação

Denilton da Silva
Diplomado

José Tadeu Jorge
Reitor