

ALTERNATIVE LOW CARBON FUEL HANDLING PROCEDURES AND TESTING MANUAL

Lehigh Hanson Materials Ltd. – Picton Cement Plant

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1.0 INTRODUCTION AND PURPOSE

This Alternative Low Carbon Fuel Handling Procedures and Testing Manual provides a summary of operational procedures related to the use of Alternative Low Carbon Fuels (ALCFs) at the Lehigh Hanson Materials Ltd. (Lehigh) Picton Cement Plant (the Site). The Site is located at 1370 Highway 49, Picton, Ontario. The following is a summary of what is included in this manual:

- Background, including a site description and proposed storage and handling equipment (Section 2).
- Handling procedures for ALCFs, and including incoming and outgoing records (Section 3).
- Material acceptance and vendor screening process (Section 4).
- ALCF sampling and testing, and steps taken upon identification of deficiencies (Section 5).

This manual should be read in conjunction with Lehigh's Quality Standard, Operating and Procedure document, QC-SOP-114 (currently in DRAFT), the current Environmental Compliance Approvals (ECAs), and updated upon issuance of the amended ECA.

Should requirements differ between this manual, QC-SOP-114 and the ECA(s), the ECA requirements should be considered accurate. This manual is administered and maintained by Lehigh. This manual will be made available to all Site inspection staff.

2.0 BACKGROUND AND PROPOSED STORAGE AND HANDLING OF ALCFS

2.1 Site Description

The Site is a Portland cement manufacturing Site and typically operates 24 hours per day, 7 days per week, and 12 months per year (except during plant shutdowns). The Site has an approved production limit of 163 tonnes per hour of cement clinker (1.4 million tonnes of clinker cement per year) from Kiln 4.

ALCFs will be delivered by enclosed trucks, which would enter the proposed fuel storage building. The unloading of these materials will take place in an enclosed process.

The proposed ALCF feed system will be fully integrated with the plant control system to regulate and limit the fuel substitution rates and maintain the required temperature profile and system conditions. ALCFs will not be used during transitional operating periods.

Further details about the proposed storage and handling of the ALCFs is provided in the following section.

2.2 Proposed Storage and Handling Equipment

2.2.1 ALCF Storage Area

Lehigh has a proposed dedicated ALCF storage building at the Site, where reception, unloading, storage, fuel preparation and feeding of the ALCF to the kiln will take place.

In accordance with O. Reg. 79/15 it is expected that each load of ALCF will be used within no more than six months of receipt and Lehigh shall ensure the following:

- 1) The fuel shall be stored,
 - a. Indoors, or
 - b. Outdoors in enclosed containers that prevents the discharge into the natural environment of both the fuel and any contaminant relating to the fuel.
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- 2) The fuel shall be stored, handled and maintained so as to prevent
 - a. Leaks or spills of the fuel and contaminants relating to the fuel, and
 - b. Damage to or deterioration of any container in which the fuel is stored.
- 3) The fuel shall be stored in a safe and secure manner that minimized the impact of dust, odour, noise vectors, vermin and litter on the general public and on the natural environment.
- 4) Access by the general public to fuel handling facilities, fuel storage facilities and fuel storage areas at the Site shall be controlled by gates, fencing, attendants or other security measures.

2.2.2 Fuel Preparation and Handling

The ALCF materials may require further size reduction to be fed as a fuel and blending to ensure consistency in the fuel feed. This is accomplished through loading the material into a de-lumper. Materials would then be fed via conveyor to the ALCF feed hopper of the fuel delivery system.

The fuel preparation and handling system will include the following:

- 1) An in-feed drag conveyor to a de-lumper to ensure appropriate particle sizes are achieved and to blend materials.
- 2) A drum or belt magnetic separator.
- 3) An enclosed conveyor to transfer materials to the hopper for the ALCF feeding system.
- 4) An ALCF feeding system, electronically controlled, and specifically designed to handle light and low bulk density materials.

3.0 ALTERNATIVE LOW CARBON FUEL (ALCF) HANDLING PROCEDURES

3.1 ALCF Fuel Reception

ALCFs will be transported to the Site in enclosed trailers. The typical capacity of each trailer is approximately 20 to 25 tonnes of ALCFs.

Upon entering the Site, each truck will be weighed and travel directly to the ALCF building for indoor unloading to minimize the potential for fugitive emissions. The unloading process will be visually inspected by the operator. Processing equipment and fuel feed system will be equipped with video surveillance / monitoring.

Upon completion of unloading, the driver will sweep out any residue remaining in the back of the trailer (especially the tail gate, doors and closure devices) so as to minimize material track out or generation of litter. The driver will close and secure the trailer doors and drive out of the receiving building. The driver will return to the weigh scale where the truck will be re-weighed and a copy of the bill of lading will be given to Lehigh personnel for record retention.

3.2 Incoming and Outgoing Records

After each trailer is unloaded, the driver will leave a copy of the bill of lading and will be retained as part of the record of delivery.

As required by s.14 of O. Reg. 79/15 (Record of Fuel), Lehigh shall ensure that a record is prepared each time the fuel is received at the Site, setting out the following information:

- a) The type and quantity of the fuel received;
- b) The source and origin of the fuel; and
- c) If the vehicle used for transporting the fuel to the site is marked with a number appearing on an environmental compliance approval authorizing the transportation or a registration number appearing on a confirmation of registration under Part II.2 of the Act in respect of the transportation, the number marked on the vehicle; or
- d) If the vehicle is not marked with a number mentioned in paragraph 3, the name of the person transporting the fuel.

In addition, Lehigh shall ensure that a record is prepared each time ALCF is refused for receipt at the Site, setting out the amount of fuel refused and the reason for the refusal.

The Records of Fuel described above shall be retained for two years following the day on which the fuel described in the record was received at the Site.

4.0 MATERIAL ACCEPTANCE

4.1 ALCF Vendor Screening

Lehigh intends to enter into formal agreements for ALCF supply. It is anticipated that the ALCF suppliers will be derived from industrial and/or post-consumer sources, with a priority on locally-sourced ALCFs.

The terms of agreements will reflect the requirement of the ALCF supplier to screen for and remove materials that would be unacceptable for Lehigh, from both the perspective of regulatory compliance and the suitability of the fuel for the cement-making process. Screening would be required to ensure that materials that do not meet the requirements of O. Reg 79/15 and O. Reg. 824/21 are excluded from the fuel mix and do not enter the Site.

4.2 Initial Fuel Testing Protocol – Acceptance Period

Upon securing agreements with ALCF suppliers, Lehigh will implement an initial fuel testing protocol over a two-month “acceptance period” in which random samples will be taken of the size-reduced fuels and tested once per week. A daily random sample will be taken to make a weekly composite sample (samples will be collected on the days that fuel is delivered to the Site). The approach will allow for Lehigh to assess if the material quality specifications are being met and will minimize potential for disruption to stable operations.

During the two-month acceptance period, Lehigh may decide to undertake random inspections at the point of supply performed by a trained operator who is familiar with the desired composition of the ALCF. The inspector will be in a position to safely observe the material as it is being loaded to the transport trailers. If the inspector observes any material in the load which is deemed to be unsuitable for use as ALCF, loading will cease immediately. Unacceptable materials or conditions could include:

- excessively wet material;
 - oversized material;
 - non-combustible material;
 - hazardous materials; and,
 - highly odours materials.
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4.3 Initial Fuel Testing Protocol – Post-Acceptance Period

Once the acceptance period is complete and if the ALCF supplier has established that they can consistently meet Lehigh’s ALCF specifications, the frequency of sampling by Lehigh of the ALCFs will consist of a weekly random sample to produce a monthly composite sample to be tested.

During the unloading of the ALCFs, the operator will be present to visually inspect the material prior to the truck leaving the building. If the operator observes any material in the load which is deemed to be unsuitable for use as an ALCF, unloading will cease immediately and the material will be returned to the fuel supplier.

Lehigh shall ensure that an electronic record is prepared each time the fuel is received at the Site, as outlined in Section 3.2.

5.0 ALCF SAMPLING AND TESTING

Lehigh has established specifications for ALCFs to meet both operational and environmental objectives. Operationally, the plant must ensure that the materials meet specifications related to particle size and moisture content so that the materials are suitable for the cement making process. From an environmental standpoint, the metals/inorganics scan will be completed in accordance with the current fuel requirements in the Site’s current ECAs.

The ALCF feed will be sampled as per the protocol below. Once the initial acceptance period is complete, Lehigh will obtain a metals/inorganics scan, including at minimum the compounds listed in Table 2 on a quarterly basis.

5.1 Sampling Protocol

During the of ALCFs, fuel sampling and testing will be performed as follows:

Grab Samples:

- The grab samples will be collected directly from the fuel feed conveyor system using a plastic shovel and a container or pail. Grab samples will be collected from the fuel feeding conveyor system after ALCF has been processed or blended, or from the trucks if processing and blending was done outside the Site, every day for a week.
- The volume of each grab sample should be equal to at least 10 litres (pail or container full).

Composite Samples:

- For the initial acceptance period, a weekly composite of daily random samples will be completed. The weekly composite sample will be composed of representative grab sample of processed ALCF taken by the Lehigh staff a minimum of one-time daily for a period of one week (seven consecutive days or as for many days that the fuel is delivered).
- The monthly composite sample will be composed of four weeks of one random grab sample per week thoroughly mixed, which will be used for the monthly or quarterly testing as outlined below. This testing will be completed to ensure that the products as received meet the required specifications. The monthly composite samples will be prepared from the mixed grab samples through quartering until a sample volume of one to two kilograms is obtained. Quartering will be preformed in the following manner, the residual waste sample is to be reduced is formed into a conical pile, the top of the pile is flattened and dived into four piles along two diameters at right angles to each other, two of the diagonally opposite quarters are removed and discarded, the remaining quarters are mixed and the previous steps are repeated until the desired sample volume is obtained of 1 kg (minimum).

- Testing of carbon (total and biological) will take place in accordance with the federal Greenhouse Gas Reporting Program (GHGRP).
- Testing of operating parameters will take place on a monthly basis to ensure that the fuels meet the operational objectives as outlined in Table 1 below.
- Testing of environmental parameters will take place on a quarterly basis to ensure that the fuels meet the environmental objectives as outlined in Table 2 below.

These are summarized in the following table.

Table 1: Summary of Sampling and Testing

Sample Period	Sample Types Required	Frequency of Sampling	Frequency of Testing	Analysis included with Testing
Initial Acceptance	Grab	One-time daily	Weekly	<ul style="list-style-type: none"> • Operating • Environmental • Carbon
	Composite	Weekly: composed of the daily samples		
Post-Acceptance	Grab	One-time weekly	Monthly to Quarterly	<ul style="list-style-type: none"> • Operating (monthly) • Environmental (quarterly) • Carbon (monthly)
	Composite	Monthly: composed of one random sample per week for four weeks Quarterly: composed of the three monthly samples		

Further details on what is included with the testing of operating and environmental parameters and the carbon content testing is provided in the next section.

5.2 ALCF Specifications and Analytical Methodology

The following tables provide the operating parameters, environmental parameters and the carbon content testing.

Table 2: Alternative Fuel Specifications – Operating Parameters – Tested Monthly

Operational Specification	Parameter	Rationale
Moisture	≤ 25% by weight	<ul style="list-style-type: none"> • Fuel quality • Prevention of run-off • Consistent heating value
Chlorine Content	≤ 1.5 % by weight	<ul style="list-style-type: none"> • Fuel quality • Similar to regulatory guideline in other jurisdictions • Testing undertaken in accordance with CSA C22.2 No.03 or MIL-DTL-24643
Calorific Value	≥ 10 MJ/kg	<ul style="list-style-type: none"> • Requirement of O. Reg. 79/15

Table 3: ALCF Specifications – Environmental Parameters - Tested Quarterly

Environmental Specification	Parameter	Rationale
Metals/inorganics	Anticipated testing for the following metals in accordance with similar facilities that have obtained an ECA (for) to use ALCFs fuel requirements in the Site's ECA (Air): <ul style="list-style-type: none"> • Antimony • Arsenic • Barium • Beryllium • Cadmium • Chromium • Cobalt • Iron • Lead • Manganese • Mercury • Nickel • Selenium • Silver • Tin • Vanadium 	<ul style="list-style-type: none"> • Quarterly testing of the ALCFs for metals anticipated to be listed in the Site's ECA. • Results of POI concentration modelling based on determination of the proportion of the contribution of the ALCF to the mass of the material to the cement plant, should indicate that the POI would not be exceeded.

Table 4: Alternative Fuel Specifications – Carbon Testing (Total and Biological)

Operational Specification	Parameter	Rationale
Carbon	Total and Biological (Biogenic) Carbon	<ul style="list-style-type: none"> • In accordance with the Greenhouse Gas Reporting Program and O. Reg. 79/15

5.3 Identification of Deficiencies

On each day that the Site is in operation, a visual inspection shall be conducted of the fuel handling facilities, fuel storage facilities and fuel storage areas to determine whether the fuel is stored, handled and maintained in accordance O. Reg. 79/15. Any deficiencies in the fuel handling facilities, fuel storage or fuel storage areas during a visual inspection or any time shall be remedied forthwith. This inspection may be completed using the 24/7 video surveillance system in the ALCF storage building or other methods.

Immediately after the completion of a visual inspection, an inspection record shall be prepared setting out:

- The name and position of the person who performed the inspection,
- The date of the inspection,

- The amount, type and location of fuel stored at the Site at the time of the inspection, and
- A description of any deficiencies identified and recommendations regarding steps that should be taken to remedy the deficiencies.

If a deficiency is identified at a time other than during a visual inspection, a record shall be prepared immediately setting out the name and position of the person who identified the deficiency, the date on which it was identified, a description of the deficiency and recommendations regarding steps that should be taken to a remedy by the deficiency.

After a deficiency has been remedied, a record shall be prepared setting out the day on which the deficiency was remedied and a description of the remedial actions taken. Lehigh will retain:

- A record for two years following the day on which the inspection was conducted or the deficiency was identified, as the case may be; and
- A record for two years following the day on which a deficiency referred to in the record was remedied.
- Records may be retained electronically.