



State of Oregon
Department of
Environmental
Quality

Beneficial Use of Solid Waste Determination Evaluation Form

Applicant: Rick Gross, Clear Water Landfill, 1990 Clearwater Lane, Springfield, OR 97478

BUD#: LaneBUD20110301SilicaWestConcreteAdditive

Solid Waste: Silica Fume

Summary of Proposed Beneficial Use: silica fume used as concrete additives

Reviewer: Hugh Gao

Date: March 25, 2011

Tier: One Two Three

Beneficial Use of Solid Waste

Beneficial use of solid waste is a sustainability practice that may involve using an industrial waste in a manufacturing process to make another product or using a waste as a substitute for construction materials.

The environmental benefits of substituting industrial waste materials for virgin materials includes conserving energy, reducing the need to extract natural resources and reducing demand for disposal facilities.

Oregon Administrative Rules (OAR) 340-093-0280 - 0290 establish standing beneficial uses and a process for DEQ review of case-specific beneficial use proposals. Under these rules, DEQ may issue a beneficial use determination as an alternative to a disposal permit for proposals that meet the rule criteria. If approved, once a beneficial use determination is issued, DEQ no longer regulates the waste as a solid waste as long as the waste is used in accordance with the approved beneficial use determination.

Beneficial Use Determination Evaluation Summary

Yes, the Beneficial Use of this solid waste meets all the case-specific performance criteria listed in OAR 340-093-0280 and is approved.

No, the Beneficial Use of this solid waste does not meet all the case-specific performance criteria listed below and is not approved.

Rick Gross of Clearwater Landfill applied for a Tier 1 beneficial use determination. The applicant intends to ship the silica fume material disposed at the landfill to a facility that will use it as a concrete additive.

An estimated 60,000-tons of pelletized silica fume generated from a metallurgical process was disposed by the previous permittee, Global Metallurgical, Inc. at the landfill. The silica fume present at this facility is in the form of ¼ to ½ inch dark gray pellets (see figure 3 of 2006 site inspection report).

Case-Specific Beneficial Use Performance Criteria:

DEQ may approve an application for a case-specific beneficial use of solid waste only if all the following performance criteria are addressed: 1) Characterization of the Solid Waste; 2) Productive Beneficial Use of the Solid Waste; and, 3) The affect of the Proposed Beneficial Use on Public Health, Safety, Welfare and/or the Environment.

1) Characterization of the Solid Waste

Did the applicant characterize the solid waste and proposed beneficial use sufficiently to demonstrate compliance with the rules for case-specific beneficial use determinations (OAR 340-093-0280) by submitting required information for the appropriate tier? (See tier sections below for detailed characterization information.)

Yes No

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Solid Waste: silica fume
Date: March 22, 2011

Currently, the owner of the site is exploring marketing the silica fume material as a cement concrete admixture. The applicant has contracted with **Cementec Industries Inc.** who will use the silica fume from the landfill as a concrete additive. **Cementec Industries Inc.** is a Canadian-based company, and the head office and operations are located in Calgary, Alberta. A description of the company's website says:

General Description: **CON-Fume** silica fume is a pozzolanic material used to produce high performance concrete or mortar possessing increased strength, impermeability and durability. Silica fume reacts with the hydration products of Portland cement, forming calcium silicate hydrate gel, which enhances strength and durability by consuming weaker calcium hydroxide. **CON-Fume** silica fume has been specially developed to provide enhanced bulk material flow and handling characteristics, providing efficient bulk transportation and pneumatic unloading.

Applications: **CON-Fume** is recommended for high performance concrete and mortar applications.

Was the following information submitted for DEQ review and how adequate was it?

Although there was no completed information submitted with the application, it is sufficient for DEQ review to make a determination on the material for the beneficial use, based on the research and information obtained from the sources, knowledge of the material disposed at the landfill, and onsite environmental monitoring for years.

Tier 1 Applicable Not applicable

- Did the applicant provide an adequate description of the material proposed for beneficial use, the manner of generation and the estimated quantity to be used beneficially each year?
 Yes No

An estimated 60,000-tons of pelletized silica fume generated from a metallurgical process was disposed by the previous permittee, Global Metallurgical, Inc. at the landfill. The silica fume present at this facility is in the form of ¼ to ½ inch dark gray pellets.

- Did the applicant provide an adequate description of the proposed beneficial use and justify how the proposed use is beneficial?
 Yes No

The applicant intends to ship the silica fume material disposed at the landfill to a facility that will use it as a concrete additive.

- Did the applicant provide a sufficient comparison of the chemical and physical characteristics of the material proposed for beneficial use with the material it will replace?
 Yes No

Despite the fact there is no information for the material provided by the applicant, DEQ can still make a determination based on the historical knowledge of the material and onsite environmental monitoring for years. According to comments from Bill Mason, DEQ Senior Hydro-geologist, "Although the applicant did not include laboratory data with the application, I am comfortable approving this use without that information. Silica fume is actually used to stabilize metals-contaminated material - so that it doesn't leach, and their decade of groundwater monitoring supports its low leachability."

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Following are examples of how silica fume is created and is being used:

<http://www.epa.gov/wastes/nonhaz/define/pdfs/silica-final.pdf>

<http://www.fhwa.dot.gov/infrastructure/materialsgrp/silica.htm>

<http://www.madehow.com/Volume-6/Silicon.html>

<http://sacademy.cbv.ns.ca/staff/bdalzell/PCA/AutoPlay/Docs/IS007.pdf>

- Did the applicant successfully demonstrate compliance of the proposed beneficial use with the performance criteria in OAR 340-093-0280 based on knowledge of the process that generated the material, properties of the finished product, or testing?

Yes No

See comments above.

- If required, did the applicant provide any other DEQ required information to evaluate the proposal?

Yes No

The applicant provided a copy of the Executive Silica Fume Sales Agreement with Cementec Industries Inc., the material end user.

2) Productive Beneficial Use of the Solid Waste

Has the applicant demonstrated that the proposed beneficial use is a productive use of the material by providing information substantiating the criteria listed below?

Yes No

The applicant has contracted with **Cementec Industries Inc.** who will use the silica fume from the landfill as a concrete additive. Silica fume, also known as microsilica, is a byproduct of the reduction of high-purity quartz with coal in electric furnaces in the production of silicon and ferrosilicon alloys. Silica Fume is also collected as a byproduct in the production of other silicon alloys such as ferrochromium, ferromanganese, ferromagnesium, and calcium silicon. This material is known to have physical properties that make it a good concrete additive.

- Did the applicant successfully identify or demonstrate a reasonable likely proposed beneficial use for the material that is not speculative?

Yes No

See comments above re Cementec Industries, Inc.

3) Effect of Proposed Beneficial Use on Public Health, Safety, Welfare and/or the Environment

Has the applicant demonstrated the proposed beneficial use will **not** create an adverse impact to public health, safety, welfare, or the environment, by providing information substantiating compliance with the criteria listed in the bullet list below?

Yes No

Please see comment above from Bill Mason, DEQ Sr. Hydro-geologist. The size and hardness of these pellets minimizes the potential for dust generation as well.

There has been no water monitoring performance going on at the site since 2003. As stated in the 2006 inspection report, groundwater monitoring is not a condition of the permit even if there have historically

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been four monitoring wells located at this site. Since site closure via waste removal is being explored, monitoring wells were inspected to determine their location and condition to support possible decommissioning and removal of the wells.

Based on the review of the applicant provided information, and the historical environmental monitoring report, it is concluded that the use of the silica fume material as a concrete additive will not create an adverse impact to public health or environmental. However, use of the silica fume material should be limited to a concrete additive only. Other uses of the material are subject to DEQ review and re-evaluation.