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August 30, 2013

Mr. Paul Milkey,
Stationary Sources Division
California Air Resources Board
1001 "T" Street
Sacramento, CA 957814

Subject: Beneficial Reuse of Ash from Thermal Processing of Waste

Dear Mr. Milkey,

We noted with keen interest your comments regarding the need to find new beneficial uses for ash produced by the thermal treatment of municipal solid waste (MSW) at the state's three waste-to-energy (WTE) facilities. Meo & Associates has been working on this for several years and would like to collaborate with the Air Resources Board (ARB) on a demonstration project. At this preliminary stage, we envision a project in which concrete made from both fly ash and bottom ash is used to construct a new parking lot or sidewalk, or repair the curbs and gutters on local streets. There are lots of reasons for ARB to support such a project, and they are presented in the following discussion.

Improving on the Existing Beneficial Reuse of WTE Ash

The existing beneficial reuse of WTE ash consists of treating the ash with cement and using the treated material at local landfills either as road base or alternative daily cover (ADC). For a discussion on current practices for treating WTE ash, refer to:

<http://www.seas.columbia.edu/earth/wtert/sofos/nawtec/anacon98/anacon98-03.pdf>

As required by AB 341, CalRecycle is developing a state-wide plan to recycle 75 percent of California's waste and has indicated that they would like to find an alternative to using treated WTE ash as ADC or road base at landfills. Ideally, WTE ash should be recycled either as a stand-alone commercial product, or be used in making a commercial product. We support this effort.

Importantly, the technology exists right now to utilize both WTE fly ash and WTE bottom ash in making cement and concrete, respectively. Unfortunately, the market for these products has not yet been established, and by working together, CalRecycle and ARB can play a key role in establishing such a market.

Using Fly Ash in Cement Reduces Greenhouse Gas Emissions and Improves Concrete

For many years, Caltrans has been using ASTM C618 fly ash from coal-burning power plants to improve the properties of the concrete used in our freeways. In the cement industry, fly ash is

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referred to as a pozzolan or supplemental cementitious material (SCM), and ARB has proposed using these materials to reduce GHG emissions from cement production in California. Diversified Minerals, Inc. (DMI), located in Oxnard, California, is a major manufacturer of blended cements, super pozzolans and SCMs. Over the past three years, DMI has developed a blended SCM that combines fly ash from thermally processing municipal waste at a WTE facility with other materials to produce a commercial alternative to coal-derived fly ash.

This unique SCM takes advantage of certain reactive constituents within the WTE ash and creates an enhanced SCM product that DMI calls NeoPozz. NeoPozz, like fly ash, can be used as a direct replacement for ordinary Portland cement in concrete to improve durability, permeability, long-term strength and reduce the “carbon intensity” of concrete. DMI has also developed a blended cement meeting ATSM C595 using NeoPozz. In most cases, C595 Blended Cements can be used to completely replace C150 Ordinary Portland Cement in applications that specify 2,500-psi concrete for applications such as curbs, sidewalks and medians, to name just a few. For a brief presentation on DMI’s “low-carbon” cement, refer to: <http://www.dmireadymix.com/products/view/dmi-low-carbon-concrete>

Naturally, the use of WTE fly ash in cement reduces GHG emissions from cement production, but it has the added benefit of being generated by combusting municipal waste which is about 65 percent biogenic, rather than burning coal, a fossil fuel.

Using WTE Bottom Ash in Concrete Construction is well Established

Using WTE bottom ash in concrete construction also reduces GHG emissions, and it is more sustainable than mining rock in a quarry and crushing it to make conventional aggregate. Fortunately, the use of bottom ash in making concrete blocks for building construction is well established. In the mid 1980s, the City of Dayton, Ohio built several City garages using concrete blocks made from bottom ash produced at their local Montgomery County, Ohio WTE facility.

In 1990 at the State University of New York, Stony Brook, The Boathouse was constructed from concrete blocks utilizing 350 tons of ash produced at the local Westchester County, New York WTE facility. This building was the subject of an extensive study funded by U.S. EPA, and an EPA report published in August of 1995 found no adverse environmental impacts. To review a copy of the EPA report, refer to: http://www.seas.columbia.edu/earth/wtert/sofos/roethel-breslin_boathouse_1995.pdf

The Need for a Demonstration Project Utilizing Low-Carbon Cement and Concrete

Not surprisingly, it is more expensive to make cement using WTE fly ash and concrete from WTE bottom ash. A demonstration project that utilized these two materials and documented the reduction in GHG emissions would highlight the environmental benefits of these two building

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products and help promote their use. As already discussed, ARB and CalRecycle should support such a project. For convenience, let me summarize the reasons:

- Concrete construction using WTE ash would demonstrate an alternative to using this material as road base or ADC at a landfill
- Using WTE fly ash as an SCM in making cement would reduce GHG emissions from cement kilns without reducing existing levels of cement production in California or increasing imports from other nations resulting in GHG “leakage”
- Using WTE bottom ash as aggregate in concrete is more sustainable than mining new aggregate
- Incorporating WTE ash into commercial products, rather than placing these materials in a landfill moves the state closer to achieving 75 percent recycling of solid waste.

Implementing the Project

It should be relatively easy to implement a demonstration project by utilizing the funds already set aside by any number of municipalities for street and sidewalk maintenance. The only funding needed from ARB and/or CalRecycle would be that required to offset the additional cost of manufacturing low-carbon concrete and project administration by Meo & Associates. Using this approach, there would be no increase in cost to the municipality for using low-carbon concrete. In addition, we are hoping that ARB staff will document the reduction in GHG emissions by using low-carbon concrete.

If you have any questions after reviewing this letter, please let me know. I am looking forward to a conference call to discuss this project in more detail. Assuming ARB and/or CalRecycle wants to support the proposed project, I am willing to meet with you in person in Sacramento.

Sincerely yours,

Meo & Associates

A handwritten signature in black ink, appearing to read "Dominic Meo III". The signature is fluid and cursive, with a large initial "D" and "M".

Dominic Meo III, P.E.
Principal Associate

cc: Dan Donohoue, CARB
Steve Cliff, CARB
Mike Tollstrup, CARB
Howard Levenson, CalRecycle