

**Ohio EPA**

**Division Of Air Pollution Control**

**Engineering Section**

**Engineering Guide #57**

**Question:**

What are the reasonably available control measures (RACM), pursuant to OAC rule 3745-17-08(B), for fugitive dust emissions from the following operations at highway construction and maintenance projects:

1. structural abrasive blasting,
2. surface cleaning of concrete and other highway surfaces,
3. concrete cutting,
4. asphalt cutting, and
5. bridge deck preparation for resurfacing.

**Answer:**

**1) Structural Abrasive Blasting:**

Structural abrasive blasting involves the removal of rust, scale, and old paint from metal surfaces on bridges prior to repainting. The following measures will be considered RACM for these operations.

An enclosure shall be erected to completely surround the blasting operation. This includes the area around and underneath the operation. The ground cannot be used as the bottom of the enclosure unless completely covered with plastic sheeting or a tarpaulin.

The enclosure shall be constructed of flexible material such as tarpaulins or containment screens which are specifically designed for this purpose, or of rigid materials such as plywood. All materials shall be maintained free of tears, cuts, or holes. However, flexible material used for the sides of the enclosure may be woven to contain a maximum of 15% holes and a minimum of 85% material. All seams shall be overlapped a minimum of 6" and fastened together at least at 12" intervals. The vertical sides of the enclosure shall extend completely up to the bottom of the deck on a steel beam bridge and up to at least the elevation of the blasting operation on a truss bridge. Bulkheads shall be used between beams to enclose the blasting area.

All debris which has been collected by this operation or which has fallen to the ground shall be collected and stored at the bridge site for testing, evaluation and disposal. Collection and storage

shall be done as often as needed, but, as a minimum, at the end of each workday. Storage shall be in steel dumpsters or drums. All containers shall include lids which shall be secured at the end of each workday.

The services of an approved testing laboratory shall be obtained to evaluate a representative sample of the abrasive blasting debris (from each bridge) for the Toxic Characteristic Leaching Procedure (TCLP) Test. Sampling shall be done within the first week of the abrasive blasting.

All sampling and testing shall be done in accordance with U.S. EPA Publication SW8 846. The test results of exceedances shall immediately be forwarded to the local air agency or Ohio EPA District Office in whose jurisdiction the blasting project is taking place.

## 2) Surface Cleaning of Concrete and Other Highway Surfaces:

### A) Smooth highway surfaces:

The surface cleaning operations on rough or smooth highway surfaces are performed to prepare the surface prior to the laying of asphalt or concrete or as general cleanup of the work area.

For smooth highway surfaces, the Vac-all truck has been used in the highway construction industry for the past few years with great success because of the effective cleaning and the speed that the surface areas can be cleaned.

The Vac-all truck uses a sweeping and vacuuming method of cleaning with a filter collector and an internal storage bin to hold the captured particulates. The filters in the Vac-all have to be cleaned and maintained at frequent intervals. Also, the vacuum and sweeping equipment have to be in good repair for proper operation of the equipment.

Therefore, the use of a Vac-all truck in good working order and with properly cleaned filters shall be the RACM for smooth highway surface cleaning.

### B) Rough highway surfaces:

The cleaning of rough construction surfaces can be accomplished by different methods. In one method, a Vac-all truck has a flexible vacuum hose attachment mounted on the rear of the truck. This vacuum hose can be used for removal of surface dust from the rough surfaces and deep crevices. An alternative method would be to wet down the area and hand sweep the surface dust. Either control method shall be used as the RACM for rough highway surface cleaning.

The use of the air lance (blowing of compressed air) should be used only after the Vac-all truck and/or wetting has been used to clean the surface of a substantial amount of the surface dirt. If not used in this manner, an excessive amount of fugitive dust will be blown into the air.

C) Other cleaning applications:

For the general cleanup of the street or highway, a street sweeper has been used effectively. The street sweeper includes a water spray bar which wets down the street surface area and a sweeper/vacuum which removes the roadway dirt to a containment bin in the vehicle. Similar to the Vac-all truck, the use of a street sweeper in good working order and with the water spray bar and sweeper/vacuum shall be considered the RACM for this general purpose cleanup.

3) Concrete Cutting:

Concrete cutting operations performed at highway projects use diamond or abrasive discs for hand-cutting operations and a Vermeer grinder wheel mounted on a construction vehicle for large cutting or trenching operations.

Operating experience has shown that a high-speed diamond disc must use water as a lubricant, while an abrasive disc can be used in dry cutting. However, the abrasive disc using water results in easier cuts. The Vermeer grinder wheel can be used in dry or wet cuts. A dry cut on the Vermeer grinder wheel is also hard on the cutting teeth.

The use of water as a coolant/lubricant for the cutter and as a means to keep down the emission of fugitive dust from the cutting operation, is not only effective, but also very reasonable in cost. Water is readily available from nearby city water fire hydrants and also from water tank trucks that are commonly used on highway construction projects. A water storage tank also is usually available on the Vermeer grinder vehicle.

Therefore, the use of water in sufficient quantities to wet the cutter, the immediate surrounding work area, and the fugitive dust immediately emanating from the cut shall be considered as the RACM for concrete cutting. As an optional control method, a hood or shroud surrounding the work area which contains the emission of fugitive dust may also be considered as the RACM for concrete cutting. In this case, the surface dust created by the concrete cutting should be promptly cleaned from the surface as outlined in item 2.

4) Asphalt Cutting:

Wet sawing, as used in concrete cutting, has proven effective in the cutting of asphalt as well as in the suppression of dust. The use of wet sawing shall be considered the RACM for asphalt cutting.

A vacuum/filter dust control option is currently being examined by the Ohio Contractors Association. Should OEPA determine this option to be an effective dust suppression technique, it will be included in this Engineering Guide.

5) Bridge Deck Preparation for Resurfacing:

Bridge deck preparation for resurfacing encompasses the following phases: milling and cleaning, delamination and cleaning, and the final cleaning in preparation for the concrete overlay.

The first phase, milling or scarification, involves grinding down the upper layers of the concrete surface. The waste, or millings, are then removed. The second phase of the rehab involves the major breaking out (jack hammering) and minor breaking out of the areas of delamination. (Delamination is a term used for the concrete that has, through deterioration, lost contact with the metal reinforcement rods (rebar) in the bridge road bed.) After the major breaking out of the delaminated areas, the waste materials are removed. Major breaking out is followed by minor, breaking out. Minor breaking out involves smaller areas of delamination, is usually done manually, and generates less waste material. After minor breaking out, the waste materials are cleaned up. The final phase in the preparation for resurfacing is the bridge deck and rebar cleaning. The purpose of the cleaning is to remove all grit and debris from the deck, and any scale from the rebar.

A) Deck milling or scarification:

The Vac-all truck has been shown to be an effective means of cleaning milled surfaces. Therefore, the use of a Vac-all truck in good working order and with properly cleaned filters shall be the RACM for the milling or scarification process.

B) Major and minor breaking out of delaminated areas:

The cleaning of delaminated areas can be accomplished with the use of a Vac-all truck. The flexible hose attachment on the rear of the truck can be used to clean up large pieces of debris, and the belly sweeping and vacuuming can be used to clean the deck surface. Therefore, the use of a Vac-all truck in good working order and with properly cleaned filters shall be the RACM for major and minor breaking out of delaminated areas.

C) Final deck cleaning in preparation for resurfacing:

Originally, OEPA had recommended that the RACM for this process should be total enclosure with tarps. However, various contractors, as well as ODOT, have criticized this method of control, citing the cost-effectiveness as a problem. The use of tarps can vastly raise the cost of an operation due to the increased man-hours, as well as lengthen the time in which traffic lanes are closed.

In a 1994 letter to Tom Kalman of OEPA, Don Conaway of ODOT had proposed the use of "dustless" abrasives as an alternative to total enclosure. The letter suggested these abrasives could be used effectively without causing a significant amount of dust. On October 18, 1995, ODOT demonstrated for RAPCA the use of these abrasives on a Clark County bridge. RAPCA found that the "dustless" abrasives actually caused excessive amounts of dust (in violation of the 20% opacity limit set in OAC 3745-17-07 (B)) and, therefore, determined that

the use of these abrasives without containment would not comply with OAC Chapter 3745-17.

Before this demonstration, OEPA had also recommended that high pressure water blasting be used to clean the exposed rebar. ODOT denied the feasibility of this process, claiming that the water did not clean effectively. When asked about the use of water with abrasives, ODOT stated that the water would cause corrosion on the metal, which would then interfere with the concrete bond. After the demonstration, RAPCA asked ODOT for technical data supporting these claims.

In response, ODOT discovered that some research had shown that a slight corrosion left by moisture on a clean bar had actually improved the concrete to metal bond. ODOT has since decided to change their contractor specifications to include water blasting supplemented by abrasives. Allowing the contractors to use this process will enable them to achieve compliance with the applicable air pollution control regulations.

As a result of these communications with ODOT, the following measures will be considered the RACM for this cleaning operation:

Sandblasting followed by air lancing has been shown to effectively remove scale and corrosion from rebar, and is capable of thoroughly cleaning all areas of the deck. RACM for this method shall be total enclosure of the bridge deck. The bridge deck enclosure shall meet the performance specifications outlined under structural abrasive blasting.

Alternatively, high pressure water blasting or water blasting supplemented by abrasives (including sand) will also effectively clean the bridge deck and exposed rebar. These methods do not produce excessive fugitive dust, provided a sufficient amount of water is utilized when abrasives are employed. Therefore, the use of high pressure water blasting or water blasting supplemented by abrasives shall be the RACM for final deck cleaning.

Equivalent alternative control methods may be used in all cases, where appropriate. The equivalency of alternative control methods for fugitive dust shall be evaluated by the local air agency or District Office of the Ohio EPA upon appropriate consultation with the Division of Air Pollution Control. A determination of equivalency for RACM should be made in writing.

It should be noted that OAC rule 3745-17-07 (B) (1) is applicable to the fugitive dust generated by the above-mentioned highway construction and maintenance projects. This paragraph establishes an allowable visible emission limitation of 20% opacity, as a 3-minute average. Any RACM employed must be capable of meeting this visible emission limitation.

This Engineering Guide was used for training purposes during the joint winter conferences in January and March of 1995 between OEPA, ODOT, and the Ohio Contractors Association.)

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December 9, 1992, revised April 3, 1996