Pollution Prevention Opportunities for Concrete Batch Plants

This checklist is a guide for concrete batch plant owners and operators to assist in establishing waste reduction opportunities. Concrete batch plants, as defined for this checklist, include plants that store, measure and transfer concrete constituents into trucks for transport to a job site, plants that use a central mix drum to manufacture concrete on-site for transfer to transport trucks, and plants that pre-cast products on-site such as concrete bricks. Raw materials include sand, aggregate, cement and water for concrete batching.

Particulate matter and stormwater runoff are primary pollutants of concern. Point source emissions are a result of the transfer of material to silos. Fugitive sources include the transfer of sand and aggregate, truck loading, mixer loading, vehicle traffic, and wind erosion from sand and aggregate storage piles. Potential batching plant wastewater and stormwater pollutants include cement, sand, aggregates, chemical additive mixtures, fuels and lubricants.

Dust prevention equipment may include water sprays, enclosures, hoods, curtains, shrouds, movable and telescoping chutes, fabric filters, etc.

Some of the pollution prevention opportunities presented in this checklist may not be practical for all concrete batch plants. Plant owners and operators are encouraged to evaluate waste reduction opportunities based upon their facility's individual operations. The same waste reduction idea that works for one plant may not necessarily work for all. Additional opportunities may exist beyond those identified in this checklist. As owners and operators, you have the expertise to identify those opportunities applicable to your operations.

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Pinellas
County
ENVIRONMENTAL
MANAGEMENT
Pollution Prevention

EMPLOYEE EDUCATION

Your Pollution Prevention efforts can only be successful if all employees are committed to minimizing their wastes.

1) Are employees trained to:
   a) recognize and minimize environmental hazards? yes __ no __
   b) handle/transfer raw materials (sand, sand, aggregate, cement, water) in a manner to reduce particulate emissions and wastewater runoff? yes __ no __
   c) clean equipment/vehicle in a manner to reduce airborne particles/wastewater runoff? yes __ no __
   d) clean vehicles before transporting materials off-site? yes __ no __
   e) use dry clean-up whenever possible? yes __ no __
   f) dispose of/recycle leftover cement properly? yes __ no __
2) Have you clearly outlined and explained to your staff and employees what pollution prevention and waste minimization are and encouraged their input in identifying site pollution prevention activities? yes __ no __
3) Do you provide incentives or awards for those who practice proper or new pollution prevention techniques? yes __ no __
4) Do you hold regular employee meetings to discuss changes or on-going equipment practices and procedures? yes __ no __

General Site Operations/Maintenance

- ❑ Locate/operate stationary CBP equipment, stockpiles and plant vehicles at least 25 feet from any property line
- ❑ Maintain all equipment, including dust/particulate collection equipment, according to manufacturer's recommendations to prevent leaks
- ❑ Identify a buffer zone surrounding your operations in which you plan to contain primary dust generating activities
- ❑ Maintain stockpiles inside this buffer zone within three-walled bunkers which extend at least two feet above the top of the unload line
- ❑ Use a totally enclosed system for the loading, unloading, handling, transfer or storage of cement, pulverized fuel ash and/or other dusty raw materials
- ❑ Keep a routine maintenance log on-site of all equipment/filter systems, recording date and time of all corrective actions
- ❑ Provide integrated quality, safety and environmental management systems for the site, operation of the plant, and delivery process

Storage Silos

- ❑ Vent all cement/fly ash storage silos and weigh hoppers to a fabric, baghouse or cartridge filter system.
- ❑ Identify the cause of all visible emissions and take corrective action immediately
- ❑ Monitor filter systems to identify when cleaning/replacement is necessary
- ❑ Regularly check for tears or leaks in fabric/cartridge filter systems and suction shroud
- ❑ Choose filter systems designed to meet at least 0.01gr/dscf outlet
- ❑ Check all filter systems and mixer/truck loading control devices for visible emissions daily during plant operations
- ❑ Provide sufficient lighting near cement and/or fly ash silo filter exhausts to observe visible emissions performance during fills that occur during non-daylight hours
- ❑ Totally enclose all silo conveying systems and maintain operations with no tears or leaks
- ❑ Monitor storage silo conveying systems for visible emissions and correct the cause of visible emissions immediately
- ❑ Install audible and visual high-level alarms on all storage silos to avoid overfilling and possible filter damage
- ❑ Use silos to store all materials capable of generating dust (cement, pulverized fuel ash, etc.)
- ❑ Connect the “high-level” alarm indicator to an automatic delivery shut down to prevent overfilling
- ❑ Install test circuits on all alarms to test prior to each silo fill
- ❑ Maintain alarms in “working order” at all times
- ❑ Fit all silo and weighing scale vents with fabric filtering systems to collect dust
- ❑ Check the seating of all silos’ pressure relief valves and reseat if necessary, before each delivery
- ❑ Enclose all receiving hoppers and areas for unloading materials on three sides up to 9 feet above the unloading point
- ❑ Avoid using receiving hoppers as material storage devices

Raw Materials

- ❑ Substitute at least 15% to 35% fly ash for cement in concrete mixes. Some applications will accommodate up to 70%.
- ❑ Substitute coal-fired boiler, cinder and bottom ash, for aggregate in concrete building block manufacturing
- ❑ Use sugar or wood-based admixtures that are safer and less toxic than other chemical concrete additives

Mixer Feed Operations

- ❑ Vent the cement/fly ash weigh hopper inside the batch mixer
- ❑ Use a spray device to prevent dust/visible emissions at the mixer feed
- ❑ Use a pickup device that delivers air to a filter to prevent dust emissions at the mixer feed
- ❑ Use an enclosed batch mixer feed to prevent dust and visible emissions at the mixer feed
- ❑ Conduct the entire mixing operation inside an enclosed process building to prevent dust and visible emissions

Material Handling/Storage

- ❑ Store aggregates 5 millimeters or less in size in totally enclosed structures (e.g. storage bins)
- ❑ Do not handle aggregates 5 millimeters or less in open areas
- ❑ Use ground stockpiling only if there is sufficient buffer area surrounding the plant
- ❑ Enclose stockpiles on at least the top and 3 sides
- ❑ Install a flexible curtain to cover stockpile entrance sides
- ❑ Totally enclose the opening between the storage bin and material weighing scale

Conveyors

- ❑ Enclose belt conveyors used for handling materials on top and 2 sides with a metal board at the bottom to eliminate any dust emissions due to wind effects
- ❑ Enclose all conveyor transfer points. Fit conveyor passage openings with flexible seals to prevent dust generation.

- ❑ Provide scrapers at the turning points of all conveyors to prevent dust collection on the belt surface

- ❑ Arrange conveyors delivering to material stockpiles in a way to minimize free fall

- ❑ Enclose all free falling transfer points from conveyors to stockpiles with chute(s) and apply dust suppression materials at these points (suppression agents, water spray)

Loading/Mixing Operations

- ❑ Load concrete trucks in a way to minimize airborne dust emissions

- ❑ Pre-mix materials in a totally enclosed concrete mixer before loading the materials into the concrete truck

- ❑ Vent all airborne dust emissions generated by material loading/mixing operations to fabric filtering systems

- ❑ Totally enclose the loading bay during the loading process. Dust tarps and other dust prevention materials are available for pre-existing equipment. Check with your suppliers for currently available dust prevention supplies.

- ❑ Provide equipment necessary to clean all concrete trucks and other vehicles after loading (preferably dry cleaning methods) and before exit from the property to wash off any dust and/or mud deposited on the wheels and/or vehicle body

- ❑ Plan with the concrete truck driver exactly where rinsing can be done. Avoid locations where run-off will get into topsoil or flow into surface water.

Housekeeping

- ❑ Sweep site regularly to remove dust buildup

- ❑ Clean up all spillages or deposits of materials on ground immediately

- ❑ Use dry clean-up methods whenever practical (sweeping, dust collection vacuum, wiping, etc.)

- ❑ Instruct staff and drivers to never dump any materials in open areas

Fabric Filters

- ❑ Service and maintain fabric filters according to manufacturer's recommendations

- ❑ Provide adequate access to the filters to allow for regular inspection and maintenance

- ❑ Record on a weekly basis in a maintenance log book:
  - ✧ pressure drop
  - ✧ visual conditions of exhaust material
  - ✧ incidents of filter media failure/replacement

Road and Yard Dust

- ❑ Minimize dust emissions due to vehicle travel by:

  - ✧ site layout and design
  - ✧ vehicle wheel cleaning before leaving the site (dry cleaning method or the wheel and truck wash facilities at site exits)
  - ✧ posted vehicle speed limits

- ❑ Avoid using plant operational vehicles within 25 feet of any property line, except for entry and exit to the site

- ❑ If roadways are not paved, consider paving all regular paths of vehicle traffic (entry, exit, main traffic areas of plant operations, batch and material truck delivery roads) with a hard surface that can be cleaned by dry methods to minimize dust and run-off to nearby properties and stormwater

- ❑ Where it is not practical to pave a site (e.g. at a short-term location), a number of alternatives exist to reduce dust emissions from yards and roadways:

  - ✧ application of a thin layer of high quality pavement over road surface
  - ✧ chemical suppressant products (several options available)
  - ✧ vegetative barriers

- ❑ Use dust-preventative barriers or vegetative buffers at least 12 feet high along roads and other traffic/work areas within your specified buffer zone

Fugitive Dust

- ❑ Consider prevailing wind directions in the design and set-up of bunkers and conveyors. Bunkers and conveyors should be set-up so as to minimize wind effects.

- ❑ If water sprays or dust suppression agents must be used to reduce dust, use application equipment and techniques that minimize water and material usage

- ❑ Receive aggregate material in a damp condition

- ❑ Provide conveyor barriers on at least one side

- ❑ Equip conveyors with a barrier on at least one side, a roof and spill trays, which direct material to a collection point

- ❑ Use belt cleaning devices at the conveyor head to reduce spillage

- ❑ Conduct all material mixing operations within an effective enclosure (walls, screens, dust guards, tarps)

- ❑ Roof and enclose mixer loading areas on two or three sides

- ❑ Install an effective air extraction and filtration system to collect dust generated during mixer truck loading

- ❑ Enclose weigh bins and hoppers on three sides and roof where a front-end loader is used

- ❑ Extend roof at least six feet beyond load areas

- ❑ A water spray system for dust prevention should only be used as a final measure if you are unable to effectively prevent dust during operations using the opportunities identified in this checklist. Water sprays create a stormwater issue for your plant. Dry method cleanup and wind barrier equipment should be your first choice.

- ❑ Clean up any raw material spills by dry sweeping. Water should not be used in the process of cleaning up spills except where the area drains to an effective wastewater collection point.

Waste Concrete

- ❑ Consider installing a recycling system for residual concrete that uses carbon dioxide or acid (carbon dioxide is safer) to lower pH and filtration to remove solids. Various types and sizes are available. A recycling system can reclaim aggregate for direct input back into batching and can produce filter cakes that may be used as a limestone substitute (road base, parking lots, other applications).

- ❑ Consider collecting waste concrete in a suitable washout pit where it becomes gravel, sand and sludge, which can subsequently be collected and reused

- ❑ Offer waste sediment, sludges and fines as fill material, gravel road stabilizer, or landfill cover

- ❑ Use waste concrete on-site for construction purposes (e.g. bunker blocks, paving unsealed areas, fill around buildings, parking lot and driveway aggregate). Check with your local permitting agency for roadway requirements.

- ❑ Use commercially available delayed set admixtures designed to keep leftover mix truck concrete in liquid form to be added to the next batch of mix

- ❑ Crush blocks and bricks that do not meet standards to use for groundcover, walkways, tracks, landfill cover, and the remanufacture of other types of block walls, dividers, or curbs

- ❑ Recycle dust into future concrete batches

Wheel Washes

- ❑ Design wheel washes to account for the maximum extended tire length expected

- ❑ Locate wheel washes in an area that provides a sufficient track-out distance before exit from the property

- ❑ Minimize off-property track-out by providing a large aggregate or paved roadway immediately after the wheel wash within property boundaries

- ❑ Install motion sensor on wheel wash units to provide water only on-demand

Waste Water

- ❑ Re-use wastewater, wash water and stormwater for concrete batching. Process water in the range of pH 6-9, and 50-200 parts-per-million total suspended solids (TSS) is ideal for re-use in batching, washing and rinsing. Monitor process water pH and TSS to ensure these ranges are met for rinsewater to be re-used for batching. ASTM Specification C-94 permits the use of wash water from mixer washout operations for mixing fresh concrete, as does Portland Cement Association (PCA) (10) standards. Literature indicates that concrete batched

from process water strength-tests equal to, or greater than, concrete made using fresh water.

- ❑ Re-use either weak wastewater/stormwater for rinsing truck exteriors, or fresh water that is collected separately from other process waters

- ❑ Re-use water for drum and chute washing, and for slumping

- ❑ Re-use water for plant and grounds wash-down and dust suppression

- ❑ Consider metering or using a timer to dispense water for mixer flushing

- ❑ An effective alternative to mixer wash-out is to use recycling admixtures to stabilize the concrete residues in the drum. Use only 40-50 gallons of fresh water and the suggested dosage or recycling admixtures to rinse mixer drums and hold the resulting slurry on the truck and incorporate into the next batch, or the first batch the following day. Studies have shown that these slurries can be held for eight hours, or longer.

- ❑ Wherever feasible, divert clean stormwater (e.g. roof run-off) away from contaminated areas and into an approved stormwater discharge system

- ❑ Use berms or curbs around truck loading areas, aggregate piles, truck washing stations, drum and cute wash-out areas, and chemical staging areas to capture contaminated stormwater and process wastewater

- ❑ Use site grading and porous paving to improve storm water handling from the general plant site

- ❑ Design a wastewater collection and recycling system to collect contaminated water from:
  - __ agitator washout
  - __ truck washing
  - __ yard washdown
  - __ contaminated stormwater
  - __ concrete batching area
  - __ slump stand
  - __ any other wastewater from the batching plant operation

- ❑ Direct process wastewater and contaminated stormwater from the entire site to an on-site settling pond, or series of ponds. This water can be reused in the concrete batching process

- ❑ Protect storm drain inlets from waste concrete/dust runoff

- ❑ Develop a routine yard and equipment maintenance program to considerably reduce the potential for discharge of sediment to your wastewater collection and recycling system

- ❑ Install sediment traps within the boundaries of the site

- ❑ Regularly inspect and provide maintenance of the sediment traps to avoid discharges of contaminated water from the site
- ❑ Seal aboveground fuel and chemical additive storage areas with an impervious material and berm to contain spills and leaks
- ❑ Test underground storage tanks annually for leaks or necessary repairs

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Contact Pinellas County's Pollution Prevention and Resource Recovery (P2R2) Program at (727) 464-4761 for Waste Reduction Assistance