SUITABILITY OF CONCRETE BATCH PLANTS FOR AIR QUALITY GENERAL ORDER OF APPROVAL: EVALUATION OF CONTROL TECHNOLOGY, AMBIENT IMPACTS, AND POTENTIAL APPROVAL CRITERIA

June 18, 2008

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EXECUTIVE SUMMARY

The Department of Ecology's (Ecology's) Air Quality Program revised its Notice of Construction rules (contained in Chapter 173-400 Washington Administrative Code) in early 2005 to allow for the Establishment of General Orders of Approval.

Ecology determined that establishment of a General Order of Approval is appropriate for concrete batch plants meeting the criteria in Table 1.

Table 1: Concrete Batch Plant, Applicability Criteria for General Order of Approval

Criterion	Limitation
Location in Washington	Any jurisdiction within which New Source Review requirements are regulated by the Department of Ecology's Air Quality Program. At the time of issuance of this general order, this includes: Adams, Asotin, Chelan, Columbia, Douglas, Ferry, Franklin, Garfield, Grant, Kittitas, Klickitat, Lincoln, Okanogan, Pend Oreille, San Juan, Stevens, Walla Walla, and Whitman counties.
Facility description	Facilities that manufacture concrete from cement, cement supplement, fine aggregate, coarse aggregate, and water.[1] The ingredients are gravity fed through a weigh hopper. In-transit mixing plant: The weigh hopper drops the ingredients into mixer trucks (in-transit mixing). Central mix plant: The weigh hopper drops the ingredients into a mixer that dumps the pre-mixed concrete into transit trucks (central mix). Portable concrete batch plant: Although a plant may be designed to be "portable," to be considered portable under this general order, the plant must be located temporarily. Ecology defines "temporary" as one year or less at the same location. This general order is valid for any location within the jurisdiction described in "Location in Washington." Stationary concrete batch plant: A plant that is located at the same site for over one year. This general order is valid only for the location specified in the Coverage Order.

[1] Cement supplement: Fly ash, ground granulated blast furnace slag, natural pozzolans, silica fume
Fine aggregate: Sand
Coarse aggregate: Gravel, crushed stone, or iron blast furnace slag.
Heavyweight aggregate: Barite, magnetite, limonite, ilmenite, iron, or steel.
Lightweight aggregate: Sintered clay, shale, slate, diatomaceous shale, perlite, vermiculate, slag pumice, cinders, or sintered fly ash.

	The concrete batch plant is not part of a new major stationary source or major modification to a major stationary source, which is subject to review under the Prevention of Significant Deterioration Program, and the addition of the concrete batch plant to an existing source does not make the source subject to the Air Operating Permit (AOP) program or require a modification in an existing AOP permit.
Size	In-transit mix: Not greater than 150,000 tons of concrete mixed in any consecutive 12 month period (74,500 cubic yards).
	Central mix: Not greater than 495,000 tons of concrete mixed in any consecutive 12 month period (246,000 cubic yards).
Design	Facility may either produce truck-mixed or central-mixed concrete.
	May be permanent or portable.
Equipment	Mobile and stationary conveying equipment for loading sand, aggregate, and cementitious material bins and silos, weigh hopper, mixer (central mix), and truck charging station.
SEPA Requirements	Portable concrete batch plant: Individual SEPA review is not required at any temporary location. Stationary concrete batch plant: SEPA review is required.
Portable plant: Special provisions	Must notify Ecology not less than 10 calendar days prior to operating at a new temporary location. A plant that has been operating under "stationary" status may move and convert to "portable" status under this general order as long as it thereafter follows the time-in-location limitations and reporting requirements of a portable plant. A new Coverage Order is not required. A plant that has been operating under "portable" status must obtain a new Coverage Order and undergo SEPA review before converting to "stationary" status at its current or a new location.

CONTENTS

Tables

1. INTRODUCTION

PURPOSE

The purpose of the analysis described in this document is to determine emission unit criteria and approval conditions within which a General Order of Approval is appropriate for concrete batch plants. In addition, a list of minimum requirements or applicability criteria will be developed to identify concrete batch plants that would qualify for coverage under the General Order of Approval.

This General Order of Approval will be required of any concrete batch plant up to the specified maximum size, unless the applicant chooses to use the standard notice of construction approval process for a stationary source or the approval process for a temporary source specified in WAC 173-400-035. Any applicant proposing any size concrete batch plant may opt to use the standard notice of construction approval process to acquire appropriate permitting.

BACKGROUND

Since 1972, Ecology has required a preconstruction review and permitting program for new sources that will emit pollutants to the air in Washington. This review and permitting process is referred to as "New Source Review" by the state or the relevant local air quality control agency. Based on that review, the relevant agency issues an approval-to-construct and operates the new source. This "Notice of Construction Approval" contains pollutant emission limitations and operating requirements for the new source.

The typical process to obtain a site-specific, individual Notice of Construction air quality permit is described in "How to Apply for a Notice of Construction Air Quality Permit." HTTP://WWW.ECY.WA.GOV/BIBLIO/ECY070121.HTML

Effective February 10, 2005, Ecology revised its regulations to include the General Order of Approval as an alternative to the individual Notice of Construction permit. By creating and issuing General Orders of Approval, Ecology intends to simplify the permitting process by reducing the regulatory and administrative burden on the applicant and Ecology. Use of General Orders should reduce the permit processing cost to both the applicant and Ecology.

2. EVALUATION BASES

GENERAL CRITERIA

Ecology's Air Quality Program established the following criteria for the General Order of Approval determination. The criteria are intended to facilitate completing the development of each categorical general order with a reasonable amount of time and effort. The criteria are:

1. Best Available Control Technology (BACT) and BACT for Toxic Air Pollutants (T-BACT) is the same as for a site-specific approval issued during the time the engineering evaluation is developed.
2. The emissions will not delay the attainment date for any area not in attainment, nor will the emissions cause or contribute to the exceedance of any ambient air quality standard.

3. An emission unit size or type cannot receive a General Order of Approval if the ambient air quality analysis indicates that a Tier 2 review (WAC 173-460-090) would be required at any potential location.
4. The General Order will assure a covered unit will comply with all applicable new source performance standards, national emissions standards for hazardous air pollutants, national emission standards for hazardous air pollutants for source categories, and emission standards adopted under the Washington State Clean Air Act.
5. The individual emission unit cannot cause a facility to become subject to the Air Operating Permit program or be subject to Prevention of Significant Deterioration (PSD) permitting. The facility may be an existing Title V or PSD source. The individual emission unit cannot trigger a required modification of an existing Title V operating permit.
6. Information content of and analyses described in the technical analysis will be similar to that required in a permit application for this type of emission unit.

Criteria 1, 2, 4, and 5 reflect the requirements of WAC 173-400-110, 112, 113, and 560, and are requirements for all new source review actions in Washington. Criterion 5 reflects specific requirements for General Orders of Approval found in WAC 173-400-560. Criterion 6 reflects the actuality that this analysis needs to evaluate a number of control options and generic emissions modeling prospectively, rather than a permit application review's retrospective analysis.

Criterion 3 reflects the criteria of the Tier 2 toxic air pollutant review process (WAC 173-460-090). A Tier 2 review is a site-specific analysis of the impacts on the surrounding community from toxic air pollutants expected from a proposed facility. A General Order of Approval is developed without a specific site in mind. A General Order of Approval is unable to incorporate the site-specific considerations of the Tier 2 process. In order to reflect this limitation, Ecology may include criteria related to the distance from the described units to property lines and buildings, hills, or other structures that affect ambient air quality concentrations.

CONCRETE BATCH PLANTS

Definition

Concrete is made by combining sand, aggregate, Portland cement and/or flyash, and water. Small amounts of supplementary materials are sometimes added to reduce cost, reduce permeability by liquids, increase strength, alter color, alter concrete viscosity, retard or accelerate setting time, entrain air, or reduce water requirements. Concrete batch plants put these components together in the desired proportions. The solid components are gravity feed from bins through a weigh hopper. In a truck mix operation, the dry components are dropped into mixer trucks (in–transit mixers), water is added volumetrically, and the concrete is mixed on the way to the place where the concrete is to be used. In a central mix operation the dry components and water are dropped into a mixer. After adequate mixing, the wet concrete is dumped into a truck for transport. Most concrete batch plants are truck mix operation.

Concrete batch plants may either be designed to be portable or permanent. The choice between a portable and a permanent plant depends on the owner's market segment. From the perspective of the concrete batch plant owner/operator, "portable" is a design option, and has little to do with

how long the plant will remain at one location. Permanent plants are more likely to be installed in large urban areas where many construction projects are in close proximity.

Portable plants may have as much as 300 cubic yards of concrete per hour capacity, but are usually less than 100 cubic yard per hour in capacity. Permanent plants may be installed with up to 400 cubic yards per hour capacity. In any case, the nominal facility capacity does not translate directly to actual throughput. Concrete batch plants rarely operate more than 60 hours per week. Truck-fill cycles, replenishment of sand and aggregate piles, and re-filling the cement, sand, and aggregate towers are intermittent operations with inherent lag-times. Practically speaking, a concrete batch plant actually has a "potential" throughput less than one-third of its rated hourly capacity.

Regulation

There are no federal or state laws or regulations that are specific to concrete batch plants. Concrete batch plants must comply with the general provisions of the Revised Code of Washington 70.94 (Washington Clean Air Act), Chapter 173-400 Washington Administrative Code (General Regulations for Air Pollution Sources), and Chapter 173-460 Washington Administrative Code (Controls for New Sources of Toxic Air Pollutants).

Emissions

Concrete batch plants emit particulate matter (PM) and any toxic metals contained in the particulate matter. PM emissions result from maintaining aggregate and sand piles, moving sand and aggregate from the piles to the feed bins, loading the sand, aggregate, and cementitious material bins and silos, and from loading the concrete trucks (in-transit mixing) or the mixer (central mix). Each of these activities generates PM. Most of the PM is larger than 10 microns in aerodynamic diameter. Most of the PM is likely to come from vehicle traffic on the unpaved plant site. About 14% by weight of the PM is Portland cement. Portland cement contains at least a dozen known toxic metals characteristic of material originating from the earth.

Basis for Requiring Permit

Sources that emit pollutants at levels less than those shown in Table 2 are exempt from new source review (NSR) under WAC 173-400-110[1].

Table 2: Exemption Levels for Criteria Pollutants, New Source Review (WAC 173-400-110)

Pollutant	Level (tons per year)
Sulfur Oxides (sulfur dioxide and sulfur trioxide)	2.0
Carbon Monoxide	5.0
Nitrogen Oxides	2.0
Volatile Organic Compounds (VOCs)	2.0
Total Suspended Particulates (TSP)	1.25

[1] WAC 173-400-110(5). The owner./operator must notify, and upon request, file a brief project summary with the permitting authority prior to beginning actual construction on the project. The permitting authority may require the owner or operator to demonstrate that the emissions from the concrete batch plant are smaller than all of the levels in Table 2. The owner/operator may begin actual construction on the project thirty-one days after the permitting authority receives the summary.

Pollutant	Level (tons per year)
Particulate material having less than or equal to a 10 µm aerodynamic diameter (PM_{10})	0.75
Lead	0.005
Ozone-depleting substances	1.0
Toxic air pollutants (TAPs)	As specified in Chapter 173-460 WAC

Concrete batch plants emit little or nothing of the pollutants listed in Table 2 except for TSP, PM_{10}, lead, and toxic air pollutants (TAPs)[2]. At this time, there are no emission level thresholds below which a source of TAPs is exempt from new source review under Chapter 173-460 WAC[3].

Ecology performed ambient impact analyses using "controlled" emission factors given in EPA's AP-42[4], an upper limit for lead content in cement of less than 100 parts per million by weight[5, 6], and the toxic metal concentrations shown in Table 4. The analyses indicate that in-transit mixing plants with capacity up to 150,000 tons concrete per year and central mix plants up to 495,000 tons concrete per year will satisfy Washington and national ambient air quality standards and benchmarks for protection of public health and the environment. Details are in Section 4. AMBIENT IMPACT ANALYSIS.

With respect to this general order, temporary sources as described in WAC 173-400-035 deserve a brief discussion. Although that section of Washington's air quality rule is titled, "Portable and temporary sources," the emphasis is on the source being a ***temporary*** installation. Specifically, it must be located at one site for not more than 365 days. Concrete batch plants designed to be portable are often located at one site for more than a year.

Although a ***temporary*** concrete batch plant is exempted from notice of construction approval under WAC 173-400-110, WAC 173-400-035 allows Ecology to "set specific conditions for operation." This is ordinarily done in the form of a "temporary source order" issued by the relevant Ecology regional office. The wording in WAC 173-400-035 is not precise concerning when the "specific conditions" are justified. The context of the rule implies that they should reflect Ecology's requirements to assure compliance with applicable emission standards and protection of ambient air quality standards. There are no emission standards specific to concrete batch plants. But, the nature of this general order bases the size limitation for applicable concrete batch plants on the maximum that would keep the ambient TSP impact below the Washington Ambient Air Quality Standard (WAAQS) including consideration of background concentrations. Consequently, Ecology is compelled to draft appropriate "specific conditions" for portable concrete batch plants into this general order. TSP sources for temporary concrete batch plants are

[2] Antimony, arsenic, barium, beryllium, cadmium, chromium, mercury, nickel, selenium, silver, and thallium.
[3] Certain sources are exempt from all or part of permitting requirements under Chapter 173-460 WAC as described in WAC 173-460-030(2). Concrete batch plants are not exempted from permitting requirements under Chapter 173-460 WAC.
[4] Chapter 11.12, "Concrete Batching," Table 11.12-2, Table 11.12-5, and Table 11.12-6 (June 2006); Chapter 13.2.2, "Unpaved Roads," Tables 13.3.3.1 and 13.2.2.2 and Equation 1a (November 1006). PM is taken to be synonymous with TSP.
[5] "An Analysis of Selected Trace Metals in Cement and Kiln Dust," Portland Cement Association (1992)
[6] Puget Sound Clean Air Agency Notice of Construction No. 9629, Jerry Nybo Construction Inc., data from Lehigh Cement Co. (August 17, 2007)

the same as for permanently-installed plants. The practical result is that under this general order, the Approval Conditions are the same for both temporary and permanent sources.

3. BEST AVAILABLE CONTROL TECHNOLOGY (BACT)

State law and rule[7] defines BACT as "an emission limitation based on the maximum degree of reduction for each air pollutant subject to regulation under the Washington Clean Air Act emitted from or which results from any new or modified stationary source, which the permitting authority, on a case-by-case basis, taking into account energy, environmental and economic impacts and other costs, determines is achievable for such source or modification through application of production processes and available methods, systems, and techniques, including fuel cleaning, clean fuels, or treatment or innovative fuel combustion techniques for control of each pollutant."

Ecology typically uses the "top-down" process to determine what BACT is for notice of construction reviews. In the "top-down" analysis process, the applicant lists and ranks all potential pollutant control options from highest level of control (lowest emission rate) to the lowest (highest emission rate). Next, those emission control options that are technically infeasible are removed from the list of available controls. The highest level of control remaining is considered technically feasible to implement on the emission unit. When that level of control is either proposed by an applicant, it is accepted as BACT with no further analysis involved. An applicant may choose to demonstrate that the highest level of emissions control is not financially feasible (not cost-effective) to implement or has adverse environmental or energy impacts. In this case, the applicant evaluates the economic, environmental and energy impacts of the next most stringent level of control until a level of control is demonstrated to be economically feasible.

In the case of this General Order of Approval Technical analysis document, there is no identified applicant. Thus, Ecology is responsible for providing this BACT technology analysis comparing the economic feasibility of several of the available emission control options available as add-on emission control technologies as part of our process to determine what BACT should be.

BACT FOR PM/PM_{10}/$PM_{2.5}$

There are at least five categorical sources of PM emissions in concrete batch plants: Maintaining aggregate and sand piles, moving sand and aggregate from the piles to the feed bins, loading the sand, aggregate, and cementitious material bins and silos, loading the concrete trucks (in-transit mixing) or the mixer (central mix), and on-site vehicle traffic. Maintaining aggregate and sand piles, moving sand and aggregate from the piles, and on-site vehicle traffic to the feed bins are sources of fugitive PM emissions. Loading the sand, aggregate, and cementitious material bins and silos cause PM emissions at the top of the bins, and may best be characterized as point emission sources. Loading the concrete trucks (in-transit mixing) or the mixer (central mix) have properties of both fugitive and point sources. After examining general and specific construction permits from Arizona, California, Idaho, Illinois, Indiana, Montana, North Carolina, New Mexico, South Carolina, Texas, the Puget Sound Clean Air Agency, the SouthWest

[7] RCW 70.94.030(7) and WAC 173-400-030(12)

(Washington) Clean Air Agency, and Ecology's Central and Eastern Regional Offices, Ecology found

- PM emissions from maintaining aggregate and sand piles, material transport, and on-site vehicle traffic are normally controlled by water spray.
- PM emissions from sand and aggregate bin loading are normally controlled by water spray.
- PM emissions from loading the cementitious material bin(s) are normally controlled by venting to a fabric filter (bag house).
- In-transit mixing plants having 300 tons per hour or less capacity and producing not more than 50,000 cubic yards in a consecutive 12 month period: PM emissions from truck filling are normally controlled by enclosing the drop chutes and weigh hopper to minimize wind effects, and dropping the concrete components through a flexible boot that fits into the truck mixer.
- In-transit mixing plants having greater than 300 tons per hour capacity or producing more than 50,000 cubic yards in a consecutive 12 month period: PM emissions from truck filling are normally controlled by sucking up the PM-laden air in the vicinity of the truck with a blower and venting it to the cement silo or an independent fabric filter in addition to using a flexible boot that fits into the truck mixer.
- Central mix plants: PM emissions from mixer filling are normally controlled by sucking up the PM-laden air in the vicinity of the mixer with a blower and venting it to the cement silo or an independent fabric filter.
- Toxic air pollutant emissions from concrete batch plants are controlled by the same methods used to control PM emissions.

>>>>> **Ecology concludes that the above practices constitute BACT PM, PM_{10}, $PM_{2.5}$, and associated toxic metal emissions in concrete batch plants.**

4. AMBIENT IMPACT ANALYSIS

All notice of construction applications are required to be evaluated for their ambient air quality impacts. "Ambient air" means the surrounding outside air, the air outside of buildings.

The federal government has established National Ambient Air Quality Standards for six common air pollutants. Ecology has adopted these standards with minor changes and also has one additional ambient air quality standard that applies in Washington. All new and modified sources of air pollution in Washington are required to demonstrate that the project will not cause or contribute to an exceedance of one or more of these ambient air quality standards.

In order to qualify for this general permit, concrete batch plants must be located such that their emissions do not cause an ambient toxic air pollutant (TAP) concentration increase in excess of any acceptable source impact level (ASIL)[8].

DISPERSION MODELING

Ecology used an air quality plume dispersion model to determine whether the ambient impacts from a proposed project will be acceptable. The dispersion model estimates the increases in ambient air concentrations of the various air pollutants caused by the project. Ecology compared the results of the model with the ambient standards to see if the project will cause or contribute to an exceedance of the standard.

There are a number of dispersion models available for use. All of them use mathematical formulas and meteorological information to predict where the exhaust emissions will travel and the ambient concentrations at specific locations. Models generally come in two forms -- screening models and complex models. In most cases, the models use the same formulae. The differences occur in the level of detail of the emission source(s) and meteorological information required by the model. Screening models use hypothetical meteorological conditions intended to project a "worst-case" environmental impact. More complex models require weather conditions based on the historical meteorology for the site or the region around the site. Due to their simpler meteorological input characteristics, screening models are typically conservative; in other words, screening models will usually over-predict the ambient concentrations compared to what would be actually measured (and compared to what would be predicted by a more complex model).

Ecology chose the SCREEN3 model for predicting ambient concentrations. This is a common screening model that has been recognized by EPA as suitable for this purpose and has been in common use for the past 15 + years. There are other models that Ecology could choose, but this one is both the simplest to use and the one most often used by small facilities and Ecology in determining ambient air quality impacts from a given facility.

Table 3 shows the National Ambient Air Quality Standards (NAAQS) and Washington State Ambient Air Quality Standards (AAQS) for Class II Areas[9]. Table 4 shows the known toxic metals in concrete batch plant PM, typical concentrations, and the highest ambient impact allowed under this general order.

Table 3: National Ambient Air Quality Standards

Pollutant	Averaging Time	National AAQS micrograms per cubic meter ($\mu g/m^3$)	Washington State AAQS ($\mu g/m^3$)
		Primary	
Total suspended particulate	Annual	N/A	60
	24-hr	N/A	150
Particulate (PM_{10})	Annual	50	50 $\mu g/m^3$

[8] A TAP concentration increase below the ASIL should not cause a significant increase in air pollution impact. A TAP above the ASIL triggers a second tier risk analysis. By definition, a second tier risk analysis case-by-case, not "general."

[9] Practically speaking, Class II Areas are everything except specially protected national parks and wildlife areas.

Pollutant	Averaging Time	National AAQS micrograms per cubic meter ($\mu g/m^3$)	Washington State AAQS ($\mu g/m^3$)
		Primary	
	24-hr	150	150 $\mu g/m^3$
Particulate ($PM_{2.5}$)	Annual	15	15
	24-hr	35	35

Table 4: Toxic Metals in Portland Cement

Toxic metal	Acceptable Source Impact Level (WAC 173-460-150 and -160), micrograms per cubic meter	Class[10]	Concentration in Portland cement, parts per million by weight
Antimony	1.7	B	50
Arsenic	0.00023	A	49
Barium	1.7	B	136
Beryllium	0.00042	A	1
Cadmium	0.00056	A	4.1
Chromium (all valences)	1.7	B	40
Chromium VI	0.000083	A	30
Mercury	0.4	B	0.25
Nickel	0.0021	A	50
Selenium	0.67	B	20
Silver	0.33	B	5
Thallium	0.33	B	20

To estimate concrete batch plant emissions, Ecology used the emission factors and toxic metal concentrations given in the previously noted AP-42, literature, and permit sources. For the sake of conservatism, Ecology assumed a "model" concrete batch plant to be on a one-acre site. Most concrete batch plants would occupy several acres with greater on-site dispersion and deposition than possible on one acre. Emissions from truck-filling in in-transit mixing plants, and to a lesser extent mixer filling in central mix plants, are sensitive to wind velocity. For the purpose of estimating worst-case 24-hour average emissions, Ecology assumed 24-hour average winds of 30 miles per hour. All emissions except for bin and silo filling were modeled as area source emissions. Bin and silo emissions were modeled as point source emissions. For both an in-transit mixing and a central mix plant, the maximum allowable size under this general permit was determined by the PM (i.e., TSP) ambient impact. Details are in Table 5.

Table 5: Ambient Impact Levels

Plant type	In-transit mixing	Central mix
Size	150,000 tons concrete per year	495,000 tons concrete per year

[10] Class A TAPs are generally carcinogens. Class B TAPs are noncarcinogenic, but may have one or more of a variety of acute toxicity characteristics.

Plant type	In-transit mixing	Central mix
TSP: 24-hour impact	56.7 micrograms per cubic meter ($\mu g/m^3$)	57 $\mu g/m^3$
TSP: 24-hr avg. background	90 $\mu g/m^3$	90 $\mu g/m^3$
TSP: 24-hr impact plus background	146.7 $\mu g/m^3$	147 $\mu g/m^3$
TSP: 24-hour WAAQS	150 $\mu g/m^3$	150 $\mu g/m^3$
TSP: Annual impact	3.4 $\mu g/m^3$	1 $\mu g/m^3$
TSP: Annual avg. background	18 $\mu g/m^3$	18 $\mu g/m^3$
TSP: Annual impact plus background	11.4 $\mu g/m^3$	19 $\mu g/m^3$
TSP: Annual WAAQS	60 $\mu g/m^3$	60 $\mu g/m^3$
PM_{10}: 24-hour impact	22.1 $\mu g/m^3$	23.8 $\mu g/m^3$
PM_{10}: 24-hr avg. background	60 $\mu g/m^3$	60 $\mu g/m^3$
PM_{10}: 24-hr impact plus background	82.1 $\mu g/m^3$	83.8 $\mu g/m^3$
PM_{10}: 24-hour NAAQS	150 $\mu g/m^3$	150 $\mu g/m^3$
PM_{10}: Annual impact	1.3 $\mu g/m^3$	4.1 $\mu g/m^3$
PM_{10}: Annual avg. background	12 $\mu g/m^3$	12 $\mu g/m^3$
PM_{10}: Annual impact plus background	13.3 $\mu g/m^3$	16.1 $\mu g/m^3$
PM_{10}: Annual NAAQS	50 $\mu g/m^3$	50 $\mu g/m^3$
$PM_{2.5}$: 24-hour impact	3.2 $\mu g/m^3$	2 $\mu g/m^3$
$PM_{2.5}$: 24-hr avg. background	22 $\mu g/m^3$	22 $\mu g/m^3$
$PM_{2.5}$: 24-hr impact plus background	25.2 $\mu g/m^3$	24 $\mu g/m^3$
$PM_{2.5}$: 24-hour NAAQS	35 $\mu g/m^3$	35 $\mu g/m^3$
$PM_{2.5}$: Annual impact	0.17 $\mu g/m^3$	0.33 $\mu g/m^3$
$PM_{2.5}$: Annual avg. background	6 $\mu g/m^3$	6 $\mu g/m^3$
$PM_{2.5}$: Annual impact plus background	6.17 $\mu g/m^3$	6.33 $\mu g/m^3$
$PM_{2.5}$: Annual NAAQS	15 $\mu g/m^3$	15 $\mu g/m^3$
Chromium VI impact	7.5×10^{-6} $\mu g/m^3$	3.4×10^{-5} $\mu g/m^3$
ASIL	.000083 $\mu g/m^3$	.000083 $\mu g/m^3$
All the other TAPs' impacts are even further from their respective ASILs than is chrome VI		

5. REGULATORY REQUIREMENTS

There are a number of regulations that apply to the installation and operation of concrete batch plants proposed for coverage under this General Order of Approval. The following is a listing of those requirements. Some of these requirements result in notification, monitoring, and reporting requirements. There are also requirements related to periodic payment of fees and reporting of emissions. Ecology recommends that these requirements be included in the text of the General Order of Approval so the applicant understands what is expected once coverage is granted.

WASHINGTON STATE LAW

Title 70 RCW, Chapter 70.94, "Washington Clean Air Act"

- 70.94.152 (3) requires that any order that is adopted under this chapter shall be in accord with this chapter, or the applicable ordinances, resolutions, rules, and regulations adopted under this chapter.
- 70.94.152 (7) requires that any features, machines, or devices that are the subject of an order shall be maintained and operated in good working order.
- 70.94.152 (10) requires that any notice of construction approval issued under (3) above shall include a determination that the source will achieve best available control technology (BACT).

WASHINGTON STATE REGULATIONS

- WAC 173-400-99 through 104, these sections deal with the source registration program. Section 100 defines which facilities are subject to the registration program and payment of periodic registration fees.
- WAC 173-400-105, Subsection (1) relates to submittal of annual emission inventory information. Subsection (2) relates to the ability of Ecology to request emissions testing. Subsection (3) relates to site access by agency personnel at reasonable times to ascertain compliance or investigate complaints.
- Under WAC 173-400-110, Subsection (5) (d) Exemption threshold table for criteria pollutants.
- Except for exemptions specified under WAC 173-460-030(2), Chapter 173-460 WAC "New Sources of Toxic Air Pollutants" does not allow facilities discharging toxics listed under WAC 173-460-150 and WAC 173-460-160 to be exempt from new source review. WAC 173-460-080(2)(e): Small Quantity Emission Rate (SQER) Tables: This rule allows an applicant for a proposed TAP emissions source to avoid a second tier risk analysis without first doing a modeling dispersion analysis if all TAPs emission rates are less than those shown under WAC 173-460-080(2)(e).

FEDERAL REGULATIONS

There are no federal laws or rules specific to concrete batch plants.

6. CONCLUSIONS

FACILITY SIZE

In-transit mixing concrete batch plants shall produce no more than 150,000 tons of concrete in any twelve consecutive months. Central mix concrete batch plants shall produce no more than 495,000 tons of concrete in any twelve consecutive months.

FACILITY DESIGN

- May be portable or permanent installation.
- The cementitious (Portland cement and/or fly ash) material bins shall be vented to a bag house.

- In-transit mixing concrete batch plants, the drop chutes and weigh hopper shall be enclosed to minimize emissions exacerbated by wind effects.
- In-transit mixing concrete batch plants, truck charging shall use a flexible boot that fits into the truck mixer.
- In-transit mixing concrete batch plants having over 300 tons per hour capacity, truck charging shall be shrouded and vented with forced air draft to bag house.
- In central mix plants producing less than 300,000 tons per year of concrete, the drop chutes and mixer shall be totally enclosed.
- In central mix plants producing 300,000 or more tons per year of concrete, the drop chutes and mixer shall be totally enclosed and operated with a fan that will exhaust emissions to either a separate or the cementitious material bag house.

OPERATIONAL REQUIREMENTS

- Emissions from dumping the aggregate and sand into their respective bins shall be controlled by a pressurized water spray system that includes a stationary water tank or constant flow water line.
- Emissions from feeding the aggregate and sand bin conveyors shall be controlled by water spray as determined by weather conditions.
- Emissions from replenishing and managing the sand and aggregate piles shall be controlled by water spray as determined by weather conditions.
- Emissions from on-site vehicle traffic shall be controlled by water spray and/or chemical dust suppressant as determined by weather conditions.
- Provision shall be made to minimize track out of site surface material onto public roadways.

OTHER APPROVAL CONDITIONS

- Opacity from emissions at the top of the aggregate and sand bins and from the cementitious material bag house exhaust stack shall not exceed 10 percent when averaged over six minutes. This shall be measured using Method 9 and a correspondingly certified opacity reader when required by Ecology.
- A water truck and/or constant flow water line with moveable sprinklers shall be available whenever the concrete batch plant is in operation, and shall be used to control fugitive particulate matter emissions from on-site vehicle traffic.
- On-site vehicles speed will be limited to not greater than 10 miles per hour.
- There will be no visible emissions allowed at the property line.
- The permittee is to follow all recommended operation and equipment maintenance provisions supplied by the manufacturer of the concrete batch plant.
- Periodic emissions inventory information and other information may be requested by the Ecology. Information requested by Ecology shall be submitted within 30 days of receiving the request unless otherwise specified in the request. Ecology will supply the necessary forms to use for periodic emission inventory.
- The applicant will pay the required annual/periodic registration or air operating permit fees within 30 days of receipt of the invoice from Ecology.
- Access to the source for the purpose of determining compliance with the terms of this General Order of Approval by Ecology staff shall be permitted during normal business hours.

Failure to allow such access is grounds for an enforcement action under the Washington State Clean Air Act.

- The concrete batch plant shall be installed and operated shall be the same as described in the application.
- The provisions of this General Order of Approval are severable and, if any provision of this authorization, or application of any provisions of this authorization to any circumstance, is held invalid, the application of such provision to their circumstances, and the remainder of this authorization, shall not be affected thereby.
- The applicant is required to comply with applicable rules and regulations pertaining to air quality, and conditions of operation imposed upon issuance of this order. Any violation of applicable state and/or federal air quality rules and regulations or of the terms of this approval shall be subject to the sanctions provided in Chapter 70.94 RCW. Authorization under this Order may be modified, suspended, or revoked in whole or part for cause including, but not limited to, the following:
    - Violation of any terms or conditions of this authorization;
    - Obtaining this authorization by misrepresentation or failure to disclose fully all relevant facts.

8. ABBREVIATIONS AND ACRONYMS

AAQS	Ambient Air Quality Standards
AQMD	Air Quality Management District
ASIL	Acceptable Source Impact Level
BACT	Best Available Control Technology
cfm	cubic feet per minute
CFR	Code of Federal Regulations
CRO	Ecology Central Regional Office
Ecology	Washington State Department of Ecology
EPA	United States Environmental Protection Agency
ERO	Ecology Eastern Regional Office
^{o}F	degrees Fahrenheit
ft	feet
g	grams
HAP	hazardous air pollutant
hr/yr	hours per year
m	meter(s)
NAAQS	National Ambient Air Quality Standards
NOC	Notice of Construction
NSPS	New Source Performance Standard
NSR	New Source Review
PM	particulate matter
PM_{10}	particulate matter with an aerodynamic diameter of 10 micrometers or less
$PM_{2.5}$	particulate matter with an aerodynamic diameter of 2.5 micrometers or less
PSD	Prevention of Significant Deterioration
SQER	small quantity emission rate
TAP(s)	toxic air pollutants as defined in Chapter 173-460 WAC
T-BACT	BACT for Toxic Air Pollutants

VOC	volatile organic compound
WAC	Washington Administrative Code
%	percent
sec	second
µg (pollutant)/m^3	micrograms (pollutant) per cubic meter