October 29, 2001
Project 01105.02

Mr. Alan Fiksdal, Manager
State of Washington, Energy Facility Site Evaluation Council
P.O. Box 43172
Olympia, WA 98504-3172

Re: *BP Cherry Point Refinery - 750 Megawatt Cogeneration Facility PSD Application - Class I Areas Air Dispersion Modeling Protocol*

Dear: Mr. Fiksdal:

BP Cherry Point Refinery (BP) proposes to construct and operate a natural-gas-fired cogeneration electric power generating facility at its refinery near Blaine, Washington. The project is anticipated to be subject to the requirements of the Prevention of Significant Deterioration (PSD) permitting process. BP, through Golder Associates, has retained the services of AirPermits.com to prepare the required air permit applications and to perform air quality dispersion modeling to demonstrate that the project will not cause or contribute to a violation of any Class I PSD Increment or Air Quality Related Value (AQRV).

Federal Class I Areas are places of special national or regional value from a natural, scenic, recreational, or historic perspective. These areas were established as part of the PSD regulations included in the 1977 Clean Air Act Amendments. Federal Class I Areas are afforded the highest degree of protection among the types of areas classified under the PSD regulations.

AirPermits.com has prepared this dispersion modeling protocol prior to completing the Class I air quality analysis for the PSD permit application. Class I modeling entails two separate analyses: Class I PSD Increments and Air Quality Related Values (AQRVs). This protocol outlines the methodologies that will be used to complete the Class I air quality analysis and includes the proposed dispersion model, selected meteorological data, proposed receptor grids, and terrain information. This protocol is submitted for your review and approval. Class II area modeling is discussed in a separate modeling protocol.

Class I areas within 200 kilometers of the BP refinery will be included in this study. Within this 200 kilometer radius are the North Cascades National Park, the Olympic National Park, the Glacier Peak Wilderness Area, the Pasayten Wilderness Area, and the Alpine Lakes Wilderness Area. AQRVs will also be calculated for the Mt. Baker Wilderness Area at the request of the U.S. Forest Service (USFS) even though it is not a Class I area.

PROJECT DESCRIPTION

The proposed power plant will be capable of generating approximately 750 megawatts (MW) of electric power. The project will include the installation and operation of up to three General Electric 7FA combustion turbines (CTs) and three heat recovery steam generators (HRSG) with supplemental firing capability (duct burners). The primary fuel for the CTs and duct burners will be natural gas although the duct burners may fire natural gas or refinery fuel gas or a mixture of both. No other fuels are being considered at this time. Each of the three CT/HRSG combinations will have an individual associated stack.

MODEL SELECTION

AirPermits.com proposes to conduct the dispersion modeling in Class I areas using the CalPuff model version 5.4 provided by Earth Tech Inc. CalPuff is a multi-layer, multi-species, non-steady-state puff dispersion model that can simulate the effects of time and space-varying meteorological conditions on pollutant transport, transformation, and removal.

Modeling will be performed in accordance with the guidelines set forth in the *Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts* and the *Federal Land Manager's Air Quality Related Values Workgroup (FLAG) Phase I Report*. Guideline options will be used such as gaussian distribution, partial-puff-height adjustment, stack tip downwash, Pasquill-Gifford dispersion coefficients and partial plume penetration of elevated inversion.

CLASS I AREA PSD INCREMENT ANALYSIS

A PSD permit application is required to demonstrate through air dispersion modeling that the emissions increase from the proposed new facility will not cause or contribute significantly to any violations of allowable increments within the identified Class I areas. A significant contribution to a Class I increment is defined as a modeled concentration in excess of the significant impact levels (SILs) for Class I increments, shown in Table 1.

Typically, for receptor locations that are less than 50 kilometers (km) from a source, steady-state Gaussian dispersion models such as the ISCST3 dispersion model are used to determine the pollutant impacts. However, most steady-state Gaussian plume models are not considered accurate for predicting ambient impacts at receptors that are greater than 50 km in distance from the source. For receptors that are located greater than 50 km in distance from the source, the CalPuff modeling system is recommended to determine if adverse impacts will occur at the Class I areas.

CLASS I AREA AQRV ANALYSES

It is the responsibility of the Federal Land Manager (FLM) to identify AQRVs in each of the Class I Areas that may be affected by air pollution. AQRV indicators typically identified by FLMs include visibility degradation and acidic deposition. The following sections discuss the AQRVs that will be addressed at Class I areas for the proposed project and address the specific methodology to be used in performing the necessary analyses.

VISIBILITY

Visibility can be affected by plume impairment (heterogeneous) or regional haze (homogeneous). Plume impairment results when there is a contrast or color difference between the plume and a viewed background (the sky or a terrain feature). Plume impairment is generally only of concern when the Class I Area is near the proposed source, such that minimal dispersion of the plume occurs. The FLM considers "near" being a distance of 50 km or less. Since the distance to the nearest Class I area is more than 50 km from the proposed plant, a regional haze analysis will be prepared for each Class I area identified. Background extinction coefficients to be used in the postprocessor CalPost will be obtained from the FLAG Phase I Report. These are 0.6 Mm^{-1} for hygroscopic components and 4.5 Mm^{-1} for non-hygroscopic components for all Class I areas in the study area. A significance level of 5 percent (%) visibility change has been set to evaluate the requirement for cumulative modeling with other nearby sources.

DEPOSITION

Soils and aquatic resources in Class I areas are potentially influenced by nitrogen and sulfur deposition. Nitrogen and sulfur deposition occur through both wet and dry processes. Significance levels of 6 grams per hectare per year (kg/ha/yr) and 10 g/ha/yr for sulfur and nitrogen deposition, respectively, will be used.

METEOROLOGICAL DATA

One year of MM5 data from March of 1998 to February of 1999 and the CalMet preprocessor will be used in conjunction with data from the BP on-site meteorological station, National Weather Service (NWS) surface meteorological stations, upper air meteorological stations, and precipitation stations to develop the meteorological field. The CalMet meteorological preprocessor combines information from multiple surface and upper air meteorological stations as well as topography and land use data to compile a three-dimensional meteorological field. Based on the IWAQM Phase 2 recommendations, the meteorological domain, which is equal to the CalPuff modeling domain, will be determined by extending 80 km beyond the outer receptors and sources considered in the analysis. This will result in a grid that is approximately 475 km by 400 km. A 12 km by 12 km resolution will be used for the domain.

The CalMet wind fields will be spot checked for agreement between predicted wind profiles and the surrounding terrain. If it is determined that the wind profiles do not agree with the nearby terrain profiles, the resolution of the meteorological domain may be reduced to improve CalMet's accuracy.

MODEL METHODOLOGY

SOURCE INFORMATION

The CalPuff dispersion model allows for emissions units to be represented as point, area, or volume sources. The same point sources (turbines) proposed in the Class II modeling protocol will be considered in the CalPuff modeling analyses. The "worst-case" stack parameters, load condition, and ambient temperature from the Class II modeling will be used in the Class I modeling.

The building downwash information determined in the original PSD modeling will also be used with all CalPuff modeling analyses.

RECEPTOR INFORMATION

Lambert Conformal Coordinates (LCC) will be used as the grid system throughout the CalPuff modeling. A 2 km spaced discrete receptor grid will be used to determine concentrations with the Class I and other specified areas. Additional specific sensitive discrete receptors within the areas will be included in the modeling analysis if necessary.

CHEMICAL REACTIONS

The primary pollutants to impact haze are ammonium sulfate and ammonium nitrate. These compounds are formed through atmospheric reactions involving NO_2 and SO_2, which are products of combustion. NO_2 absorbs light (causing a brown color) and can also impact visibility, although to a lesser degree than ammonium sulfate and ammonium nitrate. In addition, PM, which is also emitted from the turbines and duct burners, can contribute to haze. CalPuff uses the MESOPUFF-II chemical transformation algorithms, where the concentrations of the five previously mentioned pollutants plus nitric acid are tracked.

There are two user-selected input parameters that affect the MESOPUFF-II chemical transformation: ammonia and ozone concentrations. The IWAQM Phase 2 report recommends using ammonia concentration values of 0.5 ppb for forests, 1.0 ppb for arid lands, and 10 ppb for grasslands. Ammonia background concentrations in Canada have been measured at 17 ppb. Since the land use in the study domain is mixed, 17 ppb will be used as a conservative value to assure that the conversion of NO_X to ammonium sulfate is not ammonia limited. An annual ozone concentration of 28 ppb has been measured in Canada and will be used in this study as a conservative value.

ADDITIONAL MODEL SETTINGS

All analyses will be performed using the model restart option, such that puffs from the prior time period that are still active are maintained in the current time period.

SUMMARY AND APPROVAL OF MODELING PROTOCOL

Using Ecology, USFS, and NPS approved data, procedures, and the CalPuff model, AirPermits.com will prepare a modeling assessment demonstrating that emissions from the proposed facility will not cause or contribute to a violation of the NAAQS, PSD increments, or AQRVs. It is very likely that the maximum ground-level impacts from the proposed facility will be below the SILs and other significance levels. Should that be the case, cumulative modeling, modeling to incorporate the impact of other nearby existing sources, will not be performed in support of the PSD application.

AirPermits.com is supplying this written protocol for approval of the modeling methodologies to be used for this PSD permit action. If you have any questions about the material presented in this letter, require additional information, or would like to talk about any of the proposed methods, please do not hesitate to call me at (425) 788-0120 or Brian Phillips at (206) 367-2638.

Sincerely,

Walter J. Russell
President

cc: Clint Bowman, Washington State Department of Ecology
Mike Torpey, BP Cherry Point Refinery
Jim Thornton, Golder Associates
Brian Phillips, AirPermits.com

Table 1

Significant Impact Levels

Pollutant	Averaging Time				
	Annual	24-hour	8-hour	3-hour	1-hour
SO_2	0.1 $\mu g/m^3$	0.275 $\mu g/m^3$	---	1.23 $\mu g/m^3$	---
PM_{10}	0.27 $\mu g/m^3$	1.35 $\mu g/m^3$	---	---	---
NO_2	0.1 $\mu g/m^3$	---	---	---	---

October 29, 2001
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Mr. Alan Fiksdal, Manager
State of Washington, Energy Facility Site Evaluation Council
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Olympia, WA 98504-3172

Re: *BP Cherry Point Refinery - 750 Megawatt Cogeneration Facility PSD Application - Class II Areas Air Dispersion Modeling Protocol*

Dear: Mr. Fiksdal:

BP Cherry Point Refinery (BP) proposes to construct and operate a natural-gas-fired cogeneration electric power generating facility at its refinery near Blaine, Washington. The project is anticipated to be subject to the requirements of the Prevention of Significant Deterioration (PSD) permitting process. BP, through Golder Associates, has retained the services of AirPermits.com to prepare the required air permit applications and to perform air quality dispersion modeling to demonstrate that the project will not cause or contribute to a violation of any National Ambient Air Quality Standards (NAAQS) or PSD Increments. AirPermits.com has also been commissioned to perform any required state air toxics emissions and impacts evaluations.

AirPermits.com has prepared this dispersion modeling protocol for the Class II air quality analysis required for the PSD permit application. This protocol outlines the methodologies to be used in undertaking the Class II areas air quality analyses and includes the choice of dispersion model, procedures for treating building downwash, selected meteorological data, proposed receptor grids, and terrain information. This protocol is submitted for your review and approval. A separate modeling protocol will be submitted for the PSD Class I areas.

Modeling will be used to determine the impacts of the proposed power plant and to compare them with the significant impact levels (SILs), the National Ambient Air Quality Standards (NAAQS) and the PSD increments for criteria pollutants and the Acceptable Source Impact Levels (ASILs) for toxic pollutants.

PROJECT DESCRIPTION

The proposed power plant will be capable of generating approximately 750 megawatts (MW) of electric power. At this time, the project will include the installation and operation of up to three General Electric 7FA combustion turbines (CTs) and three heat recovery steam generators (HRSG) with supplemental firing capability (duct burners). The CTs will be fired primarily with natural gas. The duct burners will fire natural gas or refinery fuel gas or a mixture of both. Each of the three CT/HRSG combinations will have an individual associated stack.

MODEL SELECTION AND METHODOLOGY

SELECTION OF MODEL

AirPermits.com proposes to conduct the dispersion modeling analyses using the latest version (00101) of the Industrial Source Complex (ISCST3) model to estimate maximum ground-level concentrations. The ISCST3 dispersion model is a refined, steady-state, multiple source, Gaussian dispersion model and is the preferred model to use for industrial sources in this type of air quality analysis. AirPermits.com will use the BEE-Line Software, BEEST (version 8.17b) proprietary version of the ISCST3 model.

Building downwash will be included using the USEPA-sanctioned Building Profile Input Program (BPIP), version 95086. BPIP is designed to incorporate the concepts and procedures expressed in the Good Engineering Practice (GEP) Technical Support document, the Building Downwash Guidance document, and other related documents. BPIP is incorporated in the BEEST software.

Modeling will be performed in accordance with regulatory guidelines set forth in USEPA's *Guideline On Air Quality Models*. Regulatory default options will be used such as final plume rise, stack tip downwash and buoyancy dispersed diffusion and default values will be used for wind profile exponents, temperature gradients, and wind dispersion coefficients.

METEOROLOGICAL DATA

Actual hourly meteorological data representative of the project site are available from the BP Cherry Point Refinery on-site meteorological measurements program. The BP meteorological measurements program is operated to collect PSD-grade meteorological data. Quarterly data reports and quarterly audit reports are available. The hourly meteorological data for the 1995, 1996, 1998, 1999, and 2000 calendar years have been processed into a format suitable for use in the ISCST3 and CalPuff dispersion models using the USEPA-approved MPRM meteorological preprocessor. The 1995, 1996, 1998, and 1999 data have previously been used in a recent PSD application for BP. Data for calendar year 1997 are not used due to an abundance of missing on-site data and the difficulty of locating other needed off-site data.

Upper air data for Quillayute, Washington, will be used, as it is the closest station to the site with upper air data. Data not available on-site, such as relative humidity, and missing data will be obtained from other nearby sites such as Bellingham, Vancouver Airport, or Seattle.

RECEPTOR GRIDS

Ground-level concentrations will be calculated over four Cartesian receptor grids and at receptors placed along the BP Cherry Point refinery property line. Ground-level pollutant concentrations will not be calculated within the BP property fenceline. The property line receptors will be spaced at an interval of 50 meters. For PSD purposes, the four Cartesian grids will cover a region extending from all edges of the proposed facility boundary to approximately 12 kilometers (km) from the facility boundary.

The fine grids will contain 50-meter-spaced receptors extending to approximately 1 km and 100-meter-spaced receptors extending to approximately 2 km from the center stack of the proposed facility. The medium grids will contain 250-meter-spaced receptors extending to approximately 4 km and with 500-meter-spaced receptors extending approximately to 8 km. A coarse grid will contain 1,000-meter-spaced receptors that extend approximately to 12 km. Based on our experience, a receptor array of this type is typically sufficient for identifying the "worst-case" ground-level pollutant concentrations and rarely requires additional, more refined receptor spacing and additional model runs.

If the significance level modeling analysis predicts concentrations above or approaching the SILs at the 12 km distance, for PSD purposes, the coarse grid will be extended to capture the full area of impact. Based on past experience with similar facilities, the ground-level impacts generally do not typically exceed the SILs and the maximum ground-level impacts occur well within the 12 km distance.

In addition, receptors will be placed along the Canada-US border with a spacing of 1 km and elsewhere in the greater Vancouver area in Canada with a grid spacing of 2 km in order to determine the maximum pollutant concentrations in Canada. This receptor grid will extend out to a maximum distance of 50 kilometers from the proposed facility site. The ISCST3 dispersion model is approved for use only up to a distance of 50 kilometers from the source.

TREATMENT OF TERRAIN

Terrain elevations used in the ISCST3 modeling analyses will be extrapolated from Digital Elevation Model (DEM) data obtained from the U.S. Geological Survey (USGS). The DEM data consist of arrays of regularly spaced elevations and correspond to the 1:24,000 scale topographic quadrangle map series. The array elevations are at 30-meter intervals and the elevation at each ISCST3 receptor will be extrapolated using the BEEST software to determine elevations at the defined 50-meter, 100-meter, 250-meter, 500-meter, 1,000-meter, and 2,000-meter receptor intervals. All data obtained from the DEM files will be checked for completeness and spot-checked for accuracy against elevations on corresponding USGS 1:24,000 scale topographical quadrangle maps or other appropriate maps. Missing or erroneous data from the DEM files will be replaced by direct extrapolation from the USGS data.

LAND USE ANALYSIS

The land use in the area will be classified as rural for this analysis and rural dispersion coefficients will be specified in ISCST3.

REPRESENTATION OF EMISSION SOURCES

COORDINATE SYSTEM

In all modeling analyses, the location of emission sources, structures, and receptors will be represented in the Universal Transverse Mercator (UTM) coordinate system).

SOURCE PARAMETERS

The ISCST3 dispersion model allows for emissions units to be represented as point, area, or volume sources. For point sources with unobstructed vertical releases, it is appropriate to use actual stack parameters (i.e., height, diameter, exhaust gas temperature, and gas exit flow) in the modeling analyses. Each source to be included in the modeling analysis will be represented as a point source having an unobstructed vertical discharge using actual stack parameters (i.e., emissions in pounds per hour, flow rate in actual cubic feet per minute, stack exhaust gas temperature in degrees Fahrenheit) provided by the BP engineering consultant. The three stacks may be modeled as one collocated stack with the stack parameters the same as each individual stack but with the emissions tripled.

Facility buildings and other structures, with their associated vertical and horizontal dimensions, which could contribute to aerodynamic downwash of the plume, will be incorporated into the model. The dimensions of these buildings and other structures will be simulated in the modeling using the same coordinate system as the receptor grids.

MODELING SCENARIOS

FUEL TYPE, LOAD MODELING AND AMBIENT TEMPERATURE ANALYSIS

The air quality impacts of the CTs are dependent upon fuel type, operating load conditions and ambient temperature. Maximum impacts are not always associated with a given fuel type or an operating load of 100% on a pollutant-by-pollutant basis. Therefore, for each pollutant and averaging period, three different load scenarios will be modeled for each fuel type to be considered. These three operating load scenarios will likely consider CT loads at 100%, 75%, and 50%. During normal operations, BP will not operate at less than 50% load and any operations at less than 50% will generally be associated with startup or shutdown conditions.

Since combustion turbines exhibit some variation in emission rate and exhaust flow depending on the ambient temperature, the turbine vendors have been asked to provide emissions and flow information for ambient temperatures of 5°F, 50°F, and 85°F for each fuel type to be considered. These ambient temperature scenarios will be modeled to represent operations on a cold day, an average day, and a hot day, respectively. These temperature levels were determined using the 2-meter reference temperature data from the on-site meteorological measurements program. It is appropriate to model the 5°F turbine operating parameters only during the colder seasons of the year. Conversely, it is not appropriate to model the 85°F conditions during the colder winter months. However, for this application, each temperature scenario will be modeled for the entire year to find the potential maximum ambient impacts for short term averaging times. For the pollutants with annual average ambient air quality standards, the turbine operating parameters at the annual average temperature of 51°F will be used.

The greatest air quality impacts resulting from the three operating load scenarios and the three ambient temperature scenarios and for each potential fuel type will be used to compare against the significant impact levels (SILs) shown in Table 1. Should the modeling results show that an SIL for a given pollutant is exceeded, cumulative modeling will be performed. Should this be the case, a separate modeling protocol will be developed and submitted for review and approval prior to conducting any cumulative source modeling.

AMBIENT RATIO METHOD FOR NO_X

The Ambient Ratio Method (ARM) may be used to further refine the significance modeling analysis, NAAQS modeling analysis, or PSD increment modeling analysis for nitrogen dioxide (NO_2). The ARM has evolved from previous representations (e.g., Ozone Limiting Method) of the oxidation of nitrogen oxide by ambient ozone and other photochemical oxidants. The ARM is contained in Section 6.2.3, *Models for Nitrogen Dioxide (Annual Average)*, of 40 CFR Part 51, Appendix W. If warranted, the default ratio of 75% NO_2/NO_X will be used for the proposed facility's significance, NAAQS, and PSD increment modeling analyses.

ADDITIONAL IMPACTS ANALYSES

Additional impact analyses will be conducted to evaluate the impact of potential toxic air pollutants (TAPs) using the guidance provided in WAC 173-460. Only toxic air pollutants with emission rates in excess of the small quantity emission rates listed in WAC 173—460-080(2)(e) will be modeled with the exception of those TAPs which have Acceptable Source Impact Levels (ASILs) less than 0.001 micrograms per cubic meter ($\mu g/m^3$), which are required to be modeled regardless of emission rate. Modeled impacts will be compared to the respective ASILs. The small quantity emissions levels and ASILs of some TAPs generally associated with these types of facilities are shown in Table 3. The emissions of ammonia from the SCR system will also be modeled as required by WAC 173-460.

PSD regulations require that three additional impact analyses be performed as parts of the PSD permit application. These are a growth analysis, a soil and vegetation analysis, and a visibility analysis. The PSD application will address these issues; however, no additional modeling analyses are anticipated for the growth and soil/vegetation analyses. Visibility modeling analyses will be required for the Class I areas and will be addressed using the CalPuff model. A separate protocol for Class I area impact analyses will address the visibility analysis issues.

The impacts that the proposed cogeneration facility will have on pollutant concentrations in Canada will be evaluated by using the results of the ISCST3 modeling analyses. The results will be compared against the Canadian or British Columbia Air Quality Objectives shown in Table 2. Also, if required, the impacts in Canada will be further evaluated with consideration of the potential emission reductions that the project proponent expects to provide. If required after consultation with the Canadian air quality authorities and the presentation of the preliminary ISCST3 model results for each regulated pollutant, the 98^{th}, 75^{th}, and 50^{th} percentiles will be determined and reported along with the seasonal and cumulative PM_{10} impacts as discussed in the Particulate Matter Science Assessment Document. Based on the wind direction frequency distribution, the fraction of emissions from the facility that cross into Canada on an annual basis will be estimated.

It has been requested that startup and shutdown emissions be considered in the modeling analysis. Startup and shutdown data has not been acquired from the turbine manufacturer and it is not known exactly what the content and form of this data will be. Modeling dynamic situations such as startup and shutdown is not easily performed with a steady-state model such as ISCST3. A modeling protocol addendum will be submitted when this data has been obtained and a realistic method has been determined to model these dynamic cases.

SUMMARY AND APPROVAL OF MODELING PROTOCOL

Using Ecology-approved data, procedures, and the ISCST3 dispersion model, AirPermits.com will prepare a modeling assessment demonstrating that emissions from the proposed facility will not cause or contribute to a violation of the NAAQS, PSD increment, or toxic pollutant standards. It is very likely that the maximum ground-level impacts from the proposed facility will be below the SILs. Should that be the case, cumulative modeling, modeling to incorporate the impact of other nearby existing sources, will not be performed in support of the PSD application.

AirPermits.com is supplying this written protocol for approval of the modeling methodologies to be used for this PSD permit action. If you have any questions about the material presented in this letter, require additional information, or would like to talk about any of the proposed methods, please do not hesitate to call me at (425) 788-0120 or Brian Phillips at (206) 367-2638.

Sincerely,

Walter J. Russell
President

cc: Clint Bowman, Washington State Department of Ecology
Greg Corcoran, BP Cherry Point Refinery
Mike Torpey, BP Cherry Point Refinery
Doug Morell, Golder Associates
Brian Phillips, AirPermits.com

Table 1

Significant Impact Levels

Pollutant	Averaging Time				
	Annual	24-hour	8-hour	3-hour	1-hour
SO_2	1.0 μg/m^3	5.0 μg/m^3	---	25 μg/m^3	---
PM_{10}	1.0 μg/m^3	5.0 μg/m^3	---	---	---
NO_2	1.0 μg/m^3	---	---	---	---
CO	---	---	500 μg/m^3	---	2,000 μg/m^3
NOTE: Source: WAC 173-400					

Table 2

Canadian Air Quality Objectives

Pollutant	Averaging Time				
	Annual	24-hour	8-hour	3-hour	1-hour
SO_2	25 μg/m^3	150 μg/m^3	---	375 μg/m^3	450 μg/m^3
PM_{10}	30 μg/m^3	50 μg/m^3	---	---	---
NO_2	60 μg/m^3	200 μg/m^3	---	---	400 μg/m^3
CO	---	---	5,500 μg/m^3	---	14,300 μg/m^3

Table 3
Toxics Data

Toxic Compound	Small Quantity Emission Rate (lb/yr)	Small Quantity Emission Rate (lb/hr)	ASIL ($\mu g/m^3$)	Class A or B Toxic Compound		EPA Classified HAP (Yes/No)
VOC						
Acetaldehyde	50		0.45	A	annual	**Yes**
Acrolein	175	0.02	0.02	B	24-hr	**Yes**
Ammonia	17,500	2.0	100	B	24-hr	No
Benzene	20		0.12	A	annual	**Yes**
1,3-Butadiene	0.5		0.0036	A	annual	**Yes**
Butane (isomers)	43,748	5.0	6,300	B	24-hr	No
Cyclohexane	43,748	5.0	3,400	B	24-hr	No
Cyclopentane	43,748	5.6	5,700	B	24-hr	No
Ethylbenzene	43,748	5.0	1,000	B	24-hr	**Yes**
Formaldehyde	20		0.077	A	annual	**Yes**
Heptane (isomers)	43,748	5.0	5,500	B	24-hr	No
N-Hexane	22,750	2.6	200	B	24-hr	**Yes**
Hexane (isomers)	43,748	5.0	5,900	B	24-hr	**Yes**
Methylcyclohexane	43,748	5.0	5,400	B	24-hr	No
Naphthalene	22,750	2.6	170	B	24-hr	**Yes**
Nonane	43,748	5.0	3,500	B	24-hr	No
Octane (isomers)	43,748	5.0	4,700	B	24-hr	No
PAH	a		0.000480	A	annual	**Yes**
Pentane (isomers)	43,748	5.0	6,000	B	24-hr	No
Toluene	43,748	5.0	400	B	24-hr	**Yes**
1,2,3-Trimethylbenzene	43,748	5.0	420	B	24-hr	No
Xylene	43,748	5.0	1,500	B	24-hr	**Yes**
PM						
Arsenic	a		0.00023	A	annual	**Yes**
Barium	175	0.02	1.7	B	24-hr	No
Beryllium	a		0.00042	A	annual	**Yes**
Cadmium	a		0.00056	A	annual	**Yes**
Chromium	175	0.02	1.7	B	24-hr	**Yes**
Cobalt	175	0.02	0.33	B	24-hr	**Yes**
Copper	175	0.0	0.3	B	24-hr	No
Lead	50		0.5	A	24-hr[b]	**Yes**
Manganese	175	0.02	0.4	B	24-hr	**Yes**
Mercury	175	0.02	0.33	B	24-hr	**Yes**
Molybdenum	5,250	0.6	33	B	24-hr	No
Nickel	0.5		0.0021	A	annual	**Yes**
Selenium	175	0.02	0.67	B	24-hr	No
Sulfuric Acid	175	0.02	3.3	B	24-hr	No
Tin	175	0.02	6.7	B	24-hr	No
Vanadium	175	0.02	0.17	B	24-hr	No
Zinc	175	0.02	7	B	24-hr	No

Notes:
a. Must be modeled regardless of emission rate [WAC 173-460-080(2)(e)].
b. 24-hour averaging time – special ASIL [WAC 173-460, Table 3]