

3.4 AIR QUALITY

This section presents a description of the existing air quality setting in the vicinity of the La Center Interchange and Ridgefield Interchange Sites. Information presented here is condensed from the *Cowlitz Casino Project Environmental Impact Statement Air Quality Technical Report*, completed by CH2MHill in 2006 (CH2MHill, 2006a) and is included as DEIS Vol. I, **Appendix E**.

The alternative project sites are located in Clark County, Washington. The unifying feature of the area is the Columbia River. The alternative sites are approximately 16 and 14 miles north of the Vancouver/Portland metropolitan area, respectively, but are located in a rural area outside of the Vancouver ozone and carbon monoxide maintenance areas.

3.4.1 CLIMATE

The Coast Range to the west and the Cascade Range to the east influence the climate of Clark County. The Coast Range provides limited shelter from the Pacific Ocean. As moist, heavy air from the west rises up the steep slopes of the Cascade Range, the air is cooled, which creates moderate rainfall in the lower-lying areas and more significant rainfall on the west slope of the Cascades. The Cascades also form an eastern barrier from continental air masses originating over the Columbia River Basin. The County's geographic position between two mountain ranges serves to insulate it against dramatically differing climates occurring 100 miles in either direction.

TEMPERATURE

Temperatures in the County, as recorded at four reporting stations, average 37 degrees Fahrenheit (°F) in January and 65°F in July. Temperatures may vary from one location to another, depending on the direction of the wind, type of vegetation, and topography. Generally, temperatures are higher in the urbanized areas than in the surrounding rural areas. This is often due to 1) increased human activities that occur within urban areas, 2) less evaporation because there is less water retention in the developed areas, and 3) less heat loss at night in urban areas because of heat retention in buildings and paved areas.

There are four definite seasons of the year, but the trend from one to another is very gradual. The average annual temperature in the County is approximately 50°F. The average growing season on the western plains ranges from 154 days at Battle Ground to 178 days at La Center and 222 days at Vancouver.

PRECIPITATION

Clark County has wet, mild winters and warm, dry summers. Precipitation ranges from a low of 41 inches annually in Vancouver to a high of 114 inches annually in the northeastern corner of the County. Approximately 80% to 85% of the precipitation occurs from October to May.

Seasonal differences in precipitation are much more marked than those of temperatures. The precipitation falls mostly as rain, with the normal annual snowfall ranging from less than 6 inches on the western plains to over 22 inches in the northeastern portion of the County.

WIND

The prevailing surface winds are generally from the northwest in the months of April through September and from the east/southeast from October through March. There are occasional winds from the east that are a part of extremes in either cold or hot weather. These extremes are tempered by nearly uniform ocean temperatures ranging from 50°F to 55°F. Winter storm tracks are generally from the southwest, with infrequent snowstorms dropping down from the Gulf of Alaska. Major wind events in Clark County occur infrequently. Two of the more famous were the Columbus Day storm in 1962 and the Peter Ogden tornado in 1972.

FOG

Fog often occurs in the valleys and low-lying areas of the County. Fog is either the result of clear skies and still air that allows large heat losses at night, or of warm moist air masses moving over cooler ground. In either case, when the lower air is cooled to below the dew point, fog occurs. Fog as a result of clear skies and still air is most common in the County during the spring and fall months.

CLIMATIC CHANGE

According to the United Nations Intergovernmental Panel on Climate Change (IPCC) and the U.S. Environmental Protection Agency (USEPA), temperatures in Washington State could increase by about 5°F in winter and summer, and by about 4°F in spring and fall over the next 100 years. Precipitation is projected to change little in the spring, summer, and fall and to increase by about 10% in winter. The frequency of extreme hot days in summer is expected to increase along with the general warming trend. A recent study issued by the U.S. Department of Energy predicts similar climatic changes for the region.

TOPOGRAPHY

The structure and orientation of terrain features will often influence and even control air motion and mechanical turbulence in the lower atmosphere. Small hills and trees may alter wind speed and direction while also enhancing mechanical turbulence. Larger terrain features such as mountains, hills, and valleys may be a governing factor in the control of wind speed and wind direction.

Clark County lies within a geographic basin known as the Willamette-Puget Trough, formed by the Cascade and Pacific Coast Mountain Ranges. It is bounded on the south and west by the Columbia River, on the north by the Lewis River, and on the east by the foothills of the Cascades. Along the Columbia are low-lying bottomlands, from which a series of alluvial plains and terraces extend north and northeast. Land elevations rise from less than 10 feet on the south and west floodplains to over

3,000 feet above mean sea level (amsl) in the eastern portion. The western half of Clark County lies at the junction of the Columbia River and Willamette valleys and is comparatively level over the southern portion. As the terrain progresses northward and eastward, it develops into rolling hills, culminating in the Cascade Range.

3.4.2 REGULATORY CONTEXT

FEDERAL

The Federal Clean Air Act (CAA) of 1970, as amended, establishes air quality standards for several pollutants. These pollutants are termed “criteria” pollutants because the USEPA has established specific concentration threshold criteria based upon specific medical evidence of health effects. These national ambient air quality standards (NAAQS) are divided into primary standards and secondary standards. Primary standards are designed to protect the public health and secondary standards are intended to protect the public welfare from effects such as visibility reduction, soiling, nuisance, and other forms of damage. Ambient air quality standards are presented in **Table 3.4-1**.

Regions of Clark County are classified with respect to their attainment or the extent of their “non-attainment” of these standards. Non-attainment areas must take steps towards attainment within a specific period of time. The CAA places most of the responsibility on states to achieve compliance with the NAAQS. The primary vehicle for implementation is known as the State Implementation Plan (SIP). The SIP for Washington is officially entitled *A Plan for the Implementation, Maintenance and Enforcement of National Ambient Air Quality Standards in the State of Washington* and is a number of documents that set forth the State’s strategies for achieving Federal air quality standards. The Code of Federal Regulations (CFR Title 40, Part 52, Subpart WW Section 52.2479) lists all of the items that are included in the Washington SIP.

Whereas the southern portion of Clark County is part of the Portland/Vancouver Metropolitan area and, as such, is part of an ozone and carbon monoxide maintenance area, as shown in **Table 3.4-2**, the northern portion of Clark County is designated as unclassifiable/attainment for all NAAQS. Both the La Center Interchange Site and the Ridgefield Interchange Site are located within this northern portion of Clark County.

The USEPA Region 10 Office of Air Quality (OAQ) is responsible for administering the Tribal Authority Rule (40 CFR, Part 49), Indian Tribes: Air Quality Planning and Management (63 FR 7253, February 12, 1998), which implements Section 301 of the CAA. The Tribal Authority Rule authorizes the Regional USEPA Administrator to decide which provisions of the CAA to make available for tribal implementation and which to reserve for USEPA implementation. The rule provides that tribes may be treated in the same manner as states for virtually all CAA programs. The rule grants tribes with USEPA-approved CAA programs authority over these programs for all air

resources within the exterior boundaries of their reservation (including non-Indian owned fee lands). For off-reservation areas tribes must demonstrate the basis for jurisdiction.

TABLE 3.4-1
AMBIENT AIR QUALITY STANDARDS

Pollutant	National		Washington State
	Primary*	Secondary	
Carbon Monoxide (CO)			
8-Hour Average	9 ppm	Same as Primary	9 ppm
1-Hour Average	35 ppm	Same as Primary	35 ppm
Lead (Pb)			
Quarterly Average	1.5 µg/m ³	Same as Primary	No Standard
Total Suspended Particulates			
Annual Arithmetic Mean	No Standard	No Standard	60 µg/m ³
24-Hour Average	No Standard	No Standard	150 µg/m ³
Particulate Matter (PM₁₀)			
Annual Arithmetic Mean	50 µg/m ³	Same as Primary	50 µg/m ³
24-Hour Average	150 µg/m ³	Same as Primary	150 µg/m ³
Particulate Matter (PM_{2.5})			
24-Hour Average	35 µg/m ³	Same as Primary	65 µg/m ³
Annual Arithmetic Mean	15 µg/m ³	Same as Primary	15 µg/m ³
Sulfur Dioxide (SO₂)			
Annual Average	0.03 ppm	No Standard	0.02 ppm
24-Hour Average	0.14 ppm	No Standard	0.10 ppm
3-Hour Average	No Standard	0.50 ppm	No Standard
1-Hour Average	No Standard	No Standard	0.40 ppm***
Ozone (O₃)			
8-Hour Average**	0.08 ppm	0.08 ppm	No Standard
Nitrogen Dioxide (NO₂)			
Annual Average	0.053 ppm	Same as Primary	0.05 ppm

NOTES:

* Ambient concentrations are rounded using the next higher decimal place to determine whether a standard has been exceeded.

** Ozone 1-Hour Standard was officially revoked June 15, 2005.

*** 0.25 ppm not to be exceeded more than two times in any seven consecutive days.

ppm – parts per million

µg/m³ – micrograms per cubic meter

Source: DOE, 2004.

USEPA Region 10 has established Federal Implementation Plans (FIPs) referred to as the Federal Air Rules for Reservations (FARRs) to fill the regulatory gap on 39 Indian reservations in Washington, Oregon, and Idaho. By means of these rules, USEPA imposes regulatory requirements on industry and residents of reservations, similar to those imposed by the rules of state and local air agencies in the surrounding areas. Since the Cowlitz Indian Tribe was landless when the FARRs were

TABLE 3.4-2
 NORTHERN CLARK COUNTY NAAQS
 CRITERIA POLLUTANTS AND STATUS

Pollutant	Federal Attainment Status Designation – Classification
Ozone (O ₃)	Unclassifiable/Attainment
Respirable Particulate Matter (PM ₁₀)	Unclassifiable/Attainment
Fine Particulate Matter (PM _{2.5})	Unclassifiable/Attainment
Carbon Monoxide	Unclassifiable/Attainment
Nitrogen Dioxide	Unclassifiable/Attainment
Sulfur Dioxide	Unclassifiable/Attainment
Lead	Unclassifiable/Attainment

Source: DOE; AES, 2006.

established, they are not presently included, but retain the option of inclusion in the future when their tribal lands are established (EPA, 2005c). Therefore, subsequent to the establishment of tribal lands and prior to inclusion in the FARR system, the reservation would be subject to all nationally enforceable USEPA regulations such as Prevention of Significant Deterioration (PSD), Air Permitting Program (Title V), and New Source Performance Standards (NSPS), National Emission Standards for Hazardous Air Pollutants (NESHAPS). Hazardous (toxic) air pollutants are regulated under the NESHAPS provision in 40 CFR Part 61 (see **Section 3.4.3**), while criteria pollutants are regulated under the NAAQS, 40 CFR Part 50. The Federal government has responsibility for directly administering CAA mandated programs in Indian country in instances where a tribe is not administering provisions of these programs. USEPA provides assistance to Tribes who wish to develop their own air quality regulations under the CAA for managing air quality on their reservations.

STATE

The Washington Clean Air Act (RCW 70.94) provides that the Washington State Department of Ecology (DOE) is the air quality management agency for a geographic region of the state unless a local air authority is formed to assume this responsibility. In the case of southwest Washington, the Southwest Clean Air Agency (SWCAA) was formed in 1968 by an agreement between Clark, Cowlitz, Lewis, Skamania, and Wahkiakum counties to regulate air quality at the local level. DOE's role is to establish statewide standards and rules that local air authorities must meet. Local agencies may adopt more stringent standards and rules if the local air quality requires such action. The SWCAA has the responsibility for all outdoor air pollution sources within its five-county jurisdiction, with the exception of automobiles, chemical paper and pulp mills, and aluminum reduction plants. Local air authorities prepare the SIP and submit them to DOE for approval and forwarding to the

USEPA. As discussed above, the SIP for the State of Washington is not a single document, but a compilation of plans, programs, local air quality rules, and state and Federal rules.

SWCAA and DOE operate an air quality monitoring network that determines whether southwest Washington complies with each ambient air quality standard. Additionally, the State of Washington has codified several of the NAAQS in the Washington Administrative Code (WAC) Title 173, Chapters 470, 474, and 475. These Washington State Standards are also listed in **Table 3.4-1**.

Once the Federal government acquires the property in trust for the Tribe, the parcels would not be subject to state regulatory authority for air quality. As stated above, the Federal government will be responsible for directly administering CAA mandated programs on the Tribal land in instances where the Tribe is not administering provisions of these programs. USEPA will provide assistance to the Tribe if they wish to develop their own air quality regulations under the CAA for managing air quality on their reservation.

Climate Change

Federal

In 1997 the Council on Environmental Quality (CEQ) circulated an internal draft memorandum (CEQ, 1997a) on how global climate change should be treated for the purposes of the National Environmental Policy Act (NEPA). The CEQ draft memorandum advised federal lead agencies to consider how proposed actions subject to NEPA would affect sources and sinks of GHGs. During the same year, CEQ released guidance on the assessment of cumulative effects in NEPA documents (CEQ, 1997b). Similarly, on January 19, 2001, the Secretary of the Interior issued Secretarial Order 3226, directing Bureaus of the Department to consider and analyze potential climate change impacts in planning and in programmatic and long-term environmental reviews. Consistent with the CEQ draft memorandum, GHGs were offered as one example of a cumulative effect. The state of Washington has been a leader among the states in outlining and implementing a comprehensive climate change strategy that is designed to result in a substantial reduction in total statewide GHG emissions in the future. Washington's climate change strategy is multifaceted and involves a number of state agencies implementing a variety of state laws and policies. Key laws and policies are summarized below.

Executive Order 07-02 (EO 07-02)

EO S-07-02 was signed by the Governor of Washington on February 7, 2007. EO 07-02 established the following statewide emission reduction targets:

- Reduce GHG emissions to 1990 levels by 2020,
- Reduce GHG emissions to 20 percent below 1990 levels by 2035, and

- Reduce GHG emissions to 50 percent below 1990 levels by 2050 or 70 percent below our expected emissions that year, and
- By 2020, increase the number of clean energy sector jobs to 25,000 from the 8,400 jobs we had in 2004, and
- By 2020, reduce expenditures by 20 percent on fuel imported into the state by developing Washington resources and supporting efficient energy use.

EO 07-02 orders and directs the Director of the Department of Ecology and the Director of the Department of Community, Trade, and Economic Development in consultation with a board range of stakeholders to develop a climate change initiative, Washington Climate Change Challenge, to achieve the goals of the EO 07-02. The Washington Climate Change Challenge shall address the following elements and process steps:

- Consider the full range of policies and strategies for the state of Washington to adopt or undertake to ensure the economic and emission reduction goals are achieved, including policy options that can maximize the efficiency of emission reductions including market-based systems, allowance trading, and incentives;
- Determine specific steps the state of Washington should take to prepare for the impact of global warming, including impacts to public health, agriculture, the coast line, forestry, and infrastructure;
- Assess what further steps the state of Washington should take to be prepared of the impact of global warming to water supply and management;
- Initiate active involvement by the state of Washington in the development of regional and national climate policies and coordination with British Columbia;
- Recommend how the state of Washington, as an entity, can reduce its generation of greenhouse gas emissions;
- Work with the state of Washington's local governments to maximize coordination and effectiveness of local and state climate initiatives; and
- Inform the general public of the process, solicit comments, and involvement and develop recommendations for future public education and outreach.

Revised Code of Washington Section 80.80.020 (RCW 80.80.020)

Signed into law by the Governor on April 17, 2007, RCW 80.80.020 codifies a key requirement of EO 07-02, specifically the requirement to reduce statewide GHG emissions to 1990 levels by 2020. RCW 80.80.020 provides a regulatory basis for the implementation of EO 07-02 goals. RCW 80.80.020 focuses on adopting a carbon dioxide (CO₂) mitigation program for new thermal electric

plant, mandating integrated resource planning for electric utilities to include life-cycle costs of CO₂ emissions, adopting clean car standards and stronger appliance efficiency standards, increasing production and use of renewable energy sources by electric utilities, and creating a cap and trade program for CO₂ .

2007 Washington Law Chapter 348 § 404

On May 7, 2007 the Governor approved the Engrossed Second Substitute House Bill (HB) 1303 with the exception of Section 306. 2007 Washington Law Chapter 348 § 404 mandates the Departments of Community, Trade, and Economic Development and Ecology work with the Climate Impacts Group (CIG) at the University of Washington to produce a comprehensive assessment of the impacts of climate change on the State of Washington. 2007 Washington Law Chapter 348 § 404 specifically requires that the assessment be focused on the impacts of global warming in relation to public health, agriculture, the coastal zone, forest ecosystems, infrastructure, and water supply and management.

Western Climate Initiative

The Western Climate Initiative creates a coalition of western states (California, Washington, Oregon, Arizona, New Mexico), British Columbia, and Manitoba that have agreed to collaborate on identifying, evaluating, and implementing regional mechanisms for reducing GHG emissions. In light of this goal, the Initiative creates a regional emissions registry and plans the creation of a regional market-based multi-sector emissions reduction mechanism by August 2008.

LOCAL

Once the Federal government acquires the property in trust for the Tribe, the parcels would not be subject to local regulatory authority for air quality. However, since air quality impacts generated on Tribal land may affect citizens residing off Tribal lands, the Tribe would coordinate with local air quality authorities with regards to the potential air quality complaints arising from off-Tribal lands.

CONFORMITY

40 CFR Part 93 was promulgated in order to determine conformity of Federal actions to state or Federal implementation plans. Whereas Subpart A of Part 93 relates to transportation plans, Subpart B is directed to general Federal actions. A Federal agency must make a determination that a Federal action conforms to the applicable implementation plan before the action is taken. A conformity determination is required for each pollutant where a total of direct and indirect emissions in a nonattainment or maintenance area caused by the Federal action are greater than *de minimus* thresholds as listed in CFR Section 93.153(b).

The general conformity rule implements Section 176 of the Federal CAA, which requires that a Federal agency ensure conformity with an approved SIP for those air emissions that would be brought

about by a Federal action (EPA, 2004). There are two phases to general conformity: 1) the conformity review process entailing a review of each analyzed alternative to assess whether a full conformity determination is necessary, and 2) the conformity determination process, which demonstrates how an action would conform with the applicable implementation plan (usually the SIP). The first step compares emissions estimates for the project to the appropriate general conformity *de minimus* threshold based on non-attainment type. If the emission estimates from step one are below the thresholds, then a general conformity determination is not necessary and step two is not required.

The regulations apply to proposed Federal actions that would cause emissions of criteria air pollutants above certain levels to occur in locations designated as non-attainment or maintenance areas for the emitted pollutants. If a Federal action occurs in a location designated as attainment or unclassified, then the general conformity regulation does not apply to the project. As shown in **Table 3.4-2**, the alternative project sites are either unclassifiable or attainment for all national standards and, therefore, would not be subject to a conformity determination.

3.4.3 CRITERIA AIR POLLUTANTS

The Federal government has established NAAQS to define levels of air quality that protect the public health and welfare from the known adverse effects of air pollutants. Standards have been developed for carbon monoxide, lead, particulate matter, sulfur dioxide, ozone, and nitrogen dioxide. However, in the La Center and Ridgefield area the pollutants of primary concern are ozone, carbon monoxide, and particulate matter.

OZONE

Ozone is a colorless gas with a pungent odor. Ozone causes eye irritation and respiratory function impairment. Most ozone in the atmosphere is formed as a result of the interaction of ultraviolet light, volatile organic compounds (VOC), and oxides of nitrogen (NO_x). VOC is composed of non-methane hydrocarbons, and NO_x is made of different chemical combinations of nitrogen and oxygen, mainly nitrous oxide (NO) and nitrogen dioxide (NO₂). A highly reactive molecule, ozone readily combines with many different components of the atmosphere. Consequently, high levels of ozone tend to exist only while high VOC and NO_x levels are present to sustain the ozone formation process. Once the precursors have been depleted, ozone levels rapidly decline. Because these reactions occur on a regional scale, ozone is considered a regional pollutant.

Ozone can irritate lung airways and cause inflammation much like sunburn. Other symptoms include wheezing, coughing, pain when taking a deep breath, and breathing difficulties during exercise or outdoor activities. People with respiratory problems are most vulnerable, but even healthy people that are active outdoors can be affected when ozone levels are high. Repeated exposure to ozone pollution for several months may cause permanent lung damage. Anyone who spends time outdoors

in the summer is at risk, particularly children. Even at very low levels, ground-level ozone triggers a variety of health problems including aggravated asthma, reduced lung capacity, and increased susceptibility to respiratory illnesses like pneumonia and bronchitis.

The Federal CAA Amendments of 1990 designated the Portland/Vancouver area, which includes southern Clark County, as non-attainment (marginal) for ozone and required that attainment be reached by December 31, 1993, in order to avoid sanctions from the USEPA. The Portland/Vancouver area was redesignated attainment by the USEPA in April of 1997. Areas that are redesignated to attainment are called maintenance areas. SWCAA continues to operate according to the terms of the Ozone Maintenance Plan. As shown in **Table 3.4-2**, the alternative project sites lie outside of this Ozone Maintenance area and are classified as unclassifiable/attainment.

CARBON MONOXIDE

Carbon monoxide (CO) can cause harmful health effects by reducing oxygen delivery to the body's organs (like the heart and brain) and tissues. The health threat from lower levels of CO is most serious for those who suffer from heart disease. For a person with heart disease, a single exposure to CO at low levels may cause chest pain and reduce that person's ability to exercise; repeated exposures may contribute to other cardiovascular effects. However, even healthy people can be affected by high levels of CO. People who breathe high levels of CO can develop vision problems, reduced ability to work or learn, reduced manual dexterity, and difficulty performing complex tasks. At extremely high levels, CO is poisonous and can cause death.

The Federal CAA Amendments of 1990 designated the Portland/Vancouver area, which includes southern Clark County, as non-attainment (moderate ≤ 12.7 parts per million) for CO. Since southern Clark County only exceeded the standards once in 1994, and has had no exceedances since, it was granted redesignation in October of 1996. SWCAA continues to operate according to the terms of the Carbon Monoxide Maintenance Plan. As shown in **Table 3.4-2**, the alternative project sites are outside of this Carbon Monoxide Maintenance area and are classified as unclassifiable/attainment.

SUSPENDED PARTICULATE MATTER

Particulate matter, or PM, is the term for particles found in the air, including dust, dirt, soot, smoke, and liquid droplets. Particles can be suspended in the air for long periods of time. Some particles are large or dark enough to be seen as soot or smoke. Others are so small that individually they can only be detected with an electron microscope. Some particles are directly emitted into the air. They come from a variety of sources such as cars, trucks, buses, factories, construction sites, tilled fields, unpaved roads, stone crushing, and burning of wood. Other particles may be formed in the air from the chemical change of gases. They are indirectly formed when gases from burning fuels react with sunlight and water vapor. These can result from fuel combustion in motor vehicles, at power plants, and in other industrial processes.

PM causes a wide variety of health and environmental impacts. Many scientific studies have linked breathing PM to a series of significant health problems, including aggravated asthma, increases in respiratory symptoms like coughing, difficult or painful breathing, chronic bronchitis, decreased lung function, and even premature death. In addition, PM is the major cause of reduced visibility (haze) in parts of the United States, including many national parks. Particles can also be carried over long distances by wind and then settle on ground or water. The effects of this settling include making lakes and streams acidic, changing the nutrient balance in coastal waters and large river basins, depleting the nutrients in soil, damaging sensitive forests and farm crops, and affecting the diversity of ecosystems. Soot, a type of PM, stains and damages stone and other materials, including culturally important objects such as monuments and statues.

NAAQS for PM are expressed in terms of both 24-hour and annual average concentrations, and consider the fractions of particulate matter less than 10 microns in diameter (PM₁₀) and less than 2.5 microns in diameter (PM_{2.5}). In addition, the State of Washington has standards for total suspended particulates (TSPs) in the WAC, but these standards are not monitored. As shown in **Table 3.4-2**, Clark County is designated unclassifiable/attainment for all particulate matter standards.

NITROGEN DIOXIDE

Nitrogen oxides, or NO_x, is the generic term for a group of highly reactive gases, all of which contain nitrogen and oxygen in varying amounts. Many of the nitrogen oxides are colorless and odorless. However, one common pollutant, NO₂, along with particles in the air, can often be seen as a reddish-brown layer over many urban areas. NO_x causes a wide variety of health and environmental impacts because of various compounds and derivatives in the family of nitrogen oxides, including nitrogen dioxide, nitric acid, nitrous oxide, nitrates, and nitric oxide. For example, ground-level ozone is formed when NO_x and VOCs react in the presence of sunlight. In addition, NO_x and sulfur dioxide react with other substances in the air to form acids, which fall to the ground as rain, fog, snow or dry particles. NO_x also reacts with ammonia, moisture, and other compounds to form nitric acid and related particles. As shown in **Table 3.4-2**, Clark County is designated unclassifiable/attainment for all nitrogen dioxide standards.

SULFUR DIOXIDE

Sulfur dioxide, or SO₂, belongs to the family of sulfur oxide gases (SO_x). These gases dissolve easily in water. Sulfur is prevalent in all raw materials, including crude oil, coal, and ore that contains common metals like aluminum, copper, zinc, lead, and iron. SO_x gases are formed when fuel containing sulfur, such as coal and oil, is burned, and when gasoline is extracted from oil, or metals are extracted from ore. SO₂ dissolves in water vapor to form acid, and interacts with other gases and particles in the air to form sulfates and other products that can be harmful to people and their

environment. As shown in **Table 3.4-2**, Clark County is designated unclassifiable/attainment for all sulfur dioxide standards.

LEAD

Lead is a metal found naturally in the environment as well as in manufactured products. The major sources of lead emissions have historically been motor vehicles (such as cars and trucks) and industrial sources. Due to the phase-out of leaded gasoline, metals processing is the major source of lead emissions in the air today. The highest levels of lead in air are generally found near lead smelters. Other stationary sources are waste incinerators, utilities, and lead-acid battery manufacturers. As shown in **Table 3.4-2**, Clark County is designated unclassifiable/attainment for all lead standards.

TOXIC AIR POLLUTANTS

Toxic air pollutants (TAPs) are compounds emitted individually, or in a mixture, that have been found to cause health effects such as cancer or neurological or reproduction problems. USEPA has identified 188 compounds that are known or suspected to cause cancer or other serious health effects.

Motor vehicles emit several toxic air pollutants that USEPA classifies as known or probable human carcinogens. Benzene, for instance, is a known human carcinogen, while formaldehyde, acetaldehyde, 1,3-butadiene, and diesel particulate matter are probable human carcinogens. Emissions of these pollutants may result from 1) evaporation from gasoline or diesel fuel, or 2) release via tailpipe exhaust as a result of combustion of these fuels in motor vehicle engines. DOE has adopted WAC 460 as a statewide rule to limit the emission of toxic air pollutants from industrial and commercial sources of pollution.

The USEPA and state agencies including Washington and Oregon have reduced emissions of benzene, toluene, and other air toxics from mobile sources by requiring the use of reformulated gasoline and placing limits on tailpipe emissions. USEPA promulgated two rules in 2001 to control emissions from gasoline- and diesel-fueled vehicles. The Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements (40 CFR Part 80) will require the use of cleaner diesel fuels starting in 2006, and improvements to diesel vehicles beginning in 2007. The Control of Emissions of Hazardous Air Pollutants from Mobile Sources (40 CFR 80) will reduce emissions of 21 mobile source air toxics (MSATs) through formulation requirements applicable to fuel refiners. The toxics identified are:

- Acetaldehyde
- Acrolein
- Arsenic compounds
- Benzene

- 1,3-Butadiene
- Chromium compounds
- Diesel particulate matter + diesel exhaust organic gases
- Dioxin/furans
- Ethylbenzene
- Formaldehyde
- n-Hexane
- Lead compounds
- Manganese compounds
- Mercury compounds
- MTBE
- Naphthalene
- Nickel compounds
- POM
- Styrene
- Toluene
- Xylene

In a 2001 rulemaking, USEPA identified six priority MSATs: acetaldehyde, benzene, formaldehyde, diesel exhaust, acrolein, and 1,3-butadiene (66 FR 17230). USEPA, in its Integrated Risk Information System (IRIS), classifies benzene and butadiene as known human carcinogens, formaldehyde and acetaldehyde as probable human carcinogens, diesel exhaust as a likely human carcinogen, and acrolein as having insufficient data to assess human carcinogenic potential (EPA, 2005b).

3.4.4 EXISTING AIR QUALITY

SOURCES OF EMISSIONS

Emissions are estimated and documented through the combined effort of the DOE and the SWCAA. Emissions for all of Clark County are presented in the SWCAA's 2003 Annual Report (SWCAA, 2004).

Table 3.4-3 summarizes projected 2010 emissions of key criteria air pollutants from the two major categories of air pollutant sources. For each pollutant, estimated emissions are presented for Clark and Cowlitz counties, Washington and Washington, Clackamas, and Multnomah counties, Oregon. The dominance of the Vancouver/Portland urban area is readily apparent with on-road vehicles emissions being dominant. However, a significant amount of the CO emissions are from woodstoves and fireplaces, which would be more representative of the rural areas.

TABLE 3.4-3
PROJECTED 2010 EMISSIONS BY COUNTY AND SOURCE CATEGORY (TONS PER YEAR)

County	CO	SO ₂	VOC	NO _x	PM ₁₀	PM _{2.5}
Clark						
Area	113,075	1,255	13,819	16,583	10,244	3,314
Point	23,105	3,049	746	2,039	2,361	1,893
Clark County Total	136,180	4,304	14,565	18,621	12,604	5,206
Cowlitz						
Area	49,590	1,016	6,213	10,401	4,110	1,650
Point	38,123	2,938	2,632	6,350	3,204	3,057
Cowlitz County Total	87,713	3,954	8,845	16,751	7,314	4,707
Multnomah						
Area	238,793	10,306	57,990	49,975	17,671	6,096
Point	10,943	3,907	2,465	1,444	1,502	1,211
Multnomah County Total	249,736	14,213	60,455	51,419	19,172	7,307
Washington						
Area	163,956	3,437	23,392	15,452	20,967	5,387
Point	1,579	51	588	207	306	233
Washington County Total	165,535	3,488	23,979	15,659	21,272	5,620
Clackamas						
Area	167,677	3,392	29,465	15,304	38,413	9,554
Point	155	8	417	1,300	176	135
Clackamas County Total	167,832	3,400	29,883	16,604	38,589	9,689
Point Sources Total	73,905	9,952	6,848	11,339	7,548	6,529
Area Sources Total	733,091	19,406	130,880	107,716	91,404	26,000
Grand Total	806,996	29,358	137,728	119,055	98,953	32,530

Source: USEPA Emissions Inventory (EPA, 2006) Data is multiplied by a growth factor of 1.175.

Since ozone is a reaction between VOCs and NO_x, to get a clearer picture of the relative contribution of urban versus rural, emissions for both must be evaluated. NO_x is primarily a product of the combustion of fossil fuels, and the urban influence on the project region is apparent. VOCs are largely an evaporative emission, albeit also from combustion sources, and therefore, the urban/rural distinction is less definitive.

AIR POLLUTANT AMBIENT CONCENTRATIONS

Air pollutant emissions contribute (directly or indirectly) to the concentrations of air pollutants that are experienced and measured. The following tables summarize ambient air pollutant concentration data for monitoring stations in Clark County for the last three monitoring years. The nearest active monitoring stations in Clark County are in the Vancouver area. Particulate matter is monitored at 8205 NE 4th Plain Boulevard, CO is monitored at 2104 East 4th Plain Boulevard, and ozone is monitored at 1500 SE Blairmount Drive. All of the monitors are at least 15 miles from the alternative project sites but represent the nearest active monitoring. Ambient air quality data for PM₁₀ and PM_{2.5} for the last three monitoring years are presented in **Table 3.4-4**. Carbon monoxide data in relation to the 1-hour and 8-hour standards for the last three monitoring years are presented in **Table 3.4-5**. Ozone data for the now revoked 1-hour and the current 8-hour standards for the last three monitoring years are presented in **Table 3.4-6**

TABLE 3.4-4
PARTICULATE AMBIENT AIR QUALITY ($\mu\text{g}/\text{m}^3$)

Year	Pollutant	1 st Highest	2 nd Highest	Arithmetic Mean
2004	PM ₁₀	53	45	17.0
	PM _{2.5}	45.2	44	10.13
2003	PM ₁₀	30	27	14.2
	PM _{2.5}	35.6	28.7	8.95
2002	PM ₁₀	65	52	16.7
	PM _{2.5}	57.2	47.1	9.90

NOTES: $\mu\text{g}/\text{m}^3$ – micrograms per cubic meter

Source: DOE, 2004.

TABLE 3.4-5
CARBON MONOXIDE AMBIENT AIR QUALITY (ppm)

Year	Avg. Time	1 st Highest	2 nd Highest
2004	1-Hour	6.4	6.3
	8-Hour	5.0	5.0
2003	1-Hour	7.9	7.1
	8-Hour	4.7	4.5
2002	1-Hour	8.1	7.2
	8-Hour	5.9	5.7

Source: DOE, 2004.

TABLE 3.4-6
OZONE AMBIENT AIR QUALITY (ppm)

Year	Avg. Time	1 st Highest	2 nd Highest
2004	1-Hour	0.083	0.076
	8-Hour	0.065	0.065
2003	1-Hour	0.098	0.087
	8-Hour	0.076	0.075
2002	1-Hour	0.086	0.083
	8-Hour	0.073	0.072

Source: DOE, 2004.

According to the SWCAA 2003 Annual Report, the Mountain View High School Site (Blairmount Drive) has not registered an exceedance of the ozone standard since 1994; the Atlas & Cox Site (2104 East 4th Plain Boulevard) has not registered an exceedance of the CO standard since 1999; and the Moose Lodge Site (8205 NE 4th Plain Boulevard.) has never registered an exceedance of either the PM₁₀ or the PM_{2.5} standards since it began measuring in 1989.

SENSITIVE RECEPTORS

Sensitive receptors are facilities that house or attract children, the elderly, people with illnesses, or others who are especially sensitive to the effects of air pollutants. Hospitals, schools, convalescent facilities, and residential areas are examples of sensitive receptors. The majority of the land uses in the vicinity of the alternative project sites consist of rural residential and agriculture uses.

Sensitive receptors in the vicinity of the La Center Interchange Site include some residential areas. The parcels to the north, beyond the riparian corridor, are developed with rural residential and agricultural uses; the parcels to the east, across Interstate 5 (I-5), consist of agricultural and residential uses and include a gasoline service station; a small parcel tucked into the mid-eastern edge of the La Center Interchange Site, at the intersection of NW 319th Street and NW 31st Avenue, is the location of a vinyl siding company and drive-through espresso stand. The parcels immediately to the south of the site are mostly forested with some residential, and agricultural uses beyond; the parcels to the west consist of agricultural and rural residential development.

Sensitive receptors in the vicinity of the Ridgefield Interchange Site include some residential areas. A private residence is located in the central portion of the site and several single-family homes are located towards the eastern property boundary. A medium density housing subdivision, which includes approximately nine housing units, is located to the north of the site, as well as pasture and agricultural lands. A newly constructed fire station is located across from the northwest corner of the site. Land uses to the south include rural residential, pasture/agricultural lands and a light-industrial

business park. To the west of the Ridgefield Interchange Site, between the site and I-5 are located two gasoline service stations, a local diner, and a small shopping center.

CLIMATE CHANGE

Introduction

The Fourth Assessment Report, issued by the International Panel on Climate Change (IPCC) in 2001, anticipates that the average global temperature between the years 2000 and 2100 could rise from 0.6 (33.0) to 4.0 °C (39.2 °F) (IPCC, 2007). The extent to which human activities affect global climate change is a subject of considerable scientific debate. While many in the scientific community contend that global climate variation is a normal cyclical process that is not necessarily related to human activities, the IPCC report identifies anthropogenic greenhouse gases (GHGs) as a contributing factor to changes in the Earth's climate (Michaels, 2004; IPCC, 2007). Preferring to error on the side of caution, the analysis in this Environmental Impact Statement (EIS) assumes anthropogenic GHGs are in fact contributing to global climate changes.

The U.S. Supreme Court has affirmed the authority of the U.S. Environmental Protection Agency (USEPA) to list GHGs as pollutants under the Federal Clean Air Act (CAA). To date, however, regulatory action at the federal level has not occurred. The State of Washington, on the other hand, recently passed the Climate Change – Mitigating Impacts law 2007 (Senate Bill 6001 [SB 6001]), legislation designed to result in substantial reductions in GHG emissions generated by human activities in Washington, and additionally passed the Cleaner Energy Act (HB 1303) which requires a comprehensive assessment of the impacts of climate change on the State of Washington.

The Greenhouse Effect and Climate Change

The Earth's temperature is in part regulated by a system known as the "greenhouse effect." GHGs are primarily water vapor (H₂O), carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O) that trap the heat of the sun, preventing radiation from dissipating into space. Water vapor is the most abundant GHG and CO₂ is a distant second. Without the effect of these GHGs, which are both naturally occurring and anthropogenic, the average temperature on the Earth would be approximately -18 °C (-64.4 °F), instead of the current average of 15 °C (59 °F).

IPCC modeling estimates that anthropogenic CO₂ in the lower atmosphere has increased by approximately 31 percent since 1750. At the same time, average temperature in the lower atmosphere has increased approximately from 0.6 (33.0) to 0.8 °C (33.4 °F). Due to the challenges inherent in modeling the complexities of the Earth's climate, the proportional importance of anthropogenic activities as opposed to natural feedback systems is exceptionally difficult to establish. Nonetheless, the IPCC concludes that "Most of the observed increase in globally-averaged temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic GHG concentrations."

As noted above, this EIS assumes that an increase in anthropogenic GHG concentration is in fact contributing to global warming.

IPCC theorizes that a continuation of this warming trend could have profound implications, including flooding, erratic weather patterns, increased sea levels, and reduced arctic ice. The IPCC projects a number of future GHG emissions scenarios leading to a varying severity of impacts on the environment and the global economy. According to the 2007 IPCC report if anthropogenic GHG continue to increase in the atmosphere there will be a point at which the above impacts would become irreversible, this point is commonly referred to as the “tipping point.” Although the 2007 IPCC Report states the tipping point may be as far off as 20 years, some experts contend the tipping point has already been reached.

Table 3.4-7 illustrates the state contribution to the global increase in GHG emissions. The 2020 estimates assume “business as usual.” As shown, without modifications in human activities or the introduction of new technologies, GHG emissions are anticipated to increase.

TABLE 3.4-7
GLOBAL AND STATE GREENHOUSE GAS EMISSIONS

Regions	Estimated GHG Emissions
	Million metric tons per year of CO ₂ e ¹
1990	
Global Emissions	626,395.0
Washington State Emissions	58.4
2020	
Global Emissions	882,246.0
Washington State Emissions	91.9

¹Carbon Dioxide Equivalent (see methodology in Section 4.12)
Source: Washington State Department of Ecology, 2007; IPCC. 2007