EXHIBIT V

WASTE MINIMIZATION
OAR 345-021-0010(1)(v)

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V.1 INTRODUCTION

OAR 345-021-0010(1)(v) *Information about the applicant's plans to minimize the generation of solid waste and wastewater and to recycle or reuse solid waste and wastewater, providing evidence to support a finding by the Council as required by OAR 345-022-0120. The applicant shall include:*

Response: The evidence provided below demonstrates that this standard is met because the applicant's solid waste and wastewater plans will minimize the generation of solid waste, wastewater, and lead to recycling and reuse of such wastes. Also, the applicant's plans to manage generated wastes will result in minimal impact on surrounding and adjacent areas.

V.2 TYPES OF WASTE

OAR 345-021-0010(1)(v)(A) *A description of the major types of solid waste and wastewater that construction, operation and retirement of the facility are likely to generate*;

Response: See Sections V.2.1 through V.2.3, below.

V.2.1 Wastes Produced During Construction

Response: A variety of nonhazardous, inert construction wastes will be generated during construction, primarily concrete and asphalt waste from facility construction, wood waste from wood forms used for concrete pad construction, and scrap metal steel from tank and component construction. Some additional wastes could include erosion control materials, such as straw bales and silt fencing, and packaging materials from plant parts and other electrical equipment. Wastewater will be generated during construction from washdown of equipment during earthwork and construction phases. Concrete trucks could also be cleaned after concrete loads have been emptied. Washdown will be up to the contractor and will likely occur at a contractor owned batch plant. Portable toilets will be provided for on-site sewage handling during construction and will be pumped and cleaned regularly by the construction contractor. No other wastewater will be generated during construction.

V.2.2 Wastes Produced During Operation

Response: Little solid waste will be generated from facility operations. Office waste, such as paper and food packaging/scraps, will be generated at the facility. Some minor and potentially hazardous wastes include lubricants, coolants, or similar wastes related to turbine and gear lubrication and other maintenance, as described in Exhibit G. The only other source of waste will be incidental waste from repair and/or replacement of equipment.

Industrial wastewater will be treated at the Port of Morrow industrial wastewater treatment facility. Sewage from the toilets and sinks will be treated at the Boardman wastewater treatment plant located in Boardman.

The primary by-product of the fermentation process is distiller wet grains (DWGS), which is a high value animal feed. This material is standard feed material and will be marketed to local dairy farms. When the facility is operating at capacity, approximately 800 tons of DWGS will be produced daily. Approximately 2,000 tons of DWGS will be stored onsite with trucks hauling the material to local farms daily. No DWGS is anticipated to be sent to the landfill.

V.2.3 Wastes Produced By Retirement

Response: When the facility is retired or decommissioned, electrical equipment will be removed from the site and the materials reused and/or sold for scrap. Steel from buildings and tanks will be sold for scrap. Pipelines will remain in place for use, if possible, by a future tenant. Concrete will be broken up and used as fill material or taken to an appropriate landfill.

The rail line is a port facility, not a project component, and will remain in place for other port industrial users.

V.3 PLANS FOR RECYCLING AND REUSE

OAR 345-021-0010(1)(v)(B) *The applicant's plans to minimize, recycle or reuse the solid waste and wastewater described in (A);*

Response: Waste minimization and recycling will be implemented during project construction and operations. See Sections V.3.1 through V.3.3, below.

V.3.1 Recycling During Construction

Response: Generation of wastes from construction will be minimized through detailed estimating of materials needed and through efficient construction practices. Any wastes generated during construction will be recycled when feasible. Steel scrap will be collected and transported to a recycling facility. Wood waste will also be recycled to the greatest extent feasible, depending on size and quantity of scrap and leftover materials. Concrete waste will be used as fill on site or at another site or, if no reuse option is available, removed to a local landfill. Packaging wastes (such as paper and cardboard) will be separated and recycled. Any non-recyclable wastes will be collected and transported to a local landfill.

V.3.2 Recycling During Operations

Response: Minimal waste will be generated during operations. Office waste (*e.g.*, paper, cans, and bottles) will be collected and recycled, as feasible. Non-recyclable wastes will be collected and transported to a local landfill, most likely the Finley Buttes Landfill located near Boardman.

V.3.3 Recycling During Retirement

Response: In the event of decommissioning, waste will be removed and reused as described in section V.3.1 above.

V.4 ADVERSE IMPACTS OF WASTE DISPOSAL

OAR 345-021-0010(1)(v)(C) *A description of any adverse impact on surrounding and adjacent areas from the accumulation, storage, disposal and transportation of waste generated by the construction and operation of the facility;*

Response: Due to the minimal quantity and inert nature of most of the potential waste, there is no anticipated adverse impact on surrounding or adjacent areas from wastes generated at the facility during construction, operation, or retirement. Most waste will be removed from the site and either reused, recycled, or disposed of at an appropriate landfill or hazardous waste disposal facility, if necessary. Any waste disposed of on-site (*e.g.*, concrete waste) will be inert and will be disposed of in a manner consistent with applicable regulations and in a manner protective of human health and the environment.

V.5 EVIDENCE THAT ADVERSE IMPACTS WOULD BE MINIMAL

OAR 345-021-0010(1)(v)(D) *Evidence that adverse impacts described in (C) are likely to be minimal, taking into account any measures the applicant proposes to avoid, reduce or otherwise mitigate the impacts; and*

Response: As discussed in the response to OAR 345-021-0010(1)(v)(C) above, taking into account waste minimization and recycling, adverse impacts caused by waste generated by the project will be minimal.

The applicant's proposed measures to avoid, reduce, and mitigate any possible impacts on the site or to adjacent land are discussed above and in Exhibit G. They include storing all oily waste, such as rags or dirt, in sealable drums and removing it for recycling or disposal by a licensed contractor. In addition, spill kits containing items such as absorbent pads will be located on equipment and in the on-site temporary storage facilities to respond to accidental spills that may occur. Further, during construction, equipment (*e.g.*, graders, dozers) will be available to respond to spills and to quickly construct berms or ditches if necessary.

Disposal of materials as fill on-site will be conducted in accordance with OAR 340-093-0080 and other applicable regulations. OAR 340-093-0080 provides a permit exemption to the disposal permit requirement for disposal of inert wastes such as soil, rock, concrete, and tile that does not contain contaminants that could adversely impact waters of the state or the United States. To meet the clean fill definition, any inert construction debris to be disposed of on-site will be separated from other debris that is not inert.

The only clean fill that has the potential to be disposed of on-site is waste concrete generated during construction. The construction contractor may, with agreement of the landowner, bury waste concrete (excess cement mix from a construction site; batches of

concrete that do not meet specifications) on-site. In such cases, the material will be placed in an excavated hole, covered with at least 3 feet of topsoil, and regraded to match existing contours.

Any packing materials, paper, and refuse will be separated, accumulated in dumpsters, and periodically removed for recycling or disposal by a licensed waste hauler. Portable toilets will be provided for on-site sewage handling during construction and will be pumped and cleaned regularly by the construction contractor.

Transportation of wastes to landfills or recycling facilities will involve periodic truck trips over public and private roads between the project and the nearest landfill or recycling facilities. Given the number and frequency of these trips and the anticipated volume of waste materials, these trips are not anticipated to have adverse impacts on the adjacent or surrounding area.

V.6 PROPOSED MONITORING PROGRAM

OAR 345-021-0010(1)(v)(E) *The applicant's proposed monitoring program, if any, for minimization of solid waste and wastewater impacts;*

Response: Because no significant adverse impacts from waste or wastewater will occur on the adjacent or surrounding areas, no monitoring program is proposed. Waste-management activities will be subject to periodic inspections to ensure compliance with applicable regulations.

V.7 CONCLUSION

The evidence provided above demonstrates that the Council's waste minimization standard is met because wastes will be minimized, reused, or recycled to the greatest extent feasible and because no significant adverse impacts on the surrounding or adjacent areas will result from the management of wastes related to the project. Based on the above information, the applicant has satisfied the required OAR 345-021-0010(1)(v), and the Council may find that the standard contained in OAR 345-022-0120 is satisfied.

EXHIBIT W

FACILITY RETIREMENT AND SITE RESTORATION
OAR 345-021-0010(1)(w)

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W-1 CONTRACTOR BID FOR DECOMMISSIONING
W-2 PORT OF MORROW LETTER

W.1 INTRODUCTION

OAR 345-021-0010(1)(w) *Information about facility retirement and site restoration, providing evidence to support a finding by the Council as required by OAR 345-022-0050(1). The applicant shall include:*

W.2 USEFUL LIFE

OAR 345-021-0010(1)(w)(A) *The estimated useful life of the proposed facility;*

Response: The proposed facility is expected to have a useful operational life of 30 years.

W.3 RETIREMENT AND SITE RESTORATION

OAR 345-021-0010(1)(w)(B) *The actions that the applicant proposes for retirement of the facility and restoration of the site to a useful, non-hazardous condition*;

Response: The facility is proposed on vacant land that is zoned Port Industrial. Upon retirement of the facility, the site would be considered useful under the existing zoning if another industry could occupy the site. For purposes of this analysis, we assume that the following infrastructure would be useful to a future industrial tenant and would not have to be removed upon retirement of the facility:

- Gas pipeline
- Power supply
- Ethanol pipeline
- Administration building
- Roads and parking areas
- Concrete pads

The Port of Morrow has confirmed that this infrastructure would be useful in marketing and attracting a future industrial tenant to the site (see Appendix W-2).

The majority of buildings, equipment, and storage structures, which are constructed primarily of steel, would be dismantled and sold for scrap. These include:

- Processing building, DE&E building and distillation tower, wet cake building, boiler building, maintenance building and fermentation building, all made from steel.
- Grain storage bins, and ethanol, diesel, and denaturant tanks
- Motors

An estimate of steel tank demolition and equipment removal costs, provided by a reputable contractor that engages in such work, is attached as Appendix W-1, and concluded that demolition for facility retirement could be done for a zero total cost contract because the value of the scrap steel is higher than demolition costs.

W.4 ESTIMATED COST OF RETIREMENT

OAR 345-021-0010(1)(w)(C) *The estimated costs to retire the facility and restore the site to a useful, non-hazardous condition and a discussion of the methods and assumptions used to estimate retirement and restoration costs*; *and*

Response: The contractor's estimate for dismantling the steel buildings, storage tanks and other steel fixtures including motors is attached as Appendix W-1. The applicant has used the Department of Energy estimate of $149/ton of scrap steel, and the tonnage of steel in the structures from Exhibit G, Table G-1.

The value of the scrap steel is expected to exceed demolition costs, as confirmed by Parsons RCIE, Inc. Therefore, no bond or letter of credit should be required to assure that the site is restored to a useful industrial property for a future user.

W.5 PROPOSED MONITORING PLAN FOR HAZARDOUS MATERIALS

OAR 345-021-0010(1)(w)(D) *For facilities that might produce site contamination by hazardous materials, any proposed monitoring plan, such as periodic environmental site assessment and reporting, or an explanation why a monitoring plan is unnecessary.*

Response: The applicant will have in place all necessary plans, training, communication protocols, and implementation measures to prevent and control accidental spills. All significant materials are stored inside or in storage facilities not open to the elements and that have 125% containment capacity. If no uncontrolled spill of hazardous materials occurs on the site during the life of the facility, the applicant will conduct a level 1 site assessment upon retirement of the site, and provide the results to the Department of Energy and the Port of Morrow. Monitoring would not be proposed under this scenario, unless required by federal, state, or local regulation.

If an uncontrolled spill should occur during the life of the facility, the applicant will comply with all applicable federal, state, and local regulatory requirements for reporting, cleaning up, restoring, and monitoring the site.

W.6 CONCLUSION

Based on the above information, the applicant has satisfied the required OAR 345-021-0010(1)(w), and the Counsel can find that the standard contained in OAR-022-0050 is satisfied.

Appendix W-1

Contractor Bid for Decommissioning

Appendix W-2

Port of Morrow Letter

PARSONS
Parsons RCIE Inc. 1216 140th Ave Ct. East Sumner WA 98390

September 22, 2006

Mr. Rick Eastman
Pacific Ethanol Columbia, LLC
5711 N. West Avenue
Fresno, CA 93711

Subject: Boardman Ethanol Facility – 35 Million Gallon Per Year

Re: Zero Cost Facility Demolition

Dear Mr. Eastman,

Parsons has reviewed the costs associated with demolition of structural, mechanical and electrical elements of the subject facility. This review includes the removal of all facilities from the slab up. Specifically, excluded from removal scenario are all materials associated with the site work, foundations, underground utility services, concrete slabs, vaults, duct banks, etc.

The analysis concludes that the contractor could remove all facilities, to the limits described above, and take possession, ownership and title of; structural steel, pre-manufactured buildings, all tanks, pumps, piping, supports instrumentation and electrical components for a zero total cost contract. It is analyzed that the value of the scrap material collected and sold would cover the cost of demolition, contractors overhead, and reasonable fee.

Regards,

George Norton
Sr.Vice President

P.O. Box 200
Boardman, OR 97818
(541) 481-7678
(541) 481-2679 *fax*

PORT OF MORROW

September 7, 2006

Mr. Paul Koehler
Pacific Ethanol, LLC
424 NE Hazel Fern Place
Portland, OR 97232

RE: Ethanol Site cleanup upon termination

Dear Paul:

In regards to the property you lease from the Port of Morrow, you had requested that we consider the final cleanup requirements of the site upon Lease termination or expiration. The Port of Morrow would be willing to allow any concrete to remain that is at slab grade or below and any of the utilities to be left on site upon termination.

If you need any further clarification, or if I can be of further assistance in this matter, please don't hesitate to contact me at (541) 481-7678.

Sincerely,

Gary Neal
General Manager

GN/cv

EXHIBIT X

NOISE
OAR 345-021-0010(1)(x)

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X-1 TWE NOISE REPORT FOR THE COLUMBIA ETHANOL PROJECT

X.1 INTRODUCTION

OAR 345-021-0010(1)(x) *Information about noise generated by construction and operation of the proposed facility, providing evidence to support a finding by the Council that the proposed facility complies with the Oregon Department of Environmental Quality's noise control standards in OAR 340-035-0035. The applicant shall include:*

Response: Information about noise generated by construction and operation of the facility is summarized, and potential impacts analyzed in a noise analysis report for the Columbia Ethanol Project (TW Environmental, Inc. 2006). The analysis focused on potential noise impacts to the nearest sensitive noise receptor (a residential property approximately 0.9 miles away) and the Umatilla National Wildlife Refuge (approximately one mile away). The report is provided in Appendix X-1. The results of the noise analysis performed for the Columbia Ethanol Project show that noise levels resulting from the proposed project are not expected to exceed the standards in the *Noise Control Regulations* (OAR 340-035).

OAR-345-021-0010(1)(x)(A) *A baseline noise assessment for the proposed site and vicinity;*

Response: A baseline noise assessment is provided in the noise analysis report prepared by TW Environmental, Inc. (2006), which is provided in Appendix X-1 of this exhibit. Existing ambient 24-hour noise measurements were taken from July 15 through July 19, 2006, at the residence nearest the proposed Columbia Ethanol site (shown in Figure 1 of Appendix X-1). Minimum, maximum, and average daytime and nighttime sound levels measured are shown in Table X-1.

Table X- 1. Existing Daytime and Nighttime Hourly Noise Levels at Residence Nearest the Proposed Site (dBA)

	Daytime Levels			Nighttime Levels		
	L_{01}	L_{10}	L_{50}	L_{01}	L_{10}	L_{50}
Minimum	44	40	38	46	45	42
Maximum	73	67	57	67	55	51
Average	55	49	45	55	50	47

Noise measurements made from July 15 to July 19, 2006.

X.2 PREDICTED NOISE LEVELS

OAR-345-021-0010(1)(x)(B) *Predicted noise levels resulting from construction and operation of the proposed facility*;

Response: Project-generated noise levels estimated at the nearest residential property and at the Umatilla National Wildlife Refuge are shown in Table X-2. The L_{50} levels will limit the allowable noise levels and are the only levels shown.

Table X- 2. Project-Generated Noise Levels at Nearest Noise-Sensitive Locations (L_1, L_{10}, and L_{50} – dBA)

Prediction Site	L_{50}
Residence	43
Wildlife Refuge	42

Analysis of noise levels, resulting from construction activities, was not conducted. Noise from construction sites is exempted from the OAR 340-35 noise regulations under OAR 340-35-0035(5) (g). By the time this application is submitted, construction of the facility will be near completion. The project site is located on the Port of Morrow, which already experiences notable use and movement of industrial equipment and large transport vehicle traffic.

X.3 COMPLIANCE WITH OAR 340-035-0035

OAR 345-021-0010(1)(x)(C) *An assessment of the proposed facility's compliance with the applicable noise regulations in OAR 340-035-0035;*

Response: The *Noise Control Regulations* (OAR 340-035) govern allowable sound levels from industrial and commercial noise sources in Oregon. Under the regulations, the Columbia Ethanol Project would be considered a new industrial or commercial noise source, since the installation or construction of the facility was commenced after January 1, 1975. Also, since industrial uses have not occurred at this location during the past 20 years, the site is considered to be a previously unused industrial site.

As provided in Section X.2, project-generated noise levels would result in an estimated L_{50} for the nearest residence and the wildlife refuge of 43 and 42 dBA, respectively. These levels are in compliance with the allowable noise levels provided in OAR 340-035, and are listed below in Table X-3.

Table X- 3. Industrial and Commercial Noise Source Standards

Statistical Descriptor	Daytime Level (dBA)	Nighttime Level (dBA)
L_{50}	55	50
L_{10}	60	55
L_1	75	60

In addition to limiting statistical noise levels, the regulations prohibit noise sources that generate median octave band sound pressure levels that exceed the levels shown in Table X-4. Median octave band frequency noise levels at the nearest property are not predicted to exceed State noise standards (TW Environmental 2006).

There are no anticipated impulsive sound sources associated with the facility; therefore, the regulations addressing impulsive sounds are not included here.

Noise from construction sites is exempted from the OAR 340-35 noise regulations under OAR 340-35-0035(5) (g).

Table X- 4. Median Octave Band Standards for Industrial and Commercial Noise Sources (dB)

Octave Band Center Frequency (Hz)	Daytime (7 a.m. to 10 p.m.)	Nighttime (10 p.m. to 7 a.m.)
31.5	68	65
63	65	62
125	61	56
250	55	50
500	52	46
1000	49	43
2000	46	40
4000	43	37
8000	40	34

X.4 DESCRIPTION OF PROPOSED MITIGATION MEASURES

OAR 345-021-0010(1)(x)(D) *Any measures the applicant proposes to reduce noise levels or noise impacts;*

Response: No significant noise related impacts to sensitive receptors are anticipated from the proposed facility. Therefore, no mitigation measures are proposed.

X.5 ASSUMPTIONS AND METHODS

OAR 345-021-0010(1)(x)(E) *The assumptions and methods used in the noise analysis; and*

Response: The noise analysis for the Columbia Ethanol Project was based on noise level measurements taken at the Front Range Energy LLC facility at 31375 Great Western Parkway in Windsor, Colorado, a 40 MMgy. This is a similar facility to the Columbia Ethanol Project facility in terms of design and capacity. The data from the operating facility were used to estimate noise levels at the nearest noise sensitive property adjacent to the proposed Columbia Ethanol site and at a location in the Umatilla National Wildlife Refuge (shown in Figure 1 of Appendix X-1). Because estimated noise levels did not closely approach the OAR standards, simplifying assumptions that result in conservatively high noise estimates at the nearest receptor were used. Detailed methods and assumptions are provided in the noise analysis report provided in Appendix X-1.

X.6 MONITORING PROGRAM

OAR 345-021-0010(1)(x)(F) *The applicant's proposed monitoring program, if any, for noise generated by construction and operation of the facility.*

Response: No significant noise related impacts to sensitive receptors are anticipated from the proposed facility. Therefore, a monitoring program is not proposed.

X.7 CONCLUSION

Response: Modeling results show that statistical noise levels at the nearest properties are not predicted to exceed State noise standards with the proposed facility design. In addition, median octave band frequency noise levels at the nearest property are not predicted to exceed State noise standards. The proposed project is not anticipated to have significant noise impacts to the nearest sensitive receptors –the nearest residence and the Umatilla Wildlife Refuge. Therefore, monitoring and mitigation measures are not proposed.

X.8 REFERENCES

Oregon Administrative Rules, Department of Environmental Quality, Chapter 340, Division 35 – Noise Control Regulations.

TW Environmental, Inc. (TWE). 2006. Unpublished: Columbia Ethanol Project Noise Analysis Report. TWE. Portland, Oregon.

APPENDIX X-1

TWE Noise Report for

Columbia Ethanol Project

Draft

NOISE REPORT
FOR THE
COLUMBIA ETHANOL PROJECT

Prepared for
DAVID EVANS AND ASSOCIATES, INC.

Prepared by
TW ENVIRONMENTAL, INC.

July 25, 2006

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Appendix

A. Monitoring Data Summary, Grinder Frequency Data, and CadnaA Output Sound Levels

EXECUTIVE SUMMARY

The results of the noise analysis performed for the Columbia Ethanol Project show that noise levels resulting from the proposed project are not expected to exceed the standards in the *Noise Control Regulations* (OAR 340-035) at the nearest residential property.

PROJECT DESCRIPTION

The proposed project will produce 42 million gallons of ethanol per year from corn. The project is proposed for an approximately 25-acre site within the Port of Morrow Industrial Park. The site is served by rail for incoming shipments of grain. The ethanol will be transported to market via truck.

Structures and systems located at the facility include a grain processing building; fermentation building and tanks; distillation, drying, and evaporation buildings; ethanol storage tanks, tanks for the storage of production materials; and natural gas-fired steam production building (Boiler Building). See Tables 1 and 2 below for details regarding the on-site structures. There will be a parking lot for the approximately 25 employees who will work at the plant. Figure 1 shows a conceptual layout of the facility. Figure 2 shows a more detailed site plan.

Table 1
Structures

Structure	Dimensions	Height
Main Processing Building	150’ x 220’	43’
Fermentation Building	32’ x 154’	30’
Distillation building, Distillation tower	85’ x 90’	Open - 165’
Wet Cake Storage Building	140’ x 120’	30’
Maintenance Building	40’ x 60’	25’
Cooling Towers Area	102’ x 44’	150’
Boiler Building	80’ x 140’	35’

Table 2 Storage		
Structure	**Capacity**	**Height**
Grain Storage Silos (2)	250,000 bushels	40’
Fermentation Tanks (4)	100,000 gallons	35’
Ethanol Storage (2)	250,000 gallons	35’
Liquids Storage (4)	12,000 gallons	15’
Gasoline Tank (1)	60,000 gallons	20’

After delivery, the grain is stored and ground (milled) prior to entering the Main Processing Building. In the Main Processing Building, the corn will be made into mash by mixing the corn with water and enzymes such as alpha amylase. Aqueous ammonia is added to control the pH of the mixture. The mash will be cooked in a series of steam cookers to break down the complex sugars in the mash into simple (fermentable) sugars in this building. The steam for this process will be generated in the Boiler Building. The mash will then be cooled and mixed with yeast and additional enzymes in a series of fermentation tanks. After about 48 hours of fermentation, the resultant liquid will contain approximately 10 to 15 percent ethanol by weight.

In the Distillation Building, the distillation process separates the ethanol from the carbon dioxide and water vapor. It produces a liquid that is 95 percent ethanol and 5 percent water. Molecular sieves are used to remove the remaining water and produce 100 percent ethanol. The ethanol will be combined with a minimum of 2.5 percent gasoline to produce denatured ethanol. Approximately 96,000 gallons per day of denatured ethanol will be produced and stored in carbon steel tanks.

The primary by-product of the fermentation process is distiller wet grains (DWGS), a high-value animal feed. This material will be processed to an approximately 67 percent moisture level, mixed with standard feed materials, and marketed to local dairy farms. When the system is operating at capacity, approximately 800 tons of DWGS will be produced daily. Approximately 2,000 tons of DWGS will be stored at the facility. The DWGS will be transported from the site in trucks on a daily schedule.

Approximately 300 to 400 gallons per minute of water, provided by the Port of Morrow, will be required for the process. The applicant is contemplating either a no-discharge system or a conventional system of wastewater discharge. If the applicant selects a conventional system, approximately 100 gallons per minute of process wastewater will be generated; this wastewater will be discharged to the Port of Morrow wastewater treatment system or an evaporation pond.

Insert Figure 1

Conceptual Facility Layout and Nearest Residence Location

Insert Figure 2

Site Plan

Approximately 15 acres of the site will be impervious. Storm water from these surfaces will be allowed to sheet flow off of pavements and cross undeveloped land prior to infiltrating into the ground.

A 4-inch, 3,500-foot pipeline will be installed to carry natural gas from the Cascade Natural Gas pipeline (less than one mile to the south) to the plant. The operating pressure of the line will be 58-60 pounds per square inch gauge (psig) delivery pressure. The maximum connected load will be 3,628,800 cubic feet per day; the average for the 42 million gallon per year plant will be 3,000,000 cubic feet per day. Natural gas will primarily be used as fuel in the boilers.

LAND USE

The area surrounding the proposed facility is a mixture of industrial and agricultural land uses with an occasional residence. The topography of the area is generally flat with approximately 10 feet of elevation change between the site and the nearest noise sensitive receptor located approximately nine-tenths of a mile from the site (4,940 feet). The nearest residence is shown in Figure 1.

NOISE BACKGROUND INFORMATION

Noise is generally defined as unwanted sound, and it is a fluctuating pressure wave. Noise is measured in terms of sound pressure level and is expressed in decibels (dB). The number of fluctuation cycles or pressure waves per second of a particular sound is the frequency of the sound. The human ear is less sensitive to higher and lower frequencies than it is to mid-range frequencies. Sound level meters used to measure environmental noise incorporate a filtering system that discriminates against higher and lower frequencies in a manner similar to the human ear to produce noise measurements that approximate the normal human perception of noise. Measurements made using this filtering system are termed "A-weighted decibels" (dBA). Sound levels produced by common noise sources are shown in Table 3.

Noise levels decrease with distance from a noise source. Subjectively, a 10-dBA change in noise level is perceived by most people to be approximately a twofold change in loudness (e.g., an increase from 50 dBA to 60 dBA causes the loudness to double). Three dBA is generally the minimum change in outdoor sound levels that can be perceived by a person with normal hearing.

Table 3 Sound Levels of Common Noise Sources and Environments			
Thresholds/ Noise Sources	**Sound Level (dBA)**	**Subjective Evaluations**	**Possible Effects on Humans**
Human threshold of pain Carrier jet takeoff (50 ft)	140	Deafening	Continuous Exposure Can Cause Hearing Damage
Siren (100 ft) Jackhammer, power drill	130		
Loud rock band Auto horn (3 ft)	120		
Busy video arcade Baby crying	110		
Lawn mower (3 ft) Noisy motorcycle (50 ft)	100	Very Loud	
Heavy truck at 40 mph (50 ft) Shouted conversation	90		
Kitchen garbage disposal (3 ft) Busy urban street, daytime	80	Loud	
Normal automobile at 65 mph (25 ft) Vacuum cleaner (3 ft)	70		Speech Interference
Large air conditioning unit (20 ft) Normal conversation (3 ft)	60	Moderate	
Quiet residential area Light auto traffic (100 ft)	50		Sleep Interference
Library Quiet home	40	Faint	
Soft whisper (15 ft)	30		
Broadcasting studio	20	Very Faint	
Threshold of human hearing	0-10		
Note that both subjective evaluations and physiological responses are continuous without true threshold boundaries. Consequently, there are overlaps among categories of response that depend on the sensitivity of the noise receivers.			

REGULATIONS

The *Noise Control Regulations* (OAR 340-035) govern allowable sound levels from industrial and commercial noise sources in Oregon. Under the regulations, the Columbia Ethanol Project would be considered a new industrial or commercial noise source, since the installation or construction of the facility was commenced after January 1, 1975. Also,

since industrial uses have not occurred at this location during the past 20 years, the site is considered to be a previously unused industrial site.

The noise regulations limit allowable statistical sound levels (L_{xx}), discrete frequency sounds, and impulsive sounds. The L_{xx} is a statistical noise level descriptor, and the xx is a percentage of the measurement time, usually 1-hour. The statistical noise descriptors used in the Oregon regulations are the L_{01}, L_{10}, and L_{50} and are defined as:

> L_{01}: The sound level exceeded 1 percent of the time. This is a measure of the loudest sound levels during the measurement period. Example: During a 1-hour measurement, an L_{01} of 90 dBA means the sound level was 90 dBA or louder for 0.6 minutes, or 36 seconds.
>
> L_{10}: The sound level exceeded 10 percent of the time. This is a measure of the louder sound levels during the measurement period. Example: During a 1-hour measurement, an L_{10} of 85 dBA means the sound level was 85 dBA or louder for 6 minutes.
>
> L_{50}: The sound level exceeded 50 percent of the time. Example: During a 1-hour measurement, an L_{50} of 50 dBA means the sound level was 50 dBA or louder for 30 minutes.

Table 4 shows the allowable noise levels from OAR 340-035 for new industrial or commercial noise sources. The daytime period is 7:00 a.m. to 10:00 p.m. and the nighttime period is 10:00 p.m. to 7:00 a.m. For a new source on a previously unused industrial site, there is an additional limitation on the allowable increase in the L_{10} and L_{50}. The source may not increase the L_{10} or L_{50} level by more than 10 dBA over the existing ambient levels. All noise, directly or indirectly, caused by the source or its related activities must be included in the analysis when evaluating the increase over existing levels.

Table 4
Industrial and Commercial Noise Source Standards

Statistical Descriptor	Daytime Level (dBA)	Nighttime Level (dBA)
L_{50}	55	50
L_{10}	60	55
L_1	75	60

In addition to limiting statistical noise levels, the regulations prohibit noise sources that generate median octave band sound pressure levels that exceed the levels shown in Table 5. There are no anticipated impulsive sound sources associated with the facility; therefore, the regulations addressing impulsive sounds are not included here.

The noise limits apply at noise sensitive properties, which are defined in OAR 340-035-0015(38) as properties normally used for sleeping or normally used as schools, churches, hospitals, or public libraries. The noise standards apply 25 feet towards the noise source, from that point on the noise sensitive building nearest the source, or at that point on the noise sensitive property line nearest the noise source, whichever point is further from the noise source.

Table 5
Median Octave Band Standards for Industrial and Commercial Noise Sources (dB)

Octave Band Center Frequency (Hz)	Daytime (7 a.m. to 10 p.m.)	Nighttime (10 p.m. to 7 a.m.)
31.5	68	65
63	65	62
125	61	56
250	55	50
500	52	46
1000	49	43
2000	46	40
4000	43	37
8000	40	34

Noise from construction sites is exempted from the OAR 340-35 noise regulations under OAR 340-35-0035(5) (g).

EXISTING CONDITIONS

Existing ambient 24-hour noise measurements were taken from July 15 through July 19, 2006, at the residence nearest the proposed Columbia Ethanol site (shown in Figure 1). A summary of the collected ambient data is included in Appendix A. Minimum, maximum, and average daytime and nighttime sound levels measured are shown in Table 6.

Table 6
Existing Daytime and Nighttime Hourly Noise Levels at Residence Nearest the Proposed Site (dBA)

	Daytime Levels			Nighttime Levels		
	L_{01}	L_{10}	L_{50}	L_{01}	L_{10}	L_{50}
Minimum	44	40	38	46	45	42
Maximum	73	67	57	67	55	51
Average	55	49	45	55	50	47
Noise measurements made from July 15th to July 19th, 2006.						

NOISE ANALYSIS METHODOLOGY

The noise analysis for the Columbia Ethanol Project was based on noise level measurements from a similar facility in terms of design and capacity. The data from the operating facility were used to estimate noise levels at the nearest noise sensitive property adjacent to the proposed Columbia Ethanol site and at a location in the Umatilla National Wildlife Refuge (shown in Figure 1). Because estimated noise levels did not closely approach the OAR standards, simplifying assumptions that result in conservatively high noise estimates at the nearest receptor were used. The assumptions are discussed in the following report sections.

NOISE EMISSION DATA

Noise emission data was collected at the Front Range Energy LLC facility at 31375 Great Western Parkway in Windsor, Colorado. The Front Range Energy facility is an ethanol plant with the same components and design as the proposed Columbia Ethanol facility. The Front Range Energy facility has a capacity of 40 million gallons per year. This is very similar in capacity to the proposed Columbia Ethanol facility with a capacity of 42 million gallons per year.

Noise measurements were made around the Front Range Energy facility and numerous measurements were taken near individual processes. Distances were determined using a hand-held Global Positioning System (GPS) device. Noise from the facility was dominated by the grain grinders (milling operations). The facility has dual grain grinders installed in an exterior elevated tower at approximately 35 feet above ground level. Due to noise from the grinders, two sides of the facility without shielding of the grinder noise have substantially higher noise levels than the other sides of the facility. The pertinent measurements and noise sources contributing to the measurements for each side of the Front Range Energy facility are shown in Table 7.

Table 7
Noise Emission Data Collected at the Front Range Energy Facility (dBA)

Dominant Noise Source	Distance from Source	L_{01}	L_{10}	L_{50}
Grain Grinders, Site 1	747 feet	61	60	59
Grain Grinders, Site 3	2,052 feet	51	49	48
Grain Grinders, Trucks, Site 4	1,746 feet	59	57	54
Distillation Columns and Sieves, Site 2	77 feet	78	75	70
Distillation Columns and Sieves, Site 6	160 feet	67	66	64
Cooling Towers, Site 5	150 feet	68	67	67

Notes: Site 1 noise is dominated by grinders. Site 3 noise has a contribution from an adjacent industrial facility. Site 4 noise is dominated by grinders, but has notable contributions from other general facility operations, and trucks on access roads. Sites 2 and 6 noise is primarily from distillation processes, but has contribution from building exhaust fan and cooling towers. Site 5 noise is primarily from the cooling towers, but has some contribution is from distillation and the main processing building.

In addition to the data shown in Table 7, frequency data were collected. The facility noise sources were generally very steady in nature and did not have substantial discrete frequency tones. The distillation process had repetitive cyclic characteristics.

NOISE ESTIMATION METHODOLOGY

The far-field data collected at the Windsor, Colorado, plant were used to make an initial screening calculation of potential sound levels at the residence nearest the proposed Columbia Ethanol Project site in Boardman, Oregon. The screening analysis treated the facility as a point source and adjusted sound levels for distance only. Based on these calculations, sound levels caused by plant operations from sides of the facility with unshielded grinding operations, are expected to result in noise levels below approximately 37 dBA at the nearest residence. This is below the existing minimum ambient L_{50} measured at the nearest residence and well below the nighttime L_{50} standard of 50 dBA.

To address the grinding noise, near-field measurements from the Front Range Energy facility were used in the Cadna-A model (Version 3.5.115). Cadna-A is computer aided noise abatement program based on the International Standards Organization (ISO) 9613 (*Acoustics – Attenuation of sound during propagation outdoors*). The levels predicted using Cadna-A were compared to far-field measurements at 3 locations around the Front Range Energy Facility. The modeled and measured levels agreed closely at the location where the grinders were the only audible contributor to sound levels, and reasonably at the location where there was an audible contribution from an adjacent industrial facility, but where the sound levels were dominated by the grinding noise.

To estimate the potential worst case noise levels at the nearest residence, the grinder noise was modeled using Cadna-A (including distance attenuation), and the excess noise caused by other plant sources was added to the grinder noise assuming no distance attenuation between the measurement location at Site 4 (approximately 1,750 feet) and the residence (approximately 4,940 feet from the site). The excess noise caused by other plant sources was determined by subtracting the modeled grinder noise from the overall levels measured at the loudest side of the Front Range Energy facility at Site 4 (see Table 7). Measured near-field (approximately 9 feet from center of grinder) frequency data are included in Appendix A. Cadna-A model output for Sites 1, 3, 4, and for residence nearest the Columbia Ethanol facility are also included in Appendix A.

RESULTS

Using the estimation method described above, the project-generated noise levels estimated at the nearest residential property and at the Umatilla National Wildlife Refuge are shown in Table 8. The L_{50} levels will limit the allowable noise levels and are the only levels shown.

Table 8 Project-Generated Noise Levels at Nearest Noise-Sensitive Locations (L_1, L_{10} and L_{50} - dBA)	
Prediction Site	**L_{50}**
Residence	43
Wildlife Refuge	TBD when location determined

The results of the Cadna-A model runs show that statistical noise levels at the nearest properties are not predicted to exceed State noise standards with the proposed facility design. In addition, median octave band frequency noise levels at the nearest property are not predicted to exceed State noise standards.

REFERENCES

DataKustik, Cadna-A Computer Aided Noise Abatement Manual, Version 3.5, 2005.

Oregon Administrative Rules. “Noise Control Regulations.” OAR 340-35, Salem, OR.

Appendix A

Monitoring Data Summary, Grinder Frequency Data, and CadnaA Output Sound Levels

EXHIBIT Y

CARBON DIOXIDE EMISSIONS

OAR 345-021-0010(1)(y)

As stated in the Project Order dated April 28, 2006, "…the Council does not have a carbon dioxide standard for ethanol production facilities. The application should state the natural gas consumed at design capacity, but other information in Exhibit Y is not required. For informational purposes, ODOE also requests the amount of carbon dioxide released, if any, during the portions of the ethanol production process that do not involve burning fuel (for example, fermentation)."

Response: Natural gas consumed at design capacity would be an average of 3,000,000 cubic feet per day (based on estimate of average annual usage). The designed capacity for the pipeline into the plant facility would have a maximum connected load of 3,628,800 cubic feet per day.

Non-fuel burning carbon dioxide releases would occur as part of the fermentation process. Each bushel of corn (56 pounds [lbs]) yields about 18 lbs of alcohol, 20 lbs of distillers wet grain, and 18 lbs of carbon dioxide. This equates to a one to one ratio between production of alcohol and release of carbon dioxide. The design capacity for the plant is 35 million gallons per year and 1 gallon of ethanol equals 6.59 lbs (U.S. Dept of Energy 1980). This equates to a design capacity of 276,780,000 lbs or 138,390 tons per year. Therefore, the carbon dioxide released at capacity would be 138,390 tons per year. Carbon dioxide may be captured and sold for use to a manufacturer of dry ice or carbination.

References:

U.S. Dept. of Energy. 1980. *Fuel From Farms: a Guide to Small Scale Ethanol Production.* May 1980. Page D-3. As cited on Santa Cruz Public Libraries web site available at: http://www.santacruzpl.org/readyref/files/g-l/gasoline.shtml

EXHIBIT Z

As stated in the Project Order dated April 28, 2006, "…If the [ethanol] facility will include cooling towers similar to those used at thermal power plants, then this exhibit should include information on cooling tower drift. In the past, the Council has approved analyses of cooling tower drift impact on surrounding farmland and habitat using the SACTI model developed by the Electric Power Research Institute." Therefore, Exhibit Z of this application will address the following Oregon Administrative Rule (OAR):

OAR-345-021-0010(1)(z)(C)

The predicted locations and rates of deposition of solids released from the cooling tower (cooling tower drift) and an assessment of significant potential adverse impacts to soils, vegetation, and other land uses.

Response: The proposed Columbia Ethanol facility is located approximately 1.5 miles to the northeast of the existing Portland General Electric Coyote Springs Power Generating Plant (Coyote Springs). Cooling tower drift analysis was performed for the Coyote Springs facility as part of the EFSC review process in 1994. The drift analysis showed that no anticipated significant affects to surrounding natural resources would occur as a result of drift from the facility (Beak 1994). It is therefore assumed that cooling tower drift from the proposed Columbia Ethanol facility would have no significant affect on surrounding natural resources. This assumption is based on the details listed below. In conversation with Adam Bless, Oregon Department of Energy (Bless pers. comm. 2006), it was agreed that use of existing data (i.e. the Coyote Springs study) may be sufficient to support a finding of no significant impact for the Columbia Ethanol facility, and therefore SACTI modeling would likely not be necessary.

- The Columbia Ethanol cooling tower system is roughly 20 percent the size of the Coyote Springs system, based on recirculation rate of 12,012 gallons per minute (gpm) for Columbia Ethanol versus 65,875 gpm for Coyote Springs. This provides a considerable margin of safety in using the Coyote Springs study results for the Columbia Ethanol facility. Because cooling towers operate on the same basic principles and design, any minor configuration and operation differences of the two facilities are unlikely to outweigh the fact that the Coyote Springs cooling system is considerably larger.

- Cooling tower source water for both facilities comes from a common source, the Port of Morrow. Therefore, incoming water chemistry, including salt concentrations, is the same for both facilities.

- Due to their close proximity, general climatic conditions are the same. Therefore, weather conditions affecting drift deposition (i.e. wind direction, wind speed, relative humidity, etc.) would affect both facilities similarly. Prevailing wind direction in the project vicinity is from the southwest (based on data for Ella, Oregon). Relative humidity ranges between an average low of 23 percent in July

to an average high of 82 percent in December (based on data for Pendleton, Oregon).

- Both facilities are located in industrial zoned land, within the Port of Morrow, and surrounding land uses are similar at both facilities.

Talbot (1979), as cited by Beak (1994), reviewed actual measured or observed cooling tower drift effects on vegetation at seven operational facilities. Of the three facilities where some foliar injury was noted, such damage only occurred within roughly the first 200 meters (656 feet) from the facility. As described in Exhibit P of this application, all areas within 200 meters of the proposed Columbia Ethanol facility contain highly degraded weedy habitat. This degraded habitat extends well beyond 1,000 feet from the Columbia Ethanol facility. The project area is all zoned as industrial land, with the nearest agricultural areas occurring more than 1,000 feet from the cooling tower. Therefore, no significant impacts are expected to occur to native habitats or agricultural crops as a result of cooling tower drift deposition.

The Columbia Ethanol facility is located approximately 2,300 feet downwind from Messner Pond (i.e. prevailing wind direction, which is from the southwest). The Coyote Springs facility is located less than 500 feet from Messner Pond and is located upwind of the pond. Beak (1994) found that no significant adverse affects to water quality would occur within the pond or to its surrounding vegetation. Beak (1994) noted that the contribution of drift deposition to the annual loading of total dissolved solids to the pond would be two percent or less. Because the Columbia Ethanol facility is located considerably further and downwind of the pond, and because total drift from the facility will be far less than that produced by Coyote Springs, it is reasonable to assert that the Columbia Ethanol facility would have a similar finding of no significant adverse affects to pond water quality or its surrounding vegetation.

The nearest aquatic resource to the Columbia Ethanol facility is the Columbia River, at about 1,500 feet distance. No significant affect to Columbia River water quality is anticipated from Columbia Ethanol cooling tower drift. The majority of drift would fall out prior to reaching the river (Talbot 1979). Additional, chemical composition of any drift making its way to the river would be rapidly diluted by the large volume of water contained within the river. The river also receives considerable inputs of dissolved solids by way of wind blown dust and run-off from agricultural fields located throughout the Columbia basin, which have a far greater affect on water quality than would drift from the Columbia Ethanol facility.

References:

Beak Consultants Incorporated. 1994. Potential cooling tower drift affects on the water quality and vegetation at Messner Pond near the proposed Coyote Springs Cogeneration Facility.

Talbot, J.J. 1979. A review of potential biological impacts of cooling tower salt drift. Atmospheric Environ., 13:395-405.