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Subject: Addendum to Tradewinds Covered Source Application

Hi, April and Nolan

Attached is the Addendum that incorporates all the changes we have been talking about, including AERMOD modeling, health risk assessment, and proposed operating limits for the main mill equipment. I am e-mailing this pdf version of the document to you because it sometimes takes two days to send a Federal Express and I know you are looking for it. I will send a couple of bound hard copies tomorrow in the Fed-Ex as a follow-up. This completely replaces the draft addendum we brought to our meeting with you on July 13. We have to make it clear where and how the new material differs from the November 2006 application submittal.

We very much appreciate the way you have worked with us to get the main issues ironed out over the last couple of months and, hopefully, you will have what you need now to write a permit for this project.

Regards - jsl

(See attached file: 00001-c-r.pdf)

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ADDENDUM TO INITIAL APPLICATION FOR
A COVERED SOURCE PERMIT
TRADEWINDS O'OKALA VENEER MILL

PREPARED FOR:

**HAWAII DEPARTMENT OF HEALTH
CLEAN AIR BRANCH**

AUGUST 22, 2007

ADDENDUM TO INITIAL APPLICATION
FOR A COVERED SOURCE PERMIT:
TRADEWINDS O'OKALA VENEER MILL

Prepared for

Hawaii Department of Health
Clean Air Branch

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August 22, 2007

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TABLE OF CONTENTS

Section 1	Overview of this Addendum	1-1
Section 2	Use of Biodiesel as a Boiler Starter and Backup Fuel	2-1
Section 3	Changes to Mill Physical Layout.....	3-1
Section 4	Proposed Emissions Limitations.....	4-1
	4.1 Proposed Annual Veneer Dryer Emission Limits.....	4-1
	4.2 Proposed Annual Cogeneration Boiler Emission Limits	4-2
Section 5	Revised HAP Emissions Estimates	5-1
Section 6	Revised Air Dispersion Modeling for criteria Pollutants	6-1
	6.1 Meteorological Data for Modeling	6-1
	6.2 Use of AERMOD and Development of AERMOD meteorological Inputs.....	6-7
	6.3 Other Model Inputs.....	6-9
	6.4 Revised Criteria Pollutant Modeling Results.....	6-9
Section 7	Health Risk Assessment.....	7-1
Section 8	Greenhouse Gas Emissions of the O’okala Mill	8-1

List of Tables, Figures, and Appendices

Tables

Table 1	Maximum Veneer Dryer VOC and Particulate Emissions
Table 2	Estimated Maximum Criteria Pollutant Emissions from Cogeneration Boiler
Table 3	Emission Factors Utilized for Calculation of O'okala Mill HAP Emissions
Table 4	O'okala Mill: Estimated Annual Emission Rates for Hazardous Air Pollutants
Table 5	Stack Parameters for Emission Sources - O'okala Mill
Table 6	O'okala and Hilo Precipitation and Temperature Data
Table 7	AERMET Stage 3 Parameter Inputs
Table 8	O'okala Mill Emissions of Modeled Pollutants for Applicable Averaging Times
Table 9	O'okala Mill Maximum Predicted Criteria Pollutant Concentrations due to Mill Operations
Table 10	Identification of HAPs Potentially Subject to Health Risk Analysis Requirements per HAR 60.1-179
Table 11	HAP Pollutants Listed by Health Risk Categories and O'okala Mill Emission Sources
Table 12	Health Risk Calculations for Group 1 Pollutants -- Non-carcinogenic HAPs with a TLV-TWA
Table 13	Health Risk Calculations for Group 2 Pollutants -- Non-carcinogenic HAPs without a TLV-TWA
Table 14	Health Risk Calculations for Group 3 Pollutants -- Carcinogenic HAPs

Figures

Figure 1	Revised O'okala Mill Equipment Layout and Emissions Sources
Figure 2	Locations and Topography of O'okala and Hamakua Sites
Figure 3	Typical Nighttime and Daytime Flow Patterns on Hawaii

Appendices

Appendix A	Veneer Dryer Vendor Performance Guarantee
Appendix B	Evaluation of Hamakua Wind Data Collection versus EPA Guidance
Appendix C	DOH Health Risk Assessment Protocol

SECTION 1 OVERVIEW OF THIS ADDENDUM

This Addendum to the Tradewinds application presents revised project emissions estimates, a revised air quality impacts evaluation, a health risk analysis to evaluate project emissions of hazardous air pollutants and proposed permit limits for the operational O'okala Mill. This information supplements, and in large part replaces, the data presented in the Revised Covered Source Permit application that was submitted to Hawaii DOH in November, 2006. Specific elements of this Addendum include:

- Substitution of biodiesel fuel instead of petroleum diesel oil as the primary starter and backup fuel for the cogeneration boiler;
- Relocation of some mill equipment on the project site and changes in the dimension of certain site structures;
- Proposed operational limits for the primary mill emission sources to be used as permit conditions;
- Revised emissions estimates for criteria and hazardous air pollutants reflecting these proposed operational limits;
- Additional air dispersion modeling to reflect revised emissions estimates for criteria pollutant and hazardous air pollutants from the cogeneration boiler and veneer dryer and the use of the AERMOD dispersion model, which has replaced ISCST3 as EPA's preferred guideline model for regulatory permitting since the November 2006 application was submitted;
- Health risk calculations for the project's hazardous air pollutant emissions (not provided in the November 2006 application).

The following sections discuss each of these topics individually.

SECTION 2 USE OF BIODIESEL AS A BOILER STARTER AND BACKUP FUEL

In the November, 2006 application to DOH, emissions from the cogeneration boiler were calculated based on the following assumptions:

1. Diesel fuel oil with a maximum sulfur content of 0.4% by weight would be used for up to 264 hours per year (about 3% of the time) to support boiler startup operations and for rare periods when wood fuel may temporarily be unavailable.
2. An annual emissions limitation that corresponds to an 89% capacity factor of boiler for the remainder of the year.

In recent months, it has become increasingly likely that biodiesel produced in Hawaii will be available to meet the O'okala Mill boiler startup/backup fuel requirements. In order to provide a measure of protection against possible periods of biodiesel non-availability, Tradewinds proposes a condition limiting distillate fuel oil use to no more than 1% of the time (87 hours per year), equating to 68,854 gallons of diesel fuel per year.

Tradewinds understands that current DOH policy is to represent biodiesel emissions of criteria pollutants using diesel emission factors, with the exception that NO_x emissions are assumed to be 15% higher for biodiesel. In addition, biodiesel typically has extremely low sulfur content and can usually meet the 2006 EPA requirements for ultra-low sulfur fuel. Since boiler pollutant emissions on biodiesel fuel are the same or higher than the corresponding levels for diesel, we have recalculated the boiler's annual criteria pollutant emissions based on assumed biodiesel use for 264 hours per year, as shown in Section 4. Estimated emissions of NO_x will be slightly lower if diesel is used during some of those hours. For conservatism short-term and annual SO₂ emissions were calculated assuming 264 hours per year of 0.3% sulfur diesel fuel oil, even though a permit limiting the use of such fuel to only 87 hours per year is proposed.

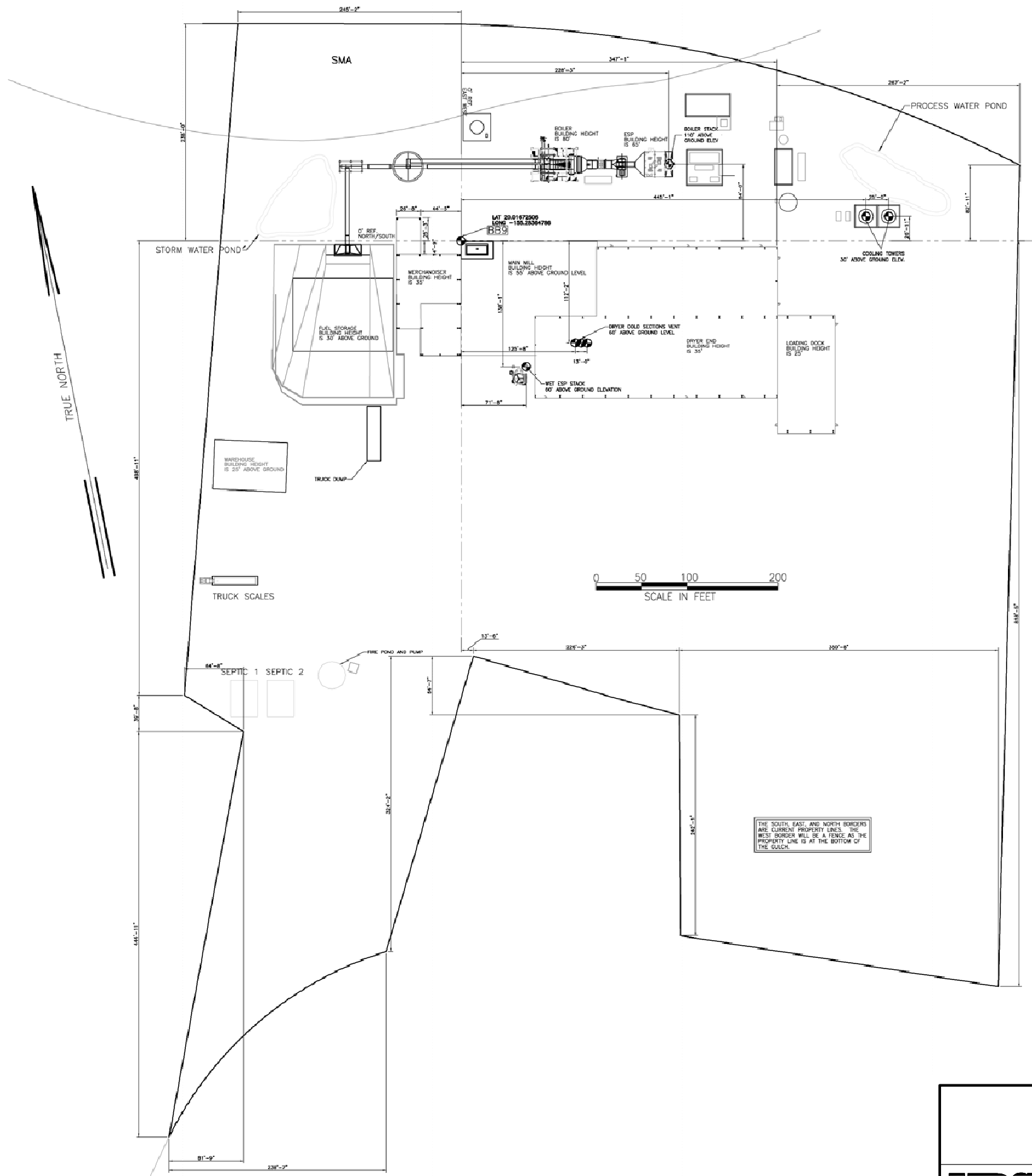
Tradewinds will use wood fuel for the boiler whenever it is available, which is expected to be the case at nearly all times. However, calculations are shown in Section 4.2 demonstrating that even if biodiesel were used continuously throughout the year, the resulting emissions would be less than for the planned scenario in which wood fuel is the primary fuel. Thus, no limitation on annual usage of biodiesel usage is required.

SECTION 3 CHANGES TO MILL PHYSICAL LAYOUT

Proposed changes to the O'okala Mill physical layout that have occurred since submittal of the November 2006 Application to DOH are listed below:

- Move Cooling Tower from the northwest area of the property to the northeast;
- Refine the Boiler Building from one building to three separate structures, including Boiler Building, Boiler ESP Building, and Steam Turbine Building;
- Move Boiler stack a few meters to the northwest to align with the ESP structure;
- Split Main Mill Building into two discrete areas (Main Mill Building and Dry End Main Mill Building);
- Revise Fuel Bin Building to reflect that it is a covered area without walls; and
- Remove Chop Saw Building and replace with new Merchandiser Building.

The effects of these changes can be seen by comparing Figure 1 (of this submittal) with the site plan in Figure 1-2 of the November 2006 application. Only the cooling tower location has changed by more than a few feet, and its estimated emissions of PM_{10} are unchanged compared with the previous application. The minor changes that have occurred in the locations of other mill emission sources and in the relationships between stack sources and other mill structures are incorporated in the revised air quality dispersion modeling in Section 6 and in the health risk assessment modeling in Section 7



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ICON	LEGEND
[A 000]	DETAIL VIEW OR SECTION FROM DWG NUMBER
[A 00]	VIEW LETTER GOTO DWG NUMBER
[000 00]	ITEM NUMBER - DETAIL GOTO DWG NUMBER
[A 02]	SECTION LETTER GOTO DWG NUMBER
[1]	BOM ITEM NUMBER
[A]	REVISION LETTER
[→]	FLOW ARROWS
[→ 100 FPM]	FEET PER MINUTE
[●]	WORK POINT
[■]	COLUMNS PLAN VIEW

REVISED O'OKALA MILL EQUIPMENT LAYOUT TRADEWINDS, HAWAII MILL			
URS	CHECKED BY:	DATE: 07-05-07	FIG. NO:
	PM: JSL	PROJ. NO: 2569045.00001	1

REFERENCE: West Coast Industrial Systems, Inc. dated 09/11/06

SECTION 4 PROPOSED EMISSIONS LIMITATIONS

4.1 PROPOSED ANNUAL VENEER DRYER EMISSION LIMITS

After consultation with DOH, Tradewinds has revised its propose annual veneer dryer emissions estimates to reflect continuous, full-time operation of this equipment throughout the year (8,760 hours). Annual emissions have been adjusted to reflect this assumption, which translates to a maximum throughput of 106,188,720 square feet per year and equates to 12,122 square feet per hour at 3/8" thickness. This is 28% higher than the annual throughput of 83,000 MSf^{3/8"} that was estimated in the November 2006 application. While the anticipated average facility production level remains close to 83,000 thousand square feet of veneer at 3/8" thickness, an operational limitations based on continuous production at the maximum throughput will simplify the permit conditions pertaining to the dryer, and will allow for operating flexibility to account for variability in the logs used in veneer production. Since the dryer is designed to use the heat of steam generated by the cogeneration boiler (indirect dryer), there is no additional fuel consumption associated with increased dryer operation and there are no combustion emissions (i.e., NO_x, CO or SO₂) from the dryer.

An appropriate operational limit on the veneer dryer for purposes of the Covered Source Permit is shown below:

- Throughput limit of 12,122 square feet per hour at 3/8" thickness and an annual throughput of 106,189 MSf^{3/8"} per year.

Table 1 presents revised estimates of VOC and particulate matter emissions from the veneer dryer. The selection of appropriate emission factors for this equipment was described in detail in the November 2006 application and no change in these factors is proposed in this Addendum. A slight adjustment to the maximum hourly emission rates has been made to reflect the manufacturer's most recent specification of a maximum design veneer dryer throughput of 12,122 square feet per hour (based on 3/8" thickness). Appendix A presents this vendor performance guarantee for the dryer. Resultant emissions in Table 1 represent the dryer's maximum potential to emit.

Note that all emissions calculations and dispersion and health risk assessment modeling presented in this Addendum incorporate this higher hourly and annual dryer throughput.

Table 1
Maximum Veneer Dryer VOC and Particulate Emissions

Pollutant	Dryer Heating Zones Emission Factor (lb/Msf ^{3/8"})	Dryer Cooling Section Emission Factor (lb/Msf ^{3/8"})	Maximum Hourly Emission Rate (lb/hour) ^b	Annual Veneer Throughput (Msf ^{3/8"}) ^c	Annual Emissions (lb/year) ^c	Annual Emissions Totals (ton/year) ^c
VOC	0.016 ^a	0.26 ^a	3.35	106,189	29,311 ^c	14.66 ^c
PM ₁₀	0.111 ^d	0	1.35		11,787 ^c	5.89 ^c

^a Total dryer emissions of VOC are estimated as the sum of emissions in the heating zones and cooling section using AP-42 emission factors, as described in the November 2006 application.

^b Maximum hourly emissions are based on maximum dryer throughput of 12,122 square feet per hour (3/8" basis).

^c Annual throughput and emissions have been calculated assuming continuous operations at the maximum hourly throughput for 8,760 hours per year.

^d Emission factor for PM₁₀ was derived by the procedure described in the November 2006 application. According to Raute, the dryer manufacturer, virtually all of the PM₁₀ emissions are released through the stack on the hot side of the dryer.

4.2 PROPOSED ANNUAL COGENERATION BOILER EMISSION LIMITS

Tradewinds also proposes that the O'okala Mill Covered Source Permit regulate emissions from the cogeneration boiler based on the maximum potential to emit for this unit, which corresponds to continuous, full-load operation for the entire year (8,760 hours). Table 2 below shows the calculation of maximum hourly emissions for different fuels and annual emissions based on an assumed worst-case fuel usage scenario of 8,496 hours of operation on wood fuel and 264 hours per year on biodiesel. The boiler emission factors used for wood and diesel fuel are the same vendor guarantees provided in the November 2006 application. Biodiesel emissions of criteria pollutants from the boiler are represented by the same emission factors as for diesel fuel oil with two exceptions: (1) per DOH policy, the factor for NO_x is estimated to be 15% higher than for diesel; and (2) SO₂ emissions are negligible, since the sulfur content of biodiesel is very small. However, in the interest of conservatism, the annual emissions for SO₂ were calculated based on use of 0.3% sulfur fuel for 264 hours per year with the remaining 8,496 hours on wood fuel.

**Table 2
Estimated Maximum Criteria Pollutant Emissions from Cogeneration Boiler**

Pollutant	Vendor Guarantee Wood Fuel (lb/MMBtu) ^a	Mass Balance Emission Factor for Diesel Fuel ^b	Estimated Factor for Bio-diesel Fuel (lb/MMBtu) ^c	Boiler Emission Rate Wood Fuel (lb/hr) ^d	Boiler Emission Rate Diesel Fuel (lb/hr) ^d	Boiler Emission Rate Bio-diesel Fuel (lb/hr) ^d	Annual Boiler Emissions Assuming 100% Biodiesel Fuel Use (tons per year) ^e	Annual Boiler Emissions for Proposed Fuel Use Scenario (tons per year) ^f
NO _x	0.230		0.196	30.45		24.91	109.09	132.62
CO	0.305		0.004	40.37		0.44	1.94	171.56
VOC	0.017		0.001	2.25		0.11	0.49	9.57
SO ₂	0.025	0.302	Negligible	3.31	33.47	Negligible	Negligible	18.48
PM ₁₀	0.025		0.014	3.31		1.55	6.79	14.26

^a Boiler NO_x, CO, SO₂ and PM₁₀ emission factors for wood fuel firing are based on vendor guarantees, with post-combustion electrostatic precipitator to control PM₁₀ emissions to the indicated level.

^b Assumed distillate oil sulfur content of 0.30 percent by weight with energy equivalent of 140,000 Btu/gal.

^c Biodiesel emission factors are assumed to be the same as diesel oil factors, except NO_x emissions are estimated to be 15% higher than diesel and SO₂ emissions are assumed negligible.

^d Hourly boiler emissions calculated based on vendor-specified fuel input energy capacity rated at 132.37 MMBtu/hr on wood fuel and 110.78 MMBtu/hr on diesel or biodiesel fuel.

^e Annual boiler emissions of NO_x, CO, VOC and PM₁₀ for the Proposed Fuel Use are estimated based on 264 hours of biodiesel fuel and the remainder of the year (8,496 hours) on wood fuel. For conservatism, annual SO₂ emissions are estimated based on 264 hours of 0.3% sulfur fuel usage and the remainder of the year on wood fuel.

^f The emission scenario with full-time exclusive use of biodiesel boiler fuel is not proposed, but rather is shown in the table solely to demonstrate that no permit limit on biodiesel usage is required if wood and diesel fuel usage limits are specified.

Appropriate operational limits on the cogeneration boiler for purposes of the Covered Source Permit are listed below:

- Maximum wood fuel usage: 132.37 MMBtu/hour (Boiler manufacturer's fuel input limit), which equates to 1.2×10^{12} Btu/year for full year-round operation on this fuel.
- No biodiesel fuel usage limit is proposed, because annual emissions for all pollutants would be lower than for the proposed fuel use scenario with wood as the primary fuel, even if biodiesel were used continuously throughout the year as the sole boiler fuel (see Table 2)
- Maximum diesel fuel usage: 110.78 MMBtu/hour, which equates to 791 gallons per hour at 140,000 Btu/gal and up to 68,854 gallons per year if this fuel is used up to 1% of annual hours (87 hours).

SECTION 5 REVISED HAP EMISSIONS ESTIMATES

DOH has advised Tradewinds that emissions of hazardous air pollutants (HAPs) from the cogeneration boiler and dryer will be evaluated based on conservative emission factors from the AP-42 compendium. However, emission factors lower than those provided in AP-42 may be proposed for individual HAPs, provided that Tradewinds is willing to accept permit conditions requiring verification of the lower factors by means of initial source testing after startup of the operational mill. In accordance with this DOH guidance, emissions of HAPs presented in this Addendum are, with one exception, quantified using AP-42 factors, whereas the November 2006 application quantified emissions using both AP-42 and NCASI data. The proposed HAP emission factors are presented in Table 3.

An emission factor lower than that given in AP-42 is hereby proposed by Tradewinds for only one HAP, specifically, hydrogen chloride (HCl), which will be emitted only by the cogeneration boiler. The detailed reasons for the conclusion that emissions of this chemical are overestimated by the AP-42 factor for wood boilers are described in the November 2006 application.

Tradewinds proposes a condition limiting emissions of HCl to 0.0117 lb/MMBtu, as indicated in Table 3 (bolded value). Compliance with this limit will be demonstrated by initial source tests following facility startup. We request that this permit condition be worded to allow the source testing for hydrogen chloride to be discontinued after this difference has been demonstrated by an initial period of source tests.

The proposed HCl emission factor of 0.0117 lb/MMBtu is 38% lower than the AP-42 factor of 0.019 lb/MMBtu, but still about 17 times greater than the standard industry emission factor of 0.00067 /MMBtu that was developed by NCASI from source tests conducted on actual forest products industry boilers burning clean wood fuels. The NCASI factor has been used in permitting numerous wood-fired boilers throughout the US in recent years. Therefore, Tradewinds is confident that source tests will confirm that the actual HCl emission rate from the O'okala boiler will actually be lower than the value proposed in this Addendum.

The value of 0.0117 lb/MMBtu has been selected to avoid artificially putting the O'okala Mill into the category of a Major Source of HAPs, which is defined as 10 tons of any individual HAP or 25 tons of all HAPs combined. With the proposed HCl emission factor, the project's estimated annual HAP emissions are below both Major Source Thresholds (see Table 4). The screening health risk assessment presented in Section 7 shows that health risks using this emission factor are nearly an order of magnitude below acceptable values for this pollutant. The calculated risk would also be acceptable if the AP-42 factor for HCl were used instead.

The screening health risk assessment presented in Section 7 shows that the proposed HCl emission factor is not required to obtain acceptable health risks for this pollutant. Instead, the value of 0.0117 lb/MMBtu has been selected solely to avoid artificially putting the O'okala Mill into the category of a Major Source of HAPs, which is defined as 10 tons of any individual HAP or 25 tons of all HAPs combined. With the substitution of the revised HCl emission factor, the project's estimated annual HAP emissions are below both Major Source Thresholds (see Table 4).

Note that annual HAP emissions calculations for liquid fuel in Table 4 use the factors (in lb/MMBtu) for biodiesel, which are slightly higher than the factors for diesel because of biodiesel's lower fuel energy content.

The emissions estimates for all other HAPs listed in Tables 3 and 4 are based on AP-42 factors. Annual HAP emissions estimates were obtained by multiplying these emission factors by the maximum possible boiler and dryer throughput levels and assuming continuous operation at these levels on a year-round basis (see Section 4). Table 4 shows that the O'okala Mill will not be a Major Source of HAPs,, even when continuous operation at the maximum design capacities of the veneer dryer and cogeneration boiler are assumed and conservative AP-42 emission factors are used for all HAPs other than HCl. The HAPs listed in Table 3 and 4 were analyzed in the health risk assessment calculations that are presented in Section 7 of this Addendum.

Table 3
Emission Factors Utilized for Calculation of O'okala Mill HAP Emissions

HAP	Emission Factors				
	Boiler (fired on wood fuel) (lb/MMBtu)	Boiler fired on diesel or bio- diesel (lb/10 ³ Gallon)	Boiler fired on biodiesel / - diesel (lb/MMBtu)	Dryer (Heated Zones) (lb/MSF ³ / ₈)	Dryer (Cooling Section) (lb/MSF ³ / ₈)
Acetaldehyde	8.30E-04			4.30E-03	3.20E-02
Acrolein	4.00E-03				
Antimony Compounds	7.90E-06				
Arsenic Compounds	2.20E-05	1.32E-03	1.02E-05 / 9.43E-06		
Benzene (includes that from gasoline)	4.20E-03	2.14E-04	1.65E-06 / 1.53E-06		
Beryllium Compounds	1.10E-06	2.78E-05	2.14E-07 / 1.99E-07		
Bis(2-ethylhexyl)phthalate (DEHP)	4.70E-08				
Cadmium Compounds	4.10E-06	3.98E-04	3.06E-06 / 2.84E-06		
Carbon tetrachloride	4.50E-05				
Chlorine	7.90E-04				
Chlorobenzene	3.30E-05				
Chloroform	2.80E-05				
Chromium Compounds	2.10E-05	8.45E-04	6.50E-06 / 6.04E-06		
Cobalt Compounds	6.50E-06				
2,4-Dinitrophenol	1.80E-07				
Ethylbenzene	3.10E-05				
Formaldehyde	4.40E-03	3.30E-02	2.54E-04 / 2.36E-04	1.10E-03	6.50E-03
Hydrogen Chloride	1.17E-02				
Lead Compounds	4.80E-05	1.51E-03	1.16E-05 / 1.08E-05		
Manganese Compounds	1.60E-03	3.00E-03	2.31E-05 / 2.14E-05		
Mercury Compounds	3.50E-06	1.13E-04	8.69E-07 / 8.07E-07		
Methanol				0.041	2.10E-02

Table 3
Emission Factors Utilized for Calculation of O'okala Mill HAP Emissions
(Continued)

HAP	Emission Factors				
	Boiler (fired on wood fuel) (lb/MMBtu)	Boiler fired on diesel or bio- diesel (lb/10 ³ Gallon)	Boiler fired on biodiesel / - diesel (lb/MMBtu)	Dryer (Heated Zones) (lb/MSF $\frac{3}{8}$)	Dryer (Cooling Section) (lb/MSF $\frac{3}{8}$)
Methyl isobutyl ketone (Hexone)				0.0022	2.90E-02
Naphthalene	9.70E-05	1.13E-03	8.69E-06 / 8.07E-06		
Nickel Compounds	3.30E-05	8.45E-02	6.50E-04 / 6.04E-04		
4-Nitrophenol	1.10E-07				
Pentachlorophenol	5.10E-08				
Phenol	5.10E-05			3.00E-03	below detection
Phosphorus	2.70E-05				
Propionaldehyde	6.10E-05				
Selenium Compounds	2.80E-06	6.83E-04	5.25E-06 / 4.88E-06		
Styrene	1.90E-03				
2,3,7,8-Tetrachlorodibenzo-p-dioxin	8.60E-12				
Toluene	9.20E-04	6.20E-03	4.77E-05 / 4.43E-05		
1,1,1-Trichloroethane		2.36E-04	1.82E-06 / 1.69E-06		
2,4,6-Trichlorophenol	2.20E-08				
Vinyl chloride	1.80E-05				
o-Xylenes	2.50E-05	1.09E-04	8.38E-07 / 7.79E-07		
POM		3.30E-03	2.54E-05 / 2.36E-05		

Note:

All emission factors are from EPA AP-42 document, except for those for hydrogen chloride (boiler only), for which a lower value has been used. Boiler emission factors in lb/MMBtu for liquid fuel were obtained from the AP-42 factors (lb/1000 gallons) and converted assuming a fuel energy content of 130,000 Btu/gallon for biodiesel and 140,000 Btu/gallon for diesel oil.

In the November 2006 application, emissions data for Acetone were presented. However, since this compound is not a federal HAP and is not listed in HAR 60.1-172, the current listing of HAPS in this table does not include Acetone. DOH substituted Acetophenone for acetone in a draft table of project emissions, since Acetophenone is a listed HAP. However, the AP-42 factors do not list this compound among the pollutants emitted by either the boiler or the dryer, so neither acetone nor acetophenone is a HAP that is emitted by the O'okala Mill.

Table 4
O'okala Mill: Estimated Annual Emission Rates for Hazardous Air Pollutants

HAP	Emissions (tons/year)			
	Boiler fired on wood fuel	Boiler fired on diesel or biodiesel	Dryer	Total Emissions
Acetaldehyde	0.467		1.927	2.394
Acrolein	2.250			2.250
Antimony Compounds	0.004			0.004
Arsenic Compounds	0.012	1.48E-04		0.013
Benzene (includes that from gasoline)	2.362	2.41E-05		2.362
Beryllium Compounds	0.001	3.13E-06		0.001
Bis(2-ethylhexyl)phthalate (DEHP)	0.000			0.000
Cadmium Compounds	0.002	4.48E-05		0.002
Carbon tetrachloride	0.025			0.025
Chlorine	0.444			0.444
Chlorobenzene	0.019			0.019
Chloroform	0.016			0.016
Chromium Compounds	0.012	9.50E-05		0.012
Cobalt Compounds	0.004			0.004
2,4-Dinitrophenol	0.000			0.000
Ethylbenzene	0.017			0.017
Formaldehyde	2.475	3.71E-03	0.404	2.882
Hydrogen Chloride	6.606			6.606
Lead Compounds	0.027	1.70E-04		0.027
Manganese Compounds	0.900	3.37E-04		0.900
Mercury Compounds	0.002	1.27E-05		0.002
Methanol			3.292	3.292
Methyl isobutyl ketone (Hexone)			1.657	1.657
Naphthalene	0.055	1.27E-04		0.055
Nickel Compounds	0.019	9.50E-03		0.028
4-Nitrophenol	0.000			0.000
Pentachlorophenol	0.000			0.000
Phenol	0.029		0.159	0.188
Phosphorus	0.015			0.015

Table 4
O'okala Mill: Estimated Annual Emission Rates for Hazardous Air Pollutants
(Continued)

HAP	Emissions (tons/year)			
	Boiler fired on wood fuel	Boiler fired on diesel or biodiesel	Dryer	Total Emissions
Propionaldehyde	0.034			0.034
Selenium Compounds	0.002	7.68E-05		0.002
Styrene	1.069			1.069
2,3,7,8-Tetrachlorodibenzo-p-dioxin	0.000			0.000
Toluene	0.517	6.97E-04		0.518
1,1,1-Trichloroethane		2.65E-05		0.000
2,4,6-Trichlorophenol	0.000			0.000
Vinyl chlororide	0.010			0.010
o-Xylenes	0.014	1.23E-05		0.014
POM		3.71E-04		0.000
Total HAPs	17.4	1.5E-02	7.4	24.9

Note:

Annual emissions based on wood and biodiesel emission factors in Table 3 and assumed full-time operation of the veneer dryer and cogeneration boiler, with the latter using wood fuel for 8,496 hours and biodiesel for 264 hours.

SECTION 6 REVISED AIR DISPERSION MODELING FOR CRITERIA POLLUTANTS

Section 3 of this Addendum provides a list of the relatively minor changes to the proposed layout of mill facilities that have occurred since the November 2006 submittal of the Tradewinds application to DOH (see also Figure 1). Table 5 shows the revised boiler and cooling tower stack location coordinates and stack parameters for modeling all project sources (changes from values in the November 2006 application are shown in bold italics).

**Table 5
Stack Parameters for Emission Sources - O’okala Mill**

Source ID	Source Type	UTM East (m)	UTM North (m)	Base Elevation (m)	Stack Height (m)	Stack Temp. (K)	Exit Velocity (m/s)	Stack Diameter (m)
BOIL	Boiler	261170	2214954	104.8	33.53	394	7.57	1.98
COOL1	Cooling Tower Cell 1	261218	2214909	110.8	9.14	311	6.88	5.49
COOL2	Cooling Tower Cell 2	261225	2214906	110.8	9.14	311	6.88	5.49
DRY	Dryer WESP	261095	2214915	108.9	15.24	339	15.24	0.76
FWP	Firewater Pump	260994	2214858	119.8	7.62	622	53.19	0.08

Also, as described in Sections 2, 4 and 5, emissions data for the operational mill have been revised to reflect the use of biodiesel as the primary backup fuel for the cogeneration boiler and new maximum annual throughputs for both the dryer and boiler. This section presents revised dispersion modeling that has been conducted to incorporate these changes in emissions and source locations. In addition, the revised modeling incorporates better meteorological data than were available for the November 2006 application, which in turn has enabled the use of a more sophisticated dispersion modeling approach. These topics are discussed in the following subsections.

6.1 METEOROLOGICAL DATA FOR MODELING

The dispersion modeling analysis described in the November 2006 application used an extremely conservative screening approach, in which the ISCST3 model was run with the default meteorological input data set from the EPA SCREEN3 model. Such screening modeling is commonly used by regulatory agencies for applications when no representative meteorological data are available for the location of a proposed project. At the time of the November 2006 submittal to DOH, a representative meteorological input dataset for the O’okala site area had not been located. DOH and Tradewinds concurred that the patterns of wind speed and direction at Hilo are probably different from those at O’okala, because of dissimilar terrain influences.

Since submittal of the November 2006 application, Tradewinds has learned of and acquired a data set consisting of hourly wind speed and direction data for a period covering January 2001 through February 2002 in the town of Haina, approximately 15 miles northwest of and further up the Hamakua coast from

O'okala. This data set was collected during post-construction monitoring of meteorological and air quality parameters that were required by the conditions of the DOH permit for a power plant in Haina that was developed by Hamakua Energy Partners (HEP). HEP's monitoring program complied with EPA monitoring and modeling guidelines, as discussed below. A formal monitoring plan for this activity was generated by HEP and an audit confirming the accuracy of the resulting data was conducted in February 2002 by RTP Environmental Associates and documented after the end of the monitoring period in a Final Data Report submitted to DOH (July 2002).

The availability of the Haina wind speed and direction data enables the use of more sophisticated modeling methods that take into account actual wind patterns in the area of the proposed mill. However use of this dataset for regulatory compliance purposes carries the responsibility to demonstrate that: (1) the wind data were collected in a manner consistent with EPA guidance for site-specific monitoring to support dispersion modeling; and (2) the wind data are reasonably representative of conditions at the O'okala site.

Conformance of Haina Wind Monitoring to EPA Guidelines. The primary purpose of the HEP monitoring program was to document local pollutant levels following commencement of operations for a new power plant in Haina, about 15 miles northwest of O'okala. Condition 6, Section D of the initial Covered Source Permit issued by DOH for this power plant specified the parameters to be measured in the post-construction monitoring program, which included concentrations of specific pollutants, as well as meteorological variables. Wind data were collected as part of this program from January 2001 through April 2002. Although the monitoring program plan stated that ambient temperature and horizontal wind deviation (sigma theta) would also be monitored and the 2002 *Final Data Report* indicates this did occur, Tradewinds has been unable to obtain the hourly data for those parameters. Accordingly, the discussion in this section focuses on the conformance of the HEP wind monitoring program to EPA guidance, and the representativeness of the HEP wind data to characterize airflow at O'okala.

The available information regarding the Haina monitoring program has been reviewed to ascertain whether the wind measurement component was designed and operated consistent with the EPA guidance for collection of data to support dispersion modeling. To this end, the following documents prepared by HEP and its consultants were obtained and reviewed.

- *Ambient Air Quality and Meteorological Monitoring Plan, Covered Source Permit No. 0243-01-C*, submitted by Hamakua Energy Partners to State of Hawaii, Department of Health, Clean Air Branch in May, 2000.
- *Quality Assurance Project Plan and Standard Operating Procedures for Hamakua Energy Partners Air Quality and Meteorological Post-Construction Monitoring Program in Haina, Hawaii*, prepared for Hamakua Energy Partners by RTP Environmental Associates, Inc., Boulder, Colorado, February 9, 2001.
- *December 2000 through April 2002, Final Data Report, Hamakua Meteorological and Air Quality Monitoring Program, Haina, Hawaii*, prepared for Hamakua Energy Partners by RTP Environmental Associates, Inc., Boulder, Colorado, July, 2002.

In addition, this review included consideration of the following EPA documents:

- Guideline on Air Quality Models, 40 CFR 51, Appendix W.
- Meteorological Monitoring Guidance for Regulatory Modeling Applications, EPA -454/R-99-005, Office of Air Quality Planning and Standards, Research Triangle Park, NC 27711, February 2000.

Section 2.4 of the *Monitoring Plan* developed for HEP's program states that the monitoring for meteorological variables "will follow the requirements documented in U.S. Environmental Protection Agency's (EPA's) Ambient Monitoring Guidelines for PSD, EPA-450/4-87-007, May 1987 and EPA's *Meteorological Monitoring Guidance for Regulatory Modeling Applications*, EPA-454/R-99-005, February 2002." The *Monitoring Plan* also states that Mr. Herman Wong of DOH, who was the Clean Air Branch modeling expert at the time, was involved in the selection of the monitoring site. Thus, there is strong evidence that the intent of the HEP wind data collection effort was consistent with the subsequent use of the resulting data for modeling studies, and that DOH participated in development/review of the monitoring plan.

The table provided as Appendix B to this Addendum lists the relevant criteria for selecting, siting and operating wind monitoring equipment to develop data suitable for dispersion modeling, as presented in *EPA Meteorological Monitoring Guidance for Regulatory Modeling Applications*. The table also shows information obtained from HEP documents relating to the Haina monitoring program's conformance with these criteria. From this analysis it is clear that the Haina monitoring program was designed and executed to comply with the same criteria that are used in obtaining meteorological measurements to support air quality modeling.

Tradewinds personnel recently visited the HEP monitoring site to observe the tower's exposure to winds. The Tradewinds representative noted the presence of trees about 300 feet south of the monitoring station. The current height of these eucalyptus trees is estimated at about 90 feet, although they are likely to have been only between 10 and 25 feet tall in the 2001-2002 timeframe when monitoring occurred, as they are now just 7 years old with a growth rate of about 1 foot per month. Also, since these trees are to the south of the tower site, they would not be expected to have a significant effect when winds are from directions other than north or south, neither of which is a dominant direction in this area.

More important during the time when wind monitoring occurred may have been the trees east of the monitoring tower. Today, the tallest of these are 18 to 30 feet tall. These trees grow much slower than eucalyptus and may have been only about 10 feet shorter than at present when monitoring was occurring. However, their base elevation is 6 to 10 feet below that of the tower site, so they would not have blocked the wind at the height of the sensor in 2001-2002.

Section 2.5 of the *Monitoring Plan* stated that "vegetation and trees that will impact proper siting will be removed", which suggests that a judgment was made that both these stands of trees, which were not removed, would not significantly affect wind flow at this site.

A full independent audit of the Haina air quality and meteorological monitoring station was conducted at the end of the monitoring period and was accepted by DOH, according to the *Final Data Report*. The audit report showed that instrumentation for wind speed and direction consistently operated within

acceptable tolerances. Statistics given in the *Final Data Report* show that valid data on wind speed and direction were captured for 99.2% of all hours over the period from *December 2000 through April 2002*, which exceeds the data capture requirements in both the *Ambient Monitoring Guidelines for PSD* and the *EPA Meteorological Monitoring Guidance*.

Based on the above information, we conclude that the wind data from the HEP monitoring program at Haina were obtained in a manner consistent with EPA guidance pertaining to meteorological measurements for regulatory modeling applications.

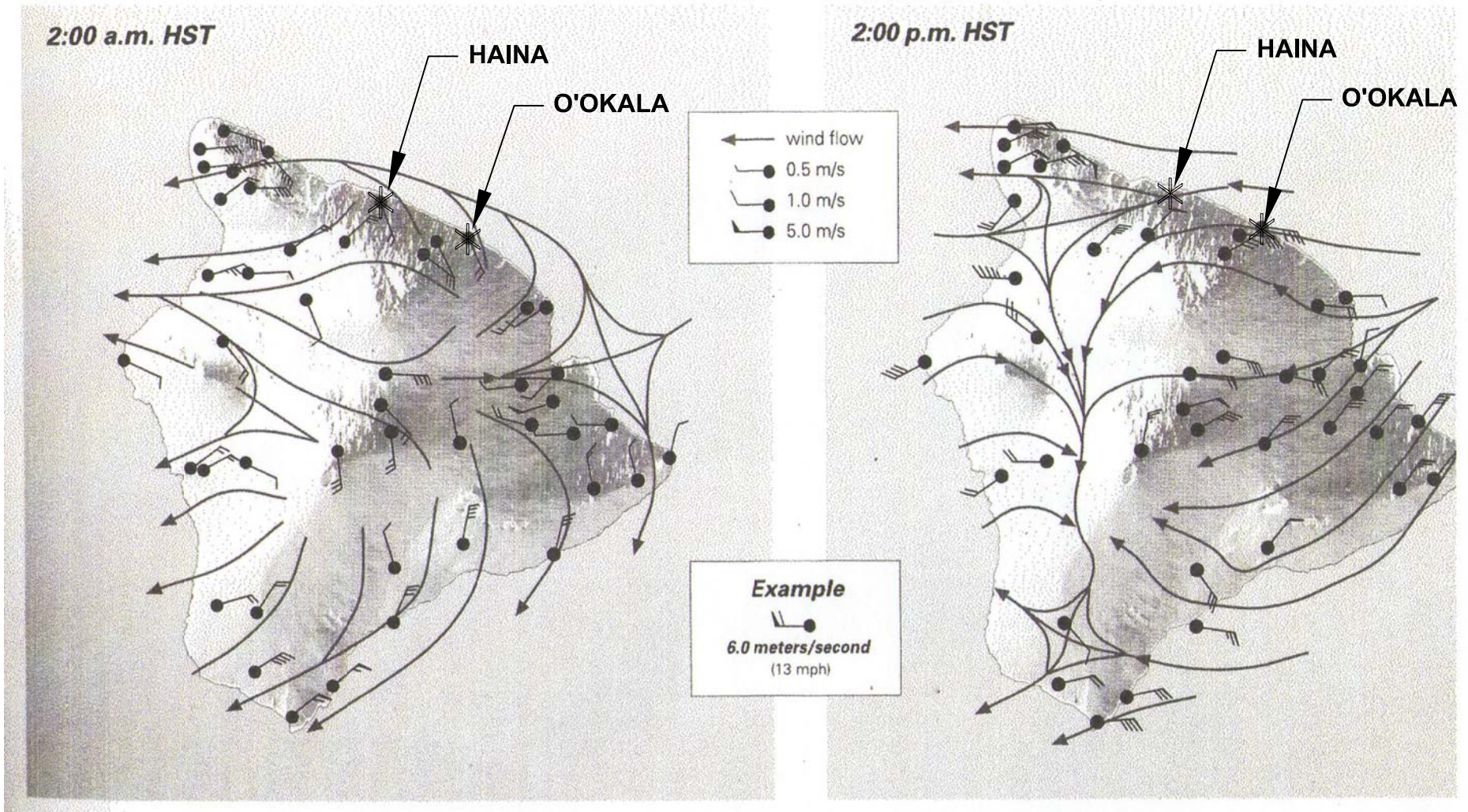
Representativeness of Haina Wind Data for O’okala:

- The wind data at Haina are also considered to be very representative of wind conditions at O’okala for several reasons: As shown in Figure 2 the orientation of the coastline is virtually identical in both locations.
- As also shown in Figure 2, the location of the power plant site relative to rising terrain within the town of Haina toward the south and southwest is also very similar to the O’okala site.
- Daytime and nighttime wind patterns on the Island of Hawaii were documented by the University of Hawaii (UH) by means of mobile meteorological monitoring during an intensive 45 day measurement period. The UH results presented in Figure 3 showed that typical flows during the daytime and nighttime are essentially the same in both locations (O’okala and Haina).

Representativeness of Other Available Meteorological Parameters. Operation of AERMOD model described below requires additional measurements to characterize other meteorological parameters that are used by the dispersion algorithms in the model. Concurrent surface and upper air measurements at the Hilo NWS station are available for the same annual period as the Haina data (Calendar Year 2001) for a number of reasons, as described below.

Hilo Airport measurements are considered representative of O’okala for air quality modeling Hilo and O’okala are both located on the windward coast of the Island of Hawaii and are separated by only about 30 miles. Very high volcanoes are located inland from both sites and both Hilo and O’okala locations receive extensive annual precipitation. Table 6 indicates that O’okala receives measurable precipitation 223 days a year on average with a mean total of 118 inches per year. Hilo receives measurable precipitation 277 days a year on average with a mean total of 128 inches per year. From “Climate of Hawaii,” Western Regional Climate Center, windward lowlands of Hawaii are “more or less perpendicular to the prevailing flow of the trade winds, [are] moderately rainy, with frequent trade wind showers. Partly cloudy to cloudy days are common. Temperatures are more nearly uniform and mild than in other regions [of Hawaii]”. This latter statement is supported by the very similar annual and seasonal temperature data shown in Table 6.

Thus, there are good reasons to expect that parameters such as temperature, cloud cover and ceiling height, turbulent intensity and mixing height are very similar in Hilo and coastal areas of the Hamakua Coast. In addition, use of data for these parameters from the nearest airport is consistent with current EPA modeling guidelines.



REFERENCE: Atlas of Hawai'i, Thrid Edition



**WIND FLOW PATTERNS
TYPICAL DAYTIME AND NIGHTTIME PREVAILING WINDS
TRADEWINDS, HAWAII MILL**



NOT TO SCALE

CHECKED BY:

DATE: 07-05-07

FIG. NO:

PM: JSL

PROJ. NO: 25696045.00001

3

Table 6
O’okala and Hilo Precipitation and Temperature Data

Rainfall

Location	Mean	>=0.01 in.	>=0.10 in.	>= 0.50 in.	>=1.00 in.
	(inches)	# Days	# Days	# Days	# Days
O’okala	117.58	223	149	64	32
Hilo	127.89	277	193	69	30

Temperature

Location	Annual Average (Deg F)	Winter Average (Deg F)	Spring Average	Summer Average	Fall Average
O’okala	72.7	70.5	71.2	74.5	74.5
Hilo	73.8	71.6	72.7	75.7	75.2

Notes:

Reference: Western Regional Climate Center webpage <http://www.wrcc.dri.edu/>

O’okala station data record: O’okala 223 Hawaii (517131), (1949 to 1993)

Hilo station data record: Hilo WSO AP 87 Hawaii (511492), (1949 – 2007)

6.2 USE OF AERMOD AND DEVELOPMENT OF AERMOD METEOROLOGICAL INPUTS

Selection of AERMOD. Identification of the Haina wind data for 2001 enabled consideration of a more sophisticated modeling approach using sequential hourly meteorological input data, in lieu of the previous screening approach. As of December 9, 2006, the USEPA officially replaced the ISCST3 model with the American Meteorological Society Environmental Protection Agency Regulatory Model (AERMOD) as the preferred dispersion modeling system for regulatory applications. AERMOD is a steady-state plume model that characterizes air dispersion based on planetary boundary layer turbulence structure and scaling concepts, including treatment of both surface and elevated sources, and both simple and complex terrain.

The DOH Clean Air Branch, determined that the revised modeling presented in this addendum should be undertaken with the AERMOD model (Version 07026) using a sequential meteorological data set consisting of hourly wind speed and direction observations and concurrent values of the other parameters used by AERMOD measured at the Hilo NWS station. The regulatory default model options in AERMOD were used, including building and stack tip downwash, default wind speed profiles, exclusion of deposition and gravitational settling, consideration of buoyant plume rise and complex terrain.

Two input data processors are used in regulatory applications of the AERMOD modeling system: AERMET, a meteorological data preprocessor that incorporates air dispersion based on planetary boundary layer turbulence structure and scaling concepts, and AERMAP, a terrain data preprocessor that incorporates complex terrain using USGS Digital Elevation Data.

Meteorological Inputs. Based on the Auer procedure for land use categorization¹, dispersion conditions are classified as “urban” when more than 50 percent of the area within a 3-km radius of the proposed emission source to be modeled is appropriately classified as urban. Since this is not the case within 3 km of the O’okala Mill site, the urban mode was not selected for the AERMOD analyses reported in this section. Terrain profiles and photographs were analyzed to assist in the selection of values for three boundary layer meteorological parameters that must be specified in generating the meteorological input data files for AERMOD, i.e., albedo, Bowen ratio and surface roughness. Land use and vegetative cover in the area immediately surrounding the main meteorological monitoring location, in this case the Haina 10 meter tower site, were examined to estimate values of these parameters within three sectors around this site based on terrain and land use characteristics. Values for each parameter were determined from tables in the following references:

- Oke, T.R. *Boundary Layer Climates, Second Edition.* University Press, Cambridge, 1987.
- U.S. Environmental Protection Agency. “User’s Guide for the Aermod Meteorological Preprocessor (AERMET),” 4-46 – 4-51. Nov. 2004. http://www.epa.gov/scram001/metobsdata_procaccprogs.htm#aermet.

The boundary layer parameter values that were selected for each directional sector in creating the AERMET Stage 3 input file are shown in Table 7. A discussion on the rationale for selecting these parameters is provided below.

Table 7
AERMET Stage 3 Parameter Inputs

Sector	Range	Albedo	Bowen Ratio	Surface Roughness	Range
1	270°-90°	0.178	0.263	0.259	270°-90°
2	90°-135°	0.16	0.6	0.5	90°-135°
3	135°-270°	0.15	0.2	0.8	135°-270°

Note: Ranges are directions from the meteorological monitoring tower and correspond to wind directions from these directions

In general, the monitoring site is covered in short grassland, with a few trees in specific directions. Boundary layer parameters for the vegetation found at this site are unlikely to change seasonally since local weather parameters are similar season to season, it does not snow at this location, and the local trees do not lose their leaves in the winter. Thus, the same parameter values in each sector were used for all seasons. The Bowen ratio was approximated for each sector assuming wet conditions, based on data provided by the Western Regional Climate Center website showing that the site area receives rain on an average of 223 days a year.

¹ Auer, August H. Jr., 1978. American Meteorological Society. *Journal of Applied Meteorology*, 17(5): 636-643. *Correlation of Land Use and Cover with Meteorological Anomalies*, May 1978.

Ground cover was observed surrounding the Haina meteorological station out to a 3 km distance. The albedo, Bowen ratio, and roughness were then calculated for sectors surrounding the meteorological site. Sector 1 covers the sector between 270°-90° from the meteorological tower site, and is characterized by ground cover that is 85% grassland and forest and 15% ocean. As a result, the albedo selected for this sector is 0.178, the Bowen ratio is 0.263, and the roughness is 0.259. Sector 2 covers the sector between 90°-135°, with ground cover that is 100% suburban. The Albedo selected for this sector is 0.16, the Bowen ratio is 0.6, and the roughness is 0.5. Sector 3, covers the sector between 135° to 270° and has 100% managed (straightly-oriented trees, similar to orchards) forest ground cover. The albedo selected for this sector is 0.15, the Bowen ratio is 0.6, and the roughness is 0.8.

6.3 OTHER MODEL INPUTS

The BPIPPRIME program was used to generate input information to AERMOD on site building locations and dimensions to facilitate simulation of aerodynamic downwash effects close to the site of the facility being modeled. The relocations of some sources that has occurred since November 2006 (see Section 3) changes the relationship of certain stacks to the Mill structures, which will change the aerodynamic downwash effect by which stack emission plumes may be brought rapidly to ground level in the low pressure area immediately downwind of buildings, tanks and other large structures.

Table 8 presents the criteria pollutant emission rates for all pollutants and averaging times addressed in the modeling analysis. Since, as described in Section 4, Tradewinds is requesting permit limits based on continuous year-round operation of both the cogeneration boiler and veneer dryer, the pollutant emission rates for these sources are generally the same for all averaging times. One exception is boiler emissions of SO₂, for which the maximum short-term emission rate is based on the limited use of 0.3% diesel fuel oil, while the annual average rate reflects wood fuel use for all but 264 hours of the year. In addition the annual emissions for all pollutants from the boiler were calculated assuming the same split between wood and liquid fuels.

As in the November 2006 application, particulate emissions from the cooling tower were assumed to occur continuously throughout the year and the diesel firewater pump would be tested just one hour per month (12 hours per year) to confirm its operability in the event of an emergency.

6.4 REVISED CRITERIA POLLUTANT MODELING RESULTS

Table 9 shows the results of revised air quality impact modeling obtained by means of AERMOD with the input data described above. Maximum predicted concentrations for all pollutants and averaging times are far below the applicable Hawaii and federal ambient air quality standards. In addition, the use of real meteorological data, instead of default screening data provides a much more realistic depiction of the locations of the maximum pollutant concentrations due to operation of the O'okala Mill.

**Table 8
O’okala Mill Emissions of Modeled Pollutants for Applicable Averaging Times**

Source ID	Source Description	Modeled Emission Rate (lb/hr)							
		NOx	CO		SO2			PM10	
		Annual	8-hr	1-hr	Annual	24-hr	3-hr	Annual	24-hr
BOIL	Boiler	30.28	40.37	40.37	4.22	33.47	33.47	3.26	3.31
CT1	Cooling Tower Cell 1	0	0	0	0	0	0	0.56	0.56
CT2	Cooling Tower Cell 2	0	0	0	0	0	0	0.56	0.56
DRY	Dryer Vent – WESP	0	0	0	0	0	0	1.35	1.35
FWP	Firewater Pump	4.25E-3	8.35E-2	6.68E-1	2.91E-4	8.84E-3	7.08E-2	3.01E-4	9.17E-3

* The large difference between the short-term and long SO₂ emission rates from the boiler is because peak 3-hour and 24-hour emissions occur with fuel oil (assumed sulfur content of 0.3% by weight), whereas the annual average emissions occur mostly on biomass fuel with a much lower sulfur content.

**Table 9
O’okala Mill Maximum Predicted Criteria Pollutant Concentrations due to Mill Operations**

Pollutant	Averaging Period	Maximum Modeled 1-Hour Concentration			Measured Background Concentration (µg/m³)	Maximum Total Concentration (µg/m³)	Below NAAQS?	Below HAAQS?	NAAQS	HAAQS
		(µg/m³)	UTM X (m)	UTM Y (m)						
PM ₁₀	Annual	3.69	260,997	2,214,955	12	15.69	yes	yes	50	50
	24-hour	10.45	261,023	2,215,012	36	46.45	yes	yes	150	150
SO ₂	Annual	0.58	260,825	2,214,975	3	3.58	yes	yes	80	80
	24-hour	31.40	260,900	2,214,300	34	65.40	yes	yes	365	365
	3-hour	249.74	260,900	2,214,300	91	340.74	yes	yes	1,300	1,300
NO ₂ *	Annual	4.16	260,825	2,214,975	2	6.16	yes	yes	100	70
CO	8-hour	109.63	261,150	2,214,250	455	564.63	yes	yes	10,000	5,000
	1-hour	613.69	261,150	2,214,300	1,022	1,635.69	yes	yes	40,000	10,000

Note:

* Annual NO₂ concentration calculation using EPA ambient ratio method

SECTION 7 HEALTH RISK ASSESSMENT*Overview of Health Risk Assessment*

Subchapter 9, Rule 60.1-179 of the Hawaii Administration Rules states that DOH may request an evaluation of potential health risk impacts for a new stationary source that will emit HAPs and DOH has determined that a health risk assessment is required for the O'okala Mill project. This section describes the methods used to conduct a screening health risk calculations and presents the results for comparison with applicable significance criteria.

Table 10 lists the hourly emission rates for the HAPs for which emission factors are provided in AP-42 for wood-fired boilers and veneer dryers. This table defines the pollutants that need to be included in the screening health risk assessment presented in this section. Appendix C shows the Protocol that was provided by DOH to guide the execution of the health risk assessment. This protocol describes the different modeling and analysis requirements for each of three separate groups of HAPs. These pollutant groups are listed in Table 11.

Separate dispersion model simulations were conducted for the health risk analyses. The averaging times for which predicted concentrations were modeled were dictated by the Protocol in Appendix C. Specifically, 8-hour concentrations were determined by modeling for comparison with the (TLV-TWA)/100 significant concentrations for the pollutants in Group 1 and annual concentrations were determined for comparison with the (TLV-TWA)/420 significant concentrations (Group 1 pollutants) and for evaluating compliance with the Hazard Indices for Group 2 pollutant and the allowable total cancer risk levels for Group 3 pollutants.

Modeling Methodology

The same meteorological input data and stack parameters used in the criteria pollutant modeling (Section 6) were used for the evaluation of HAP impacts and potential health risks. As in the criteria pollutant modeling, maximum full-load operation of the cogeneration boiler and veneer dryer over all hours of the year was assumed for purposes of this health risk assessment.

For the pollutants emitted exclusively by the boiler, it was only necessary to make one model run for the 8-hour and annual averaging periods, because the predicted maximum concentrations of individual pollutants scale linearly on their respective emission rates. Accordingly, a single AERMOD model run was made with a unit emission rate for the boiler (1 lb/hour), and the maximum predicted 8-hour and annual average concentrations values from this model run have been linearly scaled by the boiler emission rates for each pollutant to obtain the corresponding 8-hour and annual average concentrations. The same procedure was followed to estimate the maximum concentrations of pollutants that are emitted only by the veneer dryer. However separate model runs needed to be made to evaluate the combined contributions of pollutants that are emitted by both the boiler and dryer, since the linear relationship between source strength and predicted concentration is not valid for those HAPs. Only three HAPs, acetaldehyde, formaldehyde and phenol, fall into this latter category.

Table 10
Identification of HAPs Potentially Subject to Health Risk Analysis Requirements
per HAR 60.1-179

HAP	Hourly Emission Rate (lb/hr)			
	Boiler (fired on wood fuel)	Boiler (fired on bio- diesel oil)	Dryer	Total Facility Emission Rate
Acetaldehyde	1.10E-01		4.40E-01	5.50E-01
Acrolein	5.30E-01			5.30E-01
Antimony Compounds	1.05E-03			1.05E-03
Arsenic Compounds	2.91E-03	1.12E-03		2.91E-03
Benzene (includes that from gasoline)	5.56E-01	1.82E-04		5.56E-01
Beryllium Compounds	1.46E-04	2.37E-05		1.46E-04
Bis(2-ethylhexyl)phthalate (DEHP)	6.22E-06			6.22E-06
Cadmium Compounds	5.43E-04	3.39E-04		5.43E-04
Carbon tetrachloride	5.96E-03			5.96E-03
Chlorine	1.05E-01			1.05E-01
Chlorobenzene	4.37E-03			4.37E-03
Chloroform	3.71E-03			3.71E-03
Chromium Compounds	2.78E-03	7.20E-04		2.78E-03
Cobalt Compounds	8.61E-04			8.61E-04
2,4-Dinitrophenol	2.38E-05			2.38E-05
Ethylbenzene	4.10E-03			4.10E-03
Formaldehyde	5.83E-01	2.81E-02	9.21E-02	6.75E-01
Hydrogen Chloride	1.56E+00			1.56E+00
Lead Compounds	6.36E-03	1.29E-03		6.36E-03
Manganese Compounds	2.12E-01	2.56E-03		2.12E-01
Mercury Compounds	4.63E-04	9.63E-05		4.63E-04
Methanol			7.52E-01	7.52E-01
Methyl isobutyl ketone (Hexone)			3.78E-01	3.78E-01
Naphthalene	1.28E-02	9.63E-04		1.28E-02
Nickel Compounds	4.37E-03	7.20E-02		7.20E-02
4-Nitrophenol	1.46E-05			1.46E-05
Pentachlorophenol	6.75E-06			6.75E-06
Phenol	6.75E-03		3.64E-02	4.31E-02

Table 10
Identification of HAPs Potentially Subject to Health Risk Analysis Requirements
per HAR 60.1-179
(Continued)

HAP	Hourly Emission Rate (lb/hr)			
	Boiler (fired on wood fuel)	Boiler (fired on bio- diesel oil)	Dryer	Total Facility Emission Rate
Phosphorus	3.57E-03			3.57E-03
Propionaldehyde	8.08E-03			8.08E-03
Selenium Compounds	3.71E-04	5.82E-04		5.82E-04
Styrene	2.52E-01			2.52E-01
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1.14E-09			1.14E-09
Toluene	1.22E-01	5.28E-03		1.22E-01
1,1,1-Trichloroethane		2.01E-04		2.01E-04
2,4,6-Trichlorophenol	2.91E-06			2.91E-06
Vinyl chloride	2.38E-03			2.38E-03
o-Xylenes	3.31E-03	9.29E-05		3.31E-03
POM		2.81E-03		2.81E-03

Table 11
HAP Pollutants Listed by Health Risk Categories and O’okala Mill Emission Sources

Pollutant Group	Emissions Sources	
	Cogeneration Boiler	Dryer
Group 1 Non-carcinogenic HAPs with a threshold limit value-time weighted average (TLV-TWA) industrial pollutant exposure concentration standard for a normal 8-hour work day and forty hour workweek.	Acrolein Antimony Compounds Chlorobenzene Ethylbenzene Lead Compounds Manganese compounds Mercury Compounds Naphthalene Nickel Compounds Phenol Phosphorus Selenium Compounds Styrene Toluene 1,1,1-Trichloroethane o-Xylenes	Methanol Methyl isobutyl ketone Phenol
Group 2 Non-carcinogenic HAPS without a TLV-TWA	chlorine 2,4-Dinitrophenol hydrogen chloride	NONE
Group 3 Carcinogenic HAPs	Acetaldehyde Formaldehyde Arsenic Compounds Benzene Beryllium Compounds Bis(2-ethylhexyl)phthalate (DEHP) Cadmium Compounds Carbon tetrachloride Chloroform Chromium Compounds Cobalt Compounds Pentachlorophenol 2,3,7,8-Tetrachlorodibenzo-p-dioxin 2,4,6-Trichlorophenol Vinyl chloride	Acetaldehyde Formaldehyde

Health Risk Results

The results of the health risk calculations are presented in Tables 12, 13, and 14. These tables contain the actual calculations required by the DOH Protocol for the three Pollutant Groups and incorporate the off-site concentrations of each pollutant that were predicted by AERMOD. Maximum concentrations of individual HAPs are obtained from the model results as described in the previous paragraph, and these values are used to determine whether the health risk tests indicated for Group 1, Group 2 and Group 3 pollutants are met by the proposed facility. The principal findings of the analysis are summarized below:

Table 12 - The maximum 8-hour concentrations for all HAPs are all below the corresponding TLV-TWA values divided by 100. The maximum annual average concentrations for all Group 1 pollutants are also below the corresponding TLV-TWA values divided by 420, therefore demonstrating that the potential health risk is lower than the level required by HAR §11-60.1-179(a) & (b).

Table 13 - The Hazard Index, determined by summing the predicted maximum annual average concentrations for all Group 2 pollutants divided by their respective EPA Region IX Preliminary Remediation Goal (PRG) concentrations, is 0.169, which is less than the significance level of 1.0. Note that the predicted annual concentration for hydrogen chloride is based on an emission factor of 0.0117 lb/MMBtu. As described in Section 5, Tradewinds is proposing a condition to limit emissions of HCl to this level, with the understanding that verification of compliance by initial source testing will be required. However, the health risk for Group 2 pollutants would be below the significance level even if HCl emissions were calculated with the conservative AP-42 factor for HCl.

Table 14 - The Cancer Risk determined by summing the predicted maximum annual average concentrations for all Group 3 pollutants divided by their respective PRG values and multiplying by 1.0×10^{-6} is 6.86×10^{-6} , or 6.86 in a million, less than the significance level of 10 in a million.

Thus, the predicted impacts from this conservative screening health risk assessment are well below the designated significance levels for all three groups of HAPS that could be emitted from the O'okala Mill, even with the additional conservative assumption that the cogeneration boiler and veneer dryer would operate continuously year-round at their maximum design throughputs. Since this level of operation will certainly not occur in the actual operations of the mill, it can be concluded that the potential for risks to human health will in fact be less than indicated by this analysis.

Table 12
Health Risk Calculations for Group 1 Pollutants -- Non-carcinogenic HAPs with a TLV-TWA

Dispersion model inputs and results						
model input & results	model input - emission rate		model result			
	(grams/sec)	(lb/hr)	highest 1hr	8-hr	24-hr	Annual
			ug/m3	ug/m3	ug/m3	ug/m3
boiler only						
new met model	0.1260	1		2.7126		0.1371
dryer only						
new met model	0.1260	1		11.8576		2.4207

HEALTH RISK RESULTS													
HAP	Carcinogen ?	AP-42 EF lb/MMBtu	AP-42 EF lb/MSF ^{3/8}	hourly emissions lb/hr	annual emission rate lb/hr	TLV-TWA ug/m3	TLV-TWA /100 ug/m3	TLV-TWA /420 ug/m3	Modeled 8-hr scaled 8-hr (AERMOD) ug/m3	Modeled 8-hr scaled annual (AERMOD) ug/m3	Modeled annual (AERMOD) ug/m3	PRG value ug/m3	pass or NO pass
From both boiler and dryer													
Phenol	No					19000	190	45.24		0.4329		0.0889	pass
From the boiler only													
Acrolein	No	4.30E-03		0.5692	0.5692	250	2.5	0.60	1.5440		0.0780		pass
Antimony Compounds	No	7.90E-06		0.0010	0.0010	500	5	1.19	0.0028		0.0001		pass
Chlorobenzene	No	3.30E-05		0.0044	0.0044	350000	3500	833.33	0.0118		0.0006		pass
Ethylbenzene	No	3.10E-05		0.0041	0.0041	435000	4350	1035.71	0.0111		0.0006		pass
Lead Compounds	No	4.800E-05		0.0064	0.0064	50	0.5	0.12	0.0172		0.0009		pass
Manganese compounds	No	1.600E-03		0.2118	0.2118	1000	10	2.38	0.5745		0.0290		pass
Mercury Compounds	No	3.50E-06		0.0005	0.0005	50	0.5	0.12	0.0013		0.0001		pass
Naphthalene	No	9.70E-05		0.0128	0.0128	50000	500	119.05	0.0348		0.0018		pass
Nickel Compounds	No	3.30E-05		0.0044	0.0044	15	0.15	0.04	0.0118		0.0006		pass
Phosphorus	No	2.70E-05		0.0036	0.0036	100	1	0.24	0.0097		0.0005		pass
Selenium Compounds	No	2.80E-06		0.0004	0.0004	200	2	0.48	0.0010		0.0001		pass
Styrene	No	1.90E-03		0.2515	0.2515	215000	2150	511.90	0.6822		0.0345		pass
Toluene	No	9.20E-04		0.1218	0.1218	375000	3750	892.86	0.3303		0.0167		pass
1,1,1-Trichloroethane	No	1.82E-06		0.0002	0.0002	1900000	19000	4523.81	0.0007		0.0000		pass
o-Xylenes	No	2.50E-05		0.0033	0.0033	435000	4350	1035.71	0.0090		0.0005		pass
From the dryer only													
Methanol	No		6.20E-02	0.7516	0.7516	260000	2600	619.05	8.9117		1.8193		pass
Methyl isobutyl ketone	No		3.12E-02	0.3782	0.3782	205000	2050	488.10	4.4846		0.9155		pass

Table 13
Health Risk Calculations for Group 2 Pollutants -- Non-carcinogenic HAPs without a TLV-TWA

Dispersion model inputs and results						
model input & results	model input - emission rate		model results			
	(grams/sec)	(lb/hr)	max 1hr	8-hr	24-hr	Annual
			ug/m3	ug/m3	ug/m3	ug/m3
boiler only						
new met model	0.1260	1		2.7126		0.1371

HEALTH RISK RESULTS											
HAP	Carcinogen ?	emission factor lb/MMBtu	hourly emission rate lb/hr	annual emission rate lb/hr	TLV-TWA ug/m3	TLV-TWA /100 ug/m3	TLV-TWA /420 ug/m3	Modeled 8-hr ug/m3	Scaled annual ug/m3	PRG value ug/m3	pass or NO pass
From the boiler only											
chlorine	No	7.90E-04	0.1046	0.1046	NA	NA	NA	0.2837	0.0143	0.21	
2,4-Dinitrophenol	No	1.80E-07	0.0000	0.0000	NA	NA	NA	0.0001	0.0000	7.3	
hydrogen chloride	No	1.17E-02	1.5487	1.5487	NA	NA	NA	4.2011	0.2124	2.1	
Calculated Hazard Index =	0.169	<	1.00	(Significance threshold)							pass

Table 14
Health Risk Calculations for Group 3 Pollutants -- Carcinogenic HAPs

Dispersion model inputs and results						
model input & results	model input - emission rate		model results			
	(grams/sec)	(lb/hr)	max 1hr	8-hr	24-hr	Annual
			ug/m3	ug/m3	ug/m3	ug/m3
boiler only						
new met model	0.1260	1		2.7126		0.1371

HEALTH RISK RESULTS											
HAP	Carcinogen ?	emission factor lb/MMBtu	hourly emission rate lb/hr	annual emission rate lb/hr	TLV-TWA ug/m3	TLV-TWA /100 ug/m3	TLV-TWA /420 ug/m3	Scaled annual ug/m3	Modeled annual (AERMOD) ug/m3	PRG value ug/m3	pass or NO pass
From both boiler and dryer											
Acetaldehyde	Yes								1.07E+00	8.70E-01	
Formaldehyde	Yes								2.66E-01	1.50E-01	
From the boiler only											
Arsenic Compounds	Yes	2.20E-05	0.0029	0.0029				3.99E-04		4.50E-04	
Benzene	Yes	4.20E-03	0.5560	0.5560				7.62E-02		2.50E-01	
Beryllium Compounds	Yes	1.10E-06	0.0001	0.0001				2.00E-05		8.00E-04	
Bis(2-ethylhexyl)phthalate (DEHP)	Yes	4.70E-08	0.0000	0.0000				8.53E-07		4.80E-01	
Cadmium Compounds	Yes	4.10E-06	0.0005	0.0005				7.44E-05		1.07E-03	
Carbon tetrachloride	Yes	4.50E-05	0.0060	0.0060				8.17E-04		1.30E-01	
Chloroform	Yes	2.80E-05	0.0037	0.0037				5.08E-04		8.30E-02	
Chromium Compounds	Yes	2.10E-05	0.0028	0.0028				3.81E-04		1.60E-04	
Cobalt Compounds	Yes	6.50E-06	0.0009	0.0009				1.18E-04		6.90E-04	
Pentachlorophenol	Yes	5.10E-08	0.0000	0.0000				9.26E-07		5.60E-02	
2,3,7,8-Tetrachlorodibenzo-p-dioxin	Yes	8.60E-12	0.0000	0.0000				1.56E-10		4.50E-08	
2,4,6-Trichlorophenol	Yes	2.20E-08	0.0000	0.0000				3.99E-07		6.20E-01	
Vinyl chloride	Yes	1.80E-05	0.0024	0.0024				3.27E-04		1.10E-01	
Cancer Risk Total =	6.86E-06	<	1.00E-05	(Significance threshold)							pass

SECTION 8 GREENHOUSE GAS EMISSIONS OF THE O'OKALA MILL

The O'okala cogeneration boiler will primarily burn biomass fuel, i.e., wood from trees grown locally. Such units are widely regarded by regulatory bodies as being carbon neutral, because all of the carbon contained in the wood fuel and released by its combustion will have been acquired directly from the atmosphere over the previous few years. Therefore, the net boiler production of carbon dioxide (CO₂) is zero.

Moreover, as a solid wood mill producing 41,000 tons of dry carbon-based material annually, the mill will effectively be sequestering approximately 17,000 tons per year of carbon, (based on 8% moisture content and carbon content of 45% of bone dry wood mass) for as long as the structures built with the mill's products remain standing.

Appendix A Veneer Dryer Performance Guarantee



Revised by Raute July 23/07

May 2, 2007

Mr. Don Bryan
TRADEWINDS FOREST PRODUCTS, LLC
P.O. Box 43
O'okala, HI
USA 96774

SUBJECT: RAUTE VENEER DRYING LINE AND CROSSWRAP SYSTEM

REFERENCE: RAUTE DRAWING 0T690408 & 1T590412A

Dear Don,

Thank you for your commitment to purchase one (1) Raute veneer drying line and crosswrap system. Enclosed please find our Order Acknowledgement CPT6063-06-38 detailing items purchased on your purchase order no. _____ dated _____ .

We would ask that you please sign both original and copy(s) of this acknowledgement. The original is for your records and **the photocopy is for ours**. Please sign the photocopy and forward the complete document back to our office in New Westminster, BC per letterhead address and attention of Mr. Martin Murphy within ten (10) days of receiving these documents.

Please note that the down payment invoice has been enclosed and is payable on receipt.

We trust you will find the enclosed in order and look forward to working with you on this project.

Sincerely,
RAUTE CANADA LTD.

Per: Cam Davis
Sales Engineer

CD:jm

Encl. Order Acknowledgement No. CPT6063-06-38
Cc : Jason Miller

Order Acknowledgement No. CPT6063-06-38

Mr. Don Bryan
TRADEWINDS FOREST PRODUCTS, LLC
2574 Northwest Thurman Street
Portland, OR
USA 97210-2524

PRICE

One (1) Raute Veneer Drying Line and Crosswrap System
Raute Drawing No. OT690408 & 1T590412A

Comprising of: Dryer infeed, 6 deck steam heated 18 hot section and 3 cooling, dryer outfeed to visual grading, refeeding, 12 bin cog belt stacker, ControLogix controls, crosswrap infeed, wrapping unit, outfeed and control. Installation and start-up supervision for both systems.

TERMS OF PAYMENT

See Appendix 7A-06 - Payment Schedule

SHIPPING TERMS & DELIVERY TIME

DDP plant site Hilo, Hawaii (Incoterms 2000)
Raute has included the expected duty costs in the package price. Raute will organize and provide the most cost effective shipping complete with insurance we can arrange. All freight cost will be pre-paid and invoiced as per the DDP designation but all costs will be charged to the customer.

Final equipment notice to ship with-in 7-1/2 months (33 weeks) from signed effective order. Effective order being the signed order acknowledgement, down payment received, clear scope definition and Buyers Issuance of the full notice to proceed.

EQUIPMENT MANUFACTURING LOCATIONS

Dryer proper will be supplied from various locations and will be considered to be 100% metric components and steel. Dryer infeed, outfeed, grading and stacking will be supplied from North America and will be primarily imperial components were possible.

INSTALLATION & START UP SUPERVISION

See Appendix 5A-06 - Start up Supervision included to extent provided in Appendix 5A-06. Additional Supervision services, if required, to be provided at Prevailing rates. Appendix 7A-06 - Field Service Rates

CONDITIONS

The Appendixes attached hereto and referred to under the heading 'Enclosures'

Order Acknowledgement No. CPT6063-06-38

below form an integral part of the contract for Order No. CPT6063-06-38 and are expressly incorporated herein by reference. All sales are subject to the provisions of section 16 of Appendix 8A-06 hereto regarding, inter alia, damages arising from delays of manufacturers, strikes, carriers, unavoidable accidents and other causes beyond our control

Minor variations in the details of design or construction of any of the specified equipment shipped shall not give rise to defect or default or entitle the buyer to repudiate this contract.

WARRANTY

See "Agreement for the Purchase and Sale of Equipment".

STANDARDS

Raute machinery and component standard see appendix 6A-06.

CONTACT PERSON

Arne Nordstrand, Area Sales Manager
Raute
phone: (541) 484-5228, Cell: (541) 912-2154
e-mail: arne.nordstrand@raute.com

ENCLOSURES

Appendix 1A-06 - Production and Technical Data
Appendix 1B-06 - Operation Description
Appendix 2A-06 - Machine List
Appendix 2B-06 - Technical Specifications
Appendix 1A-38 - Production and Technical Data
Appendix 1B-38 - Operation Description
Appendix 2A-38 - Machine List
Appendix 2B-38 - Technical Specifications
Appendix 3-06 - General Scope of Delivery
Appendix 5A-06 - Supervision of Installation
Appendix 5B-06 - Service Rate Sheet
Appendix 6B-06 - Component Standard
Appendix 7A-06 - Payment Schedule
Appendix 8A-06 - Agreement for Purchase and Sale of Equipment
Appendix 9A-06 Draft Letters of Credit and Certificate of Project Lender

Order Acknowledgement No. CPT6063-06-38

Please confirm that the terms and conditions herein accurately reflect and constitute our mutual agreement regarding the subject matter by signing and returning to us the enclosed counterpart of this Acknowledgement.

Sincerely,
RAUTE CANADA LTD.

Per: Martin Murphy
Title: V.P. Sales & Marketing

Confirmed and agreed:

RAUTE CANADA LTD.

TRADEWINDS FOREST PRODUCTS LLC.

By: _____

By: _____

Title: _____

Title: _____

Date: _____

Date: _____

**Appendix 1A-06, Order Acknowledgement No. CPT6063-06-38
PRODUCTION AND TECHNICAL DATA**

06.00 VENEER DRYING LINE

Raute Drawing No. 0T690408

1 INITIAL DATA

The plan is to dry one specie of wood veneer in the new 6-deck dryer. The Customer provided Raute Canada Ltd. the English name of the specie per the following table. Raute used material properties given by the customer, as well as from "Wood Handbook: Wood as an Engineering Material" published by the United States Department of Agriculture (Agriculture Handbook 72). It should be understood by the buyer and seller that the customer's actual veneer material properties may differ from standard tabulated values, and as such, the numbers below may be subject to change based on these differences.

Wood species	Eucalyptus Grandis (Rose Gum)
Latin name of species used for calculations	Myrtaceae
Density (at 0% moisture) kg/m ³	460
Density (at 0% moisture) lb/ft ³	28.72
Shrinkage (tangential) %	7.9
Shrinkage (radial) %	3.5
Average veneer initial moisture (water compared to oven dry weight)	122 *
Final moisture (90% of veneers) %	6% or under*
Final moisture (10% of veneers) %	over 6%*

* Final moisture content of the veneer is dependent upon the initial moisture content of the green veneer. Final moisture contents will not be guaranteed if a fluctuation in initial moisture contents is evident.

2 PRODUCT DATA

Wood species	Eucalyptus Grandis	Eucalyptus Grandis	Eucalyptus Grandis
Veneer spur length (green) inches	101	101	101
Veneer clip width (green) full sheets inches	54	27*	10 or greater*
Veneer thickness (green peel) inches (average)	0.125	0.125	0.125
Stack height green at dryer infeed inches	36	36	36
Percentage this veneer species of total veneer run through dryer (%)	85	5	10

Base boards (caul boards) are not required in this system.

**Appendix 1A-06, Order Acknowledgement No. CPT6063-06-38
PRODUCTION AND TECHNICAL DATA**

3 DRYING CAPACITY

3.1 Capacity calculation

Capacity/h at 85 % running ratio and 97 % fill ratio (length) for the 6-deck dryer with final moisture content of 6%.

Output, m ³ /h	11.69
Output, ft ² 3/8" per hour actual (size 101" x 49.75" x 0.12")	13,214
Output, ft ² 3/8" per hour nominal (size 96" x 48" x 0.12")	12,122
Drying temperature, F	320
Drying temperature, C	160
Absolute Average Steam pressure, psi	130
Absolute Average Steam pressure, bar	9.0

- Calculation assumes humidity inside dryer is 0.6 kg H₂O per kg dry air (0.6 lb H₂O per lb dry air).
- Simultaneous feed of three 4' x 8' parallel green veneer sheets per deck.
- Depending on redrying arrangements, redrying decreases the gross capacity by approximately 5 to 10%.
- With random width veneers (if applicable) the filling ratio in lateral direction of the dryer can be lower, thus reducing the production capacity.
- The dryer capacity is dependent on the drying temperature, the initial and final moisture content of the veneer, the veneer thickness, the veneer density and the filling ratio of the dryer. These calculations have been made with the above initial data. The calculated dryer capacity reflects changes in the initial data

3.2 VDA G3 colour

Pieces per minute based on system line speed 75 (54")
(G3 scanner can operate with one inch of sheet gap provided the sheets/pieces do not overlap the scan line.)

3.3 Stacker capacity

Vacuum Transport Capacity

Veneer size clip width		min.	48"
		max.	54"
Veneer length		min.	95"
		max.	103"
Veneer thickness			1/8
Sheet Capacity maximum			60 pcs
Veneer sheet flatness	> 1"	max	1"
Veneer sheet wave		min.	12"

**Evaluation of Hamakua Wind Data Collection
versus EPA Guidance**

APPENDIX B

**Appendix B Evaluation of Hamakua Wind Data Collection versus
EPA Guidance**

Specification in EPA Guidance*	Guidance Rule Description	Haina Wind Monitoring Site Description	Compliance with Guidance?(Comments)
2.1.2 Vane-oriented and Fixed-mount Propeller Anemometers	A vane-oriented propeller anemometer may be applied to collecting mean wind speeds for input to models to determine dilution estimates and/or transport estimates. Propeller blades must achieve a threshold speed of ≤ 0.5 m/s	R.M. Young Model 05305 Wind-Monitor-AQ vane-oriented propeller anemometer was used. Equipment was designed specifically for air quality applications, and meets the requirements of the U.S. EPA Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD). Propeller threshold is 0.4 m/s and vane threshold is 0.5 m/s	Yes.
2.2.1 Wind Vanes	The starting threshold (lowest speed at which a vane will turn to within 5° of the true wind direction from an initial displacement of 10°) should be ≤ 0.5 ms^{-1} . Overshoot should be $\leq 25\%$ and the damping ratio should lie between 0.4 and 0.7.	Vane threshold is 0.5 m/s at a 10° displacement. Damping ratio for dynamic response is 0.45. Note: these are nominal values determined in accordance with ASTM standard procedures, shield bearings lubricated with Type LO-1 light general purpose instrument oil.	Yes.
3. Siting and Exposure	<p>Meteorological sensors should be sited at a distance which is beyond the influence of obstructions such as buildings and trees; this distance depends upon the variable being measured as well as the type of obstruction.</p> <p>The other general rule is that the measurement should be representative of meteorological conditions in the area of interest.</p>	<p>Monitoring was conducted at a height of 10 meters. Trees exist around the monitoring site, the most significant being 90 foot eucalyptus approximately 300 feet to the south of the station. Tree heights at the time of monitoring (2001-2002) were substantially lower. HEP committed to cut trees that obstructed wind flow. Because the location of the taller trees relative to the tower is not along a dominant wind direction, the overall effect of the trees on measured winds was most likely not significant. DOH contributed to the siting of this station.</p> <p>The data were collected near the town of Haina, approximately 15 miles northwest of the O'okala veneer mill site. The orientation of the coastline and topography at the two locations are very similar.</p>	Yes

**Evaluation of Hamakua Wind Data Collection
versus EPA Guidance**

APPENDIX B

Specification in EPA Guidance *	Guidance Rule Description	Haina Wind Monitoring Site Description	Compliance with Guidance?(Comments)
3.1 Representativeness	Is the site (are the data) representative? A quantitative method does not exist for determining representativeness absolutely. There are no generally accepted analytical or statistical techniques to determine representativeness of meteorological data or monitoring sites. In general, for use in air quality modeling applications, meteorological data should be representative of conditions affecting the transport and dispersion of pollutants in the "area of interest" as determined by the locations of the sources and receptors being modeled.	Judging the representativeness of a meteorological monitoring site to a project location is based on meteorological knowledge and experience. Based on the general proximity of the monitoring station to the O'okala site, the similar orientation to the coast line, and topographical contours in the two locations, meteorological data from Haina is representative of meteorological conditions at the O'okala mill site.	Yes.
3.1.1 Objectives for Siting	The extent to which a set of measurements taken in a space-time domain reflects the actual conditions in the same of different space-time domain taken on a scale appropriate for a specific application. Sites should perhaps be selected such that factors which cause spatial variations in meteorological conditions are invariant over the spatial domain of the application, whatever that might be. Such factors would include surface characteristics such as ground cover, surface roughness, the presence or absence of water bodies, etc.	The monitoring location domain and O'okala Mill domain have similar ground cover, surface roughness, and proximity to water bodies (Pacific Ocean).	Yes.
3.1.2 Factors to Consider	Issues of representativeness always involve case-by-case subjective judgments; consequently, experts knowledgeable in meteorological monitoring and air quality modeling should be included in the site selection process. In general, the representativeness of the meteorological data used in an air quality modeling analysis is dependent on the proximity of the meteorological monitoring site to the "area-of-interest". Factors that should be considered in selecting a monitoring site in complex terrain include: the aspect ratio and slope of the terrain, the ratios of terrain height to stack height and plume height, the distance of the source from the terrain feature, and the effects of terrain features on	In most cases, the closer the monitoring network to the "area-of-interest," (in this case being the O'okala Mill site), the better the representativeness. The monitoring network and veneer mill site, as previously stated, are 15 miles apart. The aspect ratio and slope of the terrain are very similar in both locations with respect to orientation, slope, height, and distance from terrain features. The terrain features of importance are Mauna Kea at approximately 14,000 ft elevation, 18 miles south-southwest of both the monitoring station and veneer mill site, and the Pacific Ocean, 0.5-1.25 miles northeast of the monitoring station and veneer mill site.	Yes.

**Evaluation of Hamakua Wind Data Collection
versus EPA Guidance**

APPENDIX B

Specification in EPA Guidance *	Guidance Rule Description	Haina Wind Monitoring Site Description	Compliance with Guidance?(Comments)
	<p>meteorological conditions, especially wind speed and wind direction.</p>		
<p>3.2.1.1 Probe placement</p>	<p>The standard exposure height of wind instruments over level, open terrain is 10 meters above the ground. Open terrain is defined as an area where the distance between the instrument and any obstruction is at least ten times the high of that obstruction. Where a 10 meter does not ensure measurements above all nearby obstructions, recommended anemometer height is one that is reasonably unaffected by local obstructions and represents the approximate wind values that would occur at 10 meters in the absence of the obstructions.. Slope of terrain in the vicinity of the site should be taken into account when determining the relative height of the obstruction, man-made or natural.</p>	<p>The placement of the wind instruments was over sloped terrain 10 m above the ground. However, the terrain cannot be defined as "open" because of obstructions closer than the "ten times" criterion stated at left. The terrain at the monitoring site slopes upward toward the southwest and downward to the northeast. The wind rose developed from the Haina data shows that winds from the north almost never occur and winds from the south occur less than 10% of the time, such that the tall trees to the south of the monitoring station are unlikely to have significantly affected the reported distribution of winds at this site.</p>	<p>Yes.</p>

**Evaluation of Hamakua Wind Data Collection
versus EPA Guidance**

APPENDIX B

Specification in EPA Guidance *	Guidance Rule Description	Haina Wind Monitoring Site Description	Compliance with Guidance?(Comments)
3.2.1.2 Obstructions	<p>Buildings: Aerodynamic effects due to buildings and other major structures should be avoided to the extent possible in the siting of wind sensors.</p> <p>Towers: To avoid the influence of the tower that the sensor is mounted on, closed towers, stacks, cooling towers, and similar solid structures should not be used to support wind instruments. Open-lattice towers are preferred.</p> <p>Surface roughness: The surface roughness over a given area reflects man-made and natural obstructions, and general surface features. These roughness elements affect the horizontal and vertical wind patterns. Differences in the surface roughness over the area of interest can create differences in the wind pattern.</p>	<p>Three residences are located within about 150 feet west and southwest of the monitoring station, but are unlikely to have significantly affected wind flow at the tower location, because the wind seldom blows from the west/southwest on the northeast coast of Hawaii. The meteorological tower used was a 10-meter Climatronics aluminum tilt-down tower. This type of tower has an open-lattice structure. The surface roughness between the monitoring location and the veneer mill site are likely very similar due to their close-proximity.</p>	Yes.
3.3.1 Wind Speed	<p>Great care should be taken to ensure that the tower is not sheltered in a closed valley or placed in a location that is subject to streamline compression effects. If a single suitable location cannot be found, use of multiple towers or remote sensing should be considered in consultation with the Regional Office.</p>	<p>The Haina monitoring site was not in a sheltered valley or in a location subject to significant streamline compression effects. It was at an elevation of 1,053 feet above sea level in an area of terrain rising from the ocean to the top of Mauna Kea about 30 kilometers away.</p>	Yes.
3.3.2 Wind Direction	<p>The most important consideration in siting a wind direction sensor in complex terrain is that the measured direction should not be biased in a particular direction that is not experienced by the pollutant plume</p>	<p>There existed no bias in wind direction at Haina that would not be applicable to the O'okala wood veneer mill site.</p>	Yes.
5.1 System Accuracies	<p>Wind Speed (horizontal) should have a system accuracy of $\pm (0.2 \text{ m/s} + 5\% \text{ of observed})$, measurement resolution of 0.1 m/s, and a sensor specification starting speed of $\leq 0.5 \text{ m/s}$. Wind Direction (azimuth and elevation) should have a system accuracy of ± 5 degrees, measurement resolution of 1.0 degree, a sensor specification starting speed of $\leq 0.5 \text{ m/s}$ at 10° and damping ratio of 0.4 to 0.7.</p>	<p>The Young Model 05305 Wind Monitor-AQ has a wind speed accuracy of $\pm 0.2 \text{ m/s}$ or 1% of reading, while the wind direction accuracy is ± 3 degrees. The Young Model 05305 Wind Monitor-AQ has a wind speed threshold starting speed for the propeller of 0.4 m/s and a wind direction threshold starting speed for the wind vane of 0.5 m/s at 10° displacements and damping ratio of 0.45.</p>	Yes.
5.3.2 Completeness Requirement	<p>The meteorological data base must be 90 percent complete (before substitution) in order to be acceptable for use in regulatory dispersion modeling</p>	<p>The HEP Final Data Report shows that wind speed and direction data capture for a 16 month period was 99.2 percent.</p>	Yes.

**Evaluation of Hamakua Wind Data Collection
versus EPA Guidance**

APPENDIX B

Specification in EPA Guidance *	Guidance Rule Description	Haina Wind Monitoring Site Description	Compliance with Guidance?(Comments)
8.4 Audits	The audit function has two components, the system audit and the performance audit. Questions to ask: "Are standard operating procedures being followed?"; "Are the station logs complete and up-to-date?" Performance audits are similar to calibrations by the monitoring site operators, with the additional assurance provided by an independent third party that the calibrations are done correctly and documentation is complete and accurate.	Quarterly calibrations were completed by the systems operator throughout the monitoring period, while a complete independent audit was performed at the end of the program on 26 Feb 2002.	Yes.

Section numbers in first column of this table pertain to sections of Meteorological Monitoring Guidance for Regulatory Modeling Applications, EPA -454/R-99-005.

Appendix C DOH HAP Concentration Screening Protocol

The DOH uses the following screening procedure to determine if a HAP concentration is considered significant and could result in an unacceptable risk to human health.

1. Non-carcinogenic HAP with a TLV-TWA

Significant concentration means an 8-hour average ambient air concentration greater than 1/100 of the TLV-TWA, and any annual average concentration greater than 1/420 of the TLV-TWA. Example:

Phosphine is a non-carcinogenic HAP per the EPA Region 9 PRG Table.
(<http://www.epa.gov/region09/waste/sfund/prg/>)

Phosphine TLV-TWA = 0.42 mg/m³ = 420 ug/m³ Reference: Guide to Occupational Exposure Values, compiled by ACGIH

Significant Concentration:

1/100 TLV-TWA = 4.2 ug/m³, 8-hour

1/420 TLV-TWA = 1.0 ug/m³

2. Non-carcinogenic HAP without a TLV-TWA

Significant concentration is a hazard index greater than 1. Divide the annual concentration of each non-carcinogenic HAP by its respective PRG designated as "nc" and determine the hazard index (HI) by summing the ratios of all non-carcinogenic HAPs.

$$HI = [(conc\ x / PRG\ x) + (conc\ y / PRG\ y) + (conc\ z / PRG\ z) \dots]$$

conc = annual concentration of each HAP x, y, z... represent each individual non-carcinogenic HAP

Reference: Users' Guide & Background Technical Document for USEPA Region 9's PRG Table, 2004, pg 15.

3. Carcinogenic HAP

Significant concentration for a carcinogenic HAP is a concentration that is a cancer risk greater than 1E-5, assuming continuous exposure for 70 years.

$$Risk = [(conc\ x / PRG\ x) + (conc\ y / PRG\ y) + (conc\ z / PRG\ z) \dots] \times 1e-6$$

conc = annual concentration of each HAP x, y, z... represent each individual carcinogenic HAP

Reference: Users' Guide & Background Technical Document for USEPA Region 9's PRG Table, 2004, pg 15.