

## TITLE V AIR PERMIT APPLICATION REVIEW

<b>APPLICANT:</b> Avoca, Inc.	<b>SITE LOCATION:</b> Merry Hill	<b>COUNTY:</b> Bertie	
<b>TECHNICAL CONTACT:</b> Richard Teague, Ph.D.	<b>PHONE:</b> (252) 482-2133	<b>RESPONSIBLE OFFICIAL:</b> David Peele, Ph.D.	<b>TITLE:</b> President
<b>REVIEW ENGINEER:</b> Rahul P. Thaker	<b>SIGNATURE:</b>	<b>DATE:</b> September 20, 2004	
<b>REGIONAL CONTACT:</b> Yongcheng Chen	<b>REGIONAL OFFICE:</b> Washington	<b>SIC CODE:</b> 2087/2833/325411	
<b>APPLICATION NUMBER:</b> 0800044.04B	<b>EXISTING PERMIT NUMBER:</b> 01819T28	<b>NEW PERMIT NUMBER:</b> 01819T29	

### 1. Purpose and Processing of the Application

Avoca, Inc., Merry Hill, NC facility ("Avoca") operates under the existing air permit 01819T28, which was issued on July 29, 2004 and is currently scheduled to expire on October 31, 2008.

Avoca has submitted a Title V permit application (0800044.04B), which was received by the Division of Air Quality (DAQ) on August 11, 2004. It requests a permit revision for the construction and operation of a proposed biomass extraction operation.

DAQ classifies this application for processing under 15A NCAC 2Q .0516 "significant permit modification". As per the provision (b)(4) of this rule, the application is a request of a PSD major modification review (Title I modification under Federal Clean Air Act specifically under Part C). But it does not contravene or conflict with the existing permit requirements. Hence, as per 2Q .0516(d), DAQ believes that it must be processed using the procedures of 2Q .0501(c).

As per company request (see email dated 8/23/04), the above application will be processed as per the provisions of 2Q .0501(c)(2). As indicated in this e-mail, this is a two-step process to revise the existing Title V permit.

Initially, the construction and operation permit (01819T29) will be issued, pursuant to the provisions of 2Q .0300. This permit revision will satisfy the PSD program requirements only. In brief, the revised permit will have completed all elements of the PSD program (e.g., noticing to EPA, FLM, public, etc.). At least 30 days are required for the public comment period before the permit can be issued.

Subsequent to the issuance of the construction and operation permit, the permittee will submit a new application within 12 months after commencing operation of the new biomass extraction operation, including applicable Forms As and Es, CAM applicability, and \$834

application fee. The review of the new application will allow DAQ to satisfy all Title V program requirements (e.g. noticing public, and affected states and EPA review, etc.), and issue a new permit (01819T30). In brief, in the second-step of this two-step process, at least 75 days (30 plus 45) are required after the draft permit is prepared by DAQ, to complete the entire Title V program requirements.

**2. Facility Description**

The Avoca processing plant is part of the Avoca farm, covering nearly 2,400 acres. Sage is grown and processed on site to obtain extracts, which are used primarily in producing materials used in fragrances. Extractions of plant materials are conducted also for variety of products (nutrients, flavorants, pharmaceuticals, etc.). Synthetic flavorants are also produced at this facility.

Permitted equipment are the following: sources and control devices for rotocel, recovery, sclareol recrystallization, sclareolide, ethyl vanillin glucoside, and plant nutrient extraction and botanical extraction processes. Other permitted sources are three No. 2 fuel oil fired boilers and three diesel fired emergency generators, and one lime storage silo.

**3. Statement of Compliance**

The DAQ has reviewed the compliance status of this facility. Based on its last inspection of August 6, 2003, the facility was in compliance with all applicable requirements. Through a completion of E5 form of the submitted application, the applicant has certified that the facility will be in compliance with all applicable requirements at the time of permit issuance and will continue to comply with these requirements. The applicant has also certified that the facility will be in compliance with any applicable requirements taking effect during the term of the permit and will meet such requirements on a timely basis.

**4. Permit Modification**

The new equipment will be described in the permit as follows:

Emission Source ID No.	Emission Source Description	Control Device ID No.	Control Device Description
ES-1004-1	Biomass Extraction Operation consisting of: Biomass Extraction Debagging (Infeed)	CD-1004-1-FF1	Cartridge Filter (6.7:1 air-to-cloth ratio)
ES-1004-2	Biomass Extraction Process Vents: Immersion Extractor (ID No. Z-41001), Desolventizer (ID No. Z-41002), Day Storage Tank (ID No. 490024), First Stage Evaporator (ID No. EX-41012), Second Stage Evaporator (ID No.	CD-1004-2-EX1002  CD-1004-2-EX1003	Chilled Water-Cooled Condenser  Liquid Nitrogen-Cooled Condenser

EX-41013), and Distillation Column (ID No. EX-490008)		
Biomass Extraction Equipment Leaks	-	LDAR <sup>1</sup>
Biomass Extraction Wastewater Tanks and Other Similar Vessels	-	Fixed Roofs

## 5. Emissions and Regulatory Review

The following is an emission summary for the new equipment included in Section 4 above.

<b>Pollutant</b>	<b>Potential Emission Rate</b>
	tons per year
Particulates TSP/PM-10	0.48
VOC	197.5
n-Hexane (single HAP)	<10
Total HAPs	<25

The emission estimate included above is based on the following information: 8760 hours of operation, 99% control efficiency for a cartridge filter, 98% combined control efficiency for chilled-water cooled condenser and liquid nitrogen-cooled condenser, and a 5%w maximum concentration for n-hexane in solvent.

The new emission sources are subject to the following requirements.

- 2D .0515 "Particulates from Miscellaneous Industrial Processes"
- 2D .0521 "Control of Visible Emissions"
- 2D .0530 "Prevention of Significant Deterioration"
- 2D .0614 "Compliance Assurance Monitoring"
- 2D .0958 "Work Practices for Sources of Volatile Organic Compounds"
- 2D .1100 "Control of Toxic Air Pollutants"
- 2D .1112 "112(g) Case by Case Maximum Achievable Control Technology Avoidance"
- 2Q .0711 "Emission Rates Requiring a Permit"

### 2D .0515 "Particulates from Miscellaneous Industrial Processes"

The allowable emission rate for particulate matter from the stack, vent or outlet of the biomass extraction debagging operation shall not exceed the level calculated with the equation  $E = 4.10(P)^{0.67}$ , calculated to three significant figures for process rates less than or

1 LDAR means leak detection and repair.

equal to 30 tons per hour. For the purpose of this equation "E" equals the maximum allowable emission rate for particulate matter in pounds per hour and "P" equals the process rate in tons per hour.

For a maximum process rate of 2,000 lbs/hr (or 1 ton/hr), the allowable emission rate for this emission source will be 4.1 lbs/hr. Permittee has estimated the after control emission rate for particulates from this source to be 0.11 lb/hr, based on engineering judgment and 99% control efficiency of cartridge filter. Hence, compliance is expected with this requirement.

#### 2D .0521 "Control of Visible Emissions"

For sources manufactured after July 1, 1971, visible emissions shall not be more than 20 percent opacity when averaged over a six-minute period. However, except for sources which are required to install continuous opacity monitors, six-minute averaging periods may exceed 20 percent opacity if: (1) No six-minute period exceeds 87 percent opacity; (2) No more than one six-minute period exceeds 20 percent opacity in any hour; and (3) No more than four six-minute periods exceed 20 percent opacity in any 24-hour period.

The new emission sources; biomass extraction operation including debagging equipment are subject to 20 percent opacity limit. Compliance will be verified after these sources start operating, through visual observations.

#### 2D .0530 "Prevention of Significant Deterioration"

As indicated in Section 1 of this report, this project does trigger applicability to PSD regulation. Preconstruction review including preliminary determination for the project has been prepared in a separate document. Please refer to that document for details on regulatory compliance with 2D .0530. Necessary testing/monitoring/recordkeeping/reporting requirements will be included in the permit to assure compliance with this requirement.

#### 2D .0614 "Compliance Assurance Monitoring"

The 2D .0614 implements the requirements of 40 CFR 64 "Compliance Assurance Monitoring. Per Section 64.5, the permittee must analyze whether any proposed emission unit undergoing a "significant permit revision", be deemed as large "pollutant-specific emission unit (PSEU)" and therefore a CAM plan needs to be submitted. Large PSEU are those emission units, which have after control potential to emit (PTE) equal or more of either 100 tons (for criteria pollutants) or 10/25 tons (for HAPs).

As shown below, none of the PSEU can be classified as large PSEU as the after control emissions for either PM or VOC are each less than 100 tons per year. Hence, the CAM submittal is not required for these PSEU for both particulates and VOC emissions.

Finally, for other regulated pollutants such as HAP, because the after control emissions for the PSEU (biomass extraction process vents) are less than 10/25 tons per year threshold and this PSEU is not subject to any pre-1990 NESHAP or NSPS standard, the permittee does not need to analyze the HAP emissions for CAM submittal requirement.

PSEU	After Control Potential to Emit tons per year	Large PSEU ?
biomass extraction bagging operation <i>venting to a dedicated cartridge filter</i>	0.5	No
biomass extraction process vents, <i>venting to dedicated chilled water-cooled condenser and liquid nitrogen-cooled condenser</i>	61.7	No

2D .0958 "Work Practices for Sources of Volatile Organic Compounds"

These are work practice standards for VOC emissions. The existing permit includes the work practice standards for other permitted sources. The new emission sources for biomass extraction operation VOC emissions will be required to comply with it. The revised permit will include the applicability to this requirement for these sources.

2D .1100 "Control of Toxic Air Pollutants"

2Q .0711 "Emission Rates Requiring a Permit"

2Q .0706(b)(1) states that that if there is any net increase in (actual) emissions of any NC regulated air toxics, which the facility was emitting before this modification, or if there is emissions of any new NC regulated pollutant that the facility was not emitting before this modification and is above its toxic pollutant emission rate (TPER), then the modification will require a permit application to comply with 2D .1100.

The facility has been modeled for emissions of numerous pollutants (n-hexane, isomers of hexane, etc.) from various permitted emission sources.

The proposed modification involving construction and operation of a new biomass extraction operation will result into a net increase in emissions of n-hexane (54.1 lbs/day) and isomers of hexane (180.3 lb/hr). Hence, these emissions must be modeled as per the requirements of 2D .1100.

The permittee has modeled the emission rates of n-hexane and isohexane (isomers of hexane) from this new emission source, along with the permitted emissions of the same pollutants for existing sources to demonstrate compliance on a facility wide basis. The AQAB concludes that the ambient impact of these emissions at the adjacent property boundary will be approximately 90% for 24-hr n-hexane and 23% for 1-hour isohexane (isomers of hexane).

2D .1112 "112(g) Case by Case Maximum Achievable Control Technology Avoidance"

The Section 112(g) requirements apply to a major source of HAP, unless the major source is categorically regulated or exempted from any NESHAP (Part 61) or MACT (Part 63) standards.

The proposed biomass extraction operation is not specifically regulated or excluded from any NESHAP/MACT regulations, based on the products manufactured after this permit approval. Hence, if the potential to emit for this source is exceeding the 10/25 tons per year, then, the major source review is required under the 2D .1112 requirements.

The facility has estimated that the potential to emit for the emission of hexane (n-hexane, CAS No. 100543) from the new biomass extraction process will be approximately 9.9 tons per year, which is less than 10 tons per year. This estimate is based on the control device efficiency of 98% for a combined system of chilled water-cooled condenser and liquid nitrogen-cooled condenser, and the 5% concentration of n-hexane in the solvent.

Necessary monitoring/recordkeeping and reporting requirements will be included in the revised permit to assure compliance with the avoidance of Section 112(g) requirements. It should be noted that the current permit includes a separate Section 112(g) avoidance condition for the existing botanical extraction operation, which includes the monitoring/recordkeeping/reporting requirements for the identical control devices and also for the type of solvent used. These existing requirements will be used for this emission source, to tailor its Section 112(g) avoidance requirements.

The following is an engineering review for the control devices:

Cartridge Filter (ID No. CD-1004-1-FF1)

This is a cartridge type filter for the biomass extraction debugg operation. It will be used to control the emissions of particulates during the unloading of ground biomass from the bulk bags. It is a single cartridge, reverse pulse jet type filter. The filter material is polyester and the operating temperature is 275<sup>0</sup>F. The surface area of the filter is 60 ft<sup>2</sup> and the inlet airflow rate is 400 acfm at an ambient temperature. This results in a gas-to-cloth ratio of approximately 7:1. The permittee has estimated a control efficiency of 99% for both TSP and PM-10. Although no comparative data on the performance of cartridge filter, controlling dust from the biomass loading/unloading operation, are available in the technical literature, it is this engineer's judgment that if this filter is operated as per the manufacturer's design, and is inspected and maintained properly, it will meet the estimated efficiency of 99%.

Chilled Water-Cooled Condenser (ID No. CD-1004-2-EX1002)

This is an 84-ft<sup>2</sup> shell and tube type condenser. The inlet airflow rate is 150 acfm at 114<sup>0</sup>F. The coolant is chilled water. The condensation temperature is 40<sup>0</sup>F. The permittee has estimated a control efficiency of approximately 67% for VOC emissions (as hexane) from the new biomass extraction operation, using the Antonie's equation and engineering data on air, water, and hexane. The before control emissions and after control emissions from the chilled water cooled condenser are 707.3 lbs/hr (as hexane) and 234.9 lbs/hr (as hexane), respectively.

It is this engineer's judgment that the permittee has used an accepted engineering practice to estimate the before and after control emissions of VOC from this condenser.

#### Liquid Nitrogen-Cooled Condenser (ID No. CD-1004-2-EX1003)

This is a liquid nitrogen-cooled condenser. The inlet airflow rate is 150 acfm at 40<sup>0</sup>F. The size and type of the condenser is not available at this time. The condensation temperature is -50 <sup>0</sup>F<sup>2</sup>. The permittee has estimated a control efficiency of approximately 96% for further reductions of VOC emissions (as hexane) from the chilled water cooled condenser (and thus from the biomass extraction operation), using the Antoine's equation and engineering data on air, water, and hexane. The before control emissions and after control emissions from the liquid nitrogen -cooled condenser are 234.9 lbs/hr (as hexane) and 9.1 lbs/hr (as hexane), respectively.

It is this engineer's judgment that the permittee has used an accepted engineering practice to estimate the before and after control emissions of VOC from this condenser.

The combined control efficiency for chilled water-cooled condenser and liquid nitrogen-cooled condenser exceeds 98 percent for VOC emissions.

## **6. MACT Applicability and Requirements**

As indicated above, the proposed biomass extraction operation is not subject to any MACT standard.

The facility may be subject to "Miscellaneous Organic Chemical Manufacturing", as included in 40 CFR 63 Subpart FFFF and promulgated on November 10, 2003, especially for the permitted equipment for rotocel and recovery operations. The compliance date for them is November 10, 2006. The existing permit includes the compliance date for these operations.

## **7. Other Regulatory Considerations**

1. NSPS - None of the NSPS regulations apply to the proposed project.
2. 2Q .0112 "Applications Requiring Professional Engineer Seal" - The various control devices discussed, including the options ultimately determined to be BACT were technically reviewed and approved for this application with seal in the original application by S.G. Smith (NC #8760).

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2 However, it should be noted that the condenser could comply with the proposed BACT emission limits for VOC emissions, corresponding to a 98% control at -40<sup>0</sup>F.

3. 2Q .0113 "Notification in Areas Without Zoning" - The facility is located in a part of the State, where there is no local zoning regulation applicable. DAQ has recently promulgated a rule at 2Q .0113 for this type of matter.

The permittee has complied with the regulation by providing a public notice in the local newspaper at least two weeks prior to submitting the application, and also by providing evidence of the sign posted on the property describing the proposed project.

## **8. Permit Shield**

The permit application is being processed using the provisions of 2Q .0300. Permit shield to the new equipment cannot be afforded.

## **9. General Conditions**

The permit will include a latest set of "General Conditions".

## **10. Insignificant Activities**

The existing permit includes the insignificant activities list. The permit application for this project does not include any additional emission source to be listed as insignificant activity.

## **11. Stipulation Review**

The permit 01819T28 will be revised for the following:

- Revise Section 1 Table to include emission sources and control devices for the new biomass extraction operation.
- Insert Section 2.1 P. for applicable requirements for the new biomass extraction operation.
- Revise Section 2.2 B.1.c. to include a stack test date of 7/29/05 instead of "one year of issuance of the permit (01819T28)".
- Revise Section 2.1 G.2. to explicitly state that noncompliance with testing/monitoring/record keeping requirements mean noncompliance with 15A NCAC 2Q .0317(a)(6).
- Revise Section 2.2 C.1 to include modeled emission rates for new emission source and for monitoring requirements.
- Include Part II Construction Permit for new biomass extraction operation emission sources.

## **12. Public Notice, and EPA and Affected States Review**

Pursuant to 2Q .0521, a notice of the draft Title V permit and the preliminary determination shall be placed in a newspaper of general circulation in the area where the facility is located. The notice will provide for a 30-day comment period, with an opportunity for a public hearing.

Please note that the public notice will serve the requirements of PSD program only, as included in 2D .0530. The public notice will, hence, be sent to a local library and local county official, and EPA.

Affected states review is not required for this project as it is processed under the provisions of 2Q .0300 and .0530.

## **13. Recommendations**

The Washington Region Office (WaRO) has reviewed the application. The 9/17/04 e-mail from Michelle Stephens indicates that the WaRO has no comment on the application.

Finally, the Title V application for Avoca has been reviewed by the DAQ to determine compliance with all procedures and requirements under 15A NCAC 2Q .0300 and 2D .0530. DAQ is proposing to issue the Title V Operating Permit after the completion of 30-day public comment period.