

Supplementary Technical Comments  
Concerning a Proposed Permit to Allow  
Combustion of Tire-Derived Fuels at  
the Cadillac Renewable Energy Facility

submitted to

Air Quality Division,  
Michigan Department of Environmental Quality

&

Air & Radiation Division  
U.S. Environmental Protection Agency, Region V

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## **1 Introduction**

These are technical comments that are supplementary to other comments that are being filed by the Cadillac Area Citizens for Clean Air (CACCA). These technical comments narrowly focus on only a few of the outstanding issues associated with this facility. These include the criteria pollutant emission characterization and the matter of the required level of best available control technology and related emission limitations for the facility as proposed.

The decision-makers reading this comment should **not** construe these technical comments as altering the fundamental position of the Cadillac Area Citizens for Clean Air that combustion of tire-derived fuels not be allowed at the Cadillac Renewable Energy facility. The decision-makers should also **not** construe the narrow focus of this technical comment as an implicit statement that all other issues identified by CACCA and other members of the public have been in any manner resolved and/or addressed by either the applicant or MDEQ Air Quality Division..

## **2 Comments Related to Required Prevention of Significant Deterioration New Source Review**

### **2.1 Best Available Control Technology for Sulfur Dioxide**

#### **2.1.1 All of Applicant's Economic Calculations Concerning Cost Per Ton of Sulfur Dioxide and Sulfuric Acid Reductions Rely on Poorly Documented and Unreliable Claims of "In Situ" Control of Sulfur Dioxide Emissions and its Effect on Baseline "Uncontrolled" Emissions**

At this writing, the Applicant relies on a single stack test to claim that "in situ" control on otherwise uncontrolled sulfur dioxide emissions will allow the use of a figure of 70 lb/hr of sulfur dioxide to be used for both compliance purposes and cost per ton of sulfur dioxide removed BACT determination purposes. Applicant previously submitted a stack test with higher emission rates and defended the accuracy of that test, but Applicant no longer mentions the possibility that worst case sulfur dioxide emissions may be significantly higher than shown by the second stack test.

"In situ" control relies on the apparently alkalinity of wood ash to capture and neutralize both sulfur dioxide and sulfuric acid mist found in the flue gas from combustion of wood/TDF mixtures. Applicant presents no information that shows the alkalinity of wood ash from the facility under a wide variety of operating conditions, wood feed rates, combustion temperatures, and other conditions that might affect the efficacy of this control method. It is reasonable to assume that such inherent "in situ" control would depend on the level of calcination of ash materials and that such

calcination would be dependant on plant operating parameters. Without such detailed information to characterize the long term effectiveness of reliance on “in situ” sulfur dioxide control, the characterization of sulfur dioxide emissions for purposes of BACT calculations should rely on the highest emission factor found among both stack tests for the amount of sulfur dioxide per ton of TDF combustion. Applicant’s submittal fails to consider such worst case sulfur dioxide emissions in looking at baseline uncontrolled emissions.

Applicant’s February, 2000 stack test shows that the hourly level of the corrected stack gas concentration limit and the pound per hour limit for sulfur dioxide during one of the 3 tests at the 75 ton per day rate of TDF feed would be violated.

The applicant’s October 1998 stack test was criticized by MDEQ-AQD because of potential interference by ammonia compounds that might be found in the flue gas and that such interferences might reduce the amount of sulfur dioxide detected. Notwithstanding this criticism, the applicant defended the stack test as accurate. During the 1998 stack test, the sulfur dioxide emission rate in three test runs was found to be 106.17 lbs/hr, 86.29 lbs/hr and 88.81 lbs/hr at a rate of 60 tons of TDF combustion per day. All three test runs would violate the level of the pound per hour limitation in the proposed permit.

Applicant’s 1998 stack test run at 90 tons of TDF combustion per day showed wide variations from the lowest result (90.29 tons SO<sub>2</sub>) to the highest (145.85 tons SO<sub>2</sub>). Such variability is not the hallmark of a predicable, reliable and efficacious method of “in situ” sulfur dioxide control.

### **2.1.2 Applicant’s Table 5-4 Emission Rollback Calculation is Subject to Question**

Table 5-4 of the Applicant’s submittal contains an example calculation on the amount of emission reduction from installation of a couple different scrubber options. One calculation is cited:

“Tons removed: 20 ppm SO<sub>2</sub> (139 tpy reduction); 1 ppm H<sub>2</sub>SO<sub>4</sub> (21.3 tpy reduction), maintain PM

example calc.: 56 lb/hr SO<sub>2</sub> avg = 46 ppm SO<sub>2</sub> from 2/2000 test. 20 ppm/46 ppm \* 245 tpy = 106 tpy SO<sub>2</sub> outlet 245 tpy - 106 tpy = 139 tons per year reduction”<sup>1</sup>

This calculation is subject to question on a number of grounds. First, there was no result presented in the 2/2000 sulfur dioxide stack test that was either 56 lb/hr or 46 ppm

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<sup>1</sup> July 2000 Earth Tech, Inc. Application prepared for Cadillac Renewable Energy, Table 5-4

as an average, so Applicant's calculation are not well grounded in the premise of the stack test results.

Second, where an emission reduction calculation is being made to support an annual emission reduction with control, use of a vendor's guarantee in a rollback calculation rather than use of percentage reduction data supported by a physical data observed on a similar source is inappropriate. Applicant's calculations, based on a vendor guarantee for an outlet concentration, would have the reader attempting to believe that the scrubber control will achieve an emission rate of about 24.2 lbs per hour or just less than 50% control based on the 2/2000 stack test at 50 tons of TDF per day. This is an unrealistic calculation of the emission rollback.

Applicant's rollback calculation technique based on a ratio of stack gas vendor guarantees to a single observed average uncontrolled stack gas concentration will not produce physically reliable and appropriate results since the plant can apparently operate at quite different corrected dry standard cubic feet per second stack exhaust flows at the same maximum steam production rates (see a discussion of this matter in section 3.3).

Applicant's attempted proportionalized rollback of the annual emission factor of 245 tons of sulfur dioxide per year (a permit limitation) is unclear and divorced from a clear physical calculation of expected operating emissions based on average controlled emission rates in pounds per hour times the number of operating hours per year.

All of these questionable calculations throw Applicant's calculated cost per ton of emission reduction figures into question and doubt. When Applicant and its vendors admit that 80-85% sulfur dioxide emission reductions are achievable, it is simply inappropriate to conduct cost per ton of emission reductions in such a manner that such emission reductions are not assumed as a result of imposing these controls.

Finally, none of the ton per year emission reduction figures in Table 5-4 match any of the ton per year emission reduction figures in Tables 5-1, 5-2 and 5-3.

### **2.1.3 Downtime Lost Revenue Costs Should Not be Included in BACT Cost Review**

All of the Applicant's total fixed costs analysis include between \$250,000 and \$525,000 of "downtime lost revenue." These costs are generally not envisioned by EPA OAQPS guidance as legitimate fixed costs in BACT determinations and should be excluded from the economic analysis.

#### **2.1.4 Applicant's BACT Review for Sulfur Dioxide Impermissibly and Summarily Rejects Lime Dry Scrubbing with the Existing ESP**

According to the Applicant's submittal:

"A lime dry scrubber with the existing ESP was not studied in detail. This is due to the fact that the costs for a lime dry scrubber are higher than the quoted cost for the sodium bicarb dry scrubber. Also, guaranteed outlet concentrations were higher for a dry lime scrubber compared to the quote for the sodium bicarb dry scrubber. Therefore, the cost per ton examined for dry scrubber/existing ESP is lower for the sodium bicarb and further analysis of the lime scrubber is not required."<sup>2</sup>

This type of summary exclusion of this technology violates the EPA "top-down" BACT requirement because nothing presented shows a compelling economic, technical feasibility or environmental reason why this technology should be rejected. Commentors also point out that Applicant's method using vendor guarantees on outlet concentrations of sulfur dioxide rather than percentage emission reduction calculations is also not an adequate basis of BACT selection on the basis of cost of emission control per ton of reduction.

Applicant's defective procedure for calculating the cost per ton of emission reduction can also not be used to summarily dismiss this particular type of technology.

In addition, Applicant has summarily rejected direct lime injection into the combustion chamber as a sulfur dioxide control technique solely on the basis of a less than one page memorandum from Hillman Power.<sup>3</sup> There was no detailed engineering report supporting the results at Hillman and technology transfer considerations dictate that such lime injection methods be considered in detail.

#### **2.1.5 Applicant's BACT Review Attempts to Inappropriately Assign the Costs of Particulate Control to the Sulfur Dioxide Cost of Control Determination**

Two of Applicant's control scenarios involve construction and operation of replacement or supplemental baghouses. All of the costs for such additional baghouse control are assigned to the sulfur dioxide cost control determination. This is an improper allocation of costs. Instead, such PM control costs should be assigned to the PM control cost determination that should have been done for this facility but was not.

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<sup>2</sup> Applicant's July 2000 submittal at p. 25, section 5.4

<sup>3</sup> Applicant's July 2000 submittal at p. 25, section 5.3

### **2.1.6 Averaging Time for Sulfur Dioxide BACT Determination**

Nothing in the Applicant's submittal or in the MDEQ-AQD staff report justifies the need for a 24 hour averaging time as part of determination of the sulfur dioxide BACT emission limitation for the stack gas concentration and the pound per hour limitation. A 24 hour averaging time allows the operator significant additional latitude over basic hourly or 3 hour average intervals that might be suggested by the performance of stack tests. This amount of latitude constitutes a significant variability in the emission limitation determination and it should be specifically justified.

Note also that the facility must protect 3 hour prevention of significant deterioration increments. It does not appear clear from air quality analysis of the facility that simultaneous maximum 3 hour emissions reflecting the full variability of potential emissions were considered along with the worst case 3 hour dispersion incidents.

### **2.2 Applicant Improperly Failed to Consider the Potential for a Significant Increase in Particulate Emissions and Subsequent Required PM-10 PSD Best Available Control Technology Review**

Both the Applicant and MDEQ-AQD summarily dismiss the matter of Best Available Control Technology review for PM10. MDEQ-AQD completely glosses over the potential for a significant increase in PM emissions between the 2 year baseline of actual emissions to a calculated future potential to emit. The applicant states:

“The firing of TDF is expected to increase the inlet loading to the precipitator. Stack testing indicates that the particulate matter emissions out the precipitator did increase from the baseline test. The February 2000 test for particulate matter was done by Method 5 as approved by the MDEQ. This method yields total particulate instead of differentiating particles less than 10 microns. Counting all the particulate matter is a conservative approach, since the results will count PM-10 as well as any particulate matter over 10 microns. The February 2000 test results indicate a total PM emission rate of 6.58 pounds per hour (0.00669 gr/dscf) at 50 tons per day TDF, and a total PM emission rate of 8.92 pounds per hour (0.00669 gr/dscf) at 75 tons /day TDF. The permitted emission rate in the PSD permit for the facility is 15.7 lb/hr (0.0158 gr/dscf) as given in Conditions 15 and 16. Therefore, no increase in current permitted emission limit is required.”<sup>4</sup>

Applicant's submittal and the MDEQ staff report do not establish a satisfactory basis that there will be no 15 ton/year significant increase over the 2 year actual PM-10 emissions from the plant, calculated on the “actual to potential” rule. Only a 3.4 lb per hour PM10 increase is needed in an 8760 hour year to add up to a 15 ton PM10 increase.

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<sup>4</sup> Applicant's July 2000 submittal at p. 7-8, Section 2.2.2



The October, 1998 report showed PM10 emissions increased from an average of 7.29 lb/hr with 0 TDF burning to 13.62 lb/hr with TDF combustion at 90 tons per day. Under the permit, applicant would be potentially allow 75 tons per day TDF combustion as an enforceable permit condition.

Applicant made the following emission inventory reports for calendar year's 1998 and 1999 (no report for calendar 2000 is available)<sup>5</sup>:

	1998	1999
PM	73.15 tons	29.22 tons
PM (filterable)	0.0 tons	0.01 tons
PM-10 (filterable)	30.49 tons	0.01 tons

Commentors doubt the validity of Applicant's submittal of this data on the record, since the variability in the company report of PM-10 emissions from 1998 to 1999 appears invalid. Commentors also question the proportion of 1998 emissions ascribed to total PM versus PM-10 for this facility with a recently constructed ESP.

Given that the applicant admits that TDF combustion will increase PM10 emissions, the Applicant's permit should not receive any approval before the 2 year baseline PM10 emissions are clearly and accurately established and a worst case PM10 emission factor is applied to determine if the "actual to potential" emission increase is significant. Moreover, MDEQ-AQD should unequivocally recognize that actual PM10 emissions are increasing and inform the public of that matter in any subsequent MDEQ-AQD staff analysis.

If this analysis using the 1999-2000 baseline shows that TDF combustion-related PM10 emission increases are significant, then a BACT review of PM10 must be conducted. One element of such a review should include the potential to reduce PM emission through reducing the tendency of the plant to operate with poor combustion conditions through use of wet wood as fuel. Another element of such a PM10 BACT review should include the ability of a spray dryer to increase PM control efficiency through particle agglomeration.

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<sup>5</sup> Data obtained from Michigan emission inventory system through Allen Oestrander, MDEQ-AQD

**2.3 MDEQ-AQD's Proposed Permit Relaxes Pre-existing Requirements in the Permit Presently in Effect that are Derived from Prior Prevention of Significant Deterioration Reviews for Carbon Monoxide, Nitrogen Oxides and Particulate Matter with No Explanation, Equivalency Demonstration or Statement of Basis other than the Record of Applicant's Demands for these Types of Relaxations**

The previous permit issued in 1994 contain a limit of 0.0158 grains of particulate matter per dry standard cubic foot of exhaust gas. The proposed permit eliminates this instantaneous limit (generally recognized as a one hour average).

The previous permit and the proposed permit both contain a 0.03 lb/MMBTU limitation for particulate matter. However, the proposed permit relaxes this requirement by allowing a less stringent 3 hour averaging time.

The previous permit contained an emission limitation of 0.15 lb/MMBTU for nitrogen oxides on a 24 hour rolling average basis. The proposed permit eliminates the 0.15 lb/MMBTU emission limitation.

The previous permit contained an emission limitation of 0.4 lb/MMBTU for carbon monoxide on a 8 hour averaging time basis. The proposed permit eliminates this emission limitation.

The previous permit subjected a 416 ppmdv emission limitation for carbon monoxide to a 8 hour averaging time. The proposed permit relaxes this limitation by increasing the compliance averaging time to 24 hours.

The existing MDEQ-AQD record indicates that all of these changes were sought by the company. All of these changes will essentially allow more emissions and a greater latitude of the company to operate with poor air pollution control practices and poor combustion with wet wood fuels.

All of these changes involve modification to a previously issued Prevention of Significant Deterioration Best Available Control Technology determination. There is no documentation in the MDEQ-AQD staff report justifying the necessity of these changes or demonstrating why such changes are equivalent to the original determination on control technology. In fact, these changes cannot be certified as equivalent emission control limitations as the limitation contained in the permit presently in effect.

As a result, the permit must not be issued as such changes constitute a relaxation of a prior PSD BACT determination without a basis and in violation of the PSD BACT regulations found at 40 CFR 52.21, *et seq.*

#### 2.4 The Applicant has Failed to Consider the Potential to Trigger NOX and CO Emission Increase Significance Levels from Increasing Plant Utilization and Capacity Factors

The Applicant admits that present emission limitations and problems with wet wood combustion limit the utilization and capacity factor for this facility. This quote is from a paid newspaper advertisement:

“Why doesn’t CRE just continue to burn wood fuel as they have in the past? Is there a wood shortage?”

“No, there doesn’t seem to be a wood shortage and even though waste wood is a good fuel source it does have some drawbacks; historically, the plant has experienced reduced inventory of wood fuel during the winter months due primarily to winter conditions hampering transportation. **To compound the problem the increase in wood moisture produces more CO and NOX emissions and has cause the plant to run at reduced output to stay within emissions standards.**” (Emphasis added)

The Applicant’s July 2000 submittal states:

“This data indicates that CO does not increase while firing TDF and is well below the permit level of 0.4 lb/MMBTU. The overall CO emission rate during the February test is higher than the October test as expected. **Under conditions where the wood is exceptionally wet (such as winter time), CO emissions run higher. Historically, these higher CO rates have caused the plant to curtail MW, and loosing [sic] electrical sales.** The emission rate seen in February 2000 is only half the allowed emission rate. Typically, the facility would see emissions close to 0.4 lb/MMBTU during this time of year while firing wood alone.”<sup>6</sup>

As a result of these statements, and the relaxation in the proposed permit of carbon monoxide limits by allowing 24 hour averages rather than the previous 8 hour compliance averaging time, it is reasonable to assume that the Applicant will increase its capacity factor and utilization rate if the proposed permit is granted. The Applicant plans TDF combustion to ameliorate the consequences of the facility’s proclivity for poor air pollution control practice through allowing its fuel to get “exceptionally wet” and then deliberately firing this wet fuel knowing that it will increase CO emissions.

As a result of an increase in capacity factor and utilization rates, the proposed permit change on compliance periods and the use of TDF,

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<sup>6</sup> July 2000 EarthTech Air Use Permit Application, prepared for Cadillac Renewable Energy, section 2.2.4, p. 9

the Applicant has the potential to increase NOX and potentially CO emissions. There is no information in the application which identifies the two year baseline on NOX and CO actual emissions and no data available on previous and expected utilization rates and capacity factors. As a result, the application is incomplete because there has been no analysis of potential NOX and CO increases that might trigger significance levels. This same phenomena from increased utilization could also contribute to triggering PM10 emissions significance as well. Until this issue is properly briefed in the application and a technical determination made one way or another on triggering of significance levels, the permit should not be approved. At the very least, MDEQ-AQD should acknowledge the potential for increased actual emissions of NOX, CO and PM from an increase in utilization.

EPA has very clearly indicated that federal PSD reviews must countenance that an increase in utilization or capacity is a factor for determination of whether significance levels are exceeded from an increase in emissions, even when short term actual emission rates stay the same or decline:

“1 Moreover, virtually any major capital improvement project at an existing source is designed in part to increase efficiency of production, and this will in turn almost always have the collateral effect of reducing emissions per unit of production, even though it may provide an economic incentive to increase total production, with the net result that actual emissions of air pollution to the atmosphere could increase significantly. There is nothing in the statutory terms or structure or in EPA’s regulations which suggests that such major changes should be accorded exempt status under the NSR program. To the contrary, major capital investments in industrial equipment, where they could result in an increase in emissions, appear to be precisely the type of change at an existing source that Congress intended should be subject to PSD and nonattainment area NSR permitting. See Prevention of Significant Deterioration and Nonattainment New Source Review; Proposed Rule, 61 Fed. Reg. 38250, 38262 (July 23, 1996) (“NSR Reform” proposed rulemaking). See also *Puerto Rican Cement Co. v. EPA*, 889 F.2d 292, 297-98 (1 st Cir. 1989) (modification of emissions unit that decreases emissions per unit of output, but may result in sufficient production increase such that actual emissions will increase, is subject to PSD). Conversely, nonroutine and otherwise nonexcluded changes of any type, regardless of whether they are projects such as the Dense Pack intended to increase production efficiency, or even the complete replacement of an entire industrial plant, are excluded from PSD coverage so long as they do not result in significant emissions increases. See *infra* note 4.”

“9. The argument that only changes that increase a unit’s emissions rate can trigger the NSR modification provisions has been rejected by two courts of appeals. As noted, see *supra* note 1, in *Puerto Rican Cement*, the First Circuit rejected a claim that modifications to a cement kiln, which made production more efficient and decreased the hourly emissions rate but could increase the plant’s utilization rate,

such that actual emissions to the atmosphere might increase, were exempt from PSD. The company argued that the project fell under the PSD regulatory exclusion for changes that result in an “increase in the hours of operation or in the production rate.” See 889 F.2d at 298. Similarly, in WEPCO, where the company was making “like-kind” replacements of components to restore the original design capacity of the plant, there was no increase in emissions per unit of output; rather, for PSD purposes, the emissions increase was attributable to increased utilization. The Seventh Circuit rejected the company’s reliance on the exclusion for increased hours of operation/rates of production. See 893 F.2d at 916 n. 11.”<sup>7</sup>

Both the Applicant and MDEQ-AQD must consider the issue of increased capacity factor and production utilization inherent with the changes in the proposed permit conditions and the Applicant’s admissions that utilization will increase with the advent of TDF combustion.

Upon any such further reconsideration, any subsequent PSD BACT review on CO, VOC and/or NOX or any T-BACT review addressing toxic products of incomplete combustion should consider a work practice requirement that keeps wood waste fuels stored outdoors from accumulating moisture from precipitation. Dow Corning uses silo storage technology for its wood waste fueled power plant in Midland, MI. As such, this is a feasible and prudent practice for reducing the moisture content of wood waste. Wood waste moisture should be considered as a direct contributor to increased CO, NOX and VOC emissions at wood waste combustion facilities. While silo storage may not necessarily be required, some form of covered wood waste storage should be required that will keep precipitation from invading such outdoor storage of wood waste.

## **2.5 The Effect of the Definition of Best Available Control Technology on the Proposed Decision Concerning the Applicant**

Under the Prevention of Significant Deterioration Regulations, Applicant must install Best Available Control Technology, which is defined:

*“Best available control technology means an emissions limitation (including a visible emission standard) based on the **maximum** degree of reduction for each pollutant subject to regulation under the Act which would be emitted from any proposed major stationary source or major modification which the Administrator, on a case-by-case basis, taking into account energy, **environmental**, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes or available methods, systems and*

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<sup>7</sup> U.S. EPA determination concerning NSR applicability for the Detroit Edison Monroe Power Plant, May 2000, footnotes #1 and #9 (available at <http://www.epa.gov/ttn/nsr>)

techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of such pollutant.

In no even shall application of best available control technology result in emissions of any pollutant which would exceed the emissions allowed by any applicable standard under 40 CFR parts 60 and 61.

If the Administrator determines that technological or economic limitations on the application of measurement methodology to a particulate emissions unit would make the imposition of an emissions standard infeasible, a design, equipment, work practice, operational standard, or combination thereof, may be prescribed instead to satisfy the requirement for application of best available control technology. Such standard shall, to the degree possible, set forth the emissions reduction achievable by implementation of such design, equipment, work practice or operation, and shall provide for compliance by means which achieve equivalent results.”<sup>8</sup> (Emphasis added)

Explicit in the consideration of the “environment” in the BACT definition are certain duties as outlined below.

**2.5.1 The Applicant has Failed to Conform to Requirements of EPA’s “Top Down” BACT Policy that Ensure that Environmental Affects as They Relate to Unregulated Toxic Pollutants are Considered in the Control Technology Determination**

Nothing in Applicant’s submittal discussed the consequences of various control technology decisions on the matter of unregulated toxic pollutants. Such consideration is required by the definition of Best Available Control Technology.

The first time this doctrine was clearly articulated was in a case of a municipal waste combustor in California in which citizen commentators appealed a decision of EPA Region IX on a proposed PSD permit for the North County Resource Recovery Associates.<sup>9</sup>

In a remand order back to EPA Region IX, then-EPA Administrator Lee Thomas wrote as to petitioner’s allegations:

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<sup>8</sup> 40 CFR §52.21(b)(12); See also 42 USC §7479(3)

<sup>9</sup> EPA Administrative Decision In the Matter of North County Resource Recovery Associates, Remand Order, PSD Appeal No. 85-2, June 5, 1986.

“Among the reasons the petitioners present for granting review is Region IX’s alleged failure to establish emission limitation for all pollutants, including hazardous pollutants, that will or could possibly be emitted from the facility; the alleged inadequacy of Best Available Control Technology (BACT) determinations;..... With one exception, Region IX has addressed each of petitioners’ allegations and has provided rational explanations for not making any alterations in its permit determination.

The exception concerns Region IX’s assertion that EPA lacks the authority to “consider” pollutants not regulated by the Clean Air Act when making a PSD determination. This assertion is correct only if it is read narrowly to mean EPA lacks the authority to imposed limitations or other restrictions directly on the emission of unregulated pollutants. EPA clearly has not such authority over emissions of unregulated pollutants.

Region IX’s assertion is overly broad, however, if it means as a limitation on EPA’s authority to evaluate, for example, the environmental impact of unregulated pollutants in the course of making a BACT determination for the regulated pollutants. EPA’s authority in that respect is clear.....

As defined in §169(3) the term BACT refers to an “emission limitation” that is set on a case-by-case basis for regulated pollutants, “taking into account energy, environmental, and economic impacts and other costs” associated with the particular emission control system that is selected to achieve the BACT emissions limitation. 42 USC §7479(3) (emphasis added) (40 CFR §52.21(b)(12).

Hence, if application of a control system results directly in the release (or removal) of pollutants that are not currently regulated under the Act, the net environmental impact of such emissions is eligible for consideration in making the BACT determination. The analysis may take the form of comparing the incremental environmental impact of alternative emission control systems with the control system proposed as BACT; however, as in any BACT determination, the exact form of the analysis and the level of detail required will depend upon the facts of the individual case. Depending upon what weight is assigned to the environmental impact of a particular control system, the control system proposed as BACT may have to be modified or rejected in favor of another system.

In other words, EPA may ultimately choose more stringent emission limitations for a regulated pollutant than it would otherwise have chosen if setting such limitations would have the incremental benefit of restricting a hazardous but, as yet, unregulated pollutant.” (Decision at p 3-4)

The precedent that PSD BACT determinations must consider the effects of control technology decisions on unregulated pollutants as part of the environmental impact

analysis has been extended and clarified in EPA's transitional guidance memo after the passage of the 1990 Clean Air Act Amendments.

“Toxic Effect of Unregulated Pollutants Still Considered in BACT Analysis -- Based on the remand decision on June 3, 1986 by the EPA Administrator in North County Resource Recovery Associates (PSD Appeal No. 85-2), the impact on emissions of other pollutants, including unregulated pollutants, must be taken into account in determining BACT for a regulated pollutant. When evaluating control technologies and their associated emissions limits, combustion practices, and related permit terms and conditions in a BACT proposal, the applicant must consider the environmental impacts of all pollutants not regulated by PSD. Once a project is subject to BACT due to the emission of nonexempted pollutants, the BACT analysis should therefore consider all pollutants, including Title III hazardous air pollutants previously subject to PSD, in determining which control strategy is best.”<sup>10</sup>

As such, both the Applicant and MDEQ-AQD must consider the effects of all control technology selections and options on unregulated pollutants from this process. This would include poly-chlorinated dibenzo-dioxins/furans, polycyclic aromatic hydrocarbons other than benzo(a)pyrene, other products of incomplete combustion and potentials for increased collection efficiency of toxic metals. None of this analysis has been carried out in the current technology determination, the Applicant's submittal or the MDEQ-AQD staff report.

### **2.5.2 Applicant's and MDEQ-AQD's Attempt to Include Emissions from Other Sources as Part of BACT Environmental Analysis, Such as Uncontrolled Tire Fires and Emissions Which are Not a Part of the Major Stationary Source in Question, is an Improper and Abusive Interpretation of the Environmental Impact Aspect of BACT Decisionmaking**

Both Applicant and MDEQ-AQD have attempted to roll consideration of the possibility of uncontrolled tire fires at locations other than this major stationary source into the environmental effects calculus of the BACT determination process. Essentially, that other locations might experience a tire fire and uncontrolled emissions is being offered as an excuse by the Applicant and MDEQ-AQD that a less efficient emission control system ought to be utilized.

However, the definition of BACT explicitly references control technology decisions inherent in and only directed to the major stationary source in question. As a result, suggesting that uncontrolled tire fires may occur in other location as a factor in the environmental effects calculus of a BACT control technology decision for this plant is an

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<sup>10</sup> Ibid, March 11, 1991 Seitz memo at P. 3.



abusive interpretation of the PSD BACT definition and further constitutes an arbitrary and capricious MDEQ administrative determination, abuse of discretion and clear legal error designed to justify a “less than the best” control technology decision at the proposed facility.

## **2.6 The Matter of “Sham” Permitting and BACT Determinations**

The recent history of permitting for TDF burning at wood energy facilities in Michigan shows a pattern of multiple step proposals for incremental increases in TDF combustion. For example, Viking Energy of Lincoln and Viking Energy of McBain both started with initial TDF combustion applications equivalent to 6,144 tons of TDF per year. Both facilities now seek TDF combustion of 23, 200 tons of TDF per year. The Hillman facility originally sought the equivalent tire burning capacity of 1.46 million tires per year and now seeks to increase capacity to the equivalent of 2 million tires per year.

Efforts to cut up larger projects into smaller ones and to avoid the consequences of fully exploring control technology options are known as “sham permitting, “ which is not allowed under the Clean Air Act and by EPA policy. See, for example, the EPA determination concerning New Source Review Circumvention Guidance to 3M Corporation of Maplewood, MN:

“Generally in "sham" permitting, a source attempts to expedite construction by securing minor source status through permits containing operational restrictions from which the source intends to free itself shortly after completion of construction and commencement of operation. Such attempts are treated as unlawful circumvention of the preconstruction review requirements. Similarly, attempts to expedite construction by securing several minor source permits and avoiding major modification requirements should be treated as circumvention. A memorandum dated September 18, 1989 from John Calcagni to William Hathaway stated this position (see Memorandum 4.42 in the NSR Guidance Notebook).”<sup>11</sup>

Given that the Applicant appears able to burn at least 90 tons per day (rather than the maximum 75 tons per day in the present application), it is not unreasonable to expect the probability of a future submittal from the Applicant to increase the TDF burning rate.

What is unreasonable is the effort to cut up expected air pollution impacts and determinations into smaller expected determinations so that the cost effectiveness determinations and threshold requirements for any particular determination are prejudiced towards lower cost effectiveness numbers. The Applicant should agree as part of this application to forgo any future TDF combustion rate increase. Otherwise, the BACT

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<sup>11</sup> This memorandum is available through a search at <http://www.epa.gov/ttn/nsr> at the EPA Region 7 searchable database and is also available from the preparer of this document.

determination should countenance all future TDF combustion rate increases that might be technically feasible at the facility in the determination of cost per ton of emission controlled calculations or otherwise disallow the present effort as “sham” permitting and a “sham” BACT determination.

### **3 Comments Related to the Applicant’s Stack Testing Reports**

#### **3.1 Introduction**

In order to ensure that the results of air emission stack testing are credible, it is important that such testing reports properly identify all operating conditions and testing practices that were employed during such tests. In this section, commentors discuss significant deficiencies in stack test documentation that cast doubt on the credibility of the stack test reports for use in permitting, compliance and public participation purposes.

#### **3.2 The Applicant Appears to have Failed to Ensure that Stack Tests for Airborne Toxicants Were Done Under Equilibrium Conditions; Such Failure Casts Doubt on the Reliability of the Stack Testing Results for Airborne Toxic Substances during TDF Combustion**

The particulate emission control system employed at the Cadillac Renewable Energy facility uses a mechanical cyclone to collect a significant portion of the entrained larger particulate matter in the flue gas. These particles are then re-injected into the firing zone for recombustion.<sup>12</sup>

In circumstances where ash is re-injected into the combustion area, an immediate change in fuel type containing different amounts of potential toxic substances and differing amounts of substances that may have acid neutralizing capabilities (after combustion), will not produce an immediate maximization or equilibrium of such substances in the flue gas particles that pass through the cyclone to the electrostatic precipitator for final flue gas cleaning.

In such circumstances, a time interval will be required before the particulate matter entrained in the firebox-cyclone system reaches an equilibrium. Unfortunately, there is no information in the MDEQ-AQD file in order to make any kind of judgement or estimation of how long would be required to achieve such an equilibrium.

A review of the October 1998 stack test indicates that the applicant went from 0 TDF burning during the interval on October 14, 1998 ending at 11:36 hours to 90

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<sup>12</sup> October 7, 1999 letter from Tamra Van Til, EarthTech to Mary Ann Dolehanty, MDEQ-AQD, Page 6

tons/day TDF burning equivalent less than 3 hours later at 14:14 hours on the same day for the first run at that level for air toxics stack determinations.. With the exception of chromium and nickel, every other airborne toxicant emission increased from the first test run to the second test run. This kind of pattern of results is suggestive of non-equilibrium mass/material conditions from the first test run to the second.

The third air toxicant stack test run at the equivalent of 90 tons per day occurred the next day on October 15, 1998 starting at 09:20 hours. Most of these test results are lower than the results of test #2. There is no documentation on whether the 90 ton/day TDF burning rate was maintained between the end of test #2 and the beginning of test #3; as a result, the observer cannot know if test #3 was done under equilibrium conditions.

### **3.3 The Applicant's Stack Testing Report Failed to Document How the Applicant Prepared Wood/TDF Mixtures and Operational Practices in How Such Mixtures Were Charged to the Applicant's Combustion System**

Nothing in either of the stack testing reports indicates how the applicant prepared Wood/TDF mixtures. As a result, there is no information in the file that provides even minimal assurances that the methods used to prepare such mixtures would be effective at ensuring a uniform, reliable mixture and fuel feed to the plant that ensured that the fuel characteristics were uniform and indicative during the extent of any particular TDF mixture trial. There is no information that provides fundamental information about the capacity of pre-combustion, in-plant fuel hoppers.

Without such documentation, the applicant asks the reader of such stack tests to trust that the fuel characteristic was properly maintained and typical during each test. This is not an acceptable level of assurances on an important matter requiring regulatory certainty.

There is nothing in either stack test report that provides information on the proportion that TDF constituted of total fuels during the day of the stack test for either a weight or BTU basis. If Applicant's "in situ" claim of sulfur dioxide control is to be assured, the operational practice during the test condition would have to ensure that such a proportion between wood waste and TDF was maintained for proper comparison purposes. This condition would be necessary to ensure that alkalinity available for sulfur dioxide control would be maintained in the system at a known and predictable proportion.

Comparing the 1998 and 2000 stack test report, there appears information suggestive that there might be wide variation in how the plant can be operated that might lead to significant variability of any "in situ" control efficacy. During the 1998 stack test, the plant maintained an average of 110,113 dry standard cubic feet per minute of stack gas flow during the 60 ton/day TDF burn and a similar amount during all of the other tests. However, during the 2000 test, the plant maintained a much larger airflow –

156-160 thousand dry standard cubic feet per minute. Although the plant maintained similar steam output during both tests, the facility must have burned a significantly larger amount of wood waste during the 2000 test in order to maintain plant output for a comparable TDF burn rate. This means that more alkalinity might be available under such circumstances. However, this does not mean that the stack test reflects a worst case scenario when it comes to potential sulfur dioxide emissions.

**4 Comments Concerning the Sulfur Dioxide Emissions Characterization from the Proposed Tire-Derived Fuel Burning Operations at the Facility and Emission Limitations Provided**

A review of emissions factors for the amount of sulfur dioxide emissions per ton of TDF burned reveals the following:

ton TDF per day	50	75	30	60	90
ton TDF per hour	2.1	3.1	1.3	2.5	3.8
lbs SO <sub>2</sub> per hour	50.99	70.01	28.64	93.76	120.73
lbs SO <sub>2</sub> per ton TDF burned	24.5	22.4	22.9	37.5	32.2

Note that the highest emission factor found would be at a TDF combustion rate that would be permissible under the proposed MDEQ permit. A calculation of potential emissions at the maximum TDF combustion rate on a daily basis for an entire year and at the maximum sulfur dioxide per ton TDF burned emission factor indicates potential emissions of 513 tons.

MDEQ-AQD is proposing a 245 ton per year sulfur dioxide limitation, but it is unclear how this can be enforced. Applicant's two stack tests already have shown that the facility can operate at widely varying dry standard cubic stack gas flows for the nearly identify electrical and steam outputs (see Section 3.3). There is no requirement for continuous measurement of stack gas conditions that would allow accurate emission measurement. Any other system of emission measurement based on use of stack gas concentrations must them rely on assumptions about stack gas flow and varying moisture that cannot be assured to be typical under any particular plant operating condition. As a result, the 245 ton per year sulfur dioxide limitation is not practically enforceable and does not effectively limit the potential to emit for this facility.

**5 The Proposed Permit Opens the Way for the Facility to Use Contaminated and Painted Demolition Wood**

Special condition #11 of the proposed permit provides:

“Wood or wood waste containing creosote, pentachlorophenol, or copper chromium arsenate shall not be used as fuel (R336.1225)”

Given that this is the only condition of the proposed permit that limits the type and quality of wood waste for the facility, it is thus significant that its provisions do not include as banned materials unprocessed demolition wood that has not been subject to a screening procedure and painted wood pieces. The failure of this condition to ban such materials from combustion at this site thus opens the way for the Applicant to use these materials. This condition should be explicitly amended to include demolition wood and painted wood in the list of banned wood wastes.

**6 The Applicant and MDEQ-AQD Have Again Failed to Consider Potential Emissions of Highly Toxic Poly-Chlorinated Dibenzo-Dioxins/Furans (PCDD/PCDF)**

MDEQ-AQD’s staff report states:

“The October 1998 and February 2000 stack test results demonstrate that toxic air contaminant emissions (including metals, dioxins and furans, and sulfuric acid mist) were below applicable screening levels. Therefore the proposed burning rate of TDF meets the requirements of Rules 224, 225, and 227, and all emission limitations of Permit No. 373-86A.”<sup>13</sup>

However, this finding of rules compliance by MDEQ-AQD must necessarily be in error and completely misleading to the public because neither the October 1998, nor the February 2000 stack test, contained any analytical work at on PCDD/PCDF stack emissions

The U.S. Environmental Protection Agency has identified industrial combustion of wood waste as a source of poly-chlorinated dibenzo-dioxin/furan emissions in its external review draft document of the national dioxin inventory.<sup>14</sup> This document indicates emission factors of PCDD/PCDF toxic equivalents (TEQs) ranging from 0.50 ng/kg of wood burned to 1.32 ng/kg of wood burned, with a mean of 0.82 ng TEQ/kg wood burned. The values were derived from California Air Resources Board studies of wood combustion facilities in that state. One special facility that burned wood contaminated with sea salt had an emission factor average of 17.1 ng TEQ/kg wood burned.

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<sup>13</sup> MDEQ January 18, 2001 staff report on proposed permit for Cadillac Renewable Energy, Section of T-BACT, p. 5

<sup>14</sup> External Review Draft, The Inventory of Sources of Dioxin in the United States, National Center for Environmental Assessment, EPA Office of Research and Development, Washington DC, EPA/600/P-98/002As, April 1998, Section 4.2.2, p. 4-19

The EPA report notes that combustion conditions similar to what is experienced at applicants facility when burning wet wood are an indicator of increased PCDD/PCDF emissions:

“It should be noted, however, that this emission factor (0.82 ng TEQ/kg wood) may not be an appropriate emission factor to apply to the combustion of waste wood containing elevated chlorine content. Umweltbundesamt (1996) report the results of stack gas testing at approximately 30 facilities of varying design type as well as type of wood fuel combusted. Elevated cdd/cdf emissions were observed when the combustion conditions were poor, as evidenced by elevated carbon monoxide emissions, and/or when the fuel contained elevated chlorine levels. ....

“The chlorine content of untreated wood and bark were reported to range from 0.001 to 0.01 percent by weight and 0.01 to 0.02 percent by weight, respectively. Chipboard can contain up to 0.2 percent chlorine by weight because of binding agents used to manufacture the chipboard...”<sup>15</sup>

Michigan DEQ’s RAPIDS toxic emission inventory has previously identified wood combustion as a source of PCDD/PCDF emissions in our state.

Other authorities identify wood waste combustion as a cause for concern on emissions of highly toxic PCDD/PCDFs. An EPA presentation to the stakeholder’s group involved in development of the Industrial Combustion Coordinated Rulemaking identified wood waste combustion as “moderate to high” for the need for testing based on the presence of complex organics, entrained PM, temperature considerations, sufficient chlorine and other factors.<sup>16</sup>

MDEQ-AQD must understand that very little chlorine is required for the formation for PCDD and PCDF (contrary to highly publicized claims by the environmental group Greenpeace) and that combustion conditions, flue gas conditions and other factors are more likely limiting factors in PCDD/PCDF formation.<sup>17</sup> A 1995 ASME report states:

“A general review, using a combination of Canonical Correlation Analysis and simple Linear Regression, found no statistically significant relationship between chlorine input and PCDD/F stack gas concentrations for the majority (80 percent)

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<sup>15</sup> Ibid, p. 4.22

<sup>16</sup> Presentation to Industrial Combustion Coordinated Rulemaking Meeting, Research Triangle Park, NC, September 17, 1997 by Brian Gullett, Ph.D., U.S. EPA & Randy Seeker, Ph.D. EER Corporation

<sup>17</sup> See, for example, conclusions contained in the abstract of the report, The Relationship Between Chlorine in Waste Streams and Dioxin Emissions from Waste Combustor Stacks, American Society of Mechanical Engineers, 1995

of the 90 facilities which has sufficient simultaneous data to detect a statistically significant trend. Eleven percent displayed an increase; 9 percent of the facilities displayed decreasing PCDD/F concentrations with increasing chlorine.”

“While some laboratory experiments show that this is a functional relationship between chlorine input and PCDD/F concentrations in the products of combustion under certain conditions, the effect is much smaller than the effect of confounders like combustor design, operating practices and the normal variability found in emission measurements made at commercial scale systems.”

In the present case, the ASME report identifies some of the same practices as occur in the subject facility as causes of PCDD/PCDF formation, such as poor combustion problems. These types of conditions do and will continue to occur in Applicant’s combustion process. In fact, proposed permit changes envisioned by MDEQ-AQD will allow these poor combustion conditions, and thus potential for PCDD/PCDF formation, to get worse than they presently are.

Applicant wants to charge a known source of chlorine contained in TDF to this wood fired boiler which frequently operates under conditions described in the EPA report to cause elevated PCDD/PCDF emissions. Available information from EPA in the file identifies TDF as typically containing about 0.3 % halogen content. This level of halogen input is likely to constitute a sufficient level of chlorine input for PCDD/PCDF formation, given other factors present.

MDEQ-AQD appear ready to accept Applicant’s request without question and particularly without requiring PCDD/F stack testing under worst case combustion conditions of wet wood in the combustion system. MDEQ-AQD thus continue the current practice of the Engler Administration in allowing most proposed TDF combustors to commence such burning without definitive, worst case PCDD/PCDF stack testing results. No review has been conducted about either inhalation risks or environmental damage from deposition associated with PCDD/PCDF emissions likely to occur from Applicant’s emission source. As a result, there can be no compliance with requirement for MDEQ-AQD to ascertain all pollution, impairment and destruction as a result of their proposed permit action and to determine compliance with all air toxic rules that might deal with PCDD/PCDF deposition. This situation is unacceptable, unlawful and threatens the environment of area citizens.

**7 The Proposed Permit and Permit Application Fail to Adequately Characterize TDF Quality and Process Control Issues**

Nothing in the permit application, the proposed permit or in other available information provide detailed information about the TDF to be burned in the facility. There are no laboratory reports on the TDF to be used that analyze BTU value, sulfur

content, halogen content, etc. There is no TDF quality requirement that identifies whether the TDF to be used may or may not contain wire. As a result, there is no basis for assuming that stack testing has adequately detected all metals which might be present.

Applicant has used 1.2% as a sulfur content for TDF without supporting this figure with analytical reports. However, EPA combustion researchers have found TDF to contain up to 1.75% sulfur. There has been no reconciliation of this problem. Yet, compliance with any sulfur dioxide limitation is likely to be marginal at best given past variability detected in TDF-related sulfur dioxide emissions.

Nothing in the permit limits the maximum amount of TDF that may be burned at this facility in any given year. Nothing in this permit limits the ability to inappropriately increase the proportion of TDF burned when the facility is not operating at maximum BTU input. Nothing in this permit deals with the relative proportions allowed between TDF and the wood waste, even though these fuel mix proportions are likely to significantly affect efficacy of so-called “in situ” control. The operational philosophy of the permit appears to be that the company should have maximum latitude for operational deviation, poor combustion and TDF burning without having to take the most effective measures to be accountable for their performance to the public.

**8 Commentors Ask that the Effective Date of any Final Michigan DEQ/AQD Action to Issue the Permit be Delayed for a Period of Thirty Days to Allow Time for an Appeal to the U.S. EPA Environmental Appeals Board**

At the present time, the PSD review and permitting program of the MDEQ Air Quality Division is not approved for purposes of New Source Review (See 40 CFR § 52.1176) and Significant Deterioration of Air Quality (See 40 CFR § 52.1180). As a result, Michigan is operating PSD permit reviews and approvals as a “delegated” and not “authorized” state. Because of this circumstance, Cadillac Citizens for Clean Air is entitled to begin an appeal of the issuance of the proposed permit for combustion of tire-derived fuels to the U.S. Environmental Protection Agency Environmental Appeals Board pursuant to regulations at 40 CFR §124.19.

This supplementary comment has identified unresolved issues associated with the issuance of the proposed permit. As such, we ask that the effective date of any final permit decision be stayed for a period of 30 days after announcement by Michigan DEQ/AQD of the final permit issuance decision.

We further ask that MDEQ Air Quality Division notify all commentors in writing of its final decision with the required notice concerning potential appeals to the Environmental Appeals Board.