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Mr. Marc Simpson
Acting Permit Chief
Bureau of Waste Prevention
Western Regional Office
Massachusetts Department of Environmental Protection
436 Dwight Street
Springfield, MA 01103

RE: Russell Biomass Project - Air Permit

Dear Mr. Simpson:

The purpose of this letter is to comment on the air quality permit for the Russell Biomass plant. The FEIR's analysis of air quality impacts resulting from the plant and associated activities appear to be seriously deficient. I request that DEP consider the issues raised in this letter in relation to the Russell Biomass air quality permit and require a full response by the applicant where appropriate, prior to issuance of permits. I further request that MassDEP respond to the questions and requests for more information from DEP itself presented in this letter. Please notify me as to your decision on how to proceed in response to this request. I hope that a month will provide sufficient time, therefore I request a response by August 11, 2008.

Problems with modeling of emissions

Assumptions in the AERMOD modeling are incorrect

Results of the air quality modeling and claims by the proponent that plant emissions will not worsen air quality in the town of Russell should be greeted with the utmost skepticism. To begin with, the FEIR states that AERMOD model was run to simulate plant emissions effects on Russell using data from the Westover Air Force Base because "Meteorological data from Westover AFB are representative of the site due to similarities in topography, namely both locations are in north-south oriented river valleys and both have high terrain immediately to the east."¹ This is a ludicrous statement, as demonstrated below in the historic maps presented in Figure 1. Westover AFB is located on a broad plain; rising terrain is distant. Russell is located in a narrow river valley, closely surrounded by steep slopes. With regard to particulates, the choice of Anderson Road at

¹ Appendix K of the FEIR, p. 4 (p. 8 of the pdf)

Westover AFB to illustrate background PM_{2.5} concentrations very likely under-represents actual PM_{2.5} concentrations in Russell, where mountainous terrain traps air pollution. Further, Russell is a rural area and is likely to have more wood-burning stoves that contribute to local air pollution than do the suburban neighborhoods around Westover.

Modeling results can only be as good as the data and assumptions that lie behind the model, and even the proponents' own modeling results, which show the highest deposition rates of particulates occurring on the side of Shatterack Mountain, indicate that plant emissions will flatten out and be trapped by the topography around the town. Along with air quality impacts to the town, deposition impacts of toxins, ammonia, and heavy metals to the terrain and forests around the plant are likely to be severe, as shown by the maps presented in the FEIR. Such deposition rates are likely to result in forest blight in the state-owned Tekoa Mountain Wildlife Management Area, impacting fauna and flora alike. MassDEP should consult with a credible third-party reviewer on the modeling data and make public the agency's response as to why the terrain and meteorological assumptions in the modeling are considered adequate.



Figure 1. Comparison of the topography of Westfield AFB site (left) and Town of Russell (right). The grey circle represents the approximate position of Westover AFB; the black arrow points to site of proposed Russell Biomass plant.

Particulate emissions from the plant will likely exceed DEP's Significant Impact Levels

In a presentation in April, 2008, the Massachusetts State Implementation Plan steering committee stated that because EPA has not yet set Significant Impact Levels (SILs) for PM_{2.5}, MassDEP proposes to use SILs identified by NESCAUM (Northeast States for Coordinated Air Use Management). The NESCAUM SILs are intended to set a threshold above which new source emissions are likely to have an impact on air quality, and are set at 0.3 µg/m³ and 2 µg/m³ for the annual and 24-hour PM_{2.5} levels, respectively. NESCAUM's own review of recent modeling projects in several states demonstrated that

in “essentially all instances” the 24-hour SIL of $2 \mu\text{g}/\text{m}^3$ would be exceeded by modeled projects.² This observation alone is sufficient to cast doubt upon the accuracy of the of annual and 24-hour emission rates of 0.2 and $0.9 \mu\text{g}/\text{m}^3$ reported in the Russell Biomass FEIR. A further indication that the proponent’s modeling may seriously underestimate $\text{PM}_{2.5}$ emissions is provided by NESCAUM’s written comments to EPA on the proposed rule to implement fine particle national air quality standards. In a letter written prior to the lowering of the $\text{PM}_{2.5}$ standard in 2006, NESCAUM argues that the threshold for what constitutes a major source should be lowered:

The potential of 25 to 99 ton/year direct $\text{PM}_{2.5}$ sources to cause high ambient $\text{PM}_{2.5}$ impacts provides two important justifications for lowering the definition of a major source. First, studies document adverse health effects at relatively low ambient concentrations of $\text{PM}_{2.5}$. Section III.M.5.b of EPA’s proposal (70 FR 66038) describes a modeling analysis conducted by EPA to compare $\text{PM}_{2.5}$ stack emissions to the resulting ambient impact. **Based on the results of this modeling (15 ton/yr of PM_{10} emissions results in up to $0.8 \mu\text{g}/\text{m}^3$ annual PM_{10} concentration), one can conclude that a 99 ton per year source of direct $\text{PM}_{2.5}$ could have up to a $5.3 \mu\text{g}/\text{m}^3$ annual $\text{PM}_{2.5}$ impact. This represents 35 percent of the current $\text{PM}_{2.5}$ annual NAAQS of $15 \mu\text{g}/\text{m}^3$.** A similar problem is found for short-term $\text{PM}_{2.5}$ impacts, when scaling the results of the 24-hour modeling presented in Section III.M.5.b (70 FR 66038). **A 99 ton per year $\text{PM}_{2.5}$ source could have up to a $39.6 \mu\text{g}/\text{m}^3$ 24-hour $\text{PM}_{2.5}$ impact.** This concentration is approximately 61 percent of the current $\text{PM}_{2.5}$ 24-hour NAAQS of $65 \mu\text{g}/\text{m}^3$. The issue becomes even more problematic if the standards are lowered in the future. Under the recently proposed $\text{PM}_{2.5}$ 24-hour NAAQS of $35 \mu\text{g}/\text{m}^3$, emissions from a 99 ton/year $\text{PM}_{2.5}$ source could violate the 24-hour NAAQS.

This conclusion is supported by data from the NESCAUM region. For example, air permit modeling reviewed by the New Jersey Department of Environmental Protection confirms that smaller direct $\text{PM}_{2.5}$ emission sources (i.e., less than 99 tons/year) can produce high local concentrations. **A recent application proposing a 31 ton/year of $\text{PM}_{2.5}/\text{PM}_{10}$ emissions predicted maximum annual ambient concentrations of $3.5 \mu\text{g}/\text{m}^3$ and maximum 24-hour concentrations of $31.3 \mu\text{g}/\text{m}^3$.**

Much evidence suggests that the picture of low emissions presented by Russell Biomass proponents is gravely flawed, underestimating particulate emissions by perhaps an order of magnitude or more. MassDEP should evaluate the data and modeling in the light of other work done throughout the Northeast that accurately represents particulate emissions impacts by large stationary sources, submitting the modeling data to qualified third-party review if the agency does not have adequate in-house expertise.

² NESCAUM Permit Modeling Committee, 2006. NESCAUM technical guidance on Significant Impact Levels (SILs) for $\text{PM}_{2.5}$.

Truck emissions should be included in the air quality modeling impacts

Diesel emissions are significant sources of ozone-forming NOx and volatile organic compounds (VOCs), and over 90 percent of diesel particulate emissions are PM_{2.5}.³ These emissions should be accounted for in the air quality permitting for the plant, since they represent a significant source of pollutants that will only occur if the plant is built.

Problems with the truck emissions modeling

Realizing the truck emissions are not covered by the permit in question, we nonetheless believe that DEP should be made aware of problems in the air quality components of the FEIR. As is the case for the emissions modeling for the plant, and for the river discharge and plant effluent modeling as documented in a former letter by this commenter, the truck emissions modeling relies on assumptions of dubious merit.

The air quality model MOBILE6.2 was used inappropriately in the truck emissions study. This model was not designed to represent emissions for projects below the regional level, as is noted in documents from the Federal Highway Administration and other sources. Please forgive the lengthy quote from a FHWA document, but it clearly demonstrates that one of the foundational elements of the truck air quality modeling is based on incorrect use of the model:

The EPA tools to estimate MSAT emissions from motor vehicles are not sensitive to key variables determining emissions of MSATs in the context of highway projects. While MOBILE 6.2 is used to predict emissions at a regional level, **it has limited applicability at the project level.** MOBILE 6.2 is a trip-based model--emission factors are projected based on a typical trip of 7.5 miles, and on average speeds for this typical trip. This means that MOBILE 6.2 **does not have the ability to predict emission factors for a specific vehicle operating condition at a specific location at a specific time.** Because of this limitation, MOBILE 6.2 can only approximate the operating speeds and levels of congestion likely to be present on the largest-scale projects, and **cannot adequately capture emissions effects of smaller projects.** For particulate matter, the model results are not sensitive to average trip speed, although the other MSAT emission rates do change with changes in trip speed. Also, the emissions rates used in MOBILE 6.2 for both particulate matter and MSATs are based on a limited number of tests of mostly older-technology vehicles. Lastly, in its discussions of PM under the conformity rule, EPA has identified problems with MOBILE6.2 as an obstacle to quantitative analysis. **These deficiencies compromise the capability of MOBILE 6.2 to estimate MSAT emissions. MOBILE6.2 is an adequate tool for projecting emissions trends, and performing relative analyses between alternatives for very large projects, but it is not sensitive enough to capture the effects of travel changes tied to**

³ Lyons, S. 2007. The Massachusetts 2002 diesel particulate matter inventory. Massachusetts Department of Environmental Protection, Boston, MA. September 2007.

smaller projects or to predict emissions near specific roadside locations⁴
(emphasis added).

And from a FHWA presentation,⁵ “In FHWA’s view, MOBILE6.2 is **not sufficient for**: characterizing MSAT emissions from small projects, predicting emissions at any one specific location, **or producing *absolute* MSAT emissions estimates for use in a dispersion model** (or the remaining steps of the risk assessment process).”

Despite such commonly held knowledge about the inadequacy of this approach, it is exactly the one adopted for the truck emissions modeling in the FEIR: emissions estimates from MOBILE6.2 were used in a dispersion model. MassDEP should thus request a credible third-party review of the modeling data if sufficient expertise can not be found in-house.

The emissions coefficient for 60,000 lb trucks appears unreasonably low

In the FEIR, the emissions coefficient used to represent the diesel particulate matter produced per mile traveled is 0.2903 grams per mile per truck for the HDDV8B class.⁶ The FEIR states that this emissions factor is for exhaust emissions, only, and does not take into account an additional 13 percent of emissions of total PM₁₀ that occurs primarily from brake and tire wear described in the MassDEP inventory of diesel emissions.⁷ DEP should enquire as to why the emissions factor did not account for these contributions.

One significant problem with the modeling conducted by Tech Environmental is that input files are not included in the FEIR, making it impossible to properly evaluate the assumptions behind the modeling. DEP should require that these modeling input data be provided and made public, and further should require such input data be included in *all* impact reports. That being said, even the modeling output data provided in the FEIR is incomplete. The model output for MOBILE6.2 presented in the FEIR includes modeled emissions factors for the class of HDDV vehicles as a whole (i.e., the weighted averages for all classes of trucks 8,500 lbs and above),⁸ but does not include similar detailed model output for the HDDV8B class of trucks which has dramatically higher emissions than the overall HDDV group, and which is the only class proposed to be used by the proponent. These model output data should be fully provided to DEP and the public.

Modeling has not been conducted for the actual maximum number of trucks

In sworn testimony during the DTE/DPU hearing, Russell Biomass lead developer Peter Bos stated that the actual maximum number of trucks per day could be as high as 120,

⁴ Federal Highway Administration website: Appendix C- Prototype language for compliance with 40 CFR 1502.22 (available at <http://www.fhwa.dot.gov/environment/airtoxic/020306guidapc.htm>)

⁵ available at <http://www.uic.edu/depts/cme/conferences/msat/Presentations/Uncertainties%20in%20MSAT%20Analysis.ppt#16>

⁶ Appendix K of the FEIR (p. 82 of the pdf)

⁷ Lyons, S. 2007. The Massachusetts 2002 diesel particulate matter inventory. Massachusetts Department of Environmental Protection, Boston, MA. September 2007.

⁸ Appendix K of the FEIR (p. 89 of the pdf)

and not 83, as was modeled in the truck emissions study. The WERO DEP should request this testimony from hearing officer Kathryn Sedor as it reviews comments on the air quality permit, and to the extent that modeling is revisited, model runs should take into account the true maximum number of trucks per day. However, this in no way absolves DEP of the responsibility to determine a more credible modeling approach that does not rely on MOBILE6.2, which is discredited for this type of application.

The permitting process as a whole is not protective of human health and the environment

In addition to its well documented effects on respiratory function, diesel particulate matter is considered a likely human carcinogen by the EPA.⁹ The RfC of 5 µg/m³ is set for respiratory impacts; however for cancer effects, there is no safe level, because EPA has not been able to identify a threshold below which DPM is “safe”. As stated in the MassDEP diesel emissions study, “Studies have not found a safe exposure level for PM_{2.5}; in other words, exposure to even small amounts of PM_{2.5} is associated with adverse health effects”. Further,

“Exposure to PM has been causally linked with increased mortality from cardiopulmonary diseases and lung cancer. Studies show that heart attacks may be linked with very brief exposures of less than 24 hours. Other health effects include lung damage, respiratory distress, and exacerbation of bronchitis and existing allergies. Population groups that are especially susceptible to the health effects associated with PM exposure include the elderly, children and people with existing heart disease, lung disease and diabetes.”

Reading this thoroughly researched and well-written document, one gets the impression that MassDEP is concerned about alerting citizens to the dangers of diesel emissions and protecting them against particulate matter impacts. The citizens of Russell may well wonder why the state didn't do a better job of protecting them from these impacts if the plant is built and they see **more** trucks and **greater** impacts than were promised by the proponents (as well as being indirectly promised by DEP through the agency's uncritical acceptance of questionable modeling.)

Russell Biomass air emissions in the context of air quality in Massachusetts

If you had to pick the single worst place in Massachusetts to increase emissions of ozone precursors and PM_{2.5}, Hampden County would probably be it. While the state as a whole is considered to be out of attainment for ozone standards, Hampden County is especially notable for exceeding the new national air quality standards for ozone based on 2003-2005 data,¹⁰ and particulate matter levels in the county frequently exceed safe

⁹ U.S. Environmental Protection Agency (EPA). (2002) Health assessment document for diesel engine exhaust. Prepared by the National Center for Environmental Assessment, Washington, DC, for the Office of Transportation and Air Quality; EPA/600/8-90/057F. Available from: National Technical Information Service, Springfield, VA; PB2002-107661, and <<http://www.epa.gov/ncea>>. From p. 590: The available evidence indicates that chronic inhalation of DE is likely to pose a lung cancer hazard to humans”

levels. Yet the proponents' claims that air quality impacts to the area will be negligible have apparently been swallowed whole in the permitting process.

Already, Massachusetts has multiple days when it is out of compliance with air quality standards – in fact, just today (July 8, 2008) ozone levels in the whole of Central Massachusetts reached “Moderate” and “Unhealthy for Sensitive Groups” levels, with “sensitive groups” being defined as “people with lung disease, such as asthma; children and older adults; and people who are active outdoors”. This classification appears to include just about everyone except, it seems, the people sitting in air-conditioned offices making decisions about the future of air quality in our state.

Permitting a major new source of tropospheric ozone-forming compounds and particulate matter should take into account that ground-level ozone is projected to increase significantly under climate warming, even without new emission sources. There is absolutely no mention of this fact in any of the documentation pertaining to the plant, and apparently little concern on the part of DEP that a meaningful margin of safety be included in the modeling. It is particularly ironic that biomass energy, which ostensibly seeks to reduce greenhouse gas emissions with claims of carbon neutrality, actually ends up being not only a massive source of greenhouse gases but also increases atmospheric ozone and particulate matter concentrations.

The proponents claim, and DEP apparently believes, that purchasing offsets for NO_x and other compounds that promote ground-level ozone formation will lead to an overall reduction of ozone levels in the Russell area. To this we say, prove it. Even if offsets work regionally (and they appear from where many people sit to be an elaborate shell game) there is little reason to believe they will serve to improve air quality in the inversion-prone, steep-sided river valley where Russell is located. In fact, the argument that ozone is a regional problem, and that within-county emissions have little effect on local ozone levels, does not appear to carry much weight with EPA, which explicitly identifies in-county emissions of NO_x and VOCs in its justification for county non-attainment rankings for ozone.¹¹

While the state appears as a whole to be in attainment with the new PM_{2.5} standard of 35 µg/m³, the average of the 15 air quality measuring stations reported by the governor to EPA is 29 µg/m³, still a relatively high value. With regard to the state's status, the Governor acknowledges that “our citizens are still vulnerable to the health effect of particulate matter at the concentrations currently measured on many days in Massachusetts and across the region.... Therefore, Massachusetts will continue to aggressively control its sources of fine particulate matter in the future through a variety of programs.”¹² Acknowledging that the state sits on the threshold of non-attainment, the proponents for the Russell plant assert in the FEIR that “If the US EPA lowers the PM_{2.5}

¹⁰ EPA, 2008. National ambient air quality standards for ozone. Presentation to the Massachusetts State Implementation Plan Steering Committee, April 29, 2008.

¹¹ EPA, 2004. Technical support for state and tribal air quality designations and classifications, Chapter 3. Available at <http://www.epa.gov/ozonedesignations/documents/tsd/ch3.pdf>

¹² Letter from Governor Deval Patrick to EPA, available at <http://www.epa.gov/pmdesignations/2006standards/rec/region1.htm>

NAAQS again in its next air standards review cycle, it is possible that western Massachusetts, which is now an attainment area for PM_{2.5}, might become a non-attainment area”¹³

Greenhouse gas emissions should be included in the permitting process

Carbon dioxide production at 1,732 tons per day is not the only greenhouse gas that will be produced by the plant. The group of nitrogen compounds known collectively as NO_x can have global warming potentials (GWP) many times that of carbon: for instance, nitrous oxide has an atmospheric lifetime of 120 years and a GWP of 296 times that of carbon dioxide. Carbon monoxide has a GWP of about 3, because it promotes longevity of atmospheric methane, another powerful greenhouse gas.

The best and most credible science indicates that greenhouse gas emissions should be reduced in the next decade to avoid the most catastrophic effects of climate warming. How does biomass burning, and the associated emissions from deforestation, wood cutting, grinding, and transport over hundreds of miles in trucks that get less than five miles to the gallon qualify as reducing greenhouse gas emissions? How does building a plant with greater carbon emissions than many fossil fuel-burning plants and a lifetime measured in decades get us closer to our goal? Repeating the mantra that biomass is carbon neutral is not sufficient, because given the need for immediate reductions in emissions, this statement is only true if the carbon equivalent of all the emissions associated with biomass burning is *immediately* re-sequestered in forest plantings. MassDEP should respond to show upon what basis biomass burning for energy can be considered carbon neutral. On what basis does the agency make this conclusion?

It is of the utmost urgency that the state adopt a “reality-based” standard for what constitutes carbon neutrality and air quality impacts, starting with requiring a full accounting of greenhouse gas emissions from biomass projects – the stakes are too high for human and environmental health to be entrusted to semantic manipulations. With regard to emissions, MassDEP must truly scrutinize the assumptions and data behind the air quality modeling before allowing a precedent-setting project of this magnitude to go forward, and ensure that the Town of Russell is not be made a sacrifice area for air quality just because the state needs to achieve a certain number of so-called “renewable” fuels projects – at any cost.

Thank you for your consideration,

Mary S. Booth

¹³ Appendix K of the FEIR, p. 1 (p. 5 of the pdf)