



Technical Review of Minergy Draft Air Use Permit

Delray Neighborhood, Detroit, MI



At the request of Delray United Action Council and other citizens groups in Detroit, the TOSC program at Michigan State University has reviewed the *Draft Air Use Permit 175-00* for Minergy Detroit, LLC in Detroit Michigan. Dr. Mackenzie Davis, Professor of Civil and Environmental Engineering, directed the review, with the support of Diane Lickfelt, TOSC Project Engineer. This document is the report of the TOSC review.

The TOSC technical team previously reviewed the Minergy permit *application*, the request for a permit submitted to MDEQ in June 2000. During that review, TOSC raised several concerns and issued recommendations and comments to the community and MDEQ. The review of the application served as a foundation for TOSC's review of the draft permit, as reported here. In cases where the draft permit adequately addresses an earlier concern, there is no mention of it in this review. But concerns identified in the application review that still need to be addressed *are* included in TOSC review of the draft permit.

NON-PERMIT ISSUES (Issues not covered formally under the Clean Air Act permitting process but which TOSC recommends be addressed by Minergy, MDEQ or other agencies)

TOSC and the Delray residents are concerned about the additional pollution and risk of accident posed by using trucks as the means of transporting the sludge to the Minergy plant. Did MDEQ or Minergy consider the option of pumping the sludge through an underground pipeline? Pumping the sludge through a pipeline appears feasible because (1) the distance from the WWTP to the Minergy facility is a reasonable distance to pump and (2) the Minergy facility will be generating energy, which could be used to pump the sludge from the WWTP to the plant. Using this alternative means of transporting the sludge would eliminate truck traffic and related the safety/spillage issues, while lowering air pollution from trucks (i.e., reduce the fugitive emissions from the trucks^{*}). TOSC recommends that Minergy provide a report justifying the use of trucks for transporting the sludge.

The TOSC program promotes effective citizen involvement in environmental pollution projects by providing independent technical expertise to communities. Funded under a U.S. EPA grant, TOSC is housed in the Great Lakes and Mid-Atlantic Center (GLMAC) for Hazardous Substance Research. The GLMAC comprises three leading research universities: The University of Michigan, Michigan State University and Howard University. For more information, contact Kirk Riley at (800) 490-3890 or send e-mail to tosc@egr.msu.edu

^{*} This reduction is not related to any fugitive emissions that may come from the plant itself. Pumping of the sludge would only reduce fugitive emissions from the trucks transporting the sludge.

In the event that trucking is utilized as the means of transporting the sludge from the WWTP to the Minergy plant, there are issues that need to be addressed by Minergy and/or the City. They are:

- a. City/Minergy need a spill prevention plan so that releases of sludge during transport are unlikely (e.g., which road, shortest route, contingency plan in the event of a vehicular accident or an accidental release, etc.)
- b. City/Minergy need a spill cleanup plan to minimize exposure to public in the event of a release from the transport trucks.
- c. TOSC recommends that Minergy provide a comprehensive transport plan.

PERMIT ISSUES

1. Cooling Tower and possible air quality ramifications

The cooling tower will be the most visible aspect of the facility; it will have a “plume” on many occasions. In general, plumes associated with cooling towers are not considered a source of air pollution. However, there is no discussion in the permit of the plume characteristics or management. TOSC concerns include:

- a. the water droplet size distribution may contain a respirable fraction (particulates in a size range that permits them to penetrate deep into the lungs upon inhalation).
- b. in the presence of an inversion (cool air trapped by warm air above it that keeps pollution from dispersing) the plume may cause low visibility on nearby roadways, including such major thoroughfares as nearby Interstate-75. Also, in winter there may be potential icing problems.
- c. the plume droplets may contain contaminants such as biocides (for example, does the biocide that Minergy will use contain hexavalent chrome?).

With respect to the use of biocides, there is no specification in Minergy’s application, nor in the draft permit conditions or the MDEQ fact sheet on the chemicals that will be used in the cooling tower to maintain water quality. Preliminary information from Minergy indicates that they will use a chemical called Bulab 6057. In the information provided by Minergy, it is stated that Bulab 6057 is EPA-approved for use in open recirculating cooling towers and that the chemical is used as preservative in shampoo. The information to TOSC is vague and incomplete, and Minergy should provide a discussion on whether their cooling tower chemical of choice has any air quality ramifications.

Additionally, the draft permit conditions indicate in Special Condition #63 that “the applicant shall not operate the EUCOOLINGTOWER-1 and EUCOOLINGTOWER-2 unless the DVMISTELIM-1 and DVMISTELIM-2 respectively are installed and operating properly in accordance with manufacturer’s operation and maintenance manual [R336.1901].” However, there is no specific information on the cooling tower or the associated mist eliminator (nor was

this information in the application). This information should be provided to promote better understanding on how this equipment will be utilized and what constitutes proper design.

2. NO_x Emissions and Controls

An important issue with respect to NO_x emissions is that BACT requires the selection of *best* available control technology. The technology proposed by Minergy is not the best available: the 60% removal using selective non-catalytic reduction (SNCR) is not better than other readily available technologies, particularly a selective catalytic reduction (SCR) system. In the Appendix to the permit application, Minergy argues against SCR by stating that catalyst manufacturers would not provide quotes or performance guarantees for the proposed facility because of “fouling problems.”

With respect to alternative technology, if an SCR system is placed in the treatment train in the same location proposed for the SNCR then the conditions cited (temperature and fouling) appear valid. If, on the other hand, the SCR system were placed after the fabric filter then one would expect (1) a substantial temperature reduction to protect the fabric and (2) an elimination of the fouling issue. Was there any discussion of using SCR, a technology that can achieve removals greater than 60%, placed after the fabric filter rather than immediately after the overfire air? (NOTE: The current scheme places SCNR after the overfire air and before the dry scrubber and fabric filter.) Might the use of SCR also eliminate potential for the ammonia slip associated with SNCR? Additionally, the urea that will be used with SCNR has a potential for undesirable odors (though the lime used in the ‘downstream’ scrubber will react somewhat with the urea), whereas SCR would not have this problem. TOSC requests that MDEQ look at other process arrangements.

A related issue is Minergy’s claim that the total amount of NO_x emitted will be less than is currently being emitted by Detroit’s incinerators. Minergy’s reasoning is that its process will generate electricity, which will be used to operate their facility, thus, this amount of electricity will not need to be generated by the local utility, resulting in an overall reduction of NO_x. The trade-offs on electricity consumed by the Minergy process and electricity generated by the process are not addressed in the permit, as expected, but they are not addressed in MDEQ fact sheet either. TOSC recommends that MDEQ address this claim.

Finally, we recognize that in comparing their proposed facility to the current DWSD incinerators, Minergy used AP-42 factors to calculate both their anticipated emissions and the current emissions from DWSD’s incinerators. Given that these ‘numbers’ were calculated, emission values as reported by Minergy cannot be taken as fact, but can be seen as indicators. The emission that stands out is that of NO_x, in that Minergy’s calculations indicate that the proposed Minergy plant will emit more NO_x than the DWSD incinerators. On many occasions, citizens have asked about the visible yellow plume that is often observed coming from the DWSD incinerators and have been told that the yellow plume is the NO_x emissions. In recent meetings, citizens have also been told that there would be no visible yellow plume from the proposed Minergy facility. Why is it, when emission calculations indicate that Minergy will emit MORE NO_x than the DWSD incinerators, there is such certainty that the proposed Minergy facility will have no yellow NO_x plume? Or, will the emission limits set in the permit result in lower NO_x emissions than Minergy originally calculated? In other words, how do the NO_x

emission limits in the permit compare to the predictions Minergy made in their permit application?

3. Control of mercury, dioxin and VOC emissions

It is our understanding that the dry scrubber and the fabric filter are considered to be the control devices for mercury, dioxin and VOC emissions, as well as the primary control for SO₂ and particulate matter, respectively. Additionally, support documents in the MDEQ permit 175-00 file ** show that other technologies for the control of the combination of mercury, dioxin and VOC emissions were rejected on the basis of cost. Furthermore, the cost analysis for these control technologies is a result of computing the cost for the control of each constituent separately and then adding the costs together. However, to estimate the cost as though a separate technology would be needed for each constituent is not a reasonable approach, because many of the technologies available are capable of controlling all three of these categories. *** In adding the costs together, there is an assumption that, for example, three carbon injection units would be needed to provide control when one unit can provide control for all three of these constituents. Given that the initial cost analysis used inflated values, TOSC recommends, and MDEQ should require, that Minergy provide a new cost analysis with the knowledge that one control unit can control all of the emissions in question. **** The result will probably not show that the costs are 1/3 of the initial estimate, but they should be significantly less and, perhaps, may show that an additional control device for the mercury, dioxin and VOC emissions is, in fact, feasible.

Additionally, the cost analyses on control technologies for mercury focused primarily on the use of carbon, either as carbon injection or activated carbon powder. However, there is extensive research and testing going on with respect to control technologies and there has been considerable effort over the last decade in perfecting methods of enhancing mercury removal and developing new media/controls for mercury emissions. TOSC further recommends that more extensive research on possible new media/controls be done and reported on in Minergy's new cost analysis. The discussion should also include, as referenced above, how these newer technologies may also control dioxin or general VOC emissions.

4. Disposition of the dust collected in the fabric filter

Regardless of whether additional pollution control devices are added to enhance the control of mercury (and other) emissions, there will be mercury attached to the dust (i.e., fly ash) collected in the fabric filter. In a personal communication to TOSC from Minergy, Minergy explains that this dust will be transported by vacuum to a storage silo and the material in the storage silo will either be (1) sold for use in concrete additive, (2) disposed of in a landfill, or (3) recycled back into the process to make glass. It is this third option that concerns TOSC with respect to the mercury in the dust. The permit accounts for the mercury present in the MWWS, the coal and even the limestone but if this dust is recycled back into the furnace, there will be a fourth source

** Through a series of FIOA requests, TOSC obtained a copy of the permit 175-00 file.

*** For the purposes of this discussion, we are considering the category of VOCs as one constituent.

**** One of the references in Minergy's Revised Mercury T-BACT (2-23-01), EPA-452/R97-010, states: "In addition, it should be noted that for the combustion sources, the control devices described are also effective in controlling other pollutants."

of mercury going into the furnace that is unaccounted for in the permit. Therefore, TOSC recommends that either calculations be redone to assess the effect the dust mercury may have on mercury emissions and make appropriate changes to the permit (e.g., analyzing the dust at the same frequency that the other sources are analyzed for mercury), or that the option of recycling the dust back into the furnace be eliminated such that Minergy would only sell the fabric filter dust as a concrete additive or place it in a landfill. For these two options, TOSC is assuming that Minergy will perform the appropriate analyses to be certain the dust is disposed of in the appropriate landfill and that it would not create a hazard to the environment by adding it to concrete.

5. Permit, page 9, Special Condition 11

For the statement “Applicant shall not burn more than 662.4 tons of MWWS,” no moisture content is specified. It is not clear whether the value of 662.4 tons is a dry-weight.

The 662.4 tons per day (tpd) is the capacity of the Minergy facility. What is the sludge generation rate of the Detroit WWTP? What is the potential (amount of sludge in tons per day) of bringing sludge from facilities other than Detroit WWTP?

6. Permit Fact Sheet, page 6, paragraph B. Air toxics

TOSC questions the statement, “In addition, the mixture does not suggest that substances may act in an additive way, or add to the existing background levels of key urban air pollutants, such as acrolein and manganese...”

It is not clear in the permit why there is a conclusion that the substances “do not act in an additive way.” It is our understanding that under current EPA toxicological analysis, summation of the cancer risk and summation of the hazard index are the default option for analysis. Is there a new approach?

On June 8, TOSC received a copy of the risk assessment done by MDEQ (**Risk Assessment Summary for the Proposed Minergy Facility**). Within the document, the questions about substances not acting in an additive way with respect to cancer risk and the hazard index are addressed. It is clear in sections Aggregate Exposure and Risk Assessment and Cumulative Exposure and Risk Assessment that the MDEQ applied the appropriate method in evaluating both the ways in which Minergy’s emissions may add to the levels of the same substances already present in the ambient air, and the potential additivity of the substances by calculating first the hazard quotients and then the overall hazard index. The statements from the Fact Sheet (referenced above) are the conclusions of these two analyses.

7. Permit, page 5.

Something is missing in last line at bottom of page, the 8th footnote to Table 2. It reads, “Applicant shall monitor, record the and the calculated hourly mass emission rates...”

8. Permit, page 6

The latter portion of footnote 8 for Table 2 states, "...stack performance testing from the EUGLASSFURNACE on a continuous basis in a manner..." It is not clear how one does stack testing on a continuous basis. Some time interval between stack tests is usually specified. Is the interval included in the annual testing? Or does that statement mean the calculation is continuous?

9. Permit, page 7

Why is there no requirement for verification of operating parameters for carbon monoxide (CO) emission in Table 3? Is it covered elsewhere? Every other Criteria Air Pollutant is covered in the table.

10. Permit, page 9, Special Condition 12

The amount of coal specified in special condition 12 is 637.1 tons of coal per day. Given that the amount of sludge is 662.4 tons per day, the facility will burn almost as much coal per day as sludge per day; the facility is a coal burner as much as a sludge burner. In the estimation of emissions, have DEQ/Minergy taken into account that the facility will burn as much coal as it burns sludge?

Given the amount of coal required, why is this plant coal fired, and not natural gas? Did MDEQ receive information from Minergy that explains the use of coal?

11. Permit, page 9, Special Condition 14

The draft permit states, "applicant shall provide technical information and calculations demonstrating the minimum temperature and residence time of the combustion zone." These data should be available, given that they are crucial in the determination of the time/temperature for dioxin destruction, a major source of community concern. TOSC requests that DEQ/Minergy supply the data.

12. Permit, page 11, Special Condition 17

This sentence is confusing: "The lime injection system shall be equipped with an audio alarm...when the primary indicator level drops below 110 percent of the minimum compliance level." What is the "primary level indicator?" What is it indicating? Why 110%?

Within Special Condition 17 there is reference to a screw feeder setting. Because a screw feeder setting is in rotations per minute (rpms), and even if the equipment failed the feeder could turn without any lime going through, this is really a secondary indicator. A better choice would be the use of a weighing belt feeder that could provide a measure of the mass feed rate. Mass feed rate on this kind of feeder would be primary. If a screw feeder is used, a better indicator should be chosen.

13. Permit, page 11, Special Condition 18

The second paragraph begins: “Within 60 days following completion of the second annual stack test required under Special Condition No.7, applicant shall provide to (AQD) a report describing the results of an evaluation of the mercury...the report shall include...(b) a statistical evaluation of any measurable trend in MWWS mercury concentrations. Later, in Special Condition 29: “Applicant shall analyze the MWWS and coal...of the following toxic air contaminants, in ppm, by weight, on an as fired basis during each stack test for the EUGLASSFURNACE... mercury. Thereafter, the applicant shall perform these analyses for the MWWS and the applicant shall perform sulfur and mercury analyses for coal at least once per calendar month.” ‘Thereafter’ is poorly defined and it could be interpreted that MWWS analysis is done at the same time as the stack testing leading to the conclusion that after the second annual stack test there may only be two MWWS mercury analyses on the MWWS, as well, and a statistical analysis cannot be performed on just two samples. However, #29 could be saying that monthly analysis of MWWS is required from the beginning and then 18.b. makes sense, but there is still a problem. Since there are important correlations to be drawn between the mercury concentrations in the MWWS (and other fluxes) and the mercury emissions (18.d.), there needs to be more frequent sampling so that statistical analysis can be performed on the emission data as well. Two annual samples, as stated before, are not sufficient to perform a statistical analysis. TOSC recommends that the permit be modified to require collection of stack samples for analysis of mercury once per calendar month.

14. Permit, page 20, Special Condition 40

This condition specifies that the applicant is to demonstrate the maximum heat capacity input, but does not define “maximum heat capacity input,” nor specify HOW or WHEN this demonstration is to be done. How will it be demonstrated? Will data on this parameter be submitted before permit to install is issued? In other words, is it to be submitted before construction begins? Does this relate to a limit on the feed rate of the fuel? This is important information, and like Special Condition 14, why are these data not already available?

15. Data affecting permit emission limits

The MDEQ Risk Assessment Summary for the Proposed Minergy Facility states on page 9 that “the ambient air impact level may also be looked at as an incremental increase over the existing ‘background’ ambient air levels (and) such data are not available for the specific impacted area.” This leads to the conclusion that the existing ambient air monitor data did not include current dioxin concentrations. It is our understanding that ambient air monitoring will not be required of Minergy, the reason being that the current local ambient air monitors will be sufficient. The question that arises, then, is how can these monitors be sufficient if they were unable to supply dioxin data to be used in the risk assessment?

Additionally, with respect to the risk assessment, if any new data (especially if it is specific to the Detroit area) comes to light, TOSC recommends the risk assessment be redone using the new information.