

August 26, 2024

Dr. Michelle Taylor, Health Officer  
*Via Electronic Mail:* [Michelle.Taylor@shelbycountyttn.gov](mailto:Michelle.Taylor@shelbycountyttn.gov)  
Shelby County Health Department  
814 Jefferson Avenue  
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**RE: xAI's Turbines Likely Require Air Permits**

Dear Dr. Taylor:

We are writing on behalf of Memphis Community Against Pollution, Young, Gifted & Green, Sierra Club Chickasaw Group, and Sierra Club Tennessee Chapter to raise concern regarding xAI's potential violations of the Shelby County Code and Local Implementation Plan for failure to obtain required air permits.

Air quality monitoring data shows that levels of ground-level ozone, also known as smog, in Memphis once again exceeded the National Ambient Air Quality Standard in 2023—for the third year running—and that the metropolitan area is on track to exceed the standard once again in 2024.<sup>1</sup> In other words, Memphis residents currently breathe unhealthy air, and the problem is worsening.<sup>2</sup> Exposure to ozone pollution aggravates lung diseases such as asthma, emphysema, and chronic bronchitis and increases the frequency of asthma attacks.<sup>3</sup> Children are the most vulnerable to the harmful effects of ozone pollution.<sup>4</sup>

Against this background of untenable levels of smog, Elon Musk's artificial intelligence supercomputer project, xAI, recently sprung up in southwest Memphis. This plant requires an enormous amount of electricity. To meet its demand immediately, xAI has installed at least 18 gas combustion turbines over the last several months (with more potentially on the way<sup>5</sup>), including four 16 MW SMT-130 turbines from a company called Solar Turbines, as well as at

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<sup>1</sup> Data from 2021 through 2023 is from Tennessee Department of Environment & Conservation's October 2023 presentation, showing that the 4<sup>th</sup> highest annual ozone reading has exceeded the 0.070 ppm NAAQS standard each year since 2021. Presentation of Michelle Owenby, Director, Tennessee Air Quality and Division Update, Tennessee Environmental Conference, 7 (Oct. 23-25, 2023) (Attachment A). 2024 preliminary data is from EPA's Interactive Map of Air Quality Monitors, showing the Marion monitor in Crittendon, Arkansas (within the Memphis MSA) reading 0.072 ppm.

<sup>2</sup> A graphic created based on ozone exceedance data from 2014 to 2023 demonstrates there were almost 20 ozone-exceedance days in Memphis in June of 2023, far higher than any previous month stretching back to at least 2014. Graphic Created by Rodney Cuevas, Air Quality Branch Manager, Miss. Dep't Env'tl Quality (May 13, 2023) (Attachment B).

<sup>3</sup> EPA, *Health Effects of Ozone Pollution*, <https://www.epa.gov/ground-level-ozone-pollution/health-effects-ozone-pollution> (last updated Apr. 9, 2024).

<sup>4</sup> *Id.*

<sup>5</sup> It appears the company has three additional turbines on site that are not yet operating.

least 14 smaller gas turbines reportedly with 2.5 MW capacity each.<sup>6</sup> These turbines together have the capacity to emit about 130 tons of the ozone-precursor nitrogen oxides (NOx) per year, ranking the turbines as the 9<sup>th</sup> largest source of NOx in Shelby County.<sup>7</sup>

Despite installing nearly 20 gas turbines with a combined capacity of about 100 MW—enough electricity to power around 50,000 homes—xAI apparently has not applied for any air permits for these turbines.<sup>8</sup> As discussed below, it appears that, at minimum, the four 16 MW turbines absolutely require an air permit prior to installation and operation even if they are temporary, and we suspect the smaller turbines also trigger permitting requirements. We therefore call on Shelby County Health Department (SCHD) to verify that xAI is operating these turbines without the required air permit and bring an appropriate enforcement action for failing to obtain a permit. If xAI is indeed operating these turbines illegally without a permit, SCHD should order them to cease operations until they obtain a permit, as the agency has done as recently as 2021 for another source operating without a permit.<sup>9</sup>

### **I. xAI Failed to Obtain Required Air Permits for the Four SMT-130 Turbines Prior to Installation and Operation.**

In a recent news story about xAI's turbines, a source close to xAI explained that "the facility was being allowed to operate the turbines by right for 364 days" without needing to obtain an air permit.<sup>10</sup> The source did not say *who* had authorized the turbine's operations, and it does not

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<sup>6</sup> The make and model for the SMT-130 turbines is visible from xAI's property line. *See, e.g.*, Benjamin Naylor, photo accompanying article by Samuel Hardiman, *Permits not required for temporary xAI turbines*, the Daily Memphian (Aug. 10, 2024), <https://dailymemphian.com/subscriber/article/45589/permits-not-required-for-temporary-xai-turbines> (Attachment C). The number of turbines on the property is visible using subscription GIS satellite images available to SELC from Planet GIS (Attachment D). The make and model of the 14 smaller turbines, however, as well as their heat input capacity, are not clear. One report states that they are 2.5 MW turbines from a company known as VoltaGrid, but this was apparently sourced from satellite images from an X user unaffiliated with xAI. *See* Jowi Morales, *Elon Musk powers new 'World's Fastest AI Data Center' with gargantuan portable power generators to sidestep electricity supply constraints*, Yahoo!Tech, (July 24, 2024), <https://www.yahoo.com/tech/elon-musk-powers-worlds-fastest...>. Multiple attempts by SELC to obtain documentation regarding xAI's turbines did not result in relevant information.

<sup>7</sup> As compared to EPA's most recent National Emissions Inventory. NOx emissions calculated based on VoltaGrid's emissions guarantee of 0.155 lb/MW for the 14 smaller turbines and an air permit application for a comparable Solar Turbine 130 unit, *see* Atlantic Coast Pipeline, LLC, Marts Compressor Station Permit Application, at Attachment J, Emission Points Data Summary Sheet (Emission Point CT-01, Uncontrolled NOx emissions) (Oct. 2015). (Attachment E).

<sup>8</sup> In response to a public records request from SELC regarding the xAI turbines, on August 1, 2024, a County Attorney relayed the following statement from SCHD: "In response to 'HARRELL, SAMI PRR-7/19/24 REQUESTING RECORDS RE: 3231 PAUL R. LOWRY', there are no construction or operating applications for the stated address. In addition there are no meeting notes pertaining to the xAI project." *See also* Samuel Hardiman, *Permits not required for temporary xAI turbines*, the Daily Memphian (Aug. 10, 2024) (Attachment C).

<sup>9</sup> SCHD, Public Health Order – Immediate Cessation of Operations for Planter's Gin Company, Inc. (Dec. 20, 2021). (Attachment F).

<sup>10</sup> Samuel Hardiman, *Permits not required for temporary xAI turbines*, the Daily Memphian (Aug. 10, 2024) (Attachment C).

appear that Shelby County Health Department has made any such approval.<sup>11</sup> The source's statement appears to be a reference to the nonroad engine exemption from the Clean Air Act's definition of "Stationary Source," which in part allows for some turbines and other engines to escape permitting requirements if they are operated at a given site for less than a year and meet certain other requirements.<sup>12</sup>

Critically, however, engines or turbines that are subject to regulations under Section 111 of the Clean Air Act (New Source Performance Standards, or "NSPS") are *not* nonroad engines for purposes of being excluded from the definition of Stationary Source under the Clean Air Act.<sup>13</sup> Specifically, the Clean Air Act defines "nonroad engine" as "an internal combustion engine . . . that is not used in a motor vehicle [or] **is not subject to standards promulgated under section 7411** [aka Section 111, or NSPS]."<sup>14</sup>

In short, if an engine or turbine is subject to an NSPS standard, then it is a stationary source rather than a nonroad engine and must obtain an air permit prior to installation and operation under Shelby County's EPA-approved Local Implementation Plan (LIP).<sup>15</sup> As relevant here, turbines with a heat-input capacity greater than 10 MMBtu/hr are subject to NSPS subpart KKKK, Standards of Performance for Stationary Combustion Turbines.<sup>16</sup> In other words, any

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<sup>11</sup> SCHD has stated that it has no written records related to these turbines. *See id.*

<sup>12</sup> 42 U.S.C. § 7602(z) ("The term "stationary source" means generally any source of an air pollutant except those emissions resulting directly from an internal combustion engine for transportation purposes or from a nonroad engine or nonroad vehicle as defined in section 7550 of this title.").

<sup>13</sup> *Id.*, citing to the definition of nonroad engine in section 7550.

<sup>14</sup> 42 U.S.C. § 7550(10) (emphasis added); *see also* 40 CFR § 1068.30 ("An internal combustion engine is not a nonroad engine if it meets any of the following criteria . . . The engine is regulated under 40 CFR part 60, (or otherwise regulated by a federal New Source Performance Standard promulgated under section 111 of the Clean Air Act (42 U.S.C. § 7411)).").

<sup>15</sup> The LIP incorporates Chapter 1200-3-9 of the Tennessee Air Pollution Control Regulations (*see* Memphis-Shelby Cnty. LIP §16-77), which states "no person shall begin the construction [and "construction" includes installation, *see* Tenn. Comp. R. & Regs. 1200-03-02-.01(j)] of a new air contaminant source or the modification of an air contaminant source which may result in the discharge of air contaminants without first having applied for and received from the Technical Secretary a construction permit." *See also*, SHELBY CNTY. AIR CODE § 3-5. Although the Tennessee provision does make reference to certain exemptions listed at Rule 1200-3-9-.04 of the Tennessee State Implementation Plan, none of those exemptions apply to these turbines. Finally, the LIP also incorporates Chapter 1200-3-9-.02, which says "[n]o person shall operate an air contaminant source in Tennessee without first obtaining an operating permit." The Memphis Code has gone through multiple reorganizations since it was originally incorporated into the LIP. The language of the regulations remain the same, but the numbering has changed. Memphis Code 16-77 before the reorganization in 1985 is Shelby County Code 3-5, which is the same as current Memphis Code as listed at 9-12-14. *See* Memphis Code Compar. tbl 1985 Code; Code Compar. tbl.1967 Code; *see also*, *Air Pollution Control Code*, Shelby Cnty. Health Dep't, (last visited Aug. 21, 2024), <https://www.shelbytnhealth.com/169/Air-Pollution-Control-Code>.

<sup>16</sup> 40 C.F.R. § 60.4305. Note that although the title of this subpart references "stationary" combustion turbines, the definition of "stationary combustion turbine" is clear that portable turbines are indeed subject to the subpart. *See* 40 CFR § 60.4420 ("Stationary means that the combustion turbine is not self propelled or intended to be propelled while performing its function. It may, however, be mounted on a vehicle for portability.").

turbine with a heat input greater than 10 MMBtu/hr is subject to a Part 111 standard and is therefore subject to air permitting requirements under the CAA and Shelby County's LIP.

Each 16 MW SMT-130 turbine has a heat input capacity of about 155 MMBtu/hr,<sup>17</sup> well above the 10 MMBtu/hr threshold. It is indisputable, therefore, that these turbines are subject to NSPS Subpart KKKK. A recent air permit application for this same turbine model in West Virginia confirms both the heat input capacity and that it is subject to NSPS subpart KKKK.<sup>18</sup>

In sum, the four SMT-130 turbines are not nonroad engines that could be installed on a temporary basis without an air permit. They are instead stationary sources, and Shelby County's LIP does not elsewhere contain any exemption for temporary stationary sources that would allow their operation without a permit.

## **II. The 14 Smaller Turbines Also Appear to Require a Pre-Construction Permit.**

As to the 14 smaller turbines, we are not able to confirm their heat inputs because their make and model have not been publicly verified.<sup>19</sup> If they are indeed 2.5 MW VoltaGrid turbines as has been reported,<sup>20</sup> it appears that their heat input also exceeds the 10 MMBtu/hr threshold that would require a permit (as discussed above). For instance, we estimate their heat input at about 25 MMBtu/hr,<sup>21</sup> which is consistent with other, smaller turbines—Solar Turbine's 1.2 MW and 3.5 MW generators, for example, have heat inputs of 17 and 43 MMBtu/hr, respectively.<sup>22</sup> Another company that sells similar-sized turbines, meanwhile, calculates that its 1.6 MW turbine has a heat input of 25.7 MMBtu/hr.<sup>23</sup> Unless xAI's 14 turbines are considerably smaller than these turbines, which is unlikely given their physical size compared to the SMT-130s as well as the facility's substantial electricity demand, the 14 turbines are also subject to NSPS Subpart KKKK and therefore do not qualify as permit-exempt nonroad engines.

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<sup>17</sup> Solar Turbines, SMT130 Datasheet. (Attachment G). The Datasheet lists a heat input of 9,630 Btu/kWe-hr, and an output power of 16,000 kWe-hr (or 16 MW). We therefore calculate the total heat input as 154 MMBtu/hr, which is consistent with Solar Turbine's data on the Titan 130 turbine (the SMT-130 is the portable version of the Titan 130, which the company lists as 158 MMBtu/hr. *See* Solar Turbines, Product Handbook for Power Generation, at 4. (Attachment H).

<sup>18</sup> Atlantic Coast Pipeline, LLC, Marts Compressor Station Permit Application, at 15 (Oct. 2015) (Attachment E) (“The proposed Solar combustion turbines will be subject to the requirements of this subpart [NSPS subpart KKKK]. Subpart KKKK specifies several subcategories of turbines, each with different NOx emissions limitations. The proposed turbines fall within the “medium sized” (> 50MMBtu/hr, < 850 MMBtu/hr) category for natural gas turbines.”). The application also lists the heat input for the Solar Turbine Titan 130 turbine (the non-mobile version of the SMT-130) as having a specific heat input of 170 MMBtu/hr. *Id.* at Attachment L (pdf page 63).

<sup>19</sup> *See supra*, note 6.

<sup>20</sup> *Id.*

<sup>21</sup> This is calculated by scaling the ratio of MW-to-MMBtu from the SMT-130 Solar Turbine, i.e. the SMT-130 has a 9.7 MMBtu per MW, which as applied to 2.5 MWs results in 24.2 MMBtu/hr.

<sup>22</sup> Solar Turbines, Product Handbook for Power Generation, at 4. (Attachment H).

<sup>23</sup> Destin Energy, Data Sheet for OP16, at 3. (Attachment I).

### III. Shelby County Health Department Should Investigate and Bring an Appropriate Enforcement Action.

Given that these turbines are substantial sources of NOx and Shelby County is continuing to violate EPA’s smog standards, SCHD should investigate and bring an appropriate enforcement action against xAI for constructing and operating a significant source of air pollution without a permit. We note that Shelby County Air Code requires that “[w]henver evidence has been obtained or received establishing that a violation of this code has been committed, the Health Officer **shall** issue a notice to correct the violation.”<sup>24</sup> Moreover, if the “violation is not corrected . . . the Health Officer shall have the power and authority to issue an order requiring the violator to cease or suspend operation.”<sup>25</sup> SCHD should therefore require the turbines to cease operating until xAI obtains the required air permit (unless xAI agrees to cease operations voluntarily), as the agency has done in the past for other sources operating without a permit.<sup>26</sup>

To the extent that SCHD believes we have misinterpreted the facts or the relevant permitting requirements, we are happy to discuss.

Respectfully submitted,

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<sup>24</sup> SHELBY CNTY. AIR CODE § 3-2 (emphasis added); *see also*, Memphis-Shelby Cnty. LIP § 16-56.

<sup>25</sup> *Id.*

<sup>26</sup> See, e.g., SCHD, Public Health Order – Immediate Cessation of Operations for Planter’s Gin Company, Inc. (Dec. 20, 2021). (Attachment F).

Letter from Memphis coalition to SCHD re: xAI turbines operating without permits

August 26, 2024

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