

January 18, 2019

Catherine Andrews
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19876 Roy Road
L'Anse, MI 49946-8046

Dear Ms. Andrews:

I have completed my review of the Health Consultation Public Comment Version, Analysis of Environmental Contaminants in Air and Soil, L'Anse Warden Electric Company (LWEC), L'Anse, Baraga County, Michigan, prepared by the Agency for Toxic Substances and Disease Registry (ATSDR) on December 6, 2017. This Health Consultation Report was prepared in response to a request from the U.S. Environmental Protection Agency (EPA) Region 5 Air and Radiation Division seeking "assistance in evaluating the potential health impacts of the L'Anse Warden Electric Company (LWEC) operations on the adjacent community" (ATSDR Report, p. 5). In this Health Consultation Report, ATSDR principally focused on soil sampling data and estimated ambient air pollutant levels generated by air dispersion modeling (ATSDR Report, p.1).

The data presented in this Health Consultation Report indicate that the LWEC facility releases particulates, heavy metals including lead, arsenic and manganese, volatile organic compounds and dioxins into the surrounding community (see Table 1, ATSDR Report, p. 43). It is quite clear in this report that the air emissions from LWEC facility pose unnecessary public health risks to residents who live in the surrounding neighborhoods. Cancer risk values calculated by ATSDR exceed the generally acceptable cancer risk value of one-in-a million or 1.0×10^{-6} (ATSDR Report, pp. 21-22). Unfortunately, ATSDR dismisses these findings by saying that the estimated risk numbers pose "... a low risk for increased cancer in the L'Anse community" (ATSDR Report, p. 2). I do not agree with this comment.

In my capacity as science director at CHEJ for more than 30 years, I have had the opportunity to review many of ATSDR's Health Consultation reports. Unfortunately, this report suffers from many of the same fundamental flaws and limitations that I have seen in similar documents that greatly limit the evaluation and assessment of public health risks considered by the agency. The most significant of these flaws is the reliance on limited available environmental and health data to draw its conclusions and recommendations. I am also concerned that ATSDR failed to conduct an analysis of the cumulative risks the residents living near the power plant face and to consider how the use of limited environmental and health data impacts its analysis and

evaluation of the public health risks posed by the LWEC Facility. These and other concerns are discussed below in more detail.

1) The air emissions from the LWEC power plant pose cancer risks that exceed the generally acceptable cancer risk value of one-in-a million.

The cancer risks calculated by ATSDR for many of the contaminants found in soil exceed the generally considered acceptable cancer risk value of one-in-a million or 1.0×10^{-6} (also reported as $1.0 \text{ E-}06$) (See Appendix H, ATSDR Report, pp. 224-229). According to the Health Consultation Report, "carcinogenic PAHs and dioxins in soil were above their respective risk screening levels and warranted a more detailed evaluation (ATSDR Report, p. 18). For a total of 11 samples, the agency calculated the cancer risk from exposure to both benzo(a)pyrene (BaP) and dioxin in soil. The risks ranged from a high of $4.0\text{E-}05$ to a low of $5.6\text{E-}08$ (See Table 5H, ATSDR Report, p. 229). According to ATSDR, the highest risk found was 3.9 cancer cases per 100,000 people or $3.9\text{E-}05$ (ATSDR Report p. 19).¹ This value was found at the "L4" sampling site in L'Anse. In Appendix H, ATSDR calculated cancer risks for a child (Birth to age 21), an adult (33 years) and from birth to age 33 for each of the 11 soil samples that exceeded the screening value for either BaP or dioxin. There were a total of 99 calculations and 63 of these calculations exceeded the generally considered acceptable cancer risk value of one-in-a million.

ATSDR states that the highest cancer risk, $3.9 \text{ E-}05$ ² or approximately 4 excess cancer cases per 100,000 people, is "considered to be a low increased risk of cancer" (ATSDR Report, p, 19) without providing any support or evidence that this statement is a generally accepted conclusion. This is little more than ATSDR's opinion, a value judgement and not a fact. This statement is repeated multiple times in the report including as justification for the agency's first conclusion (ATSDR Report, p. 22). Yet at no time did ATSDR provide any scientific support or evidence to back up this statement.

While one can debate whether the 3.9×10^{-5} cancer risk number is acceptable or not, what is important to understand is that there is no single answer, no "right" answer, to the question of what the calculated risk number means. The level of risk that is acceptable can only truly be assessed by the people who bear the risks. Everyone else has just an opinion and it is disingenuous for ATSDR to define what they see as a low risk that someone else has to live with. Furthermore, the ATSDR should have included a discussion in the Health Consultation Report of the many cancer risks it derived, not just a single value. Not including other calculations does not present a fair or even realistic picture of the cancer risks residents who live around the power plant face every day.

¹ While the agency states on several occasions that the highest risk found was $3.9 \text{ E-}05$, a slightly higher risk value can be found in Table 5H on p. 229 of the Health Consultation Report. This raises questions about ATSDR's accuracy and thoroughness.

² See Footnote above.

2) ATSDR dismissed many sampling results that exceed health screening values/guidelines without justifying its decisions.

ATSDR consistently dismissed the results of contaminants identified in ambient air or soil by saying that the concentrations found were “not expected to harm people’s health” (ATSDR Report, pp. 21 and 22). For example, ATSDR found that ten of twenty dioxin samples in soil exceeded its Cancer Risk Evaluation Guide (CREG) (See Table 4, ATSDR Report, p. 14) and that nine of twenty Benzo(a)pyrene Toxic Equivalent samples in soil exceeded its Cancer Risk Evaluation Guide (CREG) (See Table 3, ATSDR Report, p. 13). Yet the agency cites only a single dioxin value as exceeding health comparison values as the basis for its conclusion that “contact with dioxins, metals, the pesticide pentachlorophenol (PCP), and polycyclic aromatic hydrocarbons in soil in L’Anse is not expected to harm people’s health” (ATSDR Report, pp. 21-22). This conclusion is not scientifically supportable.

Similarly, when discussing non-cancer risks, ATSDR dismisses developmental effects used to identify the Lowest Observed Adverse Effect Level (LOAEL) as being “less serious ... in the sense that they are not expected to cause significant dysfunction or death” (ATSDR Report, p. 18). This is an outrageous value judgement that does not belong in a scientific report evaluating the public health risks of exposure to toxic chemicals and should not be used to dismiss sampling results that exceed health screening guidelines.

3) The modeling used to estimate ambient air risks posed by the LWEC power plant underestimates the concentrations people living downwind are exposed to.

The air testing that was used to generate the air dispersion models that estimated exposure concentrations for people living downwind was limited to a small number of substances including particulates, the heavy metals lead, arsenic, manganese and nickel, 2,3,7,8-tetrachlorodibenzo (p) dioxin (TCDD), hydrogen chloride, chloride, and volatile organic compounds (VOCs). As a result, public health risks were estimated for only a handful of substances, and only from data generated from a single run of testing. The stack testing that was done was conducted under optimal operating conditions (ATSDR Report, p, 19) which is not typical and would not be expected to occur on a routine day-in and day-out basis. Furthermore, the Health Consultation Report points out that "local meteorological data were not available" (ATSDR Report, p, 20). EPA selected wind data from the town of Munising which is about 100 miles away which led to large uncertainty and "diminishes confidence regarding the geographic location(s) where air pollutants from LWEC have the highest concentrations" (ATSDR Report, p, 20). Lastly, fugitive emissions were not considered in this Health Consultation Report and were not factored into the estimated ambient air risks that people living in the surrounding neighborhoods face (See ATSDR Report, p, 19).

In addition, only average concentrations were used to estimate the ambient air risks (ATSDR Report, p, 37). Single peak concentrations were not used. The air samples that EPA modeled were a peak **average** over different periods of time such as peak 1-hour average over 5 years; peak 8-hour average over 5 years; peak 24-hour average over 5 years; and monthly average over 5 years (ATSDR Report, p. 37). The problem with this analysis is that individual high readings are ignored and that the public health evaluation is only made by comparing **average** concentrations against screening guidelines. No evaluation is made of the highest estimated ambient air concentrations. For these and other reasons spelled out in the Health Consultation Report, the "EPA's modeling results are likely underestimating particulate matter and associated chemical contaminants leaving the LWEC plant" (ATSDR Report, p, 19).

4) The ATSDR's public health evaluation including its analysis and conclusions is based on limited environmental data collected primarily by EPA.

ATSDR's public health evaluation including its analysis and conclusions is based on limited environmental data primarily provided by the USEPA Region 5 (ATSDR Report, p. 1). This data included surface soil samples from 16 private residences and public facilities in L'Anse and four background samples from Zebra, a community 4 miles north of L'Anse (ATSDR Report, p, 1) and air dispersion modeling results used to estimate exposure concentrations for people living downwind from the LWEC Facility (ATSDR Report, p, 1) that measured only a limited number of substances from a single run of testing (See discussion above).

The number of surface soil samples was limited to 16 out of 2,000 residents in the study area (ATSDR Report, p. 20). This is clearly a very small portion of the impacted area, less than 1%. The agency attempted to identify homes that were "deemed to be most impacted by LWEC" (ATSDR Report, p. 3) based on the air dispersion modeling. But as described in the section above, there are many inadequacies and uncertainties in the air modeling effort that led ATSDR to state that "it is not known whether the highest offsite contamination levels were captured in this study"(ATSDR Report, p. 20).

The air testing that was used to generate the air dispersion models that estimated exposure concentrations for people living downwind was generated from a single run of stack tests that was conducted under optimal operating conditions. The modeling was further limited by testing for only a handful of substances (ATSDR Report, p. 8); by the lack local meteorological data and the need to use wind direction data from a town about 100 miles away (ATSDR Report, p. 20); the failure to include fugitive emissions (ATSDR Report, p. 19); and the use of average concentrations instead of peak concentrations to estimate the ambient air risks (ATSDR Report, p, 37). Because of these limitations, the data provided in this Health Consultation Report has limited value for assessing public health risks. ATSDR should discuss the limitations in this data, especially in the context of whether it is adequate and sufficient to properly

evaluate the public health risks posed by the air emissions from the LWEC Facility. At a minimum, ATSDR should conduct an analysis of how only using existing available data impacts its analysis and evaluation of the public health risks posed by the air emissions from the LWEC Facility.

5) ATSDR failed to consider cumulative risks in this public health evaluation.

Perhaps the greatest flaw in this public health evaluation is ATSDR's failure to consider the cumulative risks of living near the LWEC Facility. Numerous substances were found in the ambient air and in the soil around the facility. These substances were evaluated against screening guidelines or comparison values to determine if it exceeded that guideline or not. This would have been fine if the public was exposed to a single substance or to only a handful of substances, but that is not the case. Many substances were found in the soil and air samples collected by EPA. Cumulative exposure is a measure of how the public is exposed in the real world. People are exposed to all of the chemicals simultaneously coming from the power plant for varying periods of time, continuously over that time, not just at one point in time, a moment captured by an air monitor. Unfortunately, this health consultation fails to consider cumulative risks and in fact, does not even mention it. This is a huge disservice to the people living around the facility who have asked ATSDR to evaluate the public health risks posed by living near the LWEC Facility.

6) ATSDR's use of health screening guides to evaluate soil and air sampling data is inconsistent and questionable.

There are no legally enforceable standards for determining a safe level of exposure to the toxic chemicals coming from the LWEC facility. Stated another way, there are no standards for determining when the concentration of a toxic chemical in ambient air will result in an adverse health impact on an individual. As a consequence, protecting the public's health is left to the judgment of public health officials. This judgment is limited by the scientific knowledge and understanding of how chemicals cause their adverse effects in people. Unfortunately, while we know a great deal about the toxicity of many individual chemicals, as a scientific community, we know very little about what specific level of exposure to a single chemical will result in an adverse health outcome in a person. This assessment is further complicated by simultaneous exposure to multiple chemicals, for often undetermined or unknown periods of time. Consequently, public health officials at best can provide their opinion on what health effects if any may result from exposure to a specific chemical in air.

The first step in this process is generally to identify health screening guidelines that can be used to compare to environmental sampling data. In this report, ATSDR primarily used its own comparison values – Minimal Risk Levels (MRLs); Environmental Media Evaluation Guides (EMEG); and Reference Dose Media Evaluation Guides (RMEG) to evaluate concentrations in soil for non-cancer risks and Cancer Risk Evaluation Guides (CREGs) for cancer risks – but also refers to the U.S. EPA’s Reference Concentration (RfC) and Regional Screening Levels (RSL) to evaluate cancer and non-cancer risks in air and soil; and the EPA's National Ambient Air Quality Standards (NAAQS) and the World Health Organization's Air Quality Guidelines to evaluate non-cancer risks in air (ATSDR Report, p. 9 and pp.12-13). No specific set of screening guidelines provides guidance for all of the chemicals identified in the air coming from the facility. For some of the volatile (VOCs) and semi-volatile organic compounds (SVOCs) that were identified, there are CREG values, but for many, there are no comparison values, especially for non-cancer effects.

An option that the agency might consider is the air guidance values developed by the state of Massachusetts Department of Environmental Protection called Threshold Effects Exposure Limits (TELS). These TEL values “are used to evaluate potential human health risks from exposures to chemicals in air. These guidelines are set at concentrations intended to protect the general population, including sensitive populations such as children, from adverse health effects over a lifetime of continuous exposure.”

The biggest weakness of screening guides is thinking that we know what level of exposure will (or will not) lead to adverse health outcomes. As a scientific community, we simply do not know this. So, when ATSDR writes that levels below the health screening guide are “not likely to be associated with adverse health effects” (ATSDR Report, p. 18), this statement is over optimistic about what we as scientists can deliver to the public about what we actually know about chemical exposures, especially when considering a diverse population, simultaneous exposure to a mixture of chemicals and an unclear exposure period. It's tempting to over simplify and to "sell" the public on what the numbers mean. But, in reality, public health officials are just providing their best guess, their opinion, on a very complex and poorly understood process.

Another major weakness of health screening guidelines is that they are derived from data evaluating only a single substance in isolation of exposure to any other substances. This narrow focus fails to consider simultaneous multiple chemical exposures, exposure over time (compared to a snapshot in time as reflected in most environmental samples) and any cumulative adverse health damage suffered over time. Because of these uncertainties, the default assumption when assessing the potential adverse health outcomes from exposure to chemicals should be to protect public health, first and foremost.

Unfortunately, this is not the default that ATSDR uses in its health consultation assessment and report. Instead, the agency cavalierly considers any concentration that is below a health screening guide to be a non-issue, and to pose a risk that "is not expected to harm people's health" (ATSDR Report, pp. 21-22). And when the sample results exceed the health screening guide, the ATSDR simply dismisses the finding as posing little or no risk without providing any scientific support for this conclusion. This approach assumes too much about what is known about how exposure to toxic chemicals lead to adverse effects in people. I recognize that the risk assessment process and approach used by ATSDR is the standard risk management approach. However, what's missing from this approach is a hubris in understanding what we know and what we don't know about what level of exposure will (or will not) lead to adverse health outcomes. The ATSDR approach in the Health Consultation Report does not give the public a fair nor true understanding of these complex issues.

It is also unclear what screening values were used by ATSDR in some instances. For example, the agency states that "dioxins exceeded the ATSDR health comparison value at one residence about 700 meters southeast of LWEC (ATSDR Report, p. 22). Yet in Table 4, where the results from all 20 soil samples are summarized, the dioxin concentration in 10 of the 20 samples (50%) exceeded the Cancer Risk Evaluation Guide (CREG) for dioxins (ATSDR Report, p. 14). It is not clear why the agency would say this.

7) ATSDR failed to conduct an analysis of how only using available data impacts its evaluation of the public health risks posed by the LWEC Facility.

While ATSDR does acknowledge some limitations in the data collected primarily by EPA (see ATSDR Report, pp. 19-20), they were nonetheless more than willing to draw conclusions based on this extremely limited testing. The agency fails to discuss or even acknowledge how the limited testing impacts its analysis and evaluation of the public health risks posed by the emissions from the LWEC facility. The agency also failed to provide any recommendations on the need and value of additional testing. This is an enormous disservice to the residents who live around the plant and to the public in general.

It would have been very helpful to the residents to have had the benefit of an analysis that discusses how the limited testing may underestimate or even overestimate the true daily exposures that may be occurring in the vicinity of the power plant. The public would have benefited from a discussion of what testing (where, when and for what substances) would have provided more meaningful data. Recommendations along this line would have been a valued contribution to the public understanding of the testing that has been done.

The residents invited ATSDR to evaluate the public health risks (ATSDR Report, p. 20) because there was hope if not trust that the agency would conduct a fair and honest analysis and evaluation of the public health risks posed by the LWEC Facility. This means more than simply acknowledging that the available data was limited and then drawing conclusions based on this limited testing. It means providing a balanced discussion of how the limited data impacts the analysis and evaluation of the public health risks posed by the facility.

8) ATSDR defined its objectives for this public health consultation without consulting with community leaders.

It is unclear how the ATSDR determined what the main objectives of the health consultation would be. This is critically important because these objectives drive the analysis and conclusions reached by the agency. ATSDR defines the main purpose of the health consultation as, "to evaluate the public health significance of exposures to contaminants in ambient air and surface soil in this community" (ATSDR Report, p. 1). There is no discussion of whether this objective was discussed with representatives of the community including Friends of the Land of Keweenaw (FOLK). There is no discussion of whether this objective can answer the questions the community has about the public health risks posed by the LWEC facility. There is no point in conducting this health consultation if it cannot answer the questions the community has about the public health risks posed by the power plant.

The following suggestions are offered to improve ATSDR's Health Consultation Report for the L'Anse Warden Electric Company (LWEC) Facility in L'Anse, Michigan.

- 1) ATSDR should discuss all the risk calculations, especially for dioxins and benzo(a)pyrene that exceed the generally acceptable cancer risk target value of one-in-a-million and provide scientific support for why the agency believes that those values that exceed this generally acceptable cancer risk target value are "considered to be a low increased risk of cancer."**
- 2) ATSDR should address whether the soil and ambient air samples that were used to evaluate the public health risks considered in this report were adequate and sufficient to properly evaluate the public health risks posed by the LWEC Power Plant.**
- 3) ATSDR should conduct an analysis and include a robust discussion of how only using existing available data impacts its evaluation of the public health risks posed by the LWEC Facility.**

- 4) **ATSDR should include an analysis of the cumulative health risks posed by the air emissions coming from the LWEC Facility as part of its public health evaluation.**
- 5) **The agency should expand its discussion of the cancer risk calculations to include a full range of the contaminant concentrations found in the ambient air including the highest concentrations found.**
- 6) **ATSDR should conduct an analysis and include a robust discussion of the limitations of screening guidelines and how best to use these values to evaluate the public health risks posed by the air monitoring data evaluated in this report.**
- 7) **ATSDR should recognize and discuss the scientific limitations in our understanding of the toxicity of chemicals in the Health Consultation Report. As a scientific community, we know very little about what specific level of exposure to a single chemical, let alone to multiple chemicals with continuous (or intermittent) exposures over undetermined or unknown periods of time, will result in an adverse health outcome in a person. Consequently, public health officials at best can provide their opinion on what will health effects if any may result from exposure to a chemical in air.**
- 8) **In the future ATSDR should always define its objectives for a health consultation after meeting and conferring with community leaders.**

I hope these comments are helpful. Please do not hesitate to contact me if you have any questions or if you need any additional information.

Sincerely,



Stephen Lester
Science Director