

*David L. Linhardt*

---

*403 Highlands Lake Drive  
Cary, North Carolina 27511  
Office 919/363-0498 Cell 919/608-6218  
E-mail: dlcons@earthlink.net*

March 19, 2004

Mr. George W. Bruchmann, Chief  
Waste and Hazardous Materials Division  
Michigan Department of Environmental Quality  
Constitution Hall  
525 West Allegan Street  
P.O. Box 30241  
Lansing, MI 48909-7741

Dear Mr. Bruchmann:

SUBJECT: Comments: Midland Area Soils – Scope of Work Submittal  
The Dow Chemical Company – February 17, 2004

I believe that the MDEQ has requested public comments on Dow's proposed SOW for Midland soils. I would like to provide you with comments that you may wish to consider in your assessment of the SOW.

I, and my family, resided in Midland for a number of years prior to 1994. While we no longer live in Midland, we do know a number of friends and their children still reside in the community. I have some knowledge of the operations of the Midland plant and I have maintained an awareness of the various issues associated with dioxin contamination in Midland soils and in the Tittabawassee River. I have reviewed Dow's February 17, 2004 submittal and I would like to offer these comments on the Midland soils portion of the SOW. A portion of the comments are based on research that I have carried out on Dow's historic Midland Plant waste practices in preparation for publishing a book on the impact of those practices on current dioxin levels in the community.

George Bruchmann  
March 19, 2004  
Page 2

## 1. Midland Soil Sampling – Confidence Levels

It is my understanding that Dow has proposed to sample a maximum of ten locations in each of the four areas identified north and northeast of the 703/830 incinerator complex. Based on information obtained from the New York State Department of Health, the sampling of only ten locations in the Virginia Park Area (approximately 122 acres), for example, would result in only a **0.3% probability** of detecting a locally-contaminated area approximately 126 feet long by 66 feet wide. This is based on the sampling grid for dioxins that was used by the NYSDH in assessing the extent of contamination in residential neighborhoods surrounding the Love Canal dumpsite in Niagara Falls, NY.

The residential neighborhoods immediately adjacent to the LC landfill comprised approximately 84 acres. In order to achieve a 95% confidence level of detecting an area of local contamination the size identified above, 2260 locations were sampled or approximately 27 locations per acre.

I believe that it is very desirable for the Midland residents to be assured, at least to the 95% confidence level, that their property is not heavily contaminated. To provide this level of comfort, approximately **3294 locations** would need to be sampled in the Virginia Park Area. I have not carried out similar calculations for the other three proposed sampling locations described in Dow's SOW but I would recommend that the same 27 sampled locations per acre criteria be required for all sampled areas. In addition, I would recommend some type of analysis reporting schedule be developed so that the residents in the highly contaminated areas do not have to wait until all the analysis are completed before being informed that their property may be heavily contaminated. Additional information on the 95% sampling confidence level can be found on <http://www.health.state.ny.us/nysdoh/lcanal/lceda.htm>. (Pg. 11,12 – **Dioxin (2378-TCDD) in Soil** are of most interest) If I typed the link incorrectly, or if the site has been archived, please let me know and I will mail you a hard copy of the information.

## **2. Midland Soil Sampling – Depth of Sampled Soils**

The SOW indicates that all soil samples that will be analyzed for dioxins/furans will be taken from the first 1 to 3 inches of soil. While analyzing the topmost soils is an indication of dioxin exposure that could result when residents only disturb the first few inches of soil, it is not an indication of the amount of exposure that could result from activities that disturb deeper levels of soils – such as gardening, planting of trees, shrubs, installing supports below the frost line, etc. Unknown amounts of landscaping or soil addition may have buried layers of heavily contaminated soils in the 60 to 70 years since Dow's first hazardous waste "burner" was put into operation. As you recognize, there is no guarantee that an analysis of < 90 ppt TEQ on the surface is an assurance that lower soil layers in the same location are not heavily contaminated with dioxins/furans. I believe that it is very appropriate that Dow provide some type of information to the residents as to the extent of deeper dioxin contamination so that any required mitigation efforts can be explored and eventually implemented.

Let me provide some information that addresses the potential that deeper dioxin contamination could be present in Midland. In 2001, the MDEQ sampled the flood plain of the Tittabawassee River both upstream and downstream of the Dow plant. One of the locations sampled upstream was Emerson Park. Since the Park is above the Dow dam, it would be expected that any dioxin contamination found in the Park could only be from the re-location of previously contaminated soil or from emissions from Dow's waste incinerators or powerhouses. The table below is a summary of one Emerson Park location sampled at various depths.

**Midland, MI – Emerson Park Soil Analysis**

(MDEQ, 2001)

<b><u>Sample No.</u></b>	<b><u>Depth</u></b> (inches)	<b><u>Total Dioxins</u></b> (ppt)	<b><u>TEQ-TCDD</u></b> (ppt)
EMP 2-1	1	1400	24
EMP 2-3	3	1200	29
EMP 2-6	6	2000	54
EMP 2-15	15	3600	100

As can be seen, as depth increases, the dioxin concentration increases until the 90 ppt TEQ level of concern is exceeded. It would be very worthwhile to determine dioxin levels at the surface and in deeper layers in other locations in the Park. Perhaps the City of Midland could provide addition information as to the amount of soil relocation and addition that occurred during construction of the Park. This information may be of value in better understanding why dioxin levels upstream of Dow's plant increase with depth.

However, an unanswered question remains: how many other areas of Midland are also heavily contaminated with dioxins/furans below the first three inches of soil. I believe that it is appropriate to provide the Midland residents with some type of answer to this question.

I believe that dioxin/furan levels in buried soil layers could be very high. I have carried out some very crude computer modeling of dioxin levels in Midland soils in prior years based on the 1996 Midland soil analysis. As you know, a very important variable is the environmental half-life of each dioxin and furan. My estimates of dioxin/furan environmental half-lives were based on published estimates of the environmental half-life of 2378-TCDD and published estimates of the biological half-lives of TCDD and the other sixteen most toxic dioxins/furans.

I recognize that there are a number of significant defects in the modeling but the general conclusions are valid – dioxin levels in prior years were higher than current levels – the only question is how much higher. I believe that Dow’s first “tar burner” was installed in the late 1930’s. For this reason, I did not model any levels prior to the mid-1940’s.

The table below is a summary of the results of the modeling. More information is available upon request.

	<b><u>Midland, MI – Dioxin/Furan Levels</u></b> (1996 – 1946)					
	<b><u>1996</u></b>	<b><u>1986</u></b>	<b><u>1976</u></b>	<b><u>1966</u></b>	<b><u>1956</u></b>	<b><u>1946</u></b>
<b>Total dioxin/furans, ppt</b>	<b>10,138</b>	<b>35,322</b>	<b>143,028</b>	755,434	5,380,288	46,879,732
<b>TEQ – ppt</b>	<b>66.4</b>	<b>181.9</b>	<b>761.0</b>	5,149	45,479	440,467

As can be seen from the modeling, in order for TEQ levels to be as high as measured in 1996, TEQ levels in prior years must have been much higher. Since the amounts of new dioxins/furans that were deposited in Midland in the 1980’s and 1970’s were probably low due to the air pollution control equipment that had been installed on Dow’s incinerators, the estimates for 1986 and 1976 should be reasonable. The estimates of dioxin/furan levels in 1966, 1956 and 1946 are less certain since they would have been influenced significantly by the amount of dioxins/furans that could have been deposited daily in the years when the incinerators did not have adequate air pollution control equipment.

George W. Bruchmann  
March 19, 2004  
Page 6

Without additional information as to the daily amounts of dioxin/furan deposited in Midland, accurate modeling of Midland dioxin levels back to the 1940's is extremely difficult and the 1966 to 1946 results are suspect. However, a representative analysis of Midland soils for dioxins/furans at depths greater than 1 – 3 inches at several locations is easily carried out and I would recommend that deeper soil sampling be part of the SOW.

### **3. Soil Analysis Limited to Areas North and Northeast of 703/830**

The February 17, 2004 SOW indicates that certain areas that are north and northeast of Dow's current 703/830 incinerator complex have been selected for analysis based on prevailing wind patterns. I located a Wind Rose that was developed for the proposed Midland Nuclear Power Plant based on 1975 to 1977 data. Those wind patterns indicate that the prevailing winds would carry emissions from the 703/830 incinerators to areas north and northeast of the Midland plant approximately 50% of the year and other directions to a lesser extent. If the proposed analysis of north and northeast locations indicated high levels of dioxin/furans, I would recommend that other residential areas, such as west-northwest and north-northwest of the incinerators, should also be sampled and analyzed. Perhaps, a prior understanding under what conditions the additional locations would be sampled should be included in the finalized SOW.

Dow's SOW did not address the impact that the **incineration of hazardous wastes in Dow's three powerhouses** may have had on Midland dioxin contamination patterns. From approximately July, 1960 to, possibly, as late as the spring of 1971, Dow may have incinerated waste tar streams in the Westside Powerhouse (239 Building), possibly in the Southside Powerhouse (500 Building), and possibly in the NT Powerhouse. In January 1961, Dow reported that the Midland site had incinerated up to 100,000 gallons per month of waste tars in the powerhouses and had future plans to incinerate an

estimated 200,000 gallons per month of waste tars in the powerhouses. At a density of 7.5 lbs/gal to 9.0 lbs/gal, this equates to approximately 1.5 to 1.8 million pounds per month of waste tars. In 1968, Dow reported that the Midland site was incinerating a total of 7 million lbs/month of waste tars. Based on this information, the powerhouses may have incinerated 20% to 25% of Dow's total waste tar load during this time period. Additional information on the volumes of waste tars actually incinerated in the powerhouses should be available in the MDEQ's Air Permits for these units or from Dow's historic powerhouse records.

The Westside Powerhouse was located on the west side of the river near the vehicle bridge over the river. The NT Powerhouse was demolished in 1971 and it is believed that it was approximately two to three blocks from 47 Building on the east side of the river. The NT Powerhouse was constructed in 1924-1925 and some of the boilers were converted from coal to natural gas and fuel oil at a later date. Dow acknowledged that the NT Powerhouse was a major wintertime source of dark smoke when fuel oil was being burnt. It has been my experience that an oil-fired boiler will emit only white smoke if it is properly maintained and operated. The presence of dark smoke may be an indication that hazardous waste-fuel oil mixtures were used to fire the NT powerhouse boilers. The information that the unit only produced dark smoke in the wintertime suggests that the burning of hazardous wastes was limited to the wintertime when fewer residents were out-of-doors.

The Dow article did not state if the company was aware of the hazardous nature of the emissions, including the contamination of flyash or dark smoke with dioxins/furans. In the early 1970's, Dow had not yet proposed its "Chemistries of Fire" theory. I believe that the company was not yet aware of the high levels of dioxins/furans that could be present in the flyash and black soot. I believe that The Dow Chemical Company was trying to be a "good neighbor" by incinerating hazardous wastes in the NT Powerhouse only in the wintertime.

George W. Bruchmann  
March 19, 2004  
Page 8

If hazardous wastes have been burnt in both the Westside and NT Powerhouses, additional Midland locations that were north and northeast of these units should also be sampled. These locations would include the Buttles, Ellsworth, George, Rodd, Ashman, Carpenter, Orchard Drive and the Carpenter Elementary School areas. It should be noted that prevailing winds would carry dioxin emissions from these two powerhouses to Emerson Park approximately 15% to 20% of the year. This may account for the high levels of dioxins/furans that were found in the Park.

Thank you very much for the opportunity to submit my comments on Dow's most current Scope of Work. If you need any additional information on any of these items, please contact me.

Sincerely,

David L. Linhardt

Cc: Ms. Cheryl Howe, MDEQ  
Ms. Susan Carrington, The Dow Chemical Company