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Dear UM Dioxin Exposure Study team members and advisors,

I recently received a master's degree from the University of Michigan, and am now pursuing environmental journalism. I have been following the Dow dioxin contamination issue with interest, and have some questions about the Dioxin Exposure study.

I attended the Risk Science and Communication Symposium in September, where I met a member of the study team and brought up some of my questions to her. I followed up with an email, asking if I could meet with any of the team to discuss them further. She wrote back on December 5<sup>th</sup>, saying she had asked Dr. Garabrant and the team but they were too busy, and referred me to the study's website. I have reviewed the materials available on the internet extensively, but there are still a few issues I'm hoping someone will have the time to address. I thank you in advance for your time.

It is my understanding that the results of the Dioxin Exposure Study eventually will be used to determine what areas were exposed by Dow to dioxins, and to what extent, in order to formulate policies and plans for remediation. Therefore, the amount of difference between the dioxin blood levels of the control and experimental group will be an important finding.

I know that everyone nowadays has some dioxin in their blood, being that it has become so pervasive in the environment. I understand that the goal in choosing a suitable control group was not to find a "dioxin-free" area, but one that closely matched the experimental group in terms of both demographics and exposure to dioxins (minus Dow's contribution), as measured through factors such as dioxin-producing incinerators and dioxin-containing fish.

### Fish

The Dioxin Exposure Study investigators say the referent population has no known source of dioxin exposure beyond a normal, "background" level, including no dioxin fish advisories. The "no fish dioxin advisory" attribute has been repeatedly mentioned, on the website and during public meetings such as the presentation Garabrant gave at the Risk Communication Symposium. In line with this is the fact that the 2003 Michigan Family Fish Consumption Guide that is posted on the study protocol website does not show any dioxin advisory for the Calhoun or Jackson County area. But, in following up on this:

- I spoke with Bob Day (517.335.3314) of the Michigan Department of Environmental Quality, who told me that the fish in the referent population have never been tested for dioxins. In fact, he said that only ten counties in the state have had tests run in their area, because they are very expensive.
- There is no reason to assume that if tested, the fish in the control group will be negative for detectable dioxins. In fact, there are PCB advisories for fish in two locations in Calhoun County.

An area such as this where fish have not yet been tested for dioxins would have been easy to avoid, because there are many counties in Michigan that *have* had the test.

### Incinerators

- In the DEQ's 1999 soil data ([http://www.deq.state.mi.us/documents/deq-whm-hwp-mi\\_soil\\_bkgd\\_dioxin\\_data.pdf](http://www.deq.state.mi.us/documents/deq-whm-hwp-mi_soil_bkgd_dioxin_data.pdf)), Battle Creek had the highest dioxin rating in the Lower Peninsula—almost 35 ppt—twice as high as those in the Midland area. Due to the limited number of samples taken, this data was not meant to be representative, but might have served as a red flag, considering Battle Creek's level is above the level accepted in 6 states:

Oregon	3.9
Massachusetts	4.0
West Virginia	4.1
Washington	6.7
Florida	7.0
Iowa	14

- Perhaps this is due to the fact that Jackson and Calhoun Counties have five operating incinerators between them, which is definitely on the high end (half of the counties in the Lower Peninsula have none at all—see the attached list from the DEQ, sent to me after I filed a FOIA request).
- Minus Dow's incinerators, the three counties near Midland (Bay County, Saginaw County, and Midland County) have only two: those of the Midland Sugar Company and the Monitor Sugar Company. Since the intent of the control group is to find an area with similar levels of dioxin exposure, minus Dow's, then this large discrepancy between the number of non-Dow incinerators in the control and experimental group seems important.
- Foote Memorial Hospital in Jackson County had a medical waste incinerator, which closed in 2001 (per Brian Carley, DEQ: 517.780.7843). Medical waste incinerators are known to be especially dioxin-producing. Because of the persistence of dioxin, this closing is recent enough to be a dioxin source worth considering. Al Taylor of the DEQ (517.335.4799) said dioxin tests near the Foote Hospital Medical Waste Incinerator showed 3.3 ppt and 6.3 ppt, which is above the acceptable level in allowed in Oregon, Massachusetts, and West Virginia.

## Demographics

To explore counties with similar demographics, I first tried to go to the same 2000 Census data that was posted on the study protocol (<http://www.sph.umich.edu/dioxin/Protocol/Appendix%20%20-%20Census.pdf>), but was unable to replicate the study protocol numbers. For instance, the U.S. Census Bureau site at [www.factfinder.census.gov](http://www.factfinder.census.gov) shows the average % of the population age 16+ in Michigan in the 2000 census was 22.5%, the average in Midland was 25.5%, and the average in Saginaw was 20.4%, but these numbers are more than twice as high as the numbers posted on the Dioxin Study Protocol website. What link did the study team use to check census data? I cannot find it anywhere in the protocol.

The variable which appears most likely to vary county-by-county and to affect dioxin levels is “percentage of population in manufacturing.” Using the factfinder.census.gov website I searched the state for counties similar to the experimental group in this respect. I found four counties that had 1) similar levels of % of population in manufacturing, which also had 2) a similarly low number of incinerators, and which had 3) tested fish for dioxins and found levels to be undetectable:

County	#incinerators currently operating	#incinerators closed in last 10 years*	Have fish been tested for dioxins?	1999 ppt background dioxin level per DEQ	% of population age 16+ in manufacturing
Midland	1	?		NT in Midland, but 1.8, 7.9, and 12.2 in adjacent Bay County	25.5
Saginaw	1	?		13.7	20.4
<b>Average</b>	<b>1</b>			<b>8.9</b>	<b>23</b>
Jackson	2	Foote Hospital Medical Waste incinerator	No	6.5	23.6
Calhoun	3	?	No	34.7	26.1
<b>Average</b>	<b>2.5</b>			<b>20.6</b>	<b>24.9</b>
Manistee	2	?	Yes, none detected	7.5	18.8
Monroe	2	?	Yes, none detected	2.4	25.8
Newago	1	?	Yes, none detected	NT, but 1.9 in adjacent Mecosta Cty	27.3
St. Clair	0	?	Yes, none detected	2.0, 6.5	28
<b>Average</b>	<b>1.25</b>			<b>4.1</b>	<b>25</b>

\* The DEQ says it does not keep records on incinerators that have closed.

Therefore, I am wondering why Jackson and Calhoun Counties were chosen when other counties are easily found that appear to be much more appropriate, and when so much is resting on the results. Specifically, I would greatly appreciate help in answering these questions:

1. Why is the control group identified as having no dioxin advisories when the fish there were never tested?
2. Why is the control group described as having no known source of dioxin when it has a higher than average number of operating incinerators, a recently closed medical incinerator, and a 1999 test result of higher than average dioxin soil?
3. Why are the control group counties frequently described as having been chosen because of their demographics, when four other counties that also have similar demographics appear to be far more in line with the experimental group in terms of potential sources of dioxin?

It would also help a lot to have the link to explore the census data used by the researchers. Thanks again very much for your time in assisting me in answering these questions.

Sincerely,

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\*Links used to gather census data:

% of Population age 16+ in manufacturing, average for Michigan as of the 2000 census:

[http://factfinder.census.gov/servlet/QTTTable?\\_bm=n&\\_lang=en&\\_qr\\_name=DEC\\_2000\\_SF3\\_U\\_DP3&\\_ds\\_name=DEC\\_2000\\_SF3\\_U&\\_geo\\_id=04000US26](http://factfinder.census.gov/servlet/QTTTable?_bm=n&_lang=en&_qr_name=DEC_2000_SF3_U_DP3&_ds_name=DEC_2000_SF3_U&_geo_id=04000US26)

To get to county specific data, go to:

[http://factfinder.census.gov/servlet/QTTTable?\\_bm=n&\\_lang=en&\\_qr\\_name=DEC\\_2000\\_SF3\\_U\\_DP3&\\_ds\\_name=DEC\\_2000\\_SF3\\_U&\\_geo\\_id=04000US26](http://factfinder.census.gov/servlet/QTTTable?_bm=n&_lang=en&_qr_name=DEC_2000_SF3_U_DP3&_ds_name=DEC_2000_SF3_U&_geo_id=04000US26)

For example, to see % of Population age 16+ in manufacturing for Jackson County:

[http://factfinder.census.gov/servlet/QTTTable?\\_bm=y&\\_tree\\_id=403&\\_caller=geoselect&\\_BucketID=NO&\\_context=qt&\\_type=null&\\_all\\_geo\\_types=N&\\_Tables=\(DEC\\_2000\\_SF3\\_U\\_DP3\)&\\_subject=Labor%20Force%20Status%20\(Employment%20and%20Unemployment\)&\\_redoLog=false&\\_EC\\_NAME=NO&\\_lang=en&\\_geo\\_id=05000US26075&\\_ExpandSubject=NO&\\_CONTEXT=qt&\\_format=&\\_what=6&\\_search\\_results=01000US&\\_ds\\_name=DEC\\_2000\\_SF3\\_U&\\_qr\\_name=DEC\\_2000\\_SF3\\_U\\_DP3&\\_table=\(DEC\\_2000\\_SF3\\_U\\_DP3\)&\\_WhatTable=gct.&\\_ExpandItem=NO](http://factfinder.census.gov/servlet/QTTTable?_bm=y&_tree_id=403&_caller=geoselect&_BucketID=NO&_context=qt&_type=null&_all_geo_types=N&_Tables=(DEC_2000_SF3_U_DP3)&_subject=Labor%20Force%20Status%20(Employment%20and%20Unemployment)&_redoLog=false&_EC_NAME=NO&_lang=en&_geo_id=05000US26075&_ExpandSubject=NO&_CONTEXT=qt&_format=&_what=6&_search_results=01000US&_ds_name=DEC_2000_SF3_U&_qr_name=DEC_2000_SF3_U_DP3&_table=(DEC_2000_SF3_U_DP3)&_WhatTable=gct.&_ExpandItem=NO)