The Framework For A Proposed Agreement Between the State of Michigan and The Dow Chemical Company (“Framework”) must be viewed as a “disappointment” for many Midland City residents and Tittabawassee River residents that have been and still are being exposed to high levels of dioxins and furans. The “science” that formed the basis for the “Framework” appears to be questionable and only limited corrective action will occur in 2005.

In the context of this analysis, the term “Framework” is intended to mean the signed agreement plus the Interim Response Activities Work Plans (January, 2005) for Midland Area Soils and the Tittabawassee River Floodplain.

The “Framework” was developed and agreed to by the MDEQ and The Dow Chemical Company without public comment and input.

IMPACT ON CITY AND RIVER RESIDENTS:

1. The “Framework” criteria for any mitigation activity, including the very needed residential cleanup and even the Communication packages has been established at 1000 ppt-TEQ rather than the State of Michigan criteria of 90 ppt-TEQ. Although 1000 ppt-TEQ is described as “the initial priority for interim, short term activities to mitigate [dioxin] exposure”, this is clearly a set-back for residents that are exposed to potentially harmful levels of dioxins, even though environmental dioxin levels are below 1000 ppt-TEQ.

2. To date, dioxin levels have been measured in only a few locations that are very small in number in comparison to the large number of city and riverside locations where dioxin exposure has occurred. As a result, many residents do not known the extent of dioxin contamination in their properties or immediate neighborhoods.

Under the terms of the “Framework”, no additional testing of Midland dioxin levels will occur in 2005 unless the soil sampling and testing is an integral part of Dow’s bio-availability study or if Dow chooses to sample “Priority 1” locations so as to remove the location from the “Priority 1” list of properties.
The “Framework” indicates that additional sampling and measurement of dioxin levels in river sediments and floodplain soils are proposed but no details are provided including whether floodplain samples will be carried out at the “95% probability level” – 30 sampled locations per acre.

The “Framework” indicates that portions of the Saginaw River will be analyzed to further clarify the high levels of dioxins recently discovered in the Saginaw River. It is anticipated that “further clarification” may entail several years.

**IMPACT ON CITY RESIDENTS:**

1. The “Framework” will only reduce dioxin exposure in three very small neighborhoods while a larger more populated area with similar levels of dioxin contamination has been excluded from the immediate action portion of the “Framework”.

2. Although the “Framework” provides for both warning signs and mitigation and “enhancement” activities in four (4) dioxin contaminated recreational areas along the river, the “Framework” does not require any informational or warning signs or “exposure mitigation” activities in Midland recreational areas. As a minimum, it was expected that further dioxin measurement would be carried out in Midland recreational areas based on the time spent in these areas by children.

**IMPACT ON TITABAWASSEE RIVER RESIDENTS**

1. The “Framework” will only reduce dioxin exposure in the residential areas of properties where the home or yard close to the home was inundated during the March, 2004 flood (a flood expected to occur once in every 7 to 10 years). Should a similar flood occur in 2005, Dow will remove mud/dirt from the interior of the residential buildings and will remove sediment deposited by floods on paved surfaces. The “Framework” does not provide any reduction in dioxin exposure in other parts of the riverside properties (further away from the homes) that are
known to have dioxin levels greater than 1000 ppt based on previous DEQ measurements.

The “Framework” is deficient in the following areas:

“FRAMEWORK” DEFICIENCIES – CITY OF MIDLAND

1. In 2004, the DEQ identified four (4) neighborhoods that warranted Interim Response Activity (IRA) based on known or suspected levels of dioxin contamination. The “Framework” identified three of the four neighborhoods as Priority 1 IRA’s. However, the most populated neighborhood – the Virginia Park, the Maryland Park and the Parkwood Park area – was not selected as a Priority 1 IRA area. In fact, this area, bordered by Eastman Drive on the North, Swede Road on the East, E. Patrick Road on the South and S. Saginaw Road on the West, was not even identified as a lower priority IRA.

Neither the three selected IRA neighborhoods nor the excluded Virginia Park neighborhood have been heavily sampled but limited sampling has shown similar levels of dioxin contamination. One location in the excluded Virginia Park neighborhood was found to have an estimated dioxin level of 510 ppt-TEQ. The same dioxin level (510 ppt-TEQ) was estimated to be present adjacent to a Priority 1 IRA – the “Neighborhood East of Corning Lane”. In 1998, Dow and the DEQ found dioxin levels as high as 588 ppt-TEQ at Dow’s Corporate Headquarters – a location adjacent to the Virginia Park neighborhood. The “Framework” failed to provide any explanation as to why the more heavily populated neighborhood was not selected to receive mitigation efforts to reduce dioxin exposure.

The three neighborhoods that were selected as Priority 1 IRA’s are shown on Figure 1. The excluded Virginia Park neighborhood and dioxin levels measured by the EPA and DEQ are also shown on the map.
Dioxin levels degrade with time, provided that no additional amounts are added each year. Based on the operating history of Dow’s chemical waste incinerators, it is believed that dioxin levels in the city peaked in the 1968 time period after which the amounts of dioxins deposited on the city were dramatically reduced by the
construction of a new chemical waste tar burner (830 Bldg.) and the installation of improved air pollution control equipment on the company’s waste incinerator (703 Bldg).

Based on estimates of the half-lives of the dioxins and furans that are included in the TEQ “family” of dioxins, it is possible to estimate dioxin levels in prior years. Table A is an estimate of dioxin levels in the Virginia Park neighborhood and at the company’s corporate headquarters based on measurements taken in 1984 and in 1998.

Table A

<table>
<thead>
<tr>
<th>Estimated Levels of Dioxin</th>
<th>Virginia Park Neighborhoods, Dow Center (ppt-TEQ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virginia Park Dioxin Levels (510 ppt-TEQ, 1984)</td>
<td>110   250   510   1165  3070  2705  2085</td>
</tr>
<tr>
<td>Dow Center Dioxin Levels (588 ppt-TEQ, 1998)</td>
<td>385   780   1585  3630  9560  8430  5074</td>
</tr>
</tbody>
</table>

Estimates based on dioxin half-lives

As can be seen, it is possible that dioxin levels in the Virginia Park neighborhoods and the Dow Center exceeded the 1000 ppt-TEQ action level for approximately 40 years.

2. Even though the “Neighborhood East of Corning Lane” has never been sampled and analyzed to determine dioxin contamination, this neighborhood was selected on the following basis: “the MDEQ believes that properties close to and downwind of the Dow Midland Plant Site are those most likely to contain levels of dioxins and furans in soil above the ATSDR action level. These properties are identified on Attachment A [Neighborhood East of Corning Lane is included] and are presumed to contain
levels of dioxins and furans above the ATSDR action level [1000 ppt-TEQ] and hence are the focus of interim response activities required by this IRA."

The “Framework” ignores that prevailing winds deposit dioxins and furans in more Midland neighborhoods than just the three neighborhoods selected for immediate action. Based on prevailing wind information gathered during March, 1975 to February, 1977 in support of the nuclear power plant that was to be located across the river from Dow’s waste incinerator complex, there are several Midland neighborhoods that should have high levels of dioxins based on prevailing wind directions. Information on some of the Midland neighborhoods most likely affected by dioxins being carried by the prevailing winds is shown in Figure 2.

Prevailing winds will carry emissions from Dow’s chemical waste incinerator complex to the Corning Lane neighborhoods approximately 10% of the year and from the Dow incinerators to the Wexford Avenue neighborhoods approximately 6% of the time. If prevailing wind direction is a major select criteria, then the Virginia Park neighborhoods should have been selected for immediate interim response since prevailing winds have carried emissions from the incinerator complex to the Virginia Park area approximately 8% of the year – a greater length of time than the 6% of the year associated with the Wexford Avenue neighborhood.

The “Framework” appears to assume that high levels of dioxin deposition will stop at the northern boundary (E. Lyon Road) of the Wexford Avenue IRA since the more populated neighborhoods just across the street are not included in any interim mediation activities.

Rather than assume that high levels of dioxins are only associated with three very small neighborhoods based on prevailing wind directions or distances from the chemical waste incinerators, additional sampling required to identify all areas of concern should have been part of the “Framework”.

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1 Midland Area Soils Interim Response Activities Work Plan, January 2005
As can be seen, the Dow Corning Plant is directly east of Dow’s incinerator complex. The prevailing wind duration (10% of the year) is the same as the Corning Lane neighborhoods but the DC Plant is much closer. It would be expected that dioxin levels in the DC Plant would be much higher than those found in the Corning Lane area (510 ppt-TEQ, 1400 ppt-TEQ). The DEQ reported that a location on the eastern side of Dow’s Midland plant had a dioxin level of 6100 ppt-TEQ. The location is shown on Figure 2. It is not known if Dow Corning ever sampled and
analyzed locations to determine the level of dioxins that are present inside its property lines so as to determine potential dioxin exposure to its employees. The “Framework” does not address this issue.

3. Dioxin levels vary widely throughout the city and are influenced by wind speed and prevailing wind direction. The “Framework” has assumed that the only source of dioxin emissions is the incinerator complex at Dow’s Midland plant. The DEQ has based its decision as to which dioxin contaminated neighborhoods should be IRA’s based, in part, on this assumption. However, an analysis of the dioxin levels by wind direction indicates that it is possible that there were at least two sources of dioxins – the current incinerator complex and a tar burner much closer to the Midland city residents.

Table B is a summary of calculations carried out to determine the annual emission rate of dioxins based on soil dioxin levels, prevailing wind direction, and distance from Dow’s incinerator complex. The calculations are based on a modified Gaussian Plume Model commonly used to calculate ambient air pollution levels downwind from an emission source.

**Table B**

**Dioxin Emission Calculations**

<table>
<thead>
<tr>
<th>Neighbourhood</th>
<th>Prevailing Wind</th>
<th>Distance Mi.</th>
<th>Avg. ppt-TEQ</th>
<th>Calculated Emission Rate (1)</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corning Lane</td>
<td>10%</td>
<td>1.22</td>
<td>1.96</td>
<td>552</td>
<td>3.35</td>
</tr>
<tr>
<td>Virginia Park</td>
<td>8%</td>
<td>1.90</td>
<td>3.06</td>
<td>209</td>
<td>3.44</td>
</tr>
<tr>
<td>Wexford Avenue</td>
<td>6%</td>
<td>1.48</td>
<td>2.38</td>
<td>638</td>
<td>11.38</td>
</tr>
</tbody>
</table>

(1) gm/m³ - modified Gaussian Plume Model; assume that ppt-TEQ is equal to ambient air composition

Based on the parameters for the Corning Lane and Virginia Park neighborhoods, the model predicted annual dioxin emission rates for these two locations that are essentially equivalent, indicating that both locations were influenced by the same source of dioxin emissions. However, the model indicates that annual dioxin
emission rates associated with the Wexford Avenue location must be approximately three (3) times higher than the other two locations to result in soil dioxin levels that averaged 638 ppt-TEQ. This suggests that the Wexford Avenue location was influenced by more than one dioxin emission source.

The company has reported that waste tars were incinerated in the Midland plant powerhouses in the 1960’s. One Dow article suggests that waste tars may also have been burnt in a powerhouse in the 1970’s.

“Waste Tar Provides Powerhouse Fuel”

“Increased waste tars posed a disposal problem to the Midland Division and raised the possible need for an additional tar burning facility at the tar incinerator. The problem also could have led to use of the old vertical tar burner, which created air pollution problems due to poor combustion.”

“..... Power Dept. [management]... and Waste Control [management]... followed through to produce a waste tar blend suitable as a powerhouse fuel.”

“To make the blend, waste tars are mixed with an appropriate volume of recovered oil from the Bay Plant.”

“The first 10,000 gallons of waste tar blend was used in the West Side Powerhouse on July 12, 1960. Since then 100,000 gallons of waste tars per month have been utilized in the Power Dept. In the near future an estimated 200,000 gallons [approximately 1,800,000 pounds] of waste tars will be burned per month.”

Dow’s Oldest Power Plant Will Be Demolished

In the early 1970’s, the company announced the demolition of the NT Powerhouse (70 Bldg) that was constructed in 1924-1925 as a coal burning boiler that was later converted to natural gas and oil. The announcement stated, “When the NT’s lone

2 Brinewell, The Dow Chemical Company, January, 1961
boiler is shutdown for the last time, a major winter-time source of dark smoke from the Dow plant will have been eliminated. This boiler, converted from coal, is fueled with gas or oil, and the burning of oil in the winter frequently has blackened the air above its tall smoke stack."

The Dow article indicated that the NT Powerhouse emitted black smoke while burning oil. It is very unusual for a well maintained and operated oil burning boiler to emit large amounts of black smoke. It is possible that the NT Powerhouse burnt a mixture of industrial wastes and petroleum oil in the wintertime and that incomplete combustion resulted in the noticeable black smoke. The wintertime restriction suggests that the company may have been aware of the impact of its emissions on surrounding neighborhoods and restricted the incineration of industrial wastes to those cold-weather months in which most nearby residents would be indoors.

Although the exact location of the NT Powerhouse is not known, its low building number (70 Bldg.) suggests that it was located in an area adjacent to 47 Bldg., the Midland plant headquarters located at the end of Main Street. Figure 3. is a map that demonstrate how emissions from Dow’s incinerator complex and the NT Powerhouse may have impacted dioxin levels in the Wexford Avenue IRA.

Emissions from the Westside Powerhouse that burnt industrial wastes in the 1960 to 1961 time period could have also affected dioxin levels in the Wexford Avenue IRA. Prevailing winds would carry emissions from either the NT Powerhouse or the Westside Powerhouse to the Wexford Avenue neighborhood approximately 10% of the time. Combined with emissions from the current incinerator complex location, the Wexford Avenue IRA may have received dioxin emissions approximately 16% (almost two months) of the year resulting in the unusually high levels of dioxin in this area.

The exact amount and the specific composition of waste tars that were burnt in the Dow powerhouses is unknown, as are the years in which this type of incineration was carried out. Very preliminary estimates suggest that the company may have

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3 Brinewell, The Dow Chemical Company, January, 1970
incinerated as much as 20% to 25% of its total annual production of chemical tars in the powerhouses in some years.

Recent information from the EPA has indicated that the fly ash in the hot exhaust gases from coal-fired powerhouses can be a catalyst for the formation of dioxins. Information is not available on the amount of dioxins and furans that could be produced in coal-burning powerhouses that are also burning chemical wastes containing dioxins or chemical pre-cursors to dioxins. It is expected that these two factors may result in very high emission levels of dioxins.

As can be seen in Figure 3, it is probable that other “Olde Towne” neighborhoods in the vicinity of Wexford Avenue may have also experienced unusually high rates of dioxin deposition. The “Framework” failed to address these issues.
Figure 3
Wexford Avenue – Midland, Michigan
Impact of Prevailing Winds on Dioxin Levels

6% - Prevailing Wind Direction

- Dow Incinerator Complex
- Wexford Ave. IRA
- Estimated Location of NT Powerhouse (70 Bldg)
- Westside Powerhouse (239 Bldg.)
“FRAMEWORK” DEFICIENCIES – TITTABAWASSEE RIVER

The “Framework” sections dealing with dioxin contamination of Tittabawassee River properties are extensive and specific wording is very “precise” and, as a result, interpretation errors are possible and subject to correction.

Based on limited measurement of dioxin levels, the river floodplain has been shown to have higher levels of dioxins than Midland city soils. Due to the complexity of dioxin deposition and re-distribution of dioxins during periodic flooding of the river, additional background information is being provided on dioxins in the floodplain.

A. Residential Clean-up Criteria

The “Framework” only addresses those residential structures that were inundated by the March, 2004 flood or those properties in which dioxin levels close to the homes are already known to exceed or approach the action level of 1000 ppt-TEQ. Basing corrective action on the March, 2004 flood significantly reduces immediate relief since the March, 2004 flood is not the most devastating flood that has occurred. Floods in prior years (especially September, 1986) have inundated much greater areas than did the 2004 flood.

Table C provides information on the ten (10) worst floods that occurred in the Tittabawassee River. As can be seen, there were seven (7) floods that exceeded the March, 2004 flooding that the “Framework” selected as the basis for cleanup.

The “Framework” did not address the impact of earlier flooding which carried dioxins a greater distance into residential properties along the river. The levels (and types) of dioxins and furans that were deposited in the flood plain varied according to the volumes of wastes being generated by The Dow Chemical Company and the type of waste treatment that was carried out by the company prior to discharge to the river. Table C provides information as to the type of waste water treatment the company was using at the time of each flood.
The company began the chlorination of benzene and phenol in the 1920’s and 1930’s and it is believed that dioxins and furans were first discharged to the river during this time period. The initial chemical waste pond was associated with a phenol plant that was in operation during the First World War. By 1931, the Midland Plant had more than 600 acres of chemical waste ponds in operation. The ponds settled heavier than water materials and equalized discharges to the river. During the flood of 1916, the company had not yet started biological treatment and only the settlement of solids was being practiced.

Riverside residents very possibly avoided using the Tittabawassee River for drinking water or for cooking during those months of the year in which the smell and taste of chemicals was particularly offensive, especially during the warm weather months in which the strong organic waste ponds were drained to the river. The company drained these ponds during warm weather to take advantage of “the self purification forces of the

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**Table C**

**Historic Crests – Tittabawassee River**

**City of Midland Gauging Station**

(Flood Stage = 24.0 Ft.)

<table>
<thead>
<tr>
<th>DATE</th>
<th>CREST (ft.)</th>
<th>TREATMENT PRIOR TO DISCHARGE TO RIVER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sept, 1986</td>
<td>33.94</td>
<td>Biological, tertiary settling (current practice)</td>
</tr>
<tr>
<td>Mar, 1916</td>
<td>29.70</td>
<td>Settling in chemical waste ponds</td>
</tr>
<tr>
<td>Mar, 1948</td>
<td>29.50</td>
<td>Biological, no tertiary settling</td>
</tr>
<tr>
<td>Mar, 1946</td>
<td>28.80</td>
<td>Biological, no tertiary settling</td>
</tr>
<tr>
<td>Jun, 1945</td>
<td>28.00</td>
<td>Biological (phenolic’s only), settling for all other wastes</td>
</tr>
<tr>
<td>Apr, 1959</td>
<td>27.82</td>
<td>Biological, no tertiary settling</td>
</tr>
<tr>
<td>Mar, 1976</td>
<td>27.60</td>
<td>Biological, tertiary settling (current practice)</td>
</tr>
<tr>
<td><strong>Mar, 2004</strong></td>
<td><strong>27.45</strong></td>
<td><strong>Biological, tertiary (current practice) - “Framework”</strong></td>
</tr>
<tr>
<td>Sept, 1975</td>
<td>27.08</td>
<td>Biological, tertiary settling (current practice)</td>
</tr>
<tr>
<td>Apr, 1960</td>
<td>27.08</td>
<td>Biological, no tertiary settling</td>
</tr>
</tbody>
</table>

National Weather Service, Feb. 2005
river during summer months. However, during times high water flow, the chemical taste and smell diminished and residents may have believed that contact with river water was less harmful. However, during flooding, the un-recognized levels of dioxins and furans increased due to re-suspension of dioxin contaminated soil particles and other sediments.

Photograph 1 is a photograph taken along the Tittabawassee River during the flood of 1920. Although the 1920 flood was not one of the ten worst floods, the extent of flooding and inundation of residential properties along the river during this flood was quite dramatic. Based on the “Framework” criteria, since this property may not have been affected by the Flood of 2004, the home would not be eligible for dioxin removal and cleanup.

In 1929, the City of Saginaw began using the Tittabawassee River as its source of drinking water. It has been reported that an employee of the company would travel to Saginaw to close the drinking water intake gates prior to when the company would be draining a chemical waste pond to the river or if an accidental chemical spill reached a “clear water” sewer that bypassed the chemical waste ponds. It was not reported if the company notified riverside residents of the higher levels of chemicals in the river during these events.

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4 Dow Diamond, The Dow Chemical Company, August, 1938
In 1937, the company installed a biological treatment plant to remove undesirable tastes and odors from the phenol containing waste waters being discharged to the river. However, the treatment plant only removed about 90% of the phenol – the remaining 10% was partially removed by settling (and some residual biological action) in two chemical waste ponds that totaled 38 acres in size.

Analytical technology was very crude in the 1930’s compared to the ppt or ppq capabilities of 2005. In 1938, the company admitted, “We do not know the end products formed by the biological destruction of phenol.”\(^5\) It is entirely possible that many of the dioxins and furans that were treated by the “trickling biological filters” in the earliest phenolic treatment plants were bio-resistant and passed through without significant reduction. The company did not discover that TCDD was the chemical associated with chloracne until 1957. The company did not have the capability to determine if there was any reduction in dioxins or furans in the phenolic or general treatment plants in the 1930’s or 1940’s.

\(^5\) *Dow Diamond*, The Dow Chemical Company, August, 1938
Based on what is now known about the behavior of dioxins in an aqueous environment, including the extremely long half-lives at the bottom of a water column, it is very likely that the heavier-than-water dioxins settled to the bottom of the chemical waste ponds and remained there until being later discharged to the river when the stronger hydraulic forces associated with rapid draining of the ponds re-suspended the dioxin contaminated particles and released them to the river. The flow rate of the river during the months when the ponds were drained determined if dioxins settled out near the discharge point or were carried further downstream.

From the late 1930’s to the end of World War II, the volume of aqueous chemical wastes that the company discharged to the river approximately doubled from 40 million gallons per day to about 75 million gallons per day. In an in-house article, the company admitted that its waste pond system was inadequate, “The general plant waste ponds, however, that had served well when little more than [the 25,000,000] gallon daily load required treatment, became totally inadequate for the much heavier burden.” The 1958 article did not provide any information as to what the company believed was “totally inadequate.”

When the general waste water treatment plant was constructed in 1946, it utilized the same two small settling ponds that the phenolic treatment plant first began to use in 1937. It is possible that a portion of settled dioxins that had accumulated in the ponds from 1937 to 1946 were re-suspended and flushed into the river when the waste flows in and out of these two ponds tripled from 25 million gallons per day to approximately 75 million gallons per day during WW II. One of the earliest phenolic settling ponds remained in operation until the late 1980’s.

From the flood information shown in Table C, flooding of the Tittabawassee River was not excessive from 1917 to 1944. During the 1940’s, riverside residents experienced three (3) significant floods – the flood of 1945, the flood of 1946 and the flood of 1948. The large amounts of dioxins and furans that had accumulated in river sediments during minor-flood years, including the heavy build up resulting from high WW II production levels, were widely re-distributed by these three floods that occurred within a few years.
The dioxins deposited by the flood of 1945 (crest – 28.00 ft.) in portions of the floodplain were covered by additional silt and dioxins by the flood of 1946 (crest – 28.80 ft.) only to be covered by more silt and dioxins by the flood of 1948 (crest – 29.50 ft.). The three floods of the 1940’s may have been responsible for the high levels of dioxins still being found on residential properties at a depth of 15” below the surface. It is not known if high levels of dioxins can be found at depths greater than 15”.

B. University of Michigan Exposure Study

The “Framework” indicates that the “Process For Moving Forward to Final Agreement” will take into consideration the University of Michigan Dioxin Exposure Study. The U of M study is designed to measure body burden levels of dioxins in selected adults that reside along the Tittabawassee River and to determine if environmental levels of dioxins in the homes, soils adjacent to the residence and on the property can be correlated with dioxin levels in the blood. The U of M announced in February, 2005 that the initial information on the first 300 residents will be available shortly.

The study has two main defects: (1) children were excluded from the study and (2) only a single location will be sampled to characterize dioxin levels on portions of the property not adjacent to the residence.

1. Children Excluded From Study

Even though it is well recognized that children have a great risk of dioxin ingestion and exposure and, therefore, many have higher levels of dioxins in their bodies, the U of M study protocol excluded children on the basis of the size of the blood sample needed to determine dioxins levels. The size of the blood sample influences detection levels and a larger blood sample results in a lower detection limit. A smaller blood sample taken from a child will result in higher detection levels, as an example, 15 ppt-TEQ rather than 5 ppt-TEQ, but still should still be able to determine if any children have unusually high levels of dioxins.

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6 Brinewell, The Dow Chemical Company, circa 1958
To all parents, the detection of high dioxin levels in the bodies of adults is one thing; the detection of high levels of dioxins in the bodies of their young children is yet another. It is believed that the U of M study team and the sponsoring company may have fully understood this distinction when excluding children from the study.

2. Environmental Dioxin Levels

The U of M study proposed to determine dioxin levels in the homes of the selected residents, to determine dioxin soil levels in four (4) locations adjacent to the residence and to determine dioxin soil levels in one (1) location on the property not adjacent to the home or patio.

It is not known, at the present time, if the U of M study will attempt to correlate dioxin blood levels with dioxin levels at the single location distance from the residence. Based on the wide variation of dioxin levels that can occur on the same property, it is very likely that there will be no correlation. Without a correlation between body burden levels and soil dioxin levels, the DEQ may be reluctant to request extensive cleanup of riverside properties. Lack of a correlation may be an asset to The Dow Chemical Company as it defends itself against the lawsuit filed by some riverside residents.

A example of the wide variation of dioxin levels in the same property can be seen in Figure 4 on the next page. The information was reported by the DEQ in February, 2004.

Dioxin levels in the first inch of soil on this property show a wide variation – less than 5 ppt-TEQ near the residence to 1100 ppt-TEQ only a few feet away from the home to 400 ppt-TEQ closer to the river. The very low levels of dioxins (< 5ppt) are probably the result of clean fill being used to elevate the home about the high water mark. Dioxin levels of 400 ppt and 1100 ppt are very possibly more representative of actual dioxin levels on the property. The single location sampled by the U of M study will determine the correlation (if any) between body burden levels in the residents and environmental dioxin levels on the property.
C. Priority 2 Properties

The “Framework” identified approximately 140 riverside properties as “Priority 1” locations that will receive some degree of dioxin exposure mitigation in 2005. Mitigation measures include identification of areas with potentially high levels of dioxins. It is assumed that residents will avoid using those portions of their properties suspected to
contain high levels of dioxins. In effect, the “Framework” may constitute a “taking of property” without due process.

The “Framework” also establishes a procedure in which some riverside properties will be classified as “Priority 2” properties. Priority 2 properties may include those properties which were partially inundated by the flood of March, 2004 but flooding was not in close proximity to the residence. Priority 2 properties also include properties occupied by children or women of child-bearing age provided that it is known that dioxin levels approach 1000 ppt-TEQ.

Exposure mitigation activities for Priority 2 properties need not be completed until December 31, 2006, thereby continuing potential dioxin exposure for approximately two more years.

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February 16, 2005