

The Dow Chemical Company - Flawed Science

Volume 1 Mortality of Midland Plant Workers

The effects of dioxin exposure on human health have been studied for almost fifty years. The Dow Chemical Company is a recognized leader in the various issues associated with dioxin exposure to chemical workers. Occasionally, even Dow, with all its resources and expertise, can make a mistake – a mistake that brings into question the validity of a single study or, perhaps, even the validity of several dioxin studies.

Until any defects are corrected or found to be inconsequential, the relevant study must be considered “flawed science”. It is a tribute to the company that the majority of its studies are sound science and any flawed science is only “occasional.”

In November, 1997, the company issued a ten year update¹ of its studies of Midland plant workers exposed to production plant dioxins. It is unknown if the study was peer-reviewed and published.

The Ramlow (1997) study had been reviewed by the Michigan Department of Community Health (MDCH) as part of the 2002 Draft Health Assessment of Midland and the Tittabawassee River. The company mentioned the study as part of its comments to the MDCH. Since Dow failed to point out the discrepancies between the Ramlow study and previous Dow mortality studies, it is assumed that the Dow employees and contractors that prepared and reviewed the May, 2002 comments were unaware of the discrepancies at that time.

Ramlow (1997) is not available on the company's web site. The company failed to respond to DioxinSpin's request for a copy of the study. Eventually, a confidential source provided a copy of the study. Readers desiring a copy should contact Dow and request a copy. A Freedom of Information Act request to the MDCH or the DEQ will also be effective.

Ramlow (1997) is in disagreement with two prior Dow studies of the same Midland workers in several key areas: (1) the total number of dioxin-exposed workers, (2) the total number of dioxin-exposed employees that worked in each specific dioxin manufacturing plant and (3) the numbers of employees exposed to varying intensities of TCDD.

Table A is a comparison between Ramlow (1997) and an earlier study² of the Midland plant employees exposed to production plant dioxins.

¹ Ramlow, JM, *et al*, Ten-Year Update of a Cohort Mortality Study of Workers with Potential Exposure to Higher Chlorinated Dioxins, 11/13/97

² Ott MG, *et al*, Cohort Mortality Study of Chemical Workers With Potential Exposure to the Higher Chlorinated Dioxins, Jour Occ Med Vol 29, No 5, May 1987

Table A
The Dow Chemical Company : Midland Plant
Comparison of Numbers of Dioxin Plant Employees

<u>Production Area</u>	<u>Dates of Operation</u>	<u>Ramlow 1997 No. Workers</u> (a)	<u>Ott 1987 No. Workers</u>
TCP production	1942-1979	293	297
TCP neutralization and distillation	1946-1979	162	164
2,4,5-T and Silvex production and production support	1948-1971	638	862
2,4,5-T formulations	1950-1982	385	382
Esters productions (2,4,5-T and Silvex)	1950-1979	285	282
Ronnel, Erbon Production	1955-1977	219	220
Chlorophenol production and finishing	1937-1980	770	758
Total Numer of employees (a)		2752	2965

(a) Employees that worked in multiple process areas are counted with each process

As can be seen, while there are a few small discrepancies in some of the plants which could be overlooked by the readers, there appears to be a very large discrepancy of 224 workers in the 2,4,5-T and Silvex production plant.

Ramlow (1997) was aware for the difference in the number of Chlorophenol production workers since the study reported, "This [Chlorophenol worker] number differs from previous reports because of data checking documents in Ramlow et al. (1997)". The study also reported that, "A small number of minor discrepancies in the cohort department assignments, job titles and job start dates were resolved by referring to existing hard copy work histories."

This seems to imply that Ramlow (1997) is more accurate than previous reports. However, a number of previous Dow reports relied on the earlier estimates. It is not certain as to whether the Ramlow (1997) study is in error or if the previous studies were incorrect.

No information is provided on the loss of 224 workers in the 2,4,5-T and Silvex plant. It is believed that a discrepancy of 224 workers in more than a "minor discrepancy" and should have warranted additional comment, if recognized.

Another discrepancy between information provided in Ramlow (1997) and Bond (1989)³ exists in the “TCDD Exposure Intensity” and in the “Total Size of the Dioxin Cohort”. Table B provides information on these discrepancies.

Table B
The Dow Chemical Company : Midland Plant
TCDD Intensity Comparison

TCDD Intensity Exposure	Ramlow No. Employees	Bond No. Employees	Difference
0	691	369	+332
1	1000	926	+74
2	245	408	-163
3	226	201	+25
4	25	59	-34
Total	2187	1963	+224

As can be seen, each TCDD Intensity of Exposure category exhibits some differences between Ramlow (1997) and the earlier Dow study. Ramlow (1997) did not offer any explanation for the differences.

The most important discrepancy is in the total number of Dow employees exposed to production plant dioxins. Ramlow (1997) and other Dow studies have based their study and results on approximately 2,187 employees. Bond (1989) is the only Dow study that reported 1,963 workers. Bond (1989) is the only Dow study that provides a breakdown of varying levels of dioxin exposure – intensity, duration and cumulative exposure. In all reported categories, Bond (1989) reported the same number – 1,963 exposed workers.

In a April 6, 2004 correspondence, DioxinSpin asked for clarification as to the correct number of Midland workers exposed to production plant dioxins. The company still has not responded with clarification.

Since the company has not posted the Ramlow (1997) study on its dioxin-related web site, it might be assumed that the company believes the study to be of lower quality than the other studies that are made available to the public. However, if this is true, it must be questioned as to why the company did not raise this issue about study quality in its 2002 comments to the MDCH.

The Ramlow (1997) study encompassed the time period 1940 to **1994**. In 2002, Dow issued another update, Bodner, *et al.*, 2002⁴ of the same Midland employees but for the time period 1940 to **1995**. The Bodner (2002) study did not cite or mention the Ramlow (1997) study.

³ Bond GG, *et al.*, Incidence of Chloracne among Chemical Workers Potentially Exposed to Chlorinated Dioxins, Jour Occ Med, Vol. 31, No. 9, September 1989

⁴ Bodner KM, Cancer risk for chemical workers exposed to 2,3,7,8-tetrachlorodibenzo-p-dioxin, Occup Environ Med 2003; **60**:672-675

The Bond (1989) study that reported that 1,963 employees were potentially exposed to dioxins is on the dioxin-related web site – implying that the Bond study is of high quality. However, several Dow studies that reported that approximately 2,187 employees are also available on the company's web site. Since the company relies on all of these studies as the basis for its conclusions as to the impact of dioxin exposure on human health, it seems very unusual that the company has not resolved a key question – 1,963 employees or 2,187 employees?

Dow's epidemiology studies of dioxin exposed workers are consistently of high quality. Occasionally, errors can be made and may not be apparent until reviewed in detail. DioxinSpin is very confident that The Dow Chemical Company is dedicated to presenting the most accurate, sound science information needed by all the interested parties in order to resolve the various issues associated with dioxin contamination in the Midland plant, in the city of Midland and in the Saginaw Valley.

A copy of this analysis will be sent to the company for review and, hopefully, comment. Any response that the company would care to make will be posted on the DioxinSpin web site.

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