



# Love Canal Follow-up Health Study Blood Serum Investigation Community Report January 2010

This report summarizes a study of the levels of some Love Canal chemicals in the clear liquid part of the blood (serum) from some former Love Canal residents. These blood serum results are part of the larger Love Canal Follow-up Health Study being done by the New York State Department of Health.

## About the Follow-up Study

In 1996, the NYSDOH began gathering information for a comprehensive 20-year follow-up health study of Love Canal residents. The study (called the Love Canal Follow-up Health Study) is really four smaller studies. One focuses on birth outcomes, one on death rates and causes, and one on cancer incidence. The fourth measures and evaluates some Love Canal chemicals in the stored blood serum samples of a subgroup of the residents. Other health problems were not evaluated due to the difficulty in gathering comprehensive health data from former Love Canal residents. Each of the four studies is intended to stand alone and is based on information about the same group of Love Canal residents (called the Study Group). The four studies share common elements including tracking who was living or who had died among the Study Group and estimating their likelihood of exposure to Canal chemicals. (See Love Canal Background Community Report for more details).

## What We Looked For

In the Love Canal Blood Serum Investigation, we looked at how much of certain chemicals were in the stored blood serum samples of a subgroup of people. (Serum is the clear, liquid part of the blood). We tried to determine if the levels of three chemicals in the serum were related to where the residents lived in relation to the Canal, when they lived there and whether they were a child or adult at the time they lived there. The study then examined if the chemical levels were related to deaths or cancers.

## Blood Samples Used

In 1978 and 1979, some Love Canal residents who lived in the area sometime between 1940 and 1978 agreed to have blood samples taken. These samples were analyzed for routine health indicators. Serum, the clear liquid part of blood, from those samples was stored in freezers at the NYS Department of Health. In 1999, we began to match the serum samples to people who were in our study. We were able to pair the stored samples with 648 people in the Love Canal study group. Two hundred and ninety-two samples were usable and were from people we were able to contact

and who gave their permission to test their serum samples. An additional 81 usable samples were from people who had died before the testing period, so permission was not needed. Between 1999 and 2004 the Wadsworth Lab tested 373 serum samples from people who had lived at the Love Canal.

## How We Did The Investigation

We separated people whose serum was tested into different groups depending on where people lived at the Canal, the time period they lived there and their age. Where people lived was separated by sections or "tiers." Those closest to the Canal were tiers one and two and those farther away were tiers three and four (see enclosed map). Two time periods were defined: when the Canal was open (1942-1953) and after the Canal had been closed (1954-1980). People 18 years old or over were considered adults and those under 18 years old were considered children. This information was important since children were more likely to play in or near the canal than adults.

Altogether we used eight categories to look for patterns: (1) open canal, tiers 1 and 2; (2) open canal, tiers 3 and 4; (3) closed canal, tiers 1 and 2; (4) closed canal, tiers 3 and 4; (5) child, tiers 1 and 2; (6) child, tiers 3 and 4; (7) adult, tiers 1 and 2; (8) adult, tiers 3 and 4. In addition, we looked if people lived on a swale (a low, wet area) or hot spot (area with greatly elevated chemical levels), and whether they attended the 99th Street school.

In 1986, a few chemicals were selected for analyzing soil and water samples taken near the Canal. The chemicals were called Love Canal Indicator Chemicals (LCICs) since they had been disposed in the Canal. We reviewed those chemicals and our ability to measure them in human serum in 2000. We then selected eight of them for the serum analyses.

## What We Found

Out of the eight LCICs studied, three were found in most of the samples (Figure 1). These three are 1,2,4-trichlorobenzene (1,2,4-TCB), beta-hexachlorocyclohexane (beta-HCH), and 1,2-dichlorobenzene (1,2-DCB). Of these three, the levels of two of the chemicals (1,2,4-TCB and 1,2-DCB) were higher in those who lived in tiers one and two compared to those who lived in the two farther tiers (three and four). The difference was even greater for those people who lived near the canal at the time the blood samples were taken (Figure 2). For the third chemical (beta-HCH) the levels did not vary depending on where the resident lived. Beta-HCH is more

likely to be in soil, household dust, or food than in water or air and enters the body by eating. 1,2,4-TCB and 1,2-DCB, however, are more likely to be in air, than in soil, household dust or food and enter the body by breathing.

These results are important because they show that people who lived closest to the Canal at the time their blood was drawn had higher levels of some chemicals in their blood than those who lived farther away. These results also help to show that using distance from the canal to estimate exposure is likely valid for some LCICs. These findings, however, are based on blood samples taken in 1978 or 1979 from a small number of people. We also do not know if levels of these chemicals in the serum of Love Canal residents were higher or lower before 1978.

Although levels of these chemicals in serum indicate exposure, they do not tell us if or how they may have affected the health of former Love Canal residents. We did find that people with the highest levels of beta-HCH in their blood had somewhat higher rates of death and cancer. No relationship was found between 1,2,4-TCB and 1,2-DCB and rates of death and cancer. Since the number of deaths and cancers were small among the 373 persons whose serum was analyzed, we cannot be sure if this finding is real or not. The most complete information that we have on the health status of former Love Canal residents is summarized in our previous mortality and cancer reports and in our upcoming report on children born to women who lived at Love Canal. Both are available at [http://www.nyhealth.gov/environmental/investigations/love\\_canal/](http://www.nyhealth.gov/environmental/investigations/love_canal/).

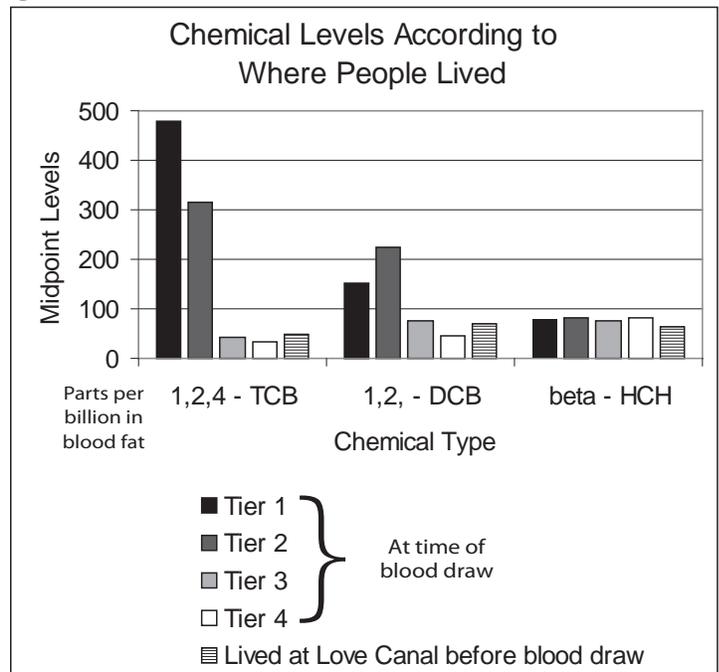
**Figure 1 Summary of All Love Canal Chemical Levels**

Love Canal Indicator Chemical (LCIC)	Percent of Samples with Detectable Levels	Levels for the Love Canal Group (parts per billion)		
		Lowest	Midpoint	Highest
<b>1, 2, 4 - trichlorobenzene (1,2,4-TCB)</b>	<b>97%</b>	<b>3.3</b>	<b>73</b>	<b>6,300</b>
<b>beta-hexachlorocyclohexane (β-HCH)</b>	<b>94%</b>	<b>8.6</b>	<b>77</b>	<b>7,300</b>
<b>1, 2 - dichlorobenzene (1,2-DCB)</b>	<b>86%</b>	<b>6.4</b>	<b>130</b>	<b>1,800</b>
gamma-hexachlorocyclohexane (γ-HCH)	49%	2.3	17	1,200
1, 2, 3, 4 - tetrachlorobenzene (1,2,3,4-TCB)	28%	1.3	38	450
delta-hexachlorocyclohexane (δ-HCH)	5%	8.4	110	250
alpha-hexachlorocyclohexane (α-HCH)	4%	2.5	6.7	17

2 - chloronaphthalene (2-CN) was not detected in any sample

\*Figure taken from Spring 2006 Love Canal newsletter

**Figure 2**



This community report is one in a series of five intended to provide results of the Love Canal Follow-up Health Study. The five reports are Background, Mortality (published in July 2008), Cancer (published in April 2009), Serum and Reproductive. The first four reports are available on the website below and the Reproductive report will be available in the coming months.

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# Love Canal EDA

