



The Michigan PBB Contamination: Lessons Learned from Decades of Research and Community Activism

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The Michigan PBB Registry (R24ES028528)

Emory HERCULES Exposome Research Center (P30ES019776)

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History of Michigan PBB Disaster (polybrominated biphenyls - flame retardant)

1973

- PBB mistakenly sent to farms across Michigan
- Farmers report problems with animals

1974

- Farmer experiments & discovers contamination
- State of Michigan tests animals for PBB and announces PBB affected “very few farms”

1975-1980

- Scope of contamination becomes clearer
- Over 500 farms quarantined
- Creation of Michigan Long-term health study

Continues

- Clean up at several Superfund sites (began 1980s)
- PBB Registry transfer to Emory (began 2010)
- Research on health outcomes (CEEnR from 2011)



Photo credit: <https://www.bridgemi.com/michigan-environment-watch/poisoned-michigan-how-weak-laws-and-ignored-history-enabled-pfas-crisis>

**What was it like soon
after the contamination was discovered?**

KNOWLEDGE CONTESTED
ILLNESS CONTESTED
UNCERTAINTY TO INACTION
COMMUNITY ORGANIZING

What happened with the responsible party?

Who cleaned-up the environment where they released PBB and other chemicals?

Environmental Clean-up: Ongoing



1980-1984: Demolition of Velsicol Chemical plant. Buried and covered with a clay cap. (\$38 million)



1999: US EPA started massive environmental remediation of Velsicol site and adjacent lands & waters. Clean-up continues (over \$375 million).

**What are the results of the
long-term health research?**

60% of Michiganders tested still have elevated PBB levels

People exposed to PBB in the 1970s

Women and men with direct exposure to PBB have increased risk of:



Digestive system cancers and lymphomas



Thyroid Problems

No evidence of increased risk of infertility

In women, PBB exposure was associated with:



Fewer days between menstrual periods and more days of menstrual bleeding



Lower estrogen levels



Increased risk of breast cancer

No evidence of increased risk of endometriosis or miscarriages.

People born to mothers exposed to PBB



PBB was transferred to infants in the womb and through breast milk

Daughters of women with high PBB exposure experienced:



On average started menstruating a year earlier



Shorter stature



Were more likely to experience a miscarriage as adults

Sons of women with high PBB exposure experienced:



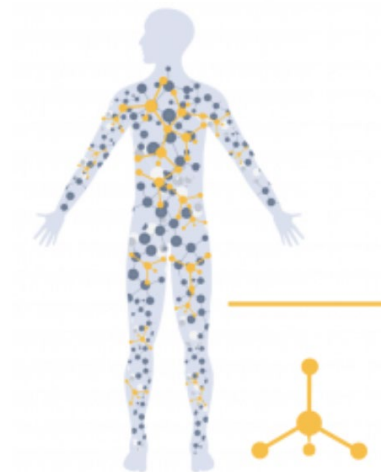
Slower growth in childhood



Report more urinary and genital conditions (such as hypospadias)

**The establishment of the PBB Registry, the commitment of research participants, and the advancement of scientific technologies has allowed more community health concerns to be addressed
*(the known unknowns & the unknown unknowns).***

Metabolomics & Epigenetics



PBB was associated with alterations in inflammation and oxidative stress-related pathways.

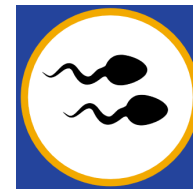
Does PBB affect the regulation of genes?



Immune
Function
&
Inflammation

Biological
Aging

Estrogen



Are we research guinea pigs?



Jane (Keon) Jelenek
Chair, Pine River Superfund Citizen Task Force
Author, Tombstone Town

"We have had in the past, experiences of researchers coming to the community, taking blood samples, fat samples, and a little bit of our dignity... we had that experience of being guinea pigs.

The big difference for us now is to be working with the Emory researchers... Yes, we happily give our blood samples and whatever else they ask of us. And, they give us feedback, they listen to our questions, they've actually designed research projects around things that we are concerned about. I don't think that implies guinea pig in anyway."



September 2020

How did we partner with a community that had lost trust in many institutions and who had felt like research guinea pigs in prior health studies?

Community Engagement



At-a-glance

COMMUNITY MEETINGS

Shared research findings, listened to concerns, asked for guidance. 30+ statewide meetings



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COMMUNITY PARTNERS

Meet monthly with PBB Leadership Team to plan engagement, research, and action. 7 funded research grants!



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COMMUNITY-ENGAGED RESEARCH

Clinical trial to speed elimination of PBB from body. Cancer & mortality analysis. Immune, joint, & neurological issues



Community Engagement



At-a-glance



ACTION

Kept PBB Registry
Active,
MI Legislative
Meetings,
Online Continuing
Medical Education
Module

Community Engagement

At-a-glance



**"We were blessed once we found out it wasn't our fault.
There really was a reason."**

—Bonnie Davis, on discovering her farm's exposure to PBB.



Alfred and Bonnie Davis, 1970s.
Courtesy of Bonnie Davis for the
Michigan PBB Oral History Project.

Bonnie and Alfred Davis had a thriving herd of Holsteins in the early 1970s when PBB hit. After the state quarantined their farm, they sent 300 animals to the Kalamazoo burial site. She explained:

"It was hard putting those steers on that truck. We never sold a calf, they always grew up to become a cow... That was hard (long pause). That was hard. You hated to say goodbye."

On April 10, 1975, Representative Donald Albores, co-chair of the Michigan House Agricultural Committee, took a busload of state legislators on a tour of farms with low-level contamination. Albores wanted to show his colleagues some clean, well-managed farms, where livestock were sick and dying through no fault of the farmers, especially after stories circulated the capital that herds were more likely suffering from poor husbandry than PBB.

The group had lunch in the Davis family's kitchen. Their farm had been quarantined. Bonnie recalled:

"We went to the barn the day they came and toured it. And they asked me questions about how, how was it? How hard was it? And how did you know, like you're asking me actually. We just knew we had a problem and we were afraid it was our problem, and we were doing something wrong. We had no clue."



Aerial view of Bonnie and Alfred Davis' farm after PBB (late 1970s).
Courtesy of Bonnie Davis for the Michigan PBB Oral History Project.



Davis family portrait, 1972. Courtesy of Bonnie Davis for the Michigan PBB Oral History Project.

Bonnie worked as a waitress and in the kitchen of a local restaurant to help the family survive the quarantine and while waiting on a settlement. When they received an offer to settle, they refused to sign a waiver for human health:

"I looked at Alfred, [he] looked at me... We got up and left. And the only thing else Alfred said is, 'I will not promise you what will happen if it gets in my family.' And we walked out."

Save the date

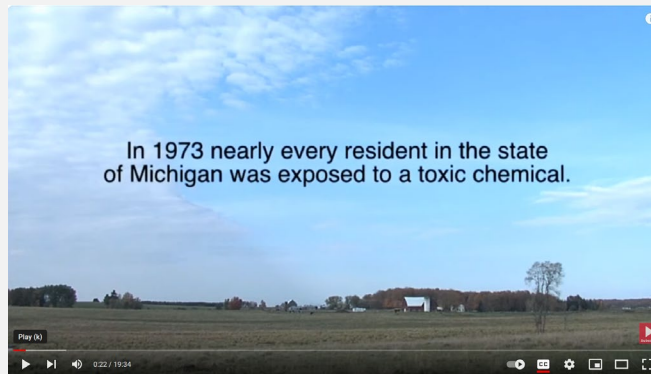
The PBB Disaster at 50

A conference to commemorate and learn from the poisoning of Michigan

Thursday, May 18 - Saturday, May 20, 2023
Alma College, Alma MI

COMMEMORATE

PBB Oral Histories,
Archiving Community
Records (CMU
Library)
Documentaries, &
50th Commemoration
Event



ON YOUR SIDE Health Reporter Valerie Lego



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ACTION

Keep Registry Open, MI Legislative Meetings, Online Continuing Medical Education Module

COMMEMORATE

PBB Oral Histories, Archiving Community Records (CMU Library) Documentaries, & 50th Commemoration Event

Unmet Needs in the PBB Disaster

Dedicated, long-term research funding

Proactive healthcare delivered by knowledgeable healthcare
(Physical & Mental Health)

Effective environmental remediation (improving).

Lessons from the PBB Disaster

Take precautionary action in the face of uncertainty.

Community members who organize and coalesce can catalyze environmental cleanups and relevant health research.

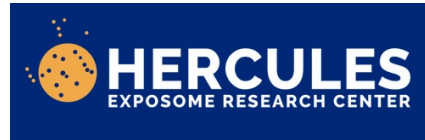
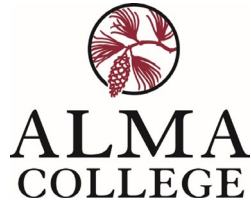
Some health impacts take years to develop. Multiple generations can be impacted.
Long-term surveillance & research is essential.

Engaging and partnering with the community in research leads to improved science and benefits for the community.

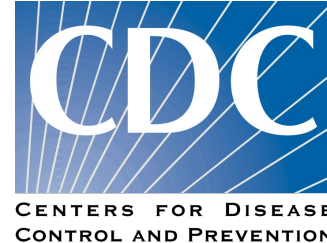
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Department of History

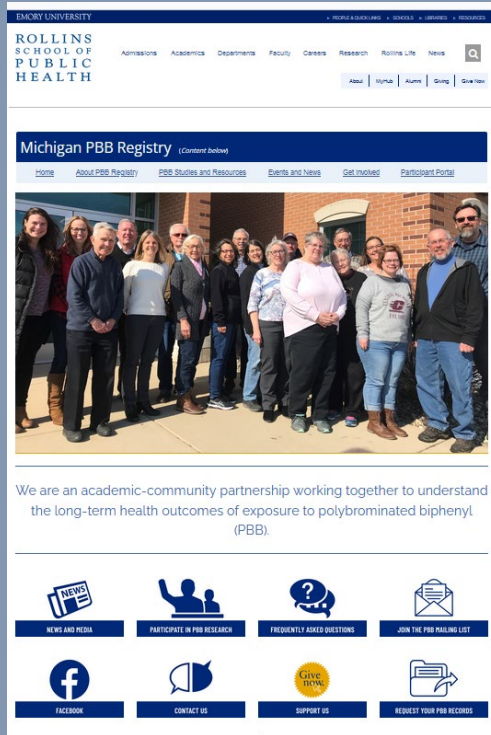


National Institute of
Environmental
Health Sciences



Resources & Information

pbbregistry.emory.edu



EMORY UNIVERSITY
ROLLINS SCHOOL OF PUBLIC HEALTH

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Michigan PBB Registry (Content below)

home About PBB Registry PBB Studies and Resources Events and News Get Involved Participant Portal

We are an academic-community partnership working together to understand the long-term health outcomes of exposure to polybrominated biphenyl (PBB).

NEWS AND MEDIA PARTICIPATE IN PBB RESEARCH FREQUENTLY ASKED QUESTIONS JOIN THE PBB MAILING LIST

FACEBOOK CONTACT US SUPPORT US REQUEST YOUR PBB RECORDS



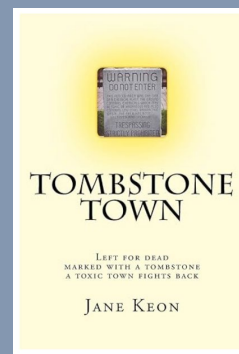
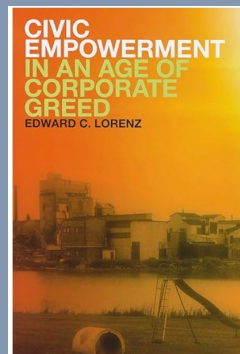
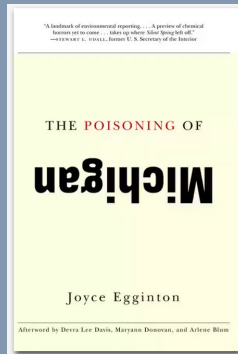
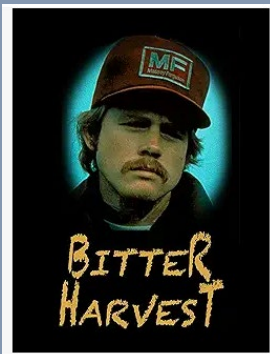
International Journal of
*Environmental Research
and Public Health*



Article

“They Kept Going for Answers”: Knowledge, Capacity, and Environmental Health Literacy in Michigan’s PBB Contamination

Erin Lebow-Skelley ^{1,*}, Brittany B. Fremion ², Martha Quinn ³, Melissa Makled ³, Norman B. Keon ^{4,5}, Jane Jelenek ^{5,6}, Jane-Ann Crowley ^{5,6,7}, Melanie A. Pearson ¹ and Amy J. Schulz ³



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