

# TCAS

Toxicology Consultants & Assessment Specialists, LLC

FORENSIC TOXICOLOGY

ENVIRONMENTAL TESTING

TOXIC EXPOSURES

RISK ASSESSMENT

CAUSATION EVALUATION

## Polycyclic Aromatic Hydrocarbons (PAHs) and Polychlorinated Biphenyls (PCBs) Create Residential Hazard

*This case study reviews a residential contamination case involving local residents exposed to PAH- and PCB-contaminated water that flooded their properties. It illustrates the importance of applying generally-accepted, peer-reviewed toxicological assessment methods and the steps necessary to present scientifically credible findings in litigation.*

### Exposure Summary

A family who lived adjacent to a creek began experiencing severe health problems including several unusual types of cancer. The creek, which also ran through a nearby 30-acre manufacturing site, had been infiltrated by a local storm sewer system. Although the site had supposedly been "cleaned up" by the manufacturing company, further investigation revealed the presence of numerous chemicals in the soil including PAHs (polycyclic aromatic hydrocarbons), PCBs (polychlorinated biphenyls), cyanide, solvents and heavy metals.

Several previous lawsuits alleging toxic contamination on the site had already been settled by the company. In this instance, residents whose property was regularly flooded by this water were still experiencing health effects long after remediation had supposedly been performed.

Water and sediment samples from the creek subsequently confirmed persistent PCB and PAH contamination. Tests by the State Health Department revealed contamination in sump pump water, in residential yards and in groundwater.

Residents filed a \$500 million lawsuit for health injuries and property damages. The company denied any wrongdoing and strongly disputed the medical claims. The case was initially thrown out, but an Appellate Court reversed this decision when it was disclosed that defendants had introduced into evidence "an *uncertified, unsworn document*" containing misleading cancer incidence rates.

To help put the case back on an objective footing, TCAS was retained to conduct an independent toxicological assessment.

### Assessment Strategy

Since the plant was in operation over a period of decades, it would have been difficult to arrive at a scientifically credible assessment of the scope of contamination. Instead, Dr. Sawyer calculated the exposure and dose from the time at which the plant had closed down (15 years earlier). By assuming the pollutants were only released thereafter, this approach had the effect of underestimating both the exposures and dose assessment.

Dr. Sawyer and his professional staff collected residential soil samples at various depths from the creek and residential property (where children frequently played) as contaminated soil had been covered over during prior cleanups. He applied the U.S. EPA values for PAH and PCB half-life decomposition in soil and the depth of penetration in undisturbed ground. He also underestimated the half-life decomposition time by assuming that contamination dated back only 15 years, rather than the decades of actual plant operation. As a result, Dr. Sawyer was able to present a scientifically credible range of contamination for the period following plant closure.



A family who lived adjacent to a creek began experiencing severe health problems.<sup>(a)</sup>

Additionally, Dr. Sawyer focused upon the health effects of one particular family and conducted extensive tests in and around their property. The analytical results of the assessment revealed several preserved layers of contamination that had been covered over with sediment and soil. In some cases, the residual contamination was more than 100 times greater than the remediated soil. This fact refuted defendants' claim that the "only proper method" was to average all soil contamination measurements in the area. Dr. Sawyer pointed out that fresh, uncontaminated soil had been deposited within the creek and that residential property was regularly flooded by the creek. Uncontaminated soil would merely dilute the average and paint an inaccurate picture of the severity and location(s) of historic, persistent contamination.

Similarly, although some families had lived in the contaminated area for a considerable period of time preceding the plant closure, Dr. Sawyer elected not to include this timeframe in his exposure assessments. These exclusions had the net effect of further underestimating the actual exposure dose, but added a degree of certainty and credibility that might otherwise have been challenged.

### Assembling the Assessment

Assembling a detailed toxicological assessment is somewhat similar to reconstructing a crime scene. Not only must all of the relevant factors be presented factually without bias or distortion, they must also be well organized and paint a coherent picture in the mind of the reader. This essential step required the creation of detailed, individual exposure assessments, a complex and demanding process. It was necessary to (a) identify all of the toxic substances at issue, (b) document and characterize the circumstances under which exposures occurred, (c) identify the pathways, durations and conditions of exposure and (d) calculate the respective dosage of each chemical or substance. It was also necessary to compensate for age, body weight, gender, duration of residence, personal habits and other variables for each person.

The half-life decomposition times for PCBs and PAHs are well documented in the toxicological literature. U.S. EPA and the states have established recommended cleanup objective ("RCO") levels for different toxic substances. Dr. Sawyer determined that of the seven carcinogenic PAHs measured in the contaminated samples, all were far in excess of the RCOs for residential soil. His assessment cited numerous peer-reviewed studies which measured PAH levels in soil and household dust within homes. Some of these studies noted soil levels similar to those to which residents had been exposed.

Dr. Sawyer cited studies noting that the contaminated dust loading levels within the homes from tracked-in soil could be harmful to young children. He further cited toxicological literature documenting exposures to the PAH combinations in the soil samples as historical causative factors for the unusual cancers experienced by some residents.

### Presenting the Assessment

With valid exposure and dose data in hand, it became possible for Dr. Sawyer to compare the dosage to peer-reviewed studies, calculate cancer risk and offer a causative opinion. He applied generally-accepted, peer-reviewed methods throughout his report based on recognized, accredited investigative techniques. To this end, Dr. Sawyer was able to offer a scientifically credible opinion to *reasonable toxicological certainty*.

Dr. Sawyer's written report contained more than arcane calculations and a laundry list of findings. He carefully explained his findings in lay terms such that any reader could understand the implications of the contamination that had been uncovered. For example, in one case Dr. Sawyer correctly characterized one resident's chronic childhood exposure to PAHs (expressed as total benzo[a]pyrene) as equivalent to smoking approximately 640 cigarettes (32 packs) per day for 6 continuous years. He also cited numerous studies and documents from the toxicological literature and regulatory agencies (such as U.S. EPA, WHO and others) to support his findings.

Dr. Sawyer also provided additional corroborative evidence from blood tests of family members and introduced the fact that at least two blood analyses revealed the presence of dioxin-like PCBs in excess of the CDC 95th percentile. This important finding not only demonstrated the reality of contamination in residents' bodies, but also validated deposition testimony of affected residents with respect to their usage of the property and periods of residency.



Dr. Sawyer on-site collecting samples for laboratory analyses. Note the creek in the background where children frequently played. (b)



The creek had been infiltrated by a local storm sewer system. (c)

## Courtroom Challenges

Dr Sawyer's report offered the opinion that residents were at a significantly increased risk of morbidity and mortality as a consequence of their exposures. Defendants vigorously discounted the medical claims and sought to minimize exposure and dose. Defendants also tried (unsuccessfully) to discredit Dr. Sawyer's toxicological assessment, which clearly itemized the latent toxic effects and malignancies resulting from the PAHs and dioxin-like properties of the PCBs to which residents had been chronically exposed.

As defendants could offer no reasonable explanation that would refute the blood evidence, defendants elected to challenge Dr. Sawyer's methods by filing multiple exclusion motions. These strongly-worded objections were overcome when, after reviewing the motions and Dr. Sawyer's rebuttals, the judge characterized defendants' arguments as "unpersuasive."

Ultimately, Dr. Sawyer's report and deposition testimony were admitted into evidence. Defendants elected to settle the case shortly thereafter.

## Summary

We live in a litigious society and there is no substitute for a well-constructed, factual toxicological assessment in litigation. A good assessment offers compelling, scientifically credible evidence by applying generally-accepted, peer-reviewed methodologies with integrity. In this instance, Dr. Sawyer's presentation objectively supported residents' health and property claims. His testimony significantly undermined defendants' credibility and position in litigation in spite of prior remediation.

*(Disclaimer: Toxicology case studies are impartial and objective summaries of toxicological matters in which TCAS was retained for the purpose of assessing health-based factors which, in some cases, led to a determination of causation. No names or identifying information have been provided due to privacy and legal considerations. In the above matter, Dr. Sawyer was retained by plaintiffs.)*

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### Images

- a. Photo by Peter Caulfield, Halstead, Essex
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### A Message from Dr. William R. Sawyer Chief Toxicologist, TCAS, LLC



*"Good data collection and analyses are most often the result of strict attention to detail. An objective assessment using accredited investigative techniques can sometimes yield credible toxicological evidence capable of identifying underlying causes of unusual disease clusters."*

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